

**A GUIDE FOR CONDUCTING POST-EVENT  
COVERAGE SURVEY IN VITAMIN A  
SUPPLEMENTATION, DEWORMING, SCREENING FOR  
MALNUTRITION AND IMMUNIZATION BY CLUSTER  
SAMPLING  
(WHO type, version 2015)**



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# Contents

<b>ABOUT THIS GUIDE</b> .....	<b>3</b>
<b>I. POST-EVENT COVERAGE SURVEY (PECS) PROCESS: AN OVERVIEW</b> .....	<b>4</b>
<b>II. PRESENTATION OF POST-EVENT COVERAGE SURVEYS (PECS) FOR VITAMIN A SUPPLEMENTATION, DEWORMING, SCREENING FOR MALNUTRITION AND IMMUNIZATIONS ACTIVITIES</b> .....	<b>5</b>
1. WHO IS TARGETED BY A PECS SURVEY? .....	5
2. WHEN SHOULD A PECS SURVEY BE CONDUCTED? .....	6
3. WHAT INFORMATION SHOULD BE COLLECTED IN A PECS SURVEY? .....	6
4. HOW LONG DOES IT TAKE TO CONDUCT A PECS SURVEY? .....	6
<b>III. PLANNING OF POST-EVENT COVERAGE SURVEYS (PECS) FOR VITAMIN A SUPPLEMENTATION, DEWORMING, SCREENING FOR MALNUTRITION AND IMMUNIZATIONS ACTIVITIES</b> .....	<b>8</b>
1. IMPLEMENT A COORDINATION COMMITTEE OR STEERING COMMITTEE FOR THE STUDY	8
2. DETERMINE THE STUDY AREA AND DISCUSS THE PURPOSE OF THE SURVEY .....	8
3. SAMPLING .....	8
THE COORDINATION COMMITTEE WANTS TO ESTIMATE THE COVERAGE IN 3 STRATA COMPOSED OF 65 DISTRICTS OF $\pm 5\%$ CONFIDENCE INTERVALS FOR AN ESTIMATED COVERAGE OF 50%. .....	16
4. SURVEY PLAN .....	17
5. SELECTION OF CLUSTERS .....	17
6. SELECTION OF HOUSEHOLDS .....	20
7. ASSESS THE ELIGIBILITY OF A HOUSEHOLD .....	22
8. CREATE WORK TOOLS (QUESTIONNAIRES) .....	23
9. OBTAIN ETHICAL AUTHORIZATION .....	24
10. SOME ETHICAL CONSIDERATIONS TO TAKE INTO ACCOUNT .....	24
11. DEVELOP TEAM SURVEY PECS .....	25
12. ORGANIZE TRAINING .....	25
13. PILOT SURVEY .....	26
14. ORGANIZE LOGISTICS .....	27
<b>IV. PERFORM FIELD WORK</b> .....	<b>29</b>
1. HOUSEHOLD CENSUS AND RANDOM SAMPLING OF HOUSEHOLDS TO SURVEY .....	29
2. SAMPLING OF HOUSEHOLDS TO SURVEY .....	29
3. FIELD DATA COLLECTION .....	30
4. SUPERVISION OF THE COLLECTION .....	30
COLLECTION MONITORING .....	30
IN CASE OF CLUSTERS SUDDENLY BECOMING INACCESSIBLE .....	31
<b>V. IV. ENSURE DATA QUALITY</b> .....	<b>31</b>
1. ENSURE DATA QUALITY WHEN USING MOBILE PHONES .....	33
2. WHAT SHOULD SUPERVISORS AND TEAM LEADERS DO TO ENSURE THAT DATA COLLECTED IS ACCURATE AND COMPLETE? .....	33
<b>VI. DATA ENTRY AND CLEANING</b> .....	<b>34</b>
1. HOW SHOULD THE INFORMATION COLLECTED DURING THE SURVEY BE ENTERED INTO THE DATABASE? .....	34
2. DUPLICATE DATA ENTRY .....	34
3. WHAT ARE THE WAYS TO ENSURE THAT THE INFORMATION IS PROPERLY AND ACCURATELY ENTERED INTO THE DATABASE? .....	35
4. DATABASE CLEANING .....	35
5. DUPLICATE, MISSING OR CONTRADICTIONARY DATA .....	35
6. IMPLAUSIBLE OR ILLOGICAL ANSWERS .....	36
7. MERGING DATABASES AND CALCULATING DERIVED VARIABLES .....	36
<b>VII. DATA ANALYSIS</b> .....	<b>36</b>

1.	WHAT COMPUTER SOFTWARE IS NEEDED TO ENTER AND ANALYZE PECS DATA? .....	36
2.	CALCULATE THE WEIGHTINGS FOR THE ANALYSIS .....	36
3.	SAMPLING WEIGHTING.....	37
4.	ADJUSTMENT WEIGHTING FOR NON-RESPONSES .....	37
5.	POST-STRATIFICATION TO RESIZE SURVEY WEIGHTINGS .....	38
<b>VIII.</b>	<b>REPORT.....</b>	<b>38</b>
<b>IX.</b>	<b>ANNEXES 1: CALCULATION OF THE SAMPLE SIZE.....</b>	<b>39</b>
	TABLE 1: STRATIFICATION MODALITIES FOR THE SURVEY .....	39
	TABLE 2: EFFECTIVE SAMPLE SIZE (ESS) ACCORDING TO EXPECTED COVERAGE AND DESIRED ACCURACY FOR A 95% CONFIDENCE INTERVAL (95% CI).....	39
	TABLE 3 : EXAMPLE OF DESIGN EFFECT (DEFF) FOR COVERAGE SURVEYS.....	39
	TABLE 4: INFLATION FACTOR TO REFLECT NON-RESPONSE .....	40
<b>X.</b>	<b>ANNEX 2: CHECKLIST OF PECS' STEPS .....</b>	<b>41</b>
<b>XI.</b>	<b>ANNEX 3 – SELECTION OF SURVEY TEAM MEMBERS.....</b>	<b>43</b>
	A. SELECT A SENIOR SUPERVISOR .....	43
	B. SELECT TEAM LEADERS.....	43
	C. SELECT ENUMERATORS (ENUMERATORS).....	43
	D. SELECT DATA ENTRY STAFF .....	43
<b>XII.</b>	<b>ANNEX 4 – PROPOSED RESPONSIBILITIES FOR THE SURVEY TEAM MEMBERS .....</b>	<b>44</b>
<b>XIII.</b>	<b>ANNEX 5 – PECS ENUMERATOR INTERVIEW FORM TEMPLATE .....</b>	<b>45</b>
<b>XIV.</b>	<b>ANNEX 6 – EXAMPLE OF GOVERNMENT APPROVAL LETTER .....</b>	<b>46</b>
<b>XVI.</b>	<b>ANNEX 7- TEAM LEADERS TRAINING PROGRAM TEMPLATE.....</b>	<b>47</b>
<b>XVII.</b>	<b>ANNEX 8- ENUMERATORS TRAINING PROGRAM TEMPLATE.....</b>	<b>47</b>
	<b>ANNEX 9 – TABLE OF RANDOM NUMBERS .....</b>	<b>50</b>
	<b>ANNEX 10: SCENARIOS FOR ROLE PLAYS .....</b>	<b>51</b>

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## ABOUT THIS GUIDE

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The objective of this post-event coverage survey (PECS) is to check the administrative data or the score sheet following a distribution or a campaign to assess the quality of service delivery. A PECS survey can also be used to determine factors influencing the coverage, the knowledge about services provided, and the effectiveness of program activities.

Usually, a PECS survey should be conducted within **1-4 weeks** after the service delivery to ensure that it is accurately remembered. Using a standard survey method for this type of research is important since it helps to compare data over time and between countries and regions.

Although this guide was designed for program managers, government agencies, non-governmental organizations (NGOs) and their partners involved in vitamin A supplementation, deworming, malnutrition screening and immunization, the strategies discussed are widely applicable and the method can be adapted to other programs.

This paper updates earlier versions of the used coverage survey manuals by emphasizing the methods recommended by WHO<sup>1</sup> for reducing bias and improving the accuracy and precision of the results.

WHO recommends the use of probability sampling in coverage surveys and, in principle, the use of census data including the lists of study areas to define the sample frame. Therefore, it is essential to develop excellent relations with the National Bureau of Statistics (or its equivalent).

Moreover, surveys should be planned well in advance (**3 months before the campaign**) when planning the campaign to get the census data and maps on time. Such surveys should follow rigorous statistical principles and strict field protocols, which require significant investments in time, expertise and resources.

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<sup>1</sup>[https://www.who.int/immunization/monitoring\\_surveillance/Vaccination\\_coverage\\_cluster\\_survey\\_FR.pdf](https://www.who.int/immunization/monitoring_surveillance/Vaccination_coverage_cluster_survey_FR.pdf)

## I. POST-EVENT COVERAGE SURVEY (PECS) PROCESS: AN OVERVIEW

### 1<sup>st</sup> step: Planning

- Contact governmental and non-governmental partners to present the survey and obtain the necessary authorizations and set up a coordination or steering committee for the study; recruit a consulting firm or group of independent consultants to conduct the study;
- Choose the place where the survey will be conducted and establish contact with the local administration;
- Perform the sampling work (define the target population, the sample size, the selection of clusters...);
- Draft the study protocol including timeline, ethical considerations, role of each team member, collection tools, budget and submit it to the ethics committee for approval;
- Contact the National Bureau of Statistics (or its equivalent) to order and receive the total number of clusters per stratum, the list of clusters, the maps and coordinate clusters of GPS, number of households in clusters etc.;
- Maintain and select survey teams (main investigator, study coordinator), the statistician (data manager), supervisors, team leaders, enumerators;
- Prepare training tools and train enumerators and supervisors to identify and enumerate eligible households by clusters, collect and send data via smartphone (ONA);
- Conduct the pilot survey (pre-test collection tools and cluster maps) and finalize the collection tools (use the pilot survey tools to make sure that questions are properly interpreted, that the answers mentioned are complete and that the sequence of instructions is correct);
- Organize the logistics of the survey (transportation, survey documents, itinerary, payment of survey team members, etc.);

### 2<sup>nd</sup> step: Implementation

- Travel to the survey sites;
- Meet with local health authorities and village chiefs;
- Identify the cluster to survey;
- Register and mark all eligible households in each cluster and send data via ONA;
- Receive from the coordination committee or supervisor the list of selected households to be surveyed;

	<ul style="list-style-type: none"> <li>• Administer the questionnaire to targets (mothers, fathers or caregivers of children for example), only to selected households;</li> <li>• Continue the survey until reaching the number of households selected by the coordination team by cluster;</li> <li>• Administer the questionnaire to health workers, community health workers in the selected clusters;</li> <li>• Oversee data collection to ensure that questions are properly asked and that answers properly are recorded;</li> <li>• Review questionnaires for completeness and compliance;</li> </ul>
<b>3<sup>rd</sup> step:</b> <b>Data analysis and dissemination</b>	<ul style="list-style-type: none"> <li>• Creation of do.files for the analysis;</li> <li>• Data cleaning;</li> <li>• Data analysis;</li> <li>• Report drafting;</li> <li>• Results dissemination</li> </ul>

## II. PRESENTATION OF POST-EVENT COVERAGE SURVEYS (PECS) FOR VITAMIN A SUPPLEMENTATION, DEWORMING, SCREENING FOR MALNUTRITION AND IMMUNIZATIONS ACTIVITIES

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### 1. Who is targeted by a PECS survey?

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The target group of PECS for VAS, deworming, malnutrition screening and immunization activities is made up of child caregivers (6 to 59 months) who were eligible to receive services during distribution. Community leaders, facility health workers, distributors, community health workers and others persons involved in the distribution can also be interviewed since their knowledge and opinions provide insight on how to strengthen the distribution program, but also to assess the quality of the implementation of activities in the field in order to make recommendations to improve the next campaigns and to make other important decisions.

## 2. When should a PECS survey be conducted?

PECS should be performed within **1-4 weeks** after VAS, deworming, malnutrition screening and immunization activities. This ensures that caregivers of children can remember if their children have received the service(s) of interest. PECS should be planned three months before the distribution campaigns to ensure that all necessary authorizations were obtained, that the survey questionnaires, training documents are complete and were reviewed in detail, and that the entire logistics is ready.

## 3. What information should be collected in a PECS survey?

The first step of the collection allows to identify all the eligible households (households with children aged 6 to 59 months as part of the VAS post-coverage survey) of the cluster (constitution of the database of eligible households) and to randomly select the number of eligible households to be surveyed in the second step.

The information collected during the household census should specify, among other things, the cluster number (EA), the name of the locality, the household identification number, the number of eligible children in the household.

Those of the actual survey should indicate whether a child has received VAS, deworming and/or immunization, if it was screened during the event, the age and sex of the child, the place where they received the service, how they heard about the event and the caregiver's knowledge about the benefits of the service(s) received. For caregivers whose children did not receive services, information should be collected on why they did not receive it, how they usually receive health information, and what would allow them or would encourage them to receive services in the future, the profile of respondents, the socio-demographic characteristics of households, how the activity was conducted.

Health workers should be questioned about how they administer the service(s) of interest (VAS, deworming, malnutrition screening, and immunization), their knowledge and the availability of supplies (Vitamin A capsules, deworming tablets, vaccines, strips, etc.). Community leaders and other stakeholders may also be questioned about how services are delivered and their knowledge about the service(s) provided.


PECS can also be used to assess the effectiveness of communication materials, social mobilization (the communication strategy used), as well as other activities implemented to increase the coverage. For example, if a radio ad was produced to raise awareness about a distribution event, the intended beneficiaries may be asked if they heard the radio message and the station on which they heard it and if they can remember the message.

## 4. How long does it take to conduct a PECS survey?

The time required to conduct a PECS survey depends on the size and characteristics of the survey area and the length of the questionnaire. For example, national surveys take longer to complete than those conducted at the regional or district level. Similarly, surveys in rural areas where households are distant from each other take longer than those conducted in urban areas. In order to allocate enough time to the PECS, a test on the questionnaires should be carried out to assess the time needed to query the number of households targeted in a cluster.

If a list of eligible households and high quality questionnaires is required more than 24 hours will be required per cluster, regardless of the method. Always go back to a household absent at the first time. Depending on the number of enumerators and the sample size, the coordination team will propose an average duration for collection, in general it is preferable that this duration does not exceed 2 weeks (agents will be too exhausted and quality of the data collected may be at risk).





*For example, the 2018 PECS in Côte d'Ivoire covered 3 Strata, 65 health districts. It was therefore decided that 36 teams, consisting of 2 enumerators by team and 1 supervisor for 3 teams, would be sufficient to cover these districts within a two-week recall period.*



### III. PLANNING OF POST-EVENT COVERAGE SURVEYS (PECS) FOR VITAMIN A SUPPLEMENTATION, DEWORMING, SCREENING FOR MALNUTRITION AND IMMUNIZATIONS ACTIVITIES

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See below a list of steps that should be followed when planning a PECS survey:

#### 1. IMPLEMENT A COORDINATION COMMITTEE OR STEERING COMMITTEE FOR THE STUDY

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The coordinating committee set up prior before conducting the survey is composed of stakeholders and government representatives. Its role is to organize regular meetings to discuss the importance of this survey, to give the main orientations of the study and get their support and the adherence of all. During these meetings, stakeholders should discuss the priorities of the survey, set realistic goals and define a feasible approach taking into account the available budget. This is also the moment in which the other so-called secondary objectives of the survey and the questions of the stakeholders can be proposed and discussed by all.

This committee approves all steps of the process and these members should also be experienced in surveys and be available.

#### 2. DETERMINE THE STUDY AREA AND DISCUSS THE PURPOSE OF THE SURVEY

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To determine the study area, the coordinating committee should answer questions of **Table 1**. The sample size depends on the desired level of accuracy of the survey objectives and the available budget.

**Table 1. Questions to determine which populations and regions to survey**

1. Does the country need information at the national, regional or district level?
2. Is it necessary to know the coverage by region and divide the country into different regions?
3. Is it necessary to target specific districts or is an estimate of the precise coverage needed? For example, districts with previously low service coverage? Or districts that were previously surveyed or not surveyed?
4. Is it necessary to know the service coverage by different service programs/strategies implemented?
5. Is it necessary to focus on populations not accessible for supplementation (hard-to-reach populations) and why these children were excluded?
6. How many trained employees are available for enumerator and supervisor training? What is their experience in surveys and local languages proficiency?
7. What is the available budget for the survey?
8. Is it possible to conduct a survey in all regions of interest during the six-week recall period, with the support and adequate supervision?

### 3. SAMPLING

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#### a. Common factors for sample size calculations

For each objective, the calculation of the sample size should use some factors. Get these figures or estimate them before performing calculations. This section describes the main factors.

- **Size of the target population:** if the sample is more than 10% of the target population then a correction factor must be applied to the sample size calculation and estimating equations.

- **Anticipated coverage (p):** The Coordination Committee can often provide the level of coverage resulting from the survey and such forecasts can influence the sample size. For a given level of accuracy or statistical power, a larger size is required if the expected coverage is around **50%** while a smaller size will be sufficient if coverage is around 0% or 100%. This factor can change for different levels if the coordination committee knows the likely coverage of each level.

- **Cluster correlation coefficient (CCC):** This is the measure of the correlation of responses between clusters. The figure influences the design effect and therefore the calculation of sample size. Usually, you will not know this figure at the survey preparation step and you will need to use that of a recent survey in the region. Alternatively, you can also take a figure slightly higher than what is seen in the field to ensure sufficient accuracy. For post-campaign surveys, an ICC between 1/24 and 1/6 seems appropriate, the high value (1/6=0.167) being the cautious slope.

- **Confidence level ( $\alpha$ ):** It is usually 5%. The confidence intervals will be (100- $\alpha$ ) %, usually 95%.

- **Half-width of the confidence interval (CI):** This measures the accuracy of the coverage estimate. If the (100- $\alpha$ ) % of the CI does not have a width of more than  $\pm 5\%$  (for example, CI = (52%, 62%), this value will be 5%. The more accurate the estimate is, the closer the CI will be requiring a larger sample. If lower accuracy is acceptable, the CI may be wider and the sample size reduced.

- **Target number of respondents per cluster (m):** Values between **5 and 15** are usually chosen for this factor, which correspond to the number of households an enumerator team can visit in one day and the total number of respondents expected in a medium-sized cluster, if all targeted respondents are interviewed. This value is called "target" since we do not know exactly the number of eligible respondents in each cluster. The number of completed questionnaires varies from one cluster to another, and the average number of eligible respondents per cluster should be  $\geq m$ .

- **Target number of cluster per level:** The total size of the m divided sample produces the target number of clusters per level. It is determined when selecting the sample size, and the clusters are chosen randomly.

- **Factors related to statistical power and probability of error:** these factors are the average number of households to visit to find an eligible child and the inflation factor to account for non-responders. The calculation method will be described below.

## ***b. What sample size should I use?***

This revised Manual in accordance with the 2015 WHO Handbook recommends a six-step process for calculating the size of cluster samples for the purpose of estimating or classifying the coverages:

1. Calculate the number of strata in which the survey will be conducted. We will refer to it by the letter A
2. Calculate the effective sample size (ESS). Will be referred to as B in subsequent calculations;
3. Calculate the design effect (DEFF). Will be referred to as C in subsequent calculations;
4. Calculate the average number of households to visit to find an eligible child. Will be referred to as D;
5. Calculate an inflation factor to account for non-responders. Will be referred to as E;
6. Use the values collected in Steps 1 to 5 to calculate the sample that is important for the survey planning and budgeting.

**1. Calculate the number of strata in which the survey will be conducted: A**

A stratum is a subgroup of the total population. This can be a sub-group on a geographical basis, such as inhabitants of the same province, region, district, or on the basis of partners who provide technical and financial support. When the survey is complete a separate estimate of coverage will be calculated for each survey stratum.

If the coordination committee wishes to calculate the results for each department or district in each province, and each province in the country, then the survey will have three levels of geographic strata. It is useful to consider the approach as a survey in each department, repeated in each department. In this case, the number of departments is the number of strata.

*For example, Burkina Faso has 13 provinces and 63 health departments. If a survey was designed to assess the coverage of each department, this would amount to conduct 63 separate surveys. The results of each of these surveys could be used to assess the coverage in the provinces and at national level.*

If the entire population should to be divided in strata and surveys conducted in each of them, calculate the total number of strata and write it in **Box A** below.

If, on the other hand, the results should be reported simply for an overall result (e.g. simply reported at the national level) and not divided, with an objective of precision per subgroup, then write "1" in Box A below. (See **annex 1 Table 2** which presents some procedures for stratifying). Skip to step 2.

Box A:

Number of strata (A) = \_\_\_\_\_

**2. Calculate the effective sample size (ESS): B**

To obtain accurate estimates at the elementary strata level (for example, a district), specify the coverage level expected for the VAS or other measure of interest and the accuracy with which coverage will be estimated. Write these values below:

Expected coverage: \_\_\_\_\_ %

Desired accuracy level:  $\pm$  \_\_\_\_\_ %

If you estimate coverages for different measures of equal importance, write the expected coverage for the measure whose expected result is closest to 50%. Use **Annex 1 Table 3** to find the ESS based on the expected coverage and the desired level of accuracy. Write the ESS in Box B below. *Skip to step 3.*

*For example, if the result studied is Vitamin A supplementation, which has an expected coverage of 80%, and you want an accuracy of  $\pm 5\%$ , Appendix 2 indicates an ESS = 306.*

**Box B:**

ESS (B) = \_\_\_\_\_

### 3. Calculate the design effect (DEFF): C

The design effect (DEFF) is a factor that tells us how much to increase the ESS to get the desired accuracy in a cluster. The DEFF is based on the number of respondents desired per cluster ( $m$ ) and the ICC. These parameters should be provided to calculate the DEFF. One is largely under your control, the other is not.

- i. **The desired number of respondents per cluster ( $m$ )** will often be between **5 and 15**, and is influenced by the number of people in each field data collection team and the duration of the survey.

For the PECS, it is recommended to start with the value of **10 respondents per cluster** and adjust it slightly when reviewing the protocol according to budget constraints.

For example, to consider adjust  $m$  down if the number of households to visit per cluster ( $D \times E \times m$ )<sup>2</sup> is too high to be carried out by a single team during the day. Increase  $m$  if ( $D \times E \times m$ ) clearly corresponds to less than a full day's work of a team on the field.

- ii. **The intra-cluster correlation coefficient (ICC):** it is a measure of the correlation of the responses within the clusters.

Indeed, respondents from the same cluster tend to give answers that are close to each other. They often come from equivalent socio-economic classes, have the same access to services and share the same mentality towards these services. Therefore, responses within a cluster are likely to be correlated, and the degree of correlation affects statistical power and sample size.

For post-campaign surveys, an ICC between 1/24 and 1/6 seems appropriate, the high value (1/6=0.167) being the cautious slope. For the PECS, an **ICC** of 1/6 is adequate.

Indicate the average number of eligible children per cluster ( $m$ ) and the ICC. Write their value below:

Average number of eligible children per cluster ( $m$ ): \_\_\_\_\_

Correlation coefficient (ICC): \_\_\_\_\_

<sup>2</sup> Parameters D and E will be defined in steps 4 and 5 respectively

Use **Appendix 3** to find the DEFF from m and the ICC previously defined, or calculate it using the following approximation equation:

$$\text{DEFF} = 1 + (m - 1) * \text{ICC}$$

Write the DEFF in Box C. Skip to Step 4

**Box C:**

DEFF (C) = \_\_\_\_\_

**4. Calculate the average number of households to visit to find an eligible child: D**

Any household within the cluster will not have a child eligible for the survey. The number of households to be visited to find at least one eligible child (**N<sub>F</sub> to find an eligible child**) needs to be estimated before the beginning of the survey work. This number will help planners to determine if the cluster (or a portion) is sufficient to find the number of eligible children needed for the survey, as well as to allocate the time required to complete the work in each sample.

- If the **N<sub>F</sub> to find an eligible child** is known or easy to find from a census or survey data, this number should be written in box D below and the reader *proceed to Step 5*.
- If it is not known, it can be estimated in different ways. Birth rates, infant mortality rates, and household size are variables easy to obtain from recent census or survey data to help estimate the **N<sub>F</sub> to find an eligible child**. Below the equations to estimate it

Equation A1 estimates the number of live births (living NNE per household), which is used in equation A2 to estimate **N<sub>F</sub> to find an eligible child**.

$$e = (1000) 1000-1000 (A1)$$

$$é=1/ é ar (A2)$$

- ✓ AE is the number of years of eligibility of children in the cohort
- ✓ BR is the birth rate per 1,000 population
- ✓ TF is the average household size,
- ✓ IM is infant mortality per 1,000 live births
- ✓ The first term of equation A 1 estimates the number of live births per household
- ✓ The second (A2) term estimates the proportion of children born alive who survived their first birthday.

The AE multiplier considers that everyone survives their first birthday and therefore equation A2 underestimates the NF to find eligible child. Round the result of equation A2 to the next integer.

Using equations A1 and A2 estimate the **N<sub>F</sub> to find an eligible child** and write it in box D below. Take the advice of a statistician or census office if the rates used in A1 and A2 are unknown or poorly estimated and there is a need for another way to estimate NF to find eligible child. Interacting with colleagues who have recently conducted national child health surveys (malaria, nutrition, etc.) can also be helpful.

**Box D:**

**N<sub>F</sub> to find an eligible child (D) = \_\_\_\_\_**

5. **Calculate an inflation factor to account for non-responders: E**

Some households with an eligible child may not participate, either because the family lives elsewhere at the time of the survey year, or because the caregiver is absent during the enumerator team visit, or the person is present but refuses to participate. As a result, although there may be one eligible respondent in one household out of seven, the team may have to visit eight or nine households, on average, for each completed interview.

Based on the experience of recent surveys in the same country, taking into account the seasonal mobility patterns, specify the percentage of households (those with a qualifying child) that we can probably exclude ( $P_{F \text{ eligible and non-response}}$ ). Write the value below:

$P_{F \text{ eligible and non-response}} = \underline{\hspace{2cm}} \%$
---

Use **Annex 1 table** to find the inflation factor ( $I_{\text{Non-response}}$ ). From  $P_{F \text{ eligible and non-response}}$  knowing that  $I_{\text{non-response}} = 100 / (100 - P_{F \text{ eligible and non-response}})$

Write the inflation factor in box E below. Do not round this result. Skip to step 6.

<b>(E)</b> $I_{\text{non-response}} = \underline{\hspace{2cm}}$
---

6. **Use the values collected in Steps 1 to 5 to calculate the sample required for the survey planning and budgeting.**

Copy the values in A-E and that of m from the previous sheets in this box:

A (strata)	B (TEE)	C ( $N_F$ with eligible children)	D (DEFF)	E $I_{\text{non-response}}$	M (see Step 3)

Then with these data:

1. **Calculate the total number of complete interviews required (NEC):**

$$NEC = \frac{\hspace{1cm}}{(A)} \times \frac{\hspace{1cm}}{(B)} \times \frac{\hspace{1cm}}{(C)} = \underline{\hspace{2cm}}$$

2. **From NEC you just calculated, as well as (D) and (E) in the boxes above, calculate the total number of households to visit in order to get the desired number of completed interviews:**

$$N_F \text{ to visit} = \frac{\hspace{1cm}}{(NEC)} \times \frac{\hspace{1cm}}{(D)} \times \frac{\hspace{1cm}}{(E)} = \underline{\hspace{2cm}}$$

3. From the values of (B) to (E) above, calculate the target value of households to visit by stratum

$$N_{\text{F to visit per stratum}} = \frac{\quad}{(B)} \times \frac{\quad}{(C)} \times \frac{\quad}{(D)} \times \frac{\quad}{(E)} = \underline{\quad}$$

4. From the values of (B), (C) and m, calculate the number of clusters needed per stratum

$$N_{\text{clusters per stratum}} = \frac{\quad}{(B)} \times \frac{\quad}{(C)} \times \frac{\quad}{m} = \underline{\quad}$$

5. Calculate the total number of households to visit by cluster:

$$N_{\text{households per stratum}} = \frac{\quad}{(D)} \times \frac{\quad}{(E)} \times \frac{\quad}{m} = \underline{\quad}$$

6. Calculate the total number of clusters in the survey:

$$N_{\text{total clusters}} = \frac{\quad}{(A)} \times \frac{\quad}{N_{\text{clusters by strata}}} = \underline{\quad}$$

### *c. Examples of sample size calculation*

#### **Example 1: National coverage only**

If the coordination committee wants to estimate national coverage with confidence intervals not exceeding  $\pm 10\%$  for 50% coverage, according to the tables in Annex B1 the values for A x B x C x D x E should be the following:

- A. Number of level = 1 (national estimate only)
  - B. Effective sample size = 103 (Annex 1, Table 2)
  - C. Consider that you will interview on average  $m = 7$  respondents per cluster with a correlation coefficient of  $1/3$ , and therefore a model effect of 3 (Annex 1, Table 3)
  - D. Consider that you will find a target child in every 20% of households to visit, themselves determined by the estimate of households with children of the target age. In practice, you will need to visit 5 households to find a target child
  - E. Consider that 10% of households with an eligible child either will not be home during the visit or refuse to participate in the survey; therefore, the sample size should be increased by 11% to compensate for non-responses (Annex 1, Table 4).
1. Total number of respondents who completed their questionnaires =  $A \times B \times C = (1) (103) (3) = 309$ . The number may change since different clusters may have different legitimate respondents
  2. Number of households to visit to obtain about 309 completed questionnaires:  $(A \times B \times C) \times D \times E = (309) (5) (1.11) = 1\ 715$
  3. Number of clusters =  $3097 = 44.1$ . Rounded to 45.



4. Number of households to visit per cluster =  $D \times E \times m = (5) (1.11) (7) = 38.85$ . Rounded to 40.

In this example, 45 clusters, or census areas/enumeration area (CA/EA), should be drawn randomly across the country. In the case where these CAs include many more than 40 households, the CA should be subdivided (with detailed maps) into portions of about 40 households one, and one of these randomly selected portions.

### **Example 2: National and provincial/region/district coverage**

Now suppose that the coordination committee want to estimate the coverage in each province/region/district and national level. If the country has 5 provinces/regions/districts, this results in conducting 5 separate surveys and then combining the results with compensation to obtain a national estimate. In the case where the coordination committee desires an estimate by province/region/district with  $\pm 5\%$  confidence intervals for an estimated provincial coverage of 50%. The tables in Annex 1 show the following figures:

- A. Number of levels = 5 (one survey by province/region/district)
- B. Required sample size = 401 (Annex 1, Table 2)
- C. Consider interviewing about 7 respondents per cluster, with a correlation coefficient between clusters of 1/3, for a model effect of 3. (Annex 1, Table 3)
- D. Consider that an eligible child will be found in 20% of the households visited and therefore you will need to visit 5 households to find a target child.
- E. Consider that 10% of households with an eligible child either will not be home during the visit or refuse to participate in the survey; therefore, the sample size should be increased by 11% to compensate for non-responses. (Annex 1, Table 4)

These figures can be combined to calculate important results for budget planning and calculation:

1. Total number of respondents who completed their questionnaires =  $A \times B \times C = (5) (401) (3) = 6,015$ . The number may change since different clusters may have different eligible respondents
2. Number of households to visit to obtain about 6,015 completed questionnaires:  $(A \times B \times C) \times D \times E = (6\ 015) (5) (1.11) = 33\ 384$
3. Number of households to visit in each province:  $B \times C \times D \times E = (401) (3)(5) (1.11) = 6\ 677$
4. Number of clusters per level =  $(401) (3)7 = 172$
5. Number of households to visit per cluster =  $D \times E \times m = (5) (1.11) (7) = 38.85$ . Rounded to 40
6. Total number of clusters in the survey =  $(5) (401) (3)7 = 860$

In this example, 172 clusters will be randomly selected in each of the 5 provinces/regions/districts. The 40 households will all be visited and the enumerators will complete a questionnaire for each eligible subject. Compensation factors will be applied to the results of each province which will themselves be cumulated and treated with a new compensation factor to produce national results. These will be of high accuracy given the size of the sample  $(401) (5) = 2,005$ .

### Example 3: Sampling calculations of the PECS survey in Côte d'Ivoire - Nov. 2018

The coordination committee wants to estimate the coverage in 3 strata composed of 65 districts of  $\pm 5\%$  confidence intervals for an estimated coverage of 50%.

A	B	C	D	E	m
3	306	2.5	1.193948	1.111111	8

- A. Number of strata = 3 (districts were classified into three groups)
- B. Effective sample size = 306 (80% coverage and 5% accuracy) (Table 2)
- C. Consider that you will interview on average  $m = 10$  respondents per cluster with a correlation coefficient of  $1/6$ , and therefore a model effect of 2.5 (Annex 1, Table 3)
- D. Consider that you will find a target child in every 10 % of households to visit, themselves determined by the estimate of households with children of the target age.

With N surviving at birth per household =  $((YC * BR) / (1000/HS)) * ((1000-IM)/1000)$

- YC = number of eligible children from birth to 5 years 4.5 years.
- BR = is the birth rate per 1,000 population = 36.832 <sup>3</sup>
- HS = Average household size = 5.4 (RGPH 2014)
- IM = infant mortality rate per 1000 live births = 64.2 <sup>4</sup>

Thus  $((4.5*36.832)/(1000/5.4))*((1000-64.2)/1000) = 0.83755747$  So  $1/0.83755747 = 1.193948$

- E. Consider that 10% of households with an eligible child either will not be home during the visit or refuse to participate in the survey; therefore, the sample size should be increased by 11% to compensate for non-responses (Annex 1, Table 4).

E = Non response rate = usually very low, but may be associated with input errors, so 10% can be safe. Calculated as follows:  $100 / (100\% \text{ of eligible households who refuse to answer}) = 100 / (100-10) = 1.111111$

m = average number of children to be surveyed per group = 8

These figures were combined to calculate important results for budget planning and calculation:

1. Estimated total number of respondents who completed their questionnaires:  
 $A \times B \times C = 3*306*2.5=2295$ .
2. Number of households to visit to obtain about 6,015 completed questionnaires:  
 $(A \times B \times C) \times D \times E = 2295*1.193948*1.111111=3044.564$  rounded to 3045
3. Number of households to visit in each province:  
 $B \times C \times D \times E = 306*2.5*1.193948*1.111111= 1014.855699$  rounded to 1015
4. Number of clusters per level:  $= 306*2.5/8=95.625$  rounded to 96

<sup>3</sup> <https://data.worldbank.org/indicator/SP.DYN.CBRT.IN?locations=CI>

<sup>4</sup> <https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?locations=CI>

5. Number of households to visit per cluster =  $D \times E \times m = 1.193948 \times 1.111111 \times 8 = 10.61287041$ . Rounded to 11
6. Total number of clusters in the survey =  $3 \times 96 = 288$

Number of households per cluster	11
Number of clusters to select by stratum	96
Number of strata	3
Total number of clusters	288
Total number of households in the sample	3168

#### 4. SURVEY PLAN

In the case of PECS, a stratified two-stage cluster survey will be conducted. The stratification criteria are: the intervention area and the nature of the areas (urban, rural) according to the context.

In the first stage: random sampling of clusters. The clusters will be represented by Enumeration Areas (EAs), an exhaustive list of which can be obtained from the national statistical institutes of the countries. This is done randomly and independently by the National Institute in charge of Statistics using the survey frame of the institute constituted by all the Enumeration Areas (EA) which constitute the clusters of the study area. Or by the coordination committee if it has the database of enumeration areas to make the sampling according to the method described below.

In the second stage: this will involve a random sampling of households eligible to survey by selected cluster using the complete list of eligible households in the cluster as a sampling frame following the census of eligible households in the cluster.

#### 5. SELECTION OF CLUSTERS

A statistical cluster is an enumeration area (geographic area/census area/administrative unit) made up of about 200 households, and is considered as the smallest sampling unit. A village can be made up of several clusters.

The cluster selection must represent the needs of the survey. Therefore if:

- A survey is designed to obtain nationally representative data; clusters must be randomly selected from the total national population;
- The survey targets a particular region, clusters must be chosen in this region;
- We want to have a representative coverage rate at national level and a representative coverage rate at regional level, so we have to process them as two different sampling frames, with clusters in each one (at country and regional level).

For example, if the purpose of the survey is to compare coverage between two groups, such as urban and rural populations, the clusters should be randomly selected from each group (urban and rural) using Proportional Probability to Estimated Size (PPES).

When making a cluster selection, it is recommended to select five "back-up" clusters so that alternative clusters are available if a cluster cannot be reached (e.g. due to insecurity).

Additional clusters must be selected separately using their own sampling interval and random number.

The steps for selecting clusters are described below:

**1<sup>st</sup> step – Determine the region(s) to review.** Determine the regions to be surveyed. These regions constitute the strata

**2<sup>nd</sup> step – List all enumeration areas** (or small administrative units) in each stratum to be sampled.

Table 2: Examples of possible clusters	
Administrative unit	Country
Neighborhood (1-3 villages)	Nepal
Village	Kenya
Statistical enumeration area	Zambia
Hamlet* or part of a street	Tanzania
Commune or neighborhood	Mali

**3<sup>rd</sup> step – List the population of each enumeration area**

Village	Population
1	3000
2	416
3	1178
4	2178
5	978
...	...

The latest figures from population projections or censuses may be used to determine the population of each enumeration area.

**4<sup>th</sup> step - Calculate the cumulative population**

The overall population is the sum of the populations in each enumeration area. To calculate the cumulative population, the population of each enumeration area is added to the sum of the previous administrative units, as shown in **Table 3**.

Table 3. Calculate the cumulative population		
Village	Population	Cumulative population
1	3000	3000
2	416	3000 + 416 = 3416
3	1178	3416 + 1178 = 4594
4	2178	4594 + 2178 = 6772
5	978	6722 + 978 = 7750
.....	.....	.....
1434	253	41762 + 253 = 42015
1435	1474	42015 + 1474 = 43489
1436	1268	43489 + 1268 = 44757

**5<sup>th</sup> step– Calculate the sampling interval**

To calculate the sampling interval, divide the total population by the number of clusters to select.

Total population: 44757. Number of clusters to select: 30  
 Sampling interval=  $44757 \div 30 = 1491.9$ . In this example, the sampling interval is 1492.

**Note on rounding:**

When divided it, the result can be a number that is not integer: ex.  $44,757 \div 30 = 1,491.9$ . In general, if a number is not integer and its first digit is 0.5 or more, the number must be rounded to the next integer digit. For example, the numbers 1,491.5; 1,491.6; 1,491.7; 1,491.8; 1,491.9; will be rounded to 1,492.

If the number is not integer and its first digit is less than 0.5; the number must be rounded down. For example, the numbers 1,491.1; 1,491.2; 1,491.3; 1,491.4; will be rounded down to 1,491.

**6<sup>th</sup> step – Choose a random number**

A random number between 1 and the sampling interval may be chosen to determine the first cluster. The random number can be chosen using a random number table (see Annex) or using a random number generator, such as the one on the site: [www.random.org](http://www.random.org). In this example, the random number should be between 1 and 1,492. For this example, the random number chosen is 1,113.

**7<sup>th</sup> step – Identify the first cluster using the random number**

Examine the table with the cumulative population figures and determine the enumeration area that contains the random number. Village # 1 has a population of 1 - 3,000, and 1,113 is within this range. As a result, the first sampling cluster in the PEC survey is Village 1.

<i>Village</i>	<i>Population</i>	<i>Cumulative population</i>	<i>Cluster sampling</i>
1	3000	3000	1
2	416	3416	
3	1178	4594	
4	2178	6772	
5	978	7750	

**8<sup>th</sup> step - Select the second cluster**

Add the sampling interval (1,492) to the random number  $1,492 + 1,113 = 2,605$ . Review the table and identify the administrative unit that contains this value (2,605). Once again, choose Unit # 1, since 2,605 falls between 1 and 3,000. This means that village # 1 contains TWO sample clusters or  $n=30 * 2=60$  children selected from the sample.

<i>Village</i>	<i>Population</i>	<i>Cumulative population</i>	<i>Cluster sampling</i>
1	3000	3000	1 & 2
2	416	3416	
3	1178	4594	
4	2178	6772	
5	978	7750	

### **9<sup>th</sup> step – Select the remaining clusters - by adding the sampling interval**

Add the sampling interval to the number used to locate the previous cluster on the list. Review the table and identify the enumeration area that contains this value. Repeat this step until 30 clusters are selected. For example, to calculate the 3rd and 4th cluster:

3rd cluster: 2,605 (number used to choose the 2nd cluster) + 1,492 = 4,097

3th cluster: 4,097 (number used to choose the 3rd cluster) + 1,492 = 5,589

Which enumeration area contains 4,097 and 5,589?

Village 3 contains a population ranging from 3,417 to 4,594, and 4,097 falls within this range.

Therefore, the 3rd cluster of the survey will be village 3. Village 4 contains a population ranging from 4,595 to 6,772, and 5,589 falls within this range. Therefore, the 4th cluster of the survey is also chosen from village 4.

<i>Village</i>	<i>Population</i>	<i>Cumulative population</i>	<i>Cluster sampling</i>
1	3000	3000	1 &2
2	416	3416	
3	1178	4594	3
4	2178	6772	4
5	978	7750	

## **6. SELECTION OF HOUSEHOLDS**

Once the cluster identified, enumerators will proceed with the first step of the census of all eligible households in the cluster by assigning one number per household, then the coordination committee or supervisor will randomly sample the number of households to survey per cluster to be visited later by enumerators. The number assigned to the household will be chalked on the household door. Thus will facilitate data collection and quality control by supervisors afterwards. For this, the random number table will be used. In our case, MS Excel will be used with the function "RANDBETWEEN".

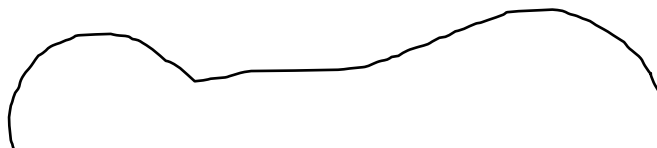
Below is a brief description of how to identify households in each cluster.

### **1<sup>st</sup> step – Get or draw a map of the cluster or find a local map**

To determine the starting point of the survey, it is necessary to have a map of the cluster subject of the survey. If a local map is available, it is the simplest and probably the most accurate map that will be used. If a local map is not available, the team leader or supervisor should inform the local health officer or village chief that a map will be required and, if possible, ask him or her in advance to prepare one.

In case there is not enough information on the place to draw a map, the team may walk across the cluster on foot or by car with a local official to study the boundaries and reference points. However, it is a process that takes a lot of time, it can take between 2 and 3 hours depending on the size of the cluster.

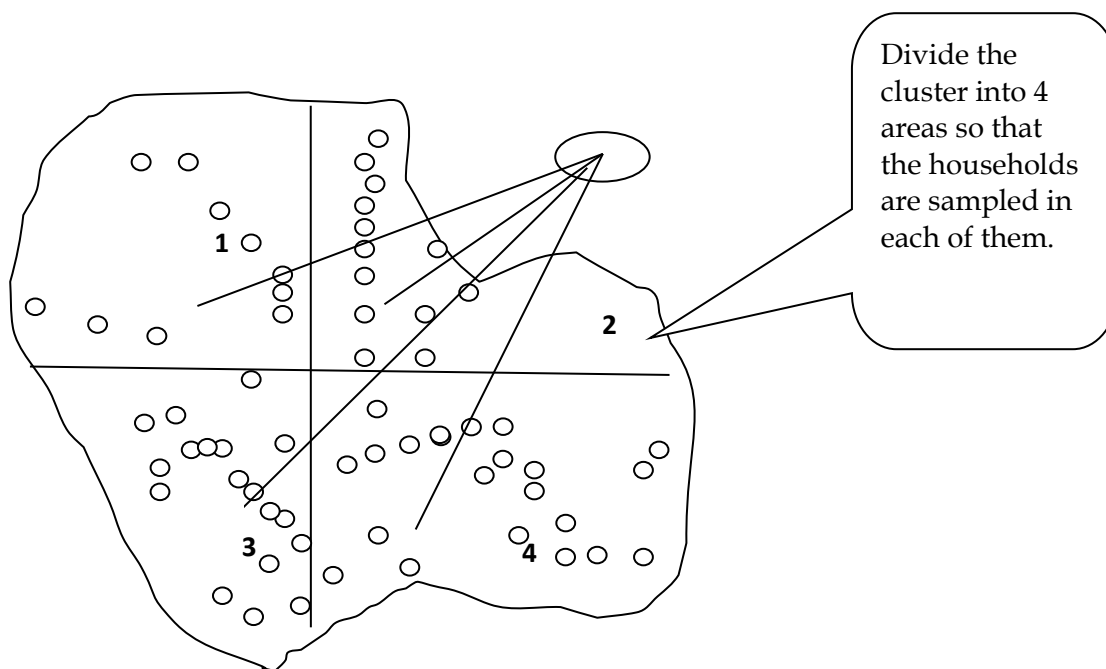
Asking to a local official to draw a map of the cluster is not enough; precise instructions should be provided or the map may look like this and be useless:



The map should show boundaries, major roads, schools, churches, markets, rivers, and any other known landmarks in the cluster.

**2<sup>nd</sup> step – Split the cluster into four quadrants**

It is important that all households in a cluster have the same chance of being sorted for the survey. Splitting the cluster into four areas will allow the selection of a group of households from four different areas in the group, not a single area, so that the surveyed households are representative of the area the subject of the survey.



**3<sup>rd</sup> step – Randomly choose a starting point from a quadrant**

To begin the household census, a starting point should be designated from a quadrant. In cases where a large part of the cluster is uninhabited (e.g. occupied by agricultural land) and all inhabitants live along the road or waterway, be sure to go around the entire cluster to identify eligible households.

**4<sup>th</sup> step – Randomly choose the direction of travel**

When enumerators arrive at the starting point of the first quadrant, they should spin a pen or bottle on the ground. When the pen stops spinning, they should look at the position indicated by the tip and go in that direction. If there are no households in the place designated by the pen, the team can still rotate the pen to choose a new direction. If the pen indicates the boundary of the quadrant/cluster, the team should move in that direction to the border, then rotate the pen to choose a new direction.

**5<sup>th</sup> step – Choose a departure household**



Start with the first household in one of the quadrants as a starting point by taking a reference and identify all the eligible households in the cluster by going from one place to another. Be sure to return to the starting point once all households in the cluster are enumerated.

**6<sup>th</sup> step – Determine the eligibility of the household**

Ask the person in charge for the age of the children living in the household to determine if they are eligible to complete the survey. If there is no eligible person in charge within the household, proceed with the next household in the direction indicated by the pen.

**7<sup>th</sup> step – Conduct the first part of the survey and mark the household**

The census should be conducted when informed consent is given by the person in charge. If he refuses to take part in the survey, clearly emphasize the purpose and importance of the survey. And if he still refuses, proceed with the next household. After the census mark the household and continue.

**8<sup>th</sup> step – Collect data from the necessary number of households**

After visiting the departure household, continue in the direction indicated by the pen by visiting each household on that line. If the enumerators arrive at the edge of the cluster/quadrant, they should spin a pen on the ground and continue in a new direction of that same quadrant. If the pen indicates a direction in which they have already surveyed or out of the quadrant, they should rotate the pen until a new direction is indicated in the quadrant. The survey team should continue to visit households until they return to the starting point of the first quadrant.

**Sampling in urban areas with residential buildings**

In cases where data are collected in an urban area with residential buildings, all eligible households should be interviewed in each building visited. The quadrant methodology and the choice of one of the starting points in each quadrant should be followed as described above. If there are no eligible children or caregivers present in the household, the nearest apartment on this floor should be visited. After completing an interview, the interviewer(s) should proceed with the next building or household in the direction indicated by the pen. When surveys are conducted in an urban setting, the survey team should also consider how best to reach caregivers at home, since many of them could be at work during the day.

## 7. ASSESS THE ELIGIBILITY OF A HOUSEHOLD

The following describes the eligibility assessment methods for surveys in which caregivers of children aged 6-59 months are eligible. However, the calculation can be changed if the eligibility criteria are different. Once in a household, the interviewers should ask mother(s) or caregiver(s) present if a child aged between 6 months and 5 years lives in the household. Enumerators should confirm that the child was in the age group of 6-59 months at the time of service delivery. Enumerators should be provided with acceptable birth dates before going on the field.

Acceptable dates can be determined using the following calculations:

- End date of campaign minus 6 months
- Starting date of campaign minus 59 months

For example, if a campaign was held from 15 to 27 December 2013, and the survey targeted parents of children aged 6-59 months at the time of the campaign, acceptable birth dates would be between:

- 27 December 2013 - 6 months = 27 June 2013
- 15 Dec. 2013- 59.97 months = 16 Dec. 2008

To determine the eligibility of a child, enumerators should follow the procedure below:

1. Ask the mother or caregiver if the child's health card or birth certificate is available.
2. If the health card is not available, ask the caregiver if he/she remembers the exact date of birth of the child.
3. If the caregiver does not remember the child's exact date of birth, the interviewer should ask if he/she remembers the specific month and year in which the child was born.
4. If the caregiver cannot remember the month of birth, a calendar of local events can be used to estimate when the child was born. A young child who walks is at least 9 months old and would be eligible for the interview.

*Note on surveys of the village chief, community health worker and health workers:* The sampling technique indicated above involves sampling at the household level. For some questionnaires in PECS, village leaders or health workers are interviewed. In these cases, team leaders will select village chiefs or health workers based on the availability of informants, with a preference for those who participated in distribution events. For these questionnaires, random statistical sampling is useless since data collected is intended to provide information about the event and knowledge of service delivery, but NOT to draw statistical conclusions.

## 8. CREATE WORK TOOLS (QUESTIONNAIRES)

Questionnaires should be designed according to the survey objectives. Decisions on the survey instrument should be collaborative and include comments of the Ministry of Health as well as those of stakeholders. Questions may be added to assess other programs or results of interest. However, we should keep in mind the duration of the surveys since a brief interview is much more pleasant for a busy person. When all partners agree on the questionnaire, it may be necessary to translate it into the local language(s).

The following forms are required:

**Questionnaire for identifying eligible households:** The household inventory form (M) serves as reference framework for household selection. It includes general information (stratum, province, region, district, locality, name or cluster number/EA etc.), household identification number, number of eligible persons in the household and any other information allowing to localized the household (a photo if possible).

*Note that a household is made up of a group of people who share food from one kitchen. In some countries, there are several households under the same roof. A separate ID number should be assigned for each household (even if they have family links) and mentioned on each form.*

### **Household questionnaire**

The information collected as part of a PECS should indicate whether a child has received VAS, deworming and/or immunization, the age and sex of the child, the place where they received the service, how they heard about the event and the caregiver's knowledge about the benefits of the service(s) received. For caregivers whose children did not services, information should be collected on why they did not receive it, how they usually receive health information, and what would allow them or would encourage them to receive services in the future, the profile of respondents, the socio-demographic characteristics of households, how the activity was conducted.

### **Health worker and community health worker questionnaire**

Health workers should be questioned about how they administer the service(s) of interest (VAS, deworming, immunization), their knowledge and the availability of supplies (Vitamin A capsules, deworming tablets, vaccines, strips, etc.). Community leaders and other stakeholders may also

be questioned about how services are delivered and their knowledge about the service(s) provided.

PECS can also be used to assess the effectiveness of communication materials, social mobilization, as well as other activities implemented to increase the coverage. For example, if a radio ad was produced to raise awareness about a distribution event, the intended beneficiaries may be asked if they heard the radio message and the station on which they heard it and if they can remember the message.

### **Quality control questionnaire**

It allows independent observers to check the work of enumerators in 10% of households surveyed from a small number of pre-defined questionnaires.

### **NB: all forms should include:**

- The cluster number (up to 4 digits);
- The household number for the cluster (three digits, each enumerator receives in advance 99 digits such as 0-99, 100-199, 200-299, etc.);
- The number of children in the household (usually a single digit but sometimes two in post-campaign surveys).

## 9. OBTAIN ETHICAL AUTHORIZATION

The survey should be conducted in accordance with national guidelines for human surveys. As a rule this involves additional documentation explaining and justifying the survey. Allocate enough time in planning for this necessary and often time consuming step.

Thus, any PECS survey protocol should go to the Ethics Committee. This protects HKI as an organization and this is also helpful as we decide to publish the results later. The attached document contains all the details on the process of developing and validating a study. **(Include references).**

However, since the PECS will be regularly conducted in countries for at least the next few years, using the same methodology, HKI suggests submitting a protocol for several PECS, for example two years. It can specify that they will be repeated approximately every six months, according to national campaign dates, following the same methodology. This will save you time and money both for you and the team, if you do need to follow the process every two years. And if slight changes are made to the methods over time, just send a letter to the committee informing them of the changes, as opposed to a full review (without paying fees).

## 10. SOME ETHICAL CONSIDERATIONS TO TAKE INTO ACCOUNT

### **Confidentiality**

Under the law on survey practice, we will protect the confidentiality of information provided by respondents. Personal data identifying the respondent will not be collected. Ethical considerations will be at the center of the process.

Collected data will only be handled by authorized persons and stored on computers whose access is secured by a password. All information obtained from questionnaires or interviews will be kept confidential. At the end of the study, the database will be sent to the client.

### **Informed consent**

Obtaining informed consent from the target population will be sought. Any refusal of participation in the survey will be respected by the enumerator, no pressure will be made on a person to compel him to take part in the study. The enumerator will explain to the respondent the purpose of the study and will give him the guarantees on result confidentiality. The enumerator will also explain to the respondent that they are free to refuse to be interviewed, to end the interview at any time or to refuse to answer a particular question or set of questions. If the respondent does not freely give consent, the enumerator should end the interview. The

consent will be verbal. The enumerator agrees during the validation of the protocol to follow the instructions and procedures described in such protocol and to respect the good research practices to comply with.

### **Benefit of the study for the population**

The study will be followed by a decision to improve the quality of future mass campaigns, thus improving the coverage of vitamin A administration and deworming as well as health interventions. This will be a contribution to improving the health of populations in general.

## 11. DEVELOP TEAM SURVEY PECS

The size and composition of the PECS team depends on the overall number of surveys to be conducted, the time required to complete a survey, whether enumerators will work individually or in pairs, and the number of vehicles.

Interviews should be arranged with all potential members of a survey team. They should include questions about the candidate's experience and language skills, as well as the simulation of a survey to assess how the candidate speaks to the caregiver and whether they can record accurately the answers to the survey.

It is recommended to retain the following people as member of the team:

The senior supervisor or consultant: There should be a senior supervisor and, if possible, one or two assistants for support. He should draft the protocol of the study and submit it to the ethics committee and he is guarantor of the implementation of the protocol (to enforce all points included in the protocol such as the strict application of the methodology) to recruit and train the survey staff. The Senior Supervisor shall in charge of the overall planning and completion of the survey. Team leaders and enumerators shall report to the Senior Supervisor who will provide them with specific instructions on how to conduct the survey, and shall also be responsible for monitoring the quality of the survey team's work and the final decision on all the issues raised.

The team leaders: Team leaders should have an extensive experience in survey and preferably an experience in the supervision of survey. Team leaders shall be in charge for managing the survey teams and the quality of the data collected. Depending on the size and conditions of the survey, each survey team should be led by one or two team leaders. When selecting the number of team leaders for a survey, the senior supervisor should consider the number of enumerators in each team and the distance to be covered by each team. The Senior Supervisor should designate the team leaders so that they will be able to follow up the work of each team enumerator and be available to assist when needed.

The enumerators: The number of enumerators required for a PECS will depend on the survey region, the budget, the time allowed to complete the survey and the number of available seats in the vehicle(s) used. Previous surveys employed between two to ten enumerators per team, but the most common number is three or four enumerators. Depending on where the survey is conducted and the experience of the enumerators, it may be helpful for enumerators to work in pairs for security reasons and to check the quality and accuracy of each other's work.

## 12. ORGANIZE TRAINING

Before going on the field, training should be organized for team leaders and enumerators. The training agenda should include general information about the survey and the service(s) of interest, a detailed review of the survey questionnaire, a survey methodology and the logistics on the field (where to eat and sleep, the safety of the team and the vehicle, etc.).

Training sessions should include hands-on interviews and role plays to prepare for the survey and the eventual challenges of the field. Train more people than you need to take only the best and keep them in reserve in case of default (for illness reason or otherwise) of enumerators already selected.

Sufficient time should be allocated for identifying clusters boundaries or selected portions, constructing household lists, and completing properly the questionnaires. If maps exist, the interviewers should be familiar with them. Provide for restitution and possible review of the instruments.

The number of days required for the training of team leaders and enumerators depends on the number of people to be trained, their level of education and their experience. Previous PECS's training lasted between 2 and 5 days with a field testing day. A comprehensive PECS training program including data collection training using mobile phones may look like this:

*1<sup>st</sup> day* – Training of team leaders

*2<sup>nd</sup> day* – Enumerator training (in presence of team leaders)

*3<sup>rd</sup> day* – Training on data collection using mobile tools (e.g. data collection using formhub, ONA for example)

*4<sup>th</sup> day* – Field testing and review of field testing

The rationale for having separate training for team leaders is to review the logistics of the survey and how team leaders should monitor the work of enumerators, supervision techniques, and quality assurance of field data. Otherwise, if necessary, this information can be covered during enumerator training.

Field testing: As part of the training, it is recommended that the enumerators practice asking questions in a place similar to that of the real survey but which was not chosen for this one to test the whole approach (of the methodology to the questionnaire). The senior supervisor may consider asking enumerators to fill out the duplicate survey form (i.e. two enumerators record the responses simultaneously on their own survey form) and compare them to confirm that they match. Meanwhile, the team leader can observe the work of the enumerator, ask questions, correct any error in the data collection and check whether the survey forms were properly completed. All aspects of the survey implementation should be practiced during the field testing including meeting with health officials and village leaders, cluster mapping, division of the quadrant cluster, choose a starting point in each quadrant and start the survey on paper or cell phones.

During the training, it is useful to distribute enumerators and team leaders in their survey teams to encourage them to work in groups from the beginning and to familiarize them with their different work and communication styles. The training should provide enough time for role plays so enumerators and team leaders may be comfortable presenting and asking the survey questions.

### 13. PILOT SURVEY

Before the survey begins, the questionnaire should be tested, or pre-tested within the community. The pilot test should be done in a village that will not be part of the survey. During the pilot test, interviews should be conducted with target recipients (caregivers, health workers, village chiefs, etc.) to confirm that all survey questions are easy to understand and that the responses listed for multiple choice questions are complete.

Another important goal of the pilot test is to decide if the sequence of questions is correct. After the pilot test, the team should meet to discuss whether to make some change and if reviews of questionnaires are necessary.

Similarly, the pilot survey shall determine the average length of an interview to assess the workload per interviewer and shall also measure the time required to administer a questionnaire for subsequent follow-up via ODK transmitted data.

It is also important to test the reliability of the maps showing clusters and portions. Before the survey begins, plan to visit at least one urban enumeration area and one non-survey rural to



check the reliability of maps and GPS coordinates. If the maps are not accurate and if there are no others available, you shall create them by hand.

So the pre-test shall:

- Test the questionnaire and its ability to meet the objectives of the survey;
- Assess the average time of administration of the questionnaire;
- Assess the mastery of the enumerators in the use of mobile phones for collection;
- Test the effectiveness of the mobile application used and the data transmission to the server;
- Identify all challenges related to the survey in order to analyze them and provide an adequate response;
- Finalize collection tools.

Each enumerator will survey at least one eligible household. A debriefing will be made at the end of this pre-test and all the lessons that can be learned will be valued in the finalization of the data collection instruments and in the organization of the survey.

## 14. ORGANIZE LOGISTICS

Good planning and organization is essential to the success of a PECS survey. All aspects of logistics related to field work should be well planned in advance, they must be accurately communicated to team leaders and enumerators during their training sessions. A checklist of planning is available in the annex.

Prior to training, the survey planning team and the senior supervisor should prepare the itinerary for each survey team including cluster locations, the number of days to be spent at each location, the distance between the clusters and the driving time approximation between each cluster. If possible, prior to their arrival, team leaders should communicate with officials in their respective areas of survey to make the necessary arrangements and learn about the security and logistical challenges that the survey team might face. If a survey area experiences an increase in theft or political tension, local escorts may be required to ensure the safety of the enumerators, the team leader, the driver and the vehicle.

Each team will receive specific instructions on how and when team leaders and enumerators will receive their per diems, their latest salaries, how to allocate fuel costs, how to record daily mileage, how to define the place of accommodation and catering for the team, and guidelines for leisure time. When setting up the survey team, be sure that its members are able to speak the local language of the regions covered by the survey. The sex of the enumerators may also be considered (e.g. in some areas women may be afraid to talk to male enumerators). Days of rest may be considered after long periods of travel, or days of worship (e.g. Sunday).

If mobile phones are used for data collection, enumerators and team leaders should be provided with specific instructions on when and where they can receive and return such devices, how to protect them, and how to charge them during the whole survey.

For survey teams with little experience, supervisors can arrange for teams to work together on the first cluster to ensure understanding. Enumerators may also work first in a group where two interviewers record the data simultaneously to confirm that they properly record the responses. When the team goes to the field, the team leader will be responsible for managing the logistics and will provide daily updates to the survey supervisor, informing them if something unexpected happens.

Planning for field guides: When conducting a PECS survey, it is essential to know the clusters to be studied, including the geographical region, the population, the languages spoken and the customs. This can be done by engaging enumerators from the region and/or asking elders and village leaders or community health workers to assist as field guides. These individuals can inform the survey team about the boundaries of the sampling areas, assist with reading

summary maps of the area, and navigate social interactions. To facilitate interaction with field guides, team leaders should, as far as possible, contact them before arrival and clearly inform them whether their services will be paid or not, and how much will be paid. It is important to know what field guides will eat and drink during fieldwork, and ask them to bring their own drinks if snacks and water are not offered.

Organization of transportation: The vehicles selected for the PECS survey should be large enough to accommodate the investigation team and all the necessary equipment. It is recommended to purchase a vehicle with one or two additional seats to accommodate the field guide and a government or community partner willing to attend or observe the survey. Vehicles should be also suitable for roads, land and weather conditions of the areas to be visited by the survey team. Be sure that the team has all the necessary tools to face all the challenges, e.g. spare tires and a jack in good condition.

Fuel: Fuel requirement forecasts should be made prior to the training of enumerators and team leaders based on the distances to be covered between clusters and the number of field trips at each site. During the PECS survey, the team leader has the additional responsibility of interviewing a health worker at the nearest health facility. This may require additional trips between the health facility and the interview location. This should be considered when estimating distances to be covered. When calculating distances between sites, it is important to remember that the village or site chosen for the actual survey may be further away from the center of the area or region and that the maps may provide inaccurate information compared to true distances. Therefore, it may be impossible to calculate the accurate distances before the survey begins. Approximations might leave room for error.

Accidents/breakdowns: It is important to be prepared for unforeseen events such as weather, breakdowns and accidents. The senior supervisor and the planning team should consider strategies to cope with such situations prior to the training of team leaders and enumerators. The strategy should include contingency funds for such events, selection the nearest repair centers, and identification of the plan of places where cell phone coverage may be too low to call for reinforcements. This strategy should be clearly communicated to team leaders and enumerators during training so that such situations can be dealt with quickly and appropriately.

Arrangements for catering and accommodation: For the survey to be successful, team leaders and enumerators need to be well nourished and rested. The team leader is responsible for locating suitable housing and eating places, but also markets to buy snacks. This information can be collected during discussions with a community partner who knows the available options in each cluster. If mobile phones are used, it is essential in choosing the hotel to provide for the availability of stable electricity for charging the phones.

Where possible, arrangements for accommodation should be made at least 24 hours before arrival. Usually, the team leader(s) and investigators will sleep at the same place to allow a quick start in the morning and hold a reporting meeting in the evening. When staying a hotel, it is often beneficial for the team leader to negotiate an adequate price including breakfast and dinner. The team can then coordinate with their driver to arrange stops at grocery stores or kiosks where they can purchase snacks and lunch foods like cookies, nuts or fruits. It is important to always have enough water in the vehicle used during the survey.

Report: Each team should reserve enough time for an adjustment meeting to discuss field challenges and lessons learned. During this meeting, the team leader should also share common mistakes, if any, that are made on the survey questionnaire as well as any other observations that might improve the team's performance. Each team member should have a notebook to record any challenge and lesson learned in the field. Note also any other information which is not on the questionnaire collected from the household. These notebooks shall be collected at the end of the survey for review by the senior supervisor.



Communication: During a PECS survey, communication is essential. The team leader should communicate daily with the survey supervisor to keep him informed of progress made and challenges faced. The senior supervisor should establish with each team leader a daily scoring schedule prior to departure for the field. As previously mentioned, prior communication with health officials and community partners in cluster localities is also critical for the successful implementation of the survey.

The survey supervisor and the planners should decide whether air-time should be allowed for enumerators and team leaders for communications during the survey. Arrangements related to air-time should be clearly communicated during training. It is important to remember that enumerators will not always be with team leaders and will need some air-time to call them with updates or to communicate their location.

If cell phones are to be used for data collection, enumerators and team leaders will need credit for the Internet connection of the phones. Previous PECS surveys used between 20-30 MB of data per enumerator per day (1 MB per survey if no photo is included). When data is collected through the mobile phone, the senior supervisor or assistant can normally track the data transmitted from a location provided with a good Internet connection.

*Note on clothing/garments:* All team members in the field need to think about which clothing/garments is most suitable for the areas in which they will be doing the survey. If no information is available, advance information should be obtained by contacting local contacts. For example, long skirts or wearing a head scarf by women may be advisable.

## **IV. PERFORM FIELD WORK**

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Collecting high-quality data (including with additional visits in case of absence) often requires more than one day per cluster. Sometimes evening or early morning visits are required. Enumerators may have to spend the night in the cluster if this is possible and safe. In all cases, logistical support should allow them to start early enough to reach the children and their caregivers at home. Sometimes, it will be necessary to make visits in the evening or early in the morning. When the clusters are located in places where both parents work outside their home during the day, interviews will be conducted at the end of the day after the parents return. In such cases, local guides can play a greater role in accessing homes. The collection is conducted through two main steps:

### **1. HOUSEHOLD CENSUS AND RANDOM SAMPLING OF HOUSEHOLDS TO SURVEY**

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This first step will consist in listing all the eligible households in each cluster. The maps of sampled clusters will be handed to the enumerators who, once in the cluster, will enumerate all the households in the cluster and enter the identification number of each identified household on their door and on the household census form (see Annex). Their progress will be marked on the map of the cluster. The household identification number will consist of:

- CS letters which means: Coverage Survey
- The number of the 3-digit cluster (all clusters will be numbered from 001 to..., total number of clusters)
- The household number for the 3-digit cluster.

*Example of household identification number: EC-004-018 this is the 18th eligible household in cluster 4.*

### **2. SAMPLING OF HOUSEHOLDS TO SURVEY**

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Each evening, all the team leaders will report the households surveyed by cluster to the senior supervisor, indicating the number of eligible households identified per cluster. A random sampling using the function RANDBETWEEN (min, max) of Excel will be used for the household sampling. It's a simple matter of entering as minimum value 1 and maximum value the number

of eligible households in the cluster and then draw the function on the number of households to be surveyed. Thus, we have a list of number of households and only these households will be surveyed (since each household in the cluster is numbered from 1 to n). An inventory form of households selected in this way will be established for monitoring.

### 3. FIELD DATA COLLECTION

This step will be done after the census of the eligible households and the sampling of households to be surveyed by the coordination team. If the data is sent via ONA to the server in the hours following the census and household sampling, the mothers or caregivers available, the interviewers administer the questionnaire to these households before leaving the cluster in which case the surveys will be conducted another day. Up to two visits may be required to complete the whole questionnaire. If the respondent is absent at the first visit, return at least twice more. Each completed questionnaire should first be rechecked by the enumerator and then by his supervisor. Each question should be clearly and legibly completed. If an enumerator writes the dates, his team-mate should check, before leaving the household, that the dates are correct and legible. These should be the exact transcript of those on the supplementation card (if any), even if the card has invalid dates. The supervisor should check each questionnaire for completeness, coherence and readability, and each photo for readability and framing. If there are errors in the questionnaire, they should be corrected by the enumerator before leaving the cluster.

### 4. SUPERVISION OF THE COLLECTION

During the collection phase, each team leader shall carry out regular field visits to ensure, on the one hand, the effective presence of his enumerators on the sites and the quality of responses obtained and the work of his team. On the other hand, the supervisor shall provide answers to any problems encountered during the collection and inform the coordinator of the progress of the collection. A 10% quality control of the data collected by the enumerators will be carried out by the supervisor. Therefore, in each locality the supervisor will randomly select 10% of the households already surveyed and will ask some essential questions from the household questionnaire for quality control. The household identification number written on their door by the enumerators will help the supervisor to easily identify the household sampled. In addition to outreach supervision mission, field monitoring and quality control missions may be carried out by the coordination committee. These missions will also help address potential field issues and check if the enumerators meet all the defined procedures. When revisiting households, the supervisor should repeat the interview with the caregiver as part of a good quality control and compare the responses with those of the previous interview.

Supervisors should immediately inform enumerators of any discrepancies found during revisits, correct them and discuss how to improve the work. Issues of discrepancy or missing data are resolved during a discussion with the enumerators, a review of the immunization card photos (if available) or a new household visit if necessary.

#### Collection monitoring

Monitoring the evolution of the collection helps to assess the performance of the teams, provide solutions to any issue and ensure that the progress is in line with the schedule. To do this, the senior supervisor shall conduct a daily telephone debriefing with all team leaders, during this debriefing each supervisor shall:

- (i) Take stock of the people surveyed by his team;
- (ii) Present the difficulties encountered by his team and the solutions provided;
- (iii) Present the agenda of the next day.

A daily report of the collection will be sent to the steering committee and will present an update on the evolution of the collection.

## In case of clusters suddenly becoming inaccessible

Initially, when creating the survey sample, the coordination committee may have excluded some areas of the national territory for security reasons. The overall results will not be representative of excluded areas. The other areas of the sample frame are considered safe and accessible during the survey. After the start of the survey, the situation may change in some clusters and they can become dangerous due to fighting or hostility towards the services provided and agents. Clusters can also become inaccessible due to fires or floods.

If the problem is temporary (for example, if the water level is going to drop) and we can hope that security will prevail in the field during data collection, we should try to keep the original clusters. This may require deferring the data collection for these clusters and returning later. This is the best solution in terms of data integrity and representativeness. If the problem still persists and the data cannot be collected as planned, then the coordination committee shall decide whether or not to replace the cluster and how to take the data into account.

If the reason that made the cluster inaccessible to the enumerators also applies to the agents, this cluster will probably have a low immunization coverage. Therefore, excluding it from the survey will bias the results upwards. A sensitivity analysis may be needed to understand the impact that a low coverage in this cluster would create. However, if the reason for the inaccessibility during the survey did not affect the services provided (for example, if it was the first fire in the region for 5 years), the coordination committee may decide to replace the cluster inaccessible by another and to dispense with sensitivity analysis.

The security of the survey staff is paramount, and the survey conditions should promote it as much as possible. If some of the original clusters are omitted or replaced during the survey, the report should clearly explain the steps, their reasons, if they could also affect the coverage of the services provided and include the sensitivity analyzes.

## V. IV. ENSURE DATA QUALITY

To ensure that the data is accurate, it is important to take measures to ensure data quality at every step of the PECS process. Looking at the data quality measures presented in Figure 2 below, we can see where action needs to be taken during planning, implementation and data analysis/dissemination steps to reduce or mitigate errors in the study results.

**Figure 2: Important data quality measures (DQM) for each step of the PEC survey**

<b>1<sup>st</sup> step:</b> Planning	<ul style="list-style-type: none"><li>• Interview and selection of survey teams (supervisor, team leaders, enumerators, data entry staff)<ul style="list-style-type: none"><li>• <b>DQM: Choose experienced and/or well-trained team members to reduce the risk of errors. It should be avoided to maintain the same team more than twice within the same surveys.</b></li></ul></li><li>• Conduct a pilot survey with the tools to ensure that the questions are properly interpreted, that the answers given are complete and that the skip patterns are correct<ul style="list-style-type: none"><li>• <b>DQM: Conduct a full pilot survey to reveal possible errors (skip patterns, typing errors, cluster identification, etc.) and take actions to correct them before implementation.</b></li></ul></li><li>• Organize and conduct training sessions for team leaders and enumerators<ul style="list-style-type: none"><li>• <b>DQM: Properly train enumerators and team leaders on survey tools, methodology, and how to resolve difficult situations on the field.</b></li></ul></li></ul>
<b>2<sup>nd</sup> step:</b>	<ul style="list-style-type: none"><li>• Randomly choose a starting point and identify the first household to study</li></ul>

## Implementation

- **DQM: Comply strictly with the methodology to ensure that the sample is representative.**
- Randomly select 10% of households in each cluster and administer the quality control questionnaire
  - **DQM: Check the compliance of data collected by enumerators within the same households. The coordinator or subcontractor should revisit 10% (ideally) of eligible children one to two days after their interviews to verify that the cards were used properly, that the limits of the clusters and portions were identified and that the enumerators did not omit (intentionally or mistakenly) eligible children.**
- Ask questions
  - **DQM: Ask the questions as they are written, probing if necessary, and write down the answers accurately.**
  - **Each enumerator should only produce complete, legible and correct questionnaires. If enumerators work in pairs, it is useful for each one to check the questionnaire of the other, once completed.**
- Oversee data collection to ensure that questions are properly asked and that answers properly are recorded.
  - **DQM: Make an adequate supervision to make sure the interviewers ask the questions properly and accurately record the answers.**
  - **Daily, the supervisor should check that each questionnaire is complete, legible and correct. And or that the data transmitted to the server are complete.**
  - **He checks that the list of households shows that complete questionnaires were filled for all eligible children and if not what were the reasons (for example, if the caregiver was absent during two successive visits or if he refused to answer).**
  - **All forms should be checked and corrected before leaving the cluster.**
- Review questionnaire for completeness and compliance;
  - **DQM: Review on a daily base surveys completed to correct errors or omissions in the field rather than during data entry.**
- Check on a random sample of each enumerator the time taken to collect data
  - **DQM: monitoring the data collection time**

## 3<sup>rd</sup> step: Analysis and dissemination of data

- Double data entry & comparison (if using paper forms)
  - **DQM: Do not have the data entered by one single person since this entails a high probability of errors in their entry. Perform a double data entry to ensure that the last database reproduces exactly what was collected in the questionnaires on paper.**
- Data cleaning
  - **DQM: Before data analysis, review it carefully to ensure that children are eligible and other abnormalities are detected and corrected**
- Data analysis
  - **DQM: Do not analyze the data until their collection and cleaning process is complete.**
- Report drafting
  - **DQM: Ask colleagues for comments to make sure all data was reported properly and that no errors persist.**

## 1. Ensure data quality when using mobile phones

Before starting data collection, it is essential that staff meticulously reviews the electronic collection form and ensures that all skip patterns are correct. Forms cannot be changed while data collection is in progress, which means that logic or faulty questions that were left out may have a serious impact on the survey results.

Using mobile data collection tools, it is possible to view data as it is collected and track progress on key indicators by geographic region. The indicators may provide the survey team an idea of the progress of the survey and help manage the quality of the dataset. The visualization of these data using the indicators should normally be limited to managers and may be used to ensure that questions are understood as intended and that data on each indicator arrive as intended.

Example of indicators that are useful in monitoring data collection:

- Number of households surveyed by each enumerator
- Number of households surveyed in each cluster

**Who should review data?** It is primarily the responsibility of each enumerator to carefully review each form completed before leaving a household. If enumerators work in pairs, they can check with each other what they have written to make sure their answers match. The next level of surveillance rests with the team leader. The team leader's role during the survey is to ensure that all data presented is accurate, comprehensible (for textual responses) and complete. Data cleaning and further review are carried out by the senior supervisor and his/her assistant(s) as data arrives (for surveys using mobile phones) as well as at the end of the collection process.

Common errors when collecting data using mobile tools include:

- Wrong input of wrong answer
- The interviewee later changes his answer to a previous question and the enumerator forgets to go back and modify the answer.

## 2. What should supervisors and team leaders do to ensure that data collected is accurate and complete?

The database collected during a PECS survey should be free from errors and bias, it should be as close to the "truth" as possible. To achieve this level of data quality, errors due to a fault of the enumerator should be minimized. If errors occur, they should be corrected as close as possible to the date of the interview.

In the field, it is recommended that enumerators conduct the interview in pairs when possible. Making sure that two enumerators visit each household together helps to control the data quality because one enumerator may ask the questions and write the answers while the other observes and follows. The second enumerator may confirm that the questions are properly asked and that answers are accurately recorded. When enumerators work in pairs, it is important for one of them to be responsible for both asking the questions and writing the answers; dividing the tasks between the two enumerators leaves no one for checking accuracy.

To better control data quality, it is necessary for team leaders to rotate all the day between enumerators and attend at least one household interview per enumerator per day. For each enumerator, the team leader should attend the interview and should either observe the transcript of the answers, or write (or enter) it at the same time on a separate blank questionnaire for at least one interview. This helps to confirm that enumerators accurately record responses and sensitizes them to common errors so that they can be corrected. This process also allows the team leader to observe the enumerators in action, offer advice on the style of greetings and the explanation of the survey, the wording of questions, or any other aspect of the survey.

Team leaders should check the forms at the end of each day so that errors can be corrected while the interviewer can still clearly remember the interview or return to a household, if necessary. Team leaders and survey supervisors should review the completed questionnaires for errors, including:

- Incomplete forms;
- Illegible forms
- Missed or empty questions
- Unclear responses to open questions or "other" answers
- Errors in the skip pattern
- Repeated/missing questionnaires

If errors are discovered, the enumerators should correct the errors that can be corrected, but common errors should be discussed by the team to reduce the possibility of repetition.

When the fieldwork is completed and the senior supervisor has all the survey questionnaires, he/she should still carefully review each team's surveys to see if the errors described above occur.

## VI. DATA ENTRY AND CLEANING

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### 1. How should the information collected during the survey be entered into the database?

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With data collection using mobile tools, data entry process is excluded. When PECS is conducted using paper-based survey, data should be entered using software such as **EpiInfo** or **SPSS** designed to program skip patterns and detect errors. To enter information into a database using software such as **EpiInfo or SPSS**, you should first create a codebook. A codebook is a spreadsheet that lists each question and the name(s) of the shortened variable assigned to each question and answer.

Once data is entered, data manager should merge them into one single file and ensure that the questionnaires are properly archived and kept in fireproof premises that also guarantee their confidentiality. Only a limited number of persons should have access to forms and photos containing information that can identify people and should be trained to work not to share the identity of respondents with those who do not have to know it. Data manager should also check the absence of viruses in the electronic files and save data regularly.

### 2. Duplicate data entry

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The procedure for duplicate data entry requires that the same data are entered by two different employees so that both databases with the same information are created. After data entry, the following data comparison based on common software data entry as Epi Info or CS Pro may be used to check the second entry against the first. If there is a difference between the two data sets, the program informs the user and allows him to decide the appropriate entry. This duplicate entry procedure highly reduces data entry errors. \*\*The duplicate data entry should be made for any PECS survey with survey forms on paper. \*\*

### 3. What are the ways to ensure that the information is properly and accurately entered into the database?

There are several ways to avoid errors in data entry when creating a data entry template in **Epi Info, CS Pro**, or Excel during data collection with mobile tools using ONA.

**Limit the answers for some questions.** For questions where there is a fixed number of possible answers, data entry screen can be designed to accept only these answers. For example, if a question has only three possible answers (Yes, No, and I don't know) the database can be adjusted to accept only these three answers.

**Define the range of acceptable values.** Similarly, if a possible answer to a question is in a wide range - such as age, distance or time - we can specify a numerical range of possibilities. For example, if the question asked: "In number of years, how old is the head of the household?" the range of reasonable answers can be defined as between 16-100 years if it is unlikely that the head of the household could be younger than 16 or older than 100.

**Make consistency checks.** These controls check that data in one question is compatible with that on another question. For example, the date of birth of the child should coincide with the age of that child on the form. Similarly, if a parent has stated that their child has received a service in the last campaign, then the part about why the child did not receive service should not be completed.

**For variables that describe distances or time**, check the range of data for each variable to ensure logic. For variables in which only some categories of answers such as those coded 1-5, 8 and 9 are possible and a category not mentioned as "7" appears when data is summarized, the error should be identified and corrected.

### 4. Database cleaning

The data manager should clean the database and implement a series of checks for each parameter. This operation, when they apply to all the parameters and all the files, takes time but it should be given the means. This is not simply about randomly checking a subgroup of parameters or folders. A software should check each parameter and each file and the contradictions resolved before the data is merged and analyzed.

The data manager should plan the responses to each type of error and apply them. If the data management team changes values in the database, these changes should be recorded in a cleanup log. Any changes should be made by a STATA software preferably without changing the values in the original database. This practice makes the changes reproducible and reversible where appropriate. This software should include either comments or parameters to understand the reasons for the change in value. The sections below suggest how to solve different types of errors.

### 5. Duplicate, missing or contradictory data

The data manager should check that the completed entries or questionnaires sent via ONA are not duplicate or that questionnaires were not omitted. When a field or more does not coincide



between the two entries, we should consult the originals (and if necessary the photos of the cards or registers) to decide which one is correct.

## 6. Implausible or illogical answers

The plausibility of the values should be checked as well as the validity of logical relationships. Here are some examples: each VAS date of a given child should occur between his/her date of birth and that of the interview, each record of a given cluster should include the date of the team's visit in that cluster, and the GPS coordinates of each file in a given geographic unit should fall within the GPS limits of that unit. The data manager should document all the checks performed to verify the plausibility of the values and the logic of the relationships.

The data manager should correct any implausible value. Check the original questionnaire, the photos of cards and registers if the problem is due to the entry. If the error is also on the original document it deserves attention. If the correction is obvious (for example, if the dates fall in early January, it is common to enter the previous year) we can re-enter the corrected value but after reflection. This reflection should be justified, documented from the beginning, consistently applied and noted in the final report. If one is not sure of the correct value, we should classify it as "absent" and inform the decision.

## 7. Merging databases and calculating derived variables

Once the data is entered, cleaned and checked there is still work to merge in a folder data from different sources. Household data can be in a different base from that of children supplemented with vitamin and dewormed and should be merged into a global database for analysis. Photo files should also be attached or associated with the individual ID numbers.

## VII. DATA ANALYSIS

### 1. What computer software is needed to enter and analyze PECS data?

For data analysis, the statistical analysis software recommended by HKI is **STATA**. This allows data analyst to clean these up, perform statistical tests, and produce results to present.

### 2. Calculate the weightings for the analysis

This manual calls insistently to conduct post-events coverage surveys with a weighted statistical analysis. The primary supervisor should plan from the beginning of the project to make recommendations on the selection of the sample, the order of the questions and their coding in the data collection sheet, on how to adjust for non-responses, how to post-stratify or make further adjustments to weightings, and how to include the weightings in the analysis.

At each step of the selection, a special effort is required to follow and document all the elements involved in weighting calculation. During fieldwork, a special effort is required to document the outcome of each visit to each household. The result of this additional effort required to conduct a weighted analysis will be a set of results more representative and generalizable than in the past. Post-events surveys with careful random selection, adequate weighting, and excellent quality control of the data collected will be more comparable with other modern surveys (such as DHS - USAID's Demographic and Health Survey Program) - or the Multiple Indicator Cluster Surveys (MICS) of UNICEF than were the cluster surveys following the past protocols.

Each complete survey response will be accompanied by one or more weightings to be calculated prior data analysis. When a calculation of a survey is weighted, this means that each person selected for the sample represents a number of similar eligible persons within the population. The analysis gives additional weight to respondents who represent more people

than those who represent less. Ideally, the sum of the weights will be equal to the total target population of the survey.

### 3. Sampling weighting

The first weighting is the sampling weighting, which represents the probability that the respondent will be selected to participate in the survey: It is the opposite of the probability of selection.

As part of the PECS with a two-stage sample, the sample weighting takes into account the probability that the cluster is selected and the probability that the household is selected, given that the cluster was selected.

**$w_{h,c} = 1 / (p_c \times p_h)$  (p<sub>c</sub> = the cluster probability) (p<sub>h</sub> = the household probability)**

Use the original probabilities of selecting the enumeration area (cluster) from the HIPC sample or any other method used.

- If you use systematic sampling, keep track of the size of the sampling interval, to identify the selected clusters for sure.
- If the cluster is divided to focus on a limited number of households, document the probability that a given portion is selected.

### 4. Adjustment weighting for non-responses

A second set of weightings can be adjusted for non-responses following data collection and cleaning. These weightings are developed after the number of households with no one at home, despite quality fieldwork by enumerators revisiting these homes at least twice, as well as the number of eligible respondents refusing to participate, became clear.

Missing data can affect weighting in a different of ways. All eligible respondents from selected households should be given a survey weight in the analysis. If there are households for which you do not know if they include eligible members, an adjustment can be made to transfer the weight that eligible respondents could have, if you have an idea, to households you know the eligibility.

The analyst should use household information with respondents to estimate the number of eligible respondents who would probably be present in households for which information on the eligibility of their members is not available, and allocate the weight of these missing respondents from all households responding to the survey.

When there are respondents whose answers are missing, the survey analysis plan should specify the method to be used to take into account the uncertainty added for not knowing what would be these answers. Some methods for missing data shall include an adjustment to the survey weighting and some not. If the survey data includes information on the result of each visit to each household in the sample, the analyst shall be able to build an analysis plan and conduct the adjusted analyzes for non-responses.

Important information to feed the adjustment for non-responses:

- Description in the analysis plan of how the missing data will be managed: for an entire cluster, an entire household, a respondent and individual questions;
- State whether the field data team obtained any information on the number of eligible respondents in each household;
- Number of eligible respondents in each household in the survey sample, based on a household occupant (preferably) or by a neighbor.

The first or second set of weights will be sufficient to estimate proportions in the population, such as estimates of coverage in each stratum. But in most cases, the analysis plan calls for

merging the estimates of the data set to calculate an estimate of national coverage. And sometimes, analyzes aim to estimate the total population: what is the estimated number of non-supplemented children in the country? In order to aggregate the coverage estimates across the data set or to estimate the totals, it will be necessary to calculate yet another set of weightings: the post-stratification weightings. The post-stratification weightings are adjusted so that their sum corresponds to the known eligible population of each stratum if these population totals are accurate.

## 5. Post-stratification to resize survey weightings

To post-stratify, each weighting is multiplied by a specific stratum factor equal to the known population of the stratum divided by the sum of the weightings (first or second set) of that stratum.

The sampling frames are often out of date or include cluster size estimates based on the total population rather than the eligible population (for example, all residents rather than just 12-23 months). Therefore, the sum of the weightings will generally not be equal to the size of the total eligible population from which the results of the survey will be generalized. If the weightings are well constructed, the dataset can be used to estimate coverage proportions, but should not be used to estimate totals, such as the total of children supplemented during a campaign. If up-to-date population totals are available from the census agency, it is possible to resize the weightings so that their sum reaches the desired total.

$$w_i = \frac{w_i}{\sum w_i} \times N$$

This method is applicable when the study designers decide to over-represent the population in a stratum of interest, relative to their share in the overall population, so as to obtain an accurate estimate of the coverage for that stratum. Before the strata data are aggregated, the weightings should be post-stratified.

The census agency can provide information for two variables, such as the total eligible population projected by gender and also by ethnic group. When these figures are provided as marginal totals of the population (sex and ethnic group separately, not all combinations of sex and ethnic group) therefore the so-called raking method can be used to post-stratify the weightings.

## VIII. REPORT

The survey report should clearly describe what software you used and, in most cases, what options you used. How were the standard errors and the confidence intervals calculated? Which confidence intervals were calculated for coverage proportions? What statistical methods and software protocols were used to test the hypotheses? The report shall be very clear on all these points. In the same way, software programs (do files) and syntax used to carry out analyzes shall be saved and not applied once then erased. They should be made available for verification or review in case errors are found, or if the analysis has to be repeated later to incorporate corrections.

Since this manual recommends collecting data for each eligible respondent in each household interviewed, the statistical software shall take into account the multiple levels of data and the correlation of respondent responses of households nested within the clusters. It should use appropriate syntax and techniques to incorporate in the estimate the identification of the stratum, cluster, household, and whenever indicated, the number of household residents.

Routine immunization data analysis takes longer than in the past.

## IX. ANNEXES 1: Calculation of the sample size

Table 1: Stratification modalities for the survey

Estimated elementary strata	Stratification modalities	Number of strata
National results with all strata combined	Country (1)	1
National results with stratification by place of residence	Urban area/Rural area	2
National results with demographic stratification by age group	Number of demographic classes (6-11 months, 12-23 months and 24-59 months)	3
Provincial results	13 provinces of BF	13
Provincial results with demographic stratification	(Number of provinces) X (Number of demographic classes)	39
Departmental results	Number of departments in BF	63
Departmental results with demographic stratification	(Number of departments) X (Number of demographic classes)	189

Table 2: Effective sample size (ESS) according to expected coverage and desired accuracy for a 95% confidence interval (95% CI)

		Expected coverage (%)					
		50-70	75	80	85	90	95
Accuracy of 95% CI	±3 %	1,097	892	788	663	518	354
	±4 %	622	517	461	394	315	227
	±5 %	401	340	306	265	216	162
	±6 %	280	242	220	192	160	132
	±7 %	207	182	167	147	125	110
	±8 %	159	143	131	117	101	93
	±9 %	126	115	106	96	83	81
	±10 %	103	95	88	80	70	70

Table 3 : Example of design effect (DEFF) for coverage surveys

	Number of respondents per cluster (m)	

<b>ICC</b>	<b>1</b>	<b>5</b>	<b>7</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>Description</b>
<b>0</b>	1	1	1	1	1	1	Uniform coverage
<b>0.042</b>	1	1.17	1.25	1.38	1.58	1.79	<i>ICC = 1/24 very small change in coverage</i>
<b>0.167</b>	1	1.67	2	2.50	3.33	4.17	<i>ICC = 1/6 careful choice for survey campaigns</i>
<b>0.333</b>	1	2.33	3	4	5.67	7.33	<i>ICC = 1/3 careful choice for routine survey</i>
<b>1</b>	1	5	7	10	15	20	Some clusters 100% coverage, other 0%

Table 4: Inflation factor to reflect non-response

<b>% expected of households with an eligible child where no one will be present or whose caregiver will refuse to answer</b>	<b>Inflation factor for non-response (INon-response)</b>
0 %	1
5 %	1.05
10 %	1.11
15 %	1.18
20 %	1.25

If the proportion of anticipated non-responses is greater than 20%, it is better not to conduct the survey. Remember that the formula of the inflation factor for non-response is:

$$\text{INon-response} = 100 / (100 - P\text{-F eligible and non-response})$$

## X. ANNEX 2: CHECKLIST OF PECS' STEPS

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### Obtain formal approval and set up teams

- Prepare the protocol and the TOR for the survey
- Present the survey to government officials and partners and then follow required procedures to obtain formal approval;
- Create a detailed budget for the PECS survey;
- Select clusters using census or other acceptable demographic data;
- Submit the protocol to the ethics committee
- Publish recruiting notices for enumerators and team leaders;
- Organize interviews for enumerators and team leaders;
- Set up teams based on local spoken languages and other relevant characteristics;
- Obtain a letter of approval from the ethics committee, make copies for the teams;
- Develop and conduct a preliminary test of the questionnaires reviewed by the partners;
- Determine routes and travel times from each team.

### Training

- Set the date for training (usually 5-7 days before starting the PEC survey);
- Get quotations and book the meeting room;
- Confirm whether Wi-Fi (Internet) technology is available in the training room;
- Confirm the number of people taking part to the training;
- Develop training materials (agenda, presentations, interviewer's guide, team leader's guide, travel schedule, contracts, etc.);
- Purchase necessary materials, including notebooks, pens, mobile phone credits, identification badges, etc.;
- Collect and pack vitamin A capsule samples and other services included in the survey for each enumerator;
- Decide on the location for the field test and make the necessary arrangements;
- Confirm training and survey dates with enumerators and team leaders.

### Logistics

- Make arrangements for vehicles carrying all teams to have enough seats and suitable to the field;
- Ensure that enumerators' fees are ready (salary, per diem), as well as accommodation, communication, fuel, etc.;
- Collect information on health officials at all levels and inform them about the survey through regular procedures of the country
- Prepare contracts for enumerators and team leaders;
- Prepare assessment forms, set a date and a schedule for taking stock
- Print questionnaires, contracts as well as instructions for enumerators, checklists) and other materials.

### Preparations required for surveys using mobile phones

- Survey program using ONA or another program such as MAGPI or Dimagi;
- Buy SIM cards;
- Set up mobile phones if you use them for the first time;
- Activate telephones for data and add credit/data plans (200-250 MB is usually enough);
- Download the survey forms on telephones;
- Thoroughly test the mobile phone survey forms to ensure that the skip patterns were properly programmed, and that all questions and answers were properly entered;
- Get as many portable chargers and cigar lighter plug chargers (Recommendation: 1 portable charger for two interviewers and 1 cigar lighter plug charger per vehicle);
- Have a power strip to charge mobile phones in case the team leaders are in charge of the charging;
- Prepare the output registers of phones and other equipment (chargers, power strip outlet, etc.);



## XI. ANNEX 3 – Selection of survey team members

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### A. Select a senior supervisor

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The senior supervisor will be in charge of all aspects of the survey, act as contact person for information, provide advice if problems arise, monitor the performance of the enumerators and team leaders, review the survey forms and be the main contact person for the survey. It is recommended to choose a supervisor and one or two assistants to help in the organization and supervision of the survey.

### B. Select team leaders

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The main task of the team leader is to guide a team of enumerators in the successful implementation of a survey. In selection process of a candidate for the position of team leader, it is recommended to look for the following qualifications:

1. Hold a secondary education degree, speak the national and local languages required to implement the survey
2. Have a leadership experience
3. Have good communication skills
4. Have good knowledge in health and education
5. Have work experience with health officials
6. Have the ability to pay attention to details
7. Have prior experience in survey

### C. Select enumerators (enumerators)

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The type of enumerators selected for a PECS depends on what is most appropriate for the community. For example, students, university graduates and NGO staff were recruited in various contexts for PECS.

The primary task of an enumerator is to conduct interviews. In selection process of a candidate for the position of enumerator, the following is recommended:

1. The candidate should at least have the level of secondary education, speak the national and local languages required to implement the survey
2. Have some basic knowledge or experience in the health area
3. Being able to communicate effectively with others
4. Have the ability to pay attention to details

### D. Select data entry staff

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In selection process for data entry staff, candidates should be assessed against the following criteria:

1. Have a good knowledge of data entry software.
2. Have prior data entry experience
3. Have good typing skills
4. Have the ability to pay attention to details
5. Ability to work effectively under pressure

## XII. ANNEX 4 – Proposed responsibilities for the survey team members

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### Proposed responsibilities for team leaders

#### Logistics:

- Communicate with village leaders and health officials to explain the purpose of the survey and obtain required approvals.
- Manage and supervise enumerators in the field.
- Interview health workers, village leaders and stakeholders.
- Respond to questions and concerns of enumerators.
- Organize travel plans throughout the survey and manage the logistics of the team including lodging and accommodation arrangements.
- Maintain regular contact with the senior supervisor of the survey.
- Recruit and organize field guides and/or translators as needed.
- Manage all aspects of the expenses incurred by the survey team.
- Ensure the quality of the data collected by enumerators.
- Ensure the submission of forms (formhub) and sheets (paper version) after verification.

### Proposed responsibilities for enumerators

- Conduct caregivers surveys (responsible for children)
- Obtain the consent of the mother or caregiver before conducting the interview.
- Follow the special instructions to ask questions:
  - Do not express opinions during the interview.
  - Do not influence interviews.
- Answer questions and concerns of the caregivers and be respectful to the team leader.
- Pay attention to details
- Record carefully and accurately the answers to the questions
- Thoroughly check the completed questionnaires at the end of each interview. If there is any problem or missing information, go back to the household and check the response with the mother.
- Be polite and respectful during the interview.

### Proposed responsibilities for data entry staff

- Enter the paper survey data into a database
- Set aside incomplete or illegible forms and discuss them with the survey supervisor
- Organize and classify paper survey forms before and after each entry



**XIII. ANNEX 5 – PECS enumerator interview form template**

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#### **XIV. ANNEX 6 – Example of government approval letter**

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## XVI. ANNEX 7- Team leaders training program template

### TEAM LEADER TRAINING PROGRAM FOR POST-EVENT COVERAGE SURVEYS (PECS) FOR VITAMIN A SUPPLEMENTATION

**Wednesday 5 June 2013**

8:45 – 9:00	<i>Welcoming speech .....</i>
9:00 – 9:15	<i>Presentations .....</i>
9:15 – 9:30	<i>Presentation of child health days, Vitamin A supplementation and deworming .....</i>
9:30– 9:45	<i>Overview of PEC survey.....</i>
9:45 – 9:30	<i>Daily survey program.....</i>
10:30 – 10:45	<i>Coffee/Tea break</i>
11:15 – 11:30	<i>Daily preparations for the survey....</i>
11:30 – 13:00	<i>Conduct caregiver surveys..... Ensure data accuracy</i>
12:00 – 14:00	<i>Lunch break</i>
14:00 – 15:00	<i>Conduct health care workers and CHW surveys .....</i>
15:00 – 15:15	<i>Accommodation and meals.....</i>
15:15 – 15:30	<i>Ensure safety of the team.....</i>
15:30 – 16:30	<i>Management of difficult situations.....</i>
16:30 – 16:45	<i>Monitor fuel consumption and expenses.....</i>
16:45 – 17:00	<i>Debriefing.....  Communication with HKI staff.....</i>
17:00 – 17:15	<i>Closing remarks.....</i>

## XVII. ANNEX 8- Enumerators training program template

**ENUMERATORS TRAINING PROGRAM FOR POST-EVENT COVERAGE SURVEYS  
(PECS) FOR VITAMIN A SUPPLEMENTATION****Thursday 6 June 2013**

8:45 – 9:00	<i>Welcoming speech.....</i>
9:00 – 9:15	<i>Presentations.....</i>
9:15 – 9:45	<i>Contact .....</i>
9:45 – 10:15	<i>Presentation of children's days and VAS coverage .....</i>
10:15 – 10:30	<i>Presentation of vitamin A supplementation</i>
10:30 – 10:45	<i>Coffee/Tea break</i>
10:45 – 11:30	<i>Methodology of PECS survey.....</i>
11:30 – 13:00	<i>Tools for PECS survey.....</i>
13:00 – 14:00	<i>Lunch break</i>
14:00 – 15:30	<i>Role play - Groups.....</i>
15:30- 17:00	<i>Role play – Together.....</i>
17:00 – 17:15	<i>Evaluation.....</i>
17:15 – 17:30	<i>Closing remarks.....</i>

**Friday 7 June 2013**

8:45 – 9:00	<i>Wrap-up.....</i>
9:00 – 9:30	<i>Introduction to Ona.....</i>
9:30 – 10:30	<i>Conduct a survey using Ona.....</i>
10:30 – 10:45	<i>Coffee/Tea break</i>
10:45 – 11:30	<i>Role play/Practice - Large group.....</i>
11:30 – 12:30	<i>Role play/Practice in groups of two.....</i>
12:30 – 13:00	<i>Discussion and questions.....</i>
13:00 – 14:00	<i>Lunch break</i>
14:00 – 15:30	<i>Role play in large group.....</i> <i>Assessment of survey skills.....</i>
15:30 – 16:00	<i>Use of mobile phones during the survey</i> <i>Logistics.....</i>
16:00 – 16:30	<i>Planning of field visit.....</i>
16:30 – 17:00	<i>Closing remarks.....</i>

**Saturday 8 June 2013**

08:00 – 12:30	<i>Testing of PEC survey in the field</i>
13:00 – 14:00	<i>Lunch break</i>
14:00 – 17:30	<i>Report and preparation for departure</i>



## ANNEX 9 – Table of random numbers

8 2 0 3 1 4 5 8 2 1 7 2 7 3 8 5 5 2 9 0 6 3 1 6 4  
 0 8 7 3 3 1 9 7 5 2 5 7 6 9 8 0 3 6 2 5 1 2 7 5 2  
 2 3 3 8 6 1 4 2 4 0 2 6 1 8 9 5 2 6 9 8 3 4 0 1 0  
 4 7 5 5 6 3 0 7 7 1 9 1 6 1 7 4 1 7 1 3 7 9 3 3 7  
 1 9 3 9 5 3 4 9 5 5 2 7 5 8 0 3 4 8 8 1 2 7 5 3 4  
 2 8 7 8 1 4 1 4 9 4 2 4 1 5 2 9 4 6 2 1 5 2 8 1 9  
 8 4 8 5 1 3 9 6 6 0 7 2 1 9 0 2 0 6 7 0 6 0 1 3 0  
 0 3 8 8 4 7 5 1 5 1 7 3 4 5 2 0 7 4 7 9 6 6 7 7 4  
 3 5 3 1 9 3 7 4 9 5 0 2 0 1 4 6 2 5 4 5 8 5 0 9 2  
 3 4 5 9 5 2 7 9 8 9 0 5 5 8 5 1 7 7 3 5 5 4 7 7 2  
 4 1 5 3 0 9 1 3 7 2 5 8 7 7 1 3 6 3 9 7 8 7 9 1 7  
 7 2 9 5 6 7 8 5 4 5 3 4 5 4 1 9 8 6 7 5 7 9 3 1 8  
 5 9 2 8 9 8 6 4 4 1 5 3 7 7 0 8 0 2 5 6 0 6 1 2 0  
 1 3 3 3 9 0 5 2 8 7 4 0 9 0 3 7 3 1 7 9 4 5 5 2 8  
 4 6 0 1 0 8 6 2 1 0 0 5 0 3 1 5 4 9 0 3 7 4 7 0 1  
 7 7 0 6 6 3 2 8 8 5 8 9 5 6 4 0 5 9 1 8 0 5 4 9 4  
 3 3 8 5 7 5 7 4 3 4 5 7 9 6 9 5 0 7 7 6 6 8 8 5 9  
 9 1 7 1 3 6 9 2 9 1 9 4 2 3 3 0 8 1 8 7 7 6 4 7 2  
 6 2 2 8 0 9 4 5 3 7 2 5 4 6 6 5 6 6 5 0 4 6 5 6 8  
 1 7 5 9 0 0 2 0 5 6 5 8 5 1 9 5 3 3 7 4 0 5 8 2 4  
 0 3 9 6 9 4 7 3 5 7 0 6 5 4 7 1 1 8 5 3 2 8 0 9 8  
 3 0 8 2 8 1 4 4 1 6 7 6 6 9 9 9 7 5 8 9 6 4 5 9 0  
 0 4 9 1 2 2 0 1 3 2 4 6 7 9 1 8 8 2 9 8 3 2 6 2 9  
 7 2 5 1 4 4 9 6 5 2 8 5 5 1 0 8 2 6 2 0 6 9 2 2 3  
 9 9 2 5 7 4 3 1 2 3 6 4 1 5 2 4 0 4 2 2 8 7 1 8 2  
 2 0 9 1 8 9 4 4 6 1 4 8 6 7 9 2 5 0 6 9 3 3 0 1 2  
 6 5 2 6 1 2 1 7 7 1 4 7 8 1 4 2 7 3 7 4 0 0 1 2 9  
 1 2 9 9 6 4 2 5 3 2 7 4 3 2 3 3 8 5 3 3 6 5 5 3 2  
 3 2 8 3 7 9 6 0 4 8 6 0 5 4 1 1 4 9 0 5 0 9 4 4 1  
 0 9 3 4 1 1 9 5 8 3 2 4 6 7 3 4 4 9 2 3 7 2 5 7 8  
 6 7 5 3 4 2 1 5 5 0 1 2 4 7 5 5 2 6 8 7 8 2 8 0 3  
 9 6 0 1 3 0 5 3 6 6 2 9 6 0 3 4 7 6 1 1 9 1 6 5 3  
 4 6 9 9 6 7 8 5 8 1 2 9 2 6 2 4 4 9 0 5 5 4 5 2 0  
 9 7 7 1 9 2 6 5 6 3 3 6 3 6 8 3 9 9 8 7 7 2 7 9 7  
 7 5 3 3 3 3 7 3 7 6 7 3 9 1 1 2 3 9 0 9 5 9 6 5 7  
 2 8 1 3 1 4 2 1 0 3 1 2 3 2 0 2 3 9 7 7 3 5 0 6 9  
 6 0 9 4 8 8 5 5 3 7 9 0 0 0 0 1 9 2 0 6 1 5 8 4 2  
 3 5 9 0 7 7 0 1 8 1 2 9 3 4 6 9 2 8 9 8 9 8 6 5 5  
 4 4 8 1 1 7 4 4 7 4 4 4 1 6 5 9 3 6 5 9 8 3 2 4 3  
 6 3 9 7 0 6 2 5 3 3 2 6 0 5 1 2 4 3 7 1 0 7 8 2 1

## ANNEX 10: Scenarios for role plays

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1. Some enumerators of your team escape the night to have fun since they do not like the chosen hotel. The next morning, you realize that one of them is absent.  
*Possible solution: You contact the survey supervisor to inform him about the situation. You try to find out if a member of the survey team or someone at the hotel has information about where the enumerator might be. If this is not the case, visit the place where the investigator is supposed to have gone the night before and ask if anyone has information about this.*
2. On your way to the cluster, your vehicle has a puncture and the spare wheel has no pressure. The distance to the next cluster is very long and it would take several hours to walk.  
*Possible solution: Call the survey supervisor to report the issue. Contact the resource person of the survey team at the nearest location to ask for an additional spare wheel to be brought by motorcycle or taxi.*
3. You arrive at the survey place on time, but when you try to call the health care worker his phone is turned off. You keep calling their phone for the next 30 minutes but the phone is still off and you have no other information about them.  
*Possible solution: Go to the health facility that serves the community, introduce your survey team and ask for someone to introduce you to the village chief.*
4. Go to the health facility that serves the community, introduce your survey team and ask for someone to introduce you to the village chief. However, when you arrive at this house, a young member of the village chief's family informs you that he/she has gone to a funeral 6 hours ago and will not come back before one week.  
*Possible solution: Ask for someone else who knows the whole village, the head of youth, and the village president if he can help the survey team.*
5. Three of the four enumerators and the team leader get sick with a serious flu. They vomit and will not be fit to travel for two days at least.  
*Possible solution: In the event that the survey team is unable to complete the survey, the survey schedule will need to be adjusted. Changes in travel dates and budgetary implications should be discussed with the survey supervisor.*
6. You receive a call from a health worker in the village you plan to survey the next day. He informs that something has happened in the village and that you cannot come and do the survey as planned. He suggests you change your route and come back to this village after four days.  
*Possible solution: If the incident which occurred is related to the security or absence of the villagers, you should proceed with another cluster, then follow the evolution of the situation by phone calls to know when it will be possible to visit this village in particular.*
7. One of the team's enumerators receives a call informing that he/she should urgently return to the household. He/she states wanting to take a bus to get back immediately.  
*Possible solution: Contact the survey supervisor to ask for advice and check if the terms of the enumerator's contract allow for early departure. If the enumerator insists to leave, the survey team shall deal with the budgetary and planning implications. Therefore, potential solutions should be discussed with the survey supervisor.*

8. It is obvious that the map provided by the village chief is not accurate since the landmarks are in the wrong place and the roads are not correctly marked.  
*Proposed solution: Cross the cluster on foot with a community guide and/or review the plan in detail to confirm the location of the boundaries and names of the roads.*
9. An investigator was sent to survey caregivers in an area without access to the network and cannot be found by the rest of the survey team.  
*Possible solution: Visit the quadrant where the enumerator worked and find out from the caregivers or from anyone outside if he saw the enumerator and in which direction he would go. To prevent such a situation from occurring, it is advisable to agree on a meeting place before the start of work in each cluster/quadrant.*
10. Tribal violence erupts during the night and police are now present in the survey area.  
*Possible solution: The team leader should check with the community leader the security situation in the area. If the situation is calm but tensions persist, therefore he can ask for a recognized community leader and some security guards to accompany the survey team. If it is dangerous for the survey team to continue working in the area, proceed with the next cluster and ask for contact information of the community leader and health worker to learn about the progress of the situation. If, however, at the end of the survey, the conditions are still not favorable, therefore you should choose a replacement cluster from the selected additional clusters.*
11. While searching for a cluster for the survey, the survey team learns that the village they are looking for does not exist.  
*Possible solution: Use a replacement cluster among the additional clusters chosen. It is advisable to make the necessary arrangements before leaving. If this were the case, the survey team should have known in advance that the village did not exist and this situation could be avoided.*
12. The cluster being surveyed is very large and consists mainly of farmland. All the inhabitants live along the roads, so that if the cluster was divided into four equal quadrants, the survey team would lose a lot of time to cross farmland without settlements.  
*Possible solution: Choose randomly five departure points along the residential areas rather than the entire cluster. In case the households are located along a road and there are only two directions that the survey team could take, we can write the two directions (left, right) on pieces of paper and choose one at random.*
13. Health workers and community health workers go on a nationwide strike and refuse to participate in the survey.  
*Possible solution: When you arrive in the village, ask how you could go to the home of the community leader. Go there, introduce the survey team, explain the reason for your presence and ask for consent to access the community. If he agrees, conduct the survey as usual.*
14. The local guide informs the survey team that the location chosen as a starting point is dangerous because it is a den of criminals in the area.  
*Possible solution: You may request that the team be accompanied by security agents. But if the guide still thinks the situation is too dangerous, choose another starting point at random and ask a guide to escort the survey team to make sure to avoid dangerous areas.*
15. A caregiver and her child have been living in the community for only a few days after the campaign took place, however, she knows about the health services from place she is from.  
*Possible solution: Collecting information from someone who just settled in and did not live in the village when the campaign took place would distort the data. The caregiver should be informed that she is not eligible for the survey and proceed with the next household. In this*

case, the survey team may provide advice on the purpose of the survey and provide information on the next phase of the campaign.

16. In the middle of the data collection, the head of the family comes in and asks what you are doing. When he learns that you are working for the government, he interrupts the interview and says he cannot cooperate with the government.  
*Possible solution: Try to explain that the whole exercise is for the benefit of the children and the health services they receive. If he is adamant, interrupt the interview and go to the next household.*
17. The survey team goes to a remote village and no member of the survey team speaks the local language. None of the caregivers speak the national language.  
*Possible solution: Ask a member of the community to help you with the interpretation. Prompt him to ask the questions exactly as you phrased them, and not to advise the caregiver on how to respond. Previous survey teams found that guides often misrepresent questions. It is therefore preferable to know the local languages in advance and to make sure that the interviewers can speak this language.*
18. The caregiver was living with a sister in the village surveyed for the past two months and the child was supplemented during the campaign.  
*Possible solution: Conduct the interview since the caregiver were in the village during all the campaign activities.*
19. No local manager who can accurately draw the map of the cluster to be surveyed is available.  
*Possible solution: Ask a guide who is very familiar with the cluster to escort the survey team. Work with the guide to establish a map with limits and landmarks.*
20. In the middle of the survey, the caregiver enters the house and does not come back.  
*Possible solution: Try to call the caregiver and in case of no answer, see if a neighbor can help talk about the importance of the survey and ask just a few extra minutes of time. If the caregiver leaves and refuses to come back, we should end the survey, proceed with the next household, and question an additional caregiver in this cluster. To avoid this kind of situation, when the enumerators present the survey, they should show how important it is, how the child caregiver will benefit from the information collected and the time it takes to complete the survey. Enumerators should always be grateful to the caregivers for their participation and always treat them with respect.*
21. The caregiver is ready to be interviewed, but such participation entails payment.  
*Possible solution: It should be explained that respondents are not paid for their participation in the survey and that the results of the survey will provide more than the money they need. In case of refusal, proceed with the next household; you should never pay.*
22. A campaign against polio took place one week before child health days, and many caregivers confused the receipt of vitamin A supplementation with the receipt of the polio vaccine.  
*Possible solution: Make sure that enumerators present to caregivers the vitamin A capsules and highlight that this is a vitamin A supplement and not a polio vaccine.*
23. You enter a household and the person you find informs you that the parents are busy doing certain shopping and in their absence, he/she can answer the questions.  
*Possible solution: The interviewee as part of the survey should be the primary caregiver. Ask if he/she is taking care of the child most of the time, if he/she is responsible for his health, if he/she knows that the child took part in the campaign and if he/she is aware*

*of the child eating habits. If the answers is "yes" to all questions, therefore he/she can be interviewed.*

24. The survey team's vehicle has a flat tire on the way to the next cluster. The wheel is repaired but the team arrived two hours late and is informed that the head of the community went to a funeral. Many people can help but they are all busy with meetings and will not be able to arrive before another hour.

*Possible solution: Try to contact the head of the community or another representative of the community by phone to request permission to conduct the survey. Ask if you can have a guide and someone to help you draw a map of the cluster.*

25. The caregiver does not have information on the child's date of birth, but you can clearly see that the child is eligible for the survey.

*Possible solution: Try to get information about the age of the child. If the caregiver cannot provide any information, he/she should not be interviewed. Some children may appear eligible but may be older than the age of the target group due to stunting or malnutrition.*