

**USING *EPI MAP* GRAPHIC DATA PRESENTATION
SOFTWARE FOR REGIONAL TARGETING**

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CONTENTS

1. Introduction	4-1
2. Instructions for Use	4-2
3. Variations on Map Presentations	4-17

1. INTRODUCTION¹

Epi Map, a powerful new mapping software program, is now available to the public from the Centers for Disease Control (CDC) in collaboration with the World Health Organization (WHO). The program can be used to identify spatial variation in household food security and nutrition-relevant variables, such as population densities, crop yields, and malnutrition rates. Geographic clustering and trends are clearly identified, and the maps can provide a means of targeting vulnerable populations, such as those with high rates of poverty or high levels of food insecurity.

Epi Map is part of *Epi Info*, a series of programs designed originally for public health professionals for epidemiological data management and analysis, but can now be readily used by researchers in a wide variety of development-oriented disciplines.

Epi Map is designed for use with IBM-compatible personal computers. It creates and displays maps of over 80 countries, as well as global regions such as Asia, Africa, and Latin America. These maps are presented using geographic "boundary" files—preexisting map files that contain outlines of countries, as well as the outlines of subnational "entities," such as regions and states. These files can be selected and modified, and then combined with data values, which are either entered manually or downloaded electronically from external data files. The data selected are displayed as various types of shading and color patterns for each of the individual geographical entities.

This guide discusses how *Epi Map* software can be freely obtained, how data from various sources can be combined with the program's own built-in resources, how modifications to maps can be made, and what kind of data and presentations should be selected, depending on the issues at hand and the indicators being studied.

¹ Funding for data collection and analysis of these data has been supported by the International Fund for Agricultural Development (TA Grant No. 301-IFPRI). We gratefully acknowledge this funding, but stress that ideas and opinions presented here are our responsibility and should, in no way, be attributed to IFAD.

2. INSTRUCTIONS FOR USE

Downloading and Installing

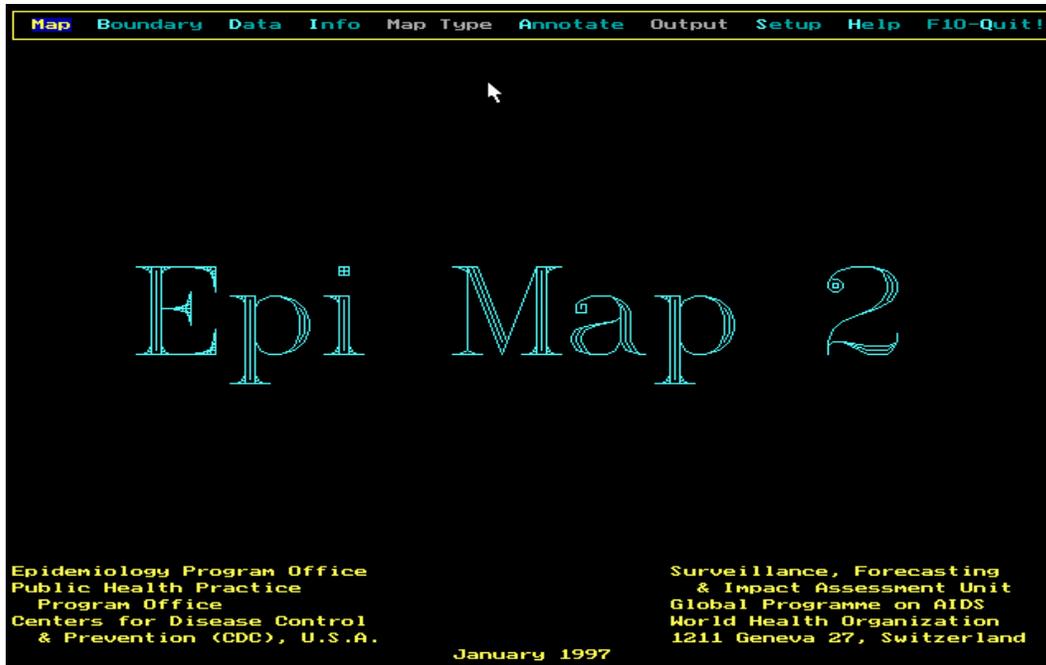
Epi Map software is freely available to anyone with access to the Internet. The entire installation process can be completed in less than one hour.

Epi Map and *Epi Map2* (an updated version), are available for downloading directly from CDC's Web site, <http://www.cdc.gov/>. Once at this page, click on "Publications, Software, and Products," and then on "Software." Then, under the "Epidemiology Program Office," click on the "download software" link, under *Epi Map*. After the *Epi Map* globe icon is chosen, each of the four necessary compressed .exe files should be selected in turn, along with the operational manual (EM201 1.EXE, EM201 2.EXE, EM201 3.EXE, EM201 4.EXE, and EM2MAN.EXE). There is also an option for "**How to Install**," which provides step-by-step instructions, along with telephone and fax numbers and an e-mail address for technical assistance. More detailed information about installation can also be found in the manual.

The *Epi Map* Manual is provided for the user and can be downloaded, together with the program software. The user is encouraged to download and print this manual for more detailed information about installation and use. *Epi Map* offers excellent technical support to users, and the telephone and fax numbers, together with the e-mail address, are listed in the manual.

Figure 1 *Epi Map's* simple menu welcomes new and returning users

Once the package has been installed, the user should go to the drive and directory where



the files have been copied (usually the "epimap2" directory) and type <epimap> at the DOS prompt to load the software (see Figure 1).

Selection of Map Files

Maps of more than 80 countries are immediately available for use, complete with the boundaries of all first-level administrative subdivisions.

Upon loading the software, the user will be presented with a menu of options across the top of the screen: "Map," "Boundary," "Data," "Info," "Map Type," "Annotate," "Output," "Setup," "Help," and "F10-Quit."

Boundary Files

Files containing the outline of individual countries and their regions are located under the "Boundary" option. For selection of one of these countries, the user can click on this option with the mouse, followed by clicking on the option "load complete." This will bring up a window for typing in or pasting from a selection of files the name of a boundary file (.bnd) for the country of interest.

Example 1 Loading a Country Map. To get a country map file for Mali, the user can press **F9** to get a complete list of the maps available, use the arrow keys to scroll down this list, press **ENTER** when "**Mali.bnd**" is highlighted in order to paste the file name to the square on the screen, and then press **F4** to bring up the map on the screen. An outline of the country, along with its regional boundaries, is presented (see Figures 2 and 3).

Figure 2 Selecting a boundary file from the main options available

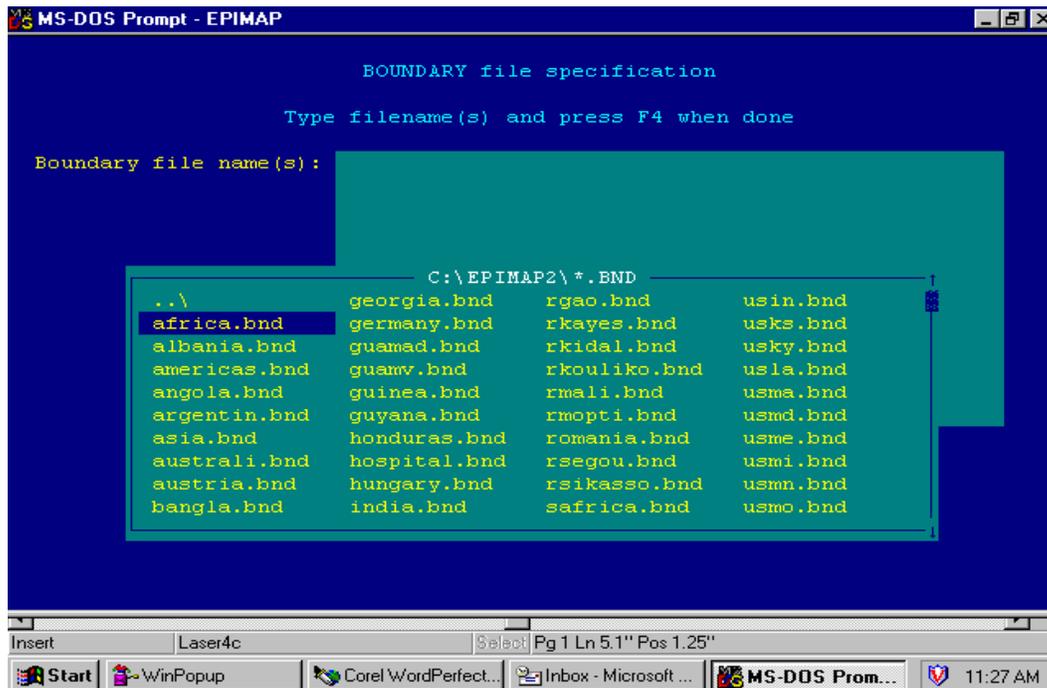


Figure 3 *Epi Map's* map of Mali, with first-level administrative boundaries



Modifying and Editing Map Files

Sometimes the maps supplied with the program do not exactly meet requirements. Modifying them is possible and relatively straightforward, but requires the investment of at least a full day.

Boundary maps can be edited and modified depending on the needs of the user. For example, in the mid 1990s, Mali divided one of its regions, Gao, into two separate regions, Gao (the southern half) and Kidal (the northern half). In order to utilize recent regional data, therefore, this region must be created by adding an additional boundary line to the map. Another

example of how the map can be modified is if a lower level of division is desired, such as with outlining the entities within the regions, called *Cercles* in Mali. To add this subdivision, the user would have to add the outlines of the individual *Cercles* within each of the regions. Both of the modifications can be done by free hand, using a mouse.

Example 2 Adding a new region. To add additional boundary lines to the map of Mali, the user should select the "load partial" option of the mali.bnd map file. This option brings up only one of the selected entities of the larger map (in this case, Regions). With the example of dividing Gao into two regions, only "MAI_Gao" should be selected (F8 will de-select the other regions, and <shift, +> will select a region (see Figures 4 and 5).

Figure 4 Selecting a region of the map to modify

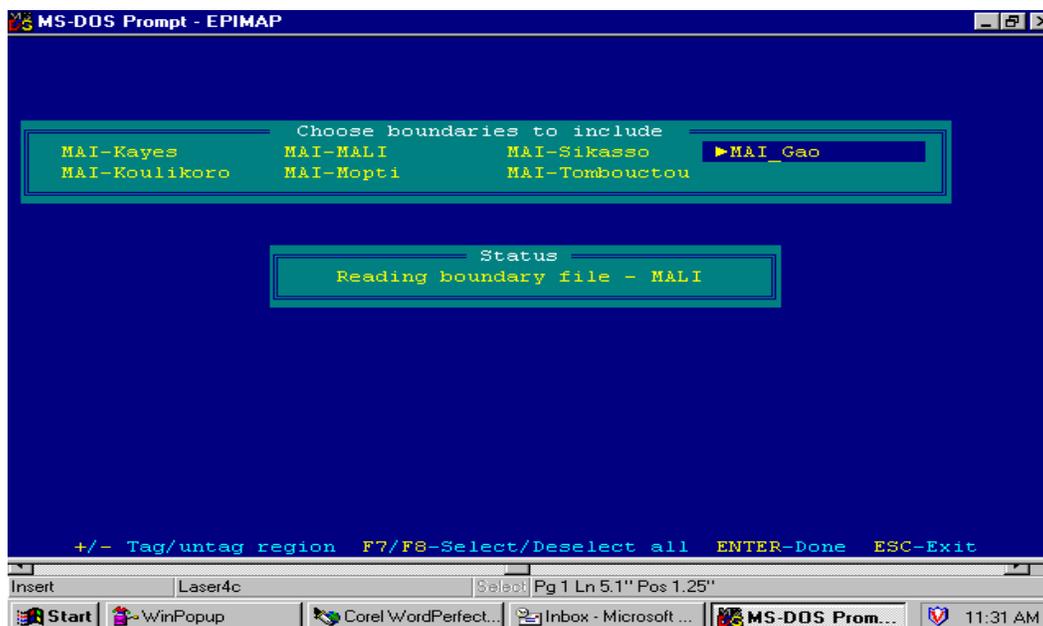
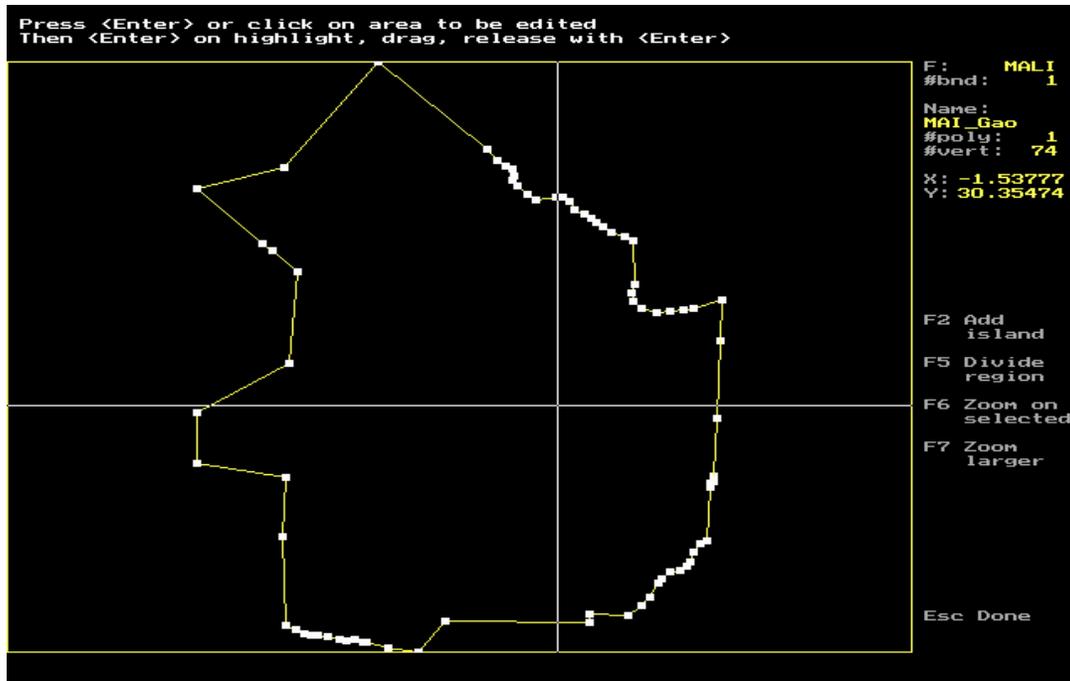


Figure 5 The region to be modified is displayed



After the outline of the particular region appears, "**boundary**" and then "**create/edit**" and then "**edit**" should be selected. A cross hair will appear on the screen and the left mouse button should be pressed in the center of the map outline. At this point, a series of highlighted squares will appear on the outline. If there is no point highlighted where the new boundary line should be connected, an additional highlighted square can be added by placing the cross hairs at the point where the new square is desired, and double clicking the mouse. Any number of points can be added to this outline (see Figure 6).

Figure 6 Placing the new boundary line



Once the new squares are added, F5 ("**divide region**") should be selected from the menu options on the right of the screen. The cross hair/cursor should be placed and clicked on one end of the new boundary line, and then placed and clicked on the other end.

At this point, one half of the map will be highlighted with the squares and the user will be asked to give this section a new region name (e.g., Kidal for the northern half). After typing in the name, and pressing **ENTER**, the other half will be highlighted and the user will be asked to give this region a new name (Gao). Once the second name is entered, the entire map is again highlighted and the cursor is attached to one end of the new boundary line. Drag this line to the other end of the new boundary line (the boundary line, in this case, is a straight line), click the mouse and then press **F4** to accept this new division. The user should then press <ESC> and select "**boundary**," "**save boundary**," and then give this new, divided region a name (e.g., Gao_Kidl.bnd) (see Figure 7). Pulling individual regions back into country maps is discussed in the next section.

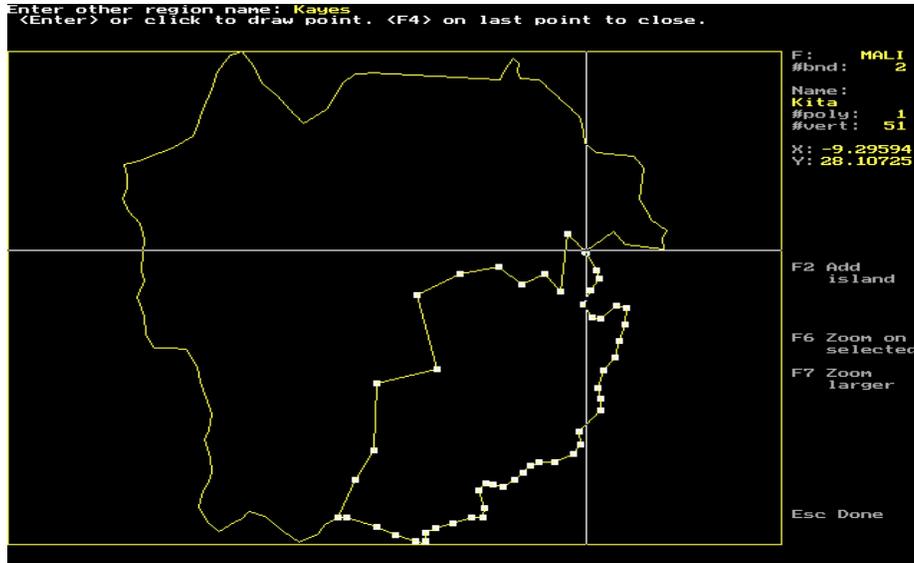
Figure 7 The original area is divided into two new areas



Example 3 Outlining subregional boundaries, and forming a new map. For adding a new level of entities, such as *Cercles* in Mali, the same basic process is followed, with a few additional steps. When the user gets to the point of naming the new sections, the new name should be the name of the *Cercle*, while the old name should be that of the region. For example, in adding the *Cercles* for Kayes, the name for the first section should be one of the *Cercles* (e.g., Kita), while the other name should remain Kayes.

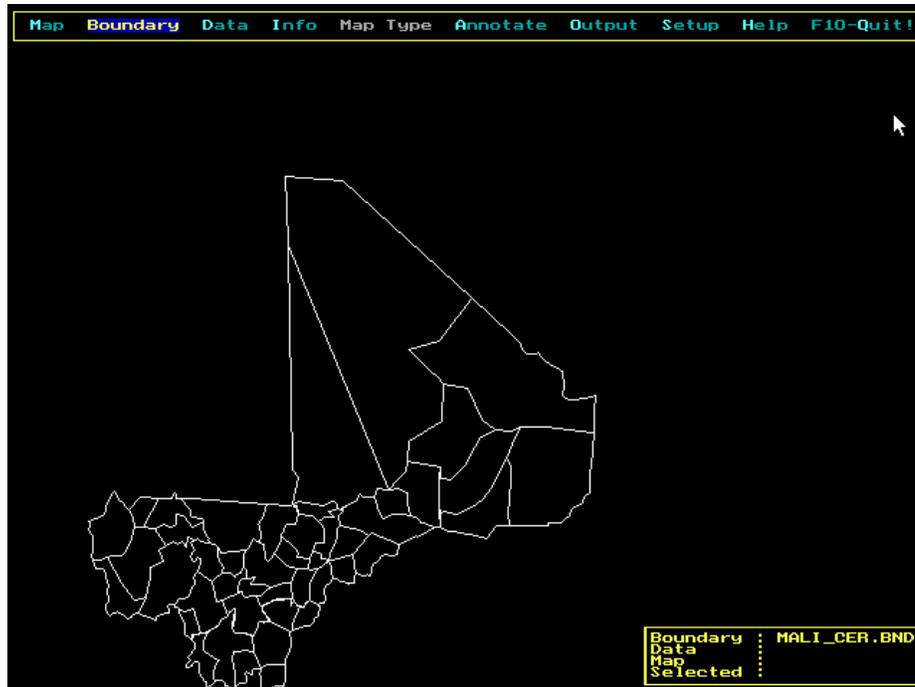
When the outline of the new section is highlighted, the cursor can be used to draw the outline of the *Cercle*, which will most likely not be straight, by making a series of closely-spaced clicks along this new boundary (see Figure 8). When all the new entities (or *Cercles*) have been added, this new regional file should be saved under a new name, such as Kayes_cer.bnd. Then the next region can be pulled up and divided into *Cercles*, and resaved in the same manner until all regions are completed.

Figure 8 Putting in a new irregular-shaped boundary



The next step is to bring all the separate regions together into a new country map of Mali. After each region has been saved, the user should select the option "**Boundary**" and then "**load complete**" and select each of the regional files (e.g., *Kayaes_cer.bnd*, *Mopti_cer.bnd*, *Segou_cer.bnd*, etc.). Once each of the regional files has been selected, F4 will pull up a map of Mali with all of the regions together, each with their individual *Cercles* boundaries. This file should also be saved with a name such as *Mali_cer.bnd* (see Figure 9).

Figure 9 A new map with finer disaggregation of administrative regions



Entering Data

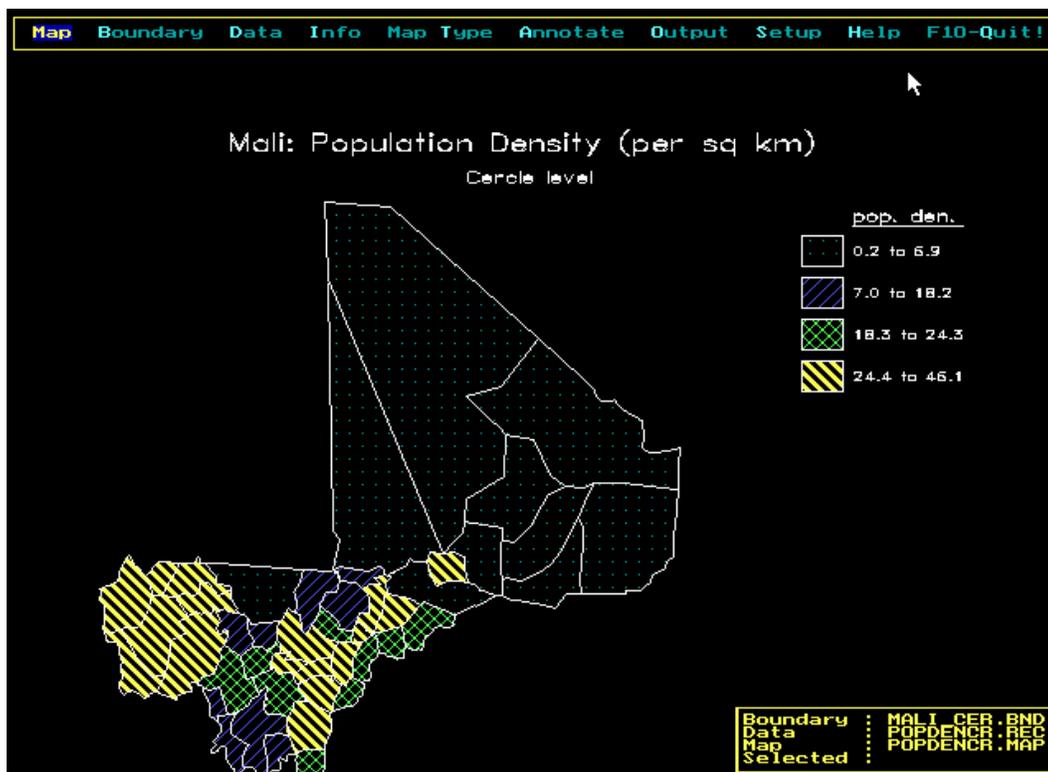
Epi Map software does not come with the data needed for the improved management and design of development projects. The necessary stage of inputting data can take anything from a few minutes if there are few variables and/or administrative subdivisions, to a few hours if there are many variables and/or administrative subdivisions.

Under the **Data** option, the user can select between pulling in (or "loading") existing data files, or entering the data manually. For manual entry of data, the user should bring up the map of interest by way of "**boundary**," "**load complete**," and then bring up the particular map file (e.g., Mali.bnd or the new Mali_cer.bnd file if the boundaries have been edited). Then "**data**"

should be selected, followed by "enter data" and <ENTER>. In this case, a list of the *Cercle* names will appear, along with a column labeled "var #1." This is where the actual data is entered for each *Cercle* (a number is typed in for each *Cercle* and <ENTER> moves the cursor to the next region). Once the data is entered, F4 should be pressed to have the data accepted.

At this point, the system presents a range of numbers that divides the data into groups. These default ranges can be used "as is" (they represent an equal count of data points per range, and can be selected with the F9 key). The ranges can also be modified by using the F8 key for "even ranges" or individual range numbers may be entered manually. If the default range is appropriate, <ESC> should be pressed, which brings up the map again, but with each of the regions having a specific pattern representing its data value in a given range. Figure 10 shows a map of Mali representing the population density (number of people per square kilometer) for each *Cercle*. This new map should be saved as a map file, such as "cerpopdn.map." (The default labels and legends can be changed. See Formatting Maps below.)

Figure 10 A map that conveys information by using different shadings



Map files contain the outlines of the boundary files together with the data pulled in from the data files. These can be saved and brought up using the "Map" selection from the menu on along the top of the screen.

Using Existing Data

Data from preexisting files can be pulled into *Epi Map* and used in the same manner as those entered manually. It is important that the original data file contain *Cercle*, region, etc., names that are identical to those listed in the *Epi Map* boundary file (such as those that might be listed in a variable called "cername").

Files from most data-oriented software packages (such as SPSS, LOTUS, EXCELL, SAS, etc.) can be resaved into a .rec file using programs such as DBMS Copy that can be read by *Epi Map*.² An example using an SPSS data file might be mhdurcer.sav resaved as mhdurcer.rec (Mali household data for ownership of **durable** goods on a *Cercle* level).

Once the file is saved into a .rec file, the user can go back into *Epi Map*, select the map of interest (Mali_cer.bnd), and then "**data**" and "**load data**" should be selected. The user will be asked to select or type the name of the data file to be loaded (mhdurcer.rec). After <ENTER> is pressed here, a list of variables in the data file will appear and the user should select a variable for the geographical presentation. Once the variable has been selected, the map will appear as with the maps based on the manually entered data (see previous section on Entering Data). Figure 11a and 11b below show the percentage of people owning radios and bicycles, respectively. This data is from the DHS files discussed in Technical Guide #2.

² The data is actually read by a program called *Epi Info* that automatically processes the data when pulled into the *Epi Map* files.

Figure 11 Maps that display shading for data from external files (maps initially appear with default names for titles and legends)

Figure 11a
Percent of population in possession of a radio

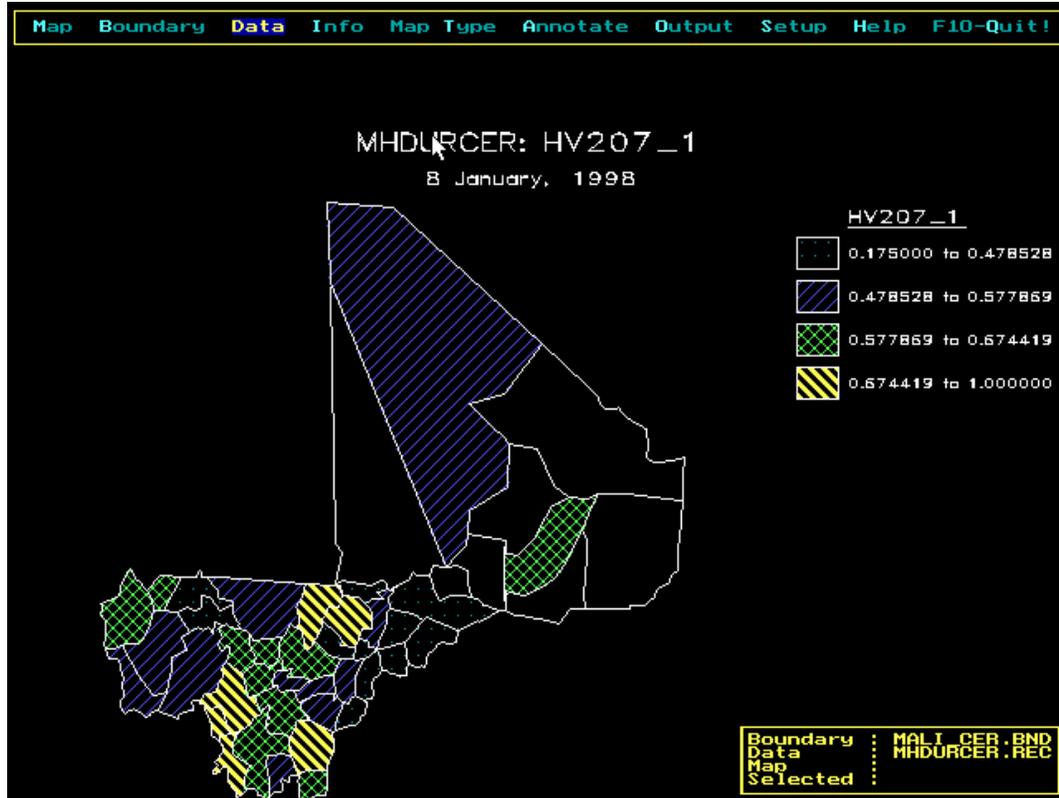
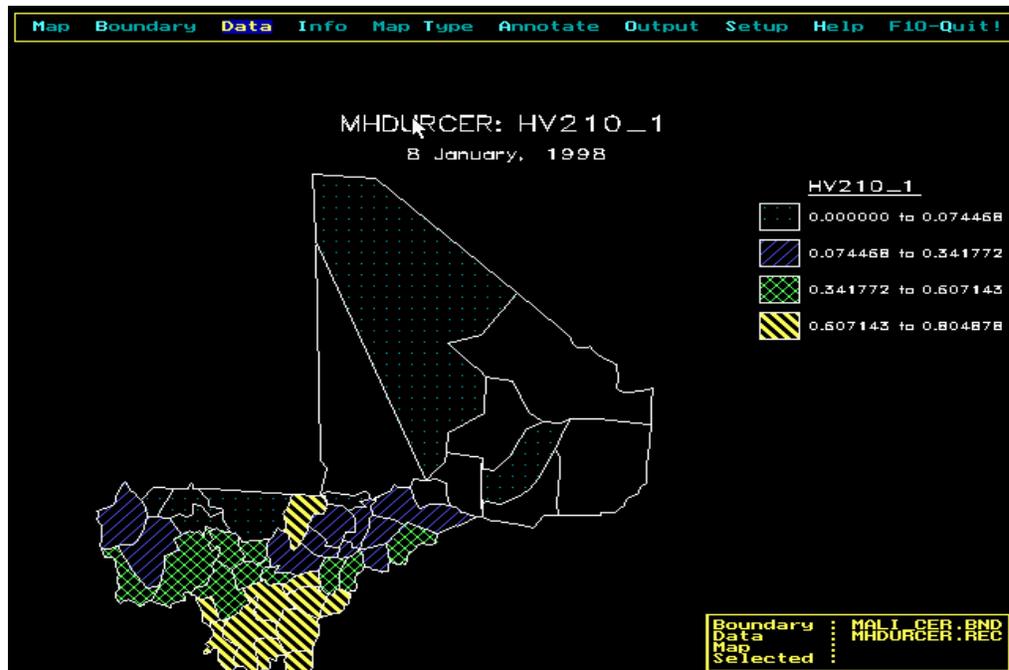


Figure 11b
Percent of population in possession of a bicycle



The data used in creating the map files shown in Figures 11a and 11b are from the Demographic and Health Survey files provided by Macro International, Inc. See Technical Guide #2 for information on how to obtain and use this data.

Formatting Maps

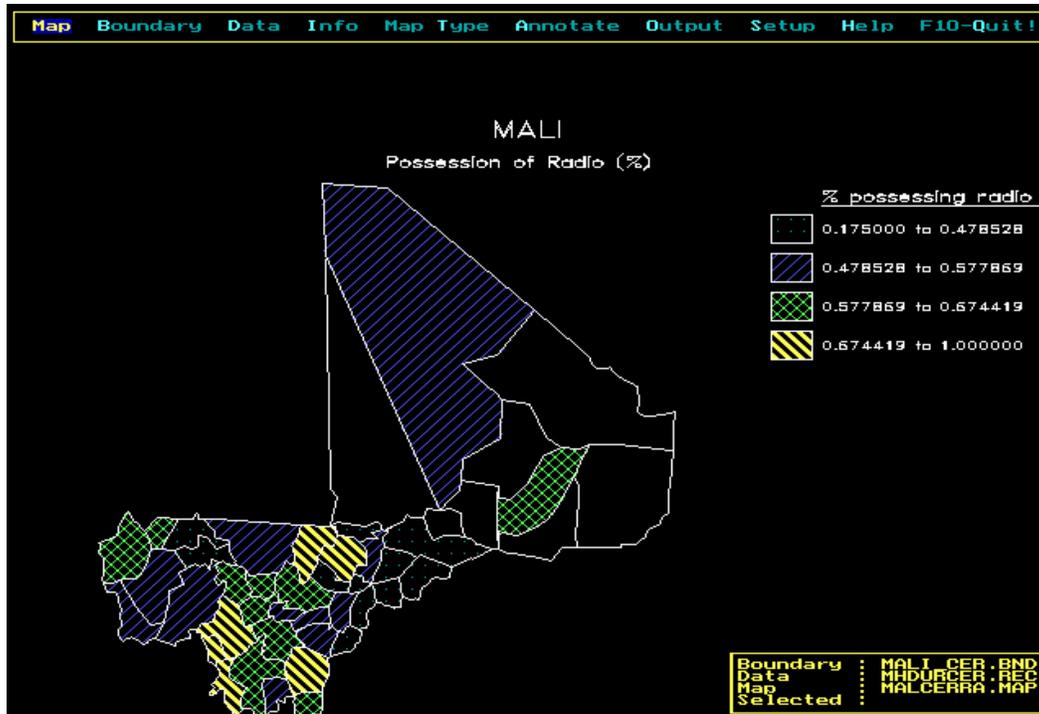
If you don't like the way your map looks ... change it!

Titles, Legends, and Labels

When the data-based maps are created, they appear with default names for the titles, legends, etc. The titles refer to the headings over the map and allow for two lines of text. As can be seen from Figures 11a and 11b, the default title refers to both the name of the data file (MHDURCER.REC) and the variable (hv207_1 or hv210_1, radio and bicycle, respectively) being used on the first line, along with the date on which the map was created appearing on the second line. The legend refers to the heading over the range presentation (hv207_1 or hv210_1 to the left of the screen). And the labels refer to the names of the individual entities, or in this case, *Cercles*. In the maps above, the option of *Cercle* labels is "**off**."

These functions can easily be changed using the "**Annotate**" option. Under Annotate, a menu containing Titles, Legends, and Labels will appear. An example of a title change might be "Mali" on the first line, and "Possession of a Radio (%)" on the second line (see Figure 12). For a change in a legend, one might use "% possession of radio." And the use of labels depends on how crowded the entities are. They can be added or eliminated with the <shift, +> keys to select "**on**" or "**off**." Labels used for this map would not be feasible since they overlap and are therefore not legible.

Figure 12 A map that displays examples of modifying titles and legends for data from external files: Percent of population in possession of a radio



3. VARIATIONS ON MAP PRESENTATIONS

Another map presentation type that has a different visual effect is a dot density map. Figure 13 shows a dot density map of Mali, on the *Cercle* level, where each dot represents 10,000 people (in absolute numbers).

It is immediately clear from this type of geographical presentation where the most densely populated areas and *Cercles* are within the country. If simply reaching large numbers of people, or the most populated areas, were the primary goals of a given project, this method of presentation could serve well to identify project potential sites.

Figure 13 A map that conveys information by using dot density (each dot represents 10,000 people)

