Activity Manual

ITN Durability Monitoring

This activity manual is geared towards PMI implementing partners that will be conducting durability monitoring of ITNs. It is intended to provide step-by-step instructions for various components of the monitoring activity. This manual also serves as a reference document for PMI country teams and technical advisors.

# Preparation

## Protocol

Download the template protocol (file 2a) from the durabilitymonitoring.org website. You will see instructions for adapting the protocol in comments within the document. The key decisions to make with the research team, donor, and NMCP are:

1. Whether to compare the same LLIN in different sites, or
2. Whether to compare different LLIN products in similar sites

(We do not advise comparing different LLIN products in drastically different environments.)

1. Whether to conduct chemical analysis

In-person or phone conference meetings are an excellent way to come to agreement on site selection and the above decisions.

## Local Partners

For PMI-funded activities, the PMI country team, and the PMI country support team will be involved in protocol approval and site selection. The NMCP is a key local partner. The implementing partner may choose to engage a local research firm, local university or national research institute, or other group to assist with fieldwork and data collection.

## Ethical Review

Ethical review by the both the implementing partner’s IRB and by a local IRB is generally required. It is important to consider ethical review timelines in the preparatory phase, as approvals may take several months. We recommend submitting for IRB approval as soon as possible following agreement of the overall protocol by the partners.

## Study team roles and responsibilities

* Principal investigator – ultimately responsible for the implementation of the activity and adherence to ethical principles
* Co-investigators – may take the lead in data analysis, oversee fieldwork, etc.
* Study coordinator – responsible for organizing fieldwork, supervising fieldwork, ensures that data collection proceeds without problems, and that data are checked and uploaded/entered.
* Field supervisors – supervise data collector teams, assist with problems, correct errors, liaise with study coordinator
* Data collectors – conduct household interviews and hole assessments

## Other early preparation

### Preparing the labels and barcodes

Preparing the labels and barcodes for eventual fieldwork can take several days, and should be done well in advance of training.

You will need the following:

* Roll(s) of white polyester woven ribbon, 1.5” wide (3.8cm) by 20m (makes 300 labels)
* Heat cutter e.g. <https://www.amazon.com/gp/product/B01AO3AEIA/ref=od_aui_detailpages00?ie=UTF8&psc=1>
* 1 package of printable, weatherproof polyester labels for laser printers, size 2.5” x 1.563”. These can be obtained from onlinelabels.com (product code OL800LP). There are 18 labels per sheet. A package of 100 sheets (1800 labels) is about $50.
* Laser printer
* Matching label template – this can be downloaded for free from [onlinelabels.com](file:///C:/Users/hkoenker/AppData/Local/Microsoft/Windows/Temporary%20Internet%20Files/Content.Outlook/TM2AG621/onlinelabels.com) with your purchase of the labels.
* The corresponding barcodes which are found in the durability package as file 4a (barcode gif files and Word documents with ready for print barcodes).

Steps:

1. Using the heat cutter, cut 2.5” (6.5cm) lengths of the ribbon until you have enough labels for your sample size, plus extras.
2. With a black permanent marker, write four-digit numbers from 1000 to 1380 (or whatever the sample size is likely to be, plus extras) on one-side of the labels. For the second site, numbering is from 2000 to 2380. A third site would begin with 3000, etc.
3. Using the Barcodes files, print out corresponding barcode stickers on the printable labels. Print a test sheet to ensure everything is lined up correctly. The bar code should be printed with its 4-digit number beneath it.
4. If additional barcode numbers are needed, you will need to create additional .gifs at the link in the “barcode generator website” file, and place those images into the template file.
5. Print the full range of barcode labels on a laser printer.
6. Peel and attach the barcode labels to the fabric labels, ensuring that the numbers are identical.
7. Separate the labels for the different sites into marked envelopes.

# Training

## Training duration and location

The sample training agenda (file 3a) describes a 5-day training, which is recommended for baseline training and/or for new implementing partners. With more experience, the training can be condensed into 3 days, particularly if the same data collectors are used at each assessment. Training location should be determined by considering site location, languages, and available facilities. If multiple sites are being monitored and sites are wide-ranging, one training per site is recommended. This also permits hiring data collectors locally which can keep travel costs down. If suitable data collectors cannot be hired locally, however, it is worth the cost to hire them elsewhere.

## Facilitator

The training facilitator will ideally have some experience already in durability monitoring; this role may fall to the PI, Co-I, or study coordinator, or a combination. The facilitator is responsible for ensuring the overall flow of training and that it covers all essential elements required.

## Number of Trainees

Generally, two teams of 4 people conduct data collection in each site, with each team working in one cluster per day. In each team, one of the members is the supervisor. Therefore, 8 trained data collectors are needed. We recommend training 2-3 additional individuals and selecting the final study team using the post-test and observations by facilitators to evaluate trainee performance and overall professional attitude.

## Supplies needed

For the training supplies, please see file 3b.v (Training Manual).

## Training agenda

Please see file 3a.

## Practical exercises

The practical hole counting exercises are crucial for trainees. These are done both in the training venue using some 3-4 training nets with holes, to allow trainees to practice counting holes, compare their results, and to learn from mistakes under supervision of the facilitator. The holes should be counted in each practice net by the facilitators and this count serves as the “gold standard”. Each interviewer team counts the holes in each of the training nets and results are compared. While size1 hole counts rarely agree, the other size counts should not differ by more than one or two counts. Repeat the practice until good agreement is reached. In addition, field practicums are done and must be arranged by the facilitators in advance, in a surrounding community. With practice and feedback from the study team, the data collectors will learn to consistently and correctly count holes. There is also a “hole counting” app now available, which can be used instead of the tally sheets to facilitate hole counting (see the “tablet” section).

## Payments to trainees

Trainees should be paid for their participation in the training and their lodging and meals covered. Payment for the duration of the training should be given on the first day of training to ensure that participants have sufficient money for accommodation and amenities. If the training is followed immediately by fieldwork, it is advisable that the participants receive payment for the first week of fieldwork, in order that they can pay for their accommodation in the field in advance. The remaining per diem can be paid at the end of the first week of fieldwork. Upon receiving their per diems, the trainees should sign a pre prepared document to record that they have received their payments.

## Selection of final data collection team

The selection of the final data collection team should be made based on their performance observed during the training, results of the post-test, and an assessment of professional attitude and approach to the activity. Trainees not selected for fieldwork should be informed, with the primary reasons communicated to them, so that they can be aware of improvements they may need to make.

## Selection of supervisors

Supervisors may be selected in advance if they are experienced, for example if a research firm or group is engaged. Otherwise, supervisors can be selected from among the pool of trainees, based on previous similar field experience, performance, leadership, and professional attitude.

## Field Hole Counting Day

For the field practical exercise, the facilitator team should liaise with the local malaria team and community leaders in advance to identify nearby households (close to the training facility) that are willing to let the trainees into their homes to conduct interviews and assess net condition. Transport must be arranged for the trainees and logistics arranged with the households/community liaison in advance and then confirmed again to avoid households being not at home or expecting the trainees at the wrong time.

## Fieldwork agreements

A fieldwork agreement should be signed by each trainee during training and before starting fieldwork. This should outline the study, the agreement between implementer and the trainee, what their role is and the per diem payment schedule. There should be a separate fieldwork agreement for each role (coordinator, supervisor and interviewer). Sample fieldwork agreements are attached to this study manual as annexes.

# Preparing the tablets

## Purchasing the tablets

Android tablets with GPS function are required, e.g. a Samsung Tab 4 or similar.

## Editing the ODK forms

See file 2j.i.

## Adding translation in ODK

Adding a new language (e.g. a local language) to the ODK form is as simple as inserting a column. The generic ODK form includes a blank column highlighted in yellow (with a column label of Swahili) in several places in each tab, to show you where you need to provide translation for questions, answer options, and prompts/hints/reminders. Note that each tab in the file has at least one column highlighted.

## Loading the ODK forms onto the tablets

See file 2j.i

## Troubleshooting

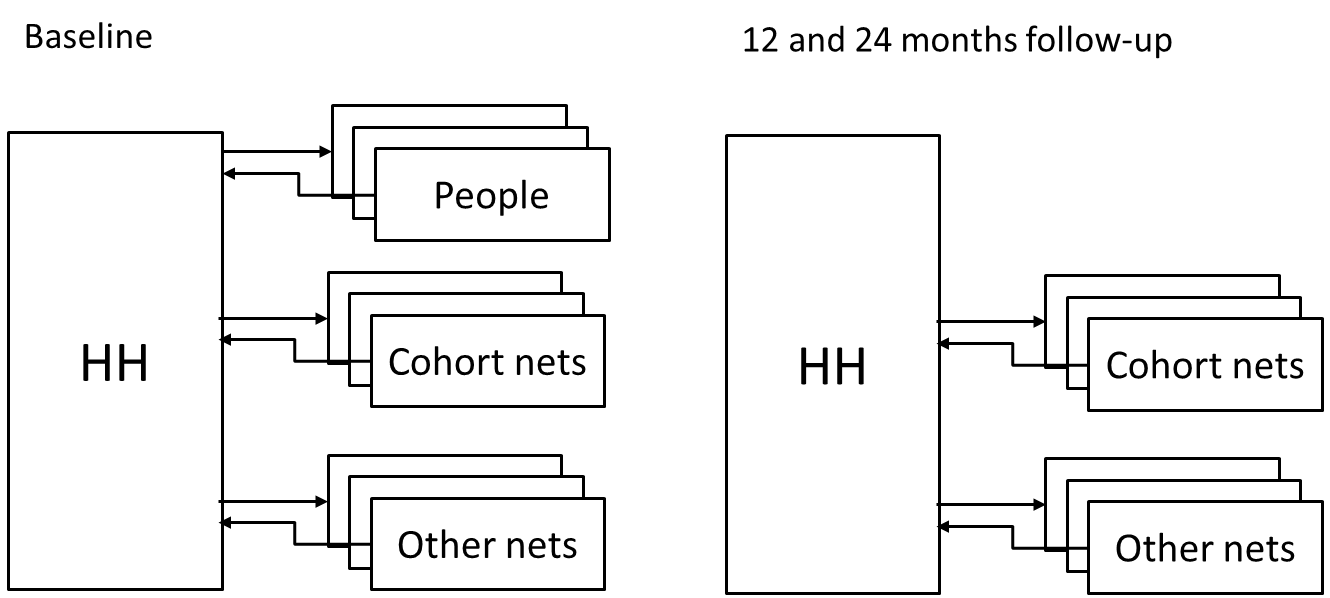
If you have removed a questionnaire from the ODK system by deleting the form and corresponding media folder from the “forms” sub-folder”, you may still see the form listed when you open ODK collect. In order to completely remove forms from the list, go to the “metadata” subfolder under “odk” on the tablet and delete all the files there. Next time you open ODK collect you will initially see a message “no forms available” but after a few seconds, it will show you those that are currently in the “forms” folder.

## GPS function

Getting the GPS coordinates is an inbuilt function in ODK and only needs the “location” function of the tablet to be enabled. When opened for the first time, it may take a few minutes before a reading is obtained. Remember that the GPS function only works outside where access to satellites can be obtained.

## Adding follow-up questionnaires

The questionnaire is slightly revised for follow-up surveys, and these files need to be uploaded on to the tablets. At 12- and 24-month data collection, no details of the household and assets or the list of people is collected (this is only repeated in the final survey).To add one of the follow-up questionnaires to ODK collect, simply copy the respective xml form and corresponding media folder to the “forms” folder on the tablet. It is advisable to remove any other questionnaires/forms from ODK collect in order to not confuse the interviewers (see also under troubleshooting above). More detailed instructions on how to delete old forms and load new forms are found below.



***To delete any previous forms and instances:***   
Connect the tablet to your laptop and go to the tablet in your file management system (you can also do it within the tab in “my files” but it is easier to work through the laptop).  
first, go to the subfolder “odk” >> “forms” and delete any files that are there, then second, go to the “odk”>>”instances” folder and delete any files that are there. Third, go to the “odk”>>”metadata” folder and delete all files (ODK will re-create these when it opens)

Then copy the new form and media folder into the “forms” folder. Now you can go to the main menu of the tablet and open ODK collect. Go to “Fill blank form” and click. First you will see a message saying “there are no forms”... but after a second or two the form should appear.

After the end of the training you have to again clean the “instances” sub-folder to delete any files from the training exercise

## Preparing follow-up listings

For the follow-up questionnaires on ODK, a number of listings are needed as part of the form and to assist in the field work. First there are two lists that are incorporated into the ODK system:

* A list of the households included in the last survey and which need to be visited with the household ID, location, name of the head and number of labeled campaign nets in that households
* A list of all the label numbers and net IDs in each household

Then there is the information needed to track the households using maps on the tablet (see also next section)

* List of each household’s GPS coordinates with household ID and name of the head of the household

Finally, a printed copy of information to assist the field teams

* List per cluster of all households to be visited and the labeled campaign nets to be assessed in each household

If the Stata statistical software was used for data analysis, these lists can easily be extracted from the data sets of the last data collection using the do-file “prep-lists,” which can be found in the package (file 4\_site1\_m12.do). This do file also contains the instruction process the lists and rename columns and files. The file with the GPS coordinates needs to be converted into a .gpx format to be readable in the mapping software. There are a number of open source tools to do that; one of which is “[GPS Babel](https://www.gpsbabel.org/)”.

## Installing Map App for finding households at 12, 24 and 36 month follow-ups

There are a number of options to use mapping software on the tablets to facilitate the tracking of previously visited households during follow-up surveys. However, good experience has been made to date with the open source application “[Open Street Maps for Android](http://osmand.net/)” or OSMAND since this free software works offline which is crucial for many remote areas where durability monitoring takes place.

* Download the latest version of OSMAND (currently 2.4.6) from the Play Store. If internet connection is an issue it may be quicker to have a copy of the apk file and install it directly on the tablet.
* You will need at least two maps on the tablets: the “world\_basemap.obf” and the specific country map for your country (up to 10 maps can be downloaded for the free version of OSMAND).
* Under the OSMAND folder on the tablet create a new folder called “tracks” and copy here the gpx file with the households to be visited or some local sites to be used during training.
* Now open the OSMAND app and in the set-up menu (usually upper left corner) enable the “GPX track” option. Then select the gpx file you need.
* Now all points will appear as red starts which will show details (household ID and name of head) if clicked on.
* A PowerPoint presentation is available for training to explain the use of OSMAND to track households.

## Household random sampling app

Instead of using the manual random number tables, an app is now available to facilitate the selection of the 10 households and 6 replacements per cluster at baseline. All input needed is the total number of households listed. The app was developed by Relief Applications and can be found on the Play Store ([Household Random Selection App](https://play.google.com/store/apps/details?id=hh.random.selection&hl=en)).

## Hole counting app

The hole counting app is a simple tool where for each counted hole (by size and net panel) a button is pressed and at the end the total hole count is presented which can be entered into the ODK entry screen. The app was developed by Relief Applications and can be found on the Play Store ([Mosquito Net Counting Holes App](https://play.google.com/store/apps/details?id=com.ionicframework.countholes689203&hl=en)).

# Fieldwork

## Fieldwork team composition

Fieldwork team size is dependent on the total number of clusters included in your sample size:

* In cases where 15 clusters of 10 households are chosen (as recommended in the PMI guidance), each site is composed of two teams per study site. Each team is composed of one supervisor and three interviewers, giving a total of eight individuals per team. There is one overall coordinator who oversees both teams,
* In cases where a different approach is used, team numbers need to be adjusted accordingly, but team size should remain the same.

The roles of each position at baseline are as follows:

**Coordinators:**

* + Coordinate the supervisors and interviewers in the field during data collection
  + Coordinate and supervise data collection and liaise daily with facilitator and/or overall durability monitoring supervisor
  + Coordinate with overall durability monitoring supervisor in case of problem
  + Transfer collected data to a designated Dropbox via internet
  + Collect hard copy consent forms from field teams at the end of every working day
  + Deliver hard copy consent forms to overall durability monitoring supervisor at the end of the fieldwork
  + Report on data collected
  + Responsible for maintenance and safe-keeping of data entry devices (Tablets, GPS, etc.)
  + Responsible for overall quality of field work

**Supervisors:**

* Participate in training on the LLIN Durability Monitoring
* Lead the team for the field work
* Organize household listing
* Lead the random selection process
* Allocate teams to selected households
* Oversee quality of field work
* Secure data entry devices after each day and hand over to coordinator

**Interviewers:**

* Participate in training on the LLIN Durability Monitoring
* Conduct interviews and net hole assessments in household
* Label campaign nets with unique number label
* Enter data in mobile data collection devices
* Collect GPS coordinates for each interviewed household

## Transport, per diem, and lodging preparations

Three cars should be hired per study site, one for each team and one for the coordinator to travel between teams. Each individual is free to choose where they wish to stay at the field sites.

## Community entry

Meetings should be held with the district/province leaders and NMCP representatives prior to commencing fieldwork, in order to explain the study and its objectives and to obtain permits and any other relevant documentation that may be needed. At the village level, the supervisor and/or coordinator should meet with the village chief/leader at the start of each day to explain the study and its objectives and to give the previously agreed incentive. Communities should then be sensitized and mobilized in order to obtain maximum cooperation for the surveys.

## Household listing process

A total of 15 clusters per site will be selected using probability proportionate to size (PPS) methodology, with the number of LLIN distributed per community as a measure of size. Within each cluster (or community), eligible households need to be listed. As per the household definition used in the LLIN distribution campaign the definition of a household will be “people eating from the same pot”. If a community is small (less than 200 households) the field team will map the whole village (i.e. list all inhabited houses where people live). If the community is large, i.e. exceeding 200 households, the equal size section-approach will be used. With the help of local authorities, the community will be divided in sections of approximately equal size each with 40-60 compounds. One of these sections will be randomly selected by the supervisor and within this section all households will be mapped as above. The number of sections used in such clusters will be recorded by the supervisor.

## Randomized selection of households process

Within each selected cluster (community), 10 households will be selected. Using the list of eligible households that were mapped in the step above, the supervisor will randomly select 10 households with equal probability for each household using random number lists. These random number lists provide 10 random numbers for each possible total of listed households. In addition, six replacement households will be sampled which will be used if a sampled household reports never to have received any nets from the campaign. The app mentioned in section 3.10 can be helpful.

Sampled households will be visited and initially screened whether or not they had participated in the LLIN distribution campaign. If this is not the case the household will be dropped and one of the replacement households will be visited. For each consenting household the GPS coordinates will be recorded and together with the full name of the head of household entered into the household master list which will be used to identify the household for the annual assessment visits.

## Informed consent process

If a household confirms participation in the campaign information on the study will be given and written consent sought using the consent script in the local language. If the household does not give consent, it will be dropped and one of the replacement households will be visited until the required number of households is reached. Household consent needs to be obtained prior to each round of data collection.

## Household visit

If a household consents to interview, they will be asked to collect all LLINs in the household. The supervisor will then interview the household head using the questionnaire uploaded onto the tablet, whilst the interviewers label the LLINs identified to be from the recent campaign with the unique barcode and inspect the LLINs for holes.

During follow-up data collection, all households that can be found are interviewed, and the status of each labeled campaign net is determined (present or not). The nets that are present are examined for holes. In addition, all other nets in the household from sources other than the campaign are recorded (but no hole assessment is done).

For each site, two lists with a) all sampled households and b) campaign nets by cluster should be produced in a Word and pdf version prior to follow-up data collection. These lists (best to use the pdf-version) need to be printed in advance and will be used by the field teams. It may be best to print two copies each in order to have a back-up.

The lists should include (columns left to right):

1. the number of households sampled in the village that have labeled campaign nets
2. the household ID number
3. the name of the head of household as recorded at baseline
4. the number of labeled campaign cohort nets in that household
5. the ID number of each campaign cohort net in the data base
6. the number on the label of the campaign cohort net

**It is important that a record on the tablet is created for every household on the list even if no interview is done.**

There are four possible outcomes of the household visit:

1. The household is still there but nobody was present or could be reached on the survey day
2. The household was there, present and interviewed after giving consent
3. The household no longer lives at the same place as before. Here two options exist:
   1. The household moved outside the cluster. The field “household moved away” is marked.
   2. The households shifted locations within the same cluster. In this case the field teams visit the new location. In the tablet they mark “household present and interview done” and then in the questionnaire answer the question “is the household still at the same location” with “no”. They then enter the new GPS location and some details of the new house.
4. The household was there and present, but consent was not given for data collection.

The questionnaire is started by entering the household ID number from the printed list. The tablet will then present the details of village, head of household etc. The interviewer must check that this is the correct household he is interviewing.

In the household module the questions regarding net ownership, BCC and net care and repair remain the same as at baseline. The information that appears on the printed list on number of labeled cohort nets, net ID and label numbers should also be uploaded on the ODK form. So when section 5 (campaign cohort nets) starts, it will present automatically the campaign net and label number that is first listed on the household list. The interviewer should identify this net in the household. If the net is no longer there, details of what happened need to be recorded. If the net is there it is assessed as before.

If the net is there but the label has been lost, the interviewer tries to identify which net it was and enters the data. If this is not possible the entry is “net no longer there” and reason for loss (Q80) is “other”.

The hole assessment is done as before and to count the holes either the tally sheet is used or the hole counting app on the tablet as the team feels most comfortable.

Once all campaign nets with labels on the list have been entered, the interviewer gets to section 6, other nets. For each other net a new “group” is added. It is important to emphasize to the team that all other nets in the household need to be recorded and none forgotten.

## Net labeling and barcode reading

Within each household all campaign nets will be identified by the field team based on the manufacturer’s tag of the net and the interview of the household respondents and the net will be labeled with a unique identifying number which will be used to create a master net list. The prepared labels with the barcodes on the back are stapled or sewn onto the manufacturer’s tag on the net. The barcode is scanned just prior to fixing the label to the net. Two staples are used to fix the label. If the net is still stored in its package and not yet hung, the net is removed from the package, the label is attached, and the data collector can gently encourage the household to use the net. However, the household is never required to use the campaign nets, nor should they feel forced to do so.

## Hole counting

The interviewers begin on the side of the LLIN that has the manufacturer’s tag. Then, using the hole tally sheet or the hole counting app, the number of Size 1, 2, 3 and 4 holes are counted per side of the net as well as the roof. If tally sheet is used, the total number of filled circles in each row (size category) is totaled for all five sections and entered into the “Total” box. These are then entered into the tablet by the supervisor.

## Supervision of data collection

At the end of each day the team supervisor will review all collected data and discuss with the team the performance in the field with respect to strengths and weaknesses. Daily reports will be made to the coordinator and if any problems arise this will be reported to the co-investigators or principle investigator for discussion and finding solutions.

For technical issues with the electronic data collection devices consultants should be on stand-by for field support throughout the field activities.

## Verifying the data entry

At the end of the day, the coordinator will verify that the data that has been entered into the tablet is complete before it is uploaded. The coordinator should connect the tablets to his/her laptop and copy all files to his/her laptop labeled under the day and team.

On the tablet the files are found under:

*Folder* odk>*folder* instances>**record folders**

The record folders are copied to the laptop

e.g. *folder* Mongala> *folder* 2017\_08\_06 > *folder* team 1 > **record folders**

The number of files from the tablet should be equal to the number of households on the printed lists for that cluster.

## Transfer and uploading of data

Data from each day and team will be uploaded to the secure web-based data base (e.g. Dropbox folder) on a daily basis or collected on a local storage device (laptop) plus a back-up (e.g. USB drive) by the supervisor until it can be transferred.

## Preparation of the tablets for the next day

If the upload is successful, then the coordinator will erase the files from the tablets before redistributing them to the team the next day. If the copy in the Dropbox is not successful (Wi-Fi connection not working, etc.) then they must keep the files in the tablets (for backup) until they can access the Dropbox and copy the files. Coordinators will send a message to the overall study coordinator when they have finished copying all of the files into the Dropbox to make sure that the files can be reviewed immediately.

## Quick checks of the data for fieldwork supervision purposes

As soon as the data arrives the study coordinator should download the files and converts from the ODK format (see 7.2 below) and checks the files for completeness and obvious errors. Points of special attention at baseline include GPS coordinates and name of household head, at the follow-up surveys the completeness of records (all households on the list need an outcome). At all times the hole assessment data should be screened for obvious problems – overly huge numbers of holes, etc, which may indicate data entry error. The study coordinator then sends a daily email back to the site coordinator with feedback for the field teams.

## Frequently encountered fieldwork problems and how to address them

There have been reports of household members physically removing the labels from the nets. It is important to emphasize to the household members at baseline the importance of the labels and that they must not be removed. Labels may also fall off of nets – households should be encouraged to keep the labels if this happens and teams will reattach them at the next visit.

# Bioassays

A sample of 30 campaign nets per site is collected for bio-assay analysis at baseline, 12, 24 and 36 months. However, only at 36 months will these nets be sampled from the labeled cohort. At baseline, 12, and 24 month, campaign nets are taken from outside the study cohort in order not to reduce sample size.

## Sampling procedure for bioassays at baseline, 12, and 24 months

For each of the 15 clusters, two households are randomly selected (e.g. random number generator in Excel) and these serve as “index” households. From the index households the survey teams visits the closest neighbor and inquires whether a) the household has any nets from the same campaign (and same LLIN brand) that are being used and b) whether they are willing to exchange one of the nets against a new net. If these conditions are not met, the team moves on to the next neighbor until a suitable net is found. If there is more than one eligible net in the household, one of them will be randomly selected.

The following materials are needed:

1. Replacement nets (30 per site, 2 per cluster)
2. Consent forms for the households (we use the same form as for the other households)
3. One page paper questionnaire for the bio-assay nets (file 2b.iv)
4. Bags for each bio-assay net and one big bag to transport the 30 nets
5. Small pieces of paper to write the bio-assay net ID (two per net, one on the net and one on the bag)
6. Stapler to fix ID number on net and bag

## Sampling procedure for bioassays at 36 months

Nets are sampled from the main study cohort at 36 months. From the master list of cohort nets still active after 24 months 30 nets will be randomly selected using a random selection in Excel or Stata). In addition, 10 replacements will be chosen from the list in case the sampled nets are no longer there.

## Paper questionnaires for bioassays at baseline, 12, and 24 months

The 1 page questionnaire is printed out prior to fieldwork and completed with pen and paper at the household, then packaged with the net in its plastic bag and sent on the lab. At 36 months no additional questionnaire is needed.

## Procedure for administering questionnaire and removing the net from the household

Households where nets are sampled for bioassays are consented into the study. If the household refuses, a replacement household is selected (see above). The paper questionnaire is administered to collect core use parameters for the bio-assay nets. The net is labeled with a unique ID number (e.g. (cluster\_year\_01 etc.) and this number is entered on the questionnaire and stapled to the net. The net is then packed into a bag with together with its questionnaire, and another label stapled to the bag.

When the team has finished the index household they turn to the **first next neighbor to the left that is not a study household** to sample the bio-assay as follows:

1. Ask whether the household has any nets from the 2015 campaign, confirming the brand
2. Ask whether any of these nets has been in use for at least 6 months
3. Ask whether they would be willing to exchange one of these nets against a new one
4. If they consent go through the consent form and get signed, if not continue to the next left household until you find a suitable net
5. If consented and there are several possible nets, select one of them by random sampling
6. Write an ID number on a piece of paper as follows “number of cluster/year/01 or 02” depending on whether it is the first or second net in that cluster, e.g. “211/2017/02”. Stable this number on the net next to the brand label
7. Roll the net up and put in plastic bag.
8. Add another piece of paper with the ID number on the bag
9. Fill the one-page questionnaire for the bio assay net and make sure it has the correct ID number
10. Fold the questionnaire and place it in the bag with the net
11. Hand over the replacement net to the household

## Replacement nets

Replacement LLINs (30 per study site) must be procured in advance (or can be organized by PMI or its implementing partners) and carried during fieldwork in order to replace nets that are taken from the households at baseline, 12, 24, and 36 months. These LLINs do not need to be exact matches for the campaign LLINs, but ideally they are as similar as possible to accommodate the household.

## Storage and transport of nets to the labs

Nets are packed in their bags with their questionnaires and identified with the unique ID number. These bags are then placed in larger bags or container for transport. During transport exposure to very high temperatures should be avoided.

## Storage of nets at the lab

In the lab the nets are stored in a cool and dry place until the bioassay is conducted.

## Bioassay procedures

Bioassays should be performed using standard [WHO approach](http://apps.who.int/iris/bitstream/10665/80270/1/9789241505277_eng.pdf?ua=1).

## Data entry for 1-page questionnaire

Once at the lab, each paper questionnaire is entered into an excel spreadsheet. As no personal identifiers are recorded on the questionnaire, it can be emailed to the PI/Co-I conducting the data analysis. Labs may choose to do double data-entry or to pull a few paper questionnaires and compare them to the entered data for quality control. Care must be taken that the ID numbers are correct as these are needed to link the bio-assay results to the questionnaire data during analysis.

## Data transfer for bioassay results

The bioassay results are entered into an excel spreadsheet (usually labs have their own standards). As no personal identifiers are recorded on the questionnaire, it can be emailed to the PI/Co-I conducting the data analysis.

# Chemical Residue Testing

## Preparation of samples

Samples for chemical residues – if it is done – are best prepared in the lab where the bio-assays are done. For each location where a bio-assay sample is taken (usually the four panels and roof) a 10x10 cm sample is cut from the net immediately adjacent to the bio-assay sample. Each sample is labeled with an ID number that indicates the net ID and location on the net. The sample with ID is then packed in aluminum foil and stored in a fridge until shipment.

## Shipment of samples

Samples can be shipped by courier and no special procedures are needed. However, care should be taken that an agreement with the in-country partner (NMCP or Health Institute) exists for the export of these samples (if required).

## Chemical residue testing procedures

Chemical analysis should be done in a laboratory that is qualified for this type of analysis and ideally is a WHO collaboration center (e.g. CDC lab or Walloon Agricultural Research Center, Gembloux, Belgium).

## Data entry

Data from the lab will either be sent as an Excel spread sheet or a pdf file. If the latter is used, data can be extracted by copy-paste into an Excel sheet and from there to the statistics program for analysis.

# Data Preparation

## Preparation and storage of uploaded data

From the secure Dropbox data are downloaded by the authorized persons and the data is stored on a secure device such as a computer with password protection and firewall.

## Data extraction

The uploaded ODK data from the tablets/phones first needs to be extracted into a “comma-delimited ACSI” format (usually with a \*.cvs extension). The ODK briefcase is used for this purpose and a detailed description can be found [here](https://www.durabilitymonitoring.org/wp-content/uploads/2015/03/2j.i.-Using-ODK-for-Durability-Monitoring-1.docx).

## Data preparation process

From the extracted files the following steps need to be taken to prepare the data:

* Import data to a statistical package
* Delete unnecessary variables from the phone records
* Rename and label variables
* Clean data (check for duplicates records, consistencies and missing values
* Prepare additional variables needed for the analysis and transfer information between different files (households, individuals, cohort nets, non-cohort nets).

If Stata is used for the data preparation, detailed do-files for each step can be found here (see file 5d).

If another statistical package is used (e.g. R), care should be taken to carefully document the process so that other users know exactly what was done and how.

In any case, it is advisable to prepare a data dictionary which is a table that lists all variables in the data set, their origin, definitions and labels.

# Data Analysis

The data analysis should be done by somebody with at minimum basic statistical skills. For those using the Stata software package all necessary do-files as well as templates for graphs and tables are provided as described below.

## Outcomes of interest

The primary outcomes of interest are described in the study protocol (file 2a) and can be highlighted as follows in order of priority:

* Median physical survival time in years of the tested LLIN product at each site
* Proportion of cohort nets surviving in serviceable physical condition at each time point
* Proportion of tested cohort nets with optimal insecticidal performance in bio-assay at each time point (at least 95% 60-minute knock-down or at least 80% mortality after 24 hours of a pyrethroid sensitive mosquito strain)
* Attrition rate of cohort nets at each time point (all-cause and due to wear and tear)
* Trends in other variables describing the environment the nets are being used in (care and repair behavior washing, net handling, sleeping place environment etc.)

## Preparing tables and graphs for baseline report

See file 6c.

## Preparing tables and graphs for follow-up reports

See file 7c.

## Preparing tables and graphs for final report

See file 8c.

## Data analysis workshops

Data analysis workshops are organized to work with partners on data analysis skills and to work through the steps of data cleaning, preparation, and analysis together in a supportive environment. They are organized after baseline data collection and may be organized after subsequent data collections depending on the budget and on skillset. A sample agenda is included on [durabilitymonitoring.org](http://www.durabilitymonitoring.org). It is important to prepare well in advance and to assess which statistical package is normally used by those attending the workshop.

# Reporting

## Report structure

See file 6b, 7b, and 8b for narrative report templates.

## Data dissemination workshops

Data dissemination and data analysis workshops may be combined or separate. Data dissemination workshops may focus explicitly on the results obtained and their implications for programmatic action. Dissemination workshops generally involve stakeholders from ITN distribution, NMCP, donors, and the research group; senior MOH officials may or may not be needed. A sample agenda for a data dissemination workshop is included on durabilitymonitoring.org.

## Data preparation for submission to PMI

### Final Protocols

A copy of the final protocol and questionnaire approved by the relevant ethical committee(s) should be submitted to PMI via email. Relevant PMI Country Team members should be cc’d. Amendments or updates to the protocol and/or questionnaires should be submitted as well to the same people to ensure PMI has records of the most up to date documents.

To: Project AOR, PMI Country Team

Attachments: Final approved protocol; final approved questionnaire.

### Baseline, 12, 24, and 36 months

Copies of datasets should be submitted to PMI in comma-separated-values format (.csv) within 3 months of completion of fieldwork, along with the survey report and data dictionary.

To: durabilitymonitoring@pmi.gov, PMI Country Team

Attachments: Analysis datasets; data dictionary, report, relevant bioefficacy report(s)

## Publication and authorship guidelines

We recommend following general authorship guidelines; most research and academic institutions have similar guidelines. Authorship should be discussed and agreed prior to beginning any manuscripts. Authors are expected have met each of the following criteria:

1. Substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data.
2. Drafting the article or revising it critically for important intellectual content; and
3. Final approval of the version to be published

Each author should have participated sufficiently in the work to take public responsibility for the appropriate portions of the content. All persons designated as authors should quality for authorship, and all those who quality should be listed.

## PMI Clearance

Manuscripts funded by PMI must undergo a clearance process at PMI before submission to journals. Please contact your agreement officer for additional details.

# Annex A: Fieldwork Supervisor Statement of Work

**Background and Purpose**

Your participation is requested to provide support as a Supervisor for data collection to in [location], during this Durability Monitoring exercise.

**Scope of Work/Job Specifications**

* Participate in training on the LLIN Durability Monitoring
* Lead the team for the fieldwork
* Organize household listing
* Lead the random selection process
* Allocate teams to selected households
* Oversee quality of field work
* Secure data entry devices after each day and hand over to coordinator
* Interact with participants, study team, and NMCP representatives in a professional and respectful manner

**Travel Requirements**

Be on time for traveling to the study district each morning.

**Responsibilities of MoH Employees during Data Collection**

You are responsible for:

* Successfully completing the training on LLIN Durability Monitoring in order to participate in fieldwork. Successful completion requires attendance and strong participation during the entire training, achieving a satisfactory score on a post-test and professional behavior during training and the practical exercise.
* Coordinating with participants and NMCP representatives to ensure data collection schedule is followed effectively.
* Ensuring effective communication between data collection team and supervisor during data collection, including prompt reporting of any issues that may arise.
* Providing strategic leadership on the team, demonstrating a strong work ethic, attention to quality and detail, and taking initiative to identify areas for improvement in the data collection process to ensure study objectives are met.
* Adequately safeguarding and returning all assigned data collection equipment, supplies and materials in the condition as provided with normal wear and tear expected.
* Immediately notifying [Implementing Organization] of any loss of equipment, supplies or materials provided.

**Other Terms and Conditions for Data Collectors**

In accepting this assignment, the Consultant expressly understands that:

* You are not being compensated or receiving salary from other U.S. government funding sources for the time spent on [Implementing Organization] business.
* If you are an employee of the government of (country), you have taken approved leave of absence from your post for the duration of this assignment.
* You have no conflict of interest that would interfere with the performance of your obligations under this assignment nor are you related by blood or marriage to any employee of the United States government or other agency who has decision-making authority over the award funding this assignment or over the project for which you will perform consulting services. You agree to notify your (implementing organization) staff contact immediately if you know of any such change in your circumstances.
* You will assume all tax obligations including declaration and payment thereof.

**Responsibilities of [Implementing Organization]**

* [Implementing Organization Fieldwork Director Name(s)] will be your contacts during this assignment. [Implementing Organization] will be responsible for
* Reviewing and approving as acceptable the deliverables submitted for this SOW.
* Providing return transport daily to all work site locations.

**Approximate Duration of SOW/Timeline for Completion**

SOW is estimated to start on [Start Date] and last for approximately 14 days. The exact start date will be communicated in advance.

**Deliverables:**

The deliverables for this SOW are:

* Compile brief field report on daily basis as per guidance to be provided during the training.
* Completed household listing sheets
* Completed questionnaires
* Signed consent forms

**Per Diem**

Per Diem will be paid according to your current position:

* Junior Officer – [Junior Per Diem Rate]
* Senior Officer – [Senior Per Diem Rate]

Per Diem will be paid after confirmation by [Implementing Organization] of daily participation after training, and after the data collection activity has been ended.

# Annex B: Fieldwork Data Collector Statement of Work

**Background and Purpose**

Your participation is requested to provide support as a Data Collector [Implementing Organization] in [Location] during this Durability Monitoring exercise.

**Scope of Work**

Participate in training on the LLIN Durability Monitoring

* Conduct household listings in specified communities
* Conduct interviews and net hole assessments in households
* Identify campaign nets with unique number label
* Enter data in mobile data collection devices
* Collect GPS coordinates for each interviewed household
* Interact with participants, study team, and NMCP representatives in a professional and respectful manner

**Travel Requirements**

Be on time for traveling to the study district each morning.

**Responsibilities of Employees during Data Collection**

You are responsible for:

* Successfully completing the training on LLIN Durability Monitoring in order to participate in fieldwork. Successful completion requires attendance and strong participation during the entire training, achieving a satisfactory score on a post-test and professional behavior during training and the practical exercise.
* Adequately safeguarding and returning all assigned data collection equipment, supplies and materials in the condition as provided with normal wear and tear expected.
* Immediately notifying the Supervisor of any loss of equipment, supplies or materials provided.
* Immediately notifying the Supervisor and the [Implementing Organization] if the consultant is unable to undertake or complete the SOW.

**Other Terms and Conditions for Employees**

In accepting this assignment, the Consultant expressly understands that:

* You are not being compensated or receiving salary or per diem from other U.S. government funding sources for the time spent on [Implementing Organization] business.
* You have approval from your supervisor to participate in this activity and to be away from your post.

**Responsibilities of [Implementing Organization]**

[Implementing Organization Fieldwork Leader Name] will be your contact during this assignment. [Implementing Organization] will be responsible for

* Reviewing and approving as acceptable the deliverables submitted under this SOW.
* Providing return transport daily to all work site locations.

**Approximate Duration of SOW/Timeline for Completion**

SOW is estimated to start on [Start Date] and last for approximately 14 days. The exact start date will be communicated in advance.

**Deliverables:**

The deliverables for this SOW are:

* Compile brief field report on daily basis as per guidance to be provided during the training.
* Completed household listing sheets
* Completed questionnaires
* Signed consent forms

**Per Diem**

Data collectors will receive per diem according to your current position:

* Junior Officer – [Junior Officer Per Diem Rate]
* Senior Officer – [Senior Officer Per Diem Rate]

Per Diem will be paid after confirmation by [Implementing Organization] of daily participation after training, and after the data collection activity has been ended.