

EPI INFO™ 7 QUICK START GUIDE

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1

INTRODUCTION TO EPI INFO™ 7

Epi Info™ is a public domain suite of software tools designed for the global community of public health practitioners. It allows the easy creation of electronic forms, rapid data entry into those forms, and analysis of the data with epidemiologic statistics, maps, and graphs. Since 1985, the Centers for Disease Control and Prevention (CDC) has been developing and maintaining Epi Info™.

As public domain software, Epi Info™ is free to download, use, and distribute without restriction. The latest version of Epi Info™ may be obtained at <http://www.cdc.gov/epiinfo>.

This guide is designed to introduce you to the core concepts of each of the main modules in Epi Info™ 7. We'll start with creating a basic data entry form for a fictional outbreak of E. Coli, enter data into that form, and discuss some of the basics of data analysis.

EPI INFO™ RESOURCES

Training documentation, translations, technical information, and other resources are available on the Epi Info™ website at <http://www.cdc.gov/epiinfo>. If you have any questions or problems using the software, or want more information, you can e-mail the Epi Info™ help desk at epiinfo@cdc.gov, or call 404.498.6190.

An Epi Info™ Internet forum was recently created at <http://www.phconnect.org/group/epiinfo>. Users around the world can ask each other questions and solicit advice.

2

DOWNLOADING AND SETUP

Epi Info™ 7 can be downloaded from <http://wwwn.cdc.gov/epiinfo/7/index.htm>. Two versions of the software are available: A “zip” file and a traditional “setup” file. “ZIP” files are also known as archive or compressed files. These files should open on any Windows computer, though different applications may be used to open them depending on the computer’s system configuration. This guide will walk you through using the Windows 7 archive file viewer to extract the files.

The “setup” file works like a traditional installer and simply needs to be run (or executed) to install Epi Info 7. You may not, however, be able to use the “setup” file if you do not have administrative rights or elevated privileges on your computer.

Note: An archive file is a container that can store other files. Because the Epi Info™ 7 software is composed of many individual files, it is not practical for you to download each file individually. All files needed to run Epi Info™ 7 are placed into a single container file.

EXTRACTING THE ARCHIVE

1. Open your **web browser** and navigate to <http://wwwn.cdc.gov/epiinfo/7/index.htm>.
2. Click the **Epi Info™ 7 (zip)** link from the download section. A prompt will appear asking if the file should be saved or opened.

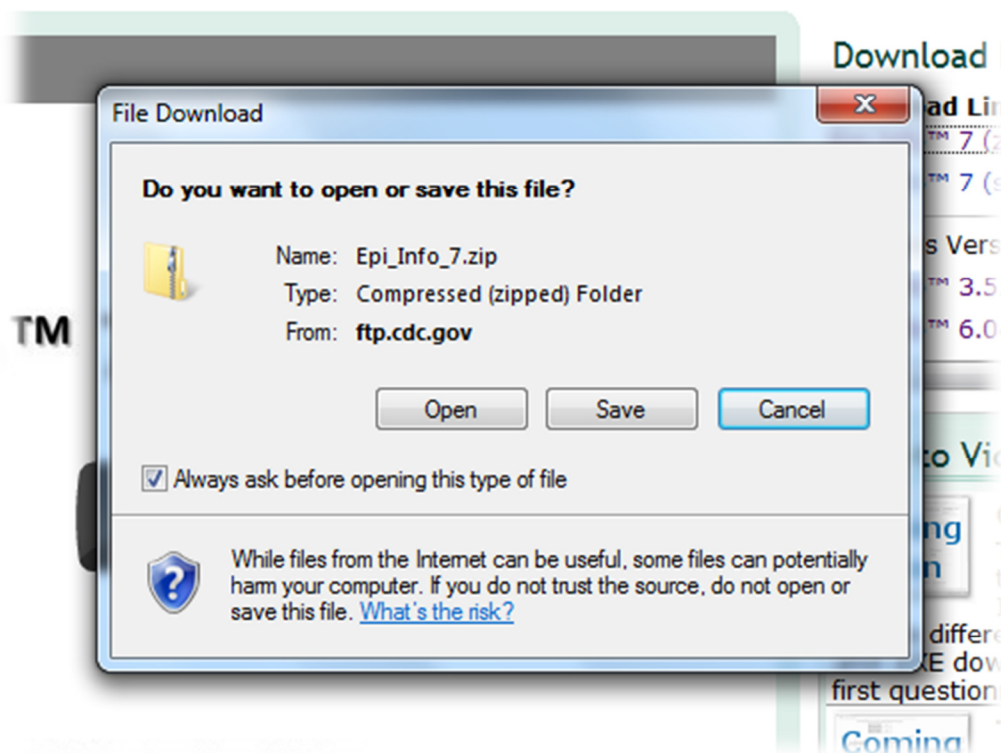


Figure 1.1: Downloading Epi Info 7 in “zip” format.

- Click the **Open** button (or the **Run** button depending on the web browser). In a few moments, the file will open (Figure 1.2).

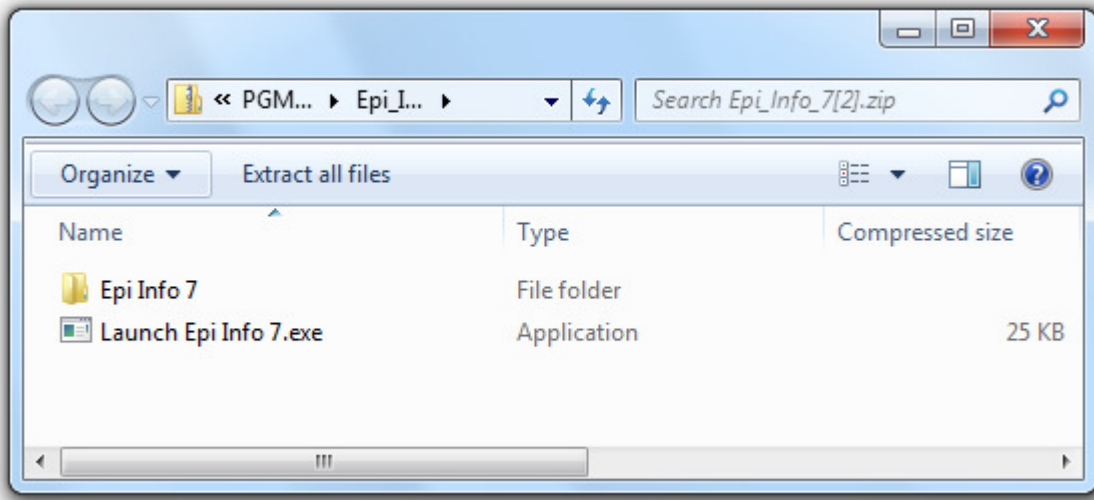


Figure 1.2: The Epi Info 7 “zip” file after being opened in Windows 7.

Note: Some computers may open the “zip” file in a different program (e.g., WinZip or WinRAR). The instructions provided here assume that the file has been opened using Windows Explorer.

4. Select the **contents** of the archive and drag them onto the desktop (Figure 1.3). This will copy the Epi Info™ 7 program files to the desktop. After completion, a pair of icons will appear on your desktop (Figure 1.4).

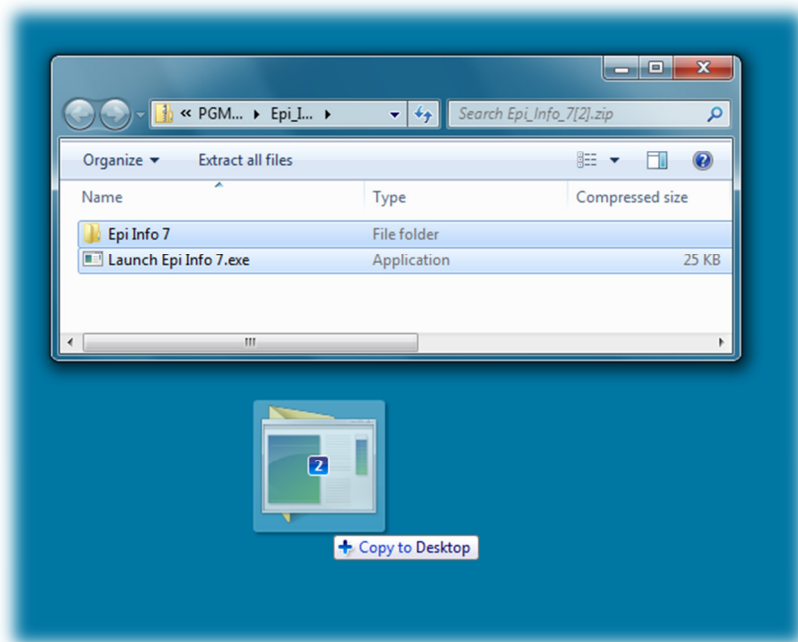


Figure 1.3: Selecting the contents of the folder and dragging them onto the computer's desktop.

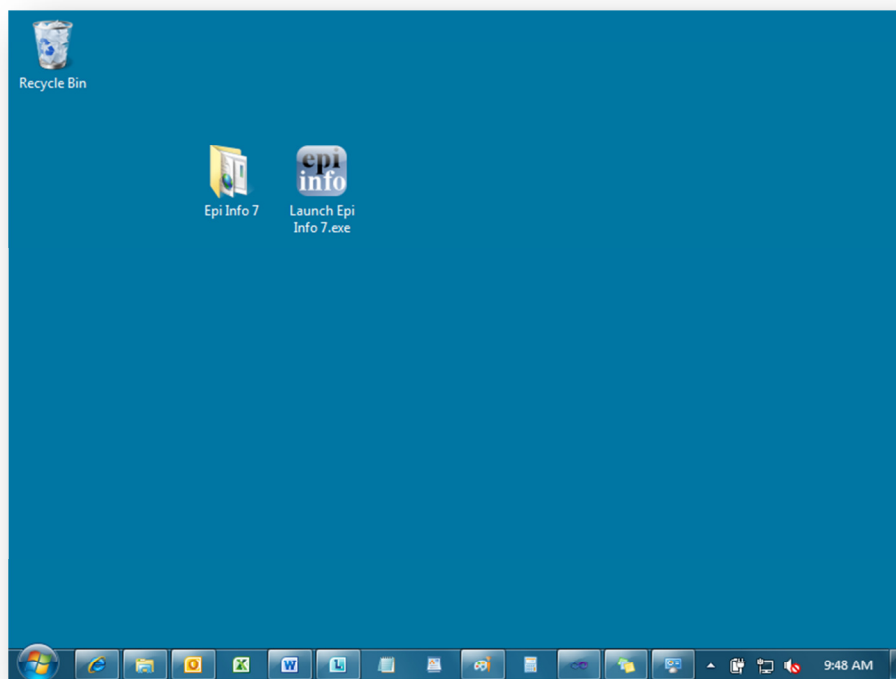


Figure 1.4: The desktop after completing Step 5.

5. After completing Step 4, double-click on the **Launch Epi Info 7** icon. Epi Info™ 7 launches.

3

CREATING A FORM

To collect data, first create a data entry form. If you recall from the introduction, we'll be creating a food history questionnaire for a fictional outbreak of E. Coli. To create our questionnaire, we'll use the Form Designer module. The Form Designer is accessed through the Epi Info™ 7 menu. You can open the menu by clicking on the **Epi Info™ icon** on your desktop (Step 5 in Part One of this guide).

Forms in Epi Info™ 7 consist of one or more pages. Each page may have one or more fields. There is no limit to the number of pages or fields on an Epi Info™ 7 form.

OPENING THE FORM DESIGNER

1. Navigate to the **desktop**.
2. Double-click on the **Launch Epi Info™** shortcut. The Epi Info™ 7 menu will appear (Figure 2.1).

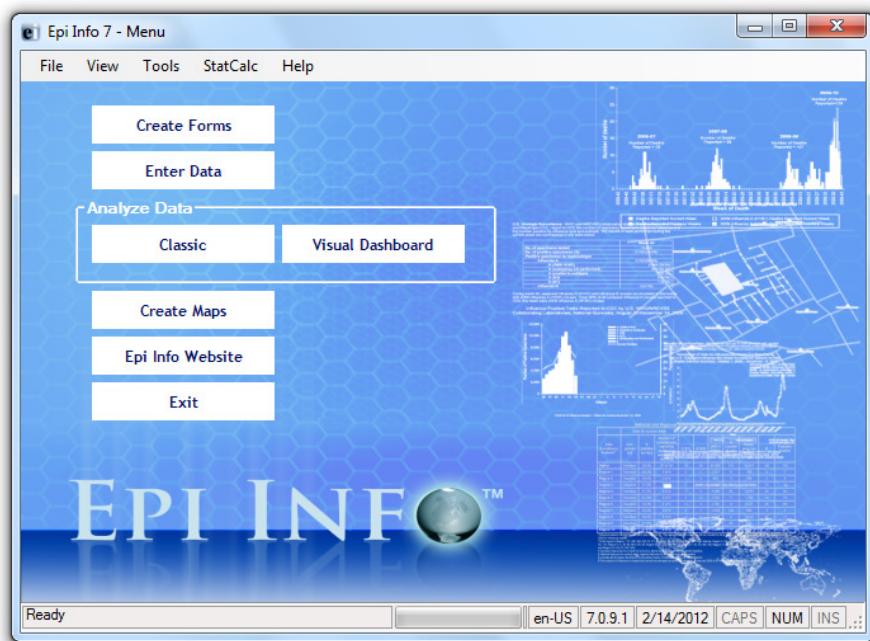


Figure 2.1: The Epi Info™ 7 menu.

3. Since we want to create a simple data entry form, click the **Create Forms** button. The Form Designer will appear (Figure 2.2).

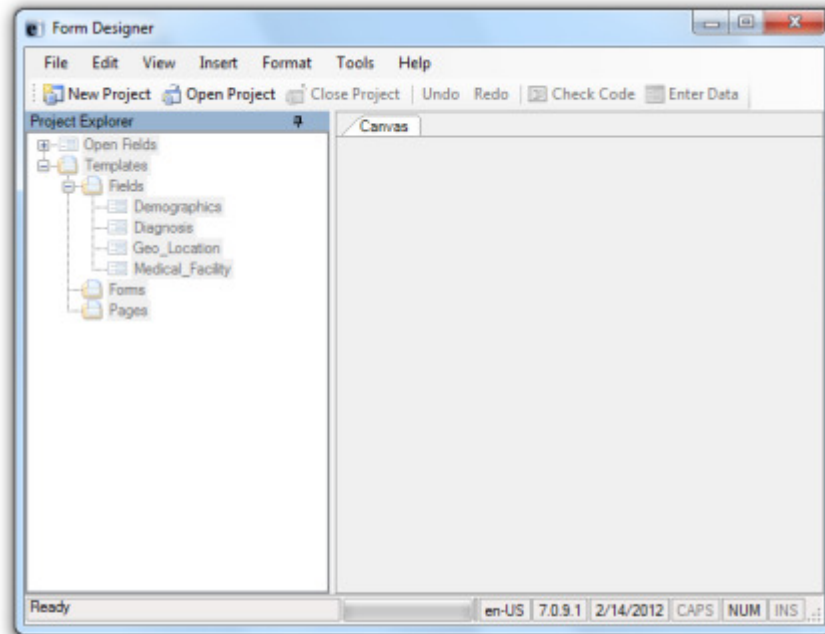


Figure 2.2: The Epi Info™ 7 Form Designer, where forms are created and edited.

CREATING YOUR FIRST PROJECT

After opening the form designer, you'll notice that many of the options are grayed out. These options are disabled because you have not created a new Epi Info™ project or opened an existing project for editing. Similar to DOC and DOCX files being the standard file formats for Microsoft Word, Epi Info™ Project Files are the standard file formats for Epi Info™. Think of the project like a container for all of the components you will need to carry out your data collection and analysis.

Before we can begin adding questions to our food history questionnaire, first create a new project:

1. From the toolbar, click the **New Project** button. The New Project window will appear.
2. In the Name field, type **EColi_Sample_2012**. This will become the project's name.
3. In the Form Name field, type **FoodHistory**. This will become the name of the first form contained within the project.
4. Click **OK**. After several seconds, the project is created and a blank canvas will appear in the Form Designer window.

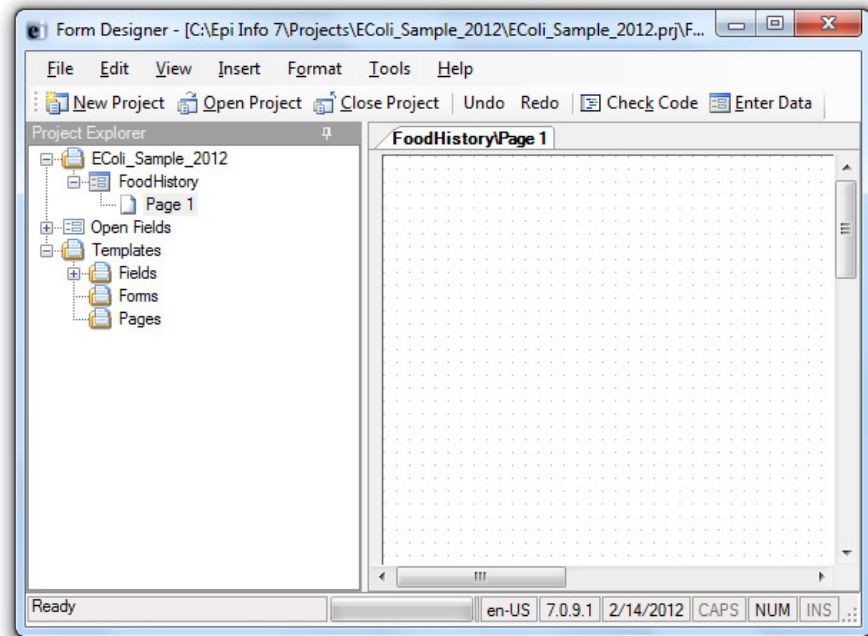


Figure 2.3: The Epi Info™ 7 Form Designer after creating a new project.

Congratulations, you've created your first Epi Info™ project! You're now ready to create fields and decide how those fields should appear.

Before proceeding, take a minute and observe the Project Explorer panel (the left-hand side of the screen in Figure 2.3). Notice the tree-like structure of objects. The project we created appears as the root item, in this case, EColi_Sample_2012. The name of our form, FoodHistory, appears underneath it. Items can be expanded or collapsed using the + and – icons to the left of the item's name.

CREATING FIELDS

ADDING A TEXT FIELD

Every time you create a new project, a default form is added to it. In the steps you completed above, this default form was called FoodHistory and is being displayed in the Form Designer window, ready to be edited. The next steps, outlined below, add fields to the form. We'll first add a Text field.

Note: Text fields allow you to type in whatever values they want and are best used for open-ended questions (e.g., street address and name).

1. With the **FoodHistory** form loaded (Figure 2.3), right-click on the **canvas**. A pop-up menu will appear (Figure 2.4).

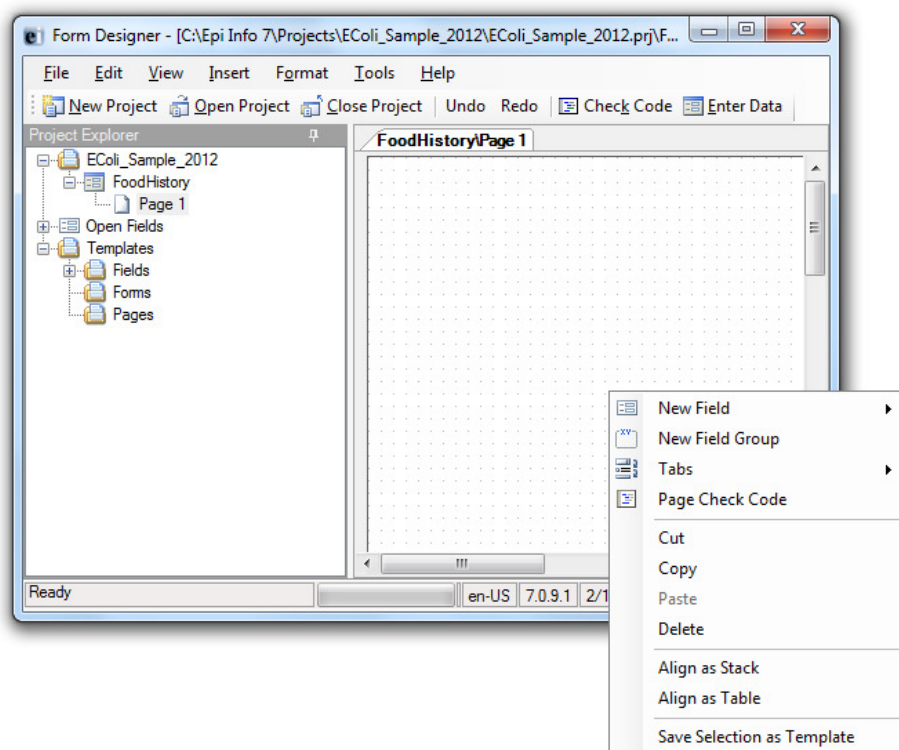


Figure 2.4: The pop-up menu when right-clicking on the canvas.

2. Move the **mouse** over the New Field option. A sub-menu will appear (Figure 2.5).

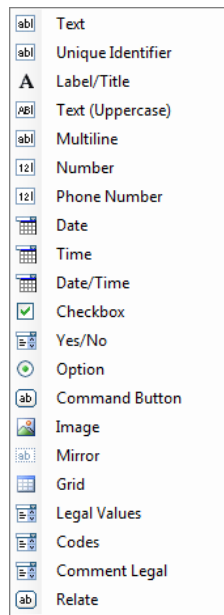


Figure 2.5: The list of field types that you can add to your form

- From the list of choices, select **Text**. A **Text** dialog will appear (Figure 2.6).

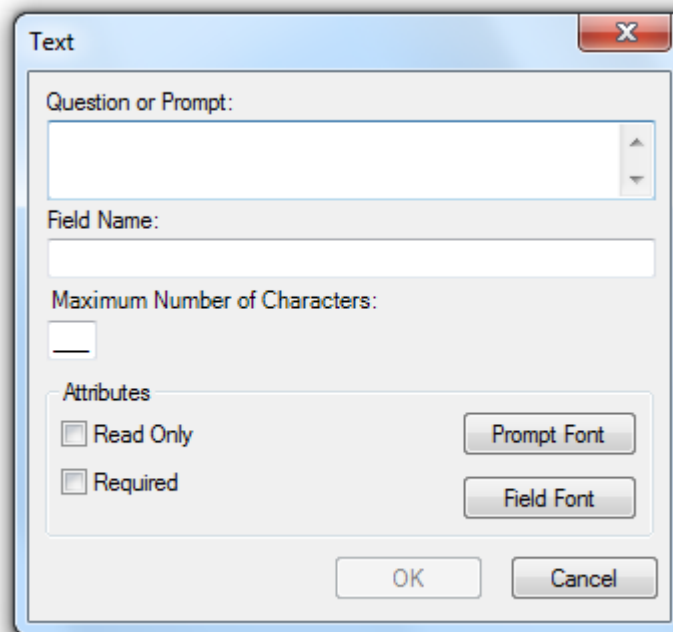


Figure 2.6: The field definition dialog box for Text fields.

- In the Question or Prompt field, type **Last Name**.
- Press the **TAB** key. Notice how the cursor jumps to the Field Name field and automatically filled it in based on the prompt.

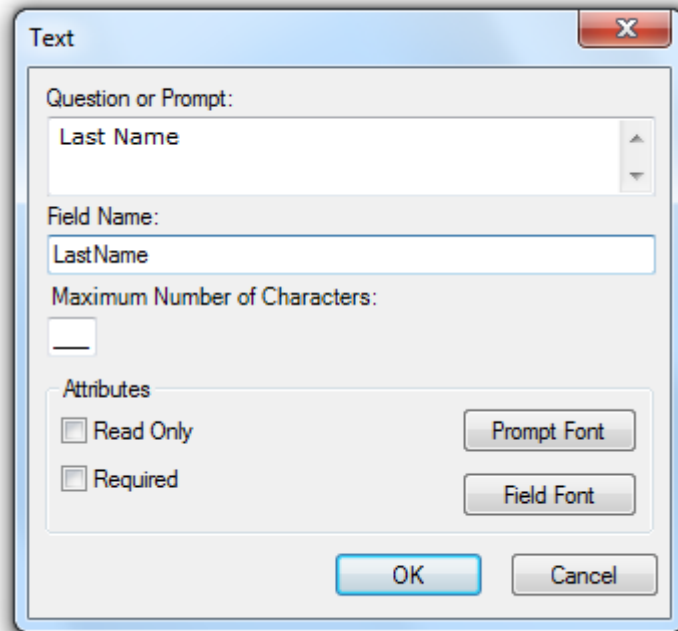


Figure 2.7: The field definition dialog box for after completing Step 5.

6. Click **OK**. The field is created and displayed on the canvas.

At the most basic level, that's all there is to adding fields – simply select the type of field you want to add and give it a prompt.

The steps above outlined how to create a text field. Other field types are also available, including number fields (which restrict you to entering valid numbers), date fields, checkboxes, and drop-down lists. Let's add several more fields.

ADDING A NUMERIC FIELD

With a text field, you can type in whatever values you want. This makes them unsuitable for collecting certain types of data (e.g., a patient's age or temperature at the time of the interview). A numeric field ensures that only valid numbers are accepted, which can be helpful later during analysis if you want to generate a mean, median, mode, min/max values, etc.

1. Right-click on the **canvas**. A pop-up menu will appear.
2. Move the **mouse** over the New Field option. A sub-menu will appear (Figure 2.5).
3. From the list of choices, select **Number**. A Number dialog will appear (Figure 2.6).
4. In the Question or Prompt field, type **Age**.
5. Press the **TAB** key. Notice how the cursor jumps to the Field Name field and automatically filled it in based on the prompt.
6. In the Pattern drop-down list, select **##**. The **##** option will force you to enter only two digits.
7. Check the **Range** box. Notice how the Upper and Lower boxes activate.
8. Type **5** for the lower value, and **80** for the upper value.

Figure 2.8: The field definition dialog box as it should look after Step 8.

9. Click **OK**. The Age field is created and displayed on the canvas.

FIELD PROPERTIES

Notice that the Field Definition window for the numeric field was different than it was for the text field. The text field did not include options to set a range or define any kind of pattern. Each field type has its own distinctive set of options available for customizing the field's appearance and behavior.

Some of the more commonly-seen properties include:

1. **Range** - Allows the designer to specify upper and lower values for the field. Any data falling outside of the upper and lower boundaries of the range property will be discarded.
2. **Required** - Must be filled in before the record can be saved.
3. **Read only** - May not be modified by the user. It is generally useful only to more advanced users.

ADDING A CHECKBOX

Text and Numeric field types allow you to enter open-ended data and may not always be useful in all scenarios. If we want to collect data on whether the patient was ill, we could use a checkbox field instead. A checkbox is either checked or unchecked and can never be set to any other value. It is well-suited for questions where the only answers are either yes or no.

1. To add a new field, right-click on the **canvas**.
2. From the list of choices, select **Checkbox**. A Checkbox dialog will appear (Figure 2.6).
3. In the Question or Prompt field, type **Ill**.

4. Press the **Tab** key. Notice how the cursor jumps to the Field Name field and automatically filled it in based on the prompt.

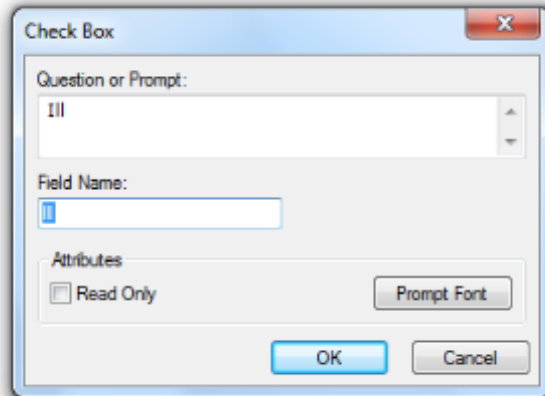


Figure 2.9: The field definition dialog box as it should look after Step 4.

5. Click **OK**. The Ill field is created and displayed on the canvas.

ADDING A YES/NO FIELD

You might wonder what the point of a Yes/No field is when there is already a Checkbox field type. It is true that Yes/No and Checkbox fields store the same type of data, but there is one very important difference: Yes/No fields can be cleared, meaning they can hold a blank or “missing” value in addition to Yes or No. For our next field, collect data on whether the patient is pregnant.

Tip: Yes/No fields are best suited for questions where “Yes” and “No” are the desired answers, but where you want the data enterer to be able to leave the question blank. Note that a checkbox field can never be blank.

1. To add a new field, right-click on the **canvas**.
2. From the list of choices, select **Yes/No**. A **Yes/No** dialog will appear.
3. In the Question or Prompt field, type **Is Pregnant?**
4. Press the **TAB** key. Notice how the cursor jumps to the Field Name field and automatically filled it in based on the prompt. Also notice how the space between Is and Pregnant and the question mark was removed; neither spaces nor question marks are valid field names.
5. Click **OK**. The field is created and displayed on the canvas.

After the Yes/No field has been created, it will appear as a drop-down list on the form. Because this is the form designer module (and not the data entry module), you will not be able to choose any of the values.

ADDING A DROP-DOWN LIST OF VALUES

The Yes/No field is an excellent choice for questions where the only possible values are yes, no, and unknown. What if we want to present a drop-down list of choices to the user, where we have defined our own list of possible values? Epi Info 7 provides three field types with which to do this: Legal Values, Comment Legal, and Codes. The simplest of these options is the Legal Values field type, which we will create in the steps below.

Let's create a drop-down list of choices for gender:

1. To add a new field, right-click on the **canvas**.
2. From the list of choices, select **Legal Values**. A Legal Values dialog will appear.

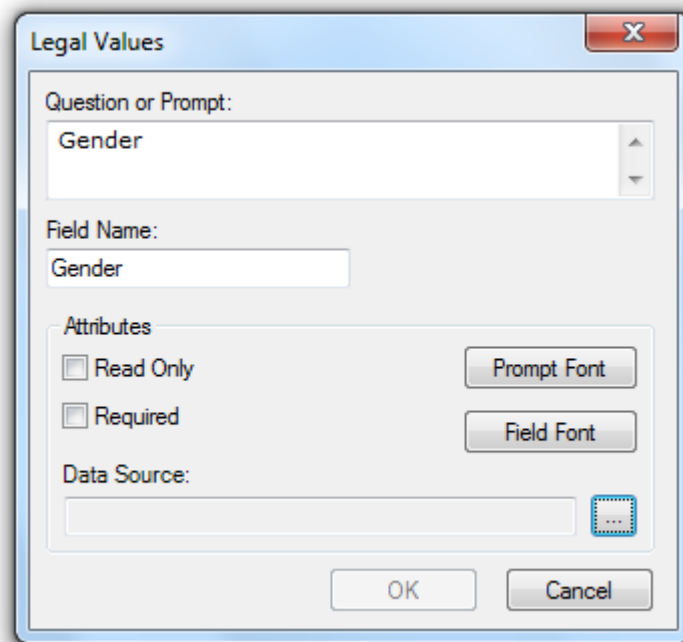


Figure 2.10: The Legal values field definition dialog after completing Step 4.

3. In the Question or Prompt field, type **Gender**.
4. Press the **Tab** key. Notice how the cursor jumps to the Field Name field and automatically filled it in based on the prompt.
5. Click the **Ellipsis** button next to the Data Source text box (shown highlighted in Figure 2.10). The Set Up Code / Legal Links dialog will appear (Figure 2.11).

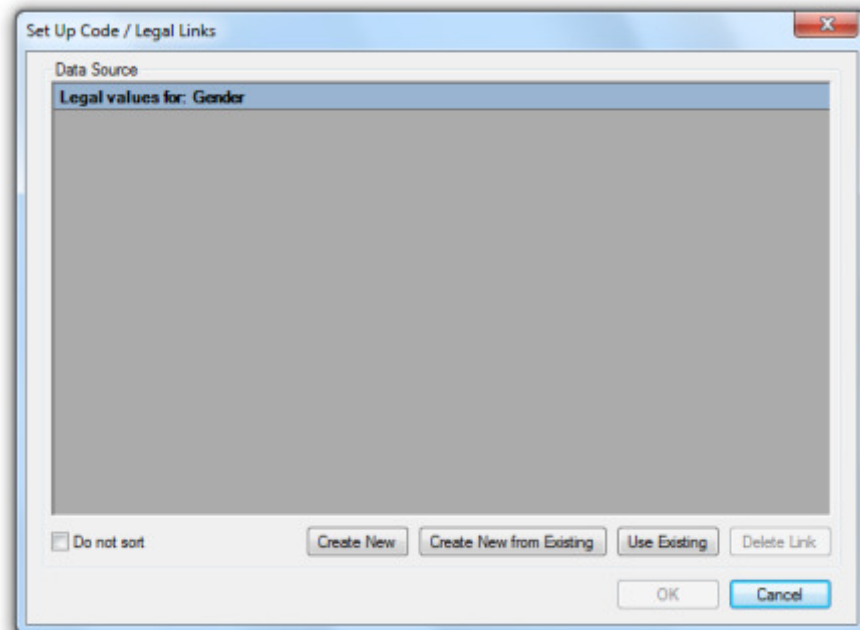


Figure 2.11: The Set Up Code / Legal Links dialog.

6. Click **Create New** to create a new list of values for this field. The dialog should change in appearance (Figure 2.12).

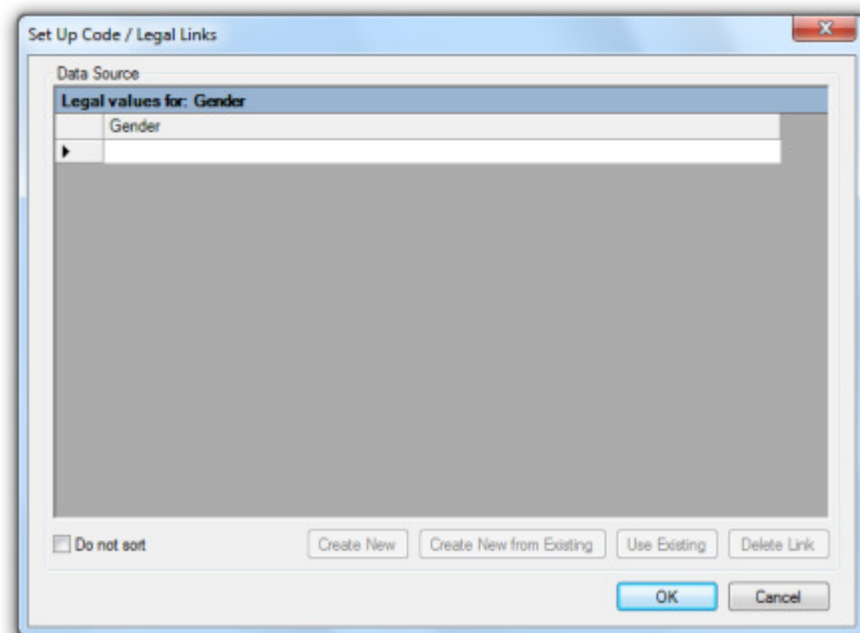


Figure 2.12: The Set Up Code / Legal Links dialog.

7. In the first row, type **Female**.
8. In the second row, type **Male** (Figure 2.13).

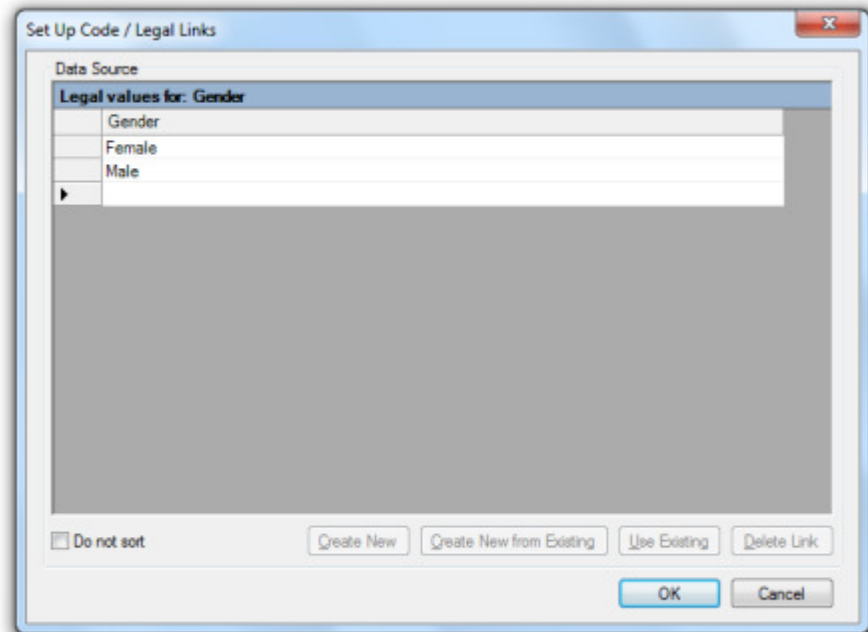


Figure 2.13: The Set Up Code / Legal Links dialog after completing Step 7.

9. Click OK. The Legal Values field definition dialog should re-appear.
10. Click OK. The field is created and displayed on the canvas (Figure 2.12).

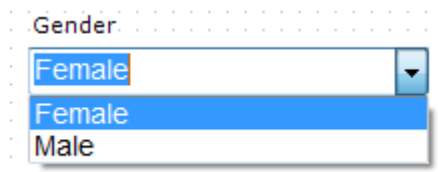


Figure 2.14: The drop-down list of values, as shown on the canvas, after completing Step 9.

Figure 2.15: The form as it should look after completing Step 9.

FIELD PLACEMENT

You should now have five fields on your page: A text box for Last Name, a numeric field for Age, a checkbox for whether the patient is ill, a yes/no field for whether the patient is pregnant, and a drop-down list for gender. If you haven't done anything else, the fields will probably look poorly placed and unprofessional.

To move a field:

1. Place the mouse cursor on the **Last Name field's prompt text**.
2. Press and hold the **left mouse button**.
3. Move the **mouse**.

Notice how the entire field, along with the prompt, moves with the mouse.

You can also move the input box for a field separately from its prompt. To do this:

1. Place the **mouse cursor** on the Last Name field's input box.
2. Press and hold the **left mouse button**.
3. Move the **mouse**.

You can set the prompt independently of the input box. If you decide you don't like how a field's input box is positioned relative to its prompt, you can always set it back to its default using the following steps:

1. Right-click on the **field**. A pop-up menu will appear
2. From the list of choices, select **Default Prompt Align**.

Note: If you observe that the fields are 'snapping' into position and don't always go exactly where you want, this is a feature called **Snap to Grid**. It can be turned off by navigating to the **Format** menu and selecting **Grid Settings**.

FIELD ALIGNMENT

Moving fields is one method of making your form look more professional. However, it can be tedious and time-consuming, especially if many fields are required. Epi Info™ has a field alignment feature that can help make this process faster:

1. Place the **mouse cursor** very close to the top-left corner of the canvas.
2. Press the **left mouse button** and hold it.
3. Move the **mouse** to the lower right-hand corner of the screen. Notice how a blue lasso is drawn as the cursor changes position.

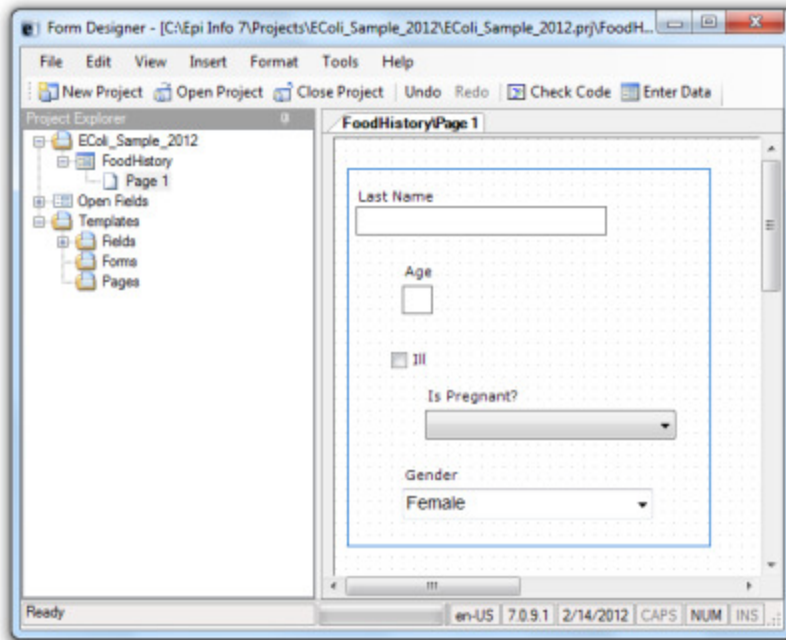


Figure 2.16: The 'lasso'

4. Ensure that all of the fields you have created fall within the blue lasso (Figure 2.16) and release the left mouse button. The fields should all appear as if they have been selected (Figure 2.17).

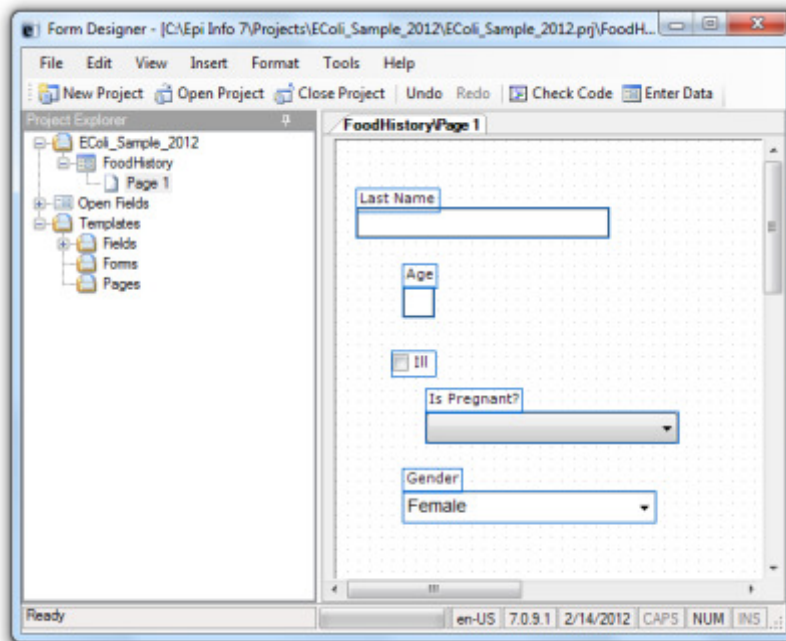


Figure 2.17: All of the fields selected.

5. Navigate to the **Format** menu item.
6. Select **Alignment > Stack** (Figure 2.18).

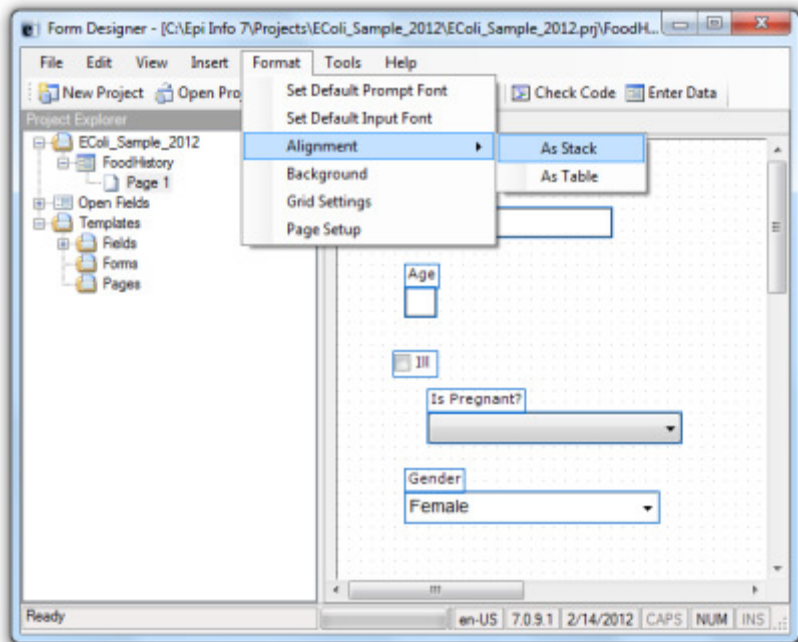


Figure 2.18: The alignment options.

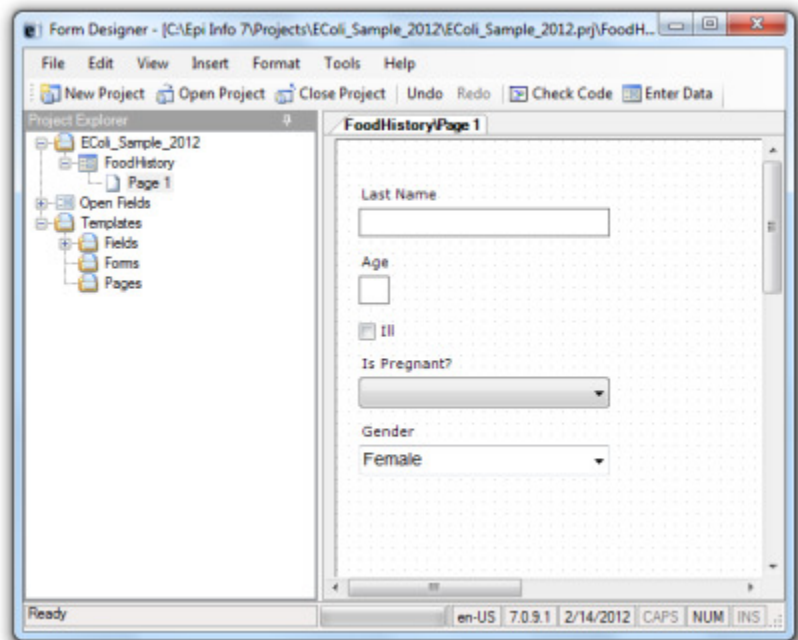


Figure 2.19: The fields after being aligned in 'stack' mode.

The fields are now aligned vertically on the screen (Figure 2.19).

OTHER FEATURES

UNDO AND REDO

Assuming you didn't actually mean to align the fields now, Epi Info™ 7 provides a way to undo your most recent changes.

1. Press **CTRL+Z** on the keyboard.
2. Or press the **Undo** button on the toolbar.

Notice how one of the fields snaps back to its original position. If you keep selecting Undo, the Form Designer will eventually revert all of the fields back to their original positions. If you go far enough, you can even undo the creation of those fields.

If you decide that you want to redo an action that you previously un-did, you can use the redo option.

1. Press **CTRL+Y**.
2. Or press the **Redo** button on the toolbar.

ADDING AND REMOVING PAGES

Sometimes, a single page is not nearly enough space to hold all of the fields for a single survey. You can quickly add or insert pages if you need additional space. Let's add a second page:

1. In the Project Explorer pane on the left-hand side of the screen, right-click the item called **FoodHistory**. A pop-up menu will appear. (FoodHistory is the name of the form we created earlier).
2. Select **Add Page**. A Page Name window should appear.
3. Leave the page name as its default of Page 2. Click **OK**. The second page is created and loaded onto the canvas.

You can navigate back and forth between pages by clicking on the **page name** in the Project Explorer. A page can be deleted by right-clicking on it and selecting **Delete Page**.

ADDING TEMPLATES

Some fields (i.e, Name, Age, Date of Birth, Address), may be fairly common among various forms that you design. Epi Info™ 7 includes a feature by which you can save one or more fields as a template to re-use those fields in other forms.

In the example below, we will add a template to Page 2. The Epi Info™ 7 development team has already included it with Epi Info™ 7, so we don't need to create it.

1. In the Project Explorer, click **Page 2** of the **FoodHistory** form.
2. Next to Templates, click the + **icon**. A new item called Standard should appear in the tree list.
3. Click the "+" icon next to **Standard** in the **Project Explorer**. Four new items should appear in the tree list.

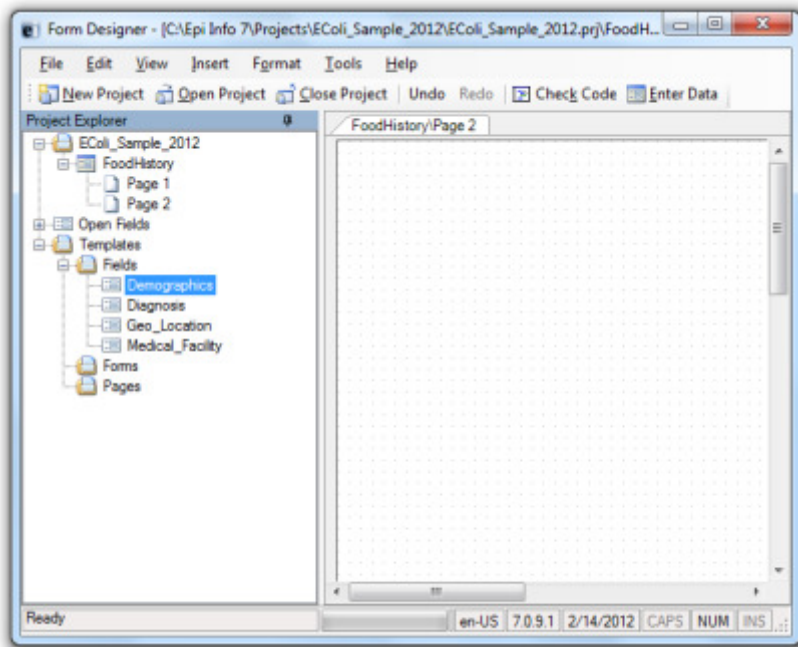


Figure 2.20: The Templates item, expanded.

4. Highlight **Demographics** (Figure 2.20) and drag it onto the **canvas**. After about 10 seconds, the demographics fields will appear (Figure 2.21).

Demographics

First Name <input type="text"/>	Last Name <input type="text"/>	Sex A-Ambiguous
DOB MM-DD-YYYY	Age <input type="text"/>	Ethnicity Group 2135.2-Hispanic or Latino
Race: <input type="checkbox"/> White <input type="checkbox"/> Native Hawaiian/Other Pacific Islander <input type="checkbox"/> Unknown/Other <input type="checkbox"/> Black <input type="checkbox"/> American Indian/Alaskan Native <input type="checkbox"/> Asian <input type="checkbox"/> Multiracial		
Patient Address <input type="text"/>	<input type="button" value="Get Patient Coordinates"/>	County <input type="text"/>
Occupation <input type="text"/>	Latitude <input type="text"/>	Longitude <input type="text"/>
Home Phone ###-###-####	Email Address <input type="text"/>	Cell Phone ###-###-####

Figure 2.21: The Demographics template.

Adding the demographics template was much faster than manually creating the first name, last name, sex, DOB, and age fields for a brand-new survey. Not all templates, however, will fit every scenario and some modifications will typically be needed. Once the template has been added to a form, you can modify the fields in manner.

You can also define your own templates by selecting multiple fields, right-clicking on the canvas, and selecting Save as Template.

ADDING A FORM TITLE

We probably want to place a heading or title on our questionnaire to make it obvious what it is the questionnaire is for. Titles can be added by creating a label field. Unlike the other fields we've created, label fields do not store any data and exist for display purposes only. Follow the steps below to add a title to the top of the questionnaire:

1. In the Project Explorer pane, click on **Page 1**. You should be on the first page.
2. Make space for the title at the top of the form. Rearrange the fields on the form to make sufficient space. You may need to re-align the fields once you are done moving them (see the Field Alignment section).
3. To add a new field, right-click on the **canvas**.
4. From the list of choices, select **Label/Title**. A Label/Title dialog will appear (Figure 2.22).

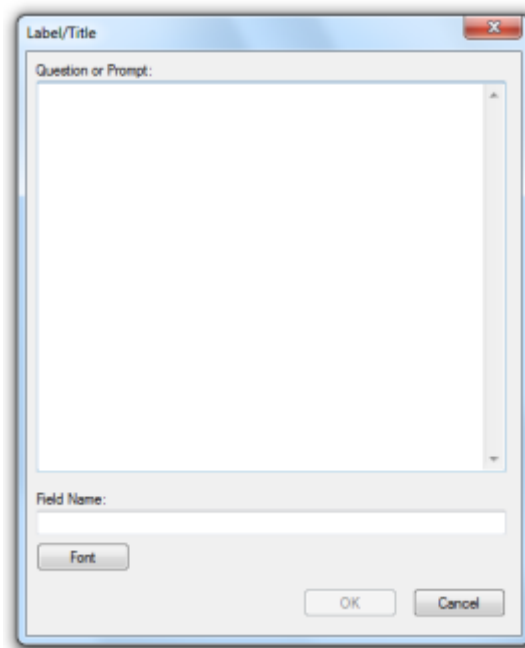


Figure 2.22: The Label/Title field definition dialog after completing Step 4.

5. In the Question or Prompt field, type **E. Coli Food History Questionnaire**.
6. Press the **Tab** key. Notice how the cursor jumps to the **Field Name** field and automatically filled it in based on the prompt.
7. Click the **Font** button. A Windows Font dialog appears.
8. Change the font style to **Bold**.
9. Set the size to **18**.

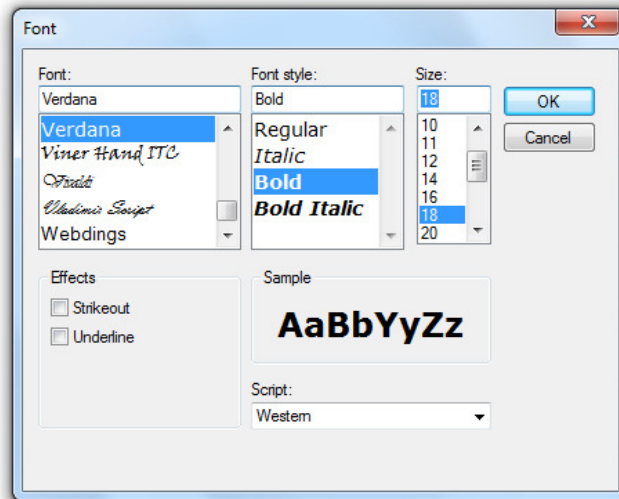


Figure 2.23: The Font dialog after completing Step 9.

10. Click **OK**. The font is set and the Label/Title field definition dialog re-appears.

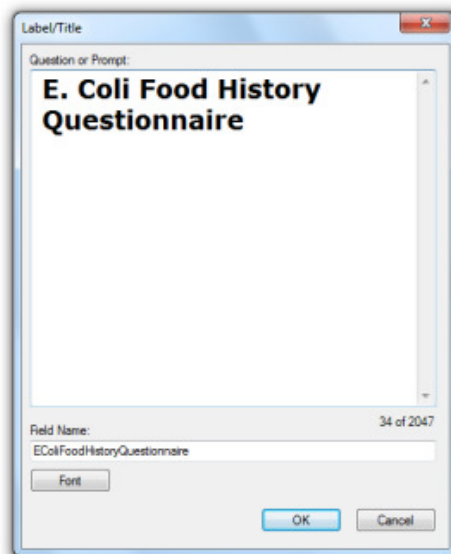


Figure 2.24: The Label/Title field definition dialog after completing Step 10.

11. Click **OK**. The field is created and displayed on the canvas.

Labels often need to be re-sized to properly fit the screen. Re-sizing labels is important because it allows the use of soft line breaks and easier placement of large amounts of text. Notice how when the mouse is moved over the label, eight handlebars appear that allow its boundaries to be expanded or collapsed (Figure 2.25).

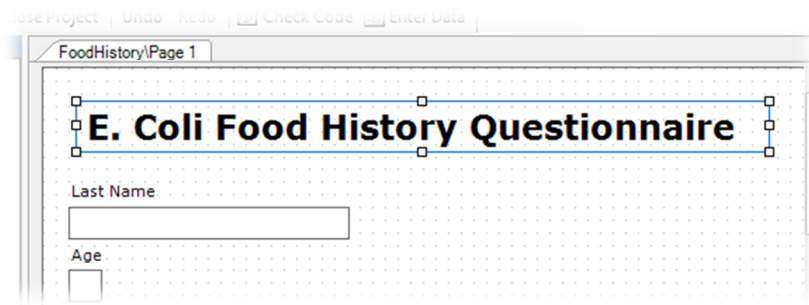


Figure 2.25: Moving the mouse over the label field.

Changing the position of the box using the handlebars can be used to break the text into multiple lines (Figure 2.26).

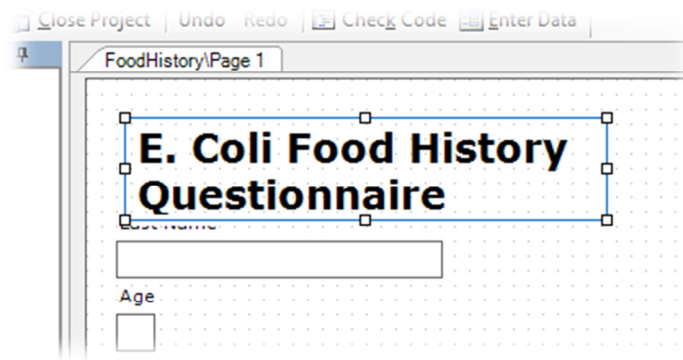


Figure 2.26: Re-sizing the title.

After adding and manipulating the title, our food history questionnaire should look similar to Figure 2.27.

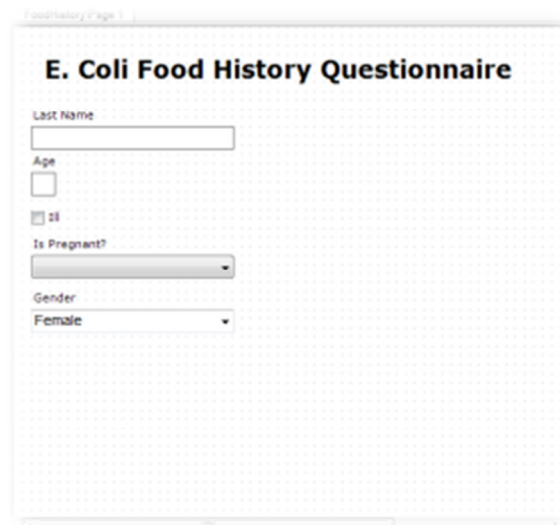


Figure 2.27: The form after adding the label/title field at the top of the page.

WORKING WITH THE TAB ORDER

The tab order refers to the order in which the cursor visits each field on a page as the Tab key is pressed. Having a tab order that does not follow the logical order of entry will make entering data cumbersome. However, the data entry person can override the tab order at any time by using the mouse. Epi Info™ 7 has several built-in options for managing the tab order which will be discussed below.

SHOWING THE TAB ORDER

First, let's go back to Page 1 and look at the tab order as it exists after completing all of the prior sections:

1. In the Project Explorer pane, click on **Page 1**.

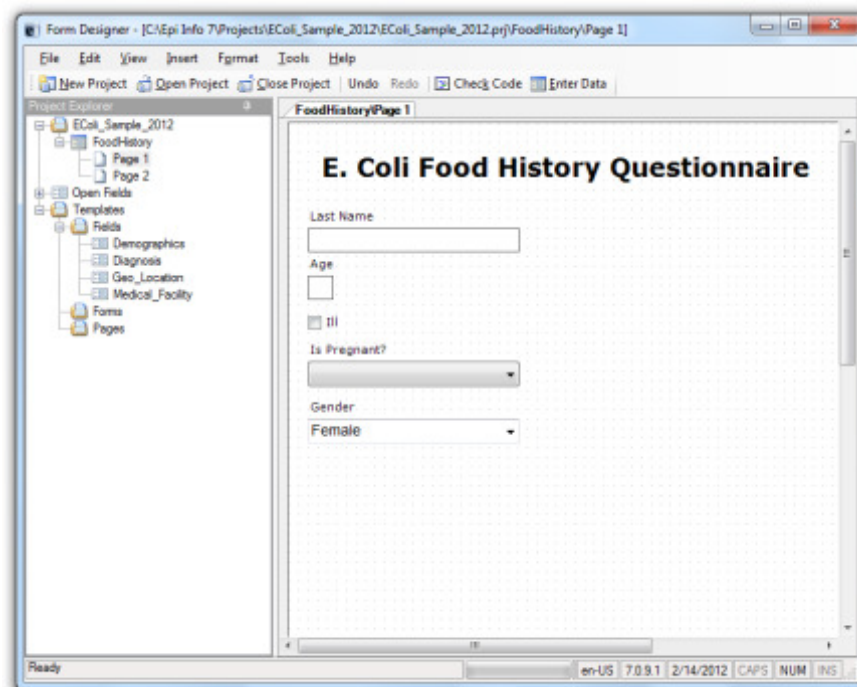


Figure 2.27: Page 1 of the FoodHistory form.

2. Right-click on the **canvas**.
3. Select **Tabs > Show Tab Order** (Figure 2.28). The canvas will change to look like Figure 2.29.

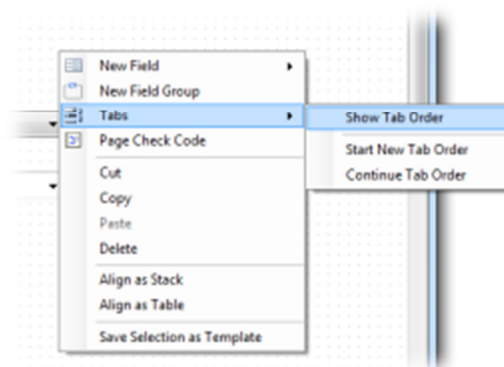


Figure 2.28: Completing step 2 above

FoodHistory Page 1

E. Coli Food History Questionnaire

Last Name
0

Age
1

Is Pregnant?
3

Gender
4
Female

Figure 2.29: The canvas after completing Step 2.

Note: The order of entry will follow from the smallest to the largest number. This means that Last Name will be filled in first. Pressing TAB will take you to the Age field. Pressing TAB again will take you to the Ill field.

4. To make the black tab boxes disappear, left-click anywhere on the **canvas**.
5. Add a new text field called **Patient ID**. Place it next to the **Last Name field** (Figure 2.30).

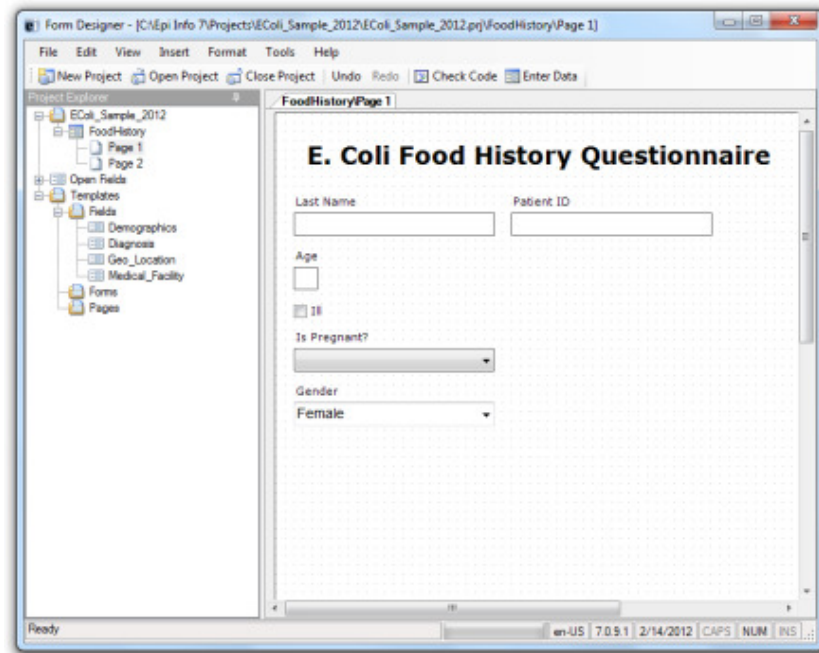


Figure 2.30: The canvas after completing Step 4.

6. Display the tab order again by repeating Step 2. The black tab boxes appear (Figure 2.31).

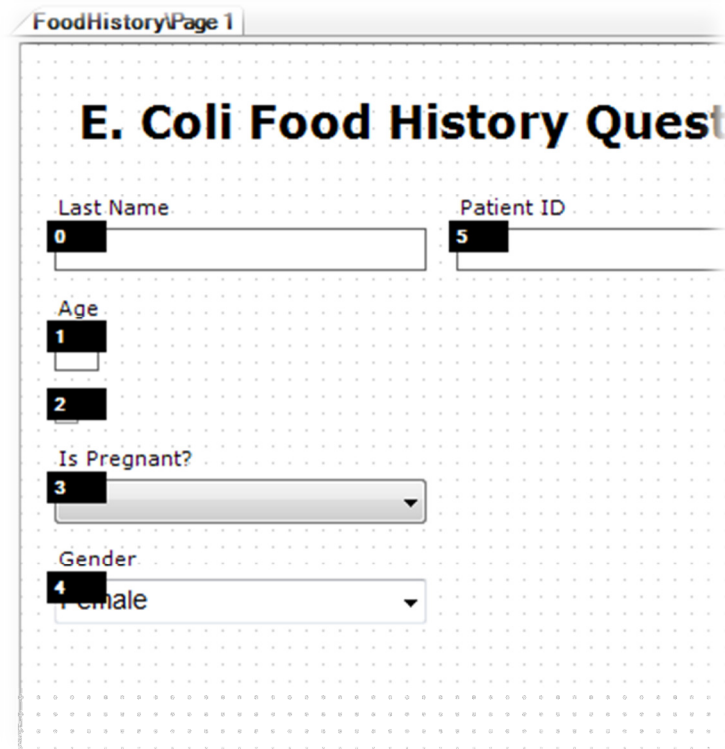


Figure 2.31: The tab order after adding Patient ID.

Because Patient ID was added last, it has the highest tab number, even though it appears right next to the Last Name field. Logically, it would make sense that the Tab key would move the cursor from Last Name to Patient ID but until the tab order is modified, this will not occur. Instead, the cursor will move in the following order:

1. Last Name
2. Age
3. Ill
4. Is Pregnant?
5. Gender
6. Patient ID

AUTOMATICALLY RE-CALCULATING THE TAB ORDER

You have two options. First, let the Form Designer automatically re-calculate the tab order based on each field's placement on the page. This will force the tabs to go in ascending order using a top-to-bottom, left-to-right algorithm.

To automatically re-calculate the tabs:

1. Right-click on the **canvas**.
2. Select **Tabs > Start New Tab Order** (Figure 2.32). In a few moments, the canvas should appear (Figure 2.33).

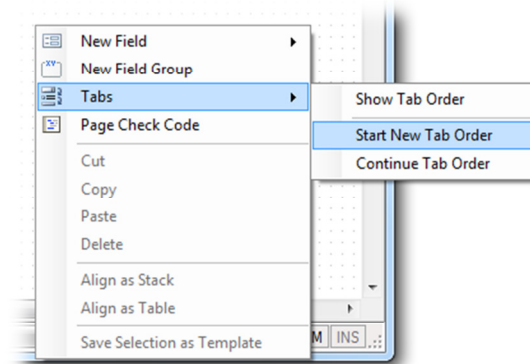


Figure 2.32: Re-calculating the tab order.

The screenshot shows a form titled "E. Coli Food History Questionnaire" with a header "FoodHistoryPage 1". The form contains several fields with numbered tabs indicating the order of entry: Last Name (tab 1), Patient ID (tab 2), Age (tab 3), Is Pregnant? (tab 4), Gender (tab 5), and Is Pregnant? (tab 6). The tabs are numbered 1 through 6, indicating the order of entry.

Figure 2.33: The re-calculated tabs.

Notice that the order has changed to ensure that Patient ID will be filled out after Last Name instead of after Gender.

MANUALLY SETTING THE TAB ORDER

There are many cases where the tab order must be set manually. For example, we may want to provide slight customizations to the tab order that the automatic tab re-calculation (discussed in the previous section) will not be able to provide. Let's change the current order of entry for Page 1 of the FoodHistory form:

1. Patient ID
2. Last Name
3. Gender
4. Age
5. Ill
6. Is Pregnant?

To make this change, we'll first display the black tab boxes and click on each of them in the order you want the entry to occur:

1. Right-click on the **canvas**.
2. Select **Tab > Show Tab Order**. The canvas will change to show black tab boxes over each field.
3. Left-click on the **black box for the Patient ID field**. This sets Patient ID as the first field.

4. Left-click on the **black box for the Last Name field**. The tab number for Last Name should change to be one more than the value in the Patient ID field.
5. Left-click on the **black box for the Gender field**.
6. Left-click on the **black box for the Age field**.
7. Left-click on the **black box for the Ill field**.
8. Left-click on the **black box for the Is Pregnant? field**.

The canvas should now appear (Figure 2.34).

FoodHistoryPage 1

E. Coli Food History Questionnaire

Last Name **3** Patient ID **2**

Age **5**

6

Is Pregnant? **7**

Gender **4** Female

Figure 2.34: The canvas after completing Step 7.

Notice that the lowest tab index is two. The order always flows from the lowest number to the highest, regardless of where the numbering starts.

If we want to go back to the previous order, follow the steps in the Automatically Re-calculating the Tab Order section.

GROUPING FIELDS

Fields can be grouped together using the Add Group Field option. The Group Field will add a rectangular box around the fields it contains, and the group's name will appear at the top. See Figure 2.35 for an example of a group field.

Places Visited

<input type="checkbox"/> Springfield	<input type="checkbox"/> Registration	<input checked="" type="checkbox"/> Staff Room	<input type="checkbox"/> Locker Rooms
<input type="checkbox"/> Boys Dorm	<input type="checkbox"/> Girls Dorm	<input checked="" type="checkbox"/> Basketball Court	<input type="checkbox"/> Lake / Canoe
<input type="checkbox"/> Library	<input type="checkbox"/> Tennis Court	<input checked="" type="checkbox"/> Ropes Course	
<input type="checkbox"/> Pool	<input type="checkbox"/> Picnic Area	<input type="checkbox"/> Arts and Crafts	
<input type="checkbox"/> Movie Theatre	<input checked="" type="checkbox"/> Dining Hall	<input type="checkbox"/> Vegetable Garden	

Figure 2.35: An example of a group of checkbox fields.

In the image above, the Places Visited group field contains 17 checkbox fields. During analysis, we have the option of analyzing the group field as a whole instead of analyzing each of the checkbox fields separately. Grouped analysis can save considerable time and effort. For more information on analyzing group fields, see the sections below on analyzing data.

Because we're dealing with an outbreak of E. Coli, we probably want to collect information regarding what foods may have been consumed. As in the example above, we could create one checkbox for each food item and group the checkboxes together, making analysis of the foods eaten much simpler.

1. Create a **third page** on the FoodHistory form.
2. Add the following checkbox fields to the third page using the techniques you have learned so far:
 - Grapes
 - Blueberries
 - Fresh Celery
 - Tomatoes
 - Raw Carrots
 - Strawberries

After the checkbox fields have been added, Page 3 of the form should look like Figure 2.36.

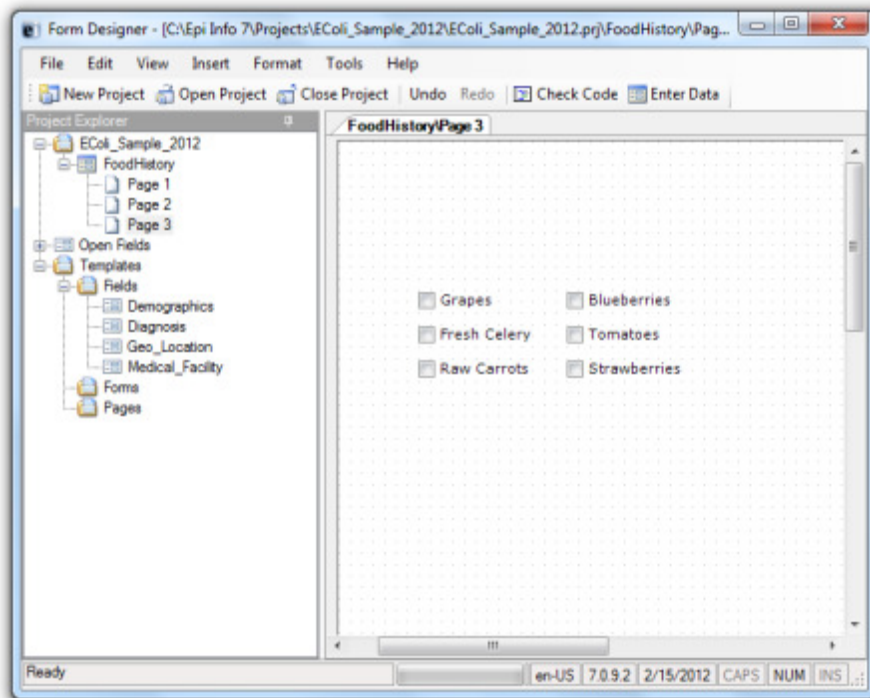


Figure 2.36: The six checkbox fields after completing Step 2.

3. To highlight the fields, left-click and drag a box around the six checkbox fields created in Step 2.

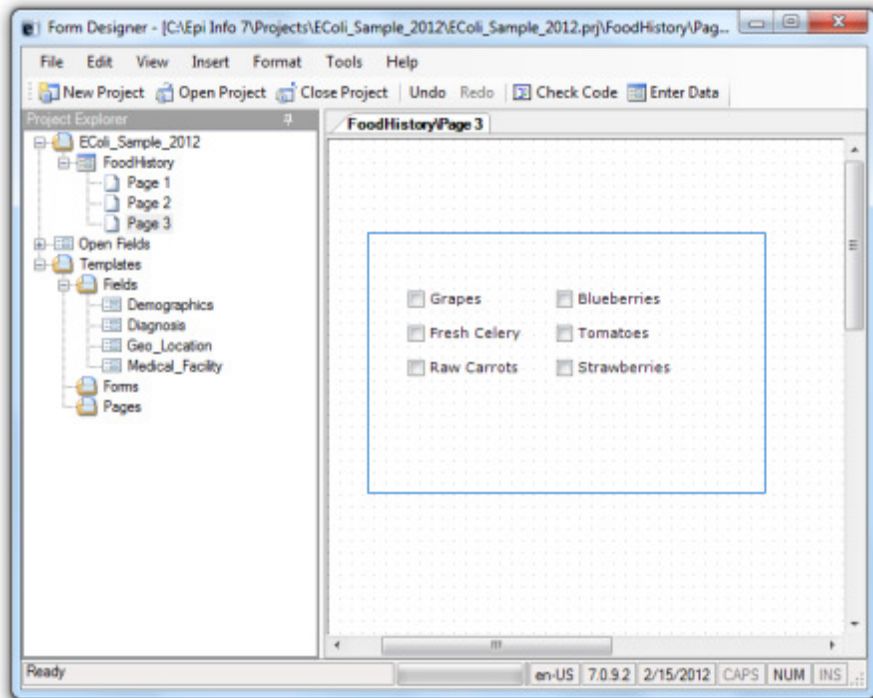


Figure 2.37: Dragging a box around the six fields.

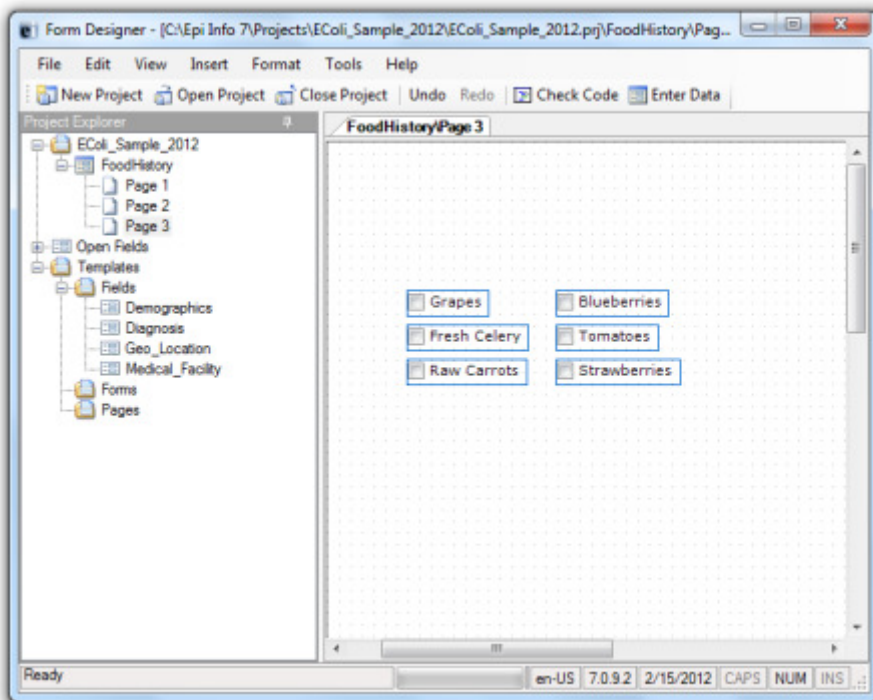


Figure 2.38: The six fields highlighted.

4. With the fields highlighted (Figure 2.38), right-click on the **canvas**.

5. From the pop-up context menu, select **New Field Group**. If you do not see the New Field Group option in the right-click context menu, make sure you right-click on the canvas and not on any of the fields. Also make sure that all six of the fields are highlighted (Figure 2.38).
6. In the group field prompt, type **Foods Eaten**.
7. To set the field's field name, press the Tab key.
8. Click **OK**. The group field is created (Figure 2.39).

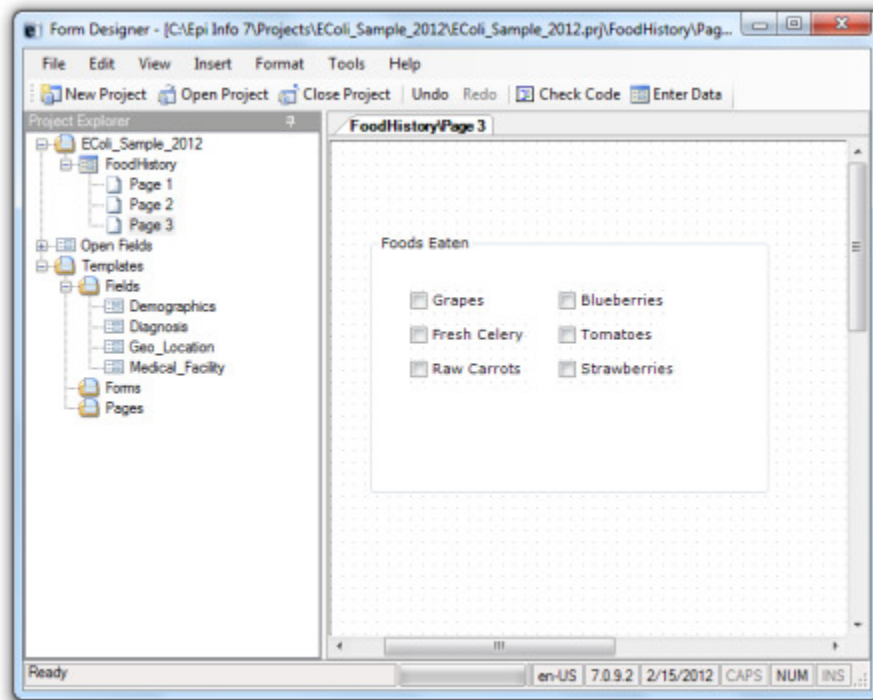


Figure 2.39: The group field after completing Step 7.

The group can be re-sized and moved similar to a label field. Moving the group field also moves the fields within the group. Note that it may be difficult to multi-select fields inside of a group. Left-clicking and dragging does not work on a group field.

ADDING INTELLIGENCE TO FORMS – CHECK CODE

Check Code helps validate data entry and allows data to be entered faster and more accurately. With advance planning, code can be created to do calculations, skip questions based on prior answers, prompt the user with dialog boxes, and populate fields. In its most basic form, Check Code is a set of rules for the person entering data to follow. It helps eliminate errors that occur when entering large amounts of information.

For the purposes of this guide, we will create a very simple skip pattern using several of the fields we generated on the first page of the E. Coli Food History Questionnaire.

Note: The term “Check Code” originated from the desire to “check” the user’s input for accuracy and correctness.

CREATING A SKIP PATTERN

To make a relevant example, first move the fields around a bit. The Gender field needs to appear beneath the **Name** field, and Is Pregnant? should appear directly under **Gender**. Use the skills you have learned in field placement to re-arrange and re-align the fields in such a manner. See Figure 2.40.

The screenshot shows the 'Form Designer' window for 'E. Coli Food History Questionnaire'. The 'Project Explorer' on the left lists the form's components: EColi_Sample_2012, FoodHistory (Page 1, Page 2, Page 3), Open Fields, Templates, Fields, Demographics, Diagnostics, Geo_Location, Medical_Facility, Forms, and Pages. The main form area displays the questionnaire layout. Fields include 'Last Name' and 'Patient ID' at the top, followed by 'Gender' (a dropdown menu currently showing 'Female'), 'Is Pregnant?' (a dropdown menu currently showing 'No'), and 'Age' (a text input field). The status bar at the bottom indicates 'Ready', 'en-US', '7.0.9.2', '2/15/2012', 'CAPS', 'NUM', and 'INS'.

Figure 2.40: The form as it should look prior to starting this section.

The form must be re-arranged to look like Figure 2.40. Otherwise, the skip pattern we’re creating will not work.

Let's start with a simple example: If the user enters Male for the **Gender** field, we want to move the cursor past the **Is Pregnant?** field, leaving it blank.

1. On the Form Designer toolbar, click the **Check Code** button. The Check Code Editor window appears (Figure 2.41).

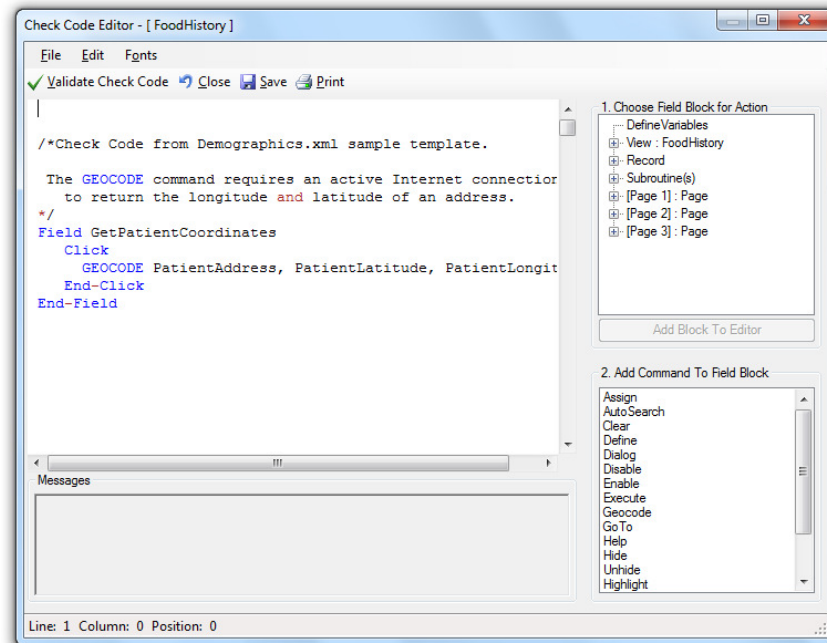


Figure 2.41: The Check Code Editor window.

2. You want the action, (in this case, the skipping of a field), to occur after you enter a value for the Gender field. You need to specify this field when creating the Check Code commands. In the Choose Field Block for Action pane, **expand the Page 1 node** (Figure 2.42). The list of fields on Page 1 should appear.

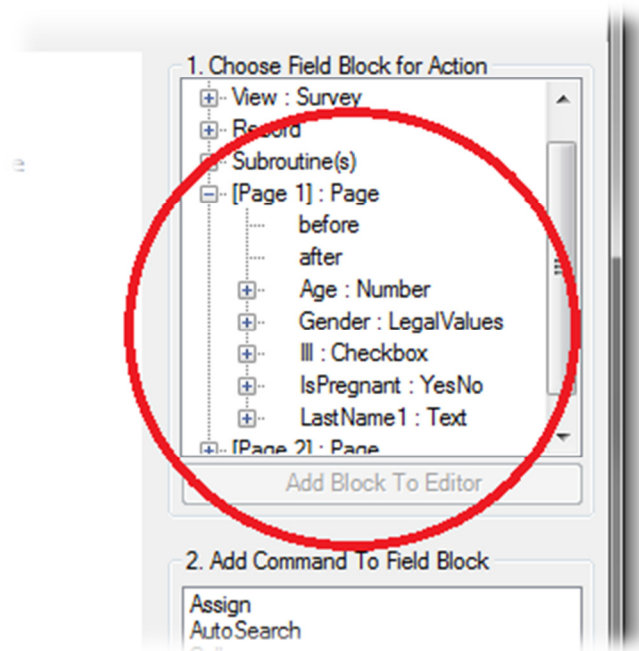


Figure 2.42: Expanding the Page 1 tree node.

- From the list of items underneath Page 1, double-click on **Gender : LegalValues**. The item expands to reveal options Before and After (Figure 2.43).

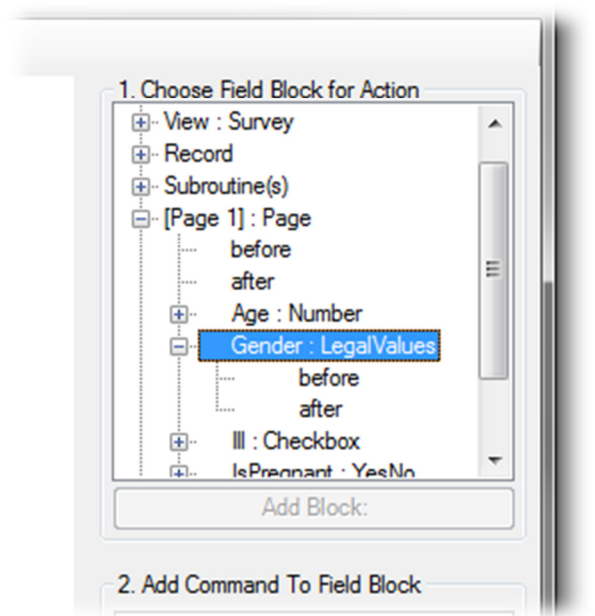


Figure 2.43: The expanded options for Gender.

- Left-click on the **after** option (Figure 2.44). Notice the Add Block button becomes enabled with the phrase Add Block: Gender after.

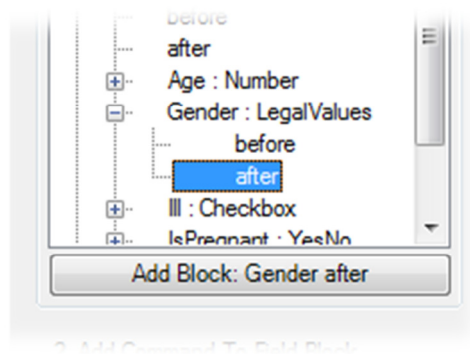


Figure 2.44: Highlighting the after option for Gender.

5. Click the **Add Block : Gender after** button. This should add a block of code to the Check Code Editor window (Figure 2.45).

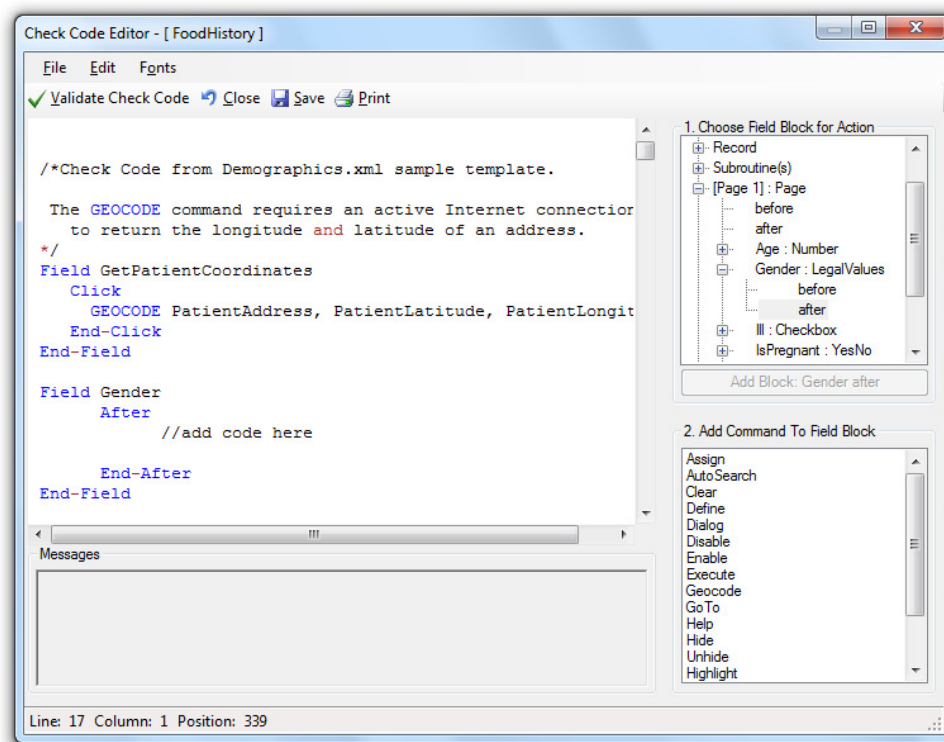


Figure 2.45: The Check Code Editor window after completing Step 7

6. Position the cursor immediately after the line that reads **//add code here**.
7. From the Add Command to Field Block pane, left-click on the **If** command option (Figure 2.46). The If command dialog appears (Figure 2.47).

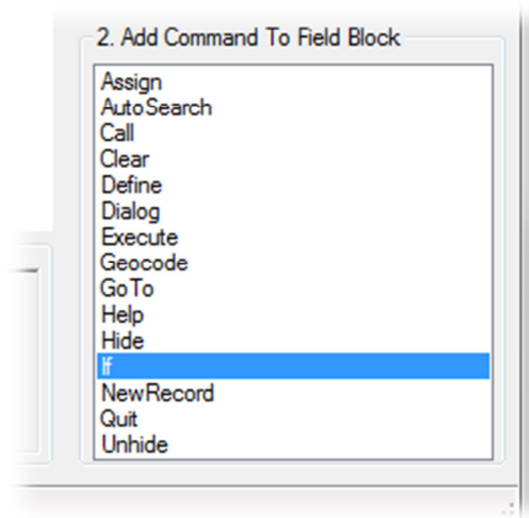


Figure 2.46: Selecting the IF command.

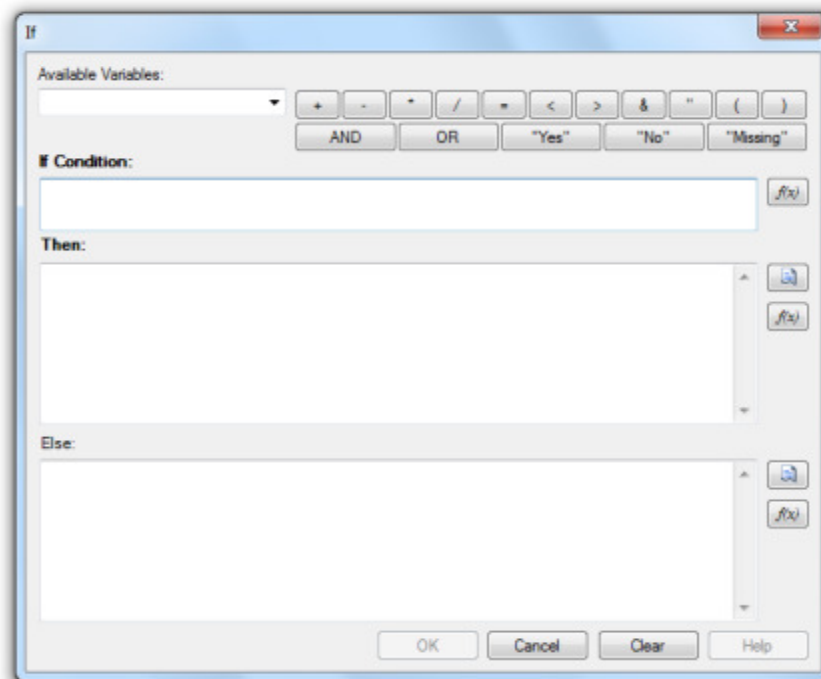


Figure 2.47: The If Command Dialog.

8. The If command dialog allows you to execute certain commands based upon a condition. Recall the condition for the example: If the patient's gender is male. Since the Gender field stores the value for gender that was entered, you need to specify it in the condition. From the Available Variables drop-down list, select **Gender**. The If dialog changes to look like Figure 2.48.

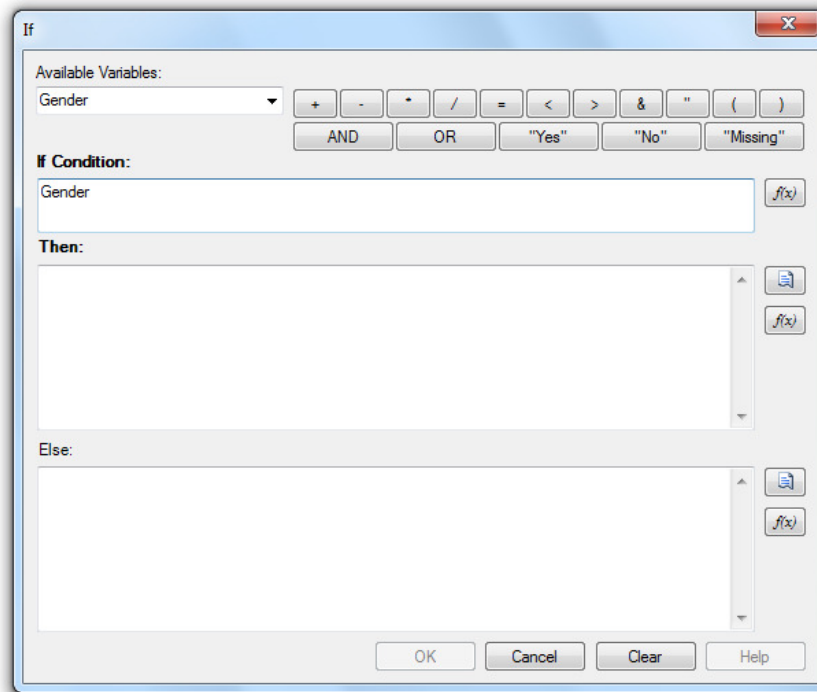


Figure 2.48: The If Command Dialog after completing Step 10.

9. From the **Operators** group, click the = button, An = sign is inserted into the If Condition text box.
10. from the **Operators** group, click the . A “ is inserted into the If Condition text box.
11. Place the **cursor** into the If Condition text box.
12. Type **Male**.
13. From the Operators group, click the “ **button**. A “ is inserted into the If Condition text box. The If command dialog should now appear (Figure 2.49).

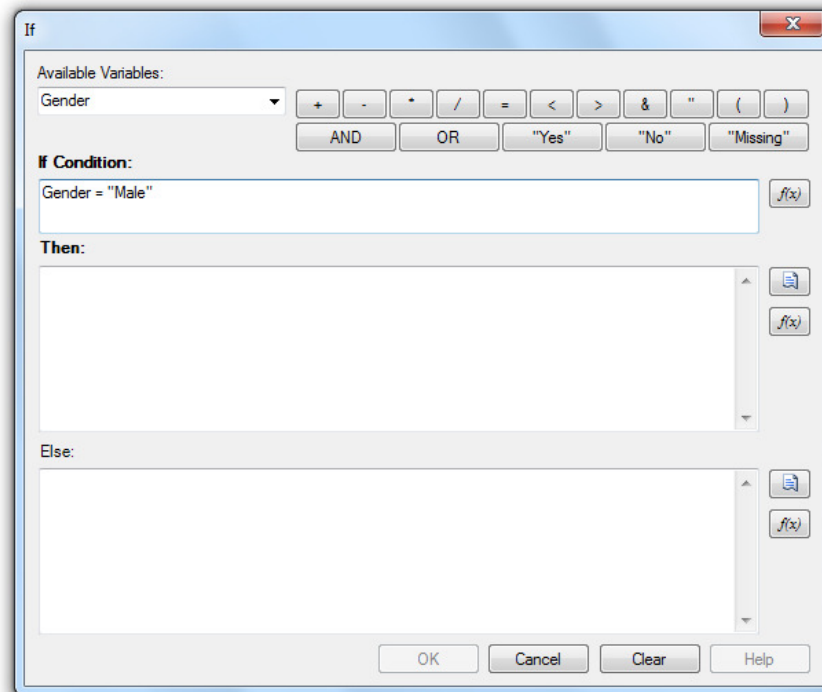



Figure 2.49: The If Command Dialog after completing Step 15.

14. Our condition has now been set. Specify what actions will be taken when this condition is true. To do this, click the  button next to the Then list box. A list of commands will appear (Figure 2.50).

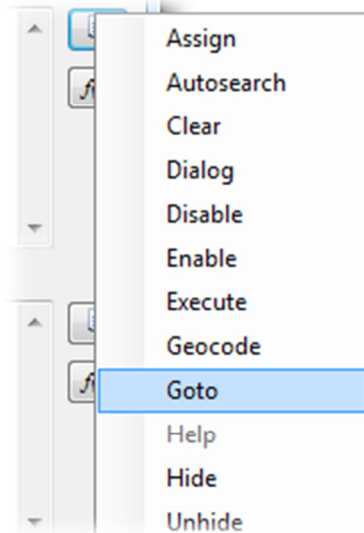


Figure 2.50: Commands available after completing Step 16.

15. From the list, select **Goto**. The **Goto** command forces the cursor to a specified field, so it is ideal to use for creating our skip pattern. A **Goto** command dialog will appear (Figure 2.51).

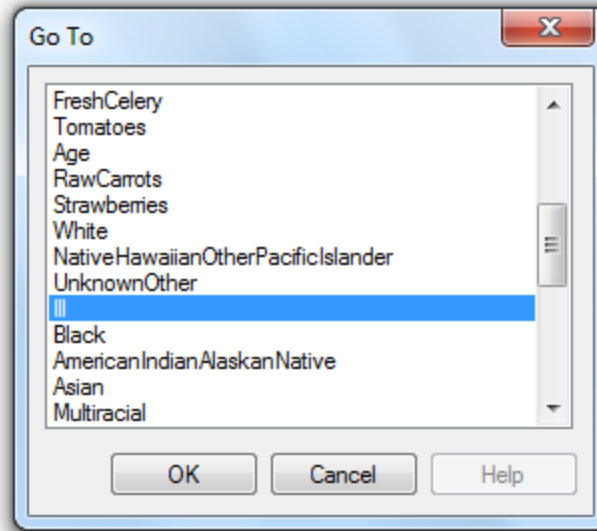


Figure 2.51: The Goto command dialog.

16. Highlight the **III** field (Figure 2.51).
17. Click the **OK** button. The **If** command dialog should re-appear (Figure 2.52).

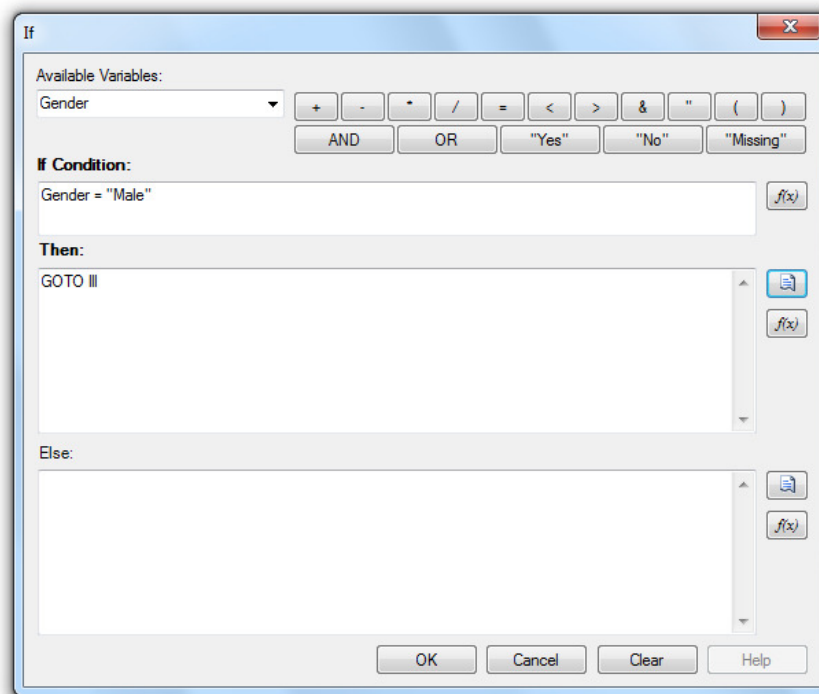


Figure 2.52: The If command dialog after completing Step 17.

18. Click **OK**. The **Check Code Editor** window should appear (Figure 2.53).

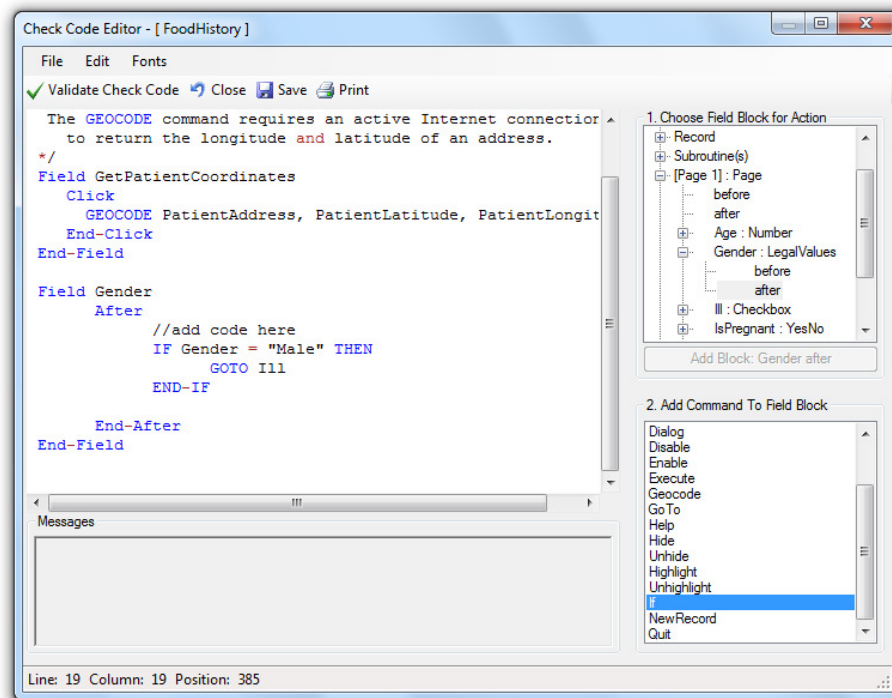


Figure 2.53: The Check Code Editor after completing Step 18.

19. From the **Check Code Editor** window toolbar, click the **Validate CheckCode** button.
20. From the **Check Code Editor** window toolbar, click the **Save** button.
21. Click the **Close** button.

Note: The Validate CheckCode button is useful for finding syntax errors in the code. If errors are found, they will be displayed to you in the **Messages** pane at the very bottom of the Check Code Editor window.

Congratulations, you've created a skip pattern! Before you can test it, however, you need to open the form in the data entry module, which will be discussed in the next section.

Warning! If the next field in the tab order also has 'after' check code, do not use a GOTO for your skip pattern. In this scenario, you should HIDE or DISABLE the fields in-between the field to be skipped, and the field to be skipped to when the condition is true. UNHIDE or ENABLE them when the condition is false.

4

ENTERING DATA

OPENING THE DATA ENTRY MODULE

Data entry in Epi Info™ 7 is fairly straightforward. Like the Form Designer, it is a distinct module that we'll need to open in order to use. Thankfully, the Form Designer makes it very easy to go straight to data entry mode:

1. From the toolbar, press the **Enter Data** button. A Create New Data Table dialog should appear.
2. Click the **Yes** button. A New Data Table dialog should appear.
3. Leave the default values alone. Click **OK**.

The Form Designer will close and the Enter module will appear in several seconds. If you followed all of the steps in part two, look at a form similar to Figure 3.1.

Figure 3.1: Your form, ready for data entry!

The Enter window looks similar to the Form Designer window: The main panel, or canvas, shows the fields you created in part two, while the left-hand side of the window shows you a list of pages that exist for this particular form.

The key difference is that you can now enter data into the fields you created. Buttons at the top of the screen allow you to navigate forwards and backwards through the records (we don't have any records since we just created the form, so these won't function at the moment), a Find feature to search for existing records, a New Record button for manually creating new records, etc.

ENTERING DATA

FIELD TYPES

If you recall, the Last Name field is a text field and accepts almost any sort of input. In other words, Smith is just as valid as abc#(&*(ojio3211.

The next field, Gender, is Legal Values and the only input that is legal is what appears in the list of choices. In this case, only Male and Female will be accepted.

Following gender is a Yes/No field. Notice how you can select either Yes or No from the drop-down list of choices. Unlike the checkbox field, however, you can leave the Yes/No field blank, which represents an unknown or missing response.

The fourth field is a checkbox asking whether the patient was ill. It starts off unchecked, or false. You can check the checkbox to give it a value of true, but you can never clear its value. It's always either true or false.

The last field, Age, is Numeric and only accepts numbers. Because you set upper and lower boundaries on what types of numbers it would accept, entering values below 5 or above 80 is not allowed.

FIELD AND PAGE NAVIGATION

To move from one field to another, use the mouse or press the **Tab** key. If you press Tab while you're on the last field on a page, Enter will automatically advance to the next page. If you're on the last field of the last page, then Tab will advance you to page 1 of a new record.

Additionally, any page in the form can be loaded by clicking on it in the Pages panel on the left-hand side of the screen.

In the previous section, you added some intelligence into the form (e.g., if Male is entered into the Gender field, then the cursor will skip past the pregnancy question). Do this now:

1. From the list of choices in Gender, select **Male**.
2. Press **tab**. The cursor should land in the **Ill** checkbox. If "Female" is selected instead, then pressing tab should move the cursor to the question regarding whether the patient is pregnant.

Because we have a lot of different fields on page two, let's navigate to that page:

1. On the left-hand side of the screen, locate the **Pages** panel.
2. From the list of pages, click on **Page 2**. The Demographics fields should appear (Figure 3.2).

Figure 3.2: The 'Demographics' fields on page two.

This template includes several field types not discussed in part two (e.g., date fields, user-defined drop-down lists, and command buttons). Don't worry about those for the moment. Enter some data into the fields to get a feel for it.

GEOCODING ADDRESSES INTO LATITUDE/LONGITUDE

Take note of the Get Coordinates button and the latitude and longitude fields. If you are connected to the Internet, Epi Info™ 7 can turn a street address into latitude and longitude. Let's take a look at how this is done.

1. Type **1600 Clifton Rd. Atlanta, GA 30329, USA** into the Address field.
2. Click the **Get Coordinates** button. A Geocoding Results dialog should appear (Figure 3.3).

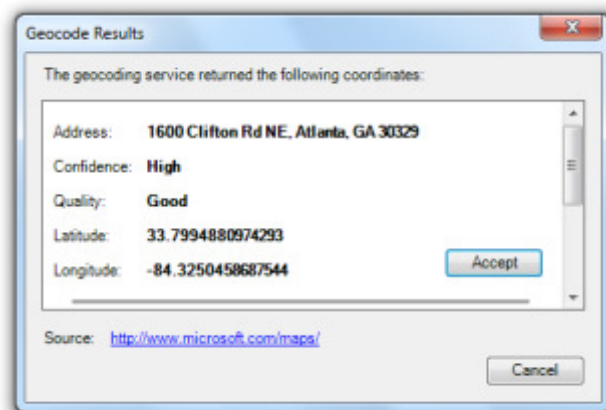


Figure 3.3: The Geocoding Results window after completing Step 2.

3. Click the **Accept** button. The latitude and longitude for this address (displayed in the Geocode Results dialog) will be placed into the form's Latitude and Longitude fields.

GPS coordinates may be helpful to collect, especially if they are displayed on a map. Epi Info™ has some built-in mapping capabilities. We'll discuss more on maps later. For now, let's show a quick map with the single record displayed:

1. If the geocoding was successful, press the **Save** button on the Enter toolbar. This will commit the record to the database.
2. From the Enter toolbar, press the **Map** button. The Map window will appear (Figure 3.4).

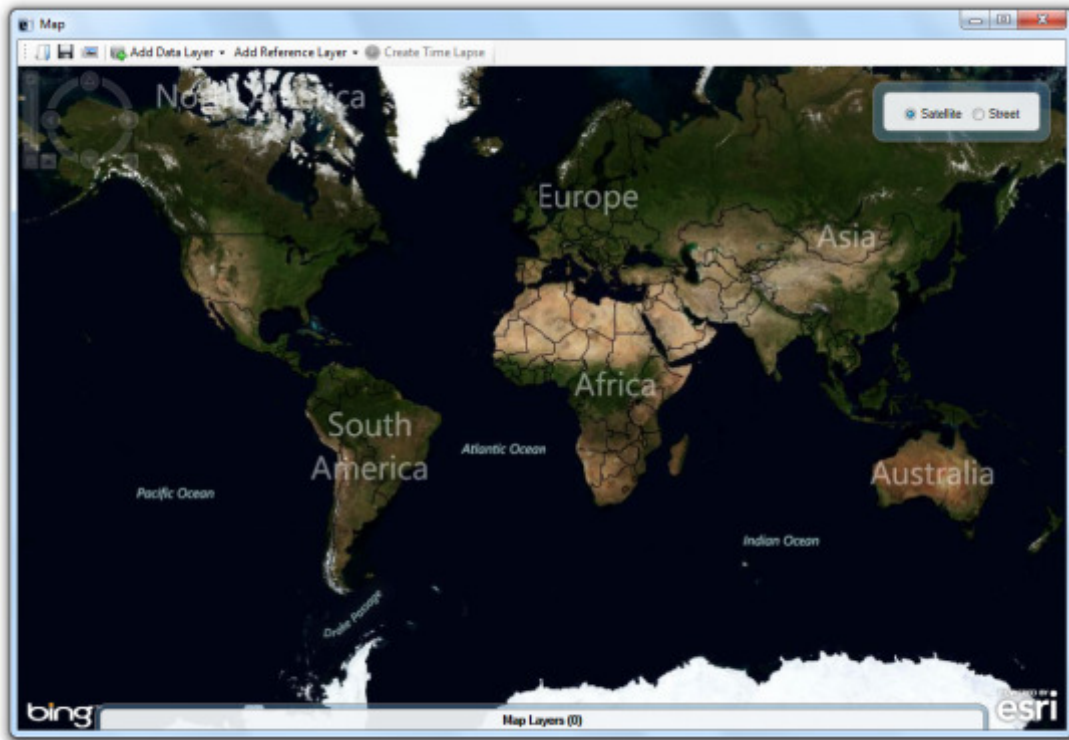


Figure 3.4: The Map window.

3. From the toolbar at the top of the **Map** window, select **Add Data Layer > Case Cluster**.
4. Select **No** when prompted to use external data. A small gadget should appear with Latitude and Longitude drop-down lists.
5. From the Latitude drop-down, select **PatientLatitude**.
6. From the Longitude drop-down, select **PatientLongitude**. (Figure 3.5).

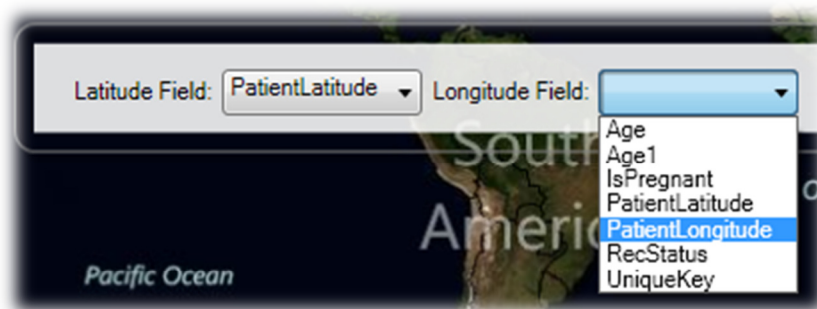


Figure 3.5: Selecting values for the fields.

After both drop-down lists have been filled in, the coordinate will be displayed. You may want to switch between Street and Satellite depending on your particular mapping needs. This can be done using the street/satellite selector in the top-right corner of the map window. Figure 3.6 shows the coordinate displayed in Street mode.

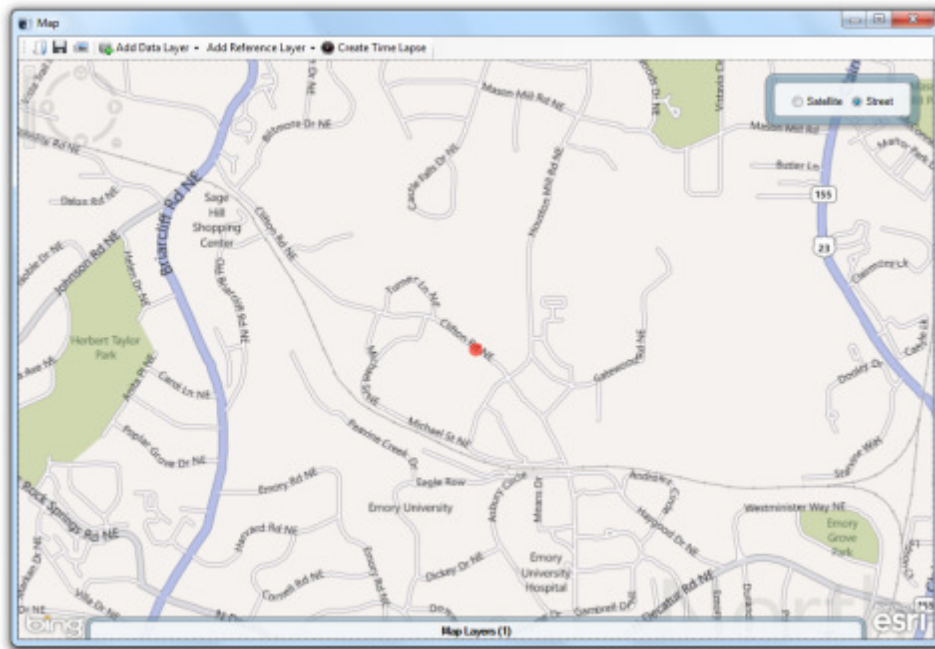


Figure 3.6: The location of the CDC.

LINE LISTS

To show some of the more advanced capabilities of the Enter module, in this case a line listing, we'll need to work with a larger set of data than what we can reasonably enter in a short period of time. Epi Info™ 7 contains a pre-built E. Coli Food History questionnaire with 359 records, which makes it an excellent candidate:

1. From the Enter toolbar, click the **Open Form**. An Open dialog will appear (Figure 3.7).

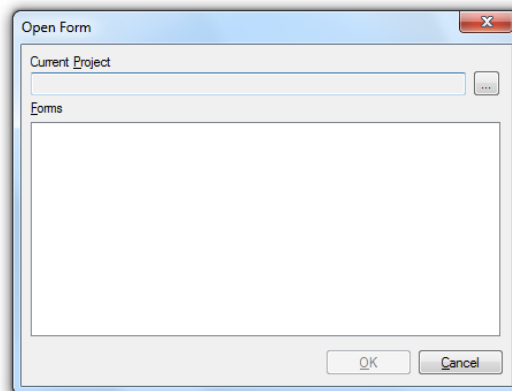


Figure 3.7: The Open form dialog.

2. To open a form in another project, change which project you're telling Enter to work with. Click the **browse** button next to the Current Project text box. A Select a Project dialog should appear.
3. From the Projects folder, select the **EColi** folder. A list of available projects should appear.
4. From the list, select **EColi**. The Open dialog shown in Figure 3.7 will change to look like Figure 3.8.

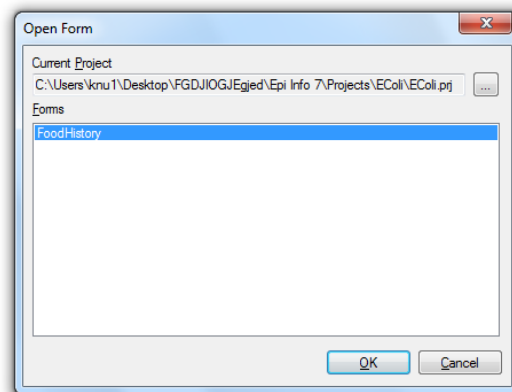


Figure 3.8: The Open form dialog after selecting the HIV project.

5. Because a new project has been opened, select a **form** within that project to work with.
6. From the Forms list, select the **FoodHistory** form.
7. Click **OK**. After several seconds, the **FoodHistory** form will appear in the Enter canvas (Figure 3.10). All data displayed in this form is fictional and for demonstration purposes only.

E. Coli O157:H7 Food History Questionnaire

Case ID: Date of Interview:

All data contained herein are fictional

Demographic Information

First Name: Last Name: Sex:

DOB: Age: Ethnicity Group:

Race: ☒ White ☐ Native Hawaiian/Other Pacific Islander ☐ Unknown/Other
☐ Black ☐ American Indian/Alaskan Native
☐ Asian ☐ Multiracial

Address: State:

Latitude: Longitude:

Occupation: Email Address: Home Phone:

Symptoms and Illness

Was the patient ill? Symptom Onset Date: Onset Week: Duration of Symptoms:

☒ Headache ☒ Fever ☒ Vomiting ☒ Bloody diarrhea ☒ Non-bloody diarrhea
☒ Poor feeding ☒ Chills ☒ Irritable ☒ Nausea ☒ Abdominal cramps

Highest fever temp:

If patient had diarrhea, how many loose stools per day?

Was the patient ill enough to require a doctor visit? Doctor visit date:

Figure 3.10: The E. Coli sample questionnaire.

If you look at the top of the Enter window, you'll we're on record 1 of 359. This provides a much larger set of records. To show a basic line listing:

1. Click on the **down arrow** next to the Line Listing button on the Enter toolbar. A list of line listing options should appear.
2. From the list of choices, select **Printable (HTML)**. An HTML line listing should appear in the operating system's default web browser.

Keep the E. Coli sample case form open for part four, data analysis.

PRINTING A FORM

From the Enter toolbar, click the Print button to produce a paper copy of your form (Figure 3.11).

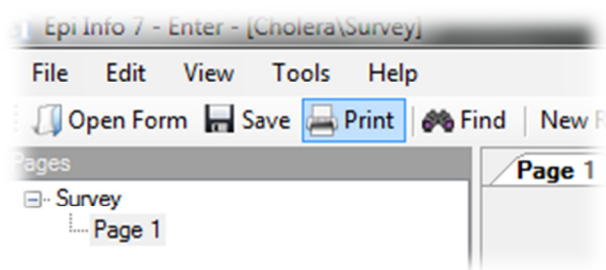


Figure 3.11: The Print button, highlighted in blue.

5

ANALYZING YOUR DATA

INTRODUCTION TO THE EPI INFO™ DASHBOARD

Epi Info™ 7 provides users with two ways of analyzing data: Through the Classic Analysis module and the Dashboard. Analysis is a very powerful command-driven module that has been included with almost every past release of Epi Info™ dating back to the 1980s. The Dashboard, a new feature with Epi Info™ 7, is designed to allow epidemiologists to conduct analysis without needing to learn intricate command syntax. For the purposes of this guide, we will only use the Epi Info™ 7 dashboard. More information on using the command-driven Classic Analysis module can be found in the Epi Info™ 7 User Manual.

To access the dashboard:

1. If you have not done so already, open the **E. Coli questionnaire form** discussed in part three.
2. From the Enter toolbar, click the **Dashboard** button. The Dashboard window will appear (Figure 4.1).

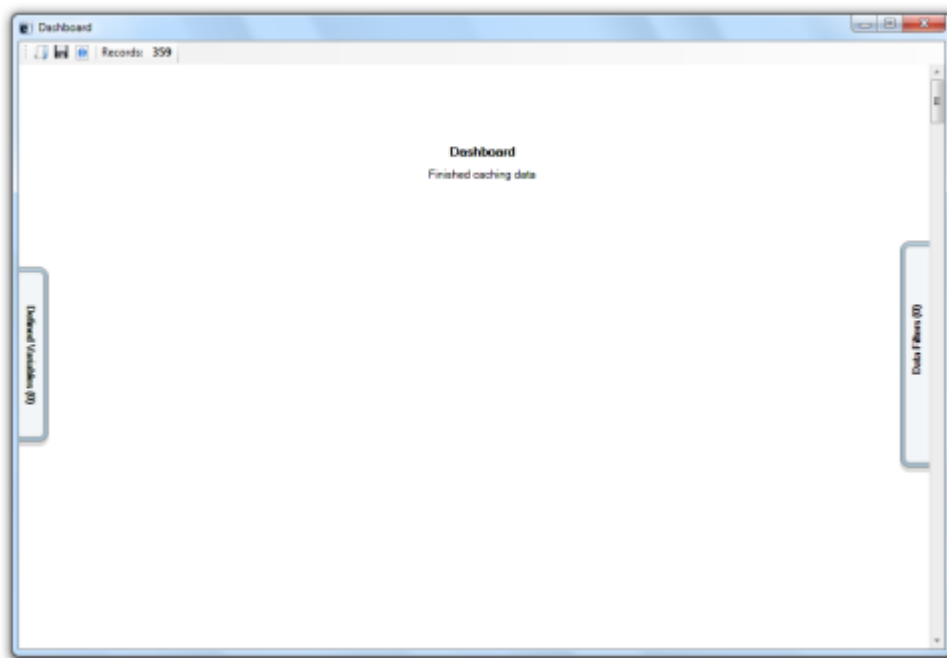


Figure 4.1: The Epi Info™ Dashboard.

The record count at the top-left corner of the Dashboard window should show 359 records. Notice the two “gadgets” on the left-hand and right-hand side of the screen. The one on the left is used for creating new variables; the one on the right is a data-filtering gadget. Those gadgets will become more useful later in this section.

E. COLI FOOD HISTORY QUESTIONNAIRE BACKGROUND

Before we continue here's some background on the E. Coli outbreak. You may have seen some of this information from the line listing that you displayed in part three, but the form has allowed us to collect several interesting pieces of information:

- Whether the patient was ill.
- What foods the patient ate.
- The patient's date of birth and age.
- The patient's gender.

All of the data was created specific to the town of Uelzen, Germany. Additionally, the data associated with this form are entirely fictional and was created to demonstrate some of the program's analytic capabilities.

ANALYSIS USING GADGETS

All of the analysis in the dashboard is done using gadgets. Three gadgets (record count, data filtering, and data recoding and formatting) always appear by default. You can add more, but never close those three.

LINE LISTS

Let's create a traditional line list of the data.

1. Right-click on the **dashboard**. A pop-up context menu will appear.
2. Select **Add Analysis Gadget > Line Listing** (Figure 4.2). A line list gadget will appear on the dashboard canvas (Figure 4.3).

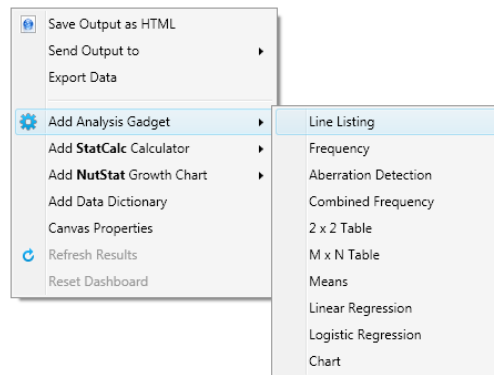


Figure 4.2: Adding a Line List gadget.

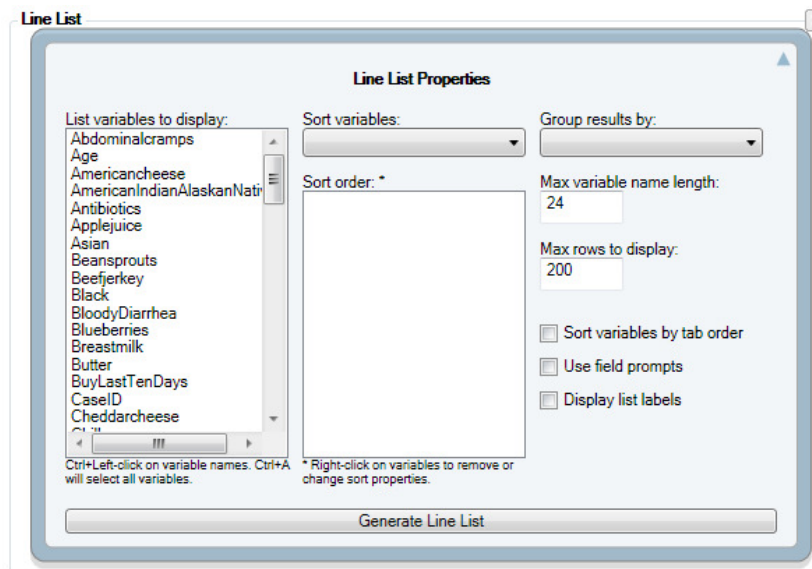


Figure 4.3: The line list gadget.

3. No fields are currently selected for display in the list. You must choose the fields you want to show. In the List variables to display list box, **CTRL+Left-click** on the **Age**, **CaseID**, **DOB**, **FeverTemp**, **ILL**, and **Sex** fields. (The CTRL+Left-click combination will allow you select multiple fields at once).
4. Click the **Generate Line List** button. The list is generated (Figure 4.4).

Line List

Line List Properties

Warning: Some rows were not displayed due to gadget settings. Showing top 200 rows only.

Line	CaseID	Sex	DOB	Age	ILL	FeverTemp
1	247	M-Male	1/1/1986	25	Yes	101.5
2	277	F-Female	10/4/1980	30	Yes	101.7
3	61	F-Female	3/11/1963	48	No	100.5
4	258	F-Female	4/19/1991	20	Yes	Missing
5	127	F-Female	3/20/1987	24	Yes	101.9
6	323	F-Female	2/4/1959	52	Yes	102.6
7	152	M-Male	9/16/1951	59	Yes	Missing
8	66	M-Male	1/1/1990	21	No	Missing

Figure 4.4: The line list of the fields CaseID, Sex, DOB, Age, Ill, and FeverTemp.

Note the yellow warning at the top of the output. By default, the line list will only show the top 200 rows; the row limit exists to improve performance when working with large data sets. It can be modified in the Line List Properties panel.

SORTING A LINE LIST

The list data is not sorted in any particular order in the example above. To sort the list by date of birth:

1. In the Line List Properties pane, click on the **Expand** arrow (Figure 4.4). The Line List Properties panel expands to show the full set of properties for the line list gadget (Figure 4.3).



Figure 4.5: The expand arrow.

2. In the Sort Variables drop-down list, select **DOB**. The DOB field will appear in the Sort Order list with (ascending) next to its name.
3. In the Sort Order list, right-click on the **DOB (ascending)** item. A context menu will appear (Figure 4.6).

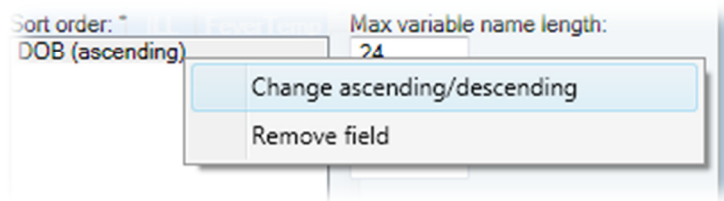


Figure 4.6: Right-clicking on an item in the Sort Order list.

4. Select the **Change ascending/descending** option. The DOB (ascending) text changes to DOB (descending).
5. Click the **Generate Line List** button. Notice that the output is now sorted by date of birth in descending order.

Multiple fields can be added to the Sort Order list box. The order of precedence for the sort will go from the first to the last field listed.

EXPORTING A LINE LIST

Once created, the line list data may be copied to the clipboard, exported to Microsoft Excel or the computer's default web browser. To export the line list data to Excel, follow the steps below. Note that you must have Excel installed to see this feature.

1. Right-click on the **line list**. A context menu will appear (Figure 4.7).

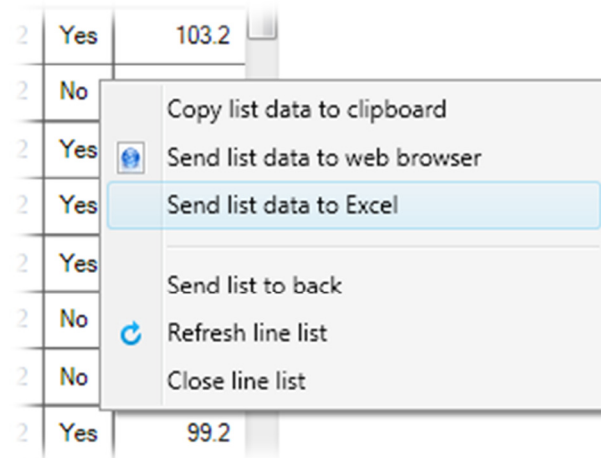


Figure 4.7: Right-clicking on the line list.

2. Select the **Send list data to Excel** menu option. In several moments, the list data appears in a Microsoft Excel spreadsheet (Figure 4.8).

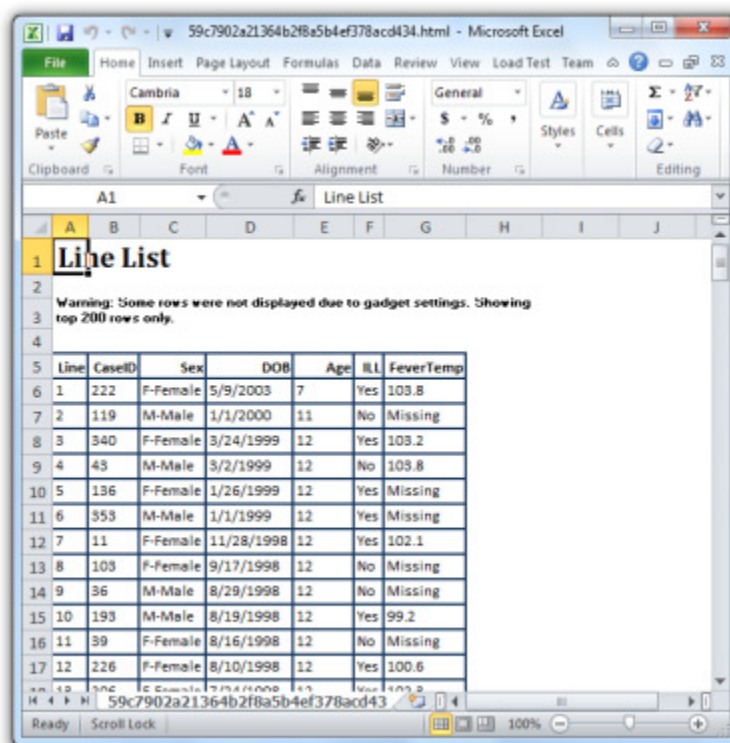


Figure 4.8: The line list data in Microsoft Excel 2010.

OTHER LINE LIST FEATURES

The line list has several other notable features in the properties panel:

- ❖ The **Group Results By** drop-down list allows the list output to be stratified by another field on the form. For example, if you want separate line lists for males and females.
- ❖ The **Max Variable Name Length** text box allows truncating long column names in the list output. It is set to 24 by default.
- ❖ The **Max Rows to Display** text box allows changing the maximum number of rows that the line list gadget will display. It is set to 200 by default.
- ❖ The **Sort Variables by Tab Order** checkbox forces the columns in the output to be sorted by their tab order. It is off by default.
- ❖ The **Use Field Prompts** checkbox will use the field's prompt as the column heading, rather than the field's name. It is off by default.
- ❖ The **Display List Labels** checkbox will use the label value for option fields and comment legal fields rather than the underlying value stored in the database. Option fields and comment legal fields are discussed further in the Epi Info™ 7 User Manual.

FREQUENCIES

Let's show a simple frequency of gender to see how many male and female patients we have:

1. Right-click on the **dashboard**. A pop-up context menu should appear.
2. Select **Add Analysis Gadget > Frequency** (Figure 4.9). A frequency gadget should appear on the dashboard canvas.

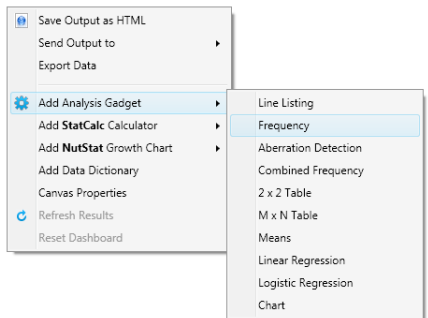


Figure 4.9: Adding a Frequency gadget.

3. In the Frequency gadget, select **Sex** in the Field drop-down list (Figure 4.10). After you choose a field, the gadget updates with the results (Figure 4.11).

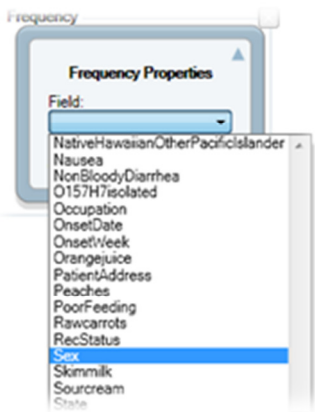


Figure 4.10: Selecting a field to run a frequency on.

A screenshot of the 'Frequency' gadget on a dashboard. It displays a table with the following data:

Sex	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper
F-Female	186	51.81 %	51.81 %	46.51 %	57.07 %
M-Male	173	48.19 %	100.00 %	42.93 %	53.49 %
TOTAL	359	100.00 %	100.00 %		

The 'Frequency Properties' dialog box is open on the right, showing 'Field: Sex' and 'Advanced options'.

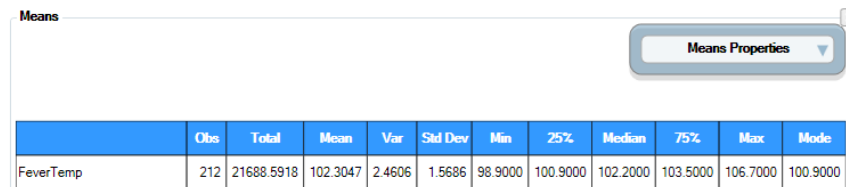
Figure 4.11: The frequency of sex among our 359 cases

Note that the frequency data (Figure 4.11) can be exported directly to Excel in the same manner as was done for the Line List gadget.

MEANS

The Dashboard also allows for the generation of summary statistics for numeric data (e.g., the mean, median, maximum, minimum, and mode). To find the mean fever temperature:

1. Right-click on the dashboard. A pop-up context menu should appear.
2. Select **Add Analysis Gadget > Means**. A means gadget should appear on the dashboard canvas.
3. In the Means gadget, select **FeverTemp** in the Field drop-down list. After you choose a field, the gadget updates with the results.



	Obs	Total	Mean	Var	Std Dev	Min	25%	Median	75%	Max	Mode
FeverTemp	212	21688.5918	102.3047	2.4606	1.5686	98.9000	100.9000	102.2000	103.5000	106.7000	100.9000

Figure 4.12: Summary statistics for the FeverTemp field.

The statistics shown in figure 4.12 can be broken down further by using the Cross-tabulate by drop-down list. To cross-tabulate by males and females:

1. In the means Properties panel, click the **expand** arrow.
2. In the expanded Means Properties panel, click the **Advanced options** text.
3. In the Cross-tabulate by drop-down list, select **Sex**. The means gadget updates to show the fever temperature data broken down by males and females.



FeverTemp * Sex	Obs	Total	Mean	Var	Std Dev	Min	25%	Median	75%	Max	Mode
F-Female	114	11642.9094	102.1295	2.4483	1.5647	98.9000	100.9000	102.0500	103.4000	105.7000	100.9000
M-Male	98	10045.6902	102.4989	2.4748	1.5639	99.2000	101.2000	102.8500	103.7000	106.7000	104.1000

Variable	SS	df	MS	F-Statistic
Between	8.7334	1	8.7334	2.7679
Within	510.0556	210	2.4306	
Total	517.5890	211		
P-Value				0.0977

Crit. Values	0.0090
Degrees of Freedom	1
P-Value	0.9435

A small p-value (e.g., less than 0.05) suggests that the variances are not homogeneous and that the ANOVA may not be appropriate.

Kruskal-Wallis H	2.8234
Degrees of Freedom	1
P-Value	0.1063

Figure 4.13: Summary statistics for the FeverTemp field broken down by males and females.

Similar to the frequency and line list data, the means data can be exported directly to Excel.

2X2 TABLES

2x2 tables can be generated using the 2x2 gadget. Our questionnaire had several checkboxes for the various foods that may have been consumed. We can select one of these checkboxes to be the exposure and use the Ill field as the outcome.

1. Right-click on the **dashboard**. A pop-up context menu should appear.
2. Select **Add Analysis Gadget > 2x2 Table**. A 2x2 table gadget should appear on the dashboard canvas.
3. In the 2x2 table gadget, select **Strawberries** in the Exposure drop-down list.
4. In the 2x2 table gadget, select **Ill** in the Outcome drop-down list. After both drop-down lists are filled in, the gadget updates with the results (Figure 4.14).

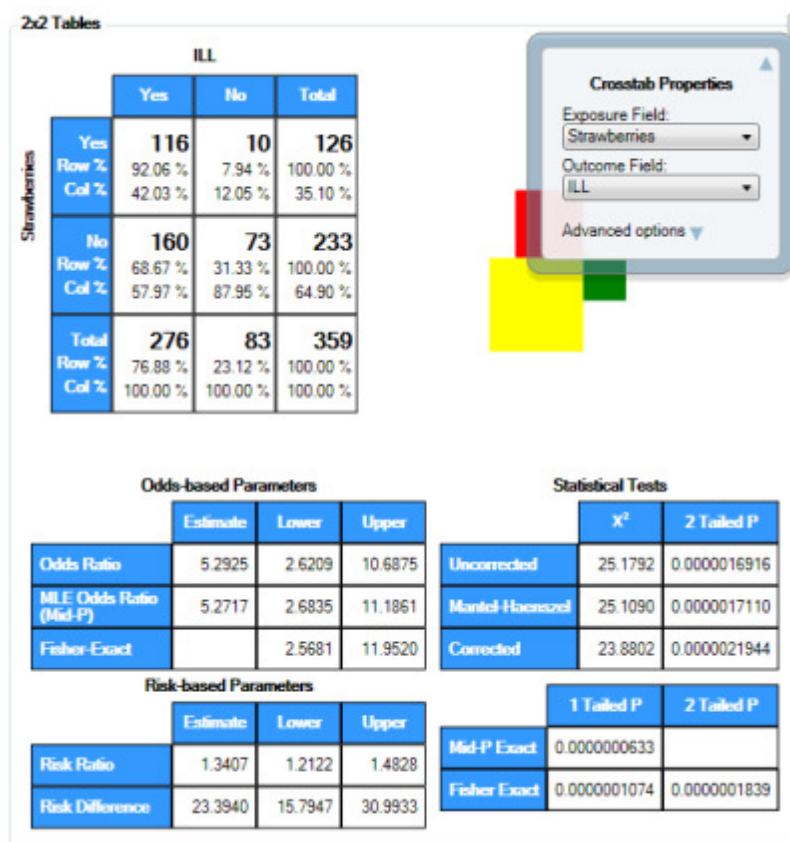


Figure 4.14: A 2x2 table showing strawberries by ill. Whether the patient ate strawberries is the exposure, and whether the patient became ill is the outcome.

The results displayed in Figure 4.14 are useful, but there are quite a few checkboxes in the Foods Eaten group on page 2. It would take considerable time to add a gadget for each one of the foods listed. Because we have a group field surrounding all of the checkboxes, we can run the 2x2 statistics on the entire group.

To run the grouped analysis:

- Change the Exposure field to **FoodsEaten**. Because FoodsEaten is a group, it will appear at the bottom of the list of fields.

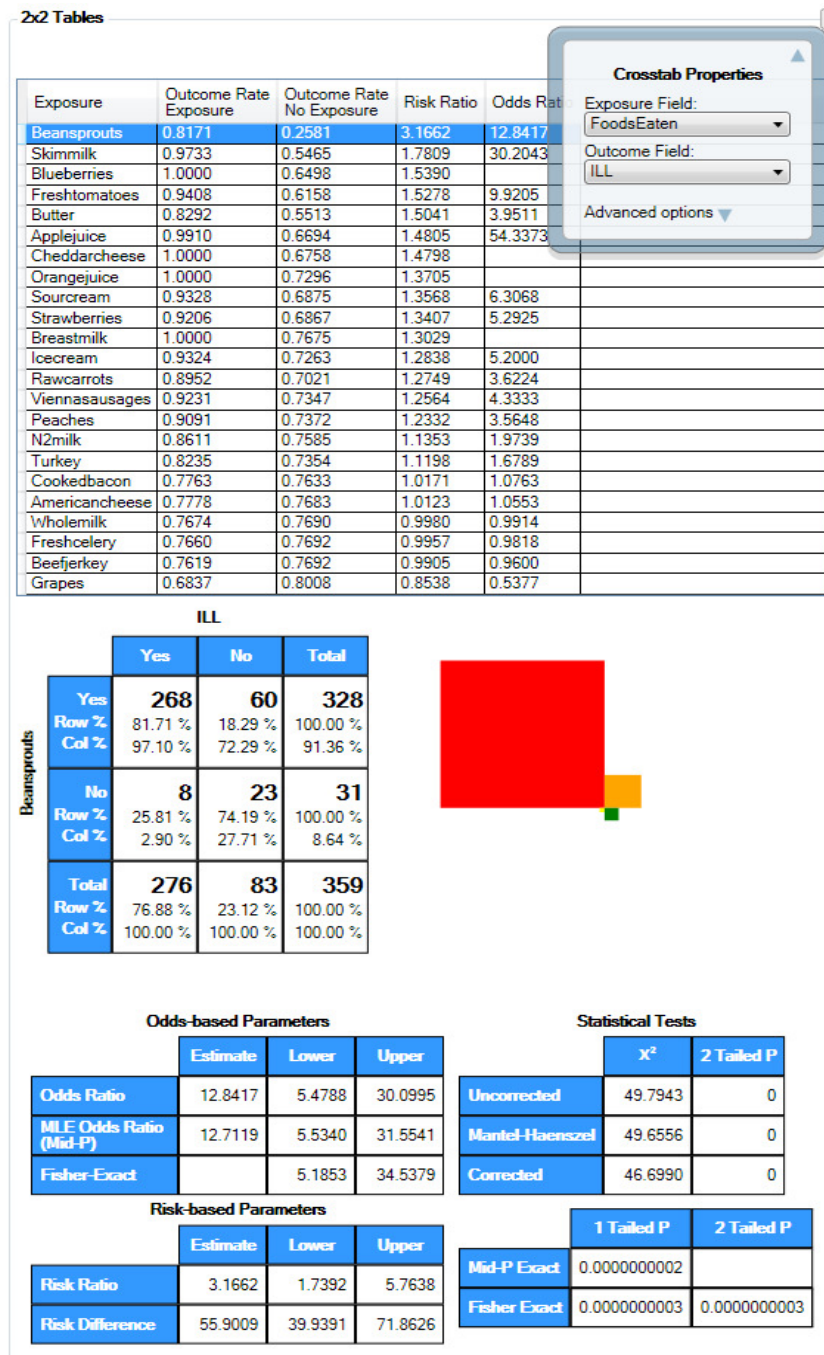


Figure 4.15: A grouped 2x2 result. The FoodsEaten group was specified as the exposure, and whether the patient became ill was specified as the outcome.

In Figure 4.15, note the relative risk chart that appears above the 2x2 results. Each row in the chart represents one of the checkboxes in the FoodsEaten group. Clicking on a particular row will change the 2x2 results shown in the lower half. The chart is sorted by risk ratio by default. Notice that BreanSprouts has the highest risk ratio.

It's important to note that the grouped 2x2 table was made possible because of the form's design: The field that stored whether or not the patient became ill was a Yes/No field, meaning it could only store a yes, no, or a missing (unknown) value. Each of the foods consumed was represented by a checkbox, meaning that only a yes or no response was valid. All exposure fields were placed into a single group field.

You are encouraged to use checkbox fields and Yes/No fields for questions that can only take a yes or a no response. This will make analysis much simpler. Intelligent use of groups can enable faster and more productive analysis.

DATA RECODING

A checkbox field or Yes/No field, however, is not adequate for data collection. Let's take the age field as an example:

1. From the dashboard canvas, select the **Frequency** gadget.
2. In the **Field** drop-down list, select **Age**.

The frequency output shows all the age values in the data set. This probably is not useful for our purposes.

Age groupings or categories would be more helpful. Fortunately, the dashboard provides such a capability.

1. On the left-hand edge of the Dashboard canvas, move the mouse cursor over the **Defined Variables** gadget. The gadget will expand and become fully visible.
2. Click the **New Variable** button.
3. Select **With Recoded Value** when prompted. The Add Recoded Variable window should appear (Figure 4.16).

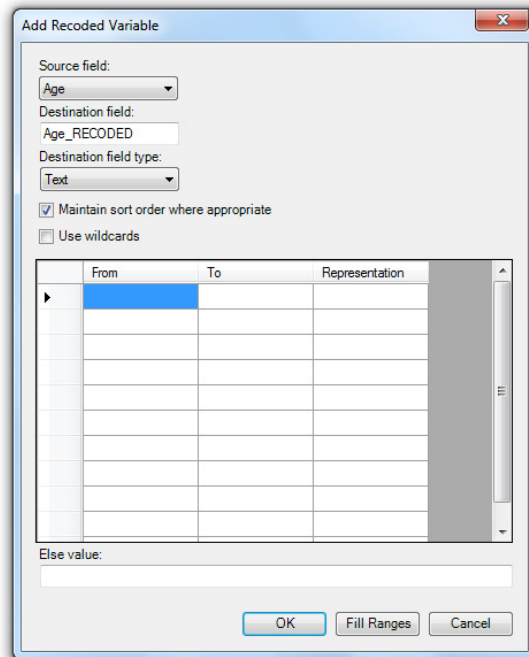


Figure 4.16: The recoding window.

4. From the Source field drop-down list, select **Age** . Leave the other choices at their default settings.
5. Click the **Fill Ranges** button. The Fill Ranges dialog appears.
6. Select **0** for the start value, **65** for the end value, and **10** for the by value (Figure 4.17).

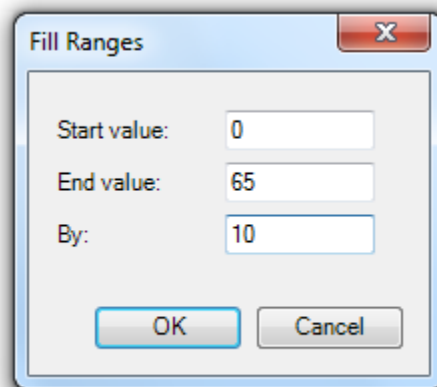


Figure 4.17: The Fill Ranges window.

7. Click **OK**. The Add Recoded Variable window should become populated with a series of range values (Figure 4.18).

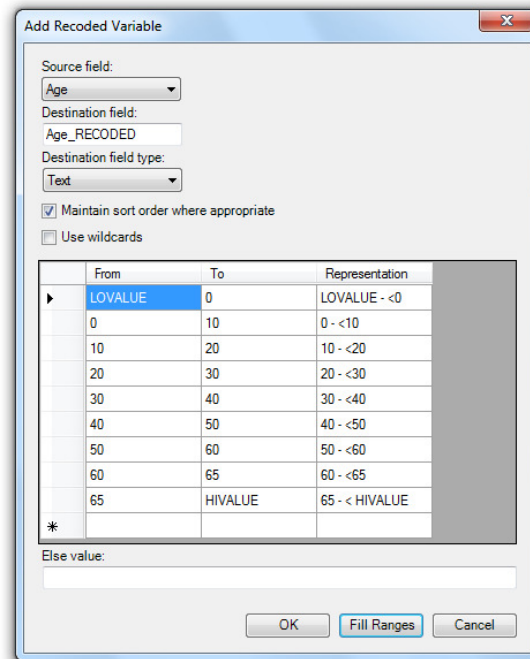


Figure 4.18: The recode variable window after completing Step 7.

8. Click **OK**. The recoding of the variable is now applied.
9. From the frequency gadget's Field drop-down list, select **Age_RECoded**. The frequency output should appear (Figure 4.19).

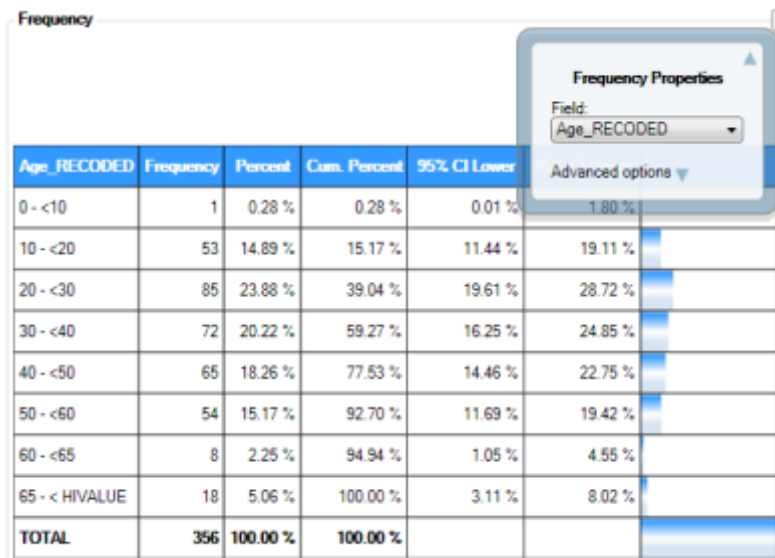


Figure 4.19: The frequency gadget's output after completing Step 9

Recoding can be a powerful tool; in addition to being able to create numeric ranges, we can also change coded values (e.g., 0 and 1 into meaningful text values that include male and female). You can also recode a series of data from multiple values to just two values. Now they can be showed in a 2x2 table.

CHARTS

The dashboard is not limited to creating data tables. Charts and graphs can also be created. While many chart types are available, this guide will cover the pie chart and epi curve.

PIE CHARTS

Let's generate a pie chart of our recoded age groups:

1. Right-click on the **dashboard**. A pop-up context menu should appear.
2. Select **Add Analysis Gadget > Chart**. A chart gadget should appear on the dashboard canvas.
3. From the Chart Type drop-down list, select **Pie**.
4. From the Chart gadget, select **Age_RECDED** in the Primary Field drop-down list.
5. From the Chart Size drop-down list, select **Large**.
6. Click the **Generate Chart** button.

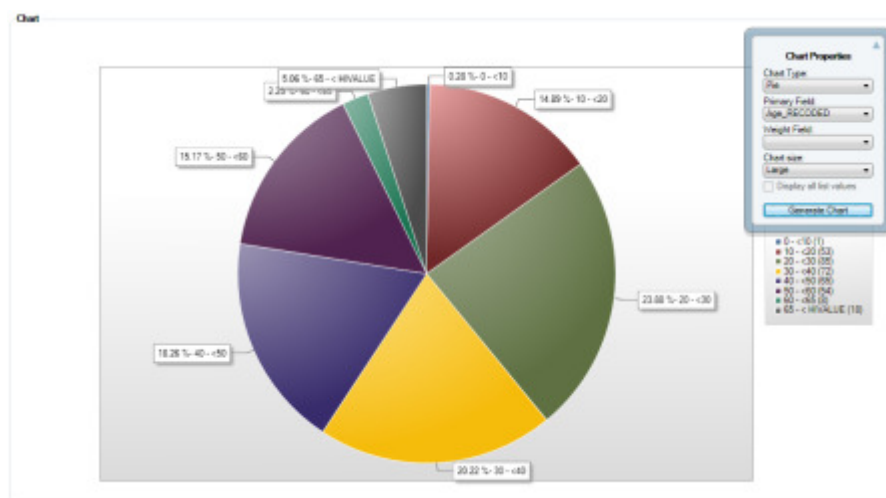
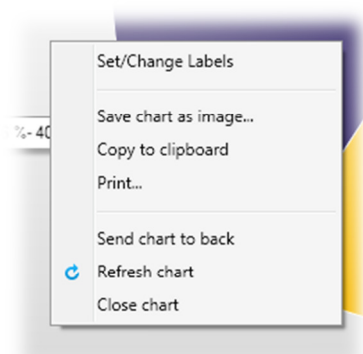


Figure 4.20: The pie chart showing the recoded age categories.

Once created, charts have their own special right-click context menu that provides additional options for configuring and saving the charts.



Set/Change Labels – allows you to create or modify the chart's title, axis labels, and legend title.

Save chart as image – allows you to save the chart as an image.

Copy to clipboard – allows you to copy the image to the clipboard for easy pasting into other applications (e.g., Microsoft Word, PowerPoint).

Print – allows you to directly print the image.

EPI CURVE CHARTS

Generate an epi curve using the OnsetDate field.

1. Right-click on the **dashboard**. A pop-up context menu should appear.
2. Select **Add Analysis Gadget > Chart**. A chart gadget should appear on the dashboard canvas.
3. From the Chart Type drop-down list, select **Epi Curve**.
4. From the Onset Date Field drop-down list, select **OnsetDate**.
5. From the Date Interval drop-down list, select **Days**.
6. Click the **Generate Chart** button.

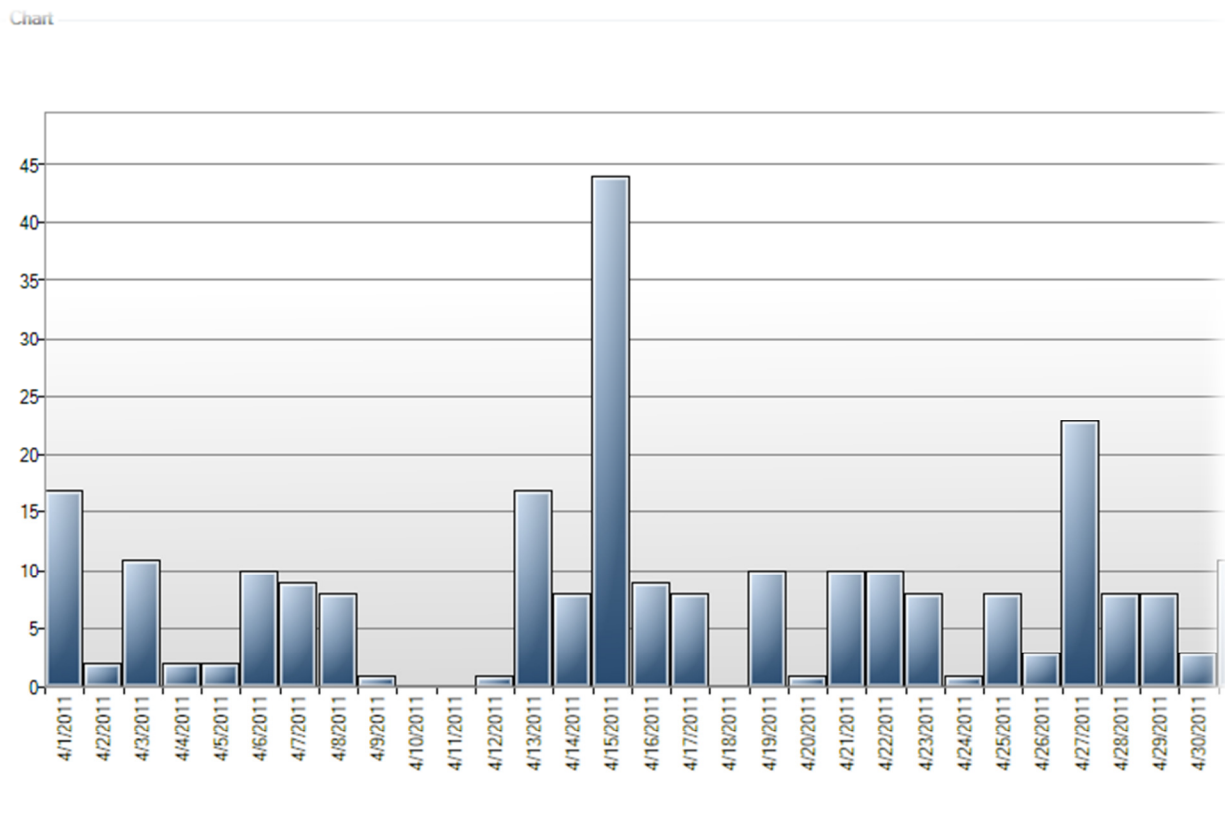


Figure 4.21: The epi curve of the date of symptom onset.

The data for this outbreak is fictional and somewhat random. The data may not actually appear to resemble a proper epi curve.

DATA FILTERING

It is not always practical to work with the entire set of records in the data set. What if you want to show a frequency of age categories (which you created in the last section by recoding the age field), but only for patients that were actually sick? To accomplish this, you need to use the **Data Filter** gadget:

1. From the right-hand edge of the dashboard canvas, move the **mouse** over the Data Filter gadget. The gadget should expand outwards.
2. From the Field Name drop-down list, select **ILL**.
3. From the Operator drop-down list, select **is equal to**.
4. From the Value drop-down list, select **Yes**.

The screenshot shows the Data Filter gadget interface. At the top, there are three dropdown menus: 'Field Name:' with 'ILL' selected, 'Operator:' with 'is equal to' selected, and 'Value:' with 'Yes' selected. Below these is an 'Add Filter' button. Underneath is a section labeled 'Data filters:' which contains an empty table. At the bottom of the gadget are three buttons: 'Remove Selected', 'Clear All', and 'Advanced Mode'. On the left side of the gadget, the text 'Data Filters (0)' is displayed.

Figure 4.22: The data filtering gadget after completing Step 4.

5. Click the **Add Filter** button. The filter condition is added to the Data filters grid view (Figure 4.23).

This screenshot shows the same Data Filter gadget as Figure 4.22, but after clicking the 'Add Filter' button. The 'Add Filter' button is now highlighted with a blue border. The 'Data filters' table now contains one row with the text 'The value of [ILL] is equal to Yes'. The record count on the left has updated to 'Data Filters (1)'. The other elements of the interface remain the same.

Figure 4.23: The data filtering gadget after completing Step 5.

If a filter condition is added or removed, any gadget on the canvas will automatically refresh. The record count in the top-left corner of the dashboard canvas now reads **276**, indicating that we're working with 276 out of 359 records where the value of ILL is Yes.

Let's assume you want to only work with records where patient was ill and between 20 and 29 years of age. Take the following steps:

1. On the right-hand edge of the Dashboard canvas, move the **mouse** over the Data Filter gadget. The gadget should expand outwards.

2. From the Field Name drop-down list, select **Age**.
3. From the Operator drop-down list, select **is between**.
4. From the Value text boxes, type in **20** for the first box.
5. From the Value text boxes, type **29** for the second box.

Figure 4.24: The data filtering gadget after completing Step 4.

6. Click **Add Filter**. A context menu appears asking if you want to add this condition using an AND or an OR.
7. Select the **AND** option. The filter condition is added to the Data filters grid view beneath the first condition.

The record count shows 64 records. Only 64 records match the two filter criteria that have been established. The patient must have been tested and be from 20 and 29 years of age. Any gadgets added to the dashboard canvas will only display data from these 64 records.

1. Add a **frequency gadget**.
2. Select **Age** or **Age_RECODED** as the field. Notice how the values displayed are only within the range specified and that the total in the frequency is small.

Clear the data filters to continue working with the full set of records again. To do this:

1. On the right-hand edge of the dashboard canvas, move the **mouse** over the Data Filter gadget. It should expand outwards.
2. Select the **second condition**, which should appear as “**The value of Age is between 20 and 29.**”
3. Click the **Remove Selected** button. The condition disappears.
4. Select the only remaining **condition**.
5. Click the **Remove Selected** button. The condition disappears.

SAVING THE DASHBOARD CANVAS

It might be useful if you could capture the gadgets displayed in the dashboard and re-loaded them again at a later date. This would prevent you from having to re-create all of the recoded variables, data filters, and gadgets each time you want to conduct analysis.

It might also be useful if you could save the output from the dashboard into a file that you could e-mail to colleagues or co-workers.

Fortunately, the Epi Info 7 Dashboard has methods to perform both tasks:

- The current data source and set of gadgets, filters, and user-defined variables can be saved to a 'Canvas file on the hard drive. You can open Canvas files from within the dashboard.
- The output from each gadget can be saved to an HTML file. HTML files can be opened in any web browser and can be e-mailed to colleagues or turned into a PDF document.

Let's start with saving the current set of gadgets and user-defined variables.

1. Ensure the dashboard you're viewing has at least the following gadgets: A frequency of Sex, a means of fever temperature, a line list, a chart of the recoded age field, and a 2x2 table showing Strawberries by ILL. It should look like Figure 4.25.

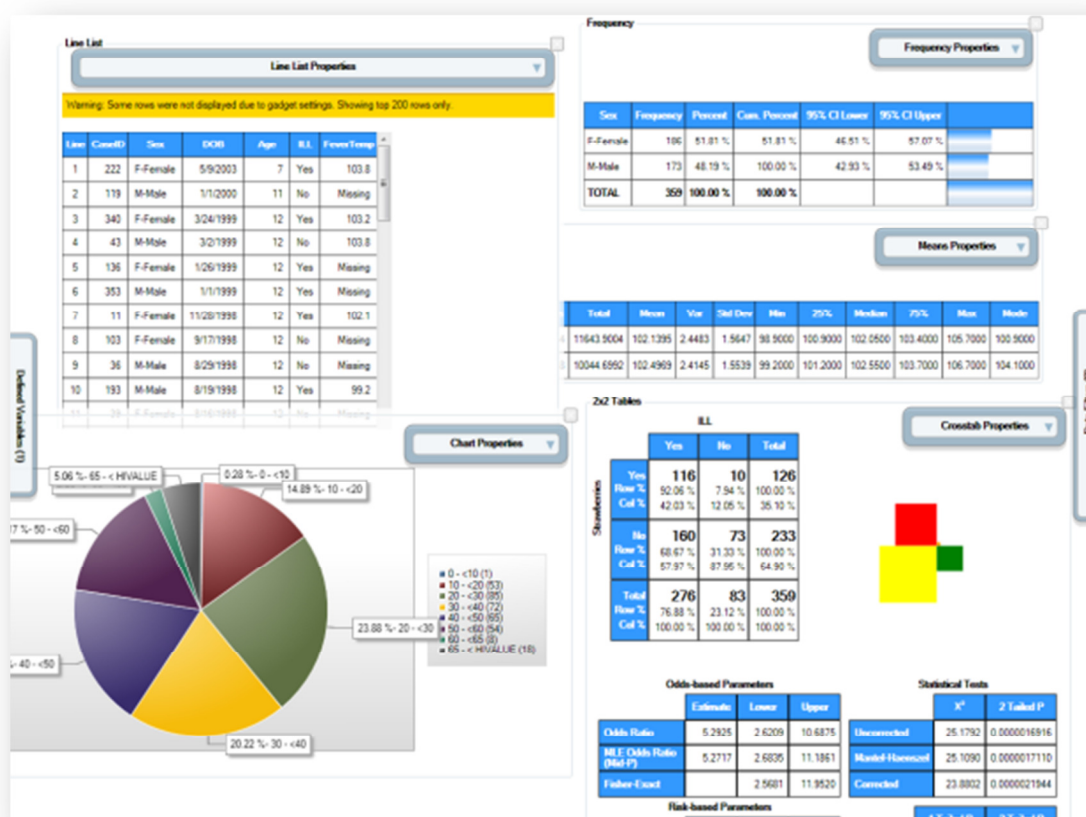



Figure 4.25: The dashboard at Step 1.

- From the dashboard window toolbar, click the **Save**  button. A Save dialog will appear asking you to provide a name for an Epi Info 7 Canvas file (Figure 4.26).
- Select your **desktop** as the location to save the file.

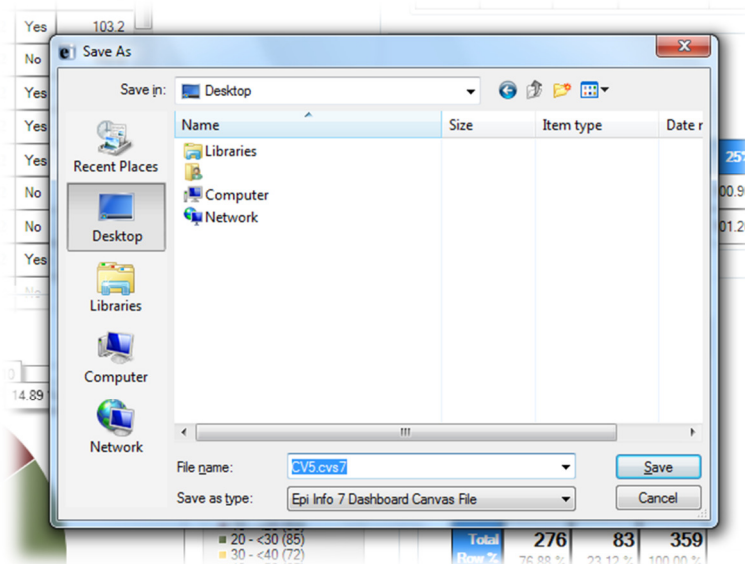



Figure 4.26: The Save Canvas dialog.

- Type QuickStartGuide into the File Name box.
- Click the **Save** button. A message should appear indicating that the save was successful.

After completing Step 5, the dashboard has been saved; any gadgets, filters, or user-defined variables have been stored to the QuickStartGuide.cvs7 file on your desktop. Only the Epi Info 7 Dashboard may open this file.

To load the file:

- Close the **dashboard window**.
- Open the **E. Coli food history questionnaire**, which should still be open in the Enter module in another window.
- Click the **Dashboard** button on the Enter toolbar. The Dashboard window should appear.
- Click the **Open**  button on the Dashboard toolbar. You should see an Open dialog.
- From the desktop, highlight the file named **QuickStartGuide.cvs7**.
- Click the **Open** button. The dashboard should re-appear with the same output as shown above.

The file you just saved and loaded only contains information about the gadgets, filters, defined variables, and data source. It uses this information to load the gadgets using whatever data source was defined (in this case, it was our HIV case report form). It does not store the actual output; the next section discusses procedures for saving the results you're seeing.

SAVING THE DASHBOARD OUTPUT

If you want to e-mail your results to a colleague, you can store the output from the gadgets into an HTML document. Unlike the canvas file you saved and opened in the last section, the HTML document can only be opened in a web browser; it cannot be used to re-create the dashboard's canvas.

To save the current output:

1. From the Dashboard toolbar, click the **Save as HTML** button. A Save dialog should appear.
2. Select your **desktop** as the location to save the file.
3. Type **FoodHistoryOutput** into the File Name text box (Figure 4.27).

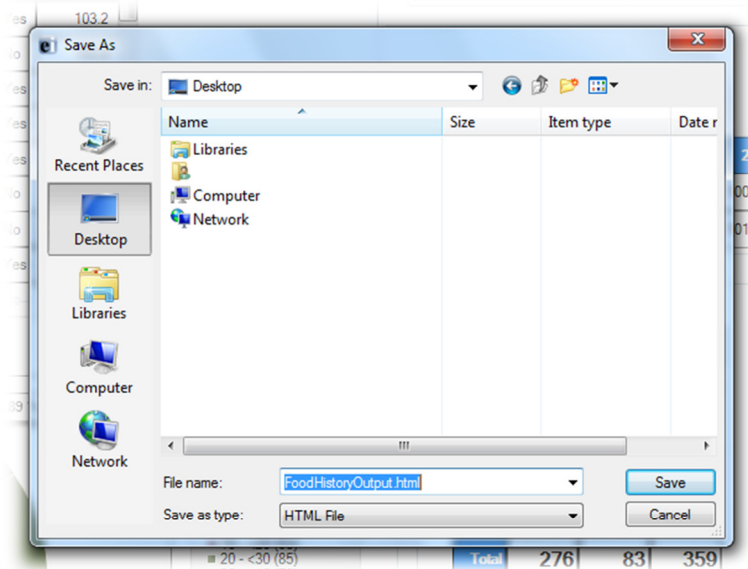


Figure 4.27: The Save as HTML dialog.

4. Click the **Save** button. A message should appear stating that the save was successful.
5. Minimize all Epi Info 7 windows and navigate to your **desktop**.
6. Locate the file named **Output1** (Figure 4.28).

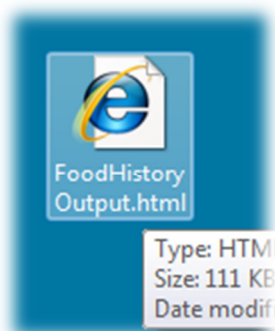


Figure 4.28: The file 'FoodHistoryOutput.html' on the desktop.

7. Double click on the **FoodHistoryOutput** file. A web browser window should appear with results similar to Figure 4.28.

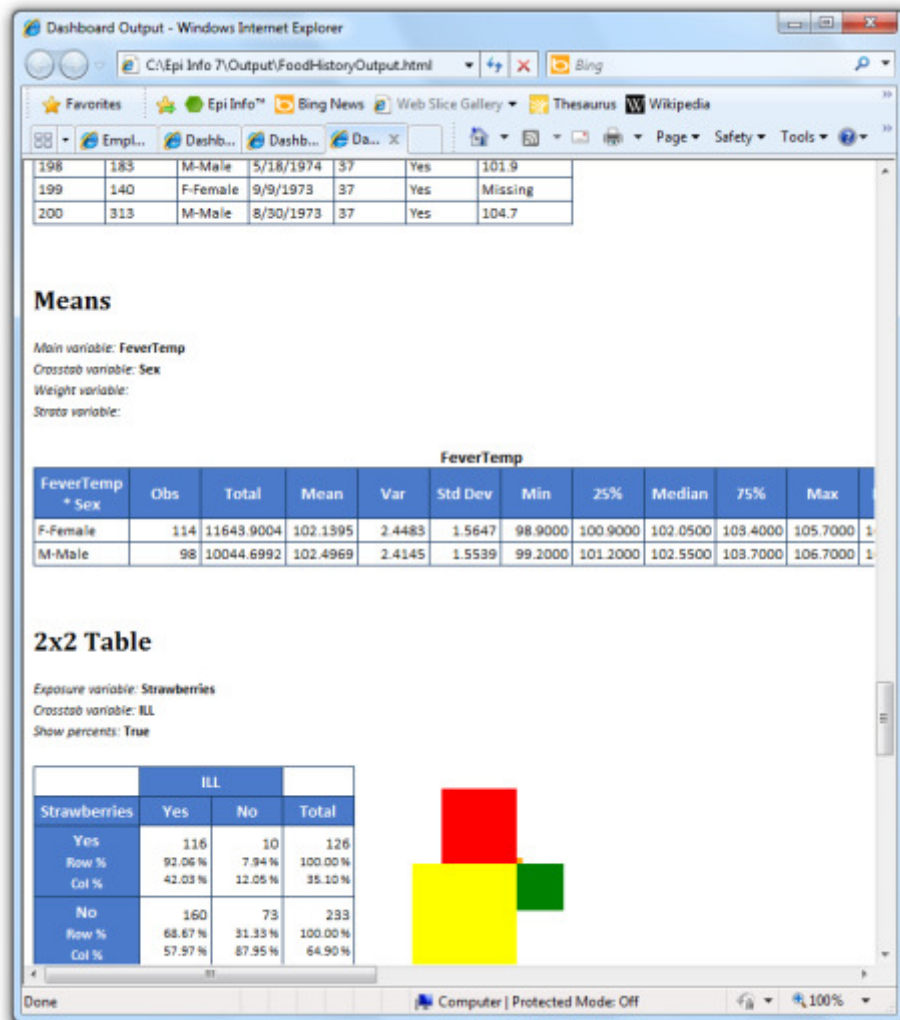


Figure 4.28: The file 'FoodHistoryOutput.html' shown in an Internet Explorer window.

6

CREATING MAPS

In part three, you geocoded an address into GPS coordinates and subsequently showed those coordinates on a map. With the E. Coli sample case data, all 359 records have their own latitude and longitude coordinates – meaning you can quickly display them without needing a lot of geocoding.

Tip: Data filtering works in the mapping window the same way it does in the dashboard.

1. Navigate back to the **Enter window**. You can leave the dashboard open.
2. With the Food History form still open, click the **Map** button on the Enter toolbar. The **Map** window will appear (Figure 5.1).

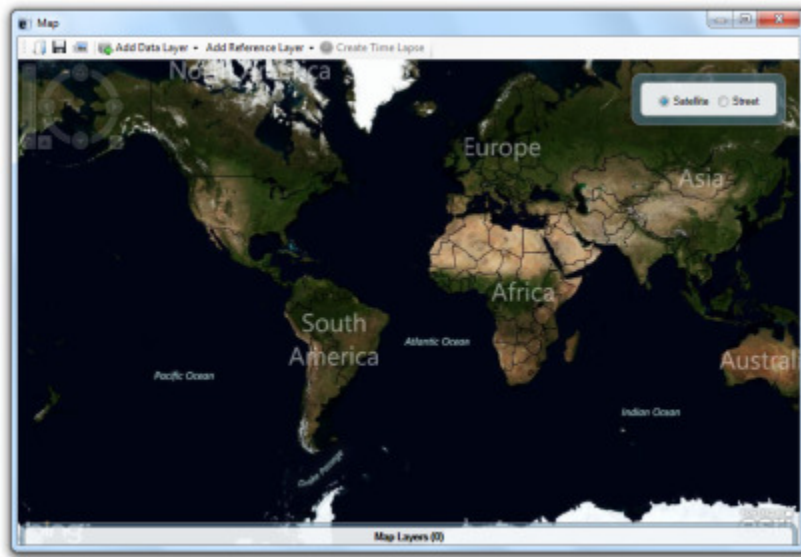


Figure 5.1: The Map window.

3. From the toolbar at the top of the **Map** window, select **Add Data Layer > Case Cluster**.
4. Select **No** when prompted to use external data. A small gadget should appear with Latitude and Longitude drop-down lists.
5. Select **Latitude** for the Latitude drop-down list.
6. Select **Longitude** for the Longitude drop-down list. The map will zoom in to the area around the coordinates.
7. On the top-right corner of the map window, select **Street**.

After completing Step 7, you should see something similar to Figure 5.2. Unlike in part three, however, there are many more points to view. Large clusters of cases appear as bigger circles with the total case count contained inside of them.

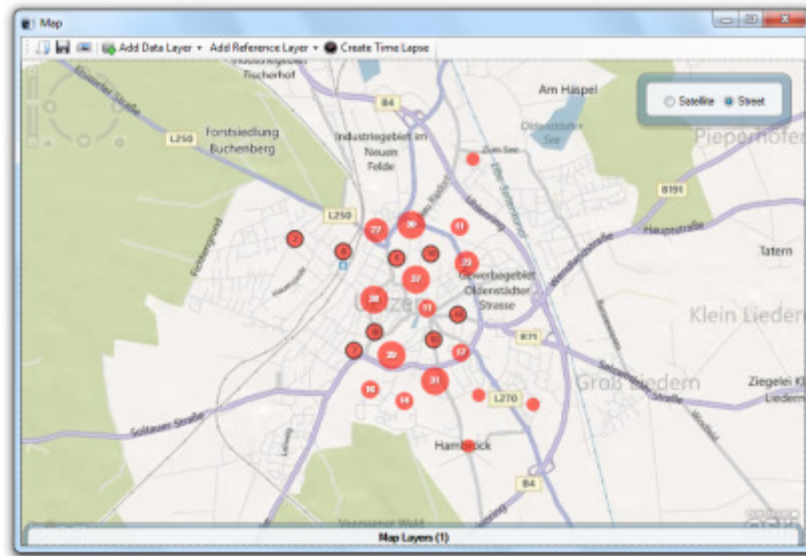


Figure 5.2: The case cluster map of HIV cases.

Use the mouse wheel to zoom in on the center of Uelzen where the 359 cases are located. The view of cases becomes far more detailed. Individual cases appear as single red dots without any number inside of them. Case clusters appear as dots with a number inside, indicating the number of cases in that cluster.

What if you see a case on the map that you want to investigate further? You can double-click on any dot representing a single case to take you directly to that record in the Enter module.

You can also move the mouse over a small case cluster (less than 12 records), which causes the cases in that cluster to flare outwards (Figure 5.4).



Figure 5.4: A flared case cluster.

Notice that this case cluster dot has a 6 in its center representing six cases. If you move the mouse over it, six smaller dots appear, each representing one of the six records inside of that dot. You can click on any of those dots to take you to that particular record in the Enter module.

More advanced options are available for mapping, including data filtering, stratifying the cases (i.e., showing white patients as green dots and Asian patients as yellow dots), displaying choropleth maps with census data behind the case clusters, etc.

DATA FILTERING IN MAPS

The key concept to remember when creating maps in Epi Info 7 is that everything is based on the concept of layers. Each layer may have its own set of data and have its own set of data filters.

For example, we can show one layer with a case cluster representing our HIV patients, and another underneath that displaying poverty rates by Census Tract. You can also use layers to create stratified maps to show male HIV cases in one color, and female HIV cases in another.

Much of the power of layers comes from using data filters on each layer's respective data set. You can apply one set of filters to one layer and another set of filters to a different one.

Let's start with something simple. You only have one layer at the moment, the one just added using HIV case data. It includes all 359 records. Assuming you only want to map cases where the patient's age is lower than 21, how do you apply such a filter?

1. From the very bottom of the map window, move the **mouse** over the Map Layers gadget. The Map Layers gadget will expand upwards (Figure 5.5).

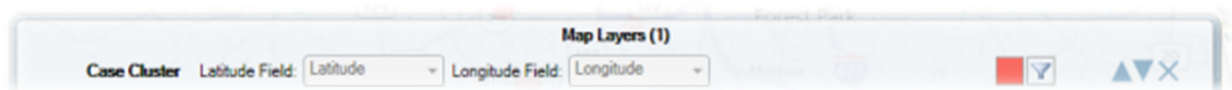


Figure 5.5: The Map Layers gadget.

2. Click on the **Data Filters** button (the button with the funnel-shape on the right-hand side of the gadget). A Data Filters gadget will appear (Figure 5.6), the same gadget you used in the Dashboard section of this document.

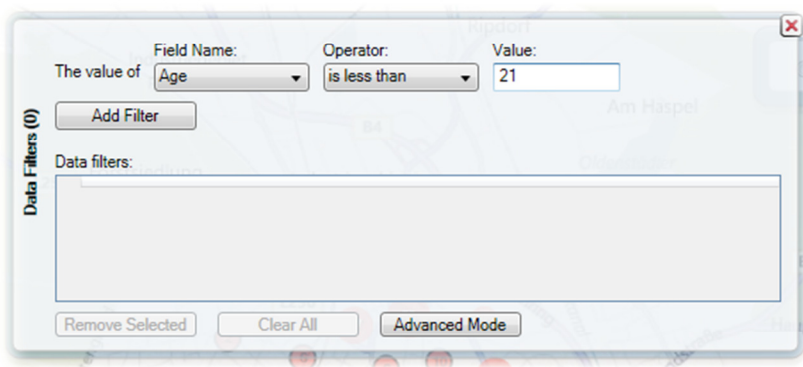


Figure 5.6: Data Filters.

3. From the Field Name drop-down list, select **Age**.
4. from the **Operator** drop-down list Select **Is Less Than**.
5. Type **21** into the Value text box.
6. Click the **Add Filter** button. The case clusters on the map should change. The filter gadget should display one row in the Data Filters table (Figure 5.7).

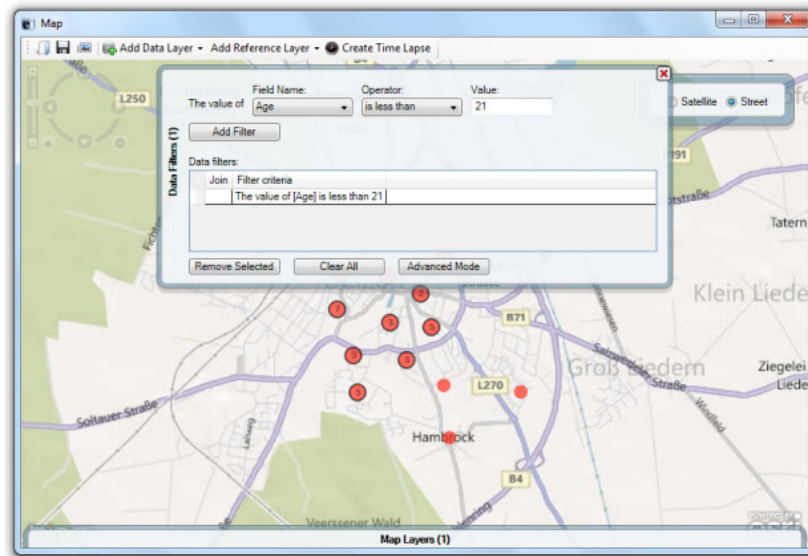


Figure 5.7: The Map window after completing Step 6.

7. To close the gadget, click the X button.

You are now observing only the cases where a patient is less than 21 years of age. What if you want to show both these cases and 21-and-older cases, but show the 21-and-older cases in a different color? In other words, you want to stratify the case clusters by whether the patient is under 21.

You need another layer. The first layer, which is the one showing currently in Figure 5.7, has a filter applied that says, “Only show the records where the age is less than 21.” Add a second layer with blue-colored dots, but this layer will have a different filter applied; it will only show the records where the age is greater than, or equal to 21.

1. From the toolbar at the top of the Map window, select **Add Data Layer > Case Cluster**.
2. Select **No** when prompted to use external data. A small gadget should appear with Latitude and Longitude drop-down lists.
3. Before selecting Latitude and Longitude, click the red **Point Color** button to change the layer's color to blue.
4. To bring up the **Data Filters** gadget, click the **Data Filters** button.
5. From the **Field Name** drop-down list, Select **Age**.
6. From the **Operator** drop-down list, select **Is Greater Than or Equal To**.
7. Type **21** into the Value text box.
8. Click the **Add Filter** button.

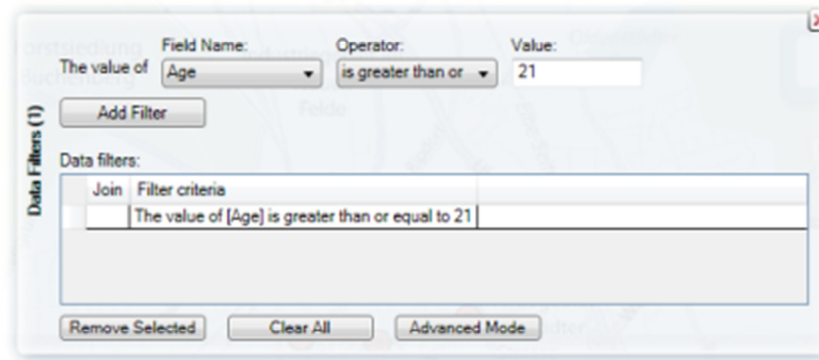


Figure 5.8: The Data Filters gadget after completing Step 8.

9. To close the Data Filters gadget, click the **X** at the top-right corner of it.
10. From the Latitude drop-down menu, select **Latitude**.
11. From the Longitude drop down menu, select **Longitude**. The map should zoom in to the area around the coordinates (Figure 5.9).

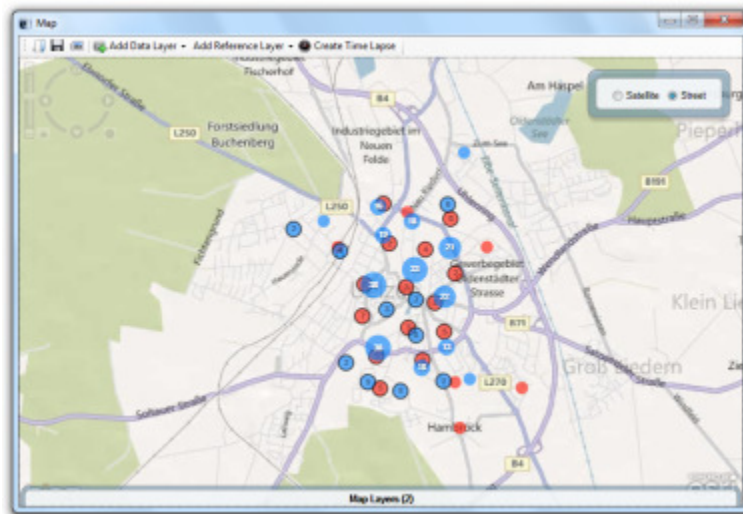


Figure 5.9: The Map window after completing Step 11.

Figure 5.9 contains a stratified map; the blue dots represent cases where the patient is 21 years of age or older, while the red dots represent cases where the patient is less than 21. You could have set the stratified by other variables (e.g., whether the patient is male or female, has only HIV or HIV and AIDS, if the viral load exceeded a certain amount, etc.).

The Map Layers gadget at the bottom of the screen shows a (2) instead of a (1) as it did previously. This is because you created two different layers: one for the younger-than-21 cases, and another for those 21-and-older.

A

APPENDIX A: EPI INFO™ 7 BEST PRACTICES

There are several “best practices” that, if followed, can make using Epi Info™ much easier.

1. When creating fields in the Form Designer, the Field Name you choose will become what you reference the field by when conducting analysis (e.g., in the dashboard). Create short and easy to understand field names.
2. Once you have created a data table for your form (entering data into the form), you can no longer change field names unless you delete the collected data. You can delete the collected data for a form by opening it in the Form Designer and selecting **Tools > Delete Data Table** from the menu.
3. Always use the Range property for numeric and date fields to help prevent incorrect or invalid input. This property can be set in a field's Field Definition dialog box.
4. Checkboxes and Yes/No fields are good choices for questionnaire responses that must be true or false. However, a checkbox field can only be true or false; a Yes/No field can be true, false, or left blank.
5. When creating 2x2 tables in the dashboard, only fields that contain (at most) two possible values will be available. Checkboxes and Yes/No fields are ideal for 2x2 tables. You can use the Recoding gadget to change a field's data into a true/false format to display a 2x2 table.
6. If you have a numeric field (e.g., Age) and use the Recoding gadget to show the values in categories.
7. In the dashboard, pay attention to gadget warnings and errors that appear above the output. Warnings appear in yellow, errors in red.