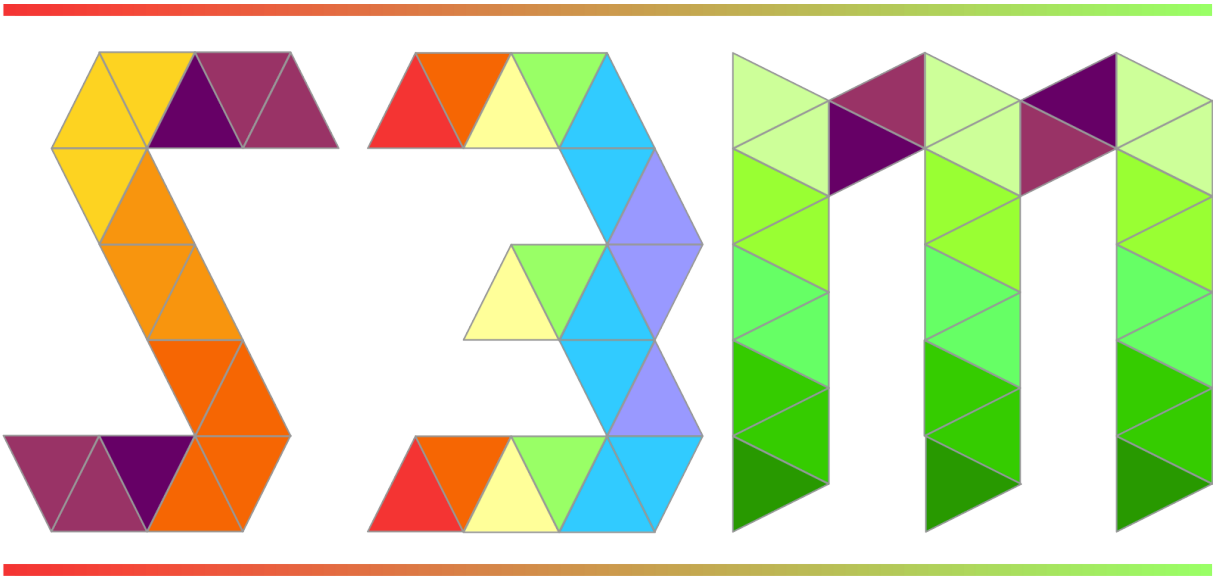
Notes on a design of a simple spatial sampling method (S3M) for assessing coverage of health and nutrition programmes in Liberia

Valid International

2018-06-21

Contents

Simple Spatial Sampling Method (S3M)



Chapter 1

Introduction

The Simple Spatial Survey Method (S3M) was developed from the CSAS coverage survey method as a response to the widespread adoption of community management of acute malnutrition (CMAM) by ministries of health. Large-scale programs need a large-scale survey method and S3M was developed to meet that need.

S3M was designed to :

- Be simple enough for MoH, NGO, and UNO personnel without specialist statistical training to perform.
- Provide a general survey method. S3M can be used to survey and map :
- Need for and coverage of selective-entry programs such as CMAM and TSFP as well as universal programs such as EPI, GMP, GFD (general ration), and "blanket" SFP over wide areas.
- Levels of indicators such as those for IYCF, WASH, and period prevalence / cumulative prevalence of ARI, fever, and diarrhoea over wide areas.

This document concentrates on using S3M to assess the need for and coverage of a variety of selective-entry feeding programs. The indicators discussed in this manual are:

- Therapeutic feeding (OTP and TSFP) programs :
- Prevalence of SAM and coverage of treatment of SAM in children aged between 6 and 59 months.
- Prevalence of MAM and coverage of treatment of MAM in children aged between 6 and 59 months.
- Prevalence of MAM and treatment of MAM and in pregnant and lactating women (PLWs).
- Food-based prevention of malnutrition (FBPM) programs :

- Prevalence of need for and coverage of food-based prevention of malnutrition in younger children at risk of developing MAM and SAM.
- Prevalence of need for and coverage of food-based prevention of malnutrition in pregnant and lactating women (PLWs) at risk of developing MAM and SAM.
- Coverage of screening for all of the above programs.
- Coverage of Behaviour Change Communication (BCC) programs focussing on maternal and child health and nutrition to all principal carers of children (usually their mothers) and all PLWs.

Chapter 2

The survey sample

The survey method described here uses a two-stage sample:

- **First-stage:** We take an even (or near-even) spatial sample of communities from all of the communities in the survey area.
- **Second-stage:** We take a sample of eligible individuals from each of the communities identified in the first stage of sampling.

Two-stage sampling is used in many survey methods. A typical example of a survey method that uses a two- stage sample is the SMART method that is commonly used for nutritional anthropometry surveys.

The main difference between the sample taken in S3M based surveys and in SMART type surveys is that S3M based samples used a spatial sample in the first stage whereas SMART type surveys use a proportional to population size (PPS) sample.

The advantages of using a spatial first stage sample is that such a sample allows us to identify where (and why) coverage is good, and where (and why) coverage is poor. This information is essential to improving program coverage and ensuring equitable access to services.

A spatial sample can be used to produce equivalent results to a traditional proportional to population size (PPS) sample as is used in (e.g.) SMART type surveys using a weighted analysis. This means that a spatial sample can be made to act as a PPS sample. A PPS type sample cannot, however, be made to act as a spatial sample.

Chapter 3

The first stage sample

3.1 Step 1: Find a map

The first step in a S3M survey is to find a map of the survey area. A map showing the locations of all towns and villages in the survey area is essential. Try to find a map showing the locations of all towns and villages in the survey area. You may need to update the map to take into account migration and displacement.

For the coverage survey of 2 counties in Liberia, it will be practical and useful to have:

- A small scale-map (a wide area map but with poor detail) of the entire survey area for each of the 2 counties. If the counties are contiguous (i.e., share borders with each other), the small scale map can be of the two counties together. This map does not need to show the location of all towns and villages in the survey area but it gives a general idea of where the 2 counties are located and main towns and locations and roads. Figure 3.1 is a small scale map of Liberia showing counties, roads and main towns and locations. Figure 3.2 is a small scale map of two counties showing all the districts within the county, roads and main towns and locations.

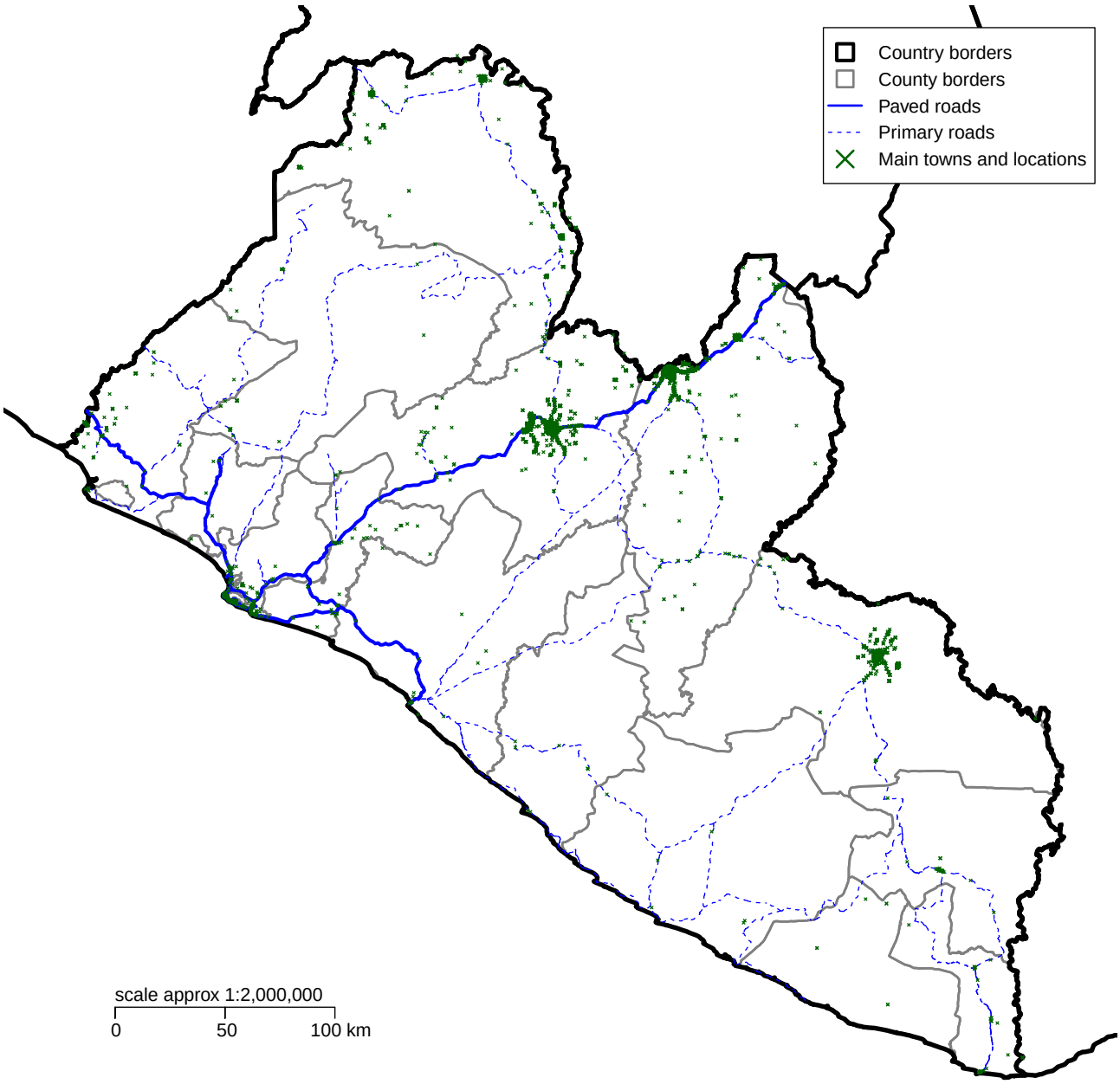


Figure 3.1: Small scale map of Liberia showing counties, roads and points of interest

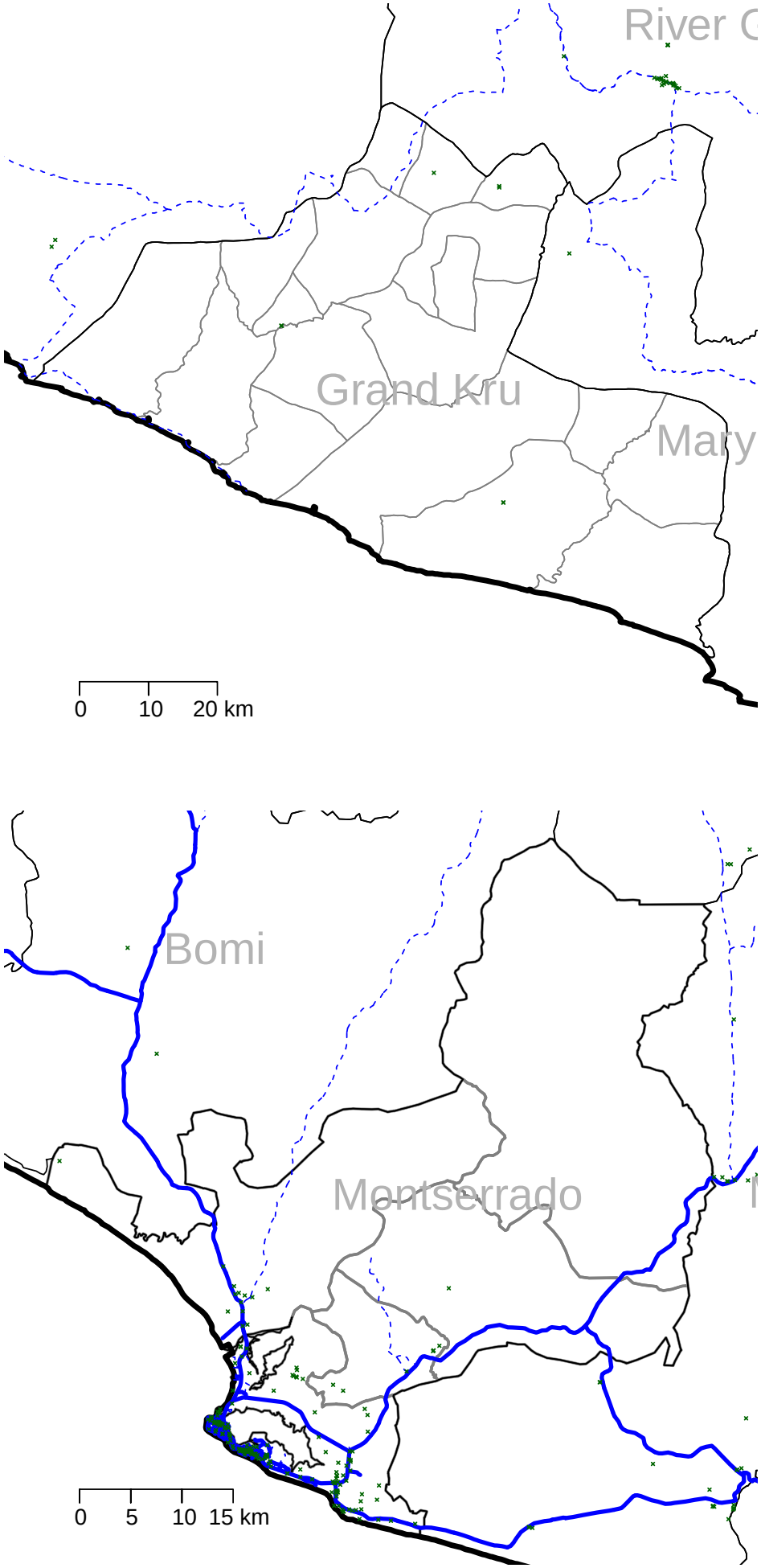


Figure 3.2: Small scale map of two counties in Liberia showing all districts, roads and points of interest

- A collection of larger scale maps (a small area map but with good detail) of each of the selected counties and each of the districts within those counties in Liberia. Figure 3.3 is a large scale map of Montserrado county showing all districts, roads and all settlements. Figure 3.4 is a collection of large scale maps of each of the districts of Montserrado country showing all roads and all settlements.

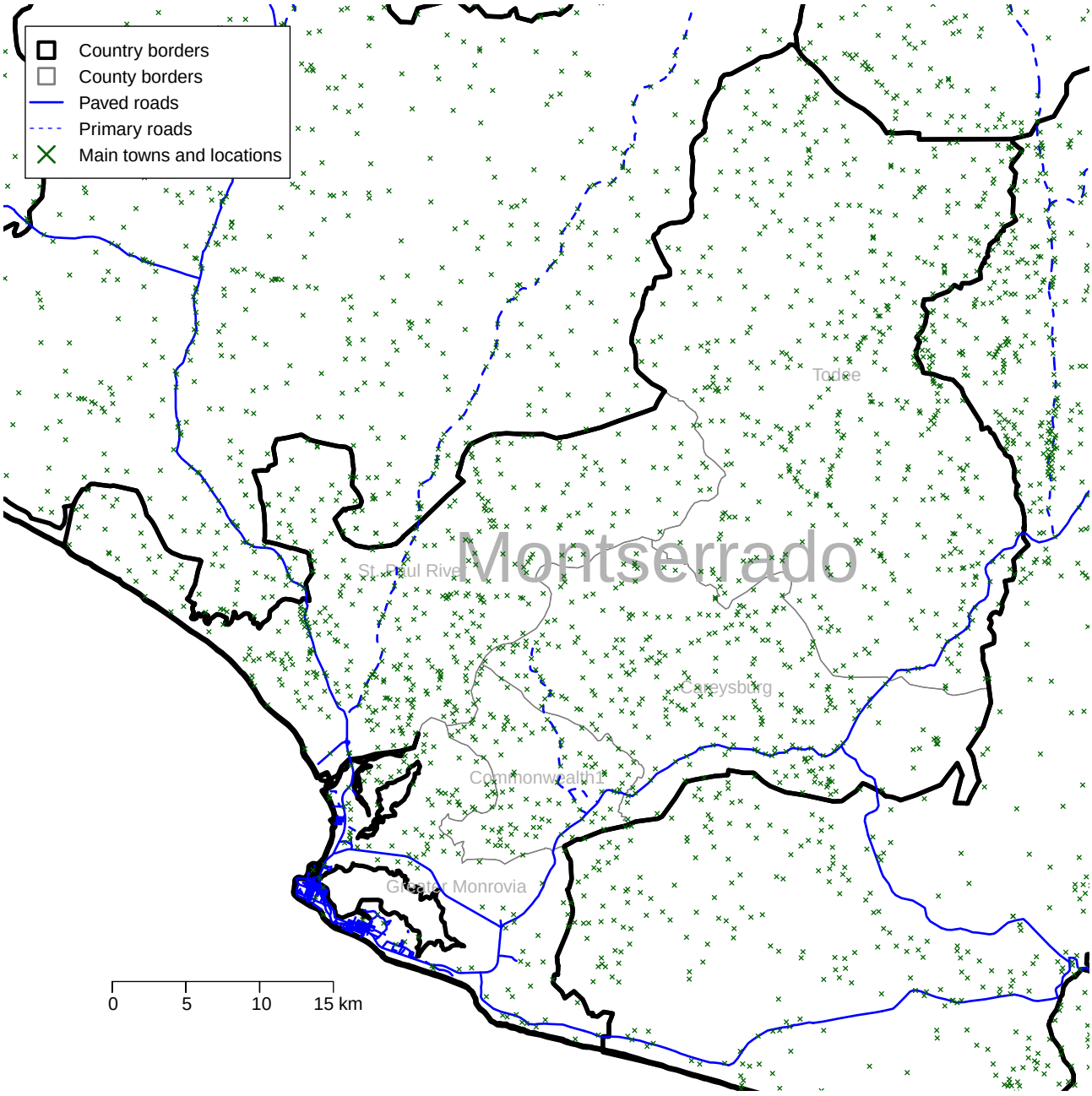


Figure 3.3: Large scale map of Montserrado county in Liberia showing all districts, roads and all settlements (towns, villages)

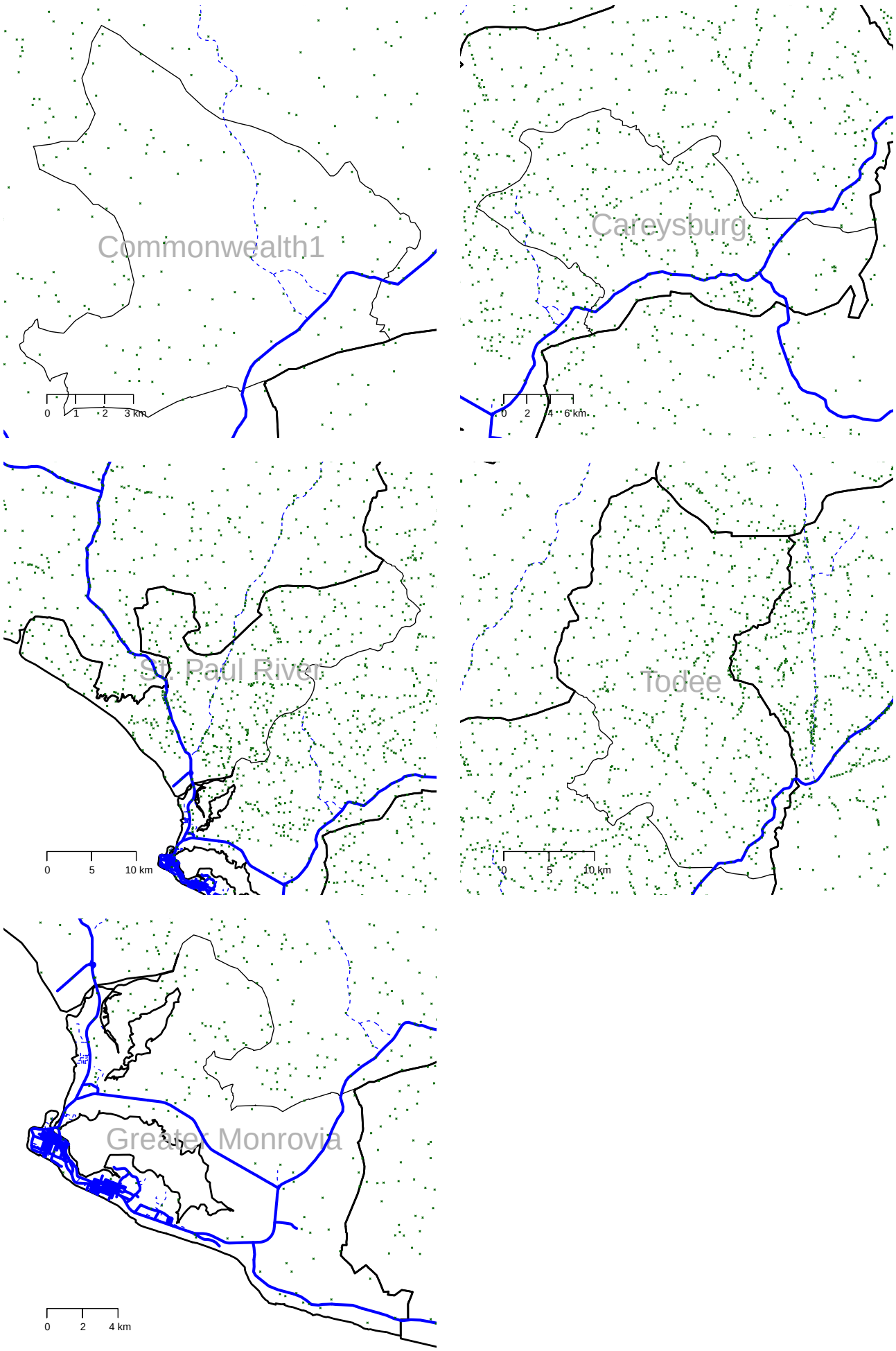


Figure 3.4: Large scale maps of 5 districts of Montserrado county in Liberia showing roads and all settlements (towns, villages)

The small-scale maps in Figures 3.1 and 3.2 will be useful for identifying initial sampling locations.

The large-scale maps in Figures 3.3 and 3.4 will be useful for identifying the precise location of sampling points and for selecting the communities to be sampled.

3.2 Step 2: Decide the area to be represented by each sampling point

The easiest way of thinking about this is as a function of the intended maximum distance (d) of any community from the nearest sampling point (see Figure 3.5.

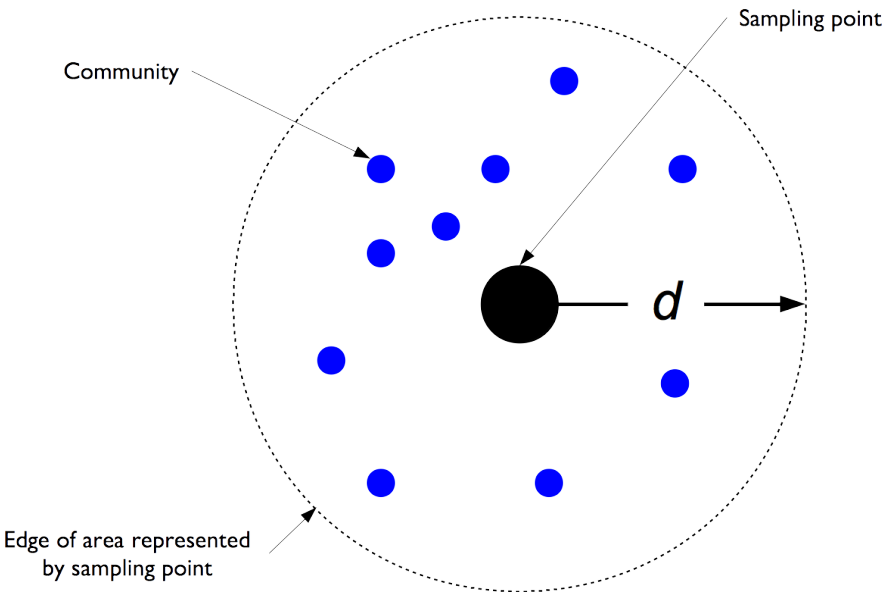


Figure 3.5: Conceptual presentation of the area represented by each sampling point

There are other ways of thinking about d. These are:

- **The area of each triangular tile**: This can be calculated using the formula:

$$A = \tan 30^\circ \times \frac{9}{4} d^2$$

For $d = 10$ km the area of each triangular tile will be about:

$$A = \tan 30^\circ \times \frac{9}{4} d^2 \approx 1.3 \times 100 = 130 \text{ km}^2$$

- **Practicability**: Most of the time spent in the field when doing a survey will be in travelling to and from sampling points. Having many sampling points can make for an expensive and / or lengthy survey. If you know how many sampling points that you can afford to take (m) then you can make a **very approximate** estimate of a suitable value for d using the following *rule-of-thumb* formula:

$$d \approx \sqrt{\frac{\text{Program Area}}{m}}$$

The value of d calculated using this formula is approximate and should be used as a starting point for a number of trial samples using the procedure outlined below.

S3M surveys have been done using a wide range (i.e. from $d = 8$ km to $d = 33$ km) of values for d. A value for d of 10 km or 12 km will probably be small enough in most circumstances.

Chapter 4

The second stage sample

Chapter 5

Analysis