

# Evaluation of the Impact of Malaria Interventions on Mortality in Children in Mainland Tanzania

## Annexes

### Tanzania Malaria Impact Evaluation Research Group

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## Annex 1: Methodological Considerations

### A.1.1 General information about Demographic and Health Surveys (DHS)

|   | TRCHS 1999   | TZ DHS 2004-2005   | THMIS 2007-2008  | TDHS 2010   |
|---|--|--|--|---|
| <b>Sample design</b>  |  |  |  |   |
| <b>Sampling frame</b>   | 1988 Census  | 2002 Population and Housing Census   | 2002 Population and Housing Census   | 2002 Population and Housing Census  |
| <b>Sampling distribution</b>  | Three-stage<br>1. Wards/branches<br>2. Enumeration areas (EAs) within wards/branches<br>3. HH within EAs                 | Two-stage<br>1. EAs<br>2. HHs within EAs   | Two-stage<br>1. EAs<br>2. HH within EAs  | Two-stage<br>1. EAs<br>2. HH within EAs   |
| <b>Number of cluster (census enumeration areas/sampling points)</b> | 146 clusters<br><br>Not representative at the regional level<br><br>Probability proportional to size (PPS)               | 475 clusters<br><br>18 clusters / region (except Dar 25 clusters)<br><br>PPS   | 475 clusters<br><br>18 clusters / region (except Dar 25 clusters)<br><br>PPS   | 475 clusters<br><br>18 clusters / region (except Dar 25 clusters)<br><br>PPS  |
| <b>Number of household/cluster</b>                                  | 20 HH/cluster<br><br>Systematic (random) sampling  | 22 HH/cluster (except Dar 16 HH)<br><br>Systematic (random) sampling   | 18 HH/cluster (Except Dar ~16 HH/cluster )<br><br>Systematic (random) sampling   | 22 HH/cluster (except Dar 16 HH)<br><br>Systematic (random) sampling  |
| <b>Sample weights</b>   | Weighted to provide representative estimates for urban/rural and for four domains: mainland, Zanzibar, Pemba and Unguja. | Weighted to provide representative estimates for regions (26 including Pemba & Unguja), for mainland by urban/rural and for Zanzibar by urban/rural. | Weighted to provide representative estimates for regions (26 including Pemba & Unguja), for mainland by urban/rural and for Zanzibar by urban/rural. | Weighted to provide representative estimates for regions (26 including Pemba & Unguja), for mainland by urban/rural and for Zanzibar. |
| <b>Sampling errors/Design</b>                                       | See Final Report Appendix B  | See Final Report Appendix B  | See Final Report Appendix B  | See Final Report Appendix B   |

|  | TRCHS 1999   | TZ DHS 2004-2005  | THMIS 2007-2008   | TDHS 2010   |
|--|--|---|---|---|
| effect   |  |   |   |   |
| <b>Representativeness</b><br>(designed to provide estimates for) | <ul style="list-style-type: none"> <li>National</li> <li>Urban and Rural areas separately</li> <li>Zanzibar (some cases, Unguja and Pemba separately)</li> </ul>             | <ul style="list-style-type: none"> <li>National</li> <li>Urban and rural areas of the Mainland, and Zanzibar</li> <li>Regional (26 regions including Pemba and Unjuga)</li> </ul> | <ul style="list-style-type: none"> <li>National</li> <li>Urban and rural areas of the Mainland, and Zanzibar</li> <li>Regional (26 regions including Pemba and Unjuga)</li> </ul> | <ul style="list-style-type: none"> <li>National</li> <li>Urban and rural areas of the Mainland, and Zanzibar</li> <li>Regional (26 regions including Pemba and Unjuga)</li> </ul> |
| <b>Month(s) survey conducted</b>                                 | Sept-Nov 1999  | Oct 2004-Feb 2005   | Oct 2007-Feb 2008   | Dec 2009-May 2010   |
| <b>Biomarkers</b>  | na   | Hemoglobin  | Hemoglobin, parasitemia   | Hemoglobin  |
| <b>Malaria microscopy</b>  | na   | na  | No microscopy results reported  | Na  |
| <b>Rapid Malaria Diagnosis (brand of RDT)</b>                    | na   | na  | Children 6-59 mo (Paracheck Pf™, detects Pf HRP2, Orchid Biomedical, India)   | Na  |
| <b>Hemoglobin values (brand of HemoCue /cuvettes)</b>            | na   | Children 6-59 months (97% of eligible children tested) and from women 15-49 years.  | Children 6-59 mo (HemoCue system)   | Children 6-59 mo (HemoCue system)   |
| <b>Under-five mortality estimate</b>                             | Direct method (complete birth history)   | Direct method (complete birth history)  | Direct method (complete birth history)  | Direct method (complete birth history)  |
| <b>ITN ownership</b>   | Net ownership is asked of all households but net treatment is only asked of households with children under five, at least some of whom slept under a net the previous night. | A complete net roster is included. We know number of nets, treatment of each net, who used each net the previous night and duration of ownership up to 3 years before the survey. | A complete net roster is included. We know number of nets, treatment of each net, who used each net the previous night and duration of ownership up to 3 years before the survey. | A complete net roster is included. We know number of nets, treatment of each net, who used each net the previous night and duration of ownership up to 3 years before the survey. |
| <b>ITN use</b>   | Households with children under five who owned at least   | Complete net roster allows us to estimate this.   | Complete net roster allows us to estimate this.   | Complete net roster allows us to estimate this.   |

|                             | TRCHS 1999  | TZ DHS 2004-2005  | THMIS 2007-2008   | TDHS 2010  |
|-----------------------------|---|---|---|--|
|                             | <p>one net were asked if all, some or none of the children under five years slept under a net the night before and then were asked if the nets were treated and how long ago. This is not done for each net. Further methodological details are included below.</p> |   |   |  |
| <b>Wealth Index</b>         | Water source, toilet type, floor, walls, electricity, radio, tv, fridge, bicycle, motorcycle, car   | Water source, toilet type, floor, walls, roof, cooking fuel, lighting fuel, number of hh members sleeping per room, electricity, radio, tv, fridge, bicycle, motorcycle/scooter, car/truck, telephone, bank account, iron, acres of land usable for farming, acres of land for grazing, has at least one domestic worker, | Water source, toilet type, floor, walls, roof, cooking fuel, number of hh members sleeping per room, electricity, radio, tv, fridge, bicycle, motorcycle/scooter, car/truck, telephone, paraffin lamp, iron, acres of land usable for farming or grazing, | Water source, toilet type, floor, walls, roof, cooking fuel, lighting fuel, number of hh members sleeping per room, electricity, radio, tv, mobile phone, other telephone, fridge, watch, bicycle, bank account, motorcycle/scooter, car/truck, telephone, paraffin lamp, iron, acres of land usable for farming or grazing, use of unowned farming land, domestic servant |
| <b>Survey Response Rate</b> |   |   |   |  |
| Households sampled          | 3826  | 8322  | 9144  | 8320   |
| Households occupied         | 3677  | 7932  | 8704  | 7832   |
| Households interviewed      | 3615  | 7847  | 8497  | 7720   |
| Household response rate     | 98.3  | 98.9  | 97.6  | 98.6   |
| Individual interviews:      |   |   |   |  |
| Number of women             | 4118  | 8347  | 9735  | 8055   |
| Number of women interviewed | 4029  | 8117  | 9343  | 7743   |
| Eligible woman rate         | 97.8  | 97.2  | 96  | 96.1   |

### A.1.2 Data and indicators on ITN coverage

Standard RBM indicators were used to estimate coverage of vector control interventions for each survey year as well as changes in coverage over the study period. These indicators are outlined below.

| <b>RBM Intervention</b>                             | <b>Indicator Description</b>  | <b>Numerator</b>  | <b>Denominator</b>  | <b>Data Availability</b>   |
|---|---|---|---|--|
| Insecticide-treated nets (ITNs)                     | 1. Proportion of households with at least one ITN.  | Number of households surveyed with at least one ITN                           | Total number of households surveyed   | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS                              |
|   | 2. Proportion of children under five years old who slept under an ITN the previous night. | Number of children under five who slept under an ITN the previous night       | Total number of children under five who spent the previous night in surveyed households       | 1999 TDHS (approximation)<br>2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |
| Prevention and control of malaria in pregnant women | 7. Proportion of pregnant women who slept under an ITN the previous night.                | Number of pregnant women aged 15-49 who slept under an ITN the previous night | Total number of pregnant women aged 15-49 who spent the previous night in surveyed households | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS                              |

In addition, several supplemental ITN indicators were calculated.

| <b>Supplemental RBM Intervention</b> | <b>Indicator Description</b>   | <b>Numerator</b>  | <b>Denominator</b>  | <b>Data Availability</b>                  |
|--------------------------------------|--|---|---|---|
| Insecticide-treated nets (ITNs)      | S1. Proportion of children under five years old sleeping in households with ITNs who slept under an ITN the previous night | Number of children under five who slept under an ITN the previous night | Total number of children under five who spent the previous night in surveyed households owning at least one ITN | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |
|                                      | S2. Proportion of individuals who slept under an ITN   | Number of individuals who slept under an ITN the                        | Total number of individuals who slept in surveyed households  | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |

|   | the previous night.  | previous night  | the previous night  |   |
|---|--|---|---|---|
| Prevention and control of malaria in pregnant women | S3. Proportion of pregnant women sleeping in households with ITNs who slept under an ITN the previous night. | Number of pregnant women aged 15-49 who slept under an ITN the previous night | Total number of pregnant women aged 15-49 who spent the previous night in surveyed households owning at least one ITN | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |

### Calculating Indicators

Data used to produce estimates of ITN ownership and use come from the DHS surveys. The specific questions and methods used to calculate the indicators are outlined below. These questions and methods are standardized for the 2004/05, 2007/08 and 2010 surveys. Alternate methods were required to derive estimates for 1999 as the questions included in the questionnaires were different at that time. The series of bednet-related questions from the 1999 TDHS are included below.

|   |   |                                       |                                    |
|---|---|---------------------------------------|------------------------------------|
| 1 | Does your household have any bednets that can be used while sleeping?   | Yes<br>No                             | Go to Q2<br>Go to end              |
| 2 | CHECK NUMBER OF CHILDREN UNDER AGE FIVE WHO SLEPT IN THE HOUSEHOLD LAST NIGHT   | ONE OR MORE<br>NONE                   | Go to Q3<br>Go to end              |
| 3 | Did any of the children under age five who slept in the household last night sleep under a bednet? If YES: did all or only some sleep under a bednet? | ALL CHILDREN<br>SOME CHILDREN<br>NONE | Go to Q4<br>Go to Q4<br>Go to end  |
| 4 | Were any of these bednets ever treated with a chemical (dawa) to avoid mosquito bites?  | YES<br>NO<br>DOES NOT KNOW            | Go to Q5<br>Go to end<br>Go to end |
| 5 | How long ago was the bednet last treated?   | MONTHS AGO<br>DOES NOT KNOW           | End                                |

From this series of questions only one standard intervention indicator can be estimated albeit indirectly: the proportion of children less than five years who

slept under an ITN the previous night. In 1999, an ITN was defined as a bednet treated with an insecticide less than 12 months previously. As the respondents were not asked exactly how many children slept under a net the previous night (responses to Q3 are “all”, “some” or “none”) a maximum and minimum were estimated using information on the total number of children under five per household (#U5/hh) and the response to question 3 above. The calculations were as follows:

Maximum % of children under five (U5) sleeping under ITN the night before the survey=

$$[[(\#U5/hh) * (Q3=All)] + [(\#U5/hh - 1) * (Q3=Some)]] \text{ if } Q5 < 12 / \text{Total \# U5}$$

Minimum % of children under five (U5) sleeping under ITN the night before the survey=

$$[[(\#U5/hh) * (Q3=All)] + [1 * (Q3=Some)]] \text{ if } Q5 < 12 / \text{Total \# U5}$$

Using these methods, the calculated difference between the maximum and minimum estimates was smaller than the range of uncertainty, thus it was estimated that 1.8% (1.2%-2.8%) of children under five slept under an ITN the night before the interview in 1999. These calculations assume that if any of the household’s nets were treated in the past 12 months (ITNs) then the children sleeping under nets, slept under an ITN. In reality, the children might have slept under an untreated net or under a net that had been treated more than 12 months prior to the date of interview. Thus, 1.8% is an over estimate of the proportion of children less than five years using ITNs. Use of ITNs by children under five in 1999 was minimal.

From the 1999 data, household ownership of ITNs cannot be estimated without some additional assumptions. Bednet treatment questions were only asked of households with at least one child under five, at least one of whom slept under a bednet the previous night; thus, direct calculation of ITN ownership and use is limited to that population. If net ownership and treatment patterns are similar in households with children under five who use nets and in those whose young children do not use nets or who do not have young children then estimates of household ITN ownership can be derived.

In this case:

% of hh with U5 who slept under a bednet the previous night that own at least one bednet treated with insecticide within the past 12 months / % of hh with U5 who slept under a bednet the previous night. Using these methods an estimate of 8.2% (5.2%-12.4%) of households owning at least one ITN was derived.

In the subsequent DHS surveys, data on bednet ownership and use were collected in a different format. Respondents reporting ownership of any nets were asked to provide specific treatment information about each net and were then asked which household members slept under each net the night prior to the interview. This “bednet roster” allows estimation of standard ITN indicators including the proportion of households with ITNs, the proportion of target populations (children under five, pregnant women) using ITNs, as well as non-

standard indicators such as proportion of the total population using ITNs, average number of ITNs per household, average duration of net ownership, etc.

### Potential Biases

These questions were asked of all household members and guests who slept in the household the night before the survey so indicators should be representative of the total population; however, some limitations may affect the validity of the indicators to correctly measure parameters of interest. Correct specification of a net as an ITN requires information on the kind of net owned or used which might not be accurately reported if interviewers were not allowed to view the net. It also requires information on treatment of nets (the timing and the substance used to treat) which is subject to recall bias. The true protection offered by ITNs requires proper use: The timing of sleep under an ITN, the condition of the net (without holes, etc), and proper net installation, are all important factors that were not measured in these surveys. For more information on RBM indicators including calculations, strengths and limitations see the “Guidelines for Core Population-Based Indicators Working Paper: RBM Working Paper Series No 1, January 2009.”

### A.1.3 Data and indicators on malaria in pregnancy (IPTp and ITN use)

Standard RBM indicators on use of interventions to prevent and control malaria in pregnant women were used in this report. These indicators are outlined below.

| <b>RBM Intervention</b>                             | <b>Indicator Description</b>   | <b>Numerator</b>   | <b>Denominator</b>   | <b>Data Availability</b>                  |
|---|--|--|--|---|
| Prevention and control of malaria in pregnant women | 7. Proportion of pregnant women who slept under an ITN the previous night.   | Number of pregnant women who slept under an ITN the previous night   | Total number of pregnant women within surveyed households                          | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |
|   | 8. Proportion of women who received intermittent preventive treatment for malaria during ANC visits during their last pregnancy. | Number of women who received two or more doses of SP to prevent malaria at least one during ANC visit during her last pregnancy that led to a live birth in the last two years | Total number of women surveyed who delivered a live baby within the last two years | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |

## Calculating Indicators

Data used to estimate these indicators come predominantly from the DHS. In the DHS, all women aged 15-49 from selected households were asked to participate in an interview. In the course of this interview each woman was asked if she was pregnant. This information along with the responses from the household questionnaire on ITN ownership and use was used to estimate the proportion of pregnant women who slept under an ITN the previous night. As mentioned in the previous section, the ITN questions were different in 1999 as compared to the more recent surveys. In the 1999 survey, the lack of a complete bednet roster means that ITN use by pregnant women cannot be directly estimated. Pregnant women were asked if they slept under a net the night before the interview and whether or not this net had ever been treated “with a chemical to avoid mosquitos.” With this information the proportion of pregnant women who slept under an ever-treated net the previous night can be calculated, an estimate that is not directly comparable to the ITN use in pregnancy indicator estimated for the subsequent survey years.

Interviewed women reporting a live birth in the two years prior to interview were also asked about to provide information about use of antenatal care (ANC) services and other malaria prevention behaviors. This information was used to estimate the proportion of these women who received at least two doses of SP for prevention of malaria during her last pregnancy, at least one of which was received during an ANC visit. In 1999 women with a live birth in the past two years were asked “During this pregnancy were you given or did you buy any drugs to prevent you from getting malaria.” If the response was “yes” they were asked to specify which drug, Fansidar (SP), Chloroquine, or Other. However, in 1999 women were not asked how many times they took these drugs nor if they received these drugs during an ANC visit; thus, the only IPTp indicator that can be estimated for 1999 is the proportion of women with a live birth in the past two years who took any SP. From subsequent surveys, women were asked the number of times they took SP during their last pregnancy and the whether the source of the SP was an antenatal visit.

## Potential Biases

This indicator is dependent on recall by interviewed women over the two year period preceding the survey. Women were asked to remember not only whether or not they took medication for malaria prevention but also the type of medication, the number of doses and the source of these doses. Accurate information for all of these parameters is necessary for construction of the IPTp indicator. In addition, these questions were asked only of women whose most recent pregnancy ended in a live birth in the two years preceding the survey. This excludes still births and miscarriages. As birth outcomes are known to be affected by malaria and IPTp is known to reduce the risk of malaria, the results may not be representative of the general population and may bias the observed relationships. In addition, the data for this indicator come from interviews with live women: Women that died in childbirth or from malaria acquired during

pregnancy are not included. Thus, the indicator may not be truly representative of the population as some selection bias may be present.

#### A.1.4 Data and indicators on prompt and effective treatment

The following RBM indicators measuring prompt and effective treatment of malaria were used in this report:

| <b>RBM Intervention</b>        | <b>Indicator Description</b>   | <b>Numerator</b>  | <b>Denominator</b>  | <b>Data Availability</b>                               |
|--------------------------------|--|---|---|--|
| Prompt and effective treatment | 4. Proportion of children under five years old with fever in last two weeks who received any antimalarial treatment  | Number of children under five who had a fever in previous two weeks who received any antimalarial treatment   | Total number of children under five who had a fever in previous two weeks | 1999 TDHS<br>2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |
|                                | 5. Proportion of children under five years old with fever in last two weeks who received antimalarial treatment according to national policy within 24 hours from onset of fever | Number of children under five who had a fever in previous two weeks who received recommended antimalarial treatment according to national policy <24 hours from fever onset | Total number of children under five who had a fever in previous two weeks | 1999 TDHS<br>2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |

#### Calculating Indicators

Data used to calculate these indicators came from the DHS from 1999 to 2010. The denominator for these indicators is biological children of interviewed women under five years of age who had fever in the two weeks prior to interview. Mothers were asked whether or not they sought treatment for their child's fever and, if so, where care was sought and what treatments were received. The timing of this treatment in relation to onset of fever was also asked. Interpretation of these indicators is challenging as the treatment options and the recommended treatments changed over the course of the study period of interest in this evaluation. The treatment options included in each survey are summarized in the table below.

| <b>Antimalarial Drugs Taken for Treatment of Fever</b> |   |  |  |
|--|---|--|--|
| <b>1999</b>  | <b>2004-05</b>  | <b>2007-08</b>   | <b>2010</b>  |
| SP/Fansidar<br>Chloroquine                             | SP/Fansidar<br>Chloroquine<br>Amodiaquine<br>Quinine<br>Artensunate | SP/Fansidar<br>Chloroquine<br>Amodiaquine<br>Quinine<br>ALU or Coartem<br>Other Antimalarial | SP/Fansidar<br>Chloroquine<br>Amodiaquine<br>Quinine<br>Artensunate<br>Artensunate and<br>Amodiaquine<br>ALU<br>Other Antimalarial |

To determine whether or not the antimalarial medication given to children with fever was “prompt” mothers were asked when the child first took the medication. Responses of “Same Day” or “Next Day” following fever onset were considered “prompt” and were included in the calculation of the second treatment indicator.

### **Potential Biases**

A potential bias is introduced by the nature of data collection for these surveys. Data were collected on biological children of interviewed women. Children whose mothers were deceased at the time of interview are not included in this estimate. This may introduce bias if the children with deceased mothers are more likely than others to have fever or if they have different treatment seeking patterns. Another potential issue is the non-specificity of the denominator. Prompt and effective treatment is only relevant if a child is actually infected with *Plasmodium* spp. parasites. In this case, an assumption is made that any child with fever is likely to have malaria, without the requirement of official clinical diagnosis. However, many interviewed households do not have access to facilities that provide diagnostic testing for malaria, or do not have the resources needed to access these services, so limiting the denominator of this indicator to diagnosed cases is not currently practical. Following WHO recommendations, many national malaria control programs have changed standards to require diagnostic testing (by RDT or microscopy) before administering malaria treatment. Until widespread implementation of these standards has occurred, the current treatment indicator remains the most practical.

Another potential problem with this indicator is the necessity of recall of types of medications. Errors in the specification of medications taken could reduce the validity of these estimates. Additionally, proper dosage is not verified.

### A.1.5 Data and indicators on malaria morbidity

Morbidity indicators measured for this report include parasitemia, anemia and fever in children under five. The details of these indicators are outlined below.

| RBM Impact Measures | Indicator Description  | Numerator  | Denominator   | Data Availability                         |
|---------------------|--|--|---|---|
| Morbidity Indicator | 10. Parasitemia Prevalence: proportion of children aged 6-59 months with malaria infection.              | Number of children 6-59 months with malaria infection detected by microscopy | Total number of children aged 6-59 months tested for malaria parasites by microscopy                  | 2007-08 TMIS                              |
|                     | 11. Anemia Prevalence: proportion of children aged 6-59 months with a hemoglobin measurement of <8 g/dL. | Number of children 6-59 months with a hemoglobin measurement of <8g/dL       | Total number of children 6-59 months who had hemoglobin measurements obtained during household survey | 2004-05 TDHS<br>2007-08 TMIS<br>2010 TDHS |

#### Calculating Indicators

The data used to calculate these indicators come from the TDHS. These biomarkers were measured for all children older than 6 months of age, for whom permission was granted, in selected households. Deviating from the RBM parasitemia indicator definition, the available data defined parasitemia using results from rapid diagnostic tests (RDT).

#### Parasitemia

Infection with *Plasmodium falciparum* parasites was measured in all children aged 6-59 months who slept in a selected household the night before the survey, for whom parental permission was granted. Blood was taken from a finger or heel stick using a cuvette. A Paracheck Pf™ rapid diagnostic blood test for *Plasmodium falciparum* antigens was then performed. Parasitemia is defined as a positive result of the Paracheck test for the purposes of these analyses.

#### Anemia

Severe anemia, defined as less than 8 grams of hemoglobin per deciliter of blood, in children aged 6-59 months who slept in a selected household the night before the survey is another outcome of interest. Hemoglobin levels were measured using the HemoCue system (a light photometer) and samples of capillary blood from finger or heel sticks. Hemoglobin quantities resulting from this test were adjusted for altitude according to the standard methodology used by the DHS.

The adjustment is made with the following formulas:

$$\text{adjust} = -0.032 \cdot \text{alt} + 0.022 \cdot \text{alt}^2$$

$$\text{adjHg} = \text{Hg} - \text{adjust} \text{ (for adjust > 0),}$$

where *adjust* is the amount of the adjustment, *alt* is altitude in feet (convert from meters by multiplying by 3.3), *adjHg* is the adjusted hemoglobin level, and *Hg* is the measured hemoglobin level in grams per deciliter. No adjustment is made for values of *adjust* less than zero (below sea-level altitude).

### **Fever**

Fever in children under age five of interviewed mothers was assessed via self-report. The recall period for this indicator is two weeks prior to interview. For analyses of correlation between the morbidity indicators, this outcome variable is limited to children aged 6-59 months.

### **Potential Biases**

Measuring parasitemia for use in comparative studies can be challenging as parasite prevalence in the population is influenced by a multitude of factors including temperature and rainfall. Thus the timing of data collection plays an important role in ensuring comparability of data, especially in areas with seasonal patterns of malaria transmission. The analyses presented in this report only include parasitemia data from one survey year, thus the issue of timing is less important. Another measurement issue arises due to the different methods available for diagnosing *Plasmodium* spp. infection. The current RBM recommendation is to report microscopy results; however, obtaining good quality microscopy data is often challenging due to logistic restraints. In this case, diagnosis was determined via rapid diagnostic tests. Comparing RDT results with those obtained via microscopy may not produce valid results as RDTs have been shown to have lower sensitivity in areas of low parasitemia. False positive RDT results can also occur when parasites have recently been cleared from the body via effective treatment. Finally, parasitemia prevalence as defined in this report may be underestimated as children may be infected with other species of *Plasmodium* parasites that would not be detected by the Pf-specific RDT used.

Anemia is not a very specific proxy for malaria as there are many other potential etiologies. Anemia data is dependent on valid hemoglobin readings from the HemoCue machine which can be affected by the skill of the technician drawing blood and on the number of blood tests being conducted with the same sample. This varied by survey.

Fever is not a very specific proxy for malaria thus the utility of this indicator for malaria-specific studies is questionable. No clinical diagnosis or testing was conducted, making the validity reliant on the accuracy of self-reported fever information. In addition, information on fever was only asked of interviewed mothers, a methodological strategy which may introduce selection bias.

## A.1.6 Data and indicators on under-five mortality

All-cause mortality in children under five is the outcome variable of greatest interest in this report.

| RBM Impact Measures | Indicator Description                         |
|---------------------|---|
| Mortality Indicator | 9. All-cause under-five mortality rate (5q0). |

### Calculating Indicators

Estimates of mortality require significant amounts of data, as death is a fairly rare event; thus, mortality rates for Mainland Tanzania were estimated using data from the birth histories from DHS interviews. The DHS calculates these estimates using information collected from birth histories of each interviewed woman. Women are asked the dates of each live birth, regardless of the current survival status of the child. For any death, child age at death is recorded. There is no time limit on this birth history, so every live birth a woman ever had during her lifetime should be recorded. With this information, 5-year mortality rates are calculated using a synthetic cohort life table approach described in detail in the “DHS Guide to Statistics”

(<http://www.measuredhs.com/help/Datasets/index.htm>). Five-year mortality estimates approximate a point estimate of mortality rates approximately 2.5 years before the survey. Confidence intervals for these estimates are calculated using the ISSA Sampling Error Module. This module uses the Jackknife repeated replication method for variance estimation due to the multi-stage stratified design of the sample population. This method derives estimates of mortality rates from each of several replications of the parent sample and calculates standard errors for these estimates using simple formulae. For each replication, all but one cluster is considered in the estimate calculations. These replications are considered pseudo-independent. The variance formula for the mortality rate  $r$  is:

$$SE^2(r) = \text{var}(r) = 1/(k(k-1)) \sum_{i=1}^k (r_i - r)^2$$

in which

$$r_i = kr - (k - 1)r_{(i)}$$

where  $r$  is the estimate computed from the full sample of clusters  
 $r_{(i)}$  is the estimate computed from the reduced sample of clusters ( $i^{\text{th}}$  cluster excluded), and  
 $k$  is the total number of clusters

### Potential Biases

As birth history information was collected from interviewed women, the mortality of children whose mothers have died is missing from the estimate. Children whose mothers have died are known to have worse survival, which may lead to mortality being underestimated. Other potential biases include under-reporting of deaths and misreported age at death. These issues and the

measures taken to avoid erroneous data are discussed in depth in the Guide to DHS Statistics (<http://www.measuredhs.com/help/Datasets/index.htm>).

## A 1.7 General information about the Household Budget Surveys

### 2001/2 Survey

A nationally-representative sample of 22,178 households was interviewed. These were drawn from a sample of 1,161 primary sampling units identified in the “regional” sample of the National Master Sample. A reduction in sample size was implemented during the survey by stopping fieldwork in the rural PSUs that were not part of the NMS “national sample”. Between 12 and 24 households were surveyed in each sampled area. In each region, the final sample comprised around 1,000 households. Sampling weights are used to make the estimates representative of mainland national and regional populations. Fieldwork was between May 2000 and June 2001.

#### Actual Sample Size

|                        | Dar es Salaam | Other Urban | Rural | Total  |
|------------------------|---------------|-------------|-------|--------|
| Primary sampling units | 57            | 566         | 535   | 1,158  |
| Households             | 1,125         | 13,384      | 7,569 | 22,178 |

The HBS interviewed 98% of the (revised) intended sample size, using replacement households where necessary (almost 12% of the households included in the final analysis were replacements).

Enumerators were supervised by field supervisors working out of the National Bureau of Statistics regional offices. Supervisors collected and checked questionnaires, which were then sent on to the head office for data entry (using data entry programme IMPS). Automated data consistency checking procedures were run on the entered data. Additional consistency checks and data cleaning continued until November 2001.

Indicators cited in the Malaria Impact Evaluation report that are derived from HBS 2000/1 data include:

- Proportion of the population (all ages) who sought health care from any modern health provider. This is a sub-set of those who reported any illness or injury in the four weeks preceding interview.
- Proportion of children under the age of five who suffered any illness or injury during the four weeks preceding interview.
- Mean distance (kms) to dispensary or health centre
- Proportion of households with a dispensary or health centre less than 2km / 6km away.

Technical notes on the survey methodology are described in Appendix A of the HBS 2000/1 (pp119-139) including sampling errors and confidence intervals for selected indicators. Confidence intervals and sample sizes were not available for any of the indicators cited in this report except the proportion of households within 6km of a dispensary or health centre (value 75.5, 95% CI 71.6-79.4).

## **2007 Survey**

The sample was smaller than the 2000/01 HBS. This is because the 2000/01 HBS provided separate estimates for each of the regions of Mainland Tanzania, whereas the 2007 survey was not intended to provide that level of disaggregation. The 2007 HBS had an intended sample of 448 clusters (villages or census enumeration areas) and 10,752 households.

The fieldwork was conducted in the same way as the 2000/01 HBS. Two households in each cluster were enumerated in each calendar month. Therefore, over the course of the survey, 24 households were to be interviewed per cluster. Enumerators, who were residents in or near the cluster, conducted an initial interview with the two households at the beginning of the survey month. They then visited households on a regular basis during that month for the purpose of recording households' daily transactions, covering expenditure, consumption and income. These visits were scheduled to be daily for the households without any literate member and every two to three days for others. Fieldwork supervision was mainly done by NBS staff in regional offices. Regional supervisors collected and checked completed questionnaires before sending them to the head office in Dar es Salaam for data entry. They also observed a sample of interviews. The data entry, using CSPro, went on in parallel with field work and was completed in March 2008. Data consistency checks were developed to identify any inconsistencies in the entered data and errors were corrected by referring to the original questionnaire. Data cleaning continued until July 2008 and the analysis was completed by mid-November 2008.

The sample was based on a revised national master sample that has been developed out of the 2002 Census information. For the 2007 HBS, the national master sample provided the primary sampling units (PSUs) for the national urban and rural sample. It was supplemented with additional PSUs to provide a regional sample for Dar es Salaam, so that the survey provides estimates for Dar es Salaam region, other urban areas and rural areas.

Primary sampling units were selected using probability proportional to size, with the number of household recorded in the Census preparatory estimates being the measures of size. A comprehensive household listing was undertaken in each of the sampled clusters. Information on a number of durable assets was collected for each household during the listing exercise. This information was used to stratify households within each cluster into high, middle and low income households. Separate proportional samples were then drawn from each of these categories. The sample selection was done in the head office and each regional supervisor was supplied with their respective list of pre-selected households. In total, the analysis includes 10,466 households and 447 of the intended 448 clusters. This is over 97 percent of the original intended sample size of 10,752

households. However, of the households included in the analysis, 13 percent were interviewed as reserve (replacement) households after the originally selected ones could not be found, a similar proportion to 2000/01.

#### Actual Sample Size

|            | DSM   | Other Urban | Rural | Total  |
|------------|-------|-------------|-------|--------|
| Clusters   | 152   | 158         | 137   | 447    |
| Households | 3,456 | 3,737       | 3,273 | 10,466 |

Analytical weights were defined as the inverse of each household's selection probability, taking into account the selection of the primary sampling units and stratification within each PSU. The weights were adjusted so that the sum of individuals by area was equal to its projected population for 2007. In some cases this adjustment was quite large, raising concerns about the listing process. Details of the sampling process and weights are given in Appendix A1 of the report.

### A 1.8 General information on Ifakara Health and Demographic Surveillance System

The HDSS area is located in southern Tanzania in parts of two districts, Kilombero and Ulanga both in Morogoro region (latitude 8° 00 to 8° 35'S, altitude 35° 58 to 36° 48'E). It covers a rural population of about 90,000 people in 20,000 households.

#### Initial census

Data collection to establish the baseline populations in the Ifakara HDSS began with a census in geographical defined surveillance areas (DSAs). The aim of the initial censuses was to obtain or establish individuals and households that will be followed up longitudinally over time. Data variables collected during these censuses included household composition i.e. household head, relation to head, demographic data (age, sex, marital status), socioeconomic characteristics (education, occupation) and household environmental conditions (source of drinking water, sanitation facility, etc.).

#### Regular updates

Trained Field Enumerators obtain vital demographic and health information by visiting each household after every four months in their assigned areas and update membership status by filling out events registration forms. Field enumerators are supervised by Field Supervisors who work under Field Managers.

#### Quality assurance

The quality of collected information is monitored through a validation process where 3-5% of households are sampled at random for re-interview and validation of previous collected data. All data collected are processed in the computer using the Household Registration System (HRS) application developed

in Foxpro 2.6 which is a relational database software with inbuilt longitudinal data consistency checks.

### **Ensuring completeness**

To ensure that all pregnancy outcomes are recorded, the HDSS has a network of key informants who reside in the surveillance communities. Key informants have received training on reporting vital births and deaths occurring in their villages or sub-villages. Births and deaths picked by key informants are reported to field supervisors, who verify this information before paying them a small token. A pregnancy outcome form is completed by a field interviewer when they visit the household to update household members' residency status. Pregnancy outcomes recorded included live births, abortion and miscarriages.

### **Mapping**

The fieldworkers constructed a sketch map of each village, with all roads and landmarks, such as schools and shops, indicated. They gave each household a unique number. The mapping exercise in the DSA was coupled with geo-referencing of residential units, using geographic information system (GIS) technology; global positioning system (GPS) coordinates are assigned as location attributes of the residential units within the database. This information allows spatial analyses to be conducted.

### **Mortality data**

Data for mortality estimation in the HDSS were collected during the census update rounds. During these rounds, interviewers ask the status of each and every member of the household who was registered during the baseline census. In case a member has died, the interviewer completes a death event form which records when the event happened and place of death. Other background information such as date of birth, sex, education, occupation and marital status are obtained by linking event forms with the members' information table.

### **Verbal Autopsy**

VA interviews on all HDSS-registered deaths are conducted by VA supervisors, using age-specific standard questionnaires. A questionnaire for deaths of infants <29 days old, another one for children between 29 days and <5 years; and a third one for all persons  $\geq 5$  years old. The interviews are held with one of the adult relatives of the deceased (preferably a caretaker) well informed of the sequence of events leading up to the death. VA supervisors conduct interviews within 2 months of the report of a death and use any available documents, such as a death certificate or prescriptions, to obtain confirmatory evidence about the cause of death from the last health facility the deceased visited. Such evidence, however, is often unavailable. The completed questionnaires are then coded independently by two physicians, according to a list of causes of death, based on the 10th revision of the International Classification of Diseases. A third physician is asked to independently code the cause of death in the case of discordant results. Where there are three discordant codes, the cause is registered as "unknown." In some instances physicians are unable to determine a cause of

death because there is not enough information to help them to assign a cause, and therefore code such deaths as “undetermined”.

### **Parasitemia & ITN use**

A random sub-sample of the HDSS households have been selected in various years for the purpose of testing for malaria infection. Between 2001 and 2006 determination of malaria parasitemia was done by microscopy and a sub-sample of slides re-read by a reference microscopist. Surveys conducted between 2007 and 2010 used RDT (Paracheck Pf). Use of nets / ITNs by all household members is determined in the same survey and sample size in order to assess “all age” net/ITN use. Timing of survey was June-September between 2001 and 2006 and May-September between 2007 and 2010.

Actual sample size for parasitemia surveys ranged from 4044 in 2004 to 7401 in 2009. Actual sample size for all-age ITN use ranged from 4724 in 2002 to 7454 in 2009.

### **ITN ownership**

Ownership of “any net” and ITN (treated within last 12 months, or LLIN) is recorded annually for all households during the HDSS census.

### **Data Management**

Data management in the HDSS is comprised of a custom designed application known as the household registration system (HRS) that facilitates the processing of longitudinal data in a relational manner. Data is collected in structured forms/questionnaires that include baseline census, event forms (pregnancy outcome, deaths, migrations, pregnancy follow-up). A reliable system has been instituted to ensure smooth flow of data from the field to the data center. The HDSS filing clerks are responsible for the movement of forms from the data center to the field and vice versa. Every week or fortnight, the filing clerk collects forms and register books from the supervisors during field meetings and provides them with fresh supplies for the coming week/ weeks. All forms entering the data room are registered before entry and likewise all forms or register books going to the field are documented.

After registration of forms or register books, data is entered using the HRS application. The HRS is a relational database that is built to maintain consistent records of demographic events occurring in a defined geographic region, generates up to date registration books which are used by the field workers and computes basic demographic rates i.e. fertility, mortality and migration.

## **Annex 2: LiST Model Details**

### **A.2.1 Methods - Lives Saved Tool (LiST model)**

#### **LiST Model**

The Lives Saved Tool (LiST model) is a computer-projection model that runs through the Spectrum demographic program developed by the Futures Institute [1]. The Spectrum program links together the LiST module containing maternal and child health interventions, the family planning module that accounts for changes in fertility and the AIDS Impact Module (AIM) that provides information on HIV/AIDS prevalence and interventions [1]. The LiST model projections and information are available from [www.jhsph.edu/dept/ih/IIP/list/](http://www.jhsph.edu/dept/ih/IIP/list/). The analysis was performed with Spectrum version 4.22. Unless otherwise indicated, the values in the standard projection for Tanzania were used.

#### **Tanzania Demographic Data**

The standard demographic data (from the United Nations Population Division) in the Spectrum projection for Tanzania was used and then adjusted to represent Mainland by multiplying by the percentage of the population living in Mainland Tanzania (97.6%). International migration values (net migrants per year) were also adjusted by multiplying by 97.6%.

#### **Family Planning Module**

The values in the standard Tanzania projection were used without change.

#### **AIDS Impact Module (AIM)**

The AIDS Impact Module (AIM) was used as is with the exception that the numbers of people treated were adjusted by 97.6%, including the number of women treated with single dose nevirapine (MTCT, 2004-2007), the number of adults receiving first line ART (Adult ART, 2004-2007) and the number of children receiving cotrimoxazole or ART (Child Treatment, 2004-2007). In the years outside 2004-2007, percentages were given instead of numbers, therefore the values were left unchanged.

#### **Mortality & Cause-Specific Mortality Profile**

The baseline mortality values for 1999 were obtained from the 1999 DHS, using the Mainland mortality rates calculated for the five year period prior to the survey. The values (per 1000 live births) are neonatal (40.8), infant (99.7) and under five (147.5).

The cause-specific breakdown of child mortality used here was developed by the CHERG [2]. For neonatal mortality, the cause-specific mortality profile for Tanzania is diarrhea (3.14%), sepsis pneumonia (28.67%), asphyxia (26.60%), prematurity (23.46%), tetanus (3.38%), congenital anomalies (7.18%) and other

(7.57%). The cause-specific mortality profile for children 1-59 months old was also obtained from the CHERG [2], with the exception that the malaria-specific mortality value from Rowe et al. [3,4] was applied. Rowe shows 23.6% (20.2 - 26.9%) of under five mortality (including neonates) was due to malaria. According to Bryce et al. [2] 26% of the under five mortality occurs in the neonatal period in Africa. Therefore we removed neonatal mortality by adjusting the 23.6% by 26%, resulting in 31.9% (27.3 - 36.4%) of mortality in 1-59 month old children being due to malaria. The LiST model calculates AIDS mortality directly. Holding the malaria and AIDS values fixed, the cause-specific mortality values from the CHERG [2] were adjusted proportionally to total 100%. The 1-59 month mortality envelope used here is therefore: diarrhea (23.32%), pneumonia (27.14%), meningitis (0%), measles (1.77%), malaria (31.90%), pertussis (2.19%), AIDS (10.92%), injury (0%) and other (2.76%).

### **Intervention Coverage**

The intervention coverage levels for indicators were obtained from the TRCHS 1999, TDHS 2004/5, THMIS 2007/08 and TDHS 2010 for Mainland Tanzania with a few exceptions. National yearly values for coverage of tetanus toxoid (% of children protected at birth) and vaccination coverage (Hib, measles (MCV1), DPT3, polio3 and BCG) were obtained from WHO-UNICEF ([http://apps.who.int/immunization\\_monitoring/en/globalsummary/timeseries/tswucoveragemcv.htm](http://apps.who.int/immunization_monitoring/en/globalsummary/timeseries/tswucoveragemcv.htm)). The proportion of children 6-59 months old receiving two doses of Vitamin A was obtained from UNICEF ChildInfo (<http://www.childinfo.org/>) and UNICEF State of the World's Children (SOWC) reports (<http://www.unicef.org/sowc/>) and is also only available as national estimates. Table A.2.3 lists the values, definitions and data sources for the prevention and treatment interventions used in this LiST analysis. Most indicators are derived from the DHS or MIS surveys and therefore values are available for 1999, 2004 and 2010 (DHS) and in some cases 2007 (MIS). For the years between surveys, the values were linearly interpolated. The interventions where coverage levels can be entered by the user are listed in Table A.2.3; not listed are the intervention coverage levels that Spectrum automatically calculates. Several of the interventions are currently in the model as place holders until the ideal indicators are developed and the model is updated. "Data not available" refers to these interventions as well as those in which data is not currently being collected/reported in the surveys.

It was assumed that most malaria-attributed deaths are in the rural areas, where the coverage of malaria interventions is lower than in urban areas. Therefore, the rural Mainland value for the percentage of households owning at least one ITN and the percentage of pregnant women sleeping under an ITN the night before the survey were used to conservatively calculate the malaria-specific deaths prevented by vector control and malaria in pregnancy measures in all of Mainland Tanzania.

### **Additional Health Status Data**

The percent of newborns with IUGR in the baseline year 1999, was calculated from the percentage of weighed babies with low birth weight (<2500g) in the

1999 TDHS, 8.56% for Mainland Tanzania. Using  $X=8.56$  in the equation from De Onis *et al.* [5]  $Y=-3.2452 + 0.852X$ , gives  $Y=4.05\%$  IUGR. 88.4% of IUGR infants are estimated to weigh between 2000 and 2500g and are the IUGR infants most likely to benefit from interventions that reduce IUGR, therefore the IUGR value used was 88.4% of calculated IUGR, which was 3.58% (I. Friberg, Johns Hopkins). National wasting and stunting values for 1999 were obtained from the WHO Global Database on Child Growth and Malnutrition ([www.who.int/nutgrowthdb/database/en/](http://www.who.int/nutgrowthdb/database/en/)). The baseline diarrhoea data in the standard projection was used and is derived from regional estimates based on the DHS data by Boschi-Pinto *et al* [6].

### **Malaria Intervention Protective Efficacy**

The protective effect of vector control methods (household ownership of ITNs or IRS) for preventing deaths in children 1-59 months due to malaria is estimated to be 55% (ranging from 49-60%) based on a review of trials and studies [7]. The protective effect of malaria control measures (ITN use by pregnant women or use of IPTp) during pregnancy is estimated to be 35% (95% confidence interval (CI) 23-45%) during the first two pregnancies based on a review of related trials [7]. The effect of preventing malaria in pregnancy is thought to be through decreasing low birth weight by preventing IUGR and therefore can affect deaths of children 0-59 months of age [7].

### **Uncertainty Limits**

The uncertainty bounds around the number of malaria deaths prevented are based on the uncertainty surrounding the three primary model parameters: percentage of deaths due to malaria [3,4], the estimated protective effect of the malaria control interventions [7] and the malaria intervention coverage estimates from the DHS survey sets.

### **A.2.2 LiST model references**

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- [4] Rowe AK et al. Estimates of the burden of mortality directly attributable to malaria for children under five years of age in Africa for 2000. Complete report is available at: [http://rbm.who.int/partnership/wg/wg\\_monitoring/docs/CHERG\\_final\\_report.pdf](http://rbm.who.int/partnership/wg/wg_monitoring/docs/CHERG_final_report.pdf)
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### A.2.3 Intervention coverage indicators & values used in LiST analysis

| <b>Intervention<sup>a</sup></b>                            | <b>1999</b>                          | <b>2004</b> | <b>2007</b> | <b>2010</b> | <b>Data Sources/Indicator Information</b>   |
|--|--------------------------------------|-------------|-------------|-------------|---|
| <b>Periconceptual</b>                                      |                                      |             |             |             |   |
| All interventions  | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| <b>Pregnancy</b>   |                                      |             |             |             |   |
| Antenatal Care   | 69.9                                 | 61.3        | n/a         | 42.7        | % of women with a live birth in the five years preceding the survey who had 4+ ANC visits for the most recent birth (DHS)   |
| Multiple Micronutrient Supplementation                     | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| Pregnant women protected via IPTp or sleeping under an ITN | 1.6                                  | 9.9         | 20.7        | 58.7        | % of pregnant women sleeping under an ITN, (for 1999 this is ever treated), Mainland, rural (DHS, MIS)  |
| Tetanus toxoid   | see yearly values under data sources |             |             |             | WHO-UNICEF <sup>b</sup> / % children protected at birth (national): '99-'09: 81, 79, 80, 80, 80, 80, 81, 81, 81, 90   |
| Balanced Energy Supplementation                            | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| Hypertensive disease case management (hospital)            | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| Case management of malaria (clinic)                        | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| Case management of malaria (hospital)                      | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| <b>Childbirth</b>  |                                      |             |             |             |   |
| Institutional delivery (clinic and hospital)               | 43.7                                 | 47.0        | n/a         | 50.2        | % of live births delivered at a health facility (public, voluntary/religious, private) (DHS)  |
| Skilled birth attendance (SBA)                             | 43.9                                 | 47.0        | n/a         | 50.5        | % of live births assisted by a skilled birth attendant [doctor, clinical officer (or rural aide in '99), nurse/midwife, MCH aide], use institutional delivery value for '04 (DHS) |
| Active management of the 3rd stage of labour               | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| MgSO <sub>4</sub> management of eclampsia                  | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| Neonatal resuscitation (home)                              | n/a                                  | n/a         | n/a         | n/a         | data not available  |
| <b>Breastfeeding</b>                                       |                                      |             |             |             |   |
| <b>&lt;1 month</b>   |                                      |             |             |             | % distribution of youngest children under three years living with the mother by breastfeeding status (retabulated DHS)  |
| Exclusive  | 61.4                                 | 77.2        | n/a         | 87.4        |   |
| Predominant  | 18.7                                 | 15.1        | n/a         | 7.04        |   |
| Partial  | 19.9                                 | 3.98        | n/a         | 2.74        |   |
| Not  | 0                                    | 3.67        | n/a         | 2.79        |   |

|   |                                      |      |      |      |   |
|---|--------------------------------------|------|------|------|---|
| <b>1-5 months</b>   |                                      |      |      |      |   |
| Exclusive   | 32.4                                 | 38.2 | n/a  | 47.2 |   |
| Predominant   | 37.2                                 | 20.4 | n/a  | 10.2 |   |
| Partial   | 27.6                                 | 39.5 | n/a  | 41.0 |   |
| Not   | 2.78                                 | 1.96 | n/a  | 1.66 |   |
| <b>6-11 months</b>  |                                      |      |      |      |   |
| Exclusive   | 1.55                                 | 1.03 | n/a  | 1.75 |   |
| Predominant   | 16.29                                | 3.71 | n/a  | 1.48 |   |
| Partial   | 78.63                                | 92.7 | n/a  | 93.2 |   |
| Not   | 3.53                                 | 2.57 | n/a  | 3.56 |   |
| <b>12-23 months</b>                                       |                                      |      |      |      |   |
| Exclusive   | 0                                    | 0.3  | n/a  | 0.53 |   |
| Predominant   | 4.29                                 | 0.95 | n/a  | 0.15 |   |
| Partial   | 74.0                                 | 76.1 | n/a  | 75.9 |   |
| Not   | 21.7                                 | 22.6 | n/a  | 23.4 |   |
| <b>Preventative After Birth</b>                           |                                      |      |      |      |   |
| Preventative Postnatal Care                               | 6.1                                  | 13.6 | n/a  | 16.3 | % of women whose child's first postnatal checkup was 0-2 days after delivery, denominator is births outside of health facility (DHS)            |
| Complementary Feeding-education only                      | 63.4                                 | 90.8 | n/a  | 92.7 | % of 6-9mo breastfeeding and consuming complementary foods (DHS)  |
| Complementary Feeding-education & supplementation         | 63.4                                 | 90.8 | n/a  | 92.7 | % of 6-9mo breastfeeding and consuming complementary foods (DHS)  |
| Use of improved water source within 30 minutes            | 65.8                                 | 54.5 | 55.6 | 56.9 | % households with improved source of drinking water (DHS, MIS)  |
| Use of water connection in the home                       | 15.1                                 | 6.41 | 6.97 | 7.42 | % of households with water piped into the dwelling/yard/plot (DHS, MIS)   |
| Improved excreta disposal (latrine/toilet)                | 2.35                                 | 6.38 | 8.33 | 12.3 | % of households with flush toilet/vip latrine (DHS, MIS)  |
| Hand washing with soap                                    | 13                                   | 13   | 13   | 13   | % washing hands with soap after toilet or after cleaning child after toilet (national): Curtis VA, Health Education Research, 2009 <sup>c</sup> |
| Hygienic Disposal of children's stools                    | 74.8                                 | 74.8 | n/a  | 69.6 | % of mothers whose youngest child under five's stools are contained (DHS), no value in '99 (used '04 value)                                     |
| Insecticide treated materials or indoor residual spraying | 9.0                                  | 13.5 | 31.6 | 63.0 | % households owning at least one ITN (Mainland, rural) (DHS, MIS)   |
| Vitamin A for prevention                                  | see yearly values under data sources |      |      |      | UNICEF <sup>d</sup> (national) % of 6-59 mo receiving two doses of vitamin A: '99-'08: 21, 22, 81, 90, 91, 93, 95, 94, 93, 93                   |
| Zinc for prevention                                       | n/a                                  | n/a  | n/a  | n/a  | data not available  |
| <b>Vaccines</b>   |                                      |      |      |      |   |

|   |                                      |      |      |       |  |
|---|--------------------------------------|------|------|-------|--|
| Rotavirus   | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| Measles   | see yearly values under data sources |      |      |       | MCV1: WHO-UNICEF <sup>b</sup> (national) '99-'09: 72, 78, 83, 89, 97, 94, 91, 93, 90, 88, 91                   |
| Hib   | 0                                    | 0    | 0    | 85    | Hib: WHO-UNICEF <sup>b</sup> (national) '09: 85  |
| Pneumococcal  | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| DPT   | see yearly values under data sources |      |      |       | DPT3: WHO-UNICEF <sup>b</sup> (national) '99-'09: 76, 79, 85, 89, 95, 95, 90, 90, 83, 86, 85                   |
| Polio   | see yearly values under data sources |      |      |       | Polio3: WHO-UNICEF <sup>b</sup> (national) '99-'09: 74, 64, 62, 91, 97, 95, 91, 91, 88, 89, 88                 |
| BCG   | see yearly values under data sources |      |      |       | BCG: WHO-UNICEF <sup>b</sup> (national) '99-'09: 87, 86, 89, 88, 91, 91, 91, 90, 89, 89, 93                    |
|   |                                      |      |      |       |  |
| <b>Curative after birth</b>   |                                      |      |      |       |  |
| Sepsis case management-basic  | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| Sepsis case management-comprehensive  | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| Kangaroo mother care  | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| Oral antibiotics: case management of severe neonatal infection  | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| Injectable antibiotics: case management of severe neonatal infection  | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| Full supportive care: case management of severe neonatal infection  | 8.74                                 | 9.4  | n/a  | 10.04 | % of live births delivered at a health facility * 0.2 (DHS)  |
| ORS   | 55.5                                 | 54.4 | n/a  | 44.1  | % of children with diarrhea given ORS packets (DHS)  |
| Antibiotics for dysentery   | 27.75                                | 27.2 | n/a  | 22.05 | 50% of ORS (DHS)   |
| Zinc for treatment  | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| Case management of pneumonia (oral antibiotics)   | 21.6                                 | 21.6 | 21.6 | 21.6  | value from '92 DHS   |
| Vitamin A for measles treatment   | see yearly values under data sources |      |      |       | same values as Vitamin A above, (national): '99-'08: 21, 22, 81, 90, 91, 93, 95, 94, 93, 93                    |
| Antimalarials   | n/a                                  | n/a  | n/a  | n/a   | not running the LiST model with this intervention (efficacy still being worked out for changing antimalarials) |
| Therapeutic feeding   | n/a                                  | n/a  | n/a  | n/a   | data not available   |
| <p><sup>a</sup>It is important to note that the LiST model calculates lives saved compared to the baseline year, therefore a <i>change</i> in intervention coverage is required to see lives saved.</p> <p><sup>b</sup>WHO-UNICEF (<a href="http://apps.who.int/immunization_monitoring/en/globalsummary/timeseries/tswucoveragemcv.htm">http://apps.who.int/immunization_monitoring/en/globalsummary/timeseries/tswucoveragemcv.htm</a>)</p> <p><sup>c</sup>Curtis VA. Health Education Research, 2009, 24(4): 655-673.</p> <p><sup>d</sup>UNICEF: ChildInfo 1999-2004,2008 &amp; SOWC 2008 &amp; 2009</p> |                                      |      |      |       |  |

## A.2.4 LiST model outputs

The malaria deaths reported here are elevated compared to the RBM Progress & Impact Series report (2010) because an improved mortality envelope was used here (Larsen & Eisele, unpublished data).

### Lives Saved Due to ITN Scale-Up

| Projection  | Malaria Deaths | Estimated Lives Saved (1-59 months) |      |      |      |      |      |      |       |       |       |       |       |
|-------------|----------------|-------------------------------------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
|             | 1999           | 2000                                | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007  | 2008  | 2009  | 2010  | Total |
| Lower Limit |                | 0                                   | 0    | 0    | 0    | 0    | 426  | 1809 | 3269  | 5942  | 8789  | 11847 | 32082 |
| Estimate    | 42,568         | 228                                 | 472  | 727  | 993  | 1273 | 3055 | 4933 | 6917  | 10414 | 14144 | 18153 | 61309 |
| Upper Limit |                | 655                                 | 1354 | 2084 | 2848 | 3650 | 5911 | 8294 | 10813 | 15121 | 19719 | 24662 | 95111 |

### Lives Saved Due to Malaria in Pregnancy Intervention Scale-Up

| Projection  | Neonatal Deaths | Estimated Lives Saved (0-59 months) |      |      |      |      |      |      |      |      |      |      |       |
|-------------|-----------------|-------------------------------------|------|------|------|------|------|------|------|------|------|------|-------|
|             | 1999            | 2000                                | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
| Lower Limit |                 | 1                                   | 3    | 4    | 6    | 8    | 19   | 32   | 46   | 96   | 156  | 221  | 592   |
| Estimate    | 51,216          | 7                                   | 16   | 26   | 36   | 49   | 73   | 100  | 129  | 206  | 300  | 404  | 1346  |
| Upper Limit |                 | 14                                  | 32   | 51   | 72   | 97   | 135  | 178  | 224  | 322  | 443  | 577  | 2145  |

## Annex 3: Data Tables with Values, 95% Confidence Limits and Sample Sizes

### A.3.1 Percentage of children under five years of age who slept under an insecticide-treated net (ITN) the night before the survey, by background characteristics

|                           | 1999  |             |      | 2004/5 |             |      | 2007/8 |             |      | 2010  |               |       |
|---------------------------|-------|-------------|------|--------|-------------|------|--------|-------------|------|-------|---------------|-------|
|                           | Value | 95% CI      | n    | Value  | 95% CI      | n    | Value  | 95% CI      | n    | Value | 95% CI        | n     |
| <b>All under-fives</b>    | 1.8%  | 0.012,0.028 | 2013 | 15.8%  | .1389,.1798 | 8147 | 24.8%  | .2255,.2721 | 7319 | 63.9% | 0.6117,0.6645 | 7768  |
| <b>Age</b>                |       |             |      |        |             |      |        |             |      |       |               |       |
| 0-11 months               | na    |             |      | 17.6%  | .1488,.2064 | 1731 | 31.5%  | .2757,.3565 | 1501 | 64.1% | 0.6017,0.6777 | 1590  |
| 12-23 months              | na    |             |      | 17.0%  | .1405,.2036 | 1676 | 28.0%  | .249,.3123  | 1508 | 65.4% | 0.6174,0.6897 | 1576  |
| 24-35 months              | na    |             |      | 14.1%  | .119,.1657  | 1654 | 22.6%  | .1942,.2613 | 1456 | 63.5% | 0.5996,0.6696 | 1473  |
| 36-47 months              | na    |             |      | 17.1%  | .1414,.2049 | 1549 | 21.3%  | .1807,.2499 | 1350 | 63.3% | 0.5977,0.6677 | 1616  |
| 48-59 months              | na    |             |      | 13.2%  | .1092,.1591 | 1534 | 20.2%  | .171,.2371  | 1490 | 62.8% | 0.5894,0.6657 | 1513  |
| <b>Sex</b>                |       |             |      |        |             |      |        |             |      |       |               |       |
| Female                    |       |             |      | 16.0%  | .1398,.183  | 4069 | 25.3%  | .2267,.2811 | 3650 | 63.9% | 0.6106,0.6666 | 3918  |
| Male                      |       |             |      | 15.6%  | .1349,.1803 | 4078 | 24.3%  | .2178,.2706 | 3669 | 63.8% | 0.607,0.6678  | 3850  |
| <b>Residence</b>          |       |             |      |        |             |      |        |             |      |       |               |       |
| Urban                     | 3%    | 0.017,0.065 | 445  | 40.9%  | .3527,.4681 | 1569 | 48.7%  | .4224,.5528 | 1278 | 64.9% | 0.5973,0.6965 | 1481  |
| Rural                     | 1%    | 0.008,0.025 | 1568 | 9.8%   | .0818,.1179 | 6578 | 19.7%  | .1759,.2209 | 6041 | 63.6% | 0.6032,0.6679 | 6287  |
| <b>Wealth quintile</b>    |       |             |      |        |             |      |        |             |      |       |               |       |
| Quintile 1 (Poorest)      | na    |             |      | 3.6%   | .0247,.0511 | 1886 | 12.6%  | .1001,.1561 | 1679 | 61.1% | 0.5636,0.6571 | 1680  |
| Quintile 2                | na    |             |      | 6.2%   | .0465,.0815 | 1701 | 16.4%  | .1356,.1967 | 1610 | 64.1% | 0.5904,0.6893 | 1847  |
| Quintile 3                | na    |             |      | 12.2%  | .0941,.1566 | 1765 | 23.4%  | .1983,.2749 | 1604 | 61.6% | 0.5696,0.6612 | 1802  |
| Quintile 4                | na    |             |      | 18.8%  | .1532,.2283 | 1580 | 27.5%  | .2352,.3189 | 1323 | 67.4% | 0.6386,0.7081 | 1446  |
| Quintile 5 (Least Poor)   | na    |             |      | 50%    | .4492,.5467 | 1214 | 54.5%  | .4912,.598  | 1102 | 66.7% | 0.6133,0.7168 | 993   |
| <b>Mother's Education</b> |       |             |      |        |             |      |        |             |      |       |               |       |
| None                      | na    |             |      | 6.8%   | .0502,.0906 | 1993 | 16.5%  | .1368,.1974 | 1674 | 62%   | .5628,.6728   | 1849  |
| Primary Incomplete        | na    |             |      | 9.4%   | .0678,.1276 | 1161 | 21.8%  | .1783,.2643 | 895  | 63.8% | .587,.6869    | 1035  |
| Primary Complete          | na    |             |      | 20.1%  | .1751,.2285 | 4065 | 28.5%  | .2564,.3162 | 3809 | 66.4% | .6386,.6894   | 3829  |
| Secondary +               | na    |             |      | 49.5%  | .4078,.5816 | 286  | 48.5%  | .3923,.5777 | 253  | 65.7% | .586,.7214    | 370.0 |
| <b>Region</b>             |       |             |      |        |             |      |        |             |      |       |               |       |
| Dodoma                    | 3.9%  | 0.013,0.110 | 65   | 5.4%   | 0.022,0.127 | 403  | 12.9%  | 0.084,0.194 | 287  | 79.1% | 0.7277,0.8428 | 179   |
| Arusha                    | 0.0%  |             | 89   | 19%    | 0.098,0.336 | 273  | 25.8%  | 0.132,0.443 | 293  | 43.5% | 0.274,0.6113  | 288   |

|                                   |      |               |     |       |               |      |       |               |      |       |               |      |
|-----------------------------------|------|---------------|-----|-------|---------------|------|-------|---------------|------|-------|---------------|------|
| Kilimanjaro                       | 0.0% |               | 51  | 13.9% | 0.068,0.263   | 220  | 14.1% | 0.081,0.233   | 232  | 65.8% | 0.5724,0.7339 | 207  |
| Tanga                             | 4.8% | 0.009,0.230   | 82  | 13.4% | 0.067,0.252   | 307  | 27.3% | 0.190,0.374   | 297  | 52.2% | 0.4346,0.6086 | 333  |
| Morogoro                          | 7.1% | 0.028,0.170   | 94  | 27.1% | 0.169,0.404   | 342  | 36.5% | 0.237,0.516   | 302  | 28.2% | 0.1676,0.4326 | 327  |
| Pwani                             | *    | *             | *   | 18.5% | 0.098,0.321   | 185  | 40.0% | 0.30,0.510    | 142  | 74.9% | 0.6798,0.8071 | 205  |
| Dar es Salaam                     | 9.0% | 0.044,0.173   | 128 | 62.7% | 0.539,0.708   | 422  | 65.2% | 0.552,0.740   | 341  | 62.0% | 0.5187,0.7114 | 364  |
| Lindi                             | 0.0% |               | 58  | 7.6%  | 0.040,0.139   | 143  | 29.3% | 0.208,0.395   | 156  | 66.5% | 0.5584,0.7571 | 136  |
| Mtwara                            | 1.1% | 0.001,0.082   | 55  | 11.0% | 0.059,0.196   | 243  | 24.5% | 0.153,0.368   | 236  | 75.2% | 0.6696,0.8196 | 238  |
| Ruvuma                            | 0.0% |               | 56  | 19.9% | 0.109,0.337   | 225  | 31.8% | 0.233,0.418   | 265  | 75.4% | 0.704,0.7975  | 253  |
| Iringa                            | 0.0% |               | 76  | 2.5%  | 0.004,0.130   | 283  | 10.8% | 0.055,0.201   | 314  | 54.1% | 0.4493,0.6305 | 313  |
| Mbeya                             | 1.2% | 0.002,0.077   | 89  | 6.9%  | 0.022,0.194   | 626  | 21.2% | 0.117,0.354   | 479  | 42.6% | 0.2876,0.5764 | 508  |
| Singida                           | 0.5% | 5.6e-04,0.041 | 58  | 8.4%  | 0.040,0.138   | 299  | 16.4% | 0.107,0.243   | 181  | 27.5% | 0.1583,0.4323 | 301  |
| Tabora                            | 0.0% |               | 66  | 5.3%  | 0.020,0.136   | 487  | 8.6%  | 0.048,0.149   | 498  | 58.5% | 0.4626,0.698  | 462  |
| Rukwa                             | 2.3% | 0.004,0.112   | 51  | 8.6%  | 0.039,0.179   | 304  | 12.5% | 0.077,0.197   | 337  | 67.6% | 0.597,0.7463  | 269  |
| Kigoma                            | 3.0% | 0.008,0.106   | 65  | 8.1%  | 0.043,0.146   | 454  | 22.1% | 0.157,0.302   | 357  | 55.6% | 0.4959,0.6149 | 409  |
| Shinyang                          | 2.3% | 0.008,0.066   | 120 | 22.4% | 0.158,0.307   | 869  | 25.6% | 0.187,0.339   | 816  | 79.1% | 0.7379,0.836  | 816  |
| Kagera                            | 0.5% | 6.9e-04,0.041 | 80  | 13.5% | 0.079,0.221   | 542  | 20.4% | 0.141,0.296   | 483  | 64.6% | 0.5707,0.7139 | 485  |
| Mwanza                            | 0.3% | 3.6e-04,0.019 | 167 | 21.0% | 0.132,0.316   | 878  | 29.2% | 0.193,0.414   | 723  | 82.7% | 0.7788,0.8663 | 789  |
| Mara                              | 0.0% |               | 75  | 11.1% | 0.069,0.173   | 376  | 38.4% | 0.268,0.529   | 351  | 78.6% | 0.7259,0.8362 | 386  |
| Manyara                           | na   | na            | na  | 4.7%  | 0.022,0.098   | 267  | 13.5% | 0.078,0.223   | 230  | 75.9% | 0.6669,0.8314 | 202  |
| <b>Zone</b>                       |      |               |     |       |               |      |       |               |      |       |               |      |
| Western                           | na   |               |     | 14.2% | 0.1073,0.1854 | 1809 | 19.7% | 0.1617,0.2389 | 1670 | 67.8% | 0.6316,0.7207 | 1687 |
| Northern                          | na   |               |     | 12.8% | 0.0889,0.18   | 1067 | 21.0% | 0.1601,0.2692 | 1052 | 57.1% | 0.5064,0.6341 | 1029 |
| Central                           | na   |               |     | 6.7%  | 0.0378,0.1156 | 702  | 14.3% | 0.1052,0.1905 | 468  | 59.2% | 0.5157,0.6632 | 780  |
| Southern Highlands                | na   |               |     | 6.3%  | 0.0315,0.122  | 1212 | 15.7% | 0.1083,0.222  | 1130 | 52.1% | 0.426,0.6137  | 1089 |
| Lake                              | na   |               |     | 16.6% | 0.123,0.2208  | 1795 | 28.5% | 0.2251,0.3542 | 1556 | 76.4% | 0.7276,0.7977 | 1660 |
| Eastern                           | na   |               |     | 41.3% | 0.3415,0.4874 | 950  | 49.6% | 0.4197,0.573  | 785  | 52.6% | 0.4488,0.6018 | 896  |
| Southern                          | na   |               |     | 13.5% | 0.0913,0.1948 | 611  | 28.6% | 0.2292,0.3498 | 658  | 73.4% | 0.6916,0.7723 | 627  |
| <b>Number of ITN in household</b> |      |               |     |       |               |      |       |               |      |       |               |      |
| 1                                 | na   |               |     | 61.9% | 0.552,0.6816  | 771  | 47.9% | 0.4401,0.5177 | 1606 | 65.7% | 0.624,0.6879  | 1956 |
| 2                                 | na   |               |     | 73.5% | 0.674,0.7872  | 587  | 57.3% | 0.5036,0.6401 | 1057 | 79.1% | 0.7624,0.8174 | 2441 |
| 3+                                | na   |               |     | 74.0% | 0.6673,0.8014 | 515  | 63.0% | 0.5628,0.6916 | 700  | 83.0% | 0.776,0.873   | 2101 |
| <b>Household size</b>             |      |               |     |       |               |      |       |               |      |       |               |      |
| <4                                | na   |               |     | 23.3% | 0.195,0.2767  | 732  | 36.9% | 0.3152,0.4261 | 527  | 67.0% | 0.6205,0.7161 | 612  |
| 4-5                               | na   |               |     | 18.0% | 0.1481,0.216  | 2444 | 29.8% | 0.2635,0.334  | 2068 | 68.3% | 0.6506,0.7141 | 2307 |

|  |           |               |      |       |               |      |       |               |      |       |               |      |
|--|-----------|---------------|------|-------|---------------|------|-------|---------------|------|-------|---------------|------|
| 6-7  | na        |               |      | 14.5% | 0.1201,0.1749 | 2123 | 23.8% | 0.2033,0.2759 | 2040 | 62.3% | 0.5904,0.6537 | 2112 |
| 8-9  | na        |               |      | 12.6% | 0.101,0.1556  | 1363 | 22.7% | 0.1888,0.2711 | 1226 | 62.4% | 0.5771,0.668  | 1184 |
| 10+  | na        |               |      | 13.4% | 0.0944,0.1875 | 1486 | 16.6% | 0.1277,0.2129 | 1459 | 59.3% | 0.5213,0.6603 | 1553 |
| <i>Memorandum Items</i>  |           |               |      |       |               |      |       |               |      |       |               |      |
| <b>Under-fives slept under ITN previous night, in HH owning 1+ITN</b>  |           |               |      |       |               |      |       |               |      |       |               |      |
| All  |           |               |      | 68.8% | 0.642,0.731   | 1873 | 54.0% | 0.505,0.575   | 3320 | 76.3% | 0.7375,0.7872 | 6499 |
| Urban  |           |               |      | 80.1% | 0.754,0.841   | 802  | 74.5% | 0.692,0.792   | 825  | 81.2% | 0.7681,0.8488 | 1183 |
| Rural  |           |               |      | 60.4% | 0.535,0.670   | 1071 | 47.3% | 0.433,0.513   | 2495 | 75.2% | 0.7218,0.7808 | 5316 |
| <b>Under-fives slept under Any Net previous night (all households)</b> |           |               |      |       |               |      |       |               |      |       |               |      |
|  | Min:20%   | (0.163-0.237) | 2013 | 30.8% | 0.279,0.338   | 8147 | 35.4% | 0.326,0.383   | 7319 | 72.4% | 0.6952,0.7504 | 7768 |
|  | Max:20.5% | (0.168-0.243) | 2013 |       |               |      |       |               |      |       |               |      |

### A.3.2 Percentage of pregnant women aged 15-49 who slept under an insecticide-treated net (ITN) the night before the survey, by background characteristics

|                             | 2004-5 |              |      | 2007-8 |                |     | 2010  |               |     |
|-----------------------------|--------|--------------|------|--------|----------------|-----|-------|---------------|-----|
|                             | Value  | 95%CI        | n    | Value  | 95%CI          | n   | Value | 95%CI         | n   |
| <b>All</b>                  | 15.7%  | 0.129,0.191  | 1054 | 26.0%  | 0.217,0.309    | 823 | 56.5% | 0.5185,0.6099 | 932 |
| <b>Residence</b>            |        |              |      |        |                |     |       |               |     |
| Urban                       | 39.9%  | 0.313,0.492  | 205  | 47.6%  | 0.379,0.575    | 164 | 46.7% | 0.3598,0.5782 | 175 |
| Rural                       | 9.9%   | 0.073,0.133  | 849  | 20.7%  | 0.160,0.262    | 660 | 58.7% | 0.5367,0.6359 | 757 |
| <b>Region</b>               |        |              |      |        |                |     |       |               |     |
| Dodoma                      | 2.9%   | .0037, .1941 | 57   | 4.9%   | .0011, .0524   | 33  | 72.2% | .5308, .8563  | 48  |
| Aarusha                     | 22.0%  | .0854, .4598 | 43   | 13.4%  | .0053, .0489   | 26  | 35.8% | .1518, .6342  | 39  |
| Kilimanjaro                 | 9.5%   | .0226, .3224 | 23   | 17.0%  | .0035, .0575   | 18  | 77.1% | .3538, .954   | 17  |
| Tanga                       | 6.2%   | .0147, .2252 | 41   | 28.4%  | .0257, .1084   | 40  | 39.6% | .2126, .6146  | 41  |
| Morogoro                    | 37.1%  | .1717, .6262 | 32   | 45.7%  | .0389, .1196   | 32  | 38.1% | .1728, .6435  | 28  |
| Pwani                       | 17.0%  | .0614, .392  | 17   | 37.1%  | .0176, .0483   | 17  | 58.2% | .3665, .7702  | 26  |
| Dar es Salaam               | 55.3%  | .3593, .732  | 55   | 62.1%  | .0713, .1632   | 38  | 45.8% | .2737, .6547  | 44  |
| Lindi                       | 6.8%   | .017, .2363  | 22   | 31.8%  | .0058, .0556   | 12  | 49.6% | .28, .7139    | 19  |
| Mtwara                      | 13.5%  | .044, .3456  | 26   | 25.3%  | .0117, .0736   | 25  | 38.8% | .2175, .5913  | 28  |
| Ruvuma                      | 26.2%  | .1322, .4532 | 26   | 28.7%  | .018, .091     | 31  | 54.5% | .3538, .7237  | 37  |
| Iringa                      | 2.9%   | .0037, .1937 | 35   | 3.8%   | 8.1e-04, .0405 | 33  | 20.2% | .0603, .5008  | 27  |
| Mbeya                       | 5.4%   | .0129, .1972 | 69   | 19.2%  | .031, .1207    | 69  | 51.0% | .3221, .6943  | 55  |
| Singida                     | 6.7%   | .0251, .1667 | 37   | 18.0%  | .0046, .045    | 17  | 26.0% | .0966, .5363  | 25  |
| Tabora                      | 9.9%   | .0393, .228  | 74   | 4.3%   | .0015, .075    | 55  | 61.4% | .4455, .7588  | 65  |
| Rukwa                       | 14.8%  | .0747, .2713 | 48   | 3.0%   | 6.5e-04, .0328 | 33  | 54.1% | .3406, .7295  | 35  |
| Kigoma                      | 10.6%  | .041, .248   | 58   | 20.9%  | .014, .084     | 36  | 28.8% | .1261, .5304  | 46  |
| Shinyanga                   | 19.8%  | .1086, .334  | 121  | 44.3%  | .0877, .2168   | 68  | 62.1% | .4495, .7665  | 107 |
| Kagera                      | 12.6%  | .062, .2382  | 69   | 28.6%  | .0469, .1649   | 67  | 77.2% | .6369, .8677  | 61  |
| Mwanza                      | 18.3%  | .0776, .3736 | 111  | 27.8%  | .0486, .2885   | 97  | 75.7% | .6471, .8413  | 108 |
| Mara                        | 17.4%  | .0807, .3352 | 54   | 43.7%  | .0629, .1631   | 50  | 69.3% | .5668, .7951  | 57  |
| Manyara                     | 6.4%   | .0194, .1899 | 32   | 17.6%  | .0078, .0519   | 25  | 77.2% | .6154, .8771  | 21  |
| <b>Zone</b>                 |        |              |      |        |                |     |       |               |     |
| Western                     | 14.8%  | .0929, .2275 | 254  | 25.1%  | .1724, .3492   | 159 | 55.5% | .4367, .6681  | 215 |
| Northern                    | 11.7%  | .0627, .2078 | 140  | 20.5%  | .128, .3114    | 110 | 50.5% | .3825, .6264  | 117 |
| Central                     | 4.4%   | .0158, .1168 | 94   | 9.4%   | .0339, .2388   | 50  | 56.5% | .419, .7006   | 72  |
| Southern Highlands          | 7.8%   | .0412, .1421 | 152  | 11.5%  | .0587, .2131   | 135 | 47.7% | .3503, .606   | 110 |
| Lake                        | 16.4%  | .0995, .2583 | 235  | 31.8%  | .2097, .4496   | 214 | 75.8% | .6921, .8134  | 216 |
| Eastern                     | 43.5%  | .3038, .5751 | 104  | 51.1%  | .3756, .6453   | 87  | 47.6% | .3502, .6043  | 96  |
| Southern                    | 16.0%  | .0903, .2668 | 75   | 28.0%  | .1553, .4519   | 68  | 50.7% | .3837, .6298  | 80  |
| <b>Education</b>            |        |              |      |        |                |     |       |               |     |
| None                        | 5.7%   | .0323, .0993 | 282  | 19.7%  | .1287, .2887   | 189 | 53.6% | .434, .6343   | 230 |
| Primary Incomplete          | 9.6%   | .0559, .1595 | 189  | 20.7%  | .1381, .2994   | 143 | 65.7% | .5543, .7461  | 141 |
| Primary Complete            | 21.1%  | .1682, .2609 | 550  | 28.8%  | .2284, .3554   | 442 | 58.1% | .5214, .6382  | 488 |
| Secondary +                 | 48.0%  | .2709, .6955 | 32   | 42.4%  | .2543, .6129   | 44  | 45.6% | .2965, .6256  | 46  |
| <b>Wealth Quintile</b>      |        |              |      |        |                |     |       |               |     |
| Quintile 1 (Poorest)        | 3.5%   | .0171, .0689 | 234  | 13.2%  | .0749, .2207   | 157 | 55.8% | .4736, .6399  | 174 |
| Quintile 2                  | 7.1%   | .0417, .1188 | 235  | 21.3%  | .1396, .3098   | 169 | 62.9% | .5492, .703   | 230 |
| Quintile 3                  | 12.9%  | .0775, .2075 | 212  | 26.1%  | .1716, .3755   | 187 | 56.6% | .4744, .6524  | 214 |
| Quintile 4                  | 15.9%  | .1095, .2305 | 207  | 22.4%  | .1512, .3183   | 161 | 58.0% | .4817, .6715  | 160 |
| Quintile 5 (Least Poor)     | 48.4%  | .3888, .5806 | 167  | 18.8%  | .3782, .5981   | 149 | 51.6% | .4026, .6268  | 130 |
| <b>Number of ITNs in HH</b> |        |              |      |        |                |     |       |               |     |
| 1                           | 73.6%  | .6341, .8178 | 127  | 52.8%  | .4334, .6212   | 176 | 66.2% | .5775, .7381  | 244 |
| 2                           | 57.4%  | .4235, .7114 | 61   | 64.1%  | .5183, .7481   | 116 | 77.2% | .6924, .8362  | 257 |
| 3+                          | 83.6%  | .6783, .9253 | 45   | 70.0%  | .5406, .8225   | 66  | 80.1% | .7288, .8571  | 202 |
| <b>Size of HH</b>           |        |              |      |        |                |     |       |               |     |
| <4                          | 19.0%  | .1422, .2501 | 298  | 33.9%  | .2533, .4372   | 167 | 55.1% | .4599, .6395  | 203 |
| 4-5                         | 17.7%  | .1287, .2379 | 295  | 29.5%  | .2084, .3994   | 227 | 59.8% | .5142, .6772  | 246 |

|   |       |             |       |       |              |      |       |               |      |
|---|-------|-------------|-------|-------|--------------|------|-------|---------------|------|
| 6-7   | 14.0% | .0874,.2154 | 178   | 29.1% | .209,.3888   | 187  | 53.8% | .4495,.6243   | 188  |
| 8-9   | 12.5% | .0704,.2114 | 129   | 13.2% | .0635,.2547  | 106  | 61.0% | .4775,.7279   | 105  |
| 10+   | 11.0% | .0599,.1945 | 143   | 16.3% | .0953,.2641  | 137  | 59.3% | .4963,.6822   | 166  |
| <i>Memorandum Items</i>                                       |       |             |       |       |              |      |       |               |      |
| <b>Non-Pregnant Women</b>                                     |       |             |       |       |              |      |       |               |      |
| Urban   | 40.9% | 0.358,0.462 | 2614  | 47.5% | 0.429,0.522  | 2111 | 52.9% | 0.485,0.5717  | 2615 |
| Rural   | 9.5%  | 0.080,0.112 | 6342  | 16.4% | 0.146,0.185  | 5825 | 48.8% | 0.4621,0.5135 | 6382 |
| All   | 18.6% | 0.166,0.209 | 8956  | 22.1% | 0.201,0.242  | 7936 | 50.0% | 0.4798,0.5204 | 8997 |
| <b>All Women 15-49yrs</b>                                     |       |             |       |       |              |      |       |               |      |
| Urban   | 40.6% | 0.357,0.457 | 2889  | 47.3% | 0.426,0.520  | 2380 | 52.5% | 0.4832,0.567  | 2787 |
| Rural   | 9.4%  | 0.079,0.112 | 7368  | 16.6% | 0.146,0.187  | 6809 | 79.9% | 0.4736,0.524  | 7132 |
| All   | 18.2% | 0.162,0.204 | 10257 | 24.5% | 0.224,0.268  | 9189 | 50.6% | 0.4861,0.5263 | 9919 |
| <b>Hati Punguzo</b>   |       |             |       |       |              |      |       |               |      |
| <b><i>Of all pregnant women 15-49</i></b>                     |       |             |       |       |              |      |       |               |      |
| % slept under ITN obtained via Hati Punguzo                   |       |             |       | 9.5%  | 0.066, 0.134 |      |       |               |      |
| % slept under ITN not-obtained via Hati Punguzo               |       |             |       | 16.5% | 0.135, 0.201 |      |       |               |      |
| <b><i>Of all pregnant women 15-49 who slept under ITN</i></b> |       |             |       |       |              |      |       |               |      |
| % whose ITN was obtained via Hati Punguzo                     |       |             |       | 36.4% | 0.275, 0.464 |      |       |               |      |
| % whose ITN was not obtained via Hati Punguzo                 |       |             |       | 63.6% | 0.537, 0.725 |      |       |               |      |

### A.3.3 Percentage of whole (de facto) population who slept under an “any net” and insecticide-treated net (ITN) the night before the survey, by background characteristics

#### Insecticide- Treated Net

|                             | 2004/5 |             |       | 2007/8 |             |       | 2010  |             |       |
|-----------------------------|--------|-------------|-------|--------|-------------|-------|-------|-------------|-------|
|                             | value  | CI          | n     | value  | CI          | n     | value | CI          | N     |
| <b>All</b>                  | 14.9%  | .1329,.1669 | 44830 | 19.7%  | .1784,.2163 | 40660 | 45.1% | .4336,.4694 | 45125 |
| <b>Residence</b>            |        |             |       |        |             |       |       |             |       |
| Urban                       | 37.4%  | .3305,.4205 | 10502 | 42.7%  | .3817,.4744 | 8669  | 51.0% | .4693,.5511 | 10077 |
| Rural                       | 8.0%   | .0677,.0946 | 34328 | 13.4%  | .1176,.1525 | 31991 | 43.5% | .4133,.456  | 35049 |
| <b>Age</b>                  |        |             |       |        |             |       |       |             |       |
| <5                          | 15.8%  | .1389,.1797 | 8147  | 24.8%  | .2254,.2721 | 7319  | 63.9% | .6117,.6645 | 7768  |
| 5-19                        | 15.2%  | .1313,.1752 | 4671  | 15.3%  | .1342,.1728 | 15795 | 37.6% | .3572,.3956 | 18050 |
| 20-49                       | 18.9%  | .1679,.2109 | 7997  | 24.5%  | .2233,.2672 | 13060 | 50.0% | .4801,.5196 | 14309 |
| 50+                         | 13.2%  | .1174,.1487 | 24014 | 12.9%  | .111,.1487  | 4486  | 29.4% | .2726,.3162 | 4998  |
| <b>Sex</b>                  |        |             |       |        |             |       |       |             |       |
| Male                        | 14.3%  | .1269,.16   | 21660 | 18.3%  | .1641,.2026 | 19465 | 47.7% | .4576,.4957 | 21703 |
| Female                      | 15.5%  | .1378,.1741 | 23170 | 21.0%  | .1906,.2298 | 21196 | 42.4% | .4058,.4431 | 23423 |
| <b>Number of ITNs in HH</b> |        |             |       |        |             |       |       |             |       |
| 1                           | 49.7%  | .4572,.5373 | 3819  | 39.6%  | .3635,.4298 | 4393  | 44.9% | .4299,.4683 | 10550 |
| 2                           | 67.2%  | .6301,.7122 | 2991  | 59.8%  | .5481,.6456 | 3013  | 66.2% | .6402,.683  | 11116 |
| 3+                          | 77.1%  | .7238,.8126 | 3596  | 69.7%  | .637,.7512  | 2268  | 77.8% | .7419,.8098 | 10642 |

#### Any Net

|                             | 2004/5 |             |       | 2007/8 |             |       | 2009/10 |             |       |
|-----------------------------|--------|-------------|-------|--------|-------------|-------|---------|-------------|-------|
|                             | value  | CI          | n     | value  | CI          | n     | value   | CI          | N     |
| <b>All</b>                  | 28.6%  | .2618,.3113 | 44830 | 29.5%  | .2712,.3205 | 40660 | 56.2%   | .5406,.5835 | 45125 |
| <b>Residence</b>            |        |             |       |        |             |       |         |             |       |
| Urban                       | 58.4%  | .5309,.6344 | 10502 | 60.1%  | .5464,.6523 | 8669  | 51.8%   | .4939,.5427 | 10077 |
| Rural                       | 19.5%  | .1721,.2198 | 34328 | 21.3%  | .1893,.2378 | 31991 | 71.5%   | .668,.757   | 35049 |
| <b>Age</b>                  |        |             |       |        |             |       |         |             |       |
| <5                          | 30.8%  | .2787,.3379 | 8147  | 35.4%  | .3262,.3832 | 7319  | 72.4%   | .6952,.7504 | 7768  |
| 6-19                        | 28.5%  | .2552,.3172 | 4671  | 23.4%  | .2091,.2603 | 15795 | 48.0%   | .4566,.5035 | 18050 |
| 20-49                       | 35.2%  | .324,.3814  | 7997  | 35.9%  | .3315,.3866 | 13060 | 62.2%   | .5994,.6449 | 14309 |
| 50+                         | 25.7%  | .2341,.2806 | 24014 | 23.2%  | .206,.2594  | 4486  | 43.5%   | .4082,.4624 | 4998  |
| <b>Sex</b>                  |        |             |       |        |             |       |         |             |       |
| Male                        | 27.4%  | .2505,.2996 | 21660 | 27.3%  | .2493,.2981 | 19465 | 59.0%   | .5676,.6125 | 21703 |
| Female                      | 29.7%  | .2716,.323  | 23170 | 31.6%  | .2904,.3421 | 21196 | 53.2%   | .5097,.5539 | 23423 |
| <b>Number of nets in HH</b> |        |             |       |        |             |       |         |             |       |
| 1                           | 46.2%  | .4346,.4894 | 6752  | 36.9%  | .3403,.3981 | 8324  | 50.0%   | .4764,.5232 | 8858  |
| 2                           | 60.3%  | .5627,.6418 | 6723  | 54.8%  | .5103,.5846 | 7295  | 68.8%   | .6628,.7118 | 12138 |
| 3+                          | 67.3%  | .601,.7368  | 8393  | 62.2%  | .5768,.6647 | 7947  | 81.5%   | .789,.8376  | 15458 |

### A.3.4 Percentage of households that owned at least one mosquito net (treated or untreated)

|                                 | 1999  |             |      | 2004/5 |              |      | 2007/8 |             |      | 2010  |               |      |
|---------------------------------|-------|-------------|------|--------|--------------|------|--------|-------------|------|-------|---------------|------|
|                                 | Value | 95% CI      | n    | Value  | 95% CI       | n    | Value  | 95% CI      | n    | Value | 95% CI        | n    |
| <b>All</b>                      | 29.8% | 0.256,0.343 | 3523 | 45.9%  | 0.431,0.486  | 9483 | 55.6%  | 0.529,0.582 | 8269 | 74.7% | 0.7284,0.7644 | 9377 |
| <b>With/without under-fives</b> |       |             |      |        |              |      |        |             |      |       |               |      |
| HH with under-fives             | 30.4% | .2566,.356  | 2013 | 48.8%  | 0.457,0.519  | 5598 | 61.0%  | 0.581,0.637 | 4971 | 87.5% | .8559,.8929   | 5517 |
| HH without under-fives          | 29.0% | .2414,.3435 | 1510 | 41.6%  | 0.386,0.447  | 3884 | 47.5%  | 0.440,0.510 | 3298 | 56.2% | .5339,.5912   | 3859 |
| <b>Residence</b>                |       |             |      |        |              |      |        |             |      |       |               |      |
| Urban                           | 57.0% | 0.493,0.642 | 920  | 74%    | 0.694,0.780  | 2492 | 79%    | 0.737,0.826 | 2041 | 84%   | 0.8096,0.8666 | 2417 |
| Rural                           | 20.2% | 0.158,0.255 | 2604 | 36%    | 0.328,0.391  | 6990 | 48%    | 0.450,0.511 | 6228 | 71%   | 0.6913,0.7365 | 6959 |
| <b>Region</b>                   |       |             |      |        |              |      |        |             |      |       |               |      |
| Dodoma                          | 14%   | 0.036,0.428 | 211  | 27.7%  | 0.149, 0.455 | 520  | 44.1%  | 0.347,0.540 | 384  | 76.1% | .7111,.8037   | 580  |
| Arusha                          | 27%   | 0.151,0.434 | 473  | 38.5%  | 0.250, 0.540 | 349  | 45.1%  | 0.281,0.633 | 362  | 59.2% | .4313,.7346   | 411  |
| Kilimanjaro                     | 28%   | 0.087,0.624 | 179  | 26.1%  | 0.145, 0.424 | 408  | 43.8%  | 0.302,0.583 | 363  | 58.4% | .4804,.6802   | 460  |
| Tanga                           | 28%   | 0.150,0.449 | 181  | 34.3%  | 0.219, 0.495 | 438  | 50.4%  | 0.395,0.612 | 407  | 70.4% | .6265,.7706   | 551  |
| Morogoro                        | 51%   | 0.328,0.680 | 196  | 64.7%  | 0.484, 0.781 | 514  | 64.1%  | 0.50,0.762  | 489  | 56.8% | .3932,.7268   | 498  |
| Pwani                           | 11%   | 0.101,0.114 | 115  | 53.5%  | 0.385, 0.678 | 283  | 62.9%  | 0.497,0.745 | 212  | 80.3% | .7407,.8532   | 269  |
| Dar es salaam                   | 74%   | 0.608,0.745 | 243  | 84.5%  | 0.789, 0.888 | 868  | 89.5%  | 0.842,0.931 | 624  | 85.8% | .809,.8963    | 730  |
| Lindi                           | 36%   | 0.206,0.552 | 83   | 45.0%  | 0.315, 0.593 | 247  | 64.7%  | 0.550,0.733 | 257  | 79.0% | .7393,.8329   | 219  |
| Mtwara                          | 23%   | 0.115,0.414 | 184  | 47.7%  | 0.356, 0.601 | 379  | 68.0%  | 0.580,0.766 | 341  | 76.1% | .7023,.811    | 425  |
| Ruvuma                          | 13%   | 0.06,0.260  | 89   | 48.6%  | 0.350, 0.625 | 304  | 60.7%  | 0.510,0.696 | 317  | 77.0% | .7235,.8107   | 361  |
| Iringa                          | 12%   | 0.032,0.360 | 177  | 17.2%  | 0.087, 0.310 | 479  | 24.6%  | 0.154,0.369 | 451  | 60.6% | .5148,.6897   | 498  |
| Mbeya                           | 37%   | 0.163,0.629 | 254  | 28.8%  | 0.163, 0.458 | 664  | 41.7%  | 0.265,0.588 | 610  | 69.4% | .6093,.7665   | 591  |
| Singida                         | 9%    | 0.038,0.205 | 122  | 22.6%  | 0.138, 0.349 | 300  | 41.9%  | 0.318,0.528 | 214  | 47.1% | .3499,.5953   | 302  |
| Tabora                          | 20%   | 0.104,0.355 | 98   | 53.0%  | 0.425, 0.632 | 390  | 58.0%  | 0.483,0.671 | 393  | 82.3% | .7373,.8854   | 365  |
| Rukwa                           | 23%   | 0.088,0.481 | 89   | 32.9%  | 0.193, 0.500 | 280  | 44.6%  | 0.341,0.555 | 293  | 78.4% | .7177,.8381   | 278  |
| Kigoma                          | 26%   | 0.112,0.493 | 92   | 29.6%  | 0.192, 0.428 | 441  | 46.4%  | 0.409,0.521 | 329  | 69.0% | .6402,.736    | 417  |
| Shinyanga                       | 26%   | 0.171,0.370 | 219  | 61.9%  | 0.532, 0.698 | 644  | 55.6%  | 0.489,0.621 | 596  | 92.9% | .8958,.9523   | 607  |
| Kagera                          | 14%   | 0.067,0.276 | 172  | 31.3%  | 0.219, 0.425 | 560  | 49.4%  | 0.394,0.595 | 480  | 75.8% | .6847,.8187   | 556  |
| Mwanza                          | 36%   | 0.259,0.476 | 234  | 69.7%  | 0.624, 0.762 | 778  | 76.0%  | 0.667,0.833 | 623  | 90.8% | .8612,.9397   | 699  |
| Mara                            | 54%   | 0.346,0.716 | 115  | 60.1%  | 0.493, 0.699 | 345  | 76.6%  | 0.651,0.851 | 280  | 92.3% | .8867,.9486   | 325  |
| Manyara                         | na    |             |      | 21.4%  | 0.122, 0.348 | 291  | 33.1%  | 0.20,0.496  | 244  | 78.1% | .713,.8361    | 233  |
| <b>Zone</b>                     |       |             |      |        |              |      |        |             |      |       |               |      |
| Western                         | 24.4% | .1757,.3301 | 408  | 49.9%  | .4373,.5599  | 1474 | 54.0%  | .4965,.5835 | 1318 | 83.0% | .7963,.8583   | 1389 |

|   |       |             |     |        |             |      |        |             |      |        |              |      |
|---|-------|-------------|-----|--------|-------------|------|--------|-------------|------|--------|--------------|------|
| Northern  | 27.37 | .1808,.3915 | 833 | 30.5%  | .239,.3801  | 1486 | 44.2%  | .3696,.5168 | 1375 | 65.3%  | .5989,.704   | 1655 |
| Central   | 12.46 | .0455,.2983 | 333 | 25.8%  | .1666,.3768 | 820  | 43.3%  | .362,.5076  | 598  | 66.1%  | .6032,.715   | 882  |
| Southern Highlands  | 25.86 | .1368,.4344 | 520 | 25.7%  | .1812,.351  | 1424 | 36.7%  | .2841,.4575 | 1355 | 68.0%  | .6293,.7266  | 1367 |
| Lake  | 32.65 | .2407,.4258 | 521 | 55.0%  | .6663,.7874 | 1684 | 66.9%  | .6078,.7243 | 1383 | 85.8%  | .8259,.8854  | 1580 |
| Eastern   | 52.7  | .3834,.6663 | 553 | 73.1%  | .3957,.5512 | 1665 | 75.9%  | .6937,.8135 | 1325 | 75.2%  | .6834,.8091  | 1498 |
| Southern  | 23.71 | .1528,.3487 | 356 | 47.3%  | .4312,.4861 | 930  | 64.5%  | .5881,.6987 | 915  | 77.0%  | .7392,.7989  | 1005 |
| <b>Wealth</b>   |       |             |     |        |             |      |        |             |      |        |              |      |
| Quintile 1 (Poorest)  |       |             |     | 26.6%  | .2302,.3055 | 1818 | 35.9%  | .322,.3982  | 1643 | 64.6%  | .6097,.6804  | 1916 |
| Quintile 2  |       |             |     | 31.3%  | .2764,.3511 | 1903 | 45.1%  | .4158,.4865 | 1633 | 71.2%  | .6791,.7424  | 1890 |
| Quintile 3  |       |             |     | 36.7%  | .3288,.4077 | 1887 | 48.7%  | .4461,.5288 | 1588 | 71.7%  | .6854,.7472  | 1912 |
| Quintile 4  |       |             |     | 49.5%  | .4493,.5398 | 1837 | 60.9%  | .5614,.6547 | 1598 | 79.0%  | .7623,.8149  | 1842 |
| Quintile 5 (Least Poor)   |       |             |     | 81.9%  | .7854,.8474 | 2038 | 84.4%  | .8126,.871  | 1803 | 87.7%  | .8497,.9004  | 1818 |
| <i>Memorandum Items</i>   |       |             |     |        |             |      |        |             |      |        |              |      |
| <b>Frequency distribution of households by number of nets owned</b> |       |             |     |        |             |      |        |             |      |        |              |      |
| 0   |       |             |     | 44.4%  | .5139,.5688 | 5135 | 4442%  | .418,.4708  | 3673 | 25%    | .2356,.2716  | 2374 |
| 1   |       |             |     | 24.9%  | .1828,.2105 | 1861 | 2485%  | .2345,.2631 | 2055 | 26%    | .2437,.2718  | 2414 |
| 2   |       |             |     | 17.6%  | .132,.1575  | 1369 | 1758%  | .163,.1895  | 1454 | 26%    | .247,.2725   | 2434 |
| 3   |       |             |     | 8.4%   | .0619,.0789 | 663  | 841%   | .0749,.0943 | 696  | 14%    | 0.1348,.1542 | 1352 |
| 4   |       |             |     | 3.1%   | .0225,.0334 | 260  | 306%   | .0256,.0365 | 253  | 5%     | .0444,.0563  | 469  |
| 5+  |       |             |     | 1.7%   | .0162,.026  | 195  | 167%   | .0132,.0211 | 138  | 4%     | .0298,.0424  | 334  |
| <b>Mean nets per Household</b>                                      |       |             |     | 0.9247 | .8542,.9952 | 9483 | 1.0662 | 1.003,1.130 | 8269 | 1.6055 | 1.55,1.67    | 9377 |
| <b>Mean nets per person</b>   |       |             |     | 0.2132 | .1967,.2298 | 9483 | 0.2424 | .2260,.2587 | 8269 | 0.3442 | .3291,.3593  | 9377 |

### A.3.5 Percentage of households that owned at least one insecticide-treated net (ITN)

|   | 2004/5 |              |      | 2007/8 |             |      | 2010  |               |      |
|---|--------|--------------|------|--------|-------------|------|-------|---------------|------|
|   | Value  | 95% CI       | n    | Value  | 95% CI      | n    | Value | 95% CI        | n    |
| <b>All</b>  | 22.5%  | 0.205,0.246  | 9483 | 38.3%  | 0.361,0.406 | 9483 | 63.5% | 0.6167,0.6519 | 9377 |
| <b>Households with/without under-fives</b>                          |        |              |      |        |             |      |       |               |      |
| with under-fives  | 23.9%  | 0.216,0.263  | 5598 | 43.9%  | 0.414,0.465 | 4971 | 81.22 | .7914,.8313   | 5517 |
| without under-fives   | 20.4%  | 0.181,0.229  | 3884 | 29.8%  | 0.271,0.327 | 3298 | 38.05 | .3565,.4051   | 3859 |
| <b>Residence</b>  |        |              |      |        |             |      |       |               |      |
| Urban   | 48%    | 0.433,0.519  | 2492 | 59%    | 0.543,0.631 | 2041 | 64.9% | 0.6159,0.6801 | 2417 |
| Rural   | 14%    | 0.117,0.156  | 6990 | 32%    | 0.293,0.340 | 6228 | 63.0% | 0.6064,0.6521 | 6959 |
| <b>Region</b>   |        |              |      |        |             |      |       |               |      |
| Dodoma  | 13.4%  | 0.067, 0.25  | 520  | 28.2%  | 0.218,0.357 | 384  | 71.8% | .6595,.7699   | 580  |
| Arusha  | 23.7%  | 0.140, 0.372 | 349  | 32.4%  | 0.202,0.476 | 362  | 51.1% | .3351,.6839   | 411  |
| Kilimanjaro   | 13.1%  | 0.067, 0.242 | 408  | 29.9%  | 0.192,0.434 | 363  | 48.6% | .4164,.5567   | 460  |
| Tanga   | 17.3%  | 0.09, 0.307  | 438  | 38.6%  | 0.286,0.497 | 407  | 60.2% | .5387,.6628   | 551  |
| Morogoro  | 32.6%  | 0.223, 0.449 | 514  | 44.1%  | 0.322,0.566 | 489  | 36.9% | .2609,.4912   | 499  |
| Pwani   | 22.4%  | 0.144, 0.330 | 283  | 47.8%  | 0.354,0.605 | 212  | 68.7% | .6367,.7337   | 269  |
| Dar es salaam   | 60.8%  | 0.543, 0.67  | 868  | 70.7%  | 0.645,0.762 | 624  | 62.0% | .5671,.6693   | 730  |
| Lindi   | 16.0%  | 0.078, 0.300 | 247  | 40.0%  | 0.328,0.478 | 257  | 64.4% | .589,.6948    | 219  |
| Mtwara  | 15.8%  | 0.098, 0.245 | 379  | 42.9%  | 0.369,0.491 | 341  | 63.7% | .5809,.6902   | 425  |
| Ruvuma  | 25.7%  | 0.180, 0.352 | 304  | 39.4%  | 0.315,0.479 | 317  | 70.0% | .6466,.7488   | 361  |
| Iringa  | 7.4%   | 0.030, 0.173 | 479  | 17.6%  | 0.111,0.267 | 451  | 52.5% | .4399,.6087   | 498  |
| Mbeya   | 13.6%  | 0.07, 0.249  | 664  | 29.9%  | 0.191,0.435 | 610  | 57.8% | .5099,.6425   | 591  |
| Singida   | 12.2%  | 0.070, 0.204 | 300  | 26.5%  | 0.188,0.359 | 214  | 34.2% | .2272,.4778   | 302  |
| Tabora  | 18.4%  | 0.117, 0.278 | 390  | 39.8%  | 0.310,0.494 | 393  | 73.1% | .6354,.8095   | 365  |
| Rukwa   | 13.5%  | 0.069, 0.246 | 280  | 29.4%  | 0.214,0.390 | 293  | 66.7% | .5954,.7314   | 278  |
| Kigoma  | 13.5%  | 0.076, 0.229 | 441  | 31.1%  | 0.247,0.383 | 329  | 57.7% | .5436,.6101   | 417  |
| Shinyanga   | 27.0%  | 0.207, 0.344 | 644  | 37.8%  | 0.317,0.442 | 596  | 84.6% | .8015,.8819   | 607  |
| Kagera  | 13.9%  | 0.089, 0.212 | 560  | 29.5%  | 0.240,0.358 | 480  | 67.6% | .6021,.7415   | 556  |
| Mwanza  | 28.1%  | 0.190, 0.395 | 778  | 48.4%  | 0.387,0.582 | 623  | 78.7% | .7183,.8423   | 699  |
| Mara  | 25.3%  | 0.180, 0.344 | 345  | 56.5%  | 0.459,0.666 | 280  | 84.3% | .7958,.8804   | 326  |
| Manyara   | 8.1%   | 0.041, 0.156 | 291  | 22.1%  | 0.119,0.374 | 244  | 72.6% | .6489,.7911   | 233  |
| <b>Zone</b>   |        |              |      |        |             |      |       |               |      |
| Western   | 20.7%  | .1666,.2542  | 1474 | 36.7%  | .3253,.411  | 1318 | 73.5% | .6982,.7691   | 1389 |
| Northern  | 15.9%  | .115,.2145   | 1486 | 31.7%  | .2591,.3821 | 1375 | 56.5% | .5113,.6166   | 1655 |
| Central   | 13.0%  | .0796,.2039  | 820  | 27.6%  | .2248,.3333 | 598  | 58.9% | .5265,.649    | 882  |
| Southern Highlands  | 11.5%  | .0742,.1743  | 1424 | 25.7%  | .1977,.3267 | 1355 | 57.7% | .5314,.6206   | 1367 |
| Lake  | 22.8%  | .1788,.2869  | 1684 | 43.5%  | .3801,.4912 | 1383 | 75.9% | .7198,.7947   | 1580 |
| Eastern   | 45.6%  | .4022,.5104  | 1665 | 57.2%  | .5104,.6313 | 1325 | 54.8% | .4993,.5961   | 1498 |
| Southern  | 19.1%  | .1452,.2464  | 930  | 40.9%  | .3669,.4521 | 915  | 66.1% | .6285,.6926   | 1005 |
| <b>Wealth Quintile</b>  |        |              |      |        |             |      |       |               |      |
| Quintile 1 (Poorest)  | 6.0%   | .047,.0751   | 1818 | 21.7%  | .1909,.2455 | 1643 | 56.4% | .5275,.6002   | 1916 |
| Quintile 2  | 10.0%  | .0836,.1202  | 1903 | 27.7%  | .2481,.3067 | 1633 | 63.6% | .6033,.6678   | 1890 |
| Quintile 3  | 14.9%  | .1249,.1777  | 1887 | 33.0%  | .297,.365   | 1588 | 63.2% | .5994,.6629   | 1912 |
| Quintile 4  | 21.7%  | .1888,.2488  | 1837 | 40.0%  | .3603,.4418 | 1598 | 66.2% | .6313,.6904   | 1842 |
| Quintile 5 (Least Poor)   | 56.5%  | .5288,.6004  | 2038 | 66.3%  | .6285,.6948 | 1803 | 68.2% | .6477,.7152   | 1818 |
| <i>Memorandum Items</i>   |        |              |      |        |             |      |       |               |      |
| <b>Frequency distribution of households by number of ITNs owned</b> |        |              |      |        |             |      |       |               |      |
| 0   | 77.5%  | .754,.7951   | 7351 | 61.7%  | .5944,.6392 | 5102 | 36.6% | .3481,.3833   | 3427 |
| 1   | 10.9%  | .0982,.12    | 1030 | 20.4%  | .1911,.2178 | 1688 | 26.5% | .2511,.2803   | 2489 |
| 2   | 6.3%   | .0545,.0727  | 598  | 11.2%  | .1009,.1237 | 924  | 21.9% | .2074,.231    | 2053 |
| 3   | 3.4%   | .0288,.0406  | 324  | 4.3%   | .0369,.0494 | 353  | 10.4% | .0956,.1131   | 976  |
| 4   | 1.2%   | .0088,.0158  | 112  | 1.6%   | .0128,.0203 | 133  | 2.9%  | .0247,.0334   | 269  |
| 5   | 0.7%   | .0052,.0097  | 67   | 0.8%   | .0057,.0117 | 68   | 1.7%  | .0137,.0218   | 162  |
| <b>Mean ITNs /HH</b>  | 0.43   | .3815,.4702  | 9483 | 0.66   | .6173,.7118 | 8269 | 1.23  | 1.179,1.271   | 9377 |
| <b>Mean ITNs/person</b>   | 0.10   | .0900,.1127  | 9483 | 0.15   | .1385,.1626 | 8269 | 0.25  | .2410,.2624   | 9377 |

### A.3.6 Percentage of women who took IPTp (at least two doses, of which one received at ANC) during the pregnancy for their last live birth in the two years preceding the survey, by background characteristics

|                                 | 2004/5 |              |      | 2007/8 |              |      | 2010  |               |      |
|---------------------------------|--------|--------------|------|--------|--------------|------|-------|---------------|------|
|                                 | Value  | 95% CI       | n    | Value  | 95% CI       | n    | Value | 95% CI        | n    |
| <b>All</b>                      | 20.8%  | 0.190,0.227  | 3415 | 29.6%  | 0.270,0.323  | 2969 | 25.7% | 0.2357,0.2804 | 3179 |
| <b>Residence</b>                |        |              |      |        |              |      |       |               |      |
| Urban                           | 28.3%  | 0.242, 0.329 | 644  | 42.4%  | 0.357, 0.495 | 506  | 30.0% | .2519,.3532   | 651  |
| Rural                           | 19.1%  | 0.171,0.212  | 2771 | 27.0%  | 0.242,0.299  | 2463 | 24.6% | .2229,.2714   | 2528 |
| <b>Region</b>                   |        |              |      |        |              |      |       |               |      |
| Dodoma                          | 21.2%  | 0.136,0.315  | 169  | 29.2%  | 0.177,0.441  | 117  | 23.3% | .1631,.3217   | 189  |
| Arusha                          | 21.5%  | 0.131,0.332  | 110  | 19.9%  | 0.108,0.339  | 114  | 30.7% | .208,.4278    | 105  |
| Kilimanjaro                     | 25.3%  | 0.162,0.372  | 72   | 22.6%  | 0.223,0.472  | 92   | 27.4% | .1559,.434    | 72   |
| Tanga                           | 36.5%  | 0.273,0.467  | 134  | 42.4%  | 0.297,0.562  | 119  | 38.8% | .2874,.4994   | 137  |
| Morogoro                        | 21.4%  | 0.129,0.334  | 137  | 43.8%  | 0.338,0.543  | 137  | 30.9% | .2107,.4272   | 139  |
| Pwani                           | 23.2%  | 0.167,0.313  | 71   | 31.9%  | 0.204,0.462  | 61   | 31.6% | .228,.4184    | 78   |
| Dar es salaam                   | 31.9%  | 0.246,0.402  | 158  | 58.3%  | 0.464,0.693  | 163  | 23.7% | .1529,.3472   | 178  |
| Lindi                           | 33.3%  | 0.239,0.442  | 57   | 40.5%  | 0.252,0.580  | 65   | 38.7% | .2777,.5097   | 58   |
| Mtwara                          | 39.3%  | 0.276,0.523  | 95   | 37.7%  | 0.273,0.493  | 93   | 40.6% | .3102,.5103   | 87   |
| Ruvuma                          | 36.1%  | 0.281,0.450  | 108  | 21.7%  | 0.129,0.343  | 122  | 24.4% | .1557,.3618   | 98   |
| Iringa                          | 19.0%  | 0.131,0.269  | 120  | 29.8%  | 0.188,0.437  | 120  | 23.7% | .142,.3678    | 121  |
| Mbeya                           | 12.7%  | 0.090,0.174  | 274  | 30.9%  | 0.186,0.466  | 173  | 14.1% | .0748,.2506   | 206  |
| Singida                         | 25.0%  | 0.146,0.395  | 127  | 45.2%  | 0.333,0.577  | 80   | 34.7% | .2285,.489    | 115  |
| Tabora                          | 14.6%  | 0.104,0.200  | 211  | 27.6%  | 0.196,0.372  | 200  | 16.3% | .1073,.2397   | 184  |
| Rukwa                           | 11.4%  | 0.065,0.193  | 122  | 29.6%  | 0.185,0.437  | 148  | 20.5% | .1232,.3219   | 118  |
| Kigoma                          | 23.7%  | 0.147,0.360  | 192  | 31.0%  | 0.233,0.399  | 150  | 29.0% | .2359,.35     | 184  |
| Shinyanga                       | 15.8%  | 0.111,0.220  | 375  | 17.0%  | 0.103,0.266  | 323  | 19.9% | .1374,.2787   | 362  |
| Kagera                          | 20.0%  | 0.157,0.252  | 242  | 29.9%  | 0.195,0.429  | 192  | 32.3% | .2176,.4505   | 203  |
| Mwanza                          | 16.1%  | 0.110,0.229  | 382  | 15.9%  | 0.10,0.243   | 279  | 20.8% | .1448,.2898   | 318  |
| Mara                            | 16.7%  | 0.104,0.256  | 156  | 19.7%  | 0.113,0.321  | 128  | 33.5% | .2396,.4456   | 148  |
| Manyara                         | 17.1%  | 0.108,0.259  | 103  | 27.5%  | 0.168,0.417  | 92   | 24.5% | .1588,.3591   | 79   |
| <b>Zone</b>                     |        |              |      |        |              |      |       |               |      |
| Western                         | 17.4%  | 0.138,0.218  | 778  | 23.2%  | 0.185,0.288  | 672  | 21.3% | .1745,.2565   | 731  |
| Northern                        | 25.8%  | 0.213,0.310  | 419  | 31.0%  | 0.246,0.383  | 417  | 31.7% | .2615,.3778   | 393  |
| Central                         | 22.9%  | 0.163,0.311  | 296  | 35.7%  | 0.266,0.460  | 198  | 27.6% | .2116,.3521   | 303  |
| Southern Highlands              | 13.8%  | 0.110,0.173  | 515  | 30.2%  | 0.229,0.385  | 441  | 18.4% | .1311,.2525   | 446  |
| Lake                            | 17.4%  | 0.141,0.213  | 781  | 21.2%  | 0.162,0.273  | 599  | 27.1% | .2206,.3281   | 669  |
| Eastern                         | 26.3%  | 0.208,0.326  | 366  | 48.3%  | 0.415,0.552  | 361  | 27.7% | .2197,.3436   | 395  |
| Southern                        | 36.6%  | 0.306,0.431  | 260  | 31.4%  | 0.248,0.388  | 279  | 33.6% | .2767,.4014   | 243  |
| <b>Wealth Quintile</b>          |        |              |      |        |              |      |       |               |      |
| Quintile 1 (Poorest)            | 17.3%  | 0.143,0.208  |      | 24.1%  | 0.198,0.289  | 543  | 24.3% | .2053,.2853   | 683  |
| Quintile 2                      | 19.7%  | 0.161,0.239  |      | 25.6%  | 0.21,0.309   | 503  | 23.1% | .1937,.2726   | 769  |
| Quintile 3                      | 16.9%  | 0.137,0.206  |      | 27.0%  | 0.224,0.321  | 467  | 26.0% | .2186,.3059   | 696  |
| Quintile 4                      | 23.6%  | 0.198,0.280  |      | 30.2%  | 0.254,0.355  | 404  | 26.9% | .2273,.316    | 589  |
| Quintile 5 (Least Poor)         | 30.2%  | 0.255,0.353  |      | 47.0%  | 0.410,0.532  | 303  | 30.6% | .2485,.3694   | 443  |
| <b>Age</b>                      |        |              |      |        |              |      |       |               |      |
| 15-19                           |        |              |      |        |              |      | 21.0% | .1631,.2669   | 331  |
| 20-24                           |        |              |      |        |              |      | 23.9% | .2054,.2763   | 868  |
| 25-29                           |        |              |      |        |              |      | 25.7% | .215,.3047    | 806  |
| 30-34                           |        |              |      |        |              |      | 32.3% | .2724,.3782   | 552  |
| 35-39                           |        |              |      |        |              |      | 24.6% | .2047,.2926   | 451  |
| 40-44                           |        |              |      |        |              |      | 26.3% | .1817,.3644   | 138  |
| 45-49                           |        |              |      |        |              |      | 24.9% | .1267,.4306   | 33   |
| <b>Level of health facility</b> |        |              |      |        |              |      |       |               |      |
| dispensary/health centre        | 21.2%  | 0.192,0.233  |      | 29.1%  | 0.263,0.319  | 1817 | 25%   | .2275,.2755   | 2644 |

|  |       |             |  |       |             |     |       |              |      |
|--|-------|-------------|--|-------|-------------|-----|-------|--------------|------|
| district hospital                      | 24.3% | 0.192,0.302 |  | 35.6% | 0.289,0.429 | 212 | 39%   | .3297,.4615  | 296  |
| regional/refferal/national             | 23.9% | 0.171,0.324 |  | 35.2% | 0.275,0.437 | 149 | 27%   | .1596,.4252  | 103  |
| other                                  | 16.4% | 0.033,0.528 |  | 14.8% | 0.045,0.393 | 18  | 17%   | .0902,.03046 | 63   |
| <b>Parity</b>                          |       |             |  |       |             |     |       |              |      |
| 1                                      |       |             |  |       |             |     | 28.7% | .2418,.3368  | 627  |
| 2                                      |       |             |  |       |             |     | 24.1% | .2028,.2839  | 624  |
| 3                                      |       |             |  |       |             |     | 25.3% | .2267,.2813  | 1928 |
| <b>Gestational Age first ANC visit</b> |       |             |  |       |             |     |       |              |      |
| 1                                      |       |             |  |       |             |     | 70.3% | .1923,.9594  | 5    |
| 2                                      |       |             |  |       |             |     | 28.8% | .1427,.4957  | 40   |
| 3                                      |       |             |  |       |             |     | 33.4% | .2763,.3969  | 373  |
| 4                                      |       |             |  |       |             |     | 27.9% | .2386,.3223  | 671  |
| 5                                      |       |             |  |       |             |     | 27.8% | .2411,.3191  | 873  |
| 6                                      |       |             |  |       |             |     | 27.0% | .2258,.3193  | 674  |
| 7                                      |       |             |  |       |             |     | 16.2% | .1186,.2168  | 377  |
| 8                                      |       |             |  |       |             |     | 7.1%  | .0329,.1448  | 86   |
| 9                                      |       |             |  |       |             |     | *     |              | 5    |
| <b>Number of ANC visits</b>            |       |             |  |       |             |     |       |              |      |
| 1                                      |       |             |  |       |             |     | 4.6%  | .0172,.1186  | 146  |
| 2                                      |       |             |  |       |             |     | 19.8% | .1533,.2516  | 543  |
| 3                                      |       |             |  |       |             |     | 26.6% | .237,.2976   | 1199 |
| 4                                      |       |             |  |       |             |     | 34.1% | .298,.3871   | 753  |
| 5+                                     |       |             |  |       |             |     | 23.8% | .1919,.2905  | 539  |

### A.3.7 Percentage of children under five years of age with fever in two weeks prior to survey treated with recommended (first-line) anti-malarial the same day or next day, following fever onset, by background characteristics

|                    | 2004/5 |             |      | 2007/8 |             |      | 2010   |             |      |
|--------------------|--------|-------------|------|--------|-------------|------|--------|-------------|------|
|                    | value  | 95% CI      | n    | value  | 95% CI      | n    | value  | 95% CI      | n    |
| <b>All</b>         | 21.4%  | .1872,.2424 | 1882 | 14.2%  | .116,.172   | 1320 | 26.7%  | .2379,.298  | 1715 |
| <b>Sex</b>         |        |             |      |        |             |      |        |             |      |
| Female             | 23.2%  | .1986,.2697 | 911  | 14.9%  | .1146,.1924 | 662  | 24.4%  | .2068,.2862 | 854  |
| Male               | 19.6%  | .1644,.2318 | 971  | 13.4%  | .1014,.175  | 658  | 28.9%  | .2489,.3333 | 861  |
| <b>Age</b>         |        |             |      |        |             |      |        |             |      |
| 0-11 months        | 19.9%  | .1536,.2537 | 455  | 12.7%  | .0861,.1831 | 312  | 18.3%  | .1394,.2363 | 370  |
| 12-23 months       | 20.8%  | .1733,.2485 | 555  | 21.1%  | .1596,.2741 | 356  | 24.4%  | .1997,.2935 | 449  |
| 24-35 months       | 22.9%  | .1839,.2813 | 391  | 12.0%  | .0807,.1748 | 294  | 29.3%  | .2299,.3653 | 343  |
| 36-47 months       | 20.4%  | .1522,.2686 | 280  | 9.4%   | .0565,.1512 | 199  | 34.5%  | .2837,.4114 | 321  |
| 48-59 months       | 24.3%  | .1797,.3204 | 201  | 11.6%  | .064,.1999  | 159  | 29.9%  | .2269,.3836 | 232  |
| <b>Residence</b>   |        |             |      |        |             |      |        |             |      |
| Urban              | 22.3%  | .1668,.2906 | 335  | 19.9%  | .1375,.2802 | 253  | 22.5%  | .1701,.2909 | 439  |
| Rural              | 21.2%  | .1821,.2443 | 1547 | 12.8%  | .1015,.1602 | 1067 | 28.1%  | .2483,.317  | 1276 |
| <b>Region</b>      |        |             |      |        |             |      |        |             |      |
| Dodoma             | 22.5%  | .138,.3443  | 106  | 14.8%  | .0507,.3621 | 51   | 27.9%  | .2063,.365  | 143  |
| Arusha             | 11.6%  | .0407,.2898 | 48   | 2.6%   | .0033,.1767 | 49   | 17.5%  | .0836,.3296 | 67   |
| Kilimanjaro        | 47.7%  | .2701,.6922 | 28   | 21.3%  | .083,.4483  | 31   | 19.4%  | .0915,.3661 | 55   |
| Tanga              | 34.0%  | .1935,.5258 | 65   | 18.4%  | .1,.3134    | 67   | 35.8%  | .2019,.5505 | 60   |
| Morogoro           | 33.8%  | .2632,.4212 | 81   | 27.9%  | .1338,.4925 | 83   | 34.8%  | .212,.5139  | 86   |
| Pwani              | 38.1%  | .294,.4757  | 71   | 33.3%  | .1722,.5445 | 37   | 37.5%  | .2718,.4904 | 45   |
| Dar es salaam      | 17.0%  | .0784,.331  | 102  | 18.3%  | .0924,.3302 | 71   | 21.7%  | .1227,.3538 | 135  |
| Lindi              | 24.6%  | .1236,.4299 | 44   | 20.9%  | .0985,.3894 | 33   | 52.3%  | .3798,.6627 | 29   |
| Mtwara             | 25.7%  | .1675,.3729 | 86   | 32.0%  | .1551,.5462 | 58   | 54.0%  | .3308,.7363 | 47   |
| Ruvuma             | 25.9%  | .1599,.3919 | 70   | 15.2%  | .0636,.3216 | 59   | 42.7%  | .3055,.5575 | 46   |
| Iringa             | 10.2%  | .0384,.2455 | 70   | 10.0%  | .0339,.2604 | 36   | 16.2%  | .0504,.4135 | 28   |
| Mbeya              | 20.6%  | .1112,.3484 | 93   | 21.1%  | .0843,.4364 | 41   | 17.4%  | .0755,.353  | 74   |
| Singida            | 19.0%  | .1236,.2811 | 64   | 10.6%  | .0226,.377  | 11   | 27.5%  | .1767,.4002 | 68   |
| Tabora             | 15.6%  | .0785,.287  | 107  | 6.2%   | .0175,.1947 | 59   | 32.0%  | .2053,.4606 | 60   |
| Rukwa              | 4.7%   | .0117,.1703 | 41   | 19.9%  | .1099,.3344 | 47   | 28.8%  | .1529,.4756 | 43   |
| Kigoma             | 21.4%  | .1349,.3233 | 224  | 9.1%   | .0384,.2016 | 54   | 23.9%  | .1421,.3722 | 154  |
| Shinyanga          | 12.9%  | .0661,.2366 | 265  | 8.1%   | .0283,.2097 | 152  | 15.3%  | .0946,.2377 | 120  |
| Kagera             | 33.8%  | .1966,.5165 | 73   | 13.4%  | .051,.3081  | 107  | 34.0%  | .226,.476   | 108  |
| Mwanza             | 33.9%  | .1857,.5364 | 80   | 3.9%   | .0119,.1225 | 141  | 27.4%  | .1764,.3996 | 201  |
| Mara               | 15.9%  | .0856,.2748 | 129  | 12.2%  | .0588,.2356 | 95   | 13.4%  | .0728,.2349 | 126  |
| Manyara            | 7.5%   | .0291,.1809 | 36   | 3.1%   | .0043,.1878 | 37   | 31.1%  | .1412,.5528 | 21   |
| <b>Zone</b>        |        |             |      |        |             |      |        |             |      |
| Western            | 16.6%  | .1178,.2291 | 596  | 7.9%   | .0399,.1496 | 265  | 0.2224 | .1673,.2894 | 334  |
| Northern           | 24.7%  | .1673,.3488 | 177  | 11.6%  | .0718,.1814 | 183  | 0.2482 | .1768,.3368 | 202  |
| Central            | 21.2%  | .1497,.2909 | 170  | 14.0%  | .0549,.315  | 62   | 0.2774 | .2172,.3469 | 210  |
| Southern Highlands | 13.8%  | .0855,.2163 | 204  | 17.4%  | .1089,.267  | 125  | 0.2057 | .1258,.3177 | 145  |
| Lake               | 25.6%  | .1817,.3481 | 282  | 9.2%   | .0525,.1556 | 343  | 0.25   | .1899,.3215 | 436  |

|                         |       |             |      |       |             |     |        |             |     |
|-------------------------|-------|-------------|------|-------|-------------|-----|--------|-------------|-----|
| Eastern                 | 28.2% | .2202,,3543 | 255  | 25.4% | .1681,,3639 | 191 | 0.2858 | .2121,,3731 | 266 |
| Southern                | 25.5% | .1924,,3306 | 200  | 23.0% | .1454,,3427 | 150 | 0.4936 | .3904,,5974 | 122 |
| <b>Wealth</b>           |       |             |      |       |             |     |        |             |     |
| Quintile 1 (Poorest)    | 20.7% | .163,,259   | 460  | 8.1%  | .0499,,1284 | 277 | 0.3047 | .247,,3693  | 371 |
| Quintile 2              | 24.0% | .1858,,3045 | 421  | 16.9% | .1161,,2392 | 294 | 0.2745 | .2207,,3358 | 346 |
| Quintile 3              | 20.2% | .1524,,2619 | 388  | 9.6%  | .0606,,1472 | 314 | 0.2757 | .2152,,3457 | 355 |
| Quintile 4              | 17.5% | .1337,,2256 | 356  | 17.3% | .1204,,2419 | 227 | 0.2222 | .1599,,3    | 394 |
| Quintile 5 (Least Poor) | 25.3% | .1827,,3392 | 257  | 22.0% | .1447,,3207 | 208 | 0.2581 | .1854,,3472 | 250 |
| <b>Education</b>        |       |             |      |       |             |     |        |             |     |
| None                    | 17.8% | .1416,,2203 | 466  | 8.9%  | .0586,,1338 | 324 | 0.2742 | .2243,,3305 | 437 |
| Primary incomplete      | 19.1% | .1404,,2546 | 295  | 12.8% | .0816,,1964 | 205 | 0.2772 | .2026,,3666 | 264 |
| Primary complete        | 23.0% | .1961,,2684 | 1049 | 17.0% | .1356,,21   | 751 | 0.2637 | .2248,,3066 | 895 |
| Secondary +             | 29.5% | .1829,,4381 | 72   | 11.0% | .029,,338   | 40  | 0.2414 | .1462,,3715 | 120 |

### A.3.8 Percentage of children under five years of age with fever in two weeks prior to survey treated with any anti-malarial the same day or next day, following fever onset, by background characteristics

|                           | 2004/5 |             |      | 2007/8 |             |       | 2010   |               |      |
|---------------------------|--------|-------------|------|--------|-------------|-------|--------|---------------|------|
|                           | value  | 95% CI      | n    | value  | 95% CI      | n     | value  | 95% CI        | n    |
| <b>All</b>                | 51.1%  | .478,.545   | 1882 | 34.4%  | .305,.385   | 1320  | 41.5%  | .3825,.4482   | 1715 |
| <b>Sex</b>                |        |             |      |        |             |       |        |               |      |
| Female                    | 53.4%  | .4914,.5766 | 911  | 36.5%  | .3146,.4189 | 662   | 39.5%  | .3491,.4431   | 854  |
| Male                      | 49.0%  | .4484,.5307 | 971  | 32.3%  | .2763,.3729 | 658   | 43.5%  | .3924,.4777   | 861  |
| <b>Age</b>                |        |             |      |        |             |       |        |               |      |
| 0-11 months               | 50.6%  | .4501,.5615 | 455  | 32.9%  | .2602,.4058 | 312   | 33.8%  | .2812,.3992   | 370  |
| 12-23 months              | 53.1%  | .4804,.5803 | 555  | 40.0%  | .3334,.4695 | 356   | 38.5%  | .3311,.4426   | 449  |
| 24-35 months              | 51.2%  | .4531,.5704 | 391  | 30.7%  | .244,.3778  | 294   | 48.9%  | .4252,.5539   | 343  |
| 36-47 months              | 44.9%  | .378,.5216  | 280  | 30.6%  | .2284,.3969 | 199   | 48.0%  | .4096,.551    | 321  |
| 48-59 months              | 55.5%  | .4664,.6396 | 201  | 36.5%  | .2781,.4626 | 159   | 39.5%  | .314,.483     | 232  |
| <b>Residence</b>          |        |             |      |        |             |       |        |               |      |
| Urban                     | 57.0%  | .4782,.6569 | 335  | 49.8%  | .4038,.5921 | 253   | 50.2%  | 0.4336,0.5697 | 439  |
| Rural                     | 49.9%  | .462,.5349  | 1547 | 30.8%  | .2678,.3504 | 1067  | 38.5%  | 0.3501,0.4213 | 1276 |
| <b>Region</b>             |        |             |      |        |             |       |        |               |      |
| Dodoma                    | 36.2%  | .2594,.4795 | 106  | 24.6%  | .1046,.4774 | 50.7  | 32.4%  | .2542,.4025   | 143  |
| Arusha                    | 20.2%  | .0839,.4102 | 48   | 5.0%   | .0114,.1956 | 49.2  | 21.0%  | .1112,.3599   | 67   |
| Kilimanjaro               | 71.5%  | .4744,.8748 | 28   | 46.5%  | .3084,.629  | 30.7  | 32.2%  | .1699,.5242   | 55   |
| Tanga                     | 60.9%  | .4444,.7521 | 65   | 34.1%  | .2436,.4529 | 66.6  | 50.9%  | .3479,.6674   | 60   |
| Morogoro                  | 82.7%  | .7081,.9037 | 81   | 60.7%  | .4509,.7437 | 82.6  | 55.6%  | .4091,.6942   | 86   |
| Pwani                     | 60.9%  | .4947,.7128 | 71   | 42.6%  | .2511,.6223 | 37.2  | 44.3%  | .3339,.5581   | 45   |
| Dar es salaam             | 41.0%  | .2651,.5715 | 102  | 58.9%  | .4154,.7431 | 71.3  | 47.4%  | .3148,.6387   | 135  |
| Lindi                     | 47.2%  | .3439,.604  | 44   | 28.5%  | .1766,.425  | 32.8  | 67.8%  | .5352,.7931   | 29   |
| Mtwara                    | 48.3%  | .3621,.605  | 86   | 58.4%  | .4344,.719  | 58.3  | 80.4%  | .6392,.905    | 47   |
| Ruvuma                    | 68.0%  | .573,.7707  | 70   | 39.5%  | .2961,.5036 | 59.3  | 64.4%  | .5083,.7606   | 46   |
| Iringa                    | 29.7%  | .1723,.4616 | 70   | 27.3%  | .1561,.4335 | 36.2  | 37.1%  | .205,.5743    | 28   |
| Mbeya                     | 34.9%  | .223,.4999  | 93   | 39.9%  | .2237,.6044 | 41.0  | 37.6%  | .223,.5588    | 74   |
| Singida                   | 37.0%  | .2539,.5026 | 64   | 34.1%  | .1236,.6545 | 11.4  | 40.3%  | .2839,.5353   | 68   |
| Tabora                    | 49.5%  | .3787,.6124 | 107  | 28.5%  | .1717,.4329 | 58.8  | 43.5%  | .3206,.5559   | 60   |
| Rukwa                     | 48.0%  | .2996,.6659 | 41   | 40.2%  | .2801,.5379 | 47.4  | 44.0%  | .2783,.6155   | 43   |
| Kigoma                    | 75.3%  | .6446,.8366 | 224  | 37.0%  | .2434,.5178 | 54.3  | 44.1%  | .3195,.5701   | 154  |
| Shinyanga                 | 45.7%  | .3447,.5745 | 265  | 31.2%  | .193,.4613  | 152.3 | 26.9%  | .2083,.3395   | 120  |
| Kagera                    | 68.2%  | .525,.8058  | 73   | 29.7%  | .1594,.4852 | 106.8 | 41.9%  | .3161,.529    | 108  |
| Mwanza                    | 60.7%  | .3869,.7903 | 80   | 22.1%  | .1013,.4157 | 140.9 | 42.8%  | .3139,.5507   | 201  |
| Mara                      | 35.3%  | .2429,.4819 | 129  | 27.6%  | .1465,.4588 | 95.5  | 26.6%  | .1672,.3958   | 126  |
| Manyara                   | 27.1%  | .1702,.4033 | 36   | 12.6%  | .0584,.2505 | 36.6  | 42.0%  | .2482,.614    | 21   |
| <b>Zone</b>               |        |             |      |        |             |       |        |               |      |
| Western                   | 57.6%  | .5121,.6364 | 596  | 31.8%  | .2363,.4116 | 265   | 37.8%  | .305,.457     | 334  |
| Northern                  | 44.6%  | .3522,.5444 | 177  | 24.1%  | .1848,.3068 | 183   | 35.0%  | .2715,.4383   | 202  |
| Central                   | 36.5%  | .2854,.4529 | 170  | 26.4%  | .1308,.46   | 62    | 35.0%  | .285,.42      | 210  |
| Southern Highlands        | 35.7%  | .27,.4551   | 204  | 36.4%  | .2764,.4609 | 125   | 39.4%  | .2937,.5044   | 145  |
| Lake                      | 51.0%  | .4136,.6053 | 282  | 26.0%  | .1755,.3668 | 343   | 37.9%  | .3102,.4527   | 436  |
| Eastern                   | 59.8%  | .4974,.6912 | 255  | 56.5%  | .4649,.6602 | 191   | 49.6%  | .397,.5944    | 266  |
| Southern                  | 54.9%  | .4781,.6184 | 200  | 44.4%  | .3676,.5234 | 150   | 71.4%  | .6281,.787    | 122  |
| <b>Wealth Quintile</b>    |        |             |      |        |             |       |        |               |      |
| Quintile 1 (Poorest)      | 42.7%  | .3652,.4903 | 460  | 18.6%  | .1327,.2553 | 277   | 37.1%  | .3037,.4437   | 371  |
| Quintile 2                | 54.3%  | .4826,.6014 | 421  | 37.1%  | .288,.4614  | 294   | 0.3908 | .3303,.4548   | 346  |
| Quintile 3                | 51.5%  | .4519,.578  | 388  | 28.2%  | .2162,.3577 | 314   | 0.4211 | .3546,.4906   | 355  |
| Quintile 4                | 54.4%  | .4671,.6194 | 356  | 39.1%  | .3187,.469  | 227   | 0.4106 | .3423,.4826   | 394  |
| Quintile 5 (Least Poor)   | 55.9%  | .4558,.6573 | 257  | 56.0%  | .4626,.6522 | 208   | 0.5119 | .4204,.6025   | 250  |
| <b>Mother's Education</b> |        |             |      |        |             |       |        |               |      |
| None                      | 45.4%  | .39,.519    | 466  | 24.8%  | .1903,.3157 | 324   | 0.377  | .3197,.438    | 437  |
| Primary incomplete        | 49.1%  | .4207,.5611 | 295  | 33.5%  | .2413,.4427 | 205   | 0.4103 | .3192,.508    | 264  |

|                  |       |             |      |       |             |     |        |             |     |
|------------------|-------|-------------|------|-------|-------------|-----|--------|-------------|-----|
| Primary complete | 54.2% | .4988,.5835 | 1049 | 38.1% | .3345,.4299 | 751 | 0.4255 | .3752,.4773 | 895 |
| Secondary +      | 52.4% | .3829,.662  | 72   | 47.7% | .2732,.6883 | 40  | 0.4845 | .3657,.6051 | 120 |

**A.3.9 Process “steps” in treatment outcomes: percentage of children aged 6-59 months with fever in two weeks prior to survey: sought treatment; treated with any anti-malarial; treated with any anti-malarial same or next day; recommended (first line) anti-malarial same or next day**

| Values                                      | 1999  |       | 2004/5 |       | 2007/8 |       | 2010   |        |
|---|-------|-------|--------|-------|--------|-------|--------|--------|
|   | lo    | hi    | lo     | hi    | lo     | hi    | lo     | hi     |
| Sought treatment formal provider            | 0.645 | 0.814 | 0.572  | 0.644 | 0.526  | 0.606 | 0.6058 | 0.6834 |
| Treated any antimalarial                    | 0.452 | 0.606 | 0.547  | 0.615 | 0.524  | 0.616 | 0.5669 | 0.634  |
| Any anti-malarial same/next day             |       |       | 0.478  | 0.545 | 0.305  | 0.385 | 0.3825 | 0.4482 |
| Recommended antimalarial same or next day   |       |       | 0.187  | 0.242 | 0.116  | 0.172 | 0.2379 | 0.298  |
| As above, first or second line antimalarial |       |       | 0.31   | 0.20  | 0.34   | 0.34  |        |        |

| Confidence intervals                      | 1999  |       | 2004  |       | 2007  |       | 2010   |        |
|---|-------|-------|-------|-------|-------|-------|--------|--------|
|   | lo    | hi    | lo    | hi    | lo    | hi    | lo     | hi     |
| Sought treatment formal provider          | 0.645 | 0.814 | 0.572 | 0.644 | 0.526 | 0.606 | 0.6058 | 0.6834 |
| Treated any antimalarial                  | 0.452 | 0.606 | 0.547 | 0.615 | 0.524 | 0.616 | 0.5669 | 0.634  |
| Any anti-malarial same/next day           |       |       | 0.478 | 0.545 | 0.305 | 0.385 | 0.3825 | 0.4482 |
| Recommended antimalarial same or next day |       |       | 0.187 | 0.242 | 0.116 | 0.172 | 0.2379 | 0.298  |

### A.3.10 Percentage of children aged 6-59 months who tested positive for malaria, by background characteristics, 2007/8 THMIS

|                           | Value | 95% CI        | n    |
|---------------------------|-------|---------------|------|
| <b>All</b>                | 18%   | .1599,.2049   | 6211 |
| <b>Residence</b>          |       |               |      |
| Urban                     | 7%    | .0332,.1438   | 1126 |
| Rural                     | 20%   | .1796,.2304   | 5085 |
| <b>Region</b>             |       |               |      |
| Dodoma                    | 12.5% | .0596,.2448   | 254  |
| Arusha                    | 0.4%  | 5.3e-04,.0299 | 242  |
| Kilimanjaro               | 1.0%  | .0026,.038    | 203  |
| Tanga                     | 13.9% | .0831,.2237   | 236  |
| Morogoro                  | 15.7% | .0741,.3019   | 246  |
| Pwani                     | 20.8% | .1375,.3012   | 123  |
| Dar es salaam             | 1.2%  | .0031,.0492   | 276  |
| Lindi                     | 35.5% | .2523,.4723   | 131  |
| Mtwara                    | 33.6% | .2544,.4296   | 196  |
| Ruvuma                    | 23.9% | .1539,.3515   | 231  |
| Iringa                    | 2.6%  | .0104,.0647   | 275  |
| Mbeya                     | 3.0%  | .0079,.106    | 421  |
| Singida                   | 6.0%  | .0175,.1854   | 157  |
| Tabora                    | 9.7%  | .0606,.1518   | 401  |
| Rukwa                     | 11.0% | .064,.1819    | 291  |
| Kigoma                    | 19.6% | .1475,.2547   | 307  |
| Shinyanga                 | 29.5% | .2239,.3776   | 690  |
| Kagera                    | 41.1% | .2867,.5473   | 423  |
| Mwanza                    | 31.4% | .2124,.4371   | 618  |
| Mara                      | 30.3% | .2275,.3905   | 297  |
| Manyara                   | 1.0%  | .0025,.0405   | 194  |
| <b>Zone</b>               |       |               |      |
| Western                   | 22%   | .1793,.2585   | 1398 |
| Northern                  | 4%    | .0267,.0691   | 875  |
| Central                   | 10%   | .0515,.1861   | 411  |
| Southern Highlands        | 5%    | .0327,.083    | 987  |
| Lake                      | 34%   | .2755,.4155   | 1338 |
| Eastern                   | 10%   | .0669,.1605   | 645  |
| Southern                  | 30%   | .2452,.3618   | 558  |
| <b>Wealth Quintile</b>    |       |               |      |
| Quintile 1 (Poorest)      | 23%   | .1944,.2805   | 1442 |
| Quintile 2                | 22%   | .1825,.259    | 1382 |
| Quintile 3                | 21%   | .1626,.2609   | 1359 |
| Quintile 4                | 15%   | .112,.1881    | 1140 |
| Quintile 5 (Least Poor)   | 4%    | .028,.0626    | 888  |
| <b>Mother's Education</b> |       |               |      |
| None                      | 23%   | .1808,.2797   | 642  |
| Primary incomplete        | 21%   | .1739,.2414   | 2170 |
| Primary complete          | 16%   | .1411,.1907   | 3201 |
| Secondary +               | 4%    | .0155,.1056   | 198  |
| <b>Altitude</b>           |       |               |      |
| <1000                     | 18%   | .1567,.2138   | 4562 |
| 1000m+                    | 18%   | .146,.2117    | 1632 |
| <b>ITN Use</b>            |       |               |      |
| No                        | 18%   | .1587,.2072   | 4750 |
| Yes                       | 18%   | .1484,.2167   | 1461 |

### A.3.11 Percentage of children aged 6-59 months with severe anaemia (<8g/dL) by background characteristics

|                    | 2004/5 |              |      | 2007/8 |               |      | 2010  |             |      |
|--------------------|--------|--------------|------|--------|---------------|------|-------|-------------|------|
|                    | Value  | 95% CI       | n    | Value  | 95% CI        | n    | Value | 95% CI      | n    |
| <b>All</b>         | 11.1%  | .0995,.1228  | 7121 | 7.5%   | 0.0655,0.0861 | 6263 | 5.5%  | .0472,.0644 | 6508 |
| <b>Age</b>         |        |              |      |        |               |      |       |             |      |
| 6-11 months        | 16.0%  | 0.135, 0.188 | 885  | 11.2%  | .0829,.1487   | 746  | 9.6%  | .0675,.1343 | 700  |
| 12-23 months       | 17.7%  | 0.152, 0.205 | 1630 | 12.1%  | .0966,.1497   | 1432 | 7.3%  | .0565,.0929 | 1486 |
| 24-35 months       | 10.7%  | 0.090, 0.127 | 1612 | 8.1%   | .0637,.1013   | 1388 | 5.5%  | .0417,.0719 | 1394 |
| 36-47 months       | 8.1%   | 0.065, 0.102 | 1512 | 5.0%   | .0317,.0771   | 1282 | 4.5%  | .0337,.0598 | 1536 |
| 48-59 months       | 4.2%   | 0.032, 0.056 | 1482 | 2.8%   | .0193,.0395   | 1415 | 2.8%  | .0177,.0426 | 1392 |
| <b>Sex</b>         |        |              |      |        |               |      |       |             |      |
| Female             | 11.1%  | 0.097, 0.127 | 3538 | 6.6%   | .0558,.0778   | 3134 | 6.1%  | .0503,.073  | 3202 |
| Male               | 11.1%  | 0.097, 0.126 | 3583 | 8.4%   | .0709,.1      | 3130 | 5.0%  | .0407,.0609 | 3306 |
| <b>Residence</b>   |        |              |      |        |               |      |       |             |      |
| Urban              | 7.4%   | .0563, .0973 | 1349 | 7.9%   | .0582,.1062   | 1058 | 5.6%  | .038,.0824  | 1185 |
| Rural              | 11.9%  | .1064,.1332  | 5772 | 7.4%   | .0635,.0869   | 5205 | 5.5%  | .0463,.065  | 5323 |
| <b>Region</b>      |        |              |      |        |               |      |       |             |      |
| Dodoma             | 6.9%   | .0395,.1185  | 350  | 2.0%   | .0083,.0481   | 254  | 3.9%  | .0142,.1009 | 414  |
| Arusha             | 5.1%   | .0252,.1002  | 236  | 6.8%   | .0366,.1217   | 243  | 10.4% | .055,.1882  | 233  |
| Kilimanjaro        | 6.0%   | .0301,.1178  | 187  | 3.6%   | .0113,.1058   | 204  | 4.0%  | .0146,.106  | 188  |
| Tanga              | 7.1%   | .0462,.109   | 268  | 7.9%   | .0396,.15     | 239  | 4.3%  | .0243,.0765 | 288  |
| Morogoro           | 9.9%   | .0617,.1543  | 288  | 14.3%  | .0956,.2078   | 248  | 7.7%  | .046,.1259  | 272  |
| Pwani              | 9.3%   | .0522,.1593  | 164  | 9.1%   | .0452,.175    | 123  | 6.4%  | .0359,.1127 | 168  |
| Dar es salaam      | 9.4%   | .0527,.1627  | 358  | 8.2%   | .0469,.139    | 279  | 4.7%  | .0232,.0933 | 269  |
| Lindi              | 13.1%  | .0987,.1729  | 128  | 6.3%   | .0398,.0984   | 133  | 6.6%  | .035,.1198  | 114  |
| Mtwara             | 12.1%  | .0826,.1732  | 218  | 7.3%   | .0373,.1385   | 199  | 5.0%  | .0252,.0986 | 202  |
| Ruvuma             | 11.6%  | .0724,.1798  | 200  | 17.5%  | .1136,.2595   | 231  | 3.0%  | .0159,.0548 | 222  |
| Iringa             | 0.0%   | na           | 250  | 3.1%   | .0152,.0629   | 276  | 1.2%  | .0039,.0378 | 271  |
| Mbeya              | 7.0%   | .0448,.1063  | 560  | 0.8%   | .002,.0298    | 421  | 4.3%  | .0245,.075  | 380  |
| Singida            | 10.7%  | .0527,.2042  | 266  | 1.7%   | .0031,.085    | 157  | 2.1%  | .0091,.0478 | 264  |
| Tabora             | 9.5%   | .07,.1284    | 402  | 6.6%   | .0434,.0989   | 407  | 6.8%  | .0375,.12   | 369  |
| Rukwa              | 6.7%   | .0414,.1076  | 270  | 3.8%   | .0215,.0646   | 291  | 1.4%  | .003,.0651  | 209  |
| Kigoma             | 15.6%  | .1039,.2281  | 396  | 8.7%   | .0644,.1157   | 308  | 8.3%  | .0405,.1641 | 326  |
| Shinyanga          | 12.4%  | .0978,.1568  | 754  | 10.7%  | .074,.1509    | 703  | 6.0%  | .0332,.1054 | 679  |
| Kagera             | 15.6%  | .1112,.214   | 482  | 8.5%   | .053,.1339    | 429  | 7.4%  | .044,.123   | 416  |
| Mwanza             | 20.8%  | .1527,.276   | 780  | 9.5%   | .0522,.1657   | 620  | 7.6%  | .0518,.11   | 697  |
| Mara               | 15.5%  | .1112,.2109  | 321  | 13.4%  | .1056,.1678   | 301  | 5.3%  | .0311,.0884 | 349  |
| Manyara            | 4.8%   | .0296,.0776  | 247  | 0.6%   | .0014,.0212   | 197  | 3.7%  | .0169,.078  | 181  |
| <b>Zone</b>        |        |              |      |        |               |      |       |             |      |
| Western            | 12.5%  | .1041, .1492 | 1552 | 9.1%   | .0706,.1154   | 1419 | 6.8%  | .0466,.0971 | 1373 |
| Northern           | 5.8%   | .0437, .0765 | 936  | 4.9%   | .0322,.0748   | 883  | 5.7%  | .0383,.0848 | 891  |
| Central            | 8.5%   | .0532, .1342 | 615  | 1.9%   | .0083,.0418   | 411  | 3.2%  | .0148,.0671 | 677  |
| Southern Highlands | 5.3%   | .0361, .0768 | 1080 | 2.3%   | .0151,.035    | 988  | 2.6%  | .0161,.043  | 859  |
| Lake               | 18.1%  | .1478, .2201 | 1583 | 10.0%  | .075,.1331    | 1349 | 7.0%  | .0534,.0911 | 1462 |
| Eastern            | 9.6%   | .0691, .1306 | 810  | 10.7%  | .0794,.1422   | 650  | 6.3%  | .0442,.088  | 708  |
| Southern           | 12.1%  | .0962, .152  | 545  | 11.3%  | .0817,.1528   | 563  | 4.5%  | .0307,.0659 | 528  |

| <b>Wealth Quintile</b>             |       |              |      |      |             |      |      |             |      |
|------------------------------------|-------|--------------|------|------|-------------|------|------|-------------|------|
| Quintile 1 (Poorest)               | 14.0% | .119, .1631  | 1652 | 8.8% | .0653,.1172 | 1453 | 7.1% | .054,.0917  | 1444 |
| Quintile 2                         | 12.1% | .1011, .1429 | 1516 | 7.5% | .0579,.0954 | 1394 | 5.0% | .0377,.0659 | 1558 |
| Quintile 3                         | 12.1% | .0955, .1527 | 1524 | 7.4% | .0504,.1081 | 1373 | 5.1% | .0383,.0687 | 1512 |
| Quintile 4                         | 8.5%  | .0666, .1068 | 1399 | 5.6% | .0412,.0769 | 1145 | 4.8% | .0297,.0767 | 1188 |
| Quintile 5 (Least Poor)            | 7.0%  | .0497, .0968 | 1031 | 8.1% | .0614,.1059 | 898  | 5.5% | .0369,.0817 | 807  |
| <b>Mother's Education</b>          |       |              |      |      |             |      |      |             |      |
| None                               | 14.3% | .1219, .1663 | 1732 | 9.6% | .0709,.1281 | 1407 | 6.8% | .0527,.0872 | 1530 |
| Primary Incomplete                 | 11.1% | .0881, .1393 | 1012 | 6.6% | .0464,.0928 | 781  | 6.4% | .0449,.0909 | 860  |
| Primary Complete                   | 10.0% | .0878, .1146 | 3533 | 7.2% | .0601,.0858 | 3225 | 4.9% | .0397,.059  | 3197 |
| Secondary+                         | 8.1%  | .0384, .1613 | 240  | 8.6% | .0417,.1697 | 201  | 6.7% | .0354,.1235 | 289  |
| <b>Altitude</b>                    |       |              |      |      |             |      |      |             |      |
| <1000m                             | 11.5% | .1013, .1303 | 5299 | 9.1% | .0726,.1128 | 4485 | 6.4% | .0485,.0845 | 1641 |
| 1000m+                             | 9.8%  | .0816, .1172 | 1822 | 6.9% | .057,.0822  | 1626 | 5.2% | .0433,.0626 | 4867 |
| <b>ITN use</b>                     |       |              |      |      |             |      |      |             |      |
| no                                 | 11.6% | .1037, .129  | 6005 | 7.1% | .0612,.0825 | 4787 | 5.5% | .0429,.0696 | 2287 |
| yes                                | 8.3%  | .0616, .1111 | 1116 | 8.8% | .0703,.11   | 1476 | 5.5% | .0457,.0669 | 4222 |
| <i>Memorandum Item</i>             |       |              |      |      |             |      |      |             |      |
| <b>Mean Haemoglobin by ITN use</b> |       |              |      |      |             |      |      |             |      |
| no ITN                             | 10.0  | 9.90,10.06   | 6005 | 10.2 | 10.16,10.33 | 4784 | 10.5 | 10.44,10.64 | 2287 |
| ITN                                | 10.1  | 10.00,10.26  | 1116 | 10.1 | 9.97,10.20  | 1476 | 10.5 | 10.44,10.59 | 4222 |
| all                                | 10.0  | 9.93,10.07   | 7121 | 10.2 | 10.13,10.28 | 6260 | 10.5 | 10.46,10.59 | 6508 |

### A.3.12 Percentage of children aged 6-23 months with severe anemia (<8g/dL) by selected background characteristics

|                            | 2004/5 |              |      | 2007/8 |              |      | 2010 |              |      |
|----------------------------|--------|--------------|------|--------|--------------|------|------|--------------|------|
| <b>Sex</b>                 |        |              |      |        |              |      |      |              |      |
| Male                       | 18.0%  | .1519, .2115 | 1262 | 12.8%  | .1064, .1542 | 1091 | 9.2% | .0718, .1173 | 1060 |
| Female                     | 16.2%  | .1378, .1898 | 1253 | 10.7%  | .0837, .1349 | 1087 | 6.9% | .0501, .0938 | 1126 |
| <b>Malaria test status</b> |        |              |      |        |              |      |      |              |      |
| Negative                   | n/a    |              |      | 8.9%   | .0736, .1074 | 1900 | n/a  |              |      |
| Positive                   | n/a    |              |      | 31.2%  | .1003, .1374 | 278  | n/a  |              |      |
| <b>Residence</b>           |        |              |      |        |              |      |      |              |      |
| Urban                      | 13.0%  | .0945, .1766 | 461  | 13.3%  | .0893, .1928 | 375  | 9.1% | .0455, .1731 | 411  |
| Rural                      | 18.0%  | .1589, .2036 | 2054 | 11.4%  | .0958, .136  | 1803 | 7.8% | .0626, .0958 | 1775 |
| <b>ITN use</b>             |        |              |      |        |              |      |      |              |      |
| No                         | 18.3%  | .1624, .2054 | 2070 | 11.5%  | .096, .1377  | 1559 | 8.9% | .0623, .1248 | 748  |
| Yes                        | 11.5%  | .0786, .1661 | 444  | 12.3%  | .0946, .1594 | 619  | 7.6% | .0586, .097  | 1438 |

### A.3.13 Percentage of children aged 6-23 months (and 24-59 months) with severe anaemia (<8g/dL) by malaria risk group (three groups of regions, roughly equal size, according to malaria parasitemia prevalence in 2007/8)

#### -children aged 6-23 months

|                   | 2004 | Lower | Medium | Higher | All   |
|-------------------|------|-------|--------|--------|-------|
| % Anemic (<8g/dL) |      | 9.5%  | 12.6%  | 20.5%  | 14.5% |
| LCI               |      | 7.5%  | 10.3%  | 17.3%  | 12.9% |
| UCI               |      | 12.0% | 15.3%  | 24.1%  | 16.2% |
| Weighted N        |      | 1115  | 894    | 1226   | 3235  |
|                   | 2007 |       |        |        |       |
| % Anemic (<8g/dL) |      | 7.7%  | 13.5%  | 14.8%  | 11.9% |
| LCI               |      | 5.4%  | 10.4%  | 11.5%  | 10.1% |
| UCI               |      | 10.7% | 17.2%  | 18.7%  | 14.0% |
| Weighted N        |      | 740   | 617    | 776    | 2133  |
|                   | 2010 |       |        |        |       |
| % Anemic (<8g/dL) |      | 7.9%  | 9.1%   | 8.2%   | 8.4%  |
| LCI               |      | 5.6%  | 5.5%   | 6.1%   | 6.7%  |
| UCI               |      | 11.0% | 14.6%  | 11.1%  | 10.4% |
| Weighted N        |      | 704   | 637    | 812    | 2152  |

#### -children aged 24-59 months

|                   | 2004 | Lower | Medium | Higher | All   |
|-------------------|------|-------|--------|--------|-------|
| % Anemic (<8g/dL) |      | 4.84% | 7.27%  | 10.87% | 7.75% |
| LCI               |      | 3.47% | 5.87%  | 8.9%   | 6.73% |
| UCI               |      | 6.71% | 8.97%  | 13.2%  | 8.91% |
| Weighted N        |      | 1633  | 1312   | 1727   | 4672  |
|                   | 2007 |       |        |        |       |
| % Anemic (<8g/dL) |      | 1.99% | 5.89%  | 7.46%  | 5.23% |
| LCI               |      | 1.24% | 4.49%  | 5.54%  | 4.28% |
| UCI               |      | 3.17% | 7.69%  | 9.96%  | 6.38% |
| Weighted N        |      | 1333  | 1186   | 1586   | 4105  |
|                   | 2010 |       |        |        |       |
| % Anemic (<8g/dL) |      | 3.1%  | 3.62%  | 5.84%  | 4.27% |
| LCI               |      | 2.04% | 2.69%  | 4.45%  | 3.54% |
| UCI               |      | 4.68% | 4.86%  | 7.62%  | 5.14% |
| Weighted N        |      | 1488  | 1241   | 1625   | 4354  |

### A.3.14 Percentage of children aged 0-59 months reported to have suffered fever in the two weeks prior to survey, by age and residence

|                      | 1999  |             |      | 2004/5 |             |      | 2007/8 |             |      | 2010  |             |      |
|----------------------|-------|-------------|------|--------|-------------|------|--------|-------------|------|-------|-------------|------|
|                      | Value | 95% CI      | n    | Value  | 95% CI      | n    | Value  | 95% CI      | n    | Value | 95% CI      | n    |
| <b>All</b>           | 35.0% | .316,.387   | 2820 | 24.2%  | .226,.260   | 7771 | 19.0%  | .177,.205   | 6943 | 23.0% | .2137,.2469 | 7461 |
| <b>Age in months</b> |       |             |      |        |             |      |        |             |      |       |             |      |
| 0 to 11              | 41.1% | .3554,.4687 | 618  | 26.6%  | .2371,.2963 | 1714 | 21.0%  | .1823,.2414 | 1485 | 23.1% | .2029,.2623 | 1599 |
| 12 to 23             | 50.7% | .4645,.5485 | 578  | 34.3%  | .3094,.3773 | 1620 | 24.4%  | .2176,.2732 | 1447 | 29.3% | .2638,.3236 | 1533 |
| 24 to 35             | 31.9% | .2578,.3864 | 574  | 25.0%  | .2229,.2784 | 1566 | 22.2%  | .1934,.2536 | 1291 | 24.3% | .2116,.2764 | 1413 |
| 36 to 47             | 29.2% | .2299,.3632 | 513  | 19.0%  | .1644,.2182 | 1475 | 17.5%  | .1462,.2072 | 1101 | 21.1% | .1861,.2382 | 1523 |
| 48 to 59             | 20.2% | .1542,.2594 | 538  | 14.4%  | .1237,.1674 | 1397 | 12.7%  | .105,.152   | 1226 | 16.7% | .1427,.194  | 1393 |
| <b>Residence</b>     |       |             |      |        |             |      |        |             |      |       |             |      |
| Urban                | 33.6% | .224,.470   | 523  | 22.3%  | .247, .268  | 1502 | 21.0%  | .178, .247  | 1202 | 30.1% | .2537,.3521 | 1459 |
| Rural                | 35.4% | .321,.387   | 2297 | 24.7%  | .228,.267   | 6269 | 18.6%  | .171,.202   | 5741 | 21.3% | .1964,.23   | 6002 |

### A.3.15 Percentage of children who tested malaria positive, by fever status (in two weeks prior to survey), 2007/8, by age group

|                                | % Malaria Positive | 95% CI    | n    |
|--------------------------------|--------------------|-----------|------|
| <b>Age 6-23 months</b>         |                    |           |      |
| No Fever in previous two weeks | 9.9%               | 7.9,12.3  | 1567 |
| Fever in previous two weeks    | 20.6%              | 15.6,26.7 | 546  |
| All                            | 12.7%              | 10.7,15.0 | 2112 |
| <b>Age 6-59 months</b>         |                    |           |      |
| No Fever in previous two weeks | 14.5%              | 12.5,16.7 | 4361 |
| Fever in previous two weeks    | 28.8%              | 24.3,33.7 | 1149 |
| All                            | 17.5%              | 15.4,19.8 | 5509 |

**A.3.16 Total slides examined and percentage of slides malaria positive, children aged 0-4 years admitted to St Francis District-Designated Hospital, Ifakara and Bagamoyo District Hospital**

| Year | Ifakara      |                  |                        | Bagamoyo     |                  |                        |
|------|--------------|------------------|------------------------|--------------|------------------|------------------------|
|      | Total slides | Malaria positive | Malaria positivity (%) | Total slides | Malaria positive | Malaria positivity (%) |
| 1999 | 4,563        | 3,484            | 76.35                  |              |                  |                        |
| 2000 | 7,127        | 5,198            | 72.93                  |              |                  |                        |
| 2001 | 3,074        | 2,150            | 69.94                  |              |                  |                        |
| 2002 | 2,632        | 1,068            | 40.58                  |              |                  |                        |
| 2003 | 4,248        | 2,114            | 49.76                  |              |                  |                        |
| 2004 | 2,565        | 926              | 36.1                   |              |                  |                        |
| 2005 | 2,994        | 901              | 30.09                  |              |                  |                        |
| 2006 | 1,831        | 330              | 18.02                  | 469          | 282              | 60.13                  |
| 2007 | 1,360        | 355              | 26.1                   | 385          | 240              | 62.34                  |
| 2008 | 1,991        | 448              | 22.5                   | 537          | 281              | 52.33                  |
| 2009 | 2,140        | 619              | 28.93                  | 387          | 155              | 40.05                  |
| 2010 | 1,535        | 490              | 31.92                  | 209          | 48               | 22.97                  |

### A.3.17 Childhood mortality rates, Tanzania Mainland, all surveys 1992-2010 by age category

|                  | Estimate                   | SE    | LCI   | UCI   |
|------------------|----------------------------|-------|-------|-------|
| <b>1991/2</b>    | DHS 1991/2, last 0-4 years |       |       |       |
| Neonatal         | 38.0                       | 3.7   | 30.5  | 45.5  |
| Postneonatal     | 54.5                       | 4.1   | 46.4  | 62.7  |
| Infant (1q0)     | 92.5                       | 5.9   | 80.8  | 104.3 |
| Child (4q1)      | 55.3                       | 3.8   | 47.7  | 62.9  |
| Under-five (5q0) | 142.7                      | 6.7   | 129.3 | 156.1 |
| <b>1996</b>      | DHS 1996, last 0-4 years   |       |       |       |
| Neonatal         | 31.9                       | 2.8   | 26.3  | 37.5  |
| Postneonatal     | 56.1                       | 3.8   | 48.4  | 63.7  |
| Infant (1q0)     | 88.0                       | 4.8   | 78.3  | 97.6  |
| Child (4q1)      | 54.3                       | 3.6   | 47.2  | 61.5  |
| Under-five (5q0) | 137.5                      | 6.0   | 125.5 | 149.6 |
| <b>1999</b>      | DHS 1999, last 0-4 years   |       |       |       |
| Neonatal         | 40.8                       | 4.8   | 31.1  | 50.4  |
| Postneonatal     | 58.9                       | 6.5   | 45.9  | 71.9  |
| Infant (1q0)     | 99.7                       | 7.3   | 85.2  | 114.3 |
| Child (4q1)      | 53.1                       | 6.3   | 40.4  | 65.8  |
| Under-five (5q0) | 147.5                      | 9.3   | 128.9 | 166.2 |
| <b>2004/5</b>    | DHS 2004/5, last 0-4 years |       |       |       |
| Neonatal         | 32.1                       | 2.8   | 26.6  | 37.7  |
| Postneonatal     | 36.2                       | 2.5   | 31.2  | 41.1  |
| Infant (1q0)     | 68.3                       | 3.7   | 60.8  | 75.8  |
| Child (4q1)      | 47.3                       | 3.3   | 40.7  | 54.0  |
| Under-five (5q0) | 112.4                      | 4.8   | 102.7 | 122.1 |
| <b>2007/8</b>    | DHS 2007/8, last 0-4 years |       |       |       |
| Neonatal         | 28.8                       | 2.8   | 23.2  | 34.3  |
| Postneonatal     | 29.4                       | 2.5   | 24.3  | 34.4  |
| Infant (1q0)     | 58.1                       | 3.7   | 50.7  | 65.6  |
| Child (4q1)      | 36.2                       | 3.1   | 30.0  | 42.5  |
| Under-five (5q0) | 92.3                       | 4.5   | 83.3  | 101.2 |
| <b>2010</b>      | DHS 2010, last 0-4 years   |       |       |       |
| Neonatal         | 25.5                       | 2.4   | 20.73 | 30.33 |
| Postneonatal     | 24.9                       | 2.135 | 20.66 | 29.21 |
| Infant (1q0)     | 50.5                       | 3.405 | 43.65 | 57.27 |
| Child (4q1)      | 32.5                       | 2.935 | 26.61 | 38.35 |
| Under-five (5q0) | 81.3                       | 4.525 | 72.25 | 90.35 |

### A.3.18 Mortality rates by age category and residence, 1999 (0-4 years) and 2010 (0-4 years)

|              | Urban       |       |                       | Rural |                       |  |
|--------------|-------------|-------|-----------------------|-------|-----------------------|--|
|              | 1999        | Value | 95% CI<br>Lower Upper | Value | 95% CI<br>Lower Upper |  |
| Neonatal     |             | 60.9  | 35.8 86.0             | 36.2  | 26.5 45.9             |  |
| PostNeonatal |             | 37.3  | 15.2 59.4             | 63.9  | 49.3 78.6             |  |
| Infant       |             | 98.2  | 72.5 123.9            | 100.1 | 83.1 117.1            |  |
| Child        |             | 49.3  | 28.0 70.6             | 53.9  | 38.8 69.0             |  |
| Under-five   |             | 142.7 | 108.1 177.2           | 148.6 | 126.8 170.4           |  |
|              | <b>2010</b> |       |                       |       |                       |  |
| Neonatal     |             | 34.8  | 22.4 47.1             | 23.2  | 18.1 28.4             |  |
| PostNeonatal |             | 31.1  | 20.0 42.2             | 23.5  | 18.9 28.1             |  |
| Infant       |             | 65.9  | 49.2 82.6             | 46.7  | 39.3 54.1             |  |
| Child        |             | 38.4  | 21.2 55.6             | 31.1  | 25.1 37.2             |  |
| Under-five   |             | 101.7 | 76.2 127.3            | 76.3  | 67.1 85.7             |  |

### A.3.19 Classification of regions into risk terciles (malaria parasite prevalence of children aged 6-59 months of interviewed mothers, 2007/8) for mortality analysis

Note: Manyara region was part of Arusha region in 1999, so was combined with Arusha for comparability across surveys.

|   | Value | n    | Weighted n |
|---|-------|------|------------|
| a. Lower risk = 0-9.2% (mean 3.4%; n=1462)        |       |      |            |
| Kilimanjaro                                       | 0.0%  | 144  | 165        |
| Arusha  | 0.9%  | 403  | 401        |
| Dar es Salaam                                     | 1.5%  | 133  | 243        |
| Mbeya   | 2.8%  | 180  | 357        |
| Iringa  | 3.0%  | 167  | 241        |
| Singida   | 5.4%  | 186  | 143        |
| Tabora  | 9.2%  | 249  | 358        |
| Mean (Low Tercile)                                | 3.4%  | 1462 | 1907       |
| b. Medium risk = 10.4%-21.9% (mean 15.2%; n=1288) |       |      |            |
| Dodoma  | 10.4% | 163  | 220        |
| Rukwa   | 10.6% | 263  | 270        |
| Tanga   | 12.9% | 147  | 204        |
| Morogoro  | 15.0% | 133  | 236        |
| Kigoma  | 17.6% | 262  | 305        |
| Ruvuma  | 21.4% | 192  | 213        |
| Pwani   | 21.9% | 128  | 110        |
| Mean (Intermediate Tercile)                       | 15.2% | 1288 | 1559       |
| c. Higher risk = 28.7%-38.6% (mean 32.1%; n=1351) |       |      |            |
| Mwanza  | 28.7% | 247  | 533        |
| Shingyanga  | 30.2% | 298  | 590        |
| Mtwara  | 31.3% | 134  | 172        |
| Mara  | 33.0% | 300  | 259        |
| Lindi   | 34.6% | 136  | 115        |
| Kagera  | 38.6% | 236  | 374        |
| Mean (Higher Tercile)                             | 32.0% | 1351 | 2043       |

### A.3.19B Classification of regions into risk terciles (malaria parasite prevalence of children aged 6-59 months who slept in the house the previous night, 2007/08) for anemia analysis

Note: Manyara region was part of Arusha region in 1999, so was combined with Arusha for comparability across surveys.

|   | Value | n    | Weighted n |
|---|-------|------|------------|
| a. Lower risk = 0.8%-9.7% (mean 3.1%; n=1605)     |       |      |            |
| Arusha  | 0.8%  | 444  | 335        |
| Kilimanjaro                                       | 1.1%  | 181  | 157        |
| Dar es Salaam                                     | 1.2%  | 161  | 213        |
| Iringa  | 2.6%  | 189  | 211        |
| Mbeya   | 3.3%  | 215  | 324        |
| Singida   | 5.0%  | 219  | 122        |
| Dodoma  | 9.7%  | 196  | 200        |
| Mean (Low Tercile)                                | 3.1%  | 1605 | 1561       |
| b. Medium risk = 9.9%-23.5% (mean 15.5%; n=1581)  |       |      |            |
| Tabora  | 9.9%  | 303  | 309        |
| Rukwa   | 11.8% | 296  | 224        |
| Tanga   | 14.2% | 183  | 184        |
| Morogoro  | 15.4% | 143  | 191        |
| Kigoma  | 18.9% | 285  | 236        |
| Pwani   | 20.7% | 150  | 95         |
| Ruvuma  | 23.5% | 221  | 180        |
| Mean (Intermediate Tercile)                       | 15.5% | 1581 | 1420       |
| c. Higher risk = 29.7%-40.4% (mean 33.0%; n=1589) |       |      |            |
| Mwanza  | 29.7% | 303  | 473        |
| Shingyanga  | 31.3% | 352  | 531        |
| Mtwara  | 32.5% | 160  | 151        |
| Mara  | 32.6% | 341  | 228        |
| Lindi   | 35.3% | 156  | 100        |
| Kagera  | 40.4% | 277  | 325        |
| Mean (Higher Tercile)                             | 33.0% | 1589 | 1809       |

### A.3.20 Infant and under-five mortality rates by malaria risk tercile

#### Under-five mortality (5q0)

|                   | 2010  | 2007  | 2004  | 1999  | change 1999-2010 |          |
|-------------------|-------|-------|-------|-------|------------------|----------|
|                   |       |       |       |       | relative         | absolute |
| <b>All</b>        |       |       |       |       |                  |          |
| Higher            | 100.2 | 105.5 | 128.5 | 168.8 | -41%             | -68.6    |
| Medium            | 84.2  | 120.1 | 139.9 | 183.1 | -54%             | -98.9    |
| Lower             | 78.5  | 87.8  | 110.5 | 124.7 | -37%             | -46.2    |
| <b>Rural only</b> |       |       |       |       |                  |          |
| Higher            | 105.6 | 104.6 | 129.1 | 174.3 | -39%             | -68.7    |
| Medium            | 84.2  | 123.1 | 143.5 | 189.0 | -55%             | -104.8   |
| Lower             | 72.0  | 77.7  | 115.7 | 117.9 | -39%             | -45.9    |

#### Infant mortality (1q0)

|                   | 2010 | 2007 | 2004 | 1999  | change 1999-2010 |          |
|-------------------|------|------|------|-------|------------------|----------|
|                   |      |      |      |       | relative         | absolute |
| <b>All</b>        |      |      |      |       |                  |          |
| Higher            | 65.0 | 74.1 | 88.9 | 143.5 | -55%             | -78.5    |
| Medium            | 57.2 | 83.8 | 94.7 | 140.9 | -59%             | -83.7    |
| Lower             | 56.9 | 66.8 | 75.5 | 86.3  | -34%             | -29.4    |
| <b>Rural only</b> |      |      |      |       |                  |          |
| Higher            | 67.7 | 71.8 | 89.9 | 148.0 | -54%             | -80.3    |
| Medium            | 58.3 | 83.4 | 98.5 | 146.6 | -60%             | -88.3    |
| Lower             | 53.0 | 58.1 | 78.5 | 87.2  | -39%             | -34.2    |

## A.3.21 Equity analysis of infant and under-five mortality, 2004/5 vs 2010

### Infant Deaths in Tanzania Mainland, 1994–2004

| Wealth quintile | # live birth | Relative % of live birth | Cumulative % live birth | U5MR | # Death | Relative % of death | Cumulative % of death |
|-----------------|--------------|--------------------------|-------------------------|------|---------|---------------------|-----------------------|
| Lowest          | 3,570        | 22.8                     | 22.8                    | 87.7 | 313     | 24.1                | 24.1                  |
| Second          | 3,354        | 21.4                     | 44.2                    | 97.4 | 327     | 25.1                | 49.2                  |
| Middle          | 3,314        | 21.2                     | 65.4                    | 88.2 | 292     | 22.5                | 71.6                  |
| Fourth          | 3,076        | 19.6                     | 85.0                    | 70.4 | 217     | 16.6                | 88.3                  |
| Highest         | 2,343        | 15.0                     | 100.0                   | 65.2 | 153     | 11.7                | 100.0                 |
| <b>Total</b>    | 15,658       |                          |                         |      | 1301    |                     |                       |

### Concentration index

| C-Index | se     | Low     | High    | Plus   | Minus  |
|---------|--------|---------|---------|--------|--------|
| -0.0632 | 0.0270 | -0.1161 | -0.0103 | 0.0529 | 0.0529 |

### Infant Deaths in Tanzania Mainland, 1998–2008

| Wealth quintile | # live birth | Relative % of live birth | Cumulative % live birth | U5MR | # Death | Relative % of death | Cumulative % of death |
|-----------------|--------------|--------------------------|-------------------------|------|---------|---------------------|-----------------------|
| Lowest          | 3,230        | 23.4                     | 23.4                    | 81.9 | 265     | 26.4                | 26.4                  |
| Second          | 2,850        | 20.6                     | 44.0                    | 69.6 | 198     | 19.8                | 46.2                  |
| Middle          | 2,975        | 21.5                     | 65.5                    | 66.9 | 199     | 19.9                | 66.1                  |
| Fourth          | 2,568        | 18.6                     | 84.1                    | 68.2 | 175     | 17.5                | 83.6                  |
| Highest         | 2,196        | 15.9                     | 100.0                   | 74.8 | 164     | 16.4                | 100.0                 |
| <b>Total</b>    | 13,819       |                          |                         |      | 1,001   |                     |                       |

### Concentration index

| C-Index | se     | Low     | High   | Plus   | Minus  |
|---------|--------|---------|--------|--------|--------|
| -0.0234 | 0.0228 | -0.0680 | 0.0213 | 0.0447 | 0.0447 |

### Under-Five Deaths in Tanzania Mainland, 1994–2004

| Wealth quintile | # live birth | Relative % of live birth | Cumulative % live birth | U5MR  | # Death | Relative % of death | Cumulative % of death |
|-----------------|--------------|--------------------------|-------------------------|-------|---------|---------------------|-----------------------|
| Lowest          | 3,570        | 22.8                     | 22.8                    | 136.9 | 489     | 23.4                | 23.4                  |
| Second          | 3,354        | 21.4                     | 44.2                    | 156.4 | 525     | 25.1                | 48.6                  |
| Middle          | 3,314        | 21.2                     | 65.4                    | 147.2 | 488     | 23.4                | 72.0                  |
| Fourth          | 3,076        | 19.6                     | 85.0                    | 118.0 | 363     | 17.4                | 89.4                  |
| Highest         | 2,343        | 15.0                     | 100.0                   | 94.8  | 222     | 10.6                | 100.0                 |
| <b>Total</b>    | 15,658       | 100.0                    |                         | 133.0 | 2086    | 100.0               |                       |

**Concentration index**

| C-Index | se     | Low     | High   |
|---------|--------|---------|--------|
| -0.0631 | 0.0402 | -0.1419 | 0.0157 |

**Under-Five Deaths in Tanzania Mainland, 2000–2010**

| Wealth quintile | # live birth | Relative % of live birth | Cumulative % live birth | U5MR  | # Death | Relative % of death | Cumulative % of death |
|-----------------|--------------|--------------------------|-------------------------|-------|---------|---------------------|-----------------------|
| Lowest          | 3,570        | 22.8                     | 22.8                    | 103.4 | 369     | 25.4                | 25.4                  |
| Second          | 3,354        | 21.4                     | 44.2                    | 92.2  | 309     | 21.2                | 46.6                  |
| Middle          | 3,314        | 21.2                     | 65.4                    | 91.2  | 302     | 20.8                | 67.4                  |
| Fourth          | 3,076        | 19.6                     | 85.0                    | 89.0  | 274     | 18.8                | 86.2                  |
| Highest         | 2,343        | 15.0                     | 100.0                   | 85.9  | 201     | 13.8                | 100.0                 |
| Total           | 15,657       | 100.0                    |                         |       | 1456    | 100.0               |                       |

**Concentration index**

| C-Index | se     | Low     | High    |
|---------|--------|---------|---------|
| -0.0335 | 0.0112 | -0.0554 | -0.0115 |

### A.3.22 All indicators, Ifakara HDSS area

| <b>All-age malaria positivity</b> |                 |              |                    |
|-----------------------------------|-----------------|--------------|--------------------|
|                                   | Tested positive | Total tested | % malaria positive |
| 2000                              |                 |              |                    |
| 2001                              |                 |              | 18.0%              |
| 2002                              |                 |              | 22.0%              |
| 2003                              |                 |              |                    |
| 2004                              | 1013            | 4044         | 25.0%              |
| 2005                              | 559             | 4902         | 11.4%              |
| 2006                              | 698             | 5223         | 13.4%              |
| 2007                              |                 |              |                    |
| 2008                              | 506             | 4533         | 11.2%              |
| 2009                              | 341             | 7401         | 4.6%               |
| 2010                              | 25              | 684          | 3.7%               |

| <b>All-age ITN use</b> |           |             |            |
|------------------------|-----------|-------------|------------|
|                        | nominator | denominator | % used ITN |
| 2000                   |           |             |            |
| 2001                   | na        | na          | 9.8%       |
| 2002                   | 491       | 4724        | 10.4%      |
| 2003                   |           |             |            |
| 2004                   | 1357      | 5163        | 26.3%      |
| 2005                   | 2034      | 5903        | 34.5%      |
| 2006                   | 2253      | 6324        | 35.6%      |
| 2007                   |           |             |            |
| 2008                   | na        | na          | 44.0%      |
| 2009                   | na        | na          | 47.0%      |
| 2010                   |           |             |            |

| <b>All-age any net use</b> |           |             |            |
|----------------------------|-----------|-------------|------------|
|                            | nominator | denominator | % used ITN |
| 2000                       |           |             |            |
| 2001                       |           |             | 68.8%      |
| 2002                       | 3300      | 4742        | 69.6%      |
| 2003                       | 3944      | 5163        | 76.4%      |
| 2004                       | 4785      | 5903        | 81.1%      |
| 2005                       | 5418      | 6324        | 85.7%      |
| 2006                       |           |             |            |
| 2007                       |           |             |            |
| 2008                       | 4330      | 4759        | 91.0%      |
| 2009                       | 6783      | 7439        | 91.2%      |
| 2010                       |           |             |            |

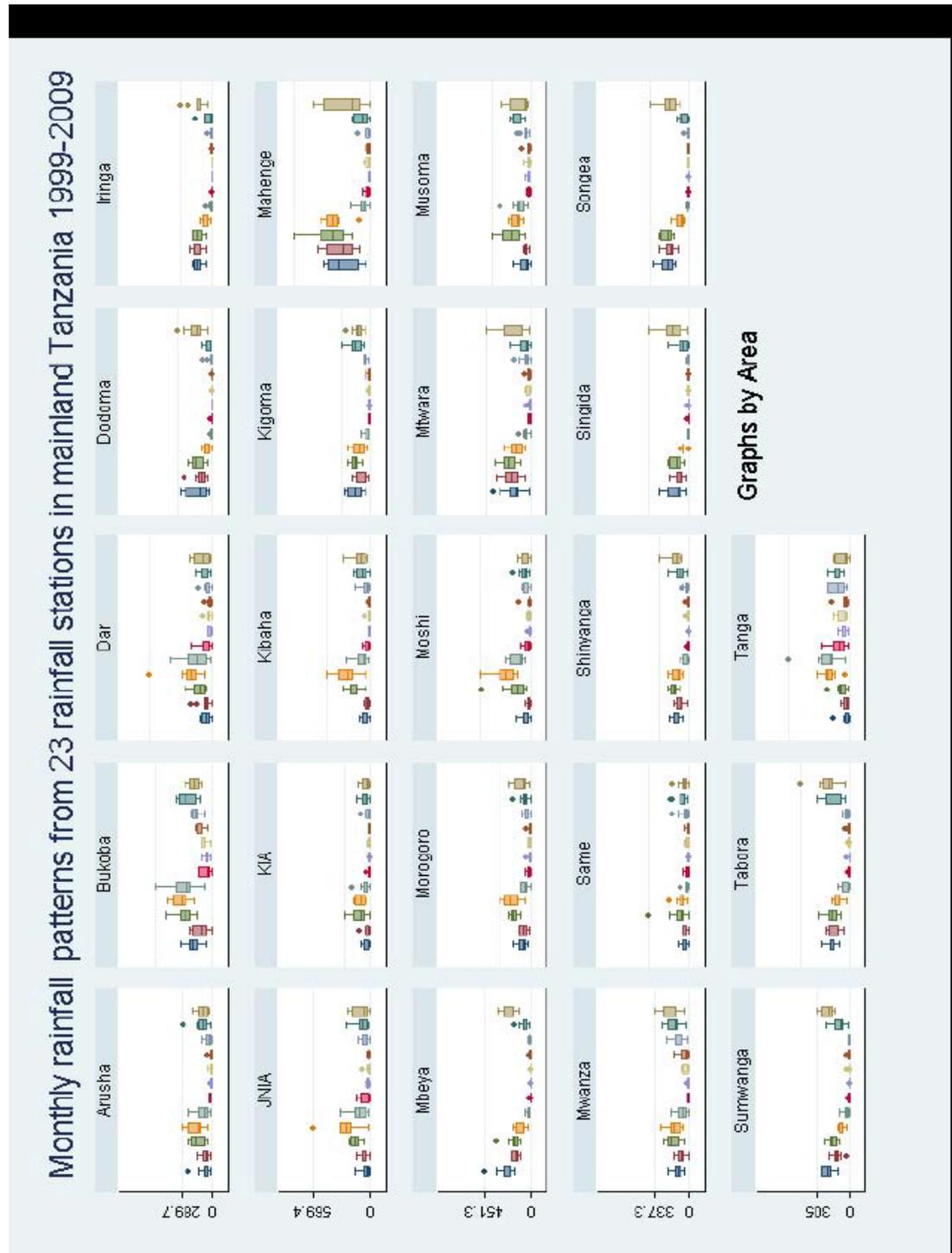
| <b>Mortality per 1,000 live births, Ifakara HDSS population</b> |              |                  |
|---|--------------|------------------|
|   | Infant (1q0) | Under-five (5q0) |
| 1998  | 115.0        | 140.8            |
| 1999  | 90.0         | 118.0            |
| 2000  | 80.6         | 136.6            |
| 2001  | 67.7         | 114.3            |

|      |      |       |
|------|------|-------|
| 2002 | 74.2 | 136.9 |
| 2003 | 89.5 | 151.3 |
| 2004 | 63.9 | 109.5 |
| 2005 | 88.4 | 126.6 |
| 2006 | 73.9 | 106.2 |
| 2007 | 65.1 | 99.9  |
| 2008 | 65.0 | 95.2  |
| 2009 | 59.8 | 87.8  |
| 2010 |      |       |

| Annual Rainfall<br>(mm) Kibaoni Tea<br>Research Institute |      |
|---|------|
| 1994  | 1407 |
| 1995  | 1753 |
| 1996  | 1669 |
| 1997  | 1352 |
| 1998  | 1264 |
| 1999  | 1871 |
| 2000  | 1037 |
| 2001  | 1476 |
| 2002  | 1719 |
| 2003  | 932  |
| 2004  | 1520 |
| 2005  | 1287 |
| 2006  | 1611 |

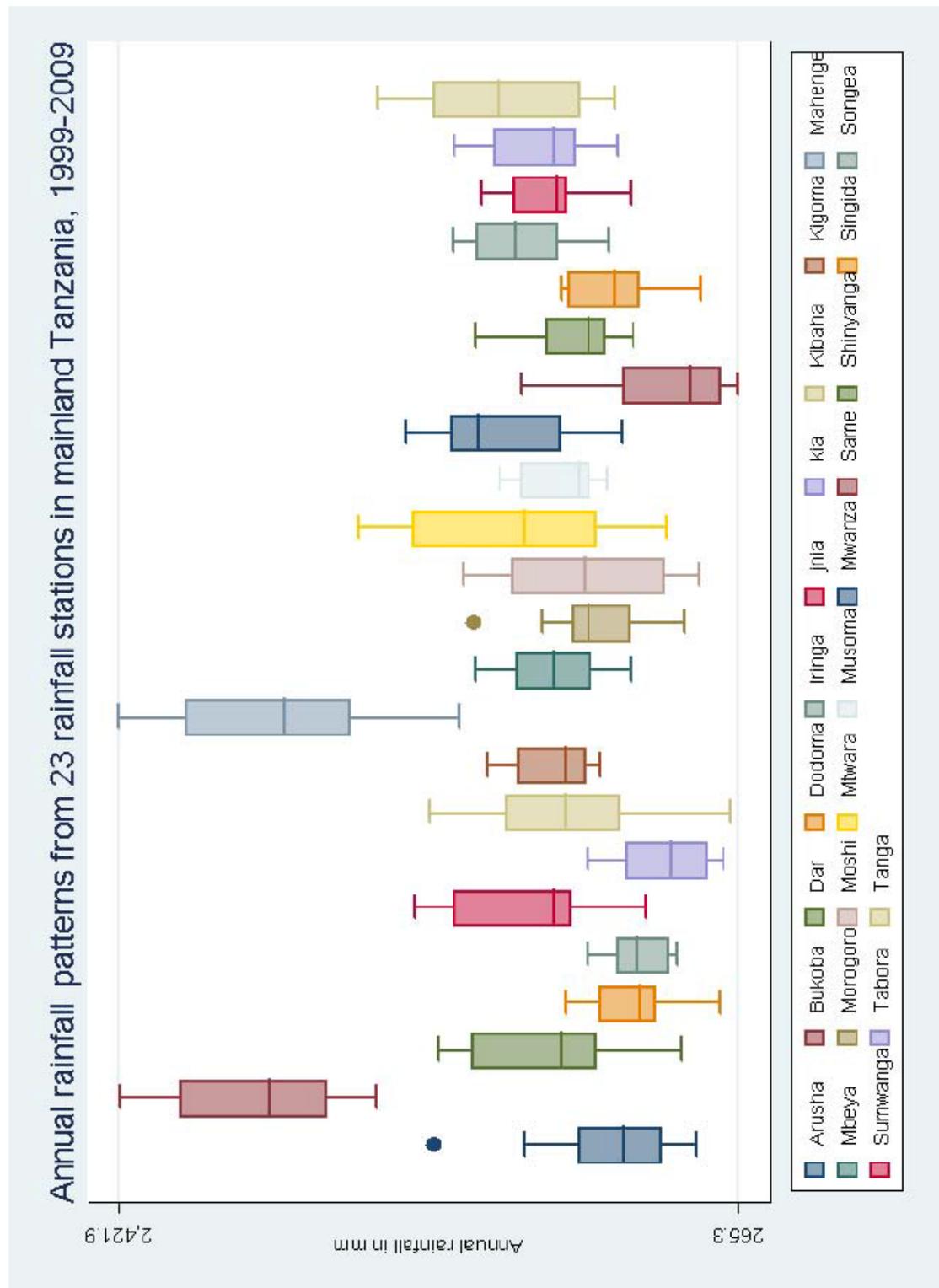
| Entomological Inoculation Rate (infectious bites per person per year) |                     |                            |                  |
|---|---------------------|----------------------------|------------------|
|   | Unprotected persons | Protected by untreated net | Protected by ITN |
| 1990-94   | 1481                |                            |                  |
| 2001-03   | 349                 | 210                        | 105              |
| 2008  | 81                  |                            |                  |

### A 3.23 Monthly rainfall pattern from 23 rainfall stations, Mainland Tanzania, 1999-2009



Graphs by Area

**A 3.24 Annual rainfall pattern from 23 rainfall stations, Mainland Tanzania, 1999-2009**



### A 3.25 Summary statistics of monthly rainfall from each of the 23 rainfall stations, mainland Tanzania, 1999-2009

| Month     | # Observations | Mean  | Std. Dev. | Min  | Max   |
|-----------|----------------|-------|-----------|------|-------|
| January   | 11             | 59.4  | 63.3      | 14.0 | 225.1 |
| February  | 11             | 52.2  | 37.7      | 13.2 | 136.3 |
| March     | 11             | 129.9 | 72.8      | 35.6 | 225.4 |
| April     | 11             | 148.1 | 79.3      | 39.4 | 289.7 |
| May       | 11             | 77.0  | 62.0      | 10.5 | 224.5 |
| June      | 11             | 11.8  | 5.6       | 6.3  | 22.1  |
| July      | 11             | 3.6   | 2.9       | 0.0  | 10.1  |
| August    | 11             | 7.7   | 11.1      | 0.0  | 36.1  |
| September | 11             | 10.2  | 15.6      | 0.0  | 43.0  |
| October   | 11             | 31.0  | 32.3      | 0.0  | 97.8  |
| November  | 11             | 93.0  | 74.8      | 18.1 | 281.5 |
| December  | 11             | 84.9  | 52.7      | 20.0 | 186.2 |

| Month     | # Observations | Mean  | Std. Dev. | Min   | Max   |
|-----------|----------------|-------|-----------|-------|-------|
| January   | 11             | 183.6 | 76.7      | 52.2  | 313.3 |
| February  | 11             | 109.3 | 71.3      | 0.0   | 208.7 |
| March     | 11             | 265.4 | 87.9      | 140.8 | 440.8 |
| April     | 11             | 304.9 | 86.3      | 165.5 | 428.3 |
| May       | 11             | 267.1 | 125.0     | 62.3  | 551.8 |
| June      | 11             | 56.6  | 47.0      | 1.0   | 125.3 |
| July      | 11             | 45.2  | 28.4      | 9.9   | 99.0  |
| August    | 11             | 65.3  | 28.0      | 9.0   | 98.8  |
| September | 11             | 102.3 | 33.8      | 41.5  | 157.5 |
| October   | 11             | 141.8 | 42.5      | 62.5  | 200.3 |
| November  | 11             | 232.6 | 91.2      | 108.0 | 351.8 |
| December  | 11             | 166.5 | 51.3      | 103.0 | 264.1 |

| Month     | # Observations | Mean  | Std. Dev. | Min  | Max   |
|-----------|----------------|-------|-----------|------|-------|
| January   | 11             | 55.4  | 36.8      | 0.0  | 105.7 |
| February  | 11             | 58.0  | 57.5      | 0.7  | 192.4 |
| March     | 11             | 118.1 | 68.8      | 49.2 | 269.4 |
| April     | 11             | 229.2 | 136.0     | 70.3 | 595.9 |
| May       | 11             | 147.4 | 117.6     | 16.7 | 408.5 |
| June      | 11             | 53.1  | 55.6      | 2.6  | 189.3 |
| July      | 11             | 16.8  | 17.2      | 2.1  | 45.3  |
| August    | 11             | 24.8  | 21.7      | 2.5  | 79.9  |
| September | 11             | 18.1  | 19.3      | 0.5  | 66.1  |
| October   | 11             | 37.0  | 36.6      | 3.7  | 127.7 |
| November  | 11             | 61.8  | 48.3      | 7.4  | 151.9 |
| December  | 11             | 95.4  | 77.9      | 7.7  | 214.5 |

| Month     | # Observations | Mean  | Std. Dev. | Min  | Max   |
|-----------|----------------|-------|-----------|------|-------|
| January   | 11             | 135.5 | 98.7      | 26.7 | 312.5 |
| February  | 11             | 107.2 | 64.6      | 45.4 | 271.5 |
| March     | 11             | 135.0 | 62.3      | 47.0 | 223.9 |
| April     | 11             | 36.6  | 35.1      | 4.4  | 98.0  |
| May       | 11             | 2.0   | 5.3       | 0.0  | 17.8  |
| June      | 11             | 0.5   | 1.7       | 0.0  | 5.5   |
| July      | 11             | 0.0   | 0.0       | 0.0  | 0.0   |
| August    | 11             | 0.0   | 0.1       | 0.0  | 0.4   |
| September | 11             | 0.2   | 0.7       | 0.0  | 2.2   |
| October   | 11             | 10.5  | 24.3      | 0.0  | 76.2  |
| November  | 11             | 27.7  | 31.4      | 0.0  | 90.4  |
| December  | 11             | 162.6 | 83.4      | 45.7 | 336.9 |

| Month     | # Observations | Mean  | Std. Dev. | Min  | Max   |
|-----------|----------------|-------|-----------|------|-------|
| January   | 11             | 127.1 | 46.8      | 52.7 | 187.8 |
| February  | 11             | 121.1 | 47.3      | 58.1 | 204.4 |
| March     | 11             | 128.4 | 45.5      | 58.1 | 185.8 |
| April     | 11             | 51.5  | 32.0      | 15.4 | 111.7 |
| May       | 11             | 11.0  | 17.4      | 0.0  | 58.1  |
| June      | 11             | 0.3   | 0.7       | 0.0  | 2.2   |
| July      | 11             | 0.0   | 0.0       | 0.0  | 0.0   |
| August    | 11             | 0.0   | 0.0       | 0.0  | 0.0   |
| September | 11             | 0.5   | 1.3       | 0.0  | 4.2   |
| October   | 11             | 5.7   | 12.8      | 0.0  | 41.9  |
| November  | 11             | 32.1  | 48.0      | 0.0  | 157.1 |
| December  | 11             | 131.8 | 75.1      | 40.5 | 306.6 |

| Month     | # Observations | Mean  | Std. Dev. | Min  | Max   |
|-----------|----------------|-------|-----------|------|-------|
| January   | 11             | 46.9  | 46.0      | 1.8  | 154.8 |
| February  | 11             | 61.8  | 41.1      | 3.5  | 149.8 |
| March     | 11             | 153.8 | 43.2      | 80.2 | 222.1 |
| April     | 11             | 248.2 | 137.3     | 13.7 | 569.4 |
| May       | 11             | 110.4 | 85.3      | 19.3 | 302.6 |
| June      | 11             | 51.3  | 53.6      | 2.8  | 142.9 |
| July      | 11             | 18.8  | 17.9      | 0.0  | 60.1  |
| August    | 11             | 19.5  | 27.1      | 0.6  | 95.4  |
| September | 11             | 14.0  | 10.6      | 2.1  | 31.1  |
| October   | 11             | 55.9  | 39.4      | 6.2  | 124.9 |
| November  | 11             | 88.9  | 63.6      | 15.5 | 240.9 |
| December  | 11             | 105.5 | 81.9      | 11.7 | 230.4 |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 34.6        | 36.7             | 3.0        | 107.4      |
| February     | 11                    | 32.1        | 35.5             | 0.8        | 120.1      |
| March        | 11                    | 115.2       | 79.6             | 10.8       | 253.7      |
| April        | 11                    | 105.0       | 52.1             | 40.8       | 174.5      |
| May          | 11                    | 58.1        | 51.8             | 9.3        | 188.9      |
| June         | 11                    | 14.4        | 13.1             | 2.5        | 50.1       |
| July         | 11                    | 3.2         | 3.0              | 0.0        | 11.1       |
| August       | 11                    | 10.4        | 12.3             | 0.0        | 37.2       |
| September    | 11                    | 6.3         | 6.2              | 0.0        | 19.2       |
| October      | 11                    | 22.8        | 34.6             | 0.0        | 110.3      |
| November     | 11                    | 57.5        | 46.4             | 0.0        | 143.8      |
| December     | 11                    | 47.9        | 45.9             | 1.8        | 134.2      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 53.3        | 39.3             | 10.4       | 114.2      |
| February     | 11                    | 33.9        | 22.2             | 2.2        | 70.7       |
| March        | 11                    | 157.2       | 69.2             | 41.7       | 272.0      |
| April        | 11                    | 231.1       | 109.5            | 40.7       | 422.6      |
| May          | 11                    | 90.2        | 67.6             | 22.9       | 240.5      |
| June         | 11                    | 29.2        | 30.5             | 2.8        | 92.1       |
| July         | 11                    | 8.4         | 7.8              | 0.5        | 23.3       |
| August       | 11                    | 13.7        | 17.7             | 0.7        | 64.4       |
| September    | 11                    | 5.2         | 6.5              | 0.0        | 21.7       |
| October      | 11                    | 45.0        | 49.1             | 0.0        | 164.7      |
| November     | 11                    | 88.4        | 60.0             | 2.2        | 175.8      |
| December     | 11                    | 110.2       | 67.4             | 30.9       | 266.0      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 153.3       | 69.7             | 62.0       | 264.8      |
| February     | 11                    | 82.3        | 62.1             | 22.2       | 191.5      |
| March        | 11                    | 155.9       | 43.0             | 89.3       | 228.3      |
| April        | 11                    | 119.7       | 66.7             | 31.0       | 233.0      |
| May          | 11                    | 31.5        | 36.3             | 0.0        | 107.7      |
| June         | 11                    | 6.8         | 7.5              | 0.0        | 18.4       |
| July         | 11                    | 0.4         | 1.2              | 0.0        | 4.1        |
| August       | 11                    | 4.6         | 9.1              | 0.0        | 23.7       |
| September    | 11                    | 14.8        | 15.4             | 0.0        | 47.9       |
| October      | 11                    | 52.7        | 22.2             | 22.7       | 78.3       |
| November     | 11                    | 160.3       | 62.0             | 71.4       | 280.7      |
| December     | 11                    | 130.0       | 51.1             | 59.8       | 241.1      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 271.9       | 147.7            | 45.9       | 457.1      |
| February     | 11                    | 288.2       | 134.3            | 119.4      | 525.2      |
| March        | 11                    | 399.0       | 177.2            | 191.7      | 753.4      |
| April        | 11                    | 362.8       | 97.5             | 124.3      | 493.8      |
| May          | 11                    | 75.8        | 56.5             | 1.7        | 200.0      |
| June         | 11                    | 37.1        | 28.8             | 5.3        | 96.1       |
| July         | 11                    | 9.8         | 7.1              | 0.0        | 20.0       |
| August       | 11                    | 26.2        | 29.8             | 0.4        | 80.4       |
| September    | 11                    | 16.9        | 16.2             | 0.2        | 42.8       |
| October      | 11                    | 30.9        | 38.4             | 0.0        | 130.6      |
| November     | 11                    | 93.5        | 70.6             | 2.7        | 184.4      |
| December     | 11                    | 265.2       | 190.7            | 4.0        | 568.1      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 235.6       | 87.5             | 150.9      | 451.3      |
| February     | 11                    | 144.2       | 34.8             | 94.6       | 187.7      |
| March        | 11                    | 164.3       | 64.0             | 103.0      | 329.7      |
| April        | 11                    | 87.2        | 47.7             | 25.8       | 169.7      |
| May          | 11                    | 16.8        | 21.9             | 0.0        | 60.5       |
| June         | 11                    | 1.0         | 2.5              | 0.0        | 8.0        |
| July         | 11                    | 0.3         | 1.0              | 0.0        | 3.4        |
| August       | 11                    | 0.5         | 1.5              | 0.0        | 4.9        |
| September    | 11                    | 1.8         | 3.3              | 0.0        | 8.6        |
| October      | 11                    | 12.1        | 9.2              | 2.2        | 32.6       |
| November     | 11                    | 54.2        | 44.5             | 11.0       | 154.4      |
| December     | 11                    | 194.7       | 64.8             | 112.9      | 319.6      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 76.3        | 41.3             | 32.6       | 164.1      |
| February     | 11                    | 65.0        | 41.2             | 18.5       | 117.1      |
| March        | 11                    | 161.1       | 32.4             | 95.3       | 207.4      |
| April        | 11                    | 184.1       | 77.7             | 54.5       | 299.7      |
| May          | 11                    | 54.0        | 34.4             | 0.6        | 97.6       |
| June         | 11                    | 18.7        | 16.0             | 1.1        | 47.8       |
| July         | 11                    | 8.8         | 10.6             | 0.2        | 38.7       |
| August       | 11                    | 9.3         | 9.7              | 0.0        | 23.8       |
| September    | 11                    | 9.3         | 11.3             | 0.0        | 37.7       |
| October      | 11                    | 35.3        | 28.3             | 0.0        | 87.3       |
| November     | 11                    | 54.6        | 47.0             | 0.0        | 164.4      |
| December     | 11                    | 95.5        | 68.4             | 12.5       | 210.0      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 42.2        | 40.6             | 1.4        | 136.4      |
| February     | 11                    | 20.1        | 16.4             | 0.6        | 47.9       |
| March        | 11                    | 146.7       | 132.2            | 35.2       | 474.4      |
| April        | 11                    | 240.9       | 111.7            | 117.8      | 490.0      |
| May          | 11                    | 120.1       | 62.8             | 53.2       | 235.9      |
| June         | 11                    | 31.2        | 29.9             | 1.6        | 97.3       |
| July         | 11                    | 9.3         | 7.2              | 1.0        | 26.0       |
| August       | 11                    | 14.0        | 12.5             | 0.0        | 39.8       |
| September    | 11                    | 16.9        | 33.7             | 0.0        | 116.2      |
| October      | 11                    | 33.2        | 32.3             | 0.0        | 88.4       |
| November     | 11                    | 58.2        | 46.8             | 6.1        | 165.6      |
| December     | 11                    | 46.9        | 42.6             | 0.3        | 129.0      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 10                    | 162.2       | 105.6            | 14.8       | 361.3      |
| February     | 10                    | 176.0       | 86.2             | 50.8       | 332.0      |
| March        | 10                    | 212.5       | 83.7             | 92.2       | 342.2      |
| April        | 10                    | 136.0       | 64.0             | 51.8       | 256.9      |
| May          | 10                    | 42.9        | 32.1             | 4.0        | 116.3      |
| June         | 10                    | 9.7         | 10.3             | 0.0        | 24.4       |
| July         | 10                    | 10.0        | 15.5             | 0.0        | 47.4       |
| August       | 10                    | 18.7        | 19.1             | 0.0        | 55.0       |
| September    | 10                    | 13.7        | 14.0             | 0.6        | 48.4       |
| October      | 10                    | 47.1        | 48.1             | 2.3        | 149.5      |
| November     | 10                    | 64.2        | 69.2             | 1.4        | 191.0      |
| December     | 10                    | 151.2       | 135.8            | 17.7       | 435.1      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 56.8        | 48.0             | 0.4        | 161.9      |
| February     | 11                    | 39.5        | 17.7             | 12.8       | 71.7       |
| March        | 11                    | 189.2       | 94.8             | 61.2       | 370.9      |
| April        | 11                    | 139.5       | 46.3             | 71.9       | 207.7      |
| May          | 11                    | 113.9       | 71.8             | 27.0       | 288.0      |
| June         | 11                    | 16.8        | 13.2             | 0.8        | 38.8       |
| July         | 11                    | 18.2        | 17.2             | 0.0        | 50.0       |
| August       | 11                    | 19.9        | 20.2             | 1.2        | 63.4       |
| September    | 11                    | 21.9        | 22.1             | 3.1        | 85.7       |
| October      | 11                    | 53.2        | 31.0             | 11.7       | 118.7      |
| November     | 11                    | 113.3       | 47.3             | 56.2       | 194.2      |
| December     | 11                    | 103.8       | 87.8             | 24.3       | 278.8      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 124.0       | 46.5             | 44.7       | 214.6      |
| February     | 11                    | 74.7        | 45.7             | 0.1        | 156.9      |
| March        | 11                    | 169.1       | 69.7             | 51.3       | 259.4      |
| April        | 11                    | 145.7       | 69.0             | 68.3       | 290.9      |
| May          | 11                    | 69.8        | 56.2             | 8.4        | 185.1      |
| June         | 11                    | 2.4         | 3.0              | 0.0        | 8.1        |
| July         | 11                    | 4.0         | 8.1              | 0.0        | 25.4       |
| August       | 11                    | 29.1        | 27.9             | 0.0        | 77.0       |
| September    | 11                    | 48.3        | 53.5             | 0.0        | 164.7      |
| October      | 11                    | 100.2       | 67.3             | 14.1       | 226.8      |
| November     | 11                    | 154.2       | 70.7             | 34.5       | 276.0      |
| December     | 11                    | 182.6       | 86.3             | 53.8       | 337.3      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 38.2        | 24.4             | 3.2        | 74.1       |
| February     | 11                    | 29.3        | 39.1             | 0.0        | 114.4      |
| March        | 11                    | 109.8       | 81.7             | 10.7       | 252.9      |
| April        | 11                    | 354.7       | 126.9            | 130.6      | 563.1      |
| May          | 11                    | 315.6       | 189.5            | 37.8       | 611.5      |
| June         | 11                    | 122.9       | 74.7             | 47.7       | 233.1      |
| July         | 11                    | 54.8        | 30.6             | 8.2        | 119.6      |
| August       | 11                    | 26.9        | 12.8             | 9.9        | 55.7       |
| September    | 11                    | 29.7        | 36.2             | 0.5        | 121.6      |
| October      | 11                    | 65.8        | 60.3             | 3.5        | 218.8      |
| November     | 11                    | 62.8        | 31.3             | 19.2       | 116.2      |
| December     | 11                    | 83.7        | 61.4             | 8.8        | 169.9      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 42.9        | 38.7             | 0.0        | 121.9      |
| February     | 11                    | 32.4        | 23.5             | 0.0        | 65.9       |
| March        | 11                    | 109.9       | 109.5            | 12.5       | 399.0      |
| April        | 11                    | 76.0        | 50.8             | 24.7       | 202.0      |
| May          | 11                    | 33.0        | 30.3             | 1.1        | 94.2       |
| June         | 11                    | 15.8        | 19.8             | 0.0        | 62.6       |
| July         | 11                    | 2.6         | 3.7              | 0.0        | 10.9       |
| August       | 11                    | 14.2        | 17.1             | 0.0        | 43.3       |
| September    | 11                    | 12.1        | 15.0             | 0.0        | 42.6       |
| October      | 11                    | 43.2        | 55.3             | 0.0        | 171.0      |
| November     | 11                    | 70.6        | 57.5             | 15.8       | 190.7      |
| December     | 11                    | 53.2        | 49.3             | 5.8        | 169.8      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 129.2       | 40.4             | 66.6       | 200.1      |
| February     | 11                    | 95.3        | 39.1             | 14.4       | 155.6      |
| March        | 11                    | 156.2       | 31.2             | 106.9      | 209.6      |
| April        | 11                    | 123.3       | 54.7             | 59.9       | 222.3      |
| May          | 11                    | 34.0        | 32.2             | 0.8        | 95.3       |
| June         | 11                    | 2.3         | 6.4              | 0.0        | 21.5       |
| July         | 11                    | 0.4         | 0.9              | 0.0        | 2.6        |
| August       | 11                    | 6.6         | 12.6             | 0.0        | 39.8       |
| September    | 11                    | 7.0         | 7.8              | 0.0        | 27.1       |
| October      | 11                    | 20.9        | 25.2             | 0.0        | 79.9       |
| November     | 11                    | 101.9       | 62.2             | 20.1       | 209.8      |
| December     | 11                    | 143.5       | 64.9             | 80.8       | 297.7      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 10                    | 141.6       | 91.1             | 36.8       | 296.2      |
| February     | 10                    | 103.5       | 50.9             | 27.1       | 200.3      |
| March        | 10                    | 133.3       | 59.6             | 49.9       | 215.8      |
| April        | 10                    | 47.7        | 25.8             | 0.0        | 85.7       |
| May          | 10                    | 8.7         | 10.0             | 0.0        | 25.5       |
| June         | 10                    | 1.7         | 5.3              | 0.0        | 16.7       |
| July         | 10                    | 1.3         | 4.2              | 0.0        | 13.2       |
| August       | 10                    | 0.9         | 2.0              | 0.0        | 6.4        |
| September    | 10                    | 1.9         | 3.8              | 0.0        | 11.8       |
| October      | 10                    | 8.0         | 11.2             | 0.0        | 26.4       |
| November     | 10                    | 74.9        | 65.8             | 5.0        | 210.9      |
| December     | 10                    | 163.8       | 113.5            | 17.9       | 398.1      |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 222.2       | 66.6             | 140.0      | 360.0      |
| February     | 11                    | 192.0       | 52.5             | 112.0      | 298.6      |
| March        | 11                    | 228.0       | 52.7             | 160.6      | 298.0      |
| April        | 11                    | 98.9        | 51.7             | 51.9       | 194.6      |
| May          | 11                    | 12.7        | 11.7             | 0.0        | 38.0       |
| June         | 11                    | 1.1         | 1.8              | 0.0        | 6.1        |
| July         | 11                    | 0.5         | 1.1              | 0.0        | 3.3        |
| August       | 11                    | 1.2         | 1.7              | 0.0        | 5.1        |
| September    | 11                    | 0.5         | 0.9              | 0.0        | 2.7        |
| October      | 11                    | 4.7         | 12.7             | 0.0        | 43.0       |
| November     | 11                    | 58.4        | 47.2             | 0.0        | 125.0      |
| December     | 11                    | 202.1       | 87.0             | 97.3       | 390.1      |

| Month     | # Observations | Mean  | Std. Dev. | Min   | Max   |
|-----------|----------------|-------|-----------|-------|-------|
| January   | 10             | 207.2 | 53.8      | 112.8 | 268.9 |
| February  | 10             | 116.1 | 42.5      | 28.9  | 188.4 |
| March     | 10             | 156.1 | 44.7      | 95.2  | 235.2 |
| April     | 10             | 73.4  | 28.7      | 31.4  | 114.5 |
| May       | 10             | 27.7  | 30.5      | 0.0   | 100.2 |
| June      | 10             | 3.0   | 4.1       | 0.0   | 12.3  |
| July      | 10             | 0.5   | 1.6       | 0.0   | 5.0   |
| August    | 10             | 2.6   | 7.8       | 0.0   | 24.9  |
| September | 10             | 2.8   | 6.6       | 0.0   | 20.5  |
| October   | 10             | 2.9   | 4.5       | 0.0   | 12.4  |
| November  | 10             | 100.6 | 69.5      | 14.7  | 220.1 |
| December  | 10             | 211.5 | 62.1      | 144.6 | 305.0 |

| Month     | # Observations | Mean  | Std. Dev. | Min   | Max   |
|-----------|----------------|-------|-----------|-------|-------|
| January   | 11             | 166.9 | 47.7      | 100.3 | 257.8 |
| February  | 11             | 133.7 | 58.6      | 51.8  | 227.0 |
| March     | 11             | 161.0 | 64.1      | 76.1  | 289.7 |
| April     | 11             | 101.2 | 41.7      | 30.2  | 163.7 |
| May       | 11             | 32.6  | 40.3      | 0.0   | 117.1 |
| June      | 11             | 2.5   | 4.9       | 0.0   | 13.4  |
| July      | 11             | 2.5   | 8.4       | 0.0   | 27.7  |
| August    | 11             | 1.3   | 2.7       | 0.0   | 8.5   |
| September | 11             | 5.2   | 11.0      | 0.0   | 36.3  |
| October   | 11             | 21.6  | 21.2      | 0.0   | 66.3  |
| November  | 11             | 131.5 | 94.6      | 34.6  | 311.0 |
| December  | 11             | 207.1 | 112.0     | 46.0  | 473.9 |

| Month     | # Observations | Mean  | Std. Dev. | Min  | Max   |
|-----------|----------------|-------|-----------|------|-------|
| January   | 11             | 28.2  | 44.0      | 0.0  | 148.0 |
| February  | 11             | 29.4  | 31.9      | 0.0  | 82.4  |
| March     | 11             | 75.0  | 56.1      | 6.1  | 209.8 |
| April     | 11             | 196.4 | 69.6      | 43.2 | 312.6 |
| May       | 11             | 215.2 | 141.5     | 46.2 | 584.4 |
| June      | 11             | 102.0 | 74.9      | 16.7 | 266.1 |
| July      | 11             | 45.8  | 29.2      | 17.1 | 106.8 |
| August    | 11             | 68.9  | 48.1      | 22.0 | 149.2 |
| September | 11             | 43.5  | 44.8      | 7.2  | 168.9 |
| October   | 11             | 110.7 | 72.4      | 24.3 | 214.6 |
| November  | 11             | 108.9 | 46.9      | 57.9 | 202.9 |
| December  | 11             | 65.3  | 62.1      | 3.7  | 159.2 |

| <b>Month</b> | <b># Observations</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|--------------|-----------------------|-------------|------------------|------------|------------|
| January      | 11                    | 83.7        | 58.7             | 1.4        | 184.6      |
| February     | 11                    | 63.4        | 81.0             | 0.0        | 257.6      |
| March        | 11                    | 183.8       | 99.0             | 44.7       | 387.6      |
| April        | 11                    | 421.1       | 214.8            | 32.4       | 705.4      |
| May          | 11                    | 196.5       | 143.5            | 31.6       | 527.4      |
| June         | 11                    | 81.3        | 63.9             | 19.4       | 195.5      |
| July         | 11                    | 34.4        | 22.8             | 9.3        | 87.6       |
| August       | 11                    | 44.4        | 27.9             | 15.3       | 104.6      |
| September    | 11                    | 26.8        | 23.5             | 2.1        | 77.7       |
| October      | 11                    | 74.4        | 58.9             | 4.1        | 177.3      |
| November     | 11                    | 186.5       | 70.8             | 31.4       | 259.1      |
| December     | 11                    | 157.9       | 86.7             | 63.3       | 362.6      |

## Annex 4: Multivariable Models

### 4.1 Methodological issues

#### Model Specification

Models were run using the most recent survey data available for the indicator of interest. In most cases this is the 2010 survey. Where parasitemia is the outcome of interest, or where parasitemia is an independent variable of interest 2007-08 data were used.

As most of the outcomes of interest are binary, multivariable logistic models were used. These models were adjusted for the survey design (probability of selection) in order to make the findings representative of the entire population of Mainland Tanzania. As information was collected on more than one individual per household, outcome variables fail to meet the criteria of independence necessary for most regression analysis. Thus, in analyses of outcomes in children under five, samples were restricted to the youngest child under five from each household. One other possible solution to this problem of dependent outcomes would be to use General Estimating Equations (GEE); however in STATA 11 these models do not allow for the adjustment of survey design. Another solution would be to use multilevel models without explicit modeling of random variance. The project authors found that these models were problematic due to non-convergence and lengthy processing time; thus the decision to restrict models to one individual per household.

Variables included in each model were determined based on relevant scientific literature. In each model, location of household was included at the zonal level and by urban/rural residence. Most models also included a variable for altitude. These parameters are important in analyses of malaria risk as well as those modeling uptake of malaria interventions that is likely to be influenced by malaria risk. More details on model-specific variables are included below. All statistical analyses were performed using STATA 11 software. Tables of final models are included in Annex 4.2.

#### ITNs

Multivariable models were created to explore factors associated with ITN use in children less than five years of age and in pregnant women. ITN use was modeled as a logistic outcome and models were limited to one child per household (the youngest child under five years of age) in order to eliminate bias due to non-independent outcomes. Covariates were selected based on evidence of associations with ITN use from published literature as well as from results of bivariate models. Covariates included altitude in meters (less than 1000m, 1000+m), zone, urban/rural residence, age (in one year intervals), sex, household wealth quintile, mother's education (none, some primary, primary complete, secondary or more), birth order (first born child or not), and number of household members (fewer than 4 members, 4-5, 6-7, 8-9, 10 or more).

A model was also run to explore associations between variables and ITN use in children under five in households owning at least one ITN. This restriction

allows differentiation between factors related to ITN ownership and those related to use. Aside from the above-mentioned variables, the number of ITNs per household was included in this model (1, 2, 3+).

ITN use was also modeled for pregnant women aged 15-49. Variables included altitude in meters (less than 1000m, 1000+m), zone, urban/rural residence, age (in five year intervals), household wealth quintile, education (none, some primary, primary complete, secondary or more), and number of household members (fewer than 4 members, 4-5, 6-7, 8-9, 10 or more).

A model was also run to explore associations between variables and ITN use in pregnant women in households owning at least one ITN. This restriction allows differentiation between factors related to ITN ownership and those related to use. Aside from the above-mentioned variables, the number of ITNs per household was included in this model (1, 2, 3+).

### **Treatment**

A multivariate logistic model was created to explore relationships between covariates and receipt of prompt and effective treatment of fever in last born children under age five who experienced fever in the two weeks preceding the survey. The definition of prompt and effective treatment changed over the course of the study period of interest as recommended treatments have changed. In 2010, this outcome was defined as treatment with ACT within 24 hours of fever onset. Variables modeled include zone, urban/rural residence, age (in one year groups), sex, household wealth quintile, mother's education (none, some primary, primary complete, secondary or more), and birth order (continuous variable).

Another multivariable model was created to examine factors related to the timing of treatment in those children receiving ACTs. This model included the variables outlined above as well as facility where treatment was sought (government facility, religious or voluntary facility, private, pharmacy, other).

### **IPTp**

A multivariate logistic model was created to explore associations between variables and receipt of at least two doses of SP for prevention of malaria in pregnancy, at least one of which was received during an antenatal care visit, among women who experienced a live birth in the two years prior to the survey (IPTp). Variables were included in the model if bivariate models suggested a possible association or if evidence of an association was documented in the relevant scientific literature. In this case: zone; residence (urban/rural); age (in five year intervals); household wealth quintile; education; parity (first birth, second birth or third +). A second model included month of gestation at time of first ANC visit in addition to the variable specified above.

## **Morbidities**

### *Parasitemia*

Infection with *Plasmodium falciparum* parasites was measured in all children aged 6-59 months who slept in a selected household the night before the survey, where parental permission was granted. Multivariable, logistic regression models were created with covariates including altitude of the household (center of the selected cluster below 1000m or 1000+ meters), zone, residence (urban/rural), household wealth quintile, age group (6-11 months, 12-23, 24-35, 36-47, 48-59), sex, mother's education (none, primary incomplete, primary complete, secondary+), and use of ITN by the child the night before the survey. These models were restricted to the youngest qualifying child from each household in order to avoid problems with dependent outcomes.

### *Anemia*

Severe anemia, defined as less than 8 grams of hemoglobin per deciliter of blood, in the youngest child aged 6-59 months who slept in a selected household the night before the survey was also modeled. Multivariable, logistic regression models of severe anemia included altitude of the household (center of the selected cluster below 1000m or 1000+ meters), zone, residence (urban/rural), household wealth quintile, age group (6-11 months, 12-23, 24-35, 36-47, 48-59), sex, and ITN use the night before the survey as covariates. These models were restricted to the youngest qualifying child from each household in order to avoid problems with dependent outcomes. An additional model restricted to children less than two years of age was also created.

### *Fever*

Fever in children under age five of interviewed mothers was assessed via self-report. The recall period for this indicator is two weeks prior to interview. Multivariable logistic regression models included zone, residence (urban/rural), household wealth quintile, mother's education (none, primary incomplete, primary complete, secondary+), age group (one year categories), and sex as covariates.

## **Mortality**

All-cause mortality rates in children under five is the outcome variable of greatest interest in this report. Calculation of this indicator is detailed above (A.1.6).

Authors of this report considered modeling relationships between malaria interventions and under-five mortality in many ways. Ideally, longitudinal data collection would be used, thereby permitting more robust inference about temporal relationships and causality. In reality, data sources were limited to nationally representative cross-sectional studies, and data from Demographic Surveillance Sites which collect longitudinal data but on a much smaller (and therefore less representative scale). Using birth histories from the TDHS it is possible to model individual survival retrospectively; however, data on the exposures of interest were collected at only a few time points. Ultimately, authors felt that the assumptions necessary to assign meaningful, reliable,

exposure status to an individual for use in a survival model were too great. Analyses are therefore of a descriptive nature with a focus on trends. In addition to simple trends over time, patterns in under-five mortality were compared by regions of varied malaria risk. Parasitemia data from the 2007-08 survey were used to classify regions into high, medium or low risk regions. Regional prevalence of RDT positivity in children of interviewed mothers between the ages of 6 and 59 months was used to create terciles of malaria risk. Changes in all-cause infant and under-five mortality over the study period were compared by parasitemia tercile using survival functions in STATA 11.

### **Potential Biases**

The analyses of malaria-associated morbidities and of child mortality described in this report are restrained by certain limitations. Attributing patterns or changes in morbidity and mortality to malaria interventions such as ITN use is difficult using cross-sectional data. For example, ITN use was only assessed for the night before the survey, leaving less than 24 hours between the measurement of intervention and the measurement of outcomes. This time frame is not biologically relevant for the transmission of malaria. Analyses of mortality by regions of malaria risk are also subject to potential biases. Risk terciles were classified using point prevalence data from 2007-08. These classifications are likely to change over time with changing epidemiological field conditions; thus, risk classification in 2007-08 may not be relevant to the actual conditions for the period from which mortality estimates were derived.

## Annex 4.2: Tables of Multivariable Models

### Factors Associated with Malaria Control Interventions from Demographic and Health Surveys (DHS)

#### A.4.2.1 ITN use by children under five

| ITN Use in Children Under Five 2010*   |                         | OR   | p-value | LCI  | UCI      |
|--|-------------------------|------|---------|------|----------|
| Wealth Quintile  |                         |      |         |      |          |
|  | Quintile 1 (Poorest)    | ref  |         |      |          |
|  | Quintile 2              | 1.25 | 0.126   | 0.94 | 1.65     |
|  | Quintile 3              | 1.04 | 0.757   | 0.80 | 1.37     |
|  | Quintile 4              | 1.33 | 0.089   | 0.96 | 1.85     |
|  | Quintile 5 (Least Poor) | 1.78 | 0.015   | 1.12 | 2.82     |
| Mother's Education   |                         |      |         |      |          |
|  | None                    | ref  |         |      |          |
|  | Primary Incomplete      | 1.12 | 0.441   | 0.84 | 1.48     |
|  | Primary Complete        | 1.35 | 0.01    | 1.07 | 1.69     |
|  | Secondary +             | 1.16 | 0.504   | 0.74 | 1.82     |
| Zone   |                         |      |         |      |          |
|  | Western                 | 2.06 | 0.001   | 1.37 | 3.09     |
|  | Northern                | 1.06 | 0.769   | 0.72 | 1.57     |
|  | Central                 | 1.72 | 0.023   | 1.08 | 2.73     |
|  | Southern Highlands      | ref  |         |      |          |
|  | Lake                    | 3.39 | <0.0005 | 2.27 | 5.04     |
|  | Eastern                 | 0.90 | 0.629   | 0.58 | 1.38     |
|  | Southern                | 2.23 | <0.0005 | 1.56 | 3.19     |
| Parity   |                         |      |         |      |          |
|  | 1                       | ref  |         |      |          |
|  | > 1                     | 1.44 | <0.0005 | 1.19 | 1.74     |
| Household Size   |                         |      |         |      |          |
|  | <4                      | ref  |         |      |          |
|  | 4 or 5                  | 0.84 | 0.256   | 0.63 | 1.13     |
|  | 6 or 7                  | 0.58 | 0.001   | 0.43 | 0.79     |
|  | 8 or 9                  | 0.59 | 0.003   | 0.41 | 0.84     |
|  | 10+                     | 0.49 | <0.0005 | 0.34 | 0.70     |
| Weighted Sample Size   |                         |      |         |      | 4949     |
| Design df  |                         |      |         |      | 364      |
| F (26, 334)  |                         |      |         |      | 4.58     |
| p>F  |                         |      |         |      | <0.00005 |
| *Controlling for age, sex and residence, restricted to youngest child under five from a household. |                         |      |         |      |          |

| ITN Use in Children Under Five from Households with at Least One ITN 2010*   |      |         |      |          |
|--|------|---------|------|----------|
|  | OR   | p-value | LCI  | UCI      |
| <b>Mother's Education</b>  |      |         |      |          |
| None   | ref  |         |      |          |
| Primary Incomplete   | 1.16 | 0.391   | 0.83 | 1.63     |
| Primary Complete   | 1.41 | 0.013   | 1.08 | 1.85     |
| Secondary +  | 0.94 | 0.823   | 0.55 | 1.60     |
| <b>Zone</b>  |      |         |      |          |
| Western  | 1.98 | 0.016   | 1.13 | 3.47     |
| Northern   | 1.84 | 0.017   | 1.12 | 3.02     |
| Central  | 4.04 | <0.0005 | 2.33 | 7.03     |
| Southern Highlands   | ref  |         |      |          |
| Lake   | 2.94 | <0.0005 | 1.72 | 5.02     |
| Eastern  | 2.90 | <0.0005 | 1.62 | 5.18     |
| Southern   | 2.07 | 0.004   | 1.26 | 3.40     |
| <b>Parity</b>  |      |         |      |          |
| 1  | ref  |         |      |          |
| > 1  | 1.26 | 0.07    | 0.98 | 1.61     |
| <b>Household Size</b>  |      |         |      |          |
| <4   | ref  |         |      |          |
| 4 or 5   | 0.33 | <0.0005 | 0.21 | 0.51     |
| 6 or 7   | 0.18 | <0.0005 | 0.11 | 0.28     |
| 8 or 9   | 0.16 | <0.0005 | 0.09 | 0.27     |
| 10+  | 0.09 | <0.0005 | 0.05 | 0.15     |
| <b>Number of ITNs per household</b>  |      |         |      |          |
| 1  | ref  |         |      |          |
| 2  | 2.53 | <0.0005 | 1.99 | 3.21     |
| 3+   | 5.49 | <0.0005 | 3.94 | 7.64     |
| Weighted Sample Size   |      |         |      | 4150.00  |
| Design df  |      |         |      | 359.00   |
| F (26, 334)  |      |         |      | 9.16     |
| p>F  |      |         |      | <0.00005 |
| *Controlling for age, wealth, sex, residence (urban/rural), restricted to youngest child under five from each household. |      |         |      |          |

### A.4.2.2 ITN use by pregnant women

| ITN Use in Pregnant Women Aged 15-49*                                     |                    |      |         |      |        |
|---|--------------------|------|---------|------|--------|
|   |                    | OR   | p-value | LCI  | UCI    |
| <b>Zone</b>   |                    |      |         |      |        |
|   | Western            | 1.84 | 0.154   | 0.79 | 4.27   |
|   | Northern           | 1.29 | 0.57    | 0.53 | 3.11   |
|   | Central            | 1.41 | 0.416   | 0.62 | 3.22   |
|   | Southern Highlands | ref  |         |      |        |
|   | Lake               | 3.91 | <0.0005 | 1.88 | 8.12   |
|   | Eastern            | 1.40 | 0.458   | 0.57 | 3.46   |
|   | Southern           | 1.36 | 0.476   | 0.58 | 3.17   |
| <b>Age in Years</b>   |                    |      |         |      |        |
|   | 15 to 19           | ref  |         |      |        |
|   | 20 to 24           | 3.29 | <0.0005 | 1.76 | 6.15   |
|   | 25 to 29           | 4.32 | <0.0005 | 2.16 | 8.61   |
|   | 30 to 34           | 2.81 | 0.004   | 1.39 | 5.69   |
|   | 35 to 39           | 3.10 | 0.005   | 1.40 | 6.88   |
|   | 40 to 44           | 1.38 | 0.557   | 0.47 | 4.05   |
|   | 45 to 49           | na   |         |      |        |
| Weighted sample size  |                    |      |         |      | 674    |
| Design df   |                    |      |         |      | 256    |
| F (22, 235)   |                    |      |         |      | 2.24   |
| p>F   |                    |      |         |      | 0.0016 |
| *Controlling for residence, wealth, mother's education and household size |                    |      |         |      |        |

| ITN Use in Pregnant Women Aged 15-49 from Households with at least one ITN* |      |         |      |        |
|---|------|---------|------|--------|
|   | OR   | p-value | LCI  | UCI    |
| <b>Zone</b>   |      |         |      |        |
| Western   | 2.13 | 0.167   | 0.73 | 6.23   |
| Northern  | 2.12 | 0.197   | 0.67 | 6.68   |
| Central   | 3.14 | 0.17    | 0.61 | 16.18  |
| Southern Highlands  | ref  |         |      |        |
| Lake  | 2.49 | 0.081   | 0.89 | 6.92   |
| Eastern   | 2.01 | 0.272   | 0.58 | 7.01   |
| Southern  | 0.92 | 0.894   | 0.27 | 3.15   |
| <b>Age in Years</b>   |      |         |      |        |
| 15 to 19  | ref  |         |      |        |
| 20 to 24  | 2.37 | 0.012   | 1.21 | 4.63   |
| 25 to 29  | 4.12 | 0.001   | 1.78 | 9.57   |
| 30 to 34  | 1.51 | 0.312   | 0.68 | 3.38   |
| 35 to 39  | 2.45 | 0.087   | 0.88 | 6.88   |
| 40 to 44  | 0.80 | 0.774   | 0.18 | 3.62   |
| 45 to 49  |      |         |      |        |
| <b>Household Size</b>   |      |         |      |        |
| <4  | ref  |         |      |        |
| 4 or 5  | 0.31 | 0.018   | 0.12 | 0.82   |
| 6 or 7  | 0.13 | <0.0005 | 0.05 | 0.33   |
| 8 or 9  | 0.14 | 0.002   | 0.04 | 0.47   |
| 10+   | 0.07 | <0.0005 | 0.02 | 0.21   |
| <b>Number of ITNs per hh</b>  |      |         |      |        |
| 1   | ref  |         |      |        |
| 2   | 4.48 | <0.0005 | 2.34 | 8.59   |
| 3+  | 6.78 | <0.0005 | 3.01 | 15.30  |
| Weighted sample size  |      |         |      | 532    |
| Design df   |      |         |      | 213    |
| F (24, 190)   |      |         |      | 2.76   |
| p>F   |      |         |      | 0.0001 |
| *Controlling for residence, wealth, and mother's education                  |      |         |      |        |

### A.4.2.3 Treatment of fever with ACTs within 24 hours of fever onset

| Treatment of Fever with ACTs within 24 hours 2010*   |                    | OR   | p-value | LCI  | UCI    |
|--|--------------------|------|---------|------|--------|
| Zone   |                    |      |         |      |        |
|  | Western            | 1.01 | 0.988   | 0.51 | 1.99   |
|  | Northern           | 1.26 | 0.551   | 0.59 | 2.67   |
|  | Central            | 1.27 | 0.523   | 0.61 | 2.67   |
|  | Southern Highlands | ref  |         |      |        |
|  | Lake               | 1.33 | 0.432   | 0.65 | 2.71   |
|  | Eastern            | 1.54 | 0.246   | 0.74 | 3.22   |
|  | Southern           | 3.74 | 0.001   | 1.78 | 7.85   |
| Residence  |                    |      |         |      |        |
|  | Rural              | ref  |         |      |        |
|  | Urban              | 0.57 | 0.056   | 0.32 | 1.01   |
| Age in Months  |                    |      |         |      |        |
|  | 0 to 11            | ref  |         |      |        |
|  | 12 to 23           | 1.52 | 0.036   | 1.03 | 2.24   |
|  | 24 to 35           | 2.23 | 0.001   | 1.39 | 3.57   |
|  | 36 to 47           | 2.84 | <0.0005 | 1.69 | 4.75   |
|  | 48 to 59           | 1.70 | 0.085   | 0.93 | 3.10   |
| Sex  |                    |      |         |      |        |
|  | Female             | ref  |         |      |        |
|  | Male               | 1.35 | 0.059   | 0.99 | 1.83   |
| Weighted sample size   |                    |      |         |      | 1382   |
| Design df  |                    |      |         |      | 319    |
| F(23, 297)   |                    |      |         |      | 2.18   |
| p>F  |                    |      |         |      | 0.0017 |
| *Controlling for wealth quintile, mother's education and birth order and restricted to youngest child under five per household |                    |      |         |      |        |

| Treatment of Fever within 24 hours in children receiving ACTs 2010*   |                    |      |         |      |        |
|---|--------------------|------|---------|------|--------|
|   |                    | OR   | p-value | LCI  | UCI    |
| Zone  |                    |      |         |      |        |
|   | Western            | 0.99 | 0.98    | 0.45 | 2.17   |
|   | Northern           | 3.24 | 0.03    | 1.12 | 9.36   |
|   | Central            | 1.60 | 0.31    | 0.64 | 4.03   |
|   | Southern Highlands | ref  |         |      |        |
|   | Lake               | 1.34 | 0.5     | 0.57 | 3.15   |
|   | Eastern            | 2.61 | 0.06    | 0.96 | 7.10   |
|   | Southern           | 6.89 | 0.003   | 1.92 | 24.77  |
| Age in Months   |                    |      |         |      |        |
|   | 0 to 11            | ref  |         |      |        |
|   | 12 to 23           | 1.32 | 0.45    | 0.65 | 2.69   |
|   | 24 to 35           | 1.54 | 0.22    | 0.77 | 3.10   |
|   | 36 to 47           | 2.83 | 0.04    | 1.05 | 7.60   |
|   | 48 to 59           | 1.18 | 0.72    | 0.47 | 2.94   |
| Weighted sample size  |                    |      |         |      | 524    |
| Design df   |                    |      |         |      | 204    |
| F(26, 179)  |                    |      |         |      | 1.18   |
| p>F   |                    |      |         |      | 0.2605 |
| *Controlling for residence, wealth, sex, mother's education, birth order and source of treatment and restricting to youngest child under five per household |                    |      |         |      |        |

### A.4.2.4 IPTp (Two or more doses, 2010)

|                                     |                    | IPTp2 in Pregnant Women aged 15-49, 2010* |         |      |        |         |         |      |         |
|-------------------------------------|--------------------|---|---------|------|--------|---------|---------|------|---------|
|                                     |                    | MODEL 1                                   |         |      |        | MODEL 2 |         |      |         |
|                                     |                    | OR  | p-value | LCI  | UCI    | OR      | p-value | LCI  | UCI     |
| <b>Zone</b>                         |                    |   |         |      |        |         |         |      |         |
|                                     | Western            | 1.26                                      | 0.306   | 0.81 | 1.96   | 1.26    | 0.293   | 0.82 | 1.94    |
|                                     | Northern           | 1.92                                      | 0.004   | 1.23 | 2.99   | 1.91    | 0.004   | 1.23 | 2.96    |
|                                     | Central            | 1.70                                      | 0.041   | 1.02 | 2.83   | 1.71    | 0.037   | 1.03 | 2.83    |
|                                     | Southern Highlands |   |         |      |        |         |         |      |         |
|                                     | Lake               | 1.66                                      | 0.026   | 1.06 | 2.60   | 1.67    | 0.022   | 1.08 | 2.58    |
|                                     | Eastern            | 1.41                                      | 0.176   | 0.86 | 2.30   | 1.33    | 0.243   | 0.82 | 2.16    |
|                                     | Southern           | 2.08                                      | 0.001   | 1.33 | 3.26   | 1.91    | 0.004   | 1.24 | 2.94    |
| <b>Age in Years</b>                 |                    |   |         |      |        |         |         |      |         |
|                                     | 15 to 19           | ref                                       |         |      |        |         |         |      |         |
|                                     | 20 to 24           | 1.60                                      | 0.01    | 1.12 | 2.30   | 1.52    | 0.026   | 1.05 | 2.20    |
|                                     | 25 to 29           | 2.12                                      | 0.002   | 1.31 | 3.44   | 1.94    | 0.008   | 1.19 | 3.17    |
|                                     | 30 to 34           | 2.93                                      | 0       | 1.82 | 4.71   | 2.76    | 0       | 1.71 | 4.48    |
|                                     | 35 to 39           | 2.18                                      | 0.002   | 1.33 | 3.55   | 2.01    | 0.005   | 1.23 | 3.29    |
|                                     | 40 to 44           | 2.29                                      | 0.009   | 1.24 | 4.23   | 2.17    | 0.014   | 1.17 | 4.04    |
|                                     | 45 to 49           | 2.59                                      | 0.053   | 0.99 | 6.78   | 2.48    | 0.078   | 0.90 | 6.84    |
| <b>Education</b>                    |                    |   |         |      |        |         |         |      |         |
|                                     | None               | ref                                       |         |      |        |         |         |      |         |
|                                     | Primary Incomplete | 1.13                                      | 0.496   | 0.80 | 1.60   | 1.09    | 0.626   | 0.77 | 1.55    |
|                                     | Primary Complete   | 1.19                                      | 0.179   | 0.92 | 1.55   | 1.13    | 0.35    | 0.87 | 1.47    |
|                                     | Secondary +        | 1.83                                      | 0.026   | 1.07 | 3.10   | 1.75    | 0.042   | 1.02 | 2.99    |
| <b>Parity</b>                       |                    |   |         |      |        |         |         |      |         |
|                                     | 1                  | ref                                       |         |      |        |         |         |      |         |
|                                     | 2                  | 0.63                                      | 0.012   | 0.45 | 0.90   | 0.63    | 0.012   | 0.44 | 0.90    |
|                                     | 3+                 | 0.57                                      | 0.003   | 0.39 | 0.83   | 0.61    | 0.013   | 0.42 | 0.90    |
| <b>Month Gestation of ANC Visit</b> |                    |   |         |      |        |         |         |      |         |
|                                     | <3                 |   |         |      |        |         |         |      |         |
|                                     | 4                  |   |         |      |        | 0.76    | 0.123   | 0.54 | 1.08    |
|                                     | 5                  |   |         |      |        | 0.77    | 0.12    | 0.56 | 1.07    |
|                                     | 6                  |   |         |      |        | 0.78    | 0.136   | 0.56 | 1.08    |
|                                     | 7+                 |   |         |      |        | 0.35    | <0.0005 | 0.23 | 0.54    |
| <b>Weighted n</b>                   |                    |   |         |      | 3105   |         |         |      | 3105    |
| <b>Design DF</b>                    |                    |   |         |      | 360    |         |         |      | 360     |
| <b>F</b>                            |                    |   |         |      | 2.62   |         |         |      | 3.15    |
| <b>p&gt;F</b>                       |                    |   |         |      | 0.0001 |         |         |      | <0.0005 |

\*Controlling for residence and wealth

Model 2 includes the variables in model 1 plus the month of gestation at the time of the first ANC visit.

#### A.4.2.5 Malaria parasitemia in children 6-59 months, 2007/8

| Parasitemia in Children 6-59 months 2007*   |                         |      |         |      |          |
|---|-------------------------|------|---------|------|----------|
|   |                         | OR   | p-value | LCI  | UCI      |
| Altitude  |                         |      |         |      |          |
|   | < 1000m                 | ref  |         |      |          |
|   | 1000-1199m              | 0.43 | <0.0005 | 0.27 | 0.68     |
| Zone  |                         |      |         |      |          |
|   | Western                 | 4.96 | <0.0005 | 2.52 | 9.78     |
|   | Northern                | 0.69 | 0.406   | 0.28 | 1.67     |
|   | Central                 | 2.02 | 0.185   | 0.71 | 5.69     |
|   | Southern Highlands      | ref  |         |      |          |
|   | Lake                    | 9.86 | <0.0005 | 4.71 | 20.62    |
|   | Eastern                 | 2.05 | 0.097   | 0.88 | 4.78     |
|   | Southern                | 3.67 | <0.0005 | 1.78 | 7.57     |
| Wealth Quintile   |                         |      |         |      |          |
|   | Quintile 1 (Poorest)    | ref  |         |      |          |
|   | Quintile 2              | 1.12 | 0.515   | 0.79 | 1.58     |
|   | Quintile 3              | 0.85 | 0.41    | 0.58 | 1.25     |
|   | Quintile 4              | 0.64 | 0.077   | 0.39 | 1.05     |
|   | Quintile 5 (Least Poor) | 0.18 | <0.0005 | 0.07 | 0.45     |
| Age in Months   |                         |      |         |      |          |
|   | 0 to 11                 | ref  |         |      |          |
|   | 12 to 23                | 1.72 | 0.007   | 1.16 | 2.55     |
|   | 24 to 35                | 3.13 | <0.0005 | 2.17 | 4.51     |
|   | 36 to 47                | 3.46 | <0.0005 | 2.20 | 5.47     |
|   | 48 to 59                | 3.84 | <0.0005 | 2.46 | 6.00     |
| Mother Education  |                         |      |         |      |          |
|   | None                    | ref  |         |      |          |
|   | Primary Incomplete      | 0.74 | 0.092   | 0.53 | 1.05     |
|   | Primary Complete        | 0.95 | 0.753   | 0.71 | 1.28     |
|   | Secondary +             | 0.47 | 0.175   | 0.16 | 1.40     |
| Used ITN previous night   |                         |      |         |      |          |
|   | No                      | ref  |         |      |          |
|   | Yes                     | 1.35 | 0.035   | 1.02 | 1.79     |
| Weighted Sample Size  |                         |      |         |      |          |
|   |                         |      |         |      | 4183     |
| Design df   |                         |      |         |      |          |
|   |                         |      |         |      | 360      |
| F(18,347)   |                         |      |         |      |          |
|   |                         |      |         |      | 12.44    |
| Prob > F  |                         |      |         |      |          |
|   |                         |      |         |      | <0.00005 |
| *Controlling for residence and sex and restricting to youngest child 6-59 months per household. |                         |      |         |      |          |

### A.4.2.6 Anemia in children 6-59 months, 2010

| Anemia (<8g/dL) in Children 6-59 months 2010*   |                         |      |         |      |          |
|---|-------------------------|------|---------|------|----------|
|   |                         | OR   | p-value | LCI  | UCI      |
| Zone  |                         |      |         |      |          |
|   | Western                 | 2.34 | 0.036   | 1.06 | 5.18     |
|   | Northern                | 2.07 | 0.082   | 0.91 | 4.70     |
|   | Central                 | 1.09 | 0.849   | 0.43 | 2.76     |
|   | Southern Highlands      | ref  |         |      |          |
|   | Lake                    | 2.58 | 0.009   | 1.27 | 5.24     |
|   | Eastern                 | 1.42 | 0.478   | 0.54 | 3.72     |
|   | Southern                | 1.00 | 0.993   | 0.44 | 2.31     |
| Wealth Quintile   |                         |      |         |      |          |
|   | Quintile 1 (Poorest)    | ref  |         |      |          |
|   | Quintile 2              | 0.63 | 0.059   | 0.39 | 1.02     |
|   | Quintile 3              | 0.69 | 0.115   | 0.44 | 1.09     |
|   | Quintile 4              | 0.61 | 0.136   | 0.32 | 1.17     |
|   | Quintile 5 (Least Poor) | 0.52 | 0.071   | 0.25 | 1.06     |
| Age in Months   |                         |      |         |      |          |
|   | 0 to 11                 | ref  |         |      |          |
|   | 12 to 23                | 0.82 | 0.37    | 0.54 | 1.26     |
|   | 24 to 35                | 0.50 | 0.013   | 0.29 | 0.86     |
|   | 36 to 47                | 0.59 | 0.049   | 0.35 | 1.00     |
|   | 48 to 59                | 0.24 | <0.0005 | 0.11 | 0.51     |
| Sex   |                         |      |         |      |          |
|   | Female                  | ref  |         |      |          |
|   | Male                    | 1.42 | 0.028   | 1.04 | 1.95     |
| Weighted Sample Size  |                         |      |         |      | 4192     |
| Design df   |                         |      |         |      | 364      |
| F(18,347)   |                         |      |         |      | 3.04     |
| Prob > F  |                         |      |         |      | <0.00005 |
| *Controlling for altitude, urban/rural residence and ITN use and restricting to youngest child under five per household |                         |      |         |      |          |

### A.4.2.7 Anemia in children 6-23 months, 2010

| Anemia in Children 6-23 months 2010*  |                    |      |         |      |      |
|---|--------------------|------|---------|------|------|
|   |                    | OR   | p-value | LCI  | UCI  |
| Altitude  | < 1000m            | ref  |         |      |      |
|   | 1000+m             | 0.37 | 0.033   | 0.15 | 0.92 |
| Zone  | Western            | 2.57 | 0.031   | 1.09 | 6.04 |
|   | Northern           | 1.05 | 0.914   | 0.40 | 2.79 |
|   | Central            | 0.80 | 0.643   | 0.30 | 2.08 |
|   | Southern Highlands | ref  |         |      |      |
|   | Lake               | 1.91 | 0.125   | 0.84 | 4.34 |
|   | Eastern            | 1.01 | 0.982   | 0.34 | 3.05 |
|   | Southern           | 0.54 | 0.262   | 0.19 | 1.58 |
|   |                    |      |         |      |      |
| Sex   | Female             | ref  |         |      |      |
|   | Male               | 1.40 | 0.094   | 0.94 | 2.08 |
| Weighted Sample Size  |                    |      |         |      | 1979 |
| Design df   |                    |      |         |      | 350  |
| F(15,336)   |                    |      |         |      | 1.14 |
| Prob > F  |                    |      |         |      | 0.32 |
| *Controlling for residence, wealth, age, and ITN use and restricting to youngest child under 23 months per household. |                    |      |         |      |      |

### A.4.2.8 Fever in previous two weeks, children aged 0-59 months, 2010

| Fever in Previous Two weeks in Children Under Five 2010*   |                         |      |         |      |          |
|--|-------------------------|------|---------|------|----------|
|  |                         | OR   | p-value | LCI  | UCI      |
| Zone   |                         |      |         |      |          |
|  | Western                 | 1.74 | 0.007   | 1.16 | 2.60     |
|  | Northern                | 1.65 | 0.004   | 1.18 | 2.32     |
|  | Central                 | 2.72 | <0.0005 | 1.79 | 4.12     |
|  | Southern Highlands      | ref  |         |      |          |
|  | Lake                    | 2.61 | <0.0005 | 1.87 | 3.64     |
|  | Eastern                 | 2.42 | <0.0005 | 1.68 | 3.48     |
|  | Southern                | 1.64 | 0.012   | 1.12 | 2.40     |
| Residence  |                         |      |         |      |          |
|  | Rural                   | ref  |         |      |          |
|  | Urban                   | 1.69 | 0.007   | 1.16 | 2.48     |
| Wealth Quintile  |                         |      |         |      |          |
|  | Quintile 1 (Poorest)    | ref  |         |      |          |
|  | Quintile 2              | 0.76 | 0.015   | 0.60 | 0.95     |
|  | Quintile 3              | 0.82 | 0.06    | 0.66 | 1.01     |
|  | Quintile 4              | 1.14 | 0.285   | 0.90 | 1.43     |
|  | Quintile 5 (Least Poor) | 0.62 | 0.034   | 0.40 | 0.96     |
| Age in Months  |                         |      |         |      |          |
|  | 0 to 11                 | ref  |         |      |          |
|  | 12 to 23                | 1.47 | 0.001   | 1.18 | 1.82     |
|  | 24 to 35                | 1.33 | 0.016   | 1.05 | 1.68     |
|  | 36 to 47                | 1.15 | 0.351   | 0.86 | 1.52     |
|  | 48 to 59                | 0.90 | 0.435   | 0.68 | 1.18     |
| Weighted Sample Size   |                         |      |         |      | 5312     |
| Design df  |                         |      |         |      | 364      |
| F (20,345)   |                         |      |         |      | 5.10     |
| Prob > F   |                         |      |         |      | <0.00005 |
| *Controlling for sex, mother's education and ITN use and restricting to the youngest child under five per household. |                         |      |         |      |          |