## Example 1: Use of Existing Long-Lasting Insecticidal Nets (LLINs)

**Table 3.5  Use of existing LLINs**  **1**

Percentage of long-lasting insecticidal nets (LLINs) that were used by anyone the night before the survey, by background characteristics, Kenya 2015

| Background characteristic **3** | Percentage of existing LLINs used last night **2** | Number of LLINs |
|---|---|---|
| **Residence** | | |
| Urban | 74.3 | 3,052 |
| Rural | 75.7 | 5,082 |
| **Malaria endemicity** | | |
| Highland epidemic | 72.4 | 2,041 |
| Lake endemic | 78.7 | 2,343 |
| Coast endemic | 82.0 | 612 |
| Semi-arid, seasonal | 82.7 | 951 |
| Low risk | 69.0 | 2,188 |
| **Wealth quintile** | | |
| Lowest | 76.8 | 1,010 |
| Second | 76.6 | 1,493 |
| Middle | 76.9 | 1,682 |
| Fourth | 77.0 | 1,711 |
| Highest | 70.9 | 2,237 |
| Total **4** | 75.2 | 8,134 |

**5**

**Step 1:**  Read the title and subtitle. They tell you the topic and the specific population group being described. In this case, the table is about the use of existing long-lasting insecticidal nets (LLIN).

**Step 2:**  Scan the column headings—highlighted in green in the table above. They describe how the information is categorized. In this table, there are two columns. The first column presents the percentage of existing LLINs that were used the night before the survey. The second column lists the denominators, or the number of LLINs in each category.

**Step 3:**  Scan the row headings—the first vertical column highlighted in blue in the table above. These show the different ways the data are divided into categories based on background characteristics. In this case, the table presents use of LLINs by urban-rural residence, malaria endemicity zone, and wealth quintile. Most of the tables in the KMIS report will be divided into these same categories.

**Step 4:**  Look at the row at the bottom of the table highlighted in red. This percentage represents the total percentage of LLINs that were used the night before the survey. In this case, 75.2% of LLINs were used the night before the survey.

**Step 5:**  To find out what percentage of LLINs in households in the lowest wealth quintile were used the night before the survey, draw two imaginary lines, as shown on the table. This shows that 76.8% of LLINs in households in the lowest wealth quintile were used the night before the survey.

**Practice**: **Use the table above to answer the following questions (answers are upside down, below):**

a) Are existing LLINs in urban or rural households more likely to be used?
b) In which malaria endemicity zone is the use of existing LLINs the highest?
c) Which wealth quintile has the highest number of existing LLINs in households?

a) Rural households—75.7% of LLINs in rural households were used the night before the survey, compared to 74.3% of LLINs in urban areas.
b) Semi-arid, seasonal—82.7%.
c) Households in the highest wealth quintile—2,237 LLINs.

# Example 2: Knowledge of ACT/AL
## Comparing and Understanding Patterns

**Table 5.5 Knowledge of ACT/AL** **1**

Percent distribution of women age 15-49 by specific medicine mentioned as the recommended treatment for malaria, and the percentage of women who have seen or heard information about ACT/AL, Kenya 2015

| Background characteristic **3** | ACT/AL **2** | SP/ Fansidar | Chloro- quine | Amodia- quine | Other | Don't know | Total | Have heard or seen information about ACT/AL | Number of women |
|---|---|---|---|---|---|---|---|---|---|
| **Residence** | | | | | | | | | |
| Urban | 39.4 | 6.2 | 1.5 | 2.6 | 10.4 | 39.9 | 100.0 | 50.9 | 2,178 |
| Rural | 43.4 | 6.3 | 2.4 | 0.8 | 7.7 | 39.4 | 100.0 | 54.1 | 3,216 |
| **Malaria endemicity** | | | | | | | | | |
| Highland epidemic | 56.1 | 5.4 | 1.3 | 0.4 | 4.1 | 32.8 | 100.0 | 60.8 | 1,042 |
| Lake endemic | 71.9 | 2.0 | 0.9 | 0.4 | 7.9 | 16.9 | 100.0 | 71.1 | 1,038 |
| Coast endemic | 37.9 | 3.2 | 0.6 | 0.1 | 10.1 | 48.2 | 100.0 | 44.9 | 379 |
| Semi-arid, seasonal | 29.9 | 8.5 | 4.0 | 1.3 | 5.3 | 50.9 | 100.0 | 48.3 | 940 |
| Low risk | 25.0 | 8.5 | 2.3 | 3.2 | 13.1 | 47.9 | 100.0 | 42.7 | 1,995 |
| **Education** | | | | | | | | | |
| No education | 26.3 | 4.6 | 0.9 | 0.5 | 5.8 | 62.0 | 100.0 | 27.9 | 419 |
| Primary incomplete | 38.5 | 3.7 | 0.9 | 2.3 | 8.0 | 46.6 | 100.0 | 51.3 | 672 |
| Primary complete | 43.7 | 7.3 | 1.7 | 1.7 | 9.0 | 36.5 | 100.0 | 55.8 | 1,812 |
| Secondary+ | 43.9 | 6.5 | 2.7 | 1.5 | 9.3 | 36.1 | 100.0 | 55.3 | 2,491 |
| **Wealth quintile** | | | | | | | | | |
| Lowest | 32.5 | 4.5 | 2.0 | 0.3 | 5.0 | 55.7 | 100.0 | 42.4 | 855 |
| Second | 43.6 | 4.9 | 2.3 | 1.3 | 9.5 | 38.4 | 100.0 | 53.2 | 969 |
| Middle | 47.6 | 8.2 | 2.4 | 0.7 | 8.7 | 32.3 | 100.0 | 56.7 | 1,000 |
| Fourth | 44.9 | 6.9 | 1.7 | 2.4 | 9.1 | 35.0 | 100.0 | 54.2 | 1,141 |
| Highest | 39.6 | 6.3 | 1.9 | 2.4 | 10.3 | 39.4 | 100.0 | 55.0 | 1,430 |
| Total | 41.8 **4** | 6.3 | 2.0 | 1.6 | 8.8 | 39.6 | 100.0 | 52.8 | 5,394 |

ACT = Artemisinin-based combination therapy; AL = artemether lumefantrine

**Step 1**: Read the title and subtitle. In this case, the table presents knowledge of artemisinin-based combination therapy (ACT)/ artemether lumenfantrine (AL) in Kenya among women age 15-49.

**Step 2**: Identify the information presented in the table—highlighted in green in the table above. In this table, the first six columns are women's responses to the question, "What is the recommended treatment for malaria?" This table is a percent distribution, which means that women could only provide one answer to the question. As such, the seventh column labeled "Total" shows that the total for each row of the previous six columns adds up to 100 percent. The eighth column shows women age 15-49 who have heard or seen information about ACT/AL. The ninth column is the denominators, or the number of women in each category.

**Step 3**: Look at the row headings to identify the background characteristics. In this table, knowledge of ACT/AL is presented by urban-rural residence, malaria endemicity zone, educational level, and wealth quintile.

**Step 4:** Look at the row in the bottom of the table to determine the total percentage of women age 15-49 who stated that ACT/AL is the recommended treatment for malaria. It's 41.8%.

**Step 5:** In Kenya, 41.8% of women age 15-49 reported that ACT/AL is the recommended treatment for malaria, but a closer look at the table shows how this knowledge varies throughout Kenya. To gain a better understanding of differences in this knowledge, consider the following questions:

- Is knowledge that ACT/AL is the recommended treatment for malaria more common in urban or rural areas? This knowledge is slightly more common in rural areas (43.4%) than in urban areas (39.4%). However, this difference is very small.
- What are the lowest and the highest percentages (range) of knowledge that ACT/AL is the recommended treatment for malaria by malaria endemicity zone? Just 25.0% of women age 15-49 in the Low risk zone of malaria endemicity reported that ACT/AL is the recommended treatment for malaria, compared to a high of 71.9% in Lake endemic.
- Look for patterns: Does knowledge that ACT/AL is the recommended treatment for malaria vary by background characteristics? For example, is there a clear pattern in this knowledge by education? By wealth quintile?
- Answers:
    - Knowledge that ACT/AL is the recommended treatment for malaria increases with a woman's level of education. Just 26.3% of women with no education report that ACT/AL is the recommended treatment for malaria, compared to 43.9% of women with secondary or higher education.
    - However, there is no clear pattern in this knowledge by household wealth quintile.
- By looking at patterns by background characteristics, we can see which groups are more in need of interventions to increase knowledge of ACT/AL. Resources are often limited; looking for patterns can help programme planners and policy makers determine how to most effectively use resources.

# Example 3: Use of Mosquito Nets by Pregnant Women
## Minimum Number of Cases Required for Reliable Results

**Table 3.7  Use of mosquito nets by pregnant women**

Percentage of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated) and the percentage who slept under a long-lasting insecticidal net (LLIN); among pregnant women age 15-49 in households with at least one LLIN, the percentage who slept under an LLIN the night before the survey; and, among pregnant women in households with at least one net for every two people, the percentage who slept under an LLIN the night before the survey, by background characteristics, Kenya 2015

| Background characteristic | Among pregnant women age 15-49 in all households | | | Among pregnant women age 15-49 in households with at least one LLIN | | Pregnant women living in households with at least one LLIN for every two people | |
|---|---|---|---|---|---|---|---|
| | Percentage who slept under any mosquito net last night | Percentage who slept under an LLIN last night | Number of women | Percentage who slept under an LLIN last night | Number of women | Percentage who slept under an LLIN last night in households with an LLIN for every two people | Number |
| **Residence** | | | | | | | |
| Urban | 61.2 | 59.9 | 130 | 85.6 | 91 | 92.9 | 58 |
| Rural | 56.6 | 56.5 | 205 | 79.4 | 146 | 83.1 | 65 |
| **Malaria endemicity** | | | | | | | |
| Highland epidemic | 61.6 | 61.6 | 63 | 72.7 | 54 | (78.9) | 31 |
| Lake endemic | 78.1 | 77.6 | 73 | 89.5 | 63 | (96.5) | 28 |
| Coast endemic | 83.7 | 83.1 | 27 | 88.9 | 25 | (87.1) | 10 |
| Semi-arid, seasonal | 42.4 | 40.5 | 72 | 68.9 | 42 | * | 13 |
| Low risk | 46.9 | 46.9 | 101 | (88.6) | 53 | * | 40 |
| **Education** | | | | | | | |
| No education | 36.8 | 36.8 | 45 | (88.5) | 19 | * | 4 |
| Primary | 65.6 | 64.4 | 142 | 81.2 | 113 | 85.6 | 48 |
| Secondary | 55.6 | 55.4 | 101 | 77.9 | 72 | (90.6) | 44 |
| More than secondary | (63.2) | (63.2) | 48 | (88.0) | 35 | * | 27 |
| **Wealth quintile** | | | | | | | |
| Lowest | 35.8 | 35.0 | 72 | 75.4 | 33 | * | 12 |
| Second | 64.0 | 64.0 | 72 | 84.1 | 55 | * | 17 |
| Middle | 71.9 | 71.9 | 54 | 79.9 | 48 | (86.3) | 26 |
| Fourth | 53.2 | 51.7 | 53 | (79.3) | 35 | * | 20 |
| Highest | 67.7 | 67.0 | 85 | 85.7 | 66 | (92.0) | 47 |
| Total | 58.4 | 57.8 | 336 | 81.8 | 237 | 87.7 | 123 |

Note: Table is based on women who stayed in the household the night before the interview. Figures in parentheses are based on 25-49 unweighted cases; an asterisk denotes a figure based on fewer than 25 cases that has been suppressed.

**Step 1:** Read the title and subtitle. In this case, the table is about the use of mosquito nets by three separate subgroups: (a) pregnant women age 15-49 in all households, (b) pregnant women age 15-49 living in households with at least one long-lasting insecticidal net (LLIN), and (c) pregnant women age 15-49 living in households with at least one LLIN for every two people.

**Step 2:** Identify the three panels. First, identify the columns that refer to pregnant women age 15-49 in all households (a). Then, isolate the columns that refer to pregnant women age 15-49 living in households with at least one LLIN (b). Finally, locate the columns that refer to pregnant women age 15-49 living in households with at least one LLIN for every two people (c).

**Step 3:** Look at the row headings to identify the background characteristics. In this table, use of mosquito nets by pregnant women is presented by urban-rural residence, malaria endemicity zone, education level, and wealth quintile.

**Step 4:** Find the denominators for each subgroup in the table. How many pregnant women age 15-49 are there in all households? It's 336. How many pregnant women age 15-49 are there in households with at least one LLIN? It's 237. Finally, how many pregnant women age 15-49 are there in households with an LLIN for every two people? It's 123. The number of women in subgroups (b) and (c) are small. When these women are divided by background characteristics, sometimes there are too few cases for the data to be reliable. For example:

• What percentage of pregnant women living in households with at least one LLIN in the fourth wealth quintile slept under an LLIN the night before the survey? 79.3%. This percent is in parentheses because there are 25-49 women (unweighted) in this category. Readers should use this number with caution—it may not be accurate. (For more information on weighted and unweighted numbers, see Example 4.)

• What percentage of pregnant women living in households with an LLIN for every two people in the Semi-arid, seasonal malaria endemicity zone slept under an LLIN the night before the survey? There is no number in this cell—only an asterisk. This is because fewer than 25 pregnant women are in this category. Results for this group are not reported. The subgroup is too small, and therefore the data are not reliable.

**Note:** When parentheses or asterisks are used in a table, the explanation will be noted under the table. If there are no parentheses or asterisks on a table, you can proceed with confidence that enough cases were included in all categories that the data are reliable.

# Example 4: Understanding Sampling Weights in KMIS Tables

A sample is a group of people who have been selected for a survey. In MIS surveys, the sample is designed to represent the national population age 15-49. In addition to national data, most countries want to collect and report data on smaller geographical or administrative areas. However, doing so requires a minimum sample size per area (e.g. about 800 women per area). For the 2015 KMIS, the survey sample is representative of Kenya as a whole, for urban and rural areas, and for 5 geographic zones of malaria endemicity (Highland epidemic; Lake endemic; Coast endemic; Semi-arid, seasonal; and Low risk).

To generate statistics that are representative of the country as a whole and the five geographic zones of malaria endemicity, the number of women surveyed in each malaria endemicity zone should contribute to the size of the total (national) sample in proportion to size of the malaria endemicity zone. However, if some malaria endemicity zones have small populations, then a sample allocated in proportion to each malaria endemicity zone's population may not include sufficient women from each malaria endemicity zone for analysis. To solve this problem, malaria endemicity zones with small populations are oversampled. For example, let's say that you have enough money to interview 5,394 women and want to produce results that are representative of Kenya as a whole and its malaria endemicity zones (as in Table 2.8). However, the total population of Kenya is not evenly distributed among the malaria endemicity zones: some, such as Low risk zone, are heavily populated while others, such as Coast endemic zone are not. Thus, Coast endemic zone must be oversampled.

A sampling statistician determines how many women should be interviewed in each malaria endemicity zone in order to get reliable statistics. The blue column (1) in the table at the right shows the actual number of women interviewed in each malaria endemicity zone. Within the malaria endemicity zones, the number of women interviewed ranges from 755 in Coast endemic to 1,268 in Low risk zone. This number of interviews is sufficient to get reliable results in each zone of malaria endemicity.

**Table 2.8  Background characteristics of respondents**

Percent distribution of women age 15-49 by selected background characteristics, Kenya 2015

| Background characteristic | Women | | |
| --- | --- | --- | --- |
| | 3 Weighted percent | 2 Weighted number | 1 Unweighted number |
| **Malaria endemicity** | | | |
| Highland epidemic | 19.3 | 1,042 | 1,210 |
| Lake endemic | 19.2 | 1,038 | 1,000 |
| Coast endemic | 7.0 | 379 | 755 |
| Semi-arid, seasonal | 17.4 | 940 | 1,161 |
| Low risk | 37.0 | 1,995 | 1,268 |
| Total 15-49 | 100.0 | 5,394 | 5,394 |

With this distribution of interviews, some malaria endemicity zones are overrepresented and some zones are underrepresented. For example, the population in the Coast endemic zone is about 7% of the population in Kenya, while Low risk zone is about 37% of the population in Kenya. But as the blue column shows, the number of women interviewed in Coast endemic accounts for about 14% of the total sample of women interviewed (755/5,394) and the number of women interviewed in the Low risk zone accounts for 24% of the total sample of women interviewed (1,268/5,394). This unweighted distribution of Kenyan women does not accurately represent the population.

In order to get statistics that are representative of Kenya, the distribution of the women in the sample needs to be weighted (or mathematically adjusted) such that it resembles the true distribution in the country. Women from a small malaria endemicity zone, like Coast endemic, should only contribute a small amount to the national total. Women from a large malaria endemicity zone, like Low risk zone should contribute much more. Therefore, DHS statisticians mathematically calculate a "weight" which is used to adjust the number of women from each malaria endemicity zone so that each zone's contribution to the total is proportional to the actual population of the malaria endemicity zone. The numbers in the purple column (2) represent the "weighted" values. The weighted values can be smaller or larger than the unweighted values at the level of malaria endemicity zone. The total national sample size of 5,394 women has not changed after weighting, but the distribution of the women in the malaria endemicity zones has been changed to represent their contribution to the total population size.

How do statisticians weight each category? They take into account the probability that a woman was selected in the sample. If you were to compare the red column (3) to the actual population distribution of Kenya, you would see that women in each malaria endemicity zone are contributing to the total sample with the same weight that they contribute to the population of Kenya. The weighted number of women in the survey now accurately represents the proportion of women who live in Coast endemic zone and the proportion of women who live in Low risk zone.

With sampling and weighting, it is possible to interview enough women to provide reliable statistics at the national level and for malaria endemicity zones. In general, only the weighted numbers are shown in each of the KMIS tables, so don't be surprised if these numbers seem low: they may actually represent a larger number of women interviewed.

REPUBLIC OF KENYA

MINISTRY OF HEALTH