

Epi Info™ 7 *Salmonella* Outbreak Tutorial

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Disclaimer

The following scenario and all data associated with the scenario and this training material are fictional. The scenario is not related to any real-life event and was designed for software training purposes only. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Introduction

Epi Info™ 7 is a series of programs for Microsoft Windows for use by public health professionals in conducting outbreak investigations, emergency response action, managing databases for public health surveillance, system applications, statistics and other tasks. With Epi Info™ 7, you can rapidly develop a questionnaire or form, customize the data entry process, and enter and analyze data.

The Epi Info™ program is divided into five core modules: Form Designer, Enter, Classic Analysis, Dashboard, and Maps. Each module has stand-alone capabilities; however, using them for one project from start to finish adds functionality and efficiency. The Form Designer module is the questionnaire or survey designer. You will start your project in the Form Designer by creating a survey. Using Enter, you will populate your database with information specific to your survey. The data entered, along with additional datasets, will be imported into the Dashboard for detailed study. This training does not cover every component of Epi Info™ 7 and is meant for the beginning and intermediate level user.

How to Use this Tutorial

You will be introduced to the basic concepts of Epi Info™ 7 throughout this tutorial. Each lesson builds upon knowledge gained from the previous lesson. Follow the lessons in the order presented and finish all the listed steps before progressing to the next lesson. Data specific to the course is provided as part of the training package. At various points in the course, you will be asked to access this data to complete the lessons. Read the Five Goals listed at the start of each lesson to review the core functions you should understand by the end of each lesson.

Step one

Read the Overview section for each lesson. Each Overview contains a Getting Started breakdown of the module. The Overview also provides information on the commands, dialog boxes, or other special features that are unique to each module. The Overview also provides you with screenshots of the module and introduces you to the basic concepts discussed in each lesson.

Step two

Complete the step-by-step instructions to learn the basics. Numbered instructions with screenshots are provided to help you to learn the core functions of each module. Numbered lessons and instructions can be followed and applied when using Epi Info™ 7 outside of the classroom.

Step three

Complete the Practice Lessons and Skills Review Exercises when provided. Practice lessons build upon skills learned during basic lessons. Practices and reviews are opportunities to try skills without

detailed instruction. Skills Reviews will consist of hands-on activities to further your understanding or a series of questions meant to reinforce basic knowledge.

Epi Info™ Resources

Training documentation, technical information, or other resources are available on the Epi Info™ website at www.cdc.gov/epiinfo.

For questions or problems, contact the Helpline at epiinfo@cdc.gov or call (404) 498-6190.

To speak with colleagues around that world about Epi Info™, visit the Epi Info™ phConnect user group at <http://www.phconnect.org/group/epiinfo>.

Tutorial Files

You must have the latest version of Epi Info™ 7 installed on your computer to complete the lessons in this tutorial. Check the Epi Info™ website for the latest version of the software at <http://wwwn.cdc.gov/epiinfo/7/index.htm>.

The files needed for this tutorial can be found in the **Epi Info 7\Resources\Training Projects\Salmonellosis** folder of Epi Info 7. The files that you will need are:

1. Salmonellosis.MDB
2. Salmonellosis.PRJ
3. SalmonellaTrainingCaseData_2013-06-17T20-04-48.edp7

If Epi Info 7 is not already installed on your computer, follow the steps below to install Epi Info™ 7 after it has been downloaded:

1. Navigate to the desktop.
2. Locate and then double-click the **Epi_Info_7.zip** file.
3. Drag the contents of the file to the desktop as shown in Figure 1.

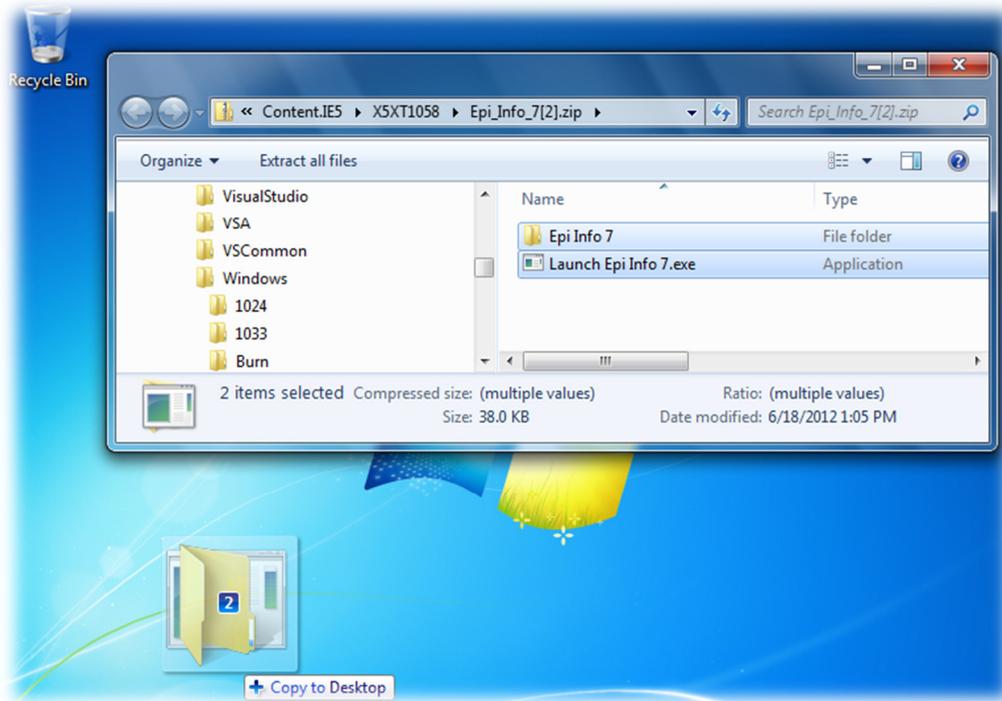


Figure 1

Once copied to the desktop, two items should appear as shown in Figure 2: a **Launch Epi Info 7** icon and an **Epi Info 7** folder.



Figure 2

Resource: Steps for downloading and installing the software are shown in the following instructional video:

<http://www.youtube.com/watch?v=FYrWiLGO7ZE>

Introduction to Scenario

This tutorial is designed to teach Epi Info™ 7 by following a scenario. A survey and data are provided and were created specifically for training purposes. The survey and datasets presented here relate to foodborne outbreak investigations, and specifically *Salmonella*; however, they can be used to teach the Epi Info™ 7 software to any user and to illustrate how the program can be used to gather, analyze, and present data.

Scenario

A local manufacturing company in Morgan County, Georgia, hosted its annual company picnic on May 5th, 2012. Friends and family members of employees were also invited. There were between 150 and 200 people who attended the event.

Catering services were provided by a local sandwich shop. The following sandwiches were listed as menu items:

- ❖ Peanut butter and jelly
- ❖ Reuben
- ❖ Egg salad sandwich
- ❖ Ham and cheese
- ❖ Grilled chicken
- ❖ Grilled cheese

Salads were offered with each meal:

- ❖ Caesar salad
- ❖ Garden salad
- ❖ Chef salad

Optional snacks or sides:

- ❖ Potato chips
- ❖ Freshly-baked chocolate chip cookies
- ❖ Freshly-baked peanut butter cookies

Choice of drinks:

- ❖ Water
- ❖ Iced tea

Because the event had a large number of attendees, food was served at two different times (noon and 2:00 pm) to give the shop ample opportunity to make all of the dishes.

Over the days following the picnic, the county health department became inundated with calls and faxed lab reports of several culture-confirmed *Salmonella* Enteritidis cases. Most cases were associated with the local company picnic held on May 5th. Because there was a sudden increase in

Salmonella cases over the weekend, an investigation into a potential outbreak was conducted. A roster of attendees at the picnic was obtained and each person was contacted. A case was defined as any attendee of the ACME company picnic presenting with diarrhea, abdominal cramps, and/or fever within 72 hours of the picnic. A total of 90 cases met the case definition.

Creating a Survey in Form Designer

This lesson introduces you to the Form Designer module of Epi Info™ 7. To determine the source of the outbreak, you must first develop the survey that will act as your primary data collection instrument. Lesson 1 guides you through the process of using *Form Designer* to create the survey. At the end of this lesson, you will have experience using the Form Designer to make many of the fields needed to collect data from the survey population.

Time to complete: 1.5 hours (Beginner)

BEFORE YOU BEGIN

Install the latest version of Epi Info™ 7 on your computer.

Complete the File Set-Up section of the tutorial.

FIVE GOALS

1. Create a project called SalmonellaExample.
2. Create three pages in a form to hold survey questions.
3. Create a set of demographics and symptom fields to describe the survey population.
4. Set the tab order to verify the data entry order the cursor needs to follow.
5. Create a project-level template that can be sent to investigators in the field.

Getting Started with Form Designer

Epi Info™ 7 forms, and the data collected using those forms, are by default stored in Microsoft Access 2003 databases. A corresponding project file acts as a pointer to the database. Epi Info™ 7 can also use Microsoft SQL Server databases if one happens to be available. Together, the database and the project file comprise the Epi Info™ 7 project. Each project contains one or more forms, and each form might contain one or more pages.

You are not limited in the number of fields you can place on a form, although you can only add up to 255 fields per page. You can have as many as 1,000 pages across all of the forms in a single Epi Info™ 7 project.

You can use the Check Code Editor component of Form Designer to add data entry validation to your form. One example, used in the tutorial, describes how to calculate the difference in years between two dates. You will create Check Code stating that when a date of birth is entered in one field, the age of an individual is automatically calculated and placed in another field. This allows you to customize your questionnaire and makes data entry quicker and more accurate.

The Form Designer Workspace

The Form Designer workspace consists of several main areas:

1. **Toolbar.** Contains buttons for common features and record navigation.
2. **Project Explorer.** Shows a list of available pages in the form.
3. **Canvas.** Holds most of the data entry functions.

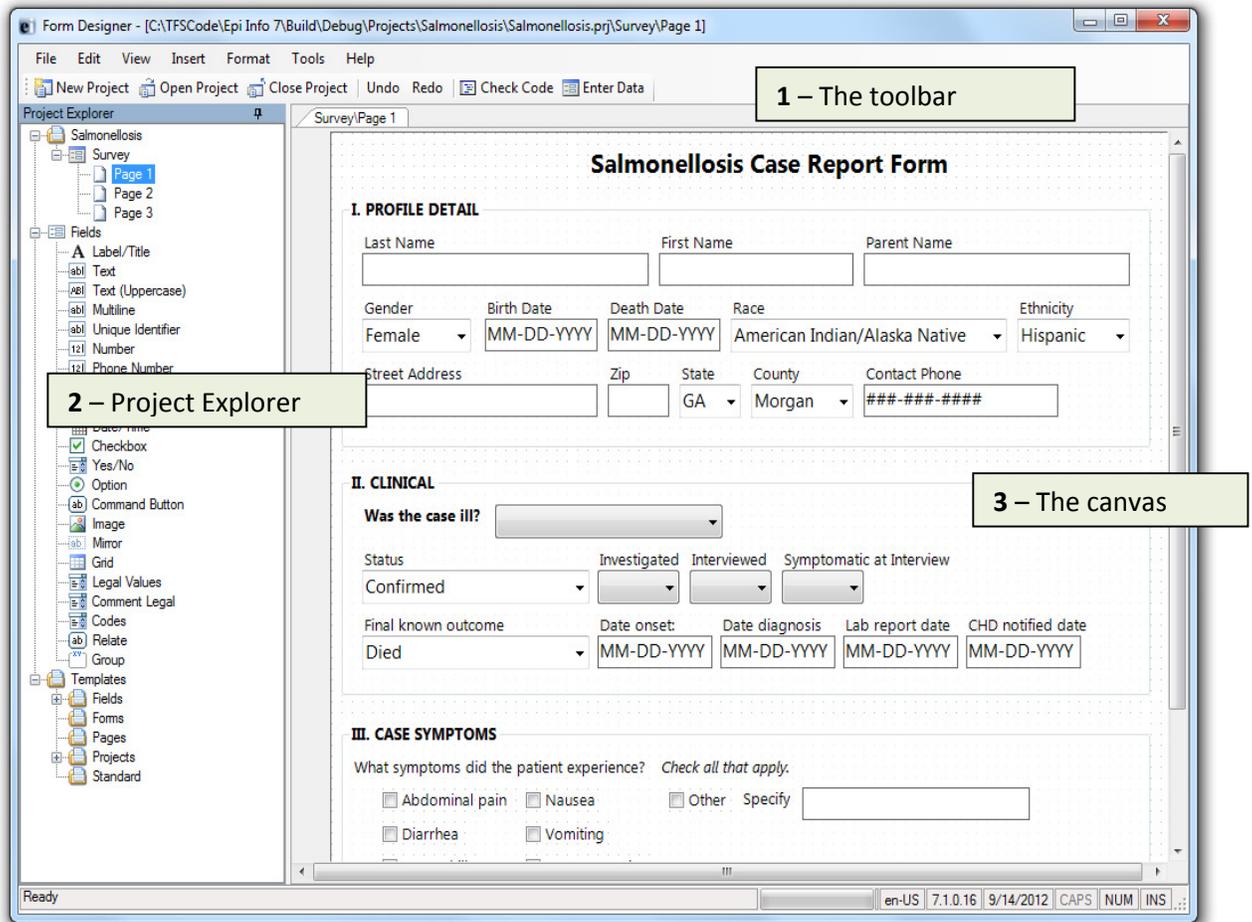


Figure 3

Key Features

The Form Designer module has the ability to:

- ❖ Create new Epi Info™ 7 projects
- ❖ Create and edit forms within Epi Info™ 7 projects
- ❖ Upgrade projects created in Epi Info™ 3.5.x
- ❖ Add, remove, and re-order pages with forms
- ❖ Add, remove, and edit fields
- ❖ Set the order of entry
- ❖ Create and edit data entry validation logic
- ❖ Create templates from fields, pages, forms, and projects for easy re-use of common form components

Create a Project

Now you will create the *Salmonella* survey. Creating the survey requires some forethought into the types of analyses you might want to run on your data. For example, later you might want to calculate the median age. To do this, you will need to have an age variable in your survey and the variable must be numeric.

You need to create a new project and a new form. Once inside the project, you can add pages and create fields to address all the survey questions. You will enter records into the survey in the next lesson.

Be sure to place all your tutorial files in the **Salmonella Training** folder you created in File Set-Up.

Follow the steps below to create your project:

1. Navigate to the desktop.
2. Double-click the **Launch Epi Info 7** icon to start the Epi Info™ 7 menu.
3. Click the **Create Forms** button to start the **Form Designer** module.
4. Select **File > New Project**. The New Project window opens.
5. Type **SalmonellaExample** in the **Name** field.
6. The default **Location** will be the *Epi Info 7\Projects* directory.
7. Type **Survey** in the **Form Name** field. The window should appear as shown in Figure 4.
8. Create the project by clicking the **OK** button. After several moments, a blank canvas will appear as shown in Figure 5.

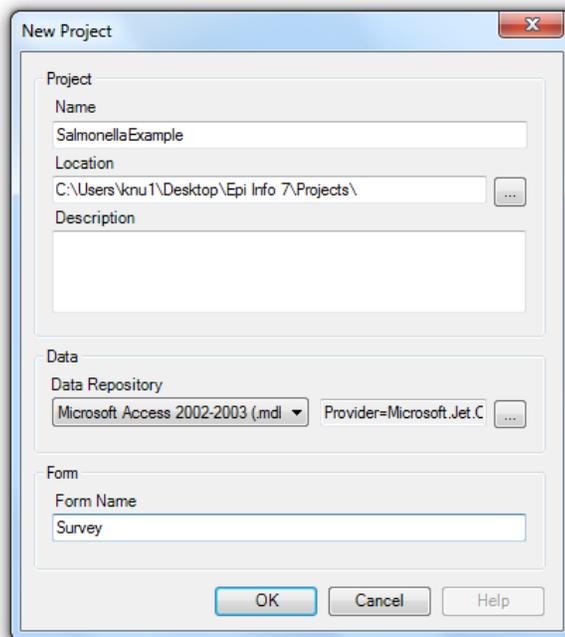


Figure 4

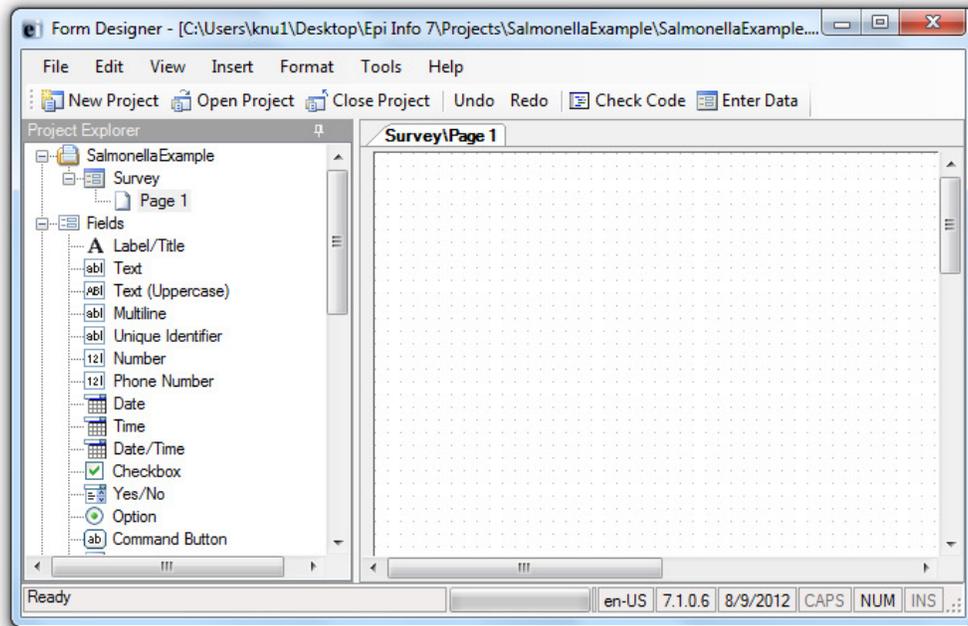


Figure 5

Recall that Epi Info™ 7 projects might contain one or more data entry forms. The text entered into the **Name** field in step 5 will become the project’s name. The project file and database file will also use this name. The text entered into the **Form Name** field in step 6 will become the name of the first form that resides within the project. More forms can be added later, but to get started you need at least one form. You can think of a project file as a “container” for forms, much like a Microsoft Excel workbook might contain multiple spreadsheets.

Pay attention to the **Project Explorer** panel in Figure 5. The Project Explorer is the tree-like list of items on the left side of the window. Items are displayed in hierarchal order; the first item in the tree is called **SalmonellaExample** and represents the project, the indented item underneath the project represents the first form within the project, and the indented item underneath the form represents the first page on the form.

Field Overview

The following section explains the field types that are available in the Form Designer and some of the field properties that can be set for each.

Field Types

From the right-click context menu on the canvas, or from the Project Explorer's list of fields, you can create a variety of different field types. Some field types are better suited for certain types of data collection while others are for display purposes or programming purposes. Each field type is explained below.

Text

Creates a text data entry field. Letters, symbols, and numbers can be entered. Text fields can be sized for specific entries or contain up to 255 characters.

Label/Title

Creates a title for the page, a label for a question, or instructions for the user. This field type is not searchable and not listed in the tab order.

Text (Uppercase)

A text field where all characters are forced into uppercase.

Multiline

Creates a data entry field that can contain letters, characters, or numbers. The multiline field can store up to two gigabytes of information. Can be used as a comments field or to enter otherwise very large amounts of text.

Number

Creates a number data entry field. Only valid numbers can be entered in the field.

Phone Number

Creates a phone number data entry field based on phone number patterns.

Date

Creates a date entry field. Several date formats are supported.

Time

Creates a time entry field.

Date/Time

Creates a data entry field that contains both a date and time.

Yes/No

Creates a "Yes or No" data entry field. The field will accept the typed word yes or no. Yes/No fields left blank will appear during analysis with missing values for those questions.

Checkbox

Creates a checkbox. The checkbox is treated like a Yes/No field. Cleared checkboxes do not appear as missing in Analysis; because the checkbox can only ever be selected or cleared, a cleared box is always false.

Option

Creates a radio button selection list of mutually exclusive choices (if more than one choice is necessary, then use the checkbox field type). See the best practices section for recommendations on using the option field type.

Command Button

Used for programming purposes. For example, you can incorporate a button on the form to open a web browser or to force navigation to a specific page (i.e. a next page button).

Image

Creates a placeholder to insert images into the record (i.e. picture of a patient, rash, x-ray, or bacteria).

Mirror

Creates a field that displays the value of another field. For example, if a Patient ID is on page 1, the value of Patient ID can be displayed onto another page using the mirror field.

Grid

Creates a related table/grid that can be inserted into a form to track multiple responses.

Relate

Creates relationships between forms. For example, a patient information form can be linked to a patient visit form.

Unique Identifier

Creates a globally unique ID value for the record.

Legal Values

Creates a drop-down list of values on the form.

Comment Legal

Creates a drop-down list of values on the form. Values in a comment legal field are separated by a dash (i.e. M-Male). Only the value to the left of the dash will be saved to the database.

Codes

Creates a linked drop-down list of values on the form. That is, when a value in a Codes drop-down list is selected, another field on the form can be set to automatically populate with a corresponding value. (i.e. choosing a hospital in the codes drop-down list could automatically fill in the county, city, and state fields.)

Field Properties

Each field also has a set of properties that can be modified by the designer. The most common properties are listed below:

- ❖ **Required:** Prevents the record from being saved unless data are entered into the field.
- ❖ **Read Only:** The field is disabled, preventing the user from modifying its contents.
- ❖ **Range:** Allows setting an upper and lower boundary on number- and date-based input.
- ❖ **Repeat Last:** When set, automatically populates new records with the same value from the previous record. Used to speed up data entry when the same values are expected in the field for every record.

Some properties only apply to certain field types. For example, the range property would have no context for a checkbox field or a multiline field. The required and read only properties are also mutually exclusive. When creating or editing a field, only the relevant properties will be enabled for selection.

Creating Fields, Part 1

Entry fields can be created in Form Designer. For this lesson, you will create fields for Title, Text, Number, Date, and Legal Value types.

Creating a label/Title field

You are first going to create a title for the outbreak survey. Follow the steps below to add a title to the form:

1. Right-click the canvas. A context menu appears.
2. Select **New Field** from the context menu. A list of fields appears.
3. Select **Label/Title** from the list of fields. The label field definition dialog box opens.
4. Type **Salmonella Survey** in the **Question or Prompt** box.
5. Click the **Font** button. The Font dialog box opens.
6. Select **Segoe UI** from the list (if available).
7. Make the font size **22** and the font style **bold**.
8. Click **OK**. Your title text has been formatted with the new font type.
9. Click **OK**. The title of your survey appears on the page.

To move your title to the top-center of the page, use the click and drag technique. To do this, left-click the field and hold while moving the text to the desired location.

Creating a text field

The next step will be to start creating some fields to capture standard demographic information for each person who will be interviewed. Start by creating a field to capture the person's first name:

1. Right-click on the canvas. A context menu appears.
2. Select **New Field** from the context menu. A list of fields appears.
3. Select **Text** from the list of fields. The text field definition dialog box opens.
4. Type **First Name** in the **Question or Prompt** box.
5. Type **FNAME** in the **Field Name** box. Field names, also known as variable names, become the field's column name in the database and are also used to reference the field in check code and when conducting analysis.
6. Click **OK**. The field for first name appears on the page.

To move both the input box and the prompt together, click the field's prompt and hold while moving the mouse. To move just the input box, click the input box and hold while moving the mouse.

Creating a date field

Follow the creation of the text field by adding a field for the date of interview:

1. Right click on the canvas. A context menu appears.
2. Select **New Field** from the context menu. A list of fields appears.
3. Select **Date** from the list of fields. The date field definition dialog box opens.
4. Type **Date of Interview** in the **Question or Prompt** box.

5. Type **InterviewDate** in the **Field Name** box.
6. Check the **Range** box and enter a lower value of 05/05/2012 and an upper value of 12/31/2012. Values that fall outside of the range will be rejected during data entry. Since you know that the outbreak started on the 5th, no cases should have been interviewed prior to this date.
7. Click **OK**. The field for the interview date appears on the page.

Notice that the width of the input box for the date field is sized appropriately for the selected pattern.

Creating a Legal Value field

The legal values field is an Epi Info™ terminology for a drop-down list of choices. Only selections from the drop-down menu will be accepted during data entry. The questionnaire will contain a question about gender. Therefore, we will create a Legal value field which will provide a drop-down list of choices for male and female.

1. Right click on the canvas. A context menu appears.
2. Select **New Field** from the context menu. A list of fields appears.
3. Select **Legal Values** from the list of fields. The legal values field definition dialog box opens.
4. Type **Gender** in the **Question or Prompt** box.
5. Type **Gender** in the **FieldName** box.
6. Click the ellipsis (...) button next to the **Data Source** text box. The **Set up code / legal links** window appears as shown in Figure 5.

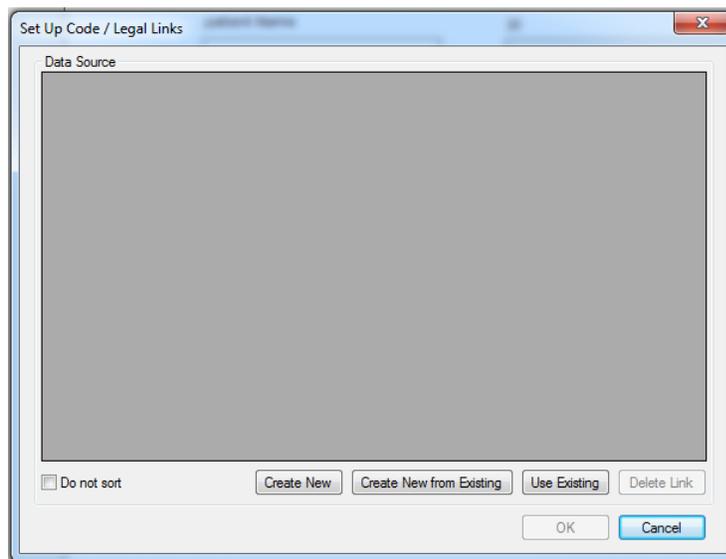


Figure 5

7. Click the **Create New** button to create a new list of values for the drop-down list.
8. Click on the new empty row in the grid.

9. Type **Male** into the grid view and hit the Enter key.
10. Type **Female** into the grid view and hit the Enter key.
11. Select the box marked **Do not sort**.

Note: When selected, **Do not sort** will arrange the items in the drop-down list exactly as they appear when you type them. When cleared, the items will be arranged alphabetically.

12. Click **OK** to accept the values. The Legal Value field definition dialog reappears.
13. Click **OK**. The field for Gender appears on the page.

Creating a number field

The number field will only accept valid numbers. Like the date field, a pattern and a range can be selected. Continue the form by adding a number field for the interviewee's age.

1. Right click the canvas. A context menu appears.
2. Select **New Field** from the context menu. A list of fields appears.
3. Select **Number** from the list of fields. The number field definition dialog box opens.
4. Type **Age** in the **Question or Prompt** box.
5. Type **Age** in the **Field Name** box.
6. Select **###** from the pattern drop down list. Each # symbol represents a digit.
7. Check the **Range** box and enter a lower value of 0 and an upper value of 110.

Note: Even with a pattern restricting the age field to 3 digits, invalid values such as 34 or 242 would still be allowed. The range property in this case adds an additional validation check.

Resource: This video will provide users with information on how to create a drop down list using a Legal Values field in the Form Designer.

http://www.youtube.com/watch?v=tEDJomzdQ_8&list=PL9B9157E47AB3FDFA&index=25

8. Click **OK**. The age field appears on the page.

As with the date field, the width of the number field is based on its pattern. Number fields do not require a pattern to be specified; however. If no pattern is specified, the field is given a default size upon its creation similar to a text field.

Your form should look similar to the one displayed in Figure 6 after creating the five fields.

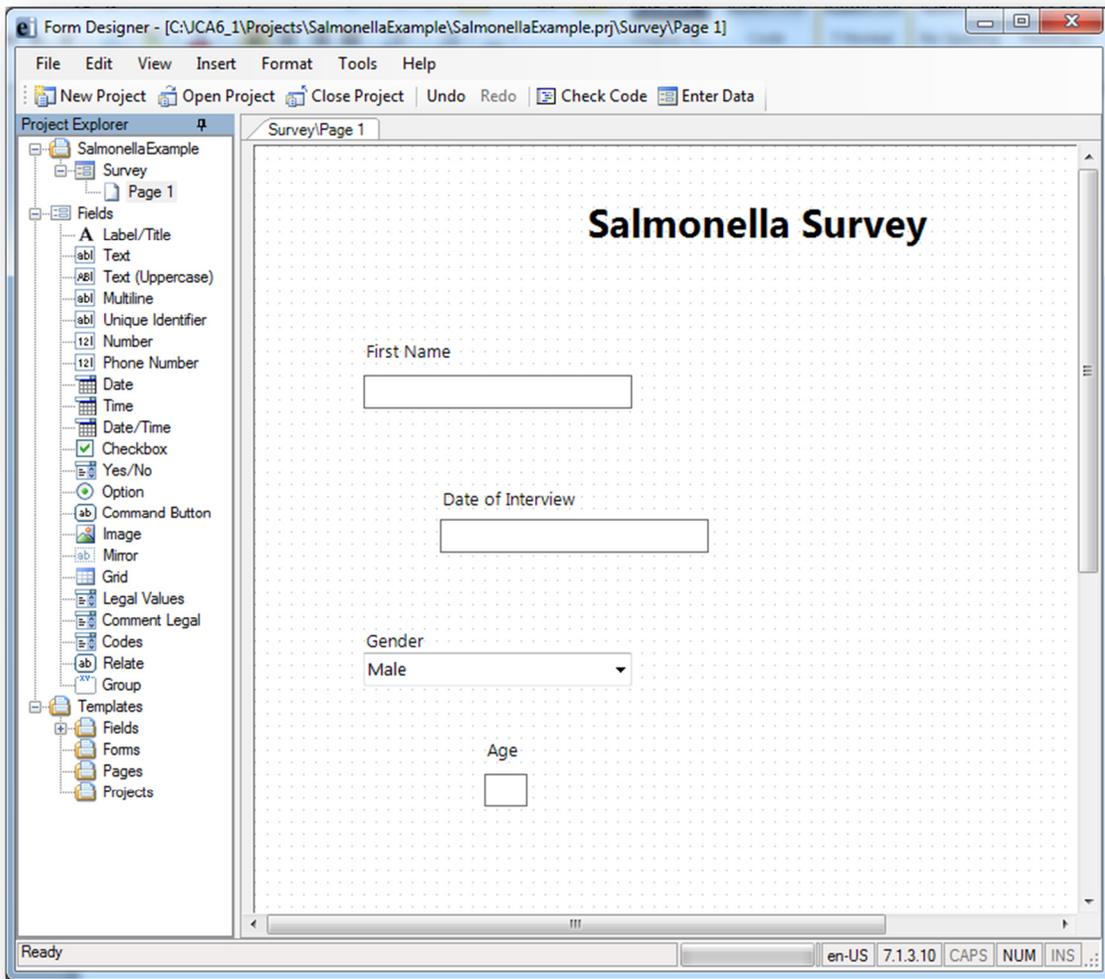


Figure 6

Student Practice

Create several additional fields using the table below.

Prompt/Question	Variable Type	Field Name	Other
Last Name	Text	LNAME	
Address	Multiline	Address	
Contact Phone	Phone Number	Phone	Use pattern ###-###-####
Was the case ill?	Yes/No	Ill	
Final known outcome	Legal values	Outcome	Use values: <ul style="list-style-type: none"> - Died - Ill at time of reporting - Recovered - Unknown Do not sort.
Race	Legal Values	Race	Use values: <ul style="list-style-type: none"> - American Indian / Alaska Native - Asian / Pacific Islander - Black - White - Other Do not sort.
Abdominal pain	Checkbox	AbdominalPain	
Diarrhea	Checkbox	Diarrhea	
Fever/chills	Checkbox	Fever	
Nausea	Checkbox	Nausea	
Vomiting	Checkbox	Vomiting	
Asymptomatic	Checkbox	Asymptomatic	
Other	Checkbox	OtherSymptom	

Table 1

When you are done adding the fields, re-arrange them so the order makes sense. The form should look similar to the one shown in Figure 7.

Salmonella Survey

First Name

Last Name

Race

Gender

Age

Address

Contact Phone

Was the case ill?

Final Outcome

Date of Interview

Abdominal pain Nausea Other

Diarrhea Vomiting

Fever/Chills Asymptomatic

Figure 7

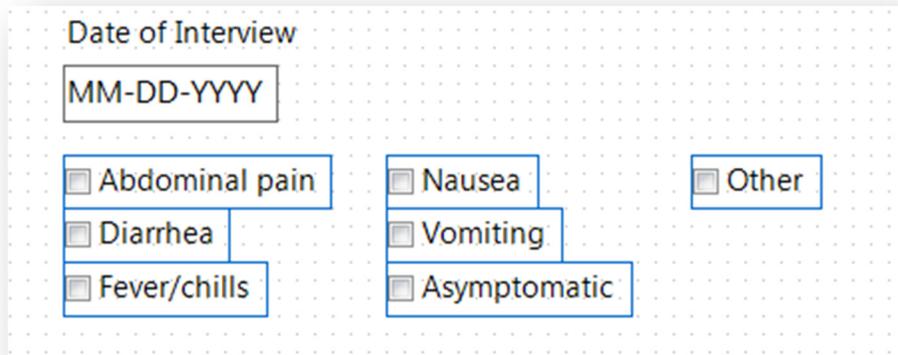
Creating Fields, Part 2

So far you have created a survey that captures basic demographic information, whether the person was ill, the final known outcome, the date of the interview, and symptom information. In this part of the tutorial, you will create a field group, an additional page, and some additional fields.

Creating a group field

Fields can be grouped together in the Form Designer using the **Group Field** feature. Groups are both visual and logical; later on, during analysis, the group itself can be used to automatically run a statistical routine across all similar fields within the group. For the purposes of this survey, create a group around the seven symptom fields.

1. Click and drag a selection box around the seven symptom checkboxes. You might have to move some fields out of the way to ensure no other fields are selected. After letting go of the mouse, the checkboxes should be highlighted as shown in Figure 8.
2. Click on the canvas and select **New Group Field** from the context menu as shown in Figure 9. The Group Properties window opens.
3. Type **Symptoms** into both the question or prompt box and the field name box as shown in Figure 10.
4. Click **OK** to create the group. The group appears on the page as shown in Figure 11.



The image shows a screenshot of a form designer interface. At the top, there is a text label "Date of Interview" followed by a text input field containing the placeholder "MM-DD-YYYY". Below this, there are seven checkbox fields arranged in two columns. The first column contains "Abdominal pain", "Diarrhea", and "Fever/chills". The second column contains "Nausea", "Vomiting", and "Asymptomatic". To the right of these, there is a single checkbox field labeled "Other". A blue rectangular selection box is drawn around all seven symptom checkboxes, indicating they are selected for grouping.

Figure 8

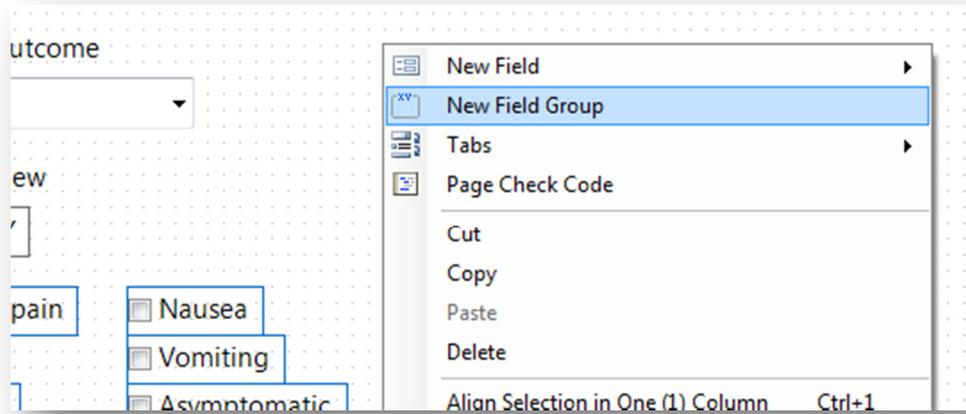


Figure 9

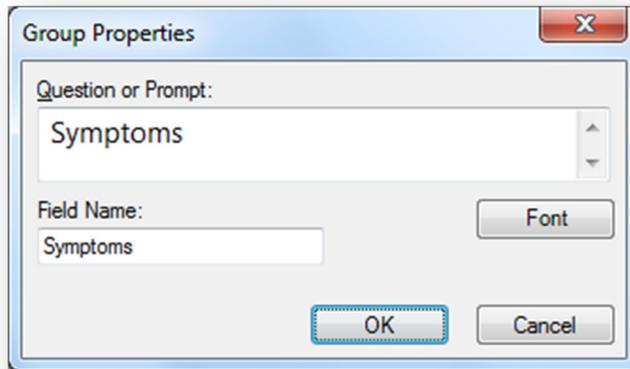


Figure 10

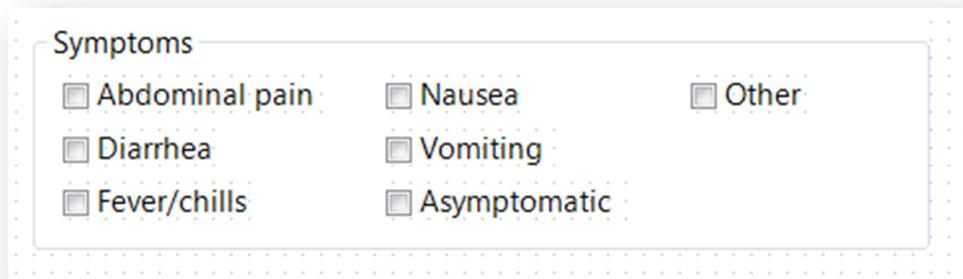


Figure 11

Creating a second page

You're probably starting to run out of room on the form. You will need to add a second page to collect additional information.

1. Right-click the **Survey** item in the **Project Explorer** panel. Recall that **Survey** is the name of the form. A context menu appears as shown in Figure 12.
2. Select **Add Page** from the context menu. A **New Page** dialog opens.
3. Click **OK**. The page is added.

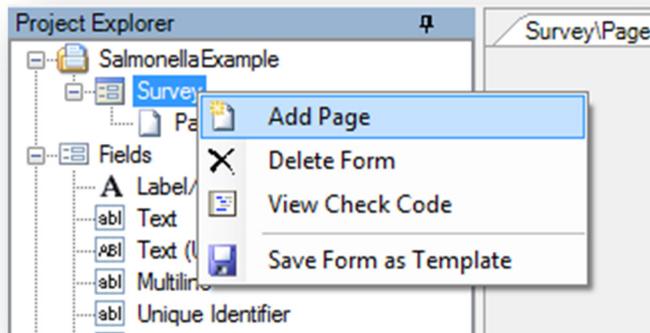


Figure 12

Renaming a page

You now have two pages: One called Page 1 and another called Page 2. To change the name of the first page on the form, follow the steps below:

1. Right-click **Page 1** in the **Project Explorer** panel. A context menu appears.
2. Select **Rename Page** from the context menu.
3. Type "Page 1 Case Information" into the Page Name box.
4. Click **OK**. The page is renamed.

Note: Page names must be unique and cannot contain any special characters such as hyphens or ampersands.

Creating a Comment Legal field

Recall that the **Legal Value** field creates a drop-down list of values and stores the full text of the user's choice in the database. This behavior presents a problem when the choices are either very long or when a code is required instead of text. For example, if the requirement for a field called "Race" is to use "1" for Asian, "2" for Black, and "3" for White, using the legal values field might confuse the person entering data because it is not easy to remember what each code represents.

Resource: This video will provide users with information on how to create drop down lists using a Comment legal field in the Form Designer.
<http://www.youtube.com/watch?v=4yyz1OrOjxc&index=24&list=PL9B9157E47AB3FDFA>

The **Comment Legal** field addresses this problem by attaching a label to each of the choices. The label is shown during data entry but is discarded when the record is saved; only the value is stored in the database. A hyphen separates the value from the label. To create a comment legal field:

1. Navigate to Page 2.
2. Right-click the canvas. A context menu appears.
3. Select **New Field** from the context menu. A list of fields appears.
4. Select **Comment Legal** from the list of fields. The comment legal field definition dialog box opens.
5. Type **Case Status** in the **Question or Prompt** box.
6. Type **CaseStatus** in the **Field Name** box.
7. Click the ellipsis (...) button next to the **Data Source** text box. The **Set up code** window appears.
8. Click the **Create New** button to create a new list of values for the drop-down list.
9. Type **C-Confirmed** into the grid view and hit the Enter key.
10. Type **P-Probable** into the grid view and hit the Enter key.
11. Type **S-Suspect** into the grid view and hit the Enter key.
12. Select the box marked **Do not sort**. (See Figure 13 for an example of how the dialog should appear after completing this step.)

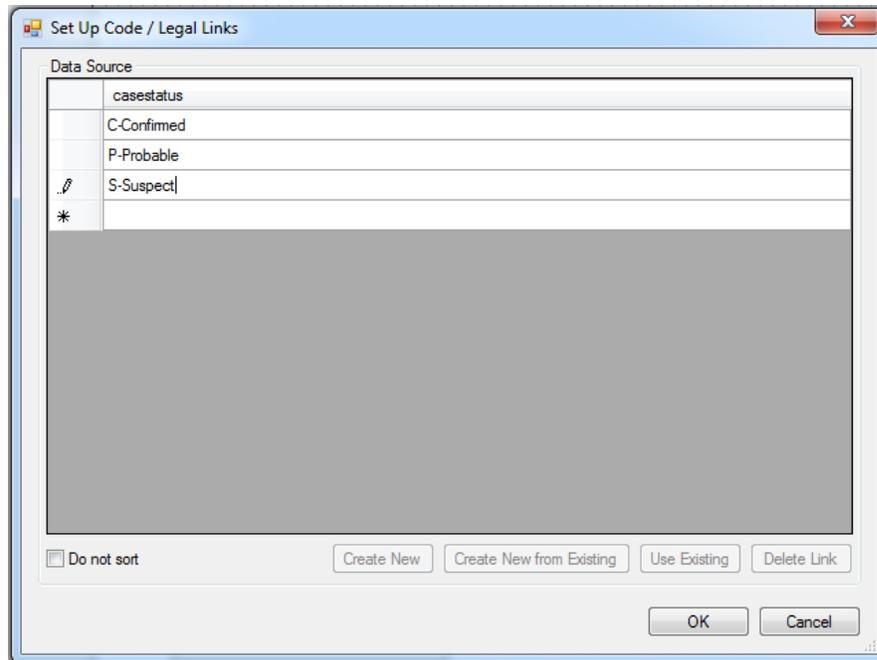


Figure 13

13. Click **OK** to accept the values. The Comment Legal field definition dialog reappears.
14. Click **OK**. The field for Case Status appears on the page.

Pay attention to the hyphens. What is to the left of the hyphen is stored in the database and is what appears during analysis. However, the entire text appears to the person entering data. In this case, selecting “P-Probable” during data entry would result in just the “P” being saved in the database.

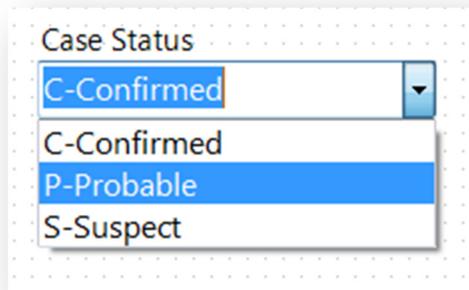


Figure 14

Creating a Codes field

The **Codes** field is another type of drop-down list. It will automatically populate another field on the form when a list value is chosen. For example, if the Codes field has a list of cities, and you select “Atlanta” from the list of cities, “Georgia” could be displayed in another field called State.

A Codes field therefore requires at least one additional field. The additional field is usually a text field that will be “linked” to the code field. To create a Codes field, you have to first create the fields you want to be linked to it. You’ll do this for hospitals within the Morgan County area; the list of hospitals will be the drop-down list values with a new field called “County” automatically accepting the county the hospital is within.

1. Navigate to Page 2.
2. Click on the canvas. A context menu appears.
3. Select **New Field** from the context menu. A list of fields appears.
4. Select **Text** from the list of fields. The text field definition dialog box opens.
5. Type **County** in the **Question or Prompt** box.
6. Type **HospitalCounty** in the **Field Name** box.
7. Click **OK**. The field for first name appears on the page.

You now need to create the Codes field and link it to the HospitalCounty field.

1. Navigate to Page 2.
2. Click on the canvas. A context menu appears.
3. Select **New Field** from the context menu. A list of fields appears.
4. Select **Codes** from the list of fields. The codes field definition dialog box opens.
5. Type **Hospital** in the **Question or Prompt** box.
6. Type **Hospital** in the **Field** box.
7. Ensure that **HospitalCounty** is selected in the **Select field(s) to be linked** list box as shown in Figure 15.
8. Click the ellipsis (...) button next to the **Data Source** text box. The **Set up code** window appears.
9. Click the **Create New** button to create a new list of values for the drop-down list.
10. Type the values shown in Table 2 into the grid.

Hospital	HospitalCounty
Hospital A	Morgan
Hospital B	Jasper
Hospital C	Putnam

Table 2

11. Check the box marked **Do not sort**. Figure 16 shows how the **Codes** grid should appear after completing this step.
12. Click **OK** to accept the values. The Codes field definition dialog reappears.
13. Click **OK**. The field for Hospital appears on the page.

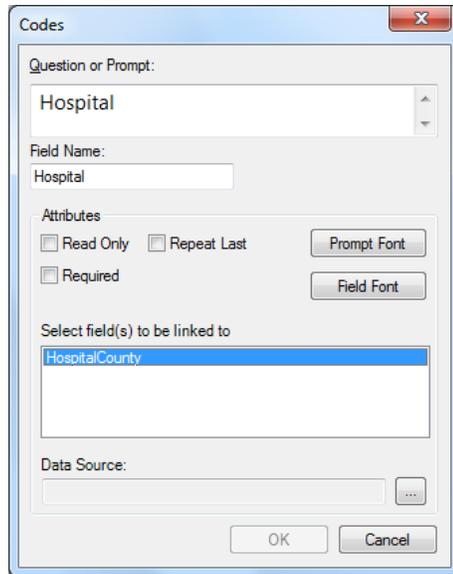


Figure 15

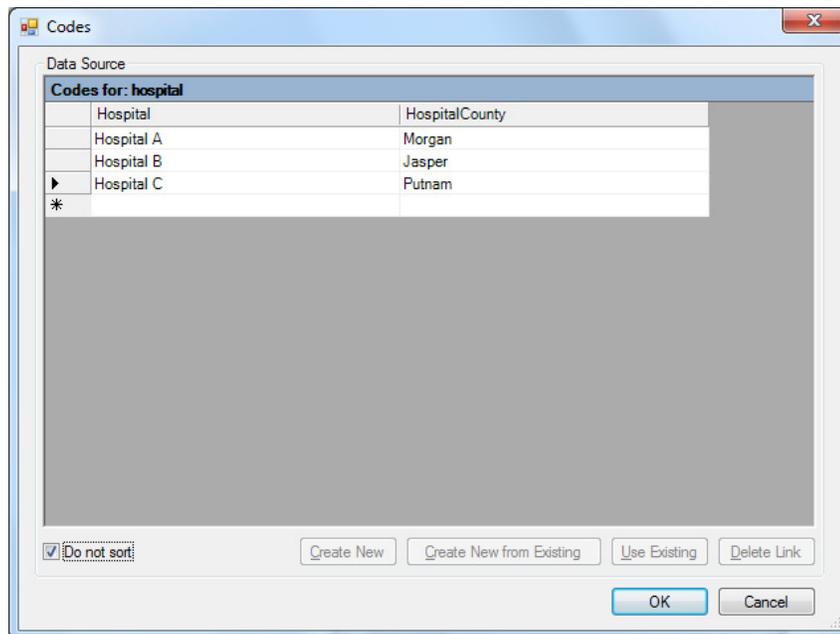


Figure 16

Note that you cannot select a drop-down list value in Hospital and observe the corresponding value, County, in the Form Designer. This process only works in data entry mode.

Resource: This video will provide users with information on how to create drop-downs using a Codes field in the Form Designer.

<http://www.youtube.com/watch?v=SyZio5yi160&index=29&list=PL9B9157E47AB3FDFA>

Creating a Mirror Field

A mirror field shows the value of one field on a different page. Since each case has two pages of information, you want to place their last name on each page.

1. Navigate to Page 2.
2. Right-click the canvas. A context menu appears.
3. Select **New Field** from the context menu. A list of fields appears.
4. Select **Mirror** from the list of fields. The mirror field definition dialog box opens.
5. Type **Last Name** in the **Question or Prompt** box.
6. Select **LNAME** in the **Assigned Variable** drop-down list. The field chosen from this list will be the field whose value will be displayed in the Mirror Field.
7. Click **OK**. The field for last name appears on the page.

The mirror field is “read-only” during data entry, meaning the user cannot modify its value. In the example above, if the user wished to change the contents of the mirror field showing the person’s last name, they would have to update the LastName field on Page 1.

Student Exercise

While several fields were added to the questionnaire, it's not complete. Take 10 to 15 minutes to think about additional fields that should be included based on the scenario and then add them to the form. Keep in mind the different types of fields that are available and ask yourself why you might use one field type over another.

Do not concern yourself with the precise arrangement of the fields. Alignment options, setting the tab order, and other formatting options are discussed in subsequent sections.

NOTE: You could also use the table reference provided in the *Student Practice- Lesson 1* section of the Appendix which includes all the fields that were incorporated into the final form.

Setting the Tab Order

The tab order is the order in which the cursor moves from field to field as data are entered. Each page on the form has its own tab order. To see the tab order for Page 1, follow the steps below:

1. Navigate to Page 1.
2. Right-click the canvas. A context menu appears.
3. Select **Tabs > Show Tab Order** from the context menu (Figure 17). The tab number for each field appears (Figure 18).

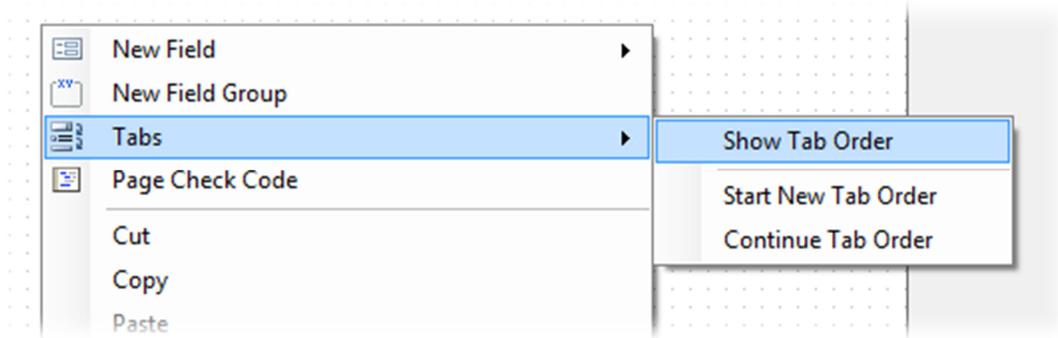


Figure 17

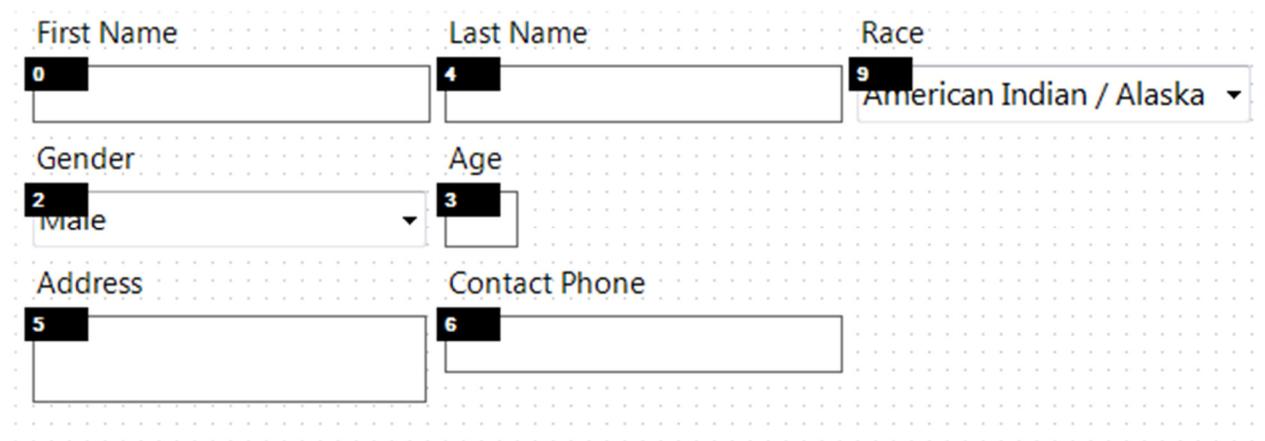


Figure 18

Figure 18 shows the tab stops aren't numbered in logical order. The cursor would automatically move from First Name to Gender instead of from First Name to Last Name. This behavior occurs because the tab stops are numbered based on *the order of creation*. You can choose a few different ways to assign a more logical tab order.

Automatically assigning tabs

You can automatically re-assign all the tabs on a given page based on a left-to-right, top-to-bottom sorting algorithm. Follow the steps below to do this:

1. Navigate to Page 1.
2. Right-click the canvas. A context menu appears.
3. Select **Tabs > Start New Tab Order** from the context menu. The program calculates the new tab numbers and displays them for each field (Figure 19).

1 First Name	2 Last Name	3 Race American Indian / Alaska ▾
4 Gender male ▾	5 Age	
6 Address	7 Contact Phone	

Figure 19

The cursor will now move from the top of the form to the bottom of the form, and left-to-right if more than one field is on the same line.

Manually Assigning Tabs

You might want to modify the ordering of the tabs manually depending on the circumstances. For instance, **assume** that the tab stops should be numbered by column (top-to-bottom) first instead of by row (left-to-right). In this case, you would do the following:

1. Navigate to Page 1.
2. Right-click the canvas. A context menu appears.
3. Select **Tabs > Start New Tab Order** from the context menu. The program calculates the new tab numbers and displays them for each field.
4. Click *once* inside of the black box for the field that should be first in the tab order (First Name). You could also right click on the black box and select the *Set as First Tab* option.
5. Click once inside of the black box for the field that should be second in the tab order (Last Name).
6. Click once inside of the black box for the field that should be third in the tab order (Race).
7. Continue clicking each black box on the form for each subsequent field. i.e., Last Name, Age, Contact Phone, and then Race.

It is possible that two fields might temporarily have the same tab numbers when the tabs are manually assigned. For example, after completing step 5, but before starting step 6, both Last Name and Gender would have the number 2. Two fields *are* allowed to have the same tab number, but this isn't recommended as it will be impossible to determine where the cursor will go during data entry. This ambiguity is one reason why you should always double-check the tab order on each page of your form.

Partially assigning tabs

The **Continue Tab Order** feature allows you a greater degree of freedom over automatic tab ordering. Follow the steps below to see how you can use this feature to set the tab order by columns.

1. Navigate to Page 1.
2. Right-click the canvas. A context menu appears.
3. Select **Tabs > Start New Tab Order** from the context menu. The tabs are re-calculated and arranged in left-to-right, top-to-bottom order as shown in Figure 19.
4. Drag a selection box around the three fields shown in Figure 20. The three fields are selected as shown in Figure 21. (Ensure *only* the fields in the first column are selected. Often, field selection can result in other fields being unintentionally included in the selection depending on how close the fields are placed together).
5. With the three fields selected as shown in Figure 21, click on the canvas. A context menu appears.
6. Select **Tabs > Start New Tab Order** from the context menu as shown in Figure 22. The tabs are re-calculated *only for the selected fields* as shown Figure 23.

Sal

First Name

Gender

Address

Last Name

Age

Company

Was the case III?

Figure 20

First Name	Last
<input type="text"/>	<input type="text"/>
Gender	Age
Male	<input type="text"/>
Address	Co
<input type="text"/>	<input type="text"/>

Was the case III?

Figure 21

First Name	Last Name	Race
<input type="text"/>	<input type="text"/>	American
Gender	Age	
Male	<input type="text"/>	
Address	Contact Phone	
<input type="text"/>	<input type="text"/>	

-  New Field
-  New Field Group
-  Tabs
-  Page Check Code
- Cut
- Copy

- Show Tab Order
- Start New Tab Order
- Continue Tab Order

Figure 22

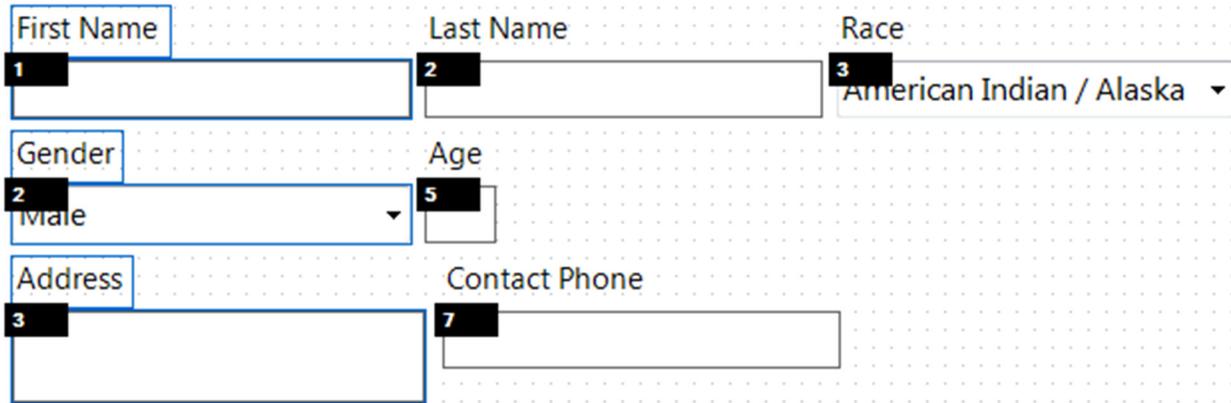


Figure 23

You need to continue the process of selecting columns and setting the tab order on those columns until there aren't any fields left. In this example, you would need to process two more columns.

However, you cannot use the **Start New Tab Order** option for the next columns because this would start the tab order over again at 1. Instead, from this point forward, you will use the **Continue Tab Order** feature.

1. Click the blank canvas background to de-select any fields that might still be selected from the prior set of steps.
2. Drag a selection box around Last Name, Age, and Contact Phone. The three fields are selected.
3. Right-click the canvas. A context menu appears.
4. Select **Tabs > Continue Tab Order** from the context menu as shown in Figure 24. The tabs for only the selected fields are calculated and displayed as shown in Figure 25.

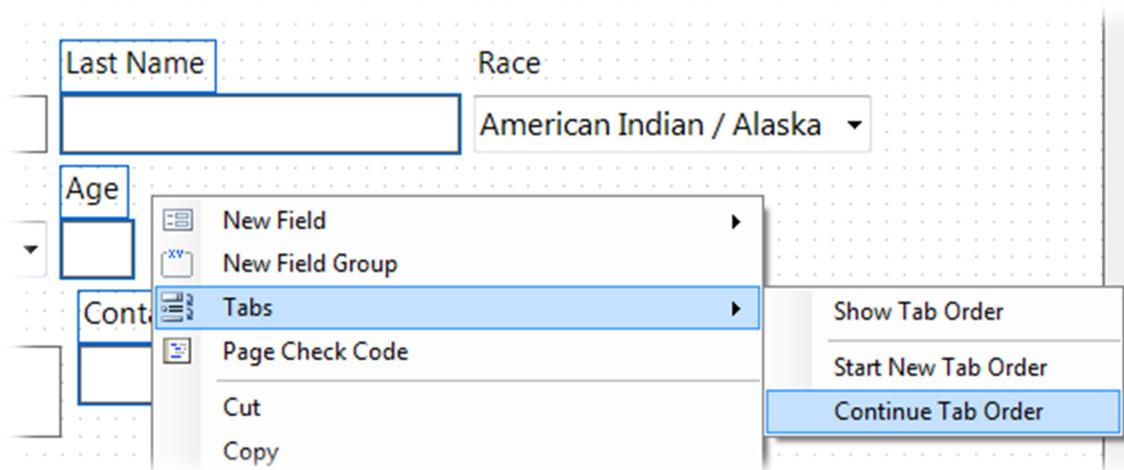


Figure 24

1 First Name

2 Gender
Female

3 Address

4 Last Name

5 Age

6 Contact Phone

Race
American Indian / Alaska

Figure 25

Notice the three selected fields continued their numbering from where you left off in the prior exercise. You can keep using the **Continue Tab Order** feature for subsequent selections of fields.

Formatting Options and Other Features

Field alignment

The Form Designer has two mechanisms to quickly align fields: Stack Alignment and Table Alignment. In Stack Alignment, the fields are aligned “stacked” on top of one another. In Table Alignment, the fields are arranged in a specified number of columns across the page. Table Alignment can be used to align fields horizontally if the number of columns you specify matches the number of fields in the selection. Follow the steps below to see an example of the alignment options:

1. Re-arrange three of the symptom fields on Page 1 as shown in Figure 26. *Move all three fields outside of the Symptoms group box before completing this step. Aligning fields in a group is easier if the fields are outside the group.*
2. Drag a selection box around the three fields.
3. Right-click the canvas. A context menu appears.
4. Select **Align Selection in One (1) Column** (Figure 27). The fields are aligned as shown in Figure 28.

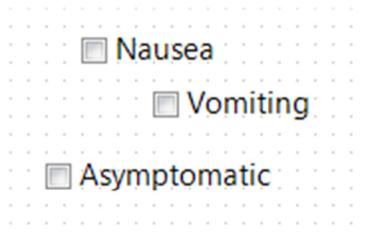


Figure 26

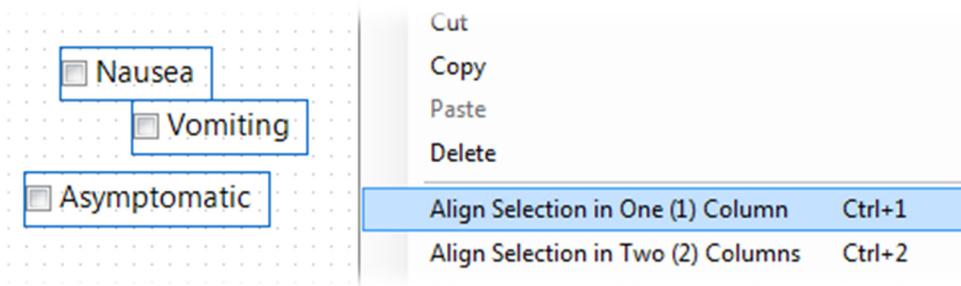


Figure 27

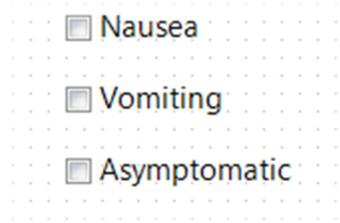


Figure 28

What if the fields should be arranged in rows and columns instead of in just one column? Follow the steps below to produce a table-like layout of your symptom fields.

1. Now we will re-arrange all the symptom fields on Page 1 as shown in Figure 29. In this example, *all seven fields should be outside from the Symptoms group box.*
2. Drag a selection box around the seven fields.
3. Right-click the canvas. A context menu appears.
4. Select **Align Selection in Three (3) Columns**. The fields are aligned as shown in Figure 30.
5. Move the seven fields back inside of the Symptoms group box.

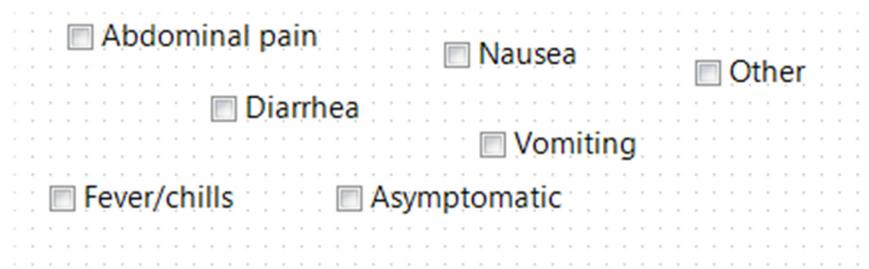


Figure 29

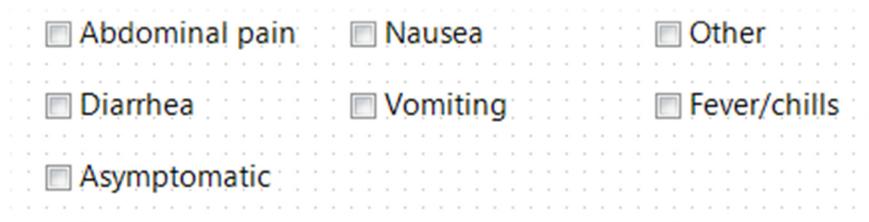


Figure 30

Font options

Default Fonts

The fields you've created up to this point all have the same font. You can change the font of all fields created after this point by selecting **Format > Set Default Prompt Font** and **Format > Set Default Input Font** from the Form Designer menu.

The distinction between prompt font and input font is that the prompt font is applied to the field's description, while the input font is applied to the input box. Fields that don't accept character input (such as Checkboxes) or that don't have any inputs at all (such as a label) ignore the default input font setting.

Note: Default fonts are only applied to fields created after the default font is set. Changing the default font does *not* change the font properties for any fields already on the form. Setting the default fonts prior to creating a survey is recommended.

Changing Field Fonts

Changing the fonts for existing fields must be done on a one-by-one basis. To change the font for a field, right-click the field and select **Properties** from the context menu. The Field Definition dialog box will re-appear. You can use the Prompt Font and Input Font buttons to modify the font settings.

Field Input box placement

Most fields typically consist of both an input box and a prompt as shown in Figure 31.



Figure 31

Epi Info™ 7 will place the input box below the prompt by default. Sometimes, however, the prompt might be needed somewhere else in relation to the input box. To move the input box to the right of the prompt, simply click the input box, hold the mouse button down, and then drag the input box to its desired location.



Figure 32

You can place the input box anywhere on the page in relation to the prompt. To move both the prompt and the input box together, click the *prompt*, hold the mouse button down, and then drag the prompt to its desired location.

If at any time you want the input box to snap back to its “default” position relative to the prompt, right-click the field and select **Default Prompt Align** as shown in Figure 33.

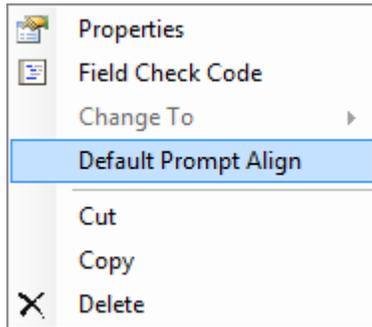


Figure 33

Page sizes and orientation

Epi Info™7 forms are sized to fit on an 8 ½ x 11 inch sheet of paper. However, you might wish for the page sizes to be larger or smaller. For example, if you will be entering the data on laptops with small screens, using a small page size would help eliminate scrolling during data entry.

Page sizes can be changed by navigating to **Format > Page Setup** from the Form Designer menu.

Grid settings

You might have noticed that as you move fields around on the form, they tend to “snap” into position. This “snapping” behavior is the field automatically placing itself into the grid square closest to where it was dropped. This feature can be beneficial for making sure fields that you are aligning yourself (as opposed to using the stack and table alignment options) don’t need a lot of small, tedious movements to ensure they are all on the same line.

Navigate to **Format > Grid Settings** to open the Grid Settings dialog.

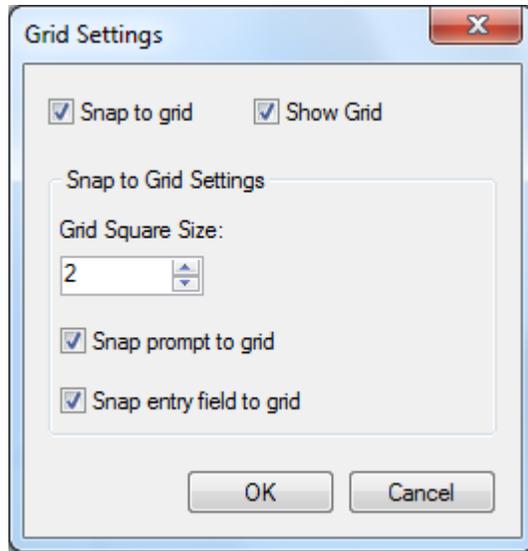


Figure 34

Grid Settings Dialog

- ❖ **Snap to grid:** Determines whether fields snap to the closest grid square when they are dropped. Turning off this setting will allow exact field placement on the form.
- ❖ **Show grid:** Shows or hides the gray dots that make up the “grid” background on the canvas.
- ❖ **Grid Square Size:** Determines the size of each grid square. A lower setting will provide a greater level of control over field placement when Snap to grid is enabled.
- ❖ **Snap prompt to grid:** Determines whether a field’s prompt is subject to Snap-to-grid.
- ❖ **Snap entry field to grid:** Determines whether a field’s input box is subject to Snap-to-grid.

Cut, copy, and paste

You can cut, copy, and paste fields in the Form Designer. To copy and paste a set of fields, you would first drag a selection box around those fields, select **Edit > Copy** from the menu, then right-click the canvas at the desired destination location, and select **Paste** from the context menu.

Important: Because pasted fields contain the original field’s field name with a 1 appended, these default field names aren’t generally useful. If you paste a field *after* starting data collection, you will be prevented from changing the default field name.

Data dictionary

The Data Dictionary displays all of the fields in a spreadsheet-like view for the current form. Information shown in the dictionary includes the field’s page number, prompt, field name, field type, any formatting, and any other special information for that field. Reviewing the data dictionary prior

to starting data collection can help identify weaknesses in field naming standards and is also a good way to check that all date and number fields have consistent patterns and range values.

To show the data dictionary for the *Salmonella* outbreak form, follow the steps below:

1. Navigate to **Tools > Data Dictionary** from the Form Designer menu. The Data Dictionary window appears (Figure 35).

	Page Number	Prompt	Field Type	Name	Variable Type	Format	Special Info
▶	1	Age	Number	Age	Number	###	
	1	First Name	Text	FNAME	Text		
	1	Last Name	Text	LNAME	Text		
	2	County	Text	HospitalCounty	Text		
	1	Address	Multiline	Address	Text		
			GlobalRecordId	GlobalRecordId	Text		
	1	Date of Interview	Date	InterviewDate	Date	MM-DD-YYYY	
	1	Abdominal pain	Checkbox	AbdominalPain	Boolean		
	1	Diarhea	Checkbox	Diarhea	Boolean		
	1	Fever/chills	Checkbox	Fever	Boolean		
	1	Nausea	Checkbox	Nausea	Boolean		
	1	Vomiting	Checkbox	Vomiting	Boolean		
	1	Asymptomatic	Checkbox	Asymptomatic	Boolean		
	1	Other	Checkbox	OtherSymptom	Boolean		
	1	Contact Phone	Phone Number	ContactPhone	Phone Number		

Selected View: View/Print as Web Page Close

Figure 35

The dictionary can be sorted by clicking each column heading. Additionally, the dictionary can be shown in a web browser (where it is easier to print) by clicking the **View/Print as Web Page** button.

Templates

You might want to save certain fields for use on forms you will create later, as opposed to having to create those same fields over and over (think of case demographic information that is likely to appear on multiple forms for different types of outbreaks). Saving fields for later use would also be a good way to have a library of fields already built and ready to go in case of a public health emergency. Epi Info™ 7 allows you to do this using a feature called **Templates**.

All currently available templates are displayed in the Project Explorer pane underneath the **Templates** item (Figure 36). Note the four different categories of templates: Field templates, form templates, page templates, and project templates.

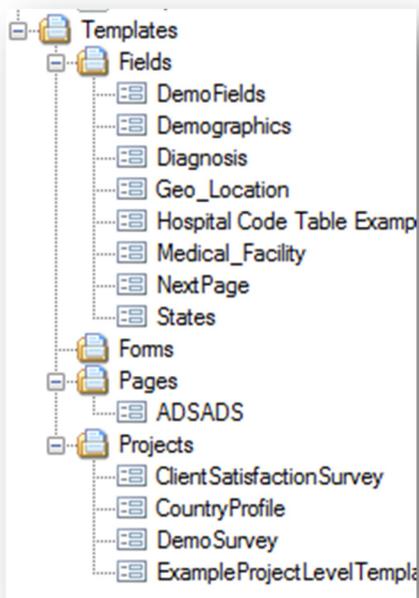


Figure 36

Working with field-level templates

Go ahead and create a template for the demographics fields on the first page of the survey.

1. Navigate to Page 1.
2. Drag a selection box around the demographics fields that have been placed on the form. These include First Name, Last Name, Race, Gender, Date of Birth, Address, and Contact Phone.
3. Right-click an empty portion of the canvas. A context menu appears.
4. Select **Save Selection as Template** from the context menu. The **Add Template** dialog opens.
5. Type "DemoTemplate1" into the **Template Name** box.
6. Click **OK**.

After completing step 6, an item called “DemoTemplate1” should be present underneath the **Templates/Fields** item in the Project Explorer (Figure 37).

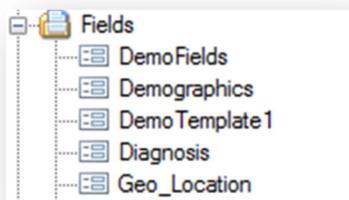


Figure 37

Now that the template has been saved, it can be added to any other forms or projects created on that computer. Go ahead and add the template to a new page on the form:

1. Add a new page to the form. (Refer back to the earlier section about adding pages if you’re unsure how to add a page.)
2. Find the **DemoTemplate1** item underneath **Templates** and then **Fields** in the **Project Explorer**. You might have to scroll down in the Project Explorer pane to find it.
3. Drag the **DemoTemplate1** item from the Project Explorer to the top-left section of the canvas and drop it. The set of demographic fields saved in the prior example are re-created on the new page.

Note: Field templates, once added to a form, can be modified as if they were regular fields.

Working with project-level templates

You’ve created the *Salmonella* outbreak form. You now need to distribute it to your investigators who will be interviewing the picnic attendees. How would you distribute the project to them?

You could transfer the Epi Info™ 7 project files from your computer to the other computers that will be used. A thumb drive or e-mail might be sufficient for this. However, a direct transfer of the project files might present you with several problems:

- ❖ If the underlying database type for the project is Microsoft Access, then attaching the database file to an e-mail might cause the e-mail to be blocked due to the file type. Also, very large forms might exceed the file size limits on certain e-mail systems.
- ❖ If the underlying database type for the project is Microsoft SQL Server, then the database cannot be attached to an e-mail message or copied to a thumb drive at all.
- ❖ If you have already started to collect data, then attaching the database to the e-mail will send the recipient both the form *and* the data that you have already collected.

- ❖ Both the .prj file and the .mdb database file must be sent. Many users aren't aware that both files are required. Any confusion that results from an incomplete transmission (i.e., only one of the two files was sent) could result in delays.

While some of these issues can be overcome, the recommended way of dealing with these problems is to use project-level templates. Once a project-level template has been created, it can be e-mailed to your colleagues without fear of being blocked due to file type restrictions or file size limitations, it won't contain any data that has been collected, it can be used with both Microsoft Access and Microsoft SQL Server database types, and it is contained in a single file.

Creating a project-level template

Unlike a field-level template, a project-level template encompasses the entire project, including all the forms in the project, all the pages on each of the forms, and all data entry validation logic. Follow the steps below to create a project-level template from the form you have just created:

1. Right-click the **SalmonellaExample** item in the **Project Explorer** pane. A context menu appears. (Recall that **SalmonellaExample** is the name of the project.)
2. Select **Save Project as Template** from the context menu (Figure 38). The **Save Project as Template** dialog opens.
3. Type "DemoProjectTemplate1" into the **Template Name** field.
4. Click **OK**.

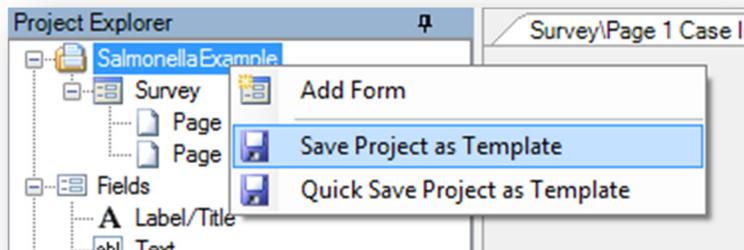


Figure 38

Sending a project template to a colleague

After completing step 4, the project will appear underneath the Templates/Projects tree in the Project Explorer. It's now time to send the project template to the investigators so they can start collecting data. Follow the steps below to find the file so it can be attached to an e-mail message or copied to a thumb drive.

1. Find the **DemoProjectTemplate1** item underneath the **Template** and then **Projects** tree in the **Project Explorer**. You might have to scroll down in the Project Explorer pane to find it.
2. Right-click the **DemoProjectTemplate1** item. A context menu appears (Figure 39).

3. Select **Open Containing Folder** from the context menu. A File Explorer window opens.
4. Find the file called DemoProjectTemplate1.xml from the list of files in the File Explorer window. This file represents the template.

Once you've located the template file in the File Explorer Window, you can attach it to an e-mail message using the e-mail client of your choice or you can copy it to a thumb drive.

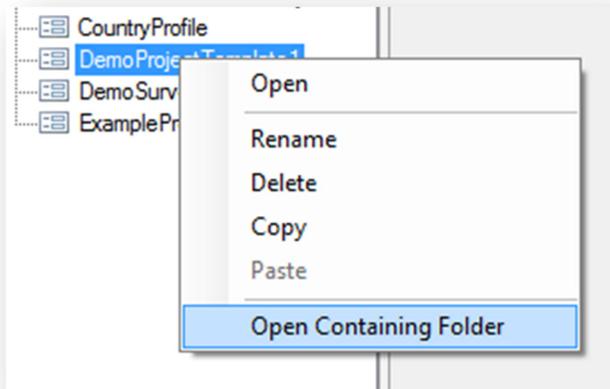


Figure 39

Downloading a project template from a colleague

Now assume you're the investigator assigned to interview the picnic attendees. You just received the project template file from your colleague through your health department e-mail account. You can follow the steps below to load the template into Epi Info™ 7 and create a project from it.

1. Download the file attachment from your e-mail client to the desktop.
2. Open the Epi Info™ 7 Form Designer module.
3. Navigate to **File > Get Template...** (Figure 40). A Windows Open File dialog appears.
4. In the Open File dialog, navigate to the desktop.
5. Select the file that was just downloaded from the e-mail client.
6. Click **Open**. After the above process has been completed, the template will be loaded into Epi Info™ 7
7. To create a new project using the project template, double click on the project template name from the **Templates** and then **Projects** tree in the Project Explorer.

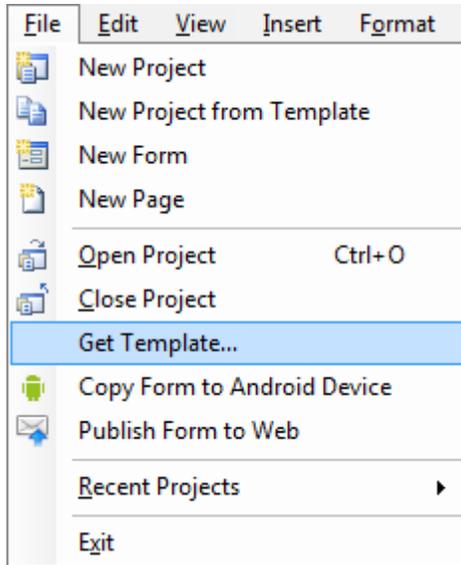


Figure 40

Creating a project from a template

For templates that have already been loaded, you can select the **New Project from Template** option in the File menu. This will start the template creation at step 6 in the previous example.

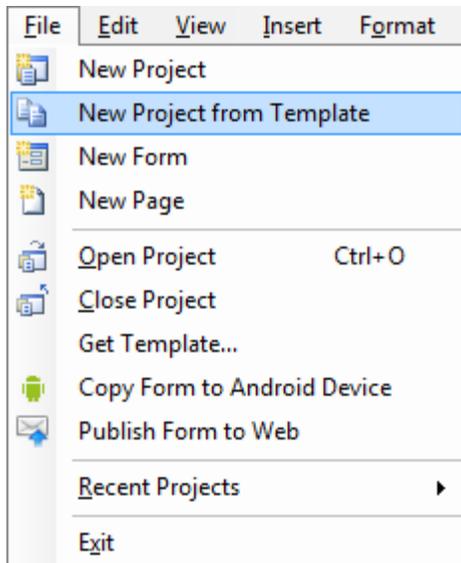


Figure 41

Best Practices in Epi Info™ 7 Form Design

As you can see, creating an Epi Info™ 7 form isn't difficult. However, it helps to have an idea of how the data will be analyzed prior to starting the form design process. This typically requires some forethought and planning about the types of fields that will be used.

Use of Yes/No and checkbox fields instead of drop-down list fields

A typical requirement for drop-down lists (Legal values field) is that they contain Yes, No, and Don't Know as choices. If the intention is to use that field as part of a 2x2 table, then having more than two possible values will generate a non-2x2 table and thus, 2x2 statistics won't be available. The Epi Info™ 7 analysis tools have ways of recoding categorical data into dichotomous values such as true and false, but this requires some effort and the process must be done for each field. Imagine if the *Salmonella* survey in the example scenario had 100 food items with Yes, No, and Don't know as choices; you would need to recode all 100 variables to use the 2x2 statistics.

It's recommended to use the checkbox fields and Yes/No fields as often as possible for fields where a 2x2 table might be needed.

Yes/No fields versus checkbox fields

Recall that Epi Info™ 7 has two similar field types: The Yes/No field and the checkbox field. The Yes/No field will create a drop-down list with Yes and No as choices. The checkbox can either be selected or cleared. The key difference between the two field types is that you can leave a Yes/No field blank, representing an unknown or missing value. If the intention for a given question is to allow for the possibility that it is unknown or missing, then the Yes/No field should be used as a checkbox can never be left blank. A cleared checkbox will always be saved to the database as FALSE.

Page size awareness

When creating a form, keep in mind that not all computers have large screens. Will the screens used to display your form be large or will they be small? The default Epi Info™ 7 page size is 8 ½ x 11 inches and works well for desktop computers with large monitors. The default page size may not work very well when used on tablet PCs or laptops. If you're going to be conducting a lot of field work and aren't sure what equipment you'll be using, consider two choices:

- ❖ Reduce the page size. This will limit the number of fields you can put on a given page, but it will also limit the amount of vertical and horizontal scrolling that will be needed during data entry.
- ❖ Change the page orientation to landscape. Many smaller screens have more screen width than height, so displaying the form in landscape mode might offer a better utilization of the available screen space.

Group Fields

If you're using Epi Info™ 7 to analyze data, then intelligent use of group fields can greatly speed up the analysis. For example, you can use groups to combine fields together or you can run a more

complex analysis routine (such as a 2x2 table) across all fields in the group at once. Grouped analysis is discussed in more detail in later sections of this tutorial.

Limit the use of required fields

The person entering data must fill in all required fields before a record can be saved. While marking all fields as “Required” might make sense, there are downsides; for example, if the data being entered comes from a paper survey and the paper survey is missing a page or has an ambiguous mark whose intent cannot be determined. To proceed, the people entering data would be forced to either discard the record or enter garbage data into all the required fields they don’t know the answers to. All that garbage data then must be cleaned during data analysis.

If you want to allow for the possibility of missing data, perhaps due to incomplete data collection or problems interpreting handwritten results, then two choices are recommended:

- ❖ Do not use the required field property
- ❖ Alternatively, leave a “Don’t know” choice for any required fields.

Limit the use of option fields

Option fields were not discussed in this lesson, but they should be avoided if possible. An option field does not store the option itself in the database, but rather, stores the *numeric position* of that option in the list. For example, if the option field has choices Yes, No, and Unknown, then selecting “Yes” would result in a 0 being saved to the database. Selecting “No” would result in a 1 being saved to the database. If 50 records were saved, and the options were re-arranged such that No appeared first, then No would be represented by zero. However, changing the order of the options would not update the 50 records whose data was already collected. Option fields also consume large amounts of screen real-estate. For these reasons, it is recommended to use drop-down lists (Legal values, comment legal fields, or code fields) instead of option fields.

Use the range property for date and number fields

A simple way to check for out-of-range input is to use the range property on number and date fields. Think about a field for Age; even with a pattern that restricts input to three digits, you can still type a negative value or type a clearly incorrect value (such as 222 instead of 22). Any analysis that relied on finding the mean age, for example, would be skewed. If a user enters a value that is out of bounds, the software will prompt the user about the error, show them the allowed range of values, and then erase their invalid input.

Be mindful of whether the form has a data table

You might find yourself navigating back and forth to the Enter module to ensure your tab order and check code work as you intend. However, when you open the form in Enter, a data table is created for the form and you will be prevented from changing field names afterwards. If you need to change your field names after you’ve tested the form, and find that you can’t, you can navigate to **Tools > Delete Data Table** from the Form Designer menu. Be warned that deleting the data table erases all data you’ve collected. It is highly recommended to review the data dictionary and make field name

changes *before* starting data collection to avoid a scenario where the only solution to changing a field's name is to erase live data.

Use multiline fields to capture large amounts of text

If you need to capture potentially large amounts of text information, such as a 'Comments' section on a survey, use the Multiline field type. Unlike the Text field, the Multiline field can be re-sized vertically and it can include both line breaks and tabs. It can also store 2 gigabytes of text, whereas the Text field can store only 255 characters.

Use field templates to avoid repeating work

If you're using Epi Info™ 7 to create numerous surveys, consider using field-level templates to avoid re-creating the same set of fields over and over (e.g. Demographics).

Use project templates to distribute your Epi Info™ 7 projects

When distributing the project becomes necessary, such as when providing investigators the outbreak investigation form, consider using project-level templates as the distribution mechanism. Sending your colleagues the project-level template, instead of the actual Epi Info™ 7 project you've been working on, has several benefits and can avoid unnecessary hassles. See the earlier section of this manual regarding project-level templates for further details.

Additionally, consider creating certain projects ahead of time and saving them as templates in a location where your team can access them quickly (such as a network shared drive). Take the *Salmonella* outbreak as an example; if a *Salmonella* outbreak survey had been created before the outbreak occurred, the investigators would have started with a solid foundation and simply modified the template to the specifics of the outbreak.

Summary

During this lesson, you were introduced to the concept of creating electronic data entry forms using the Form Designer module of Epi Info™ 7. You can now:

- ❖ Create a new Epi Info™ 7 project
- ❖ Add pages to a form
- ❖ Add fields to a form
- ❖ Set the tab order on the form and change formatting options
- ❖ Work with templates

Q&A

Q: Why can't I change field names on my form? I'm looking at the Field Definition dialog for every field on my form, but the field name box is disabled and I can't edit it.

A: Field names cannot be changed once data entry has started. Even testing your form in data entry mode is considered data entry, so even a quick check to make sure the tab order works can prevent you from editing the field names. The way to solve this issue is to open the form in the Form Designer module and select **Tools > Delete Data Table** from the menu. This action will erase all collected data up to that point.

Q: What is the difference between the Text field type and the Multiline field type?

A: The Text field type creates a single-line text box on the form. It can accept up to 255 characters of input. The multiline field type creates a multiple-line text box on the form. It can be resized vertically, unlike the Text field, and can store 2 gigabytes of text data. Use the multiline field when large amounts of text might be required.

Q: How can I reorder the pages on the form?

A: Pages can be re-ordered by left-clicking on them and dragging them to the desired position. Follow the steps below to move the second page up to the first position, and then back again to the second position:

1. Click on **Page 2** in the **Project Explorer** panel. The Page 2 item is highlighted.
2. Click and hold the **Page 2** item in the **Project Explorer** panel while dragging the mouse onto the **Page 1 Case Information** item.
3. Release the mouse button. Page 2 now appears first.
4. Click and hold the **Page 1 Case Information** item in the **Project Explorer** panel while dragging the mouse onto the **Page 2** item.
5. Release the left mouse button. Page 1 now appears first.

Quiz

The following questions will see how much you have learned about using the Form Designer module.

Questions

1. An Epi Info™ 7 project might contain one or more forms.
 - a. True
 - b. False
2. An Epi Info™ 7 form might contain one or more pages.
 - a. True
 - b. False
3. The tab order can be set manually or automatically.
 - a. True
 - b. False
4. A field's input box cannot be moved independently of the field prompt.
 - a. True
 - b. False
5. Which two field properties are mutually exclusive?
 - a. Read only and required
 - b. Range and repeat last
 - c. Range and required
 - d. None of the above
6. A certain field type can only be true or false; it can never be left blank or missing. What field type does this description remind you of?
 - a. The Yes/No field
 - b. The checkbox field
 - c. The legal values field
 - d. The dichotomous field
 - e. None of the above
7. What field type shows the user both a value/code and a label describing that value/code, but only stores the value/code in the database?
 - a. The legal value field
 - b. The codes field
 - c. The comment legal field
 - d. All of the above
 - e. None of the above
8. A user wants to add a field on their form to capture comments. What field type would be best suited for this purpose?
 - a. A text field
 - b. A legal values field
 - c. An option field
 - d. A multiline field

- e. None of the above
9. A user is interested in running 2x2 tables on their data after data collection has finished. On the fields intended for use in the 2x2 tables, what field types might work best to reduce data recoding during analysis?
- a. Yes/No and checkbox fields
 - b. Text fields
 - c. Legal values fields
 - d. Number fields
 - e. None of the above
10. A user wants to create a drop-down list of clinics. When a clinic is chosen, she wants the county the clinic is in to be automatically populated into another field. What would be best suited for this situation?
- a. A legal values field
 - b. A comment legal field
 - c. Two legal value fields
 - d. A codes field linked to a text field
 - e. Two text fields
11. You just finished creating the *Salmonella* outbreak form and now want to create an *E. Coli* food history form. You want to re-use the demographics fields from the first form. How would you do this?
- a. Copy the fields from the *Salmonella* form, open the *E. coli* form, and then paste them
 - b. Save the fields as a template, open the *E. coli* form, and drag the template onto the canvas
 - c. Open the data dictionary, select the fields you want to copy, and then paste them into the *E. coli* food history form
 - d. There is no way to do this; the fields have to be re-created from scratch
12. You have created a number field called "Case ID" on Page 1. You want to show the case ID on each subsequent page. What field type would be best suited to show the case ID on subsequent pages of the form?
- a. Mirror field
 - b. Number field
 - c. Text field
 - d. All of the above
13. Your supervisor asks to see a list of all the fields on the form, including the field names, prompts, page numbers and any other special information. What could you use to quickly send the supervisor this information?
- a. A project template
 - b. The data dictionary
 - c. A screenshot of the form
 - d. Your Epi Info™ 7 project file
 - e. All of the above
 - f. None of the above

Answers

1. A
2. A
3. A
4. B
5. A
6. B. Yes/No fields can be true, false, or left blank. Yes/No fields are blank by default.
7. C
8. D. The text field can store up to 255 characters while the multiline field can store over 2 gigabytes of character data.
9. A. The checkbox and Yes/No fields ensure the data are captured perfectly for 2x2 tables. (Legal value fields might work if there are only two possible choices, but can sometimes still require recoding to ensure the 'positive' value appears in the first row or first column.)
10. D
11. B
12. A
13. B

Data Entry Validation using Check Code

This lesson introduces you to creating Check Code inside the Form Designer module of Epi Info™ 7. You will learn how to customize your survey by creating a series of data entry rules. You will also learn the components of the Form Designer's Check Code Editor.

In Lesson 1, you created a variety of fields to collect data for your survey. In Lesson 2, you will use the survey you created and add Check Code to some of the fields. Check Code makes the data entry process faster and more efficient; therefore, fewer errors occur when you use the data later to create the statistics and develop your report.

Time to complete: 2 hours (Intermediate)

BEFORE YOU BEGIN

Complete Lesson 1

FIVE GOALS

1. Learn how to navigate the Check Code editor window of the Form Designer.
2. Calculate age using the ASSIGN command.
3. Show a warning dialog box to the user.
4. Disable and enable fields on the form using conditional logic.
5. Use the SYSTEMDATE and YEARS functions.

Getting Started with Check Code

Check Code is used to validate data entry and to enable the user to enter data faster. With some advance planning, you can create code that will perform calculations, skip questions based on answers, prompt the user with dialog boxes, and populate fields across pages and records. In its most basic form, Check Code is a set of rules for the person entering data to follow. It also helps to eliminate errors when entering large amounts of data.

You can open the Check Code Editor by clicking the **Check Code** button located on the Form Designer toolbar or by selecting **Tools > Check Code Editor** from the Form Designer navigation menu.

The Check Code window contains three working areas: the Program Editor, the Field block panel, and the Command panel.

The Check Code editor workspace

The Check Code window contains three primary sections:

1. **The Program Editor.** This section is where Check Code syntax appears. Users can optionally type commands directly into the editor, or copy/paste their commands from the editor into another program. The program editor also contains a Messages box that will show details regarding any errors in the code or failed validation.
2. **The Code Block panel.** This section contains all of the available “blocks” that might contain Check Code commands.
3. **The Command panel.** This section contains all of the available commands that can be issued within a command block.

Figure 42 shows where to find the three sections.

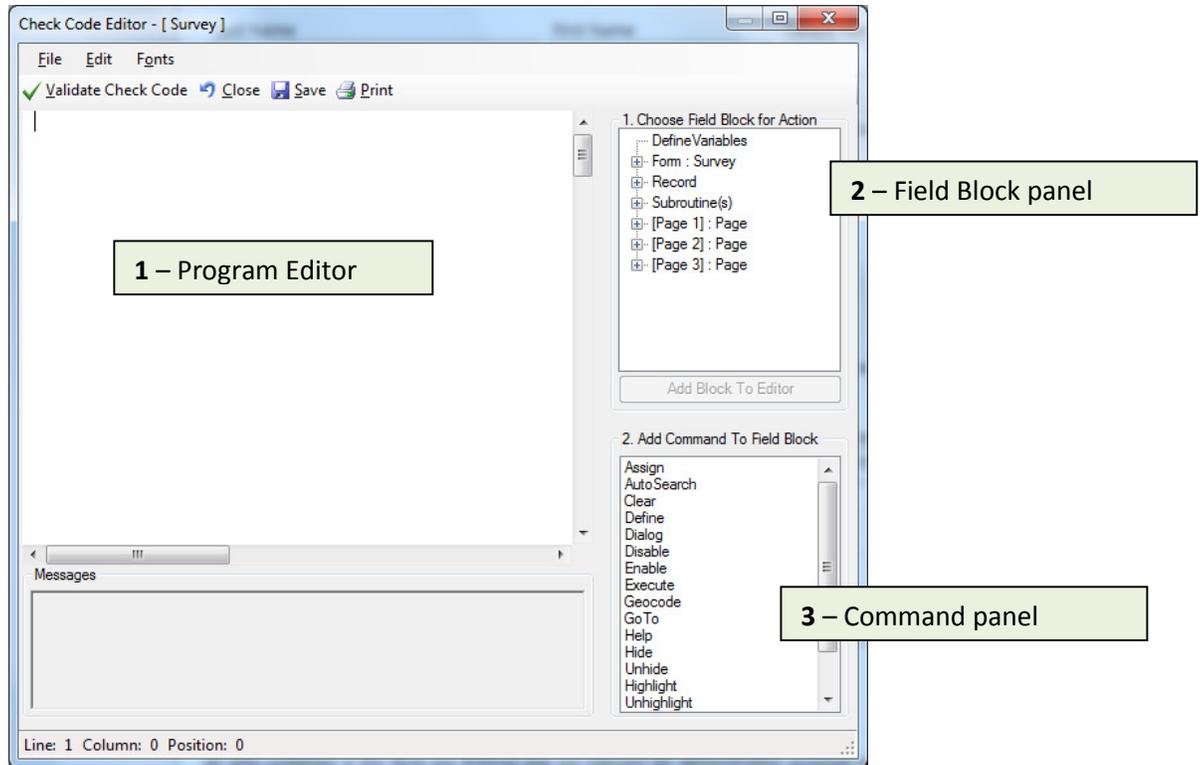


Figure 42

Events

As noted above, Check Code is a set of rules for the person entering data to follow. It's important to consider *where* those rules will be enforced, however, because Check Code can only run when certain events occur during data entry. Those events include:

- ❖ When the form opens
- ❖ When the form closes
- ❖ When the page opens
- ❖ When the page closes
- ❖ When the record opens
- ❖ When the record closes
- ❖ When the cursor enters a field
- ❖ When the cursor leaves a field
- ❖ When the user clicks a field (checkboxes, command buttons and option fields only)

Consider the following example: You have a form with many fields, among which are date of interview, date of birth, and age. You want the age to be calculated based on the date of interview and the date of birth and then assigned to the Age field.

Where would you place the logic for the calculation and the assignment? To figure it out, consider how the data are entered. The date of interview is probably typed first, located somewhere near the top of the form. Date of birth is probably filled out further down the page. It would therefore make

sense to do the calculation *after the date of birth field has been entered*; at that point, both date fields likely contain values.

What if you placed the logic into the date of interview field instead, such that it ran after the date of interview had been entered (and not after date of birth had been entered)? Epi Info™ 7 would still calculate the difference in years between the two dates, but because date of birth is unlikely to have been typed in at that point, the result will be a null value.

A key distinction should be made between the “before entry” and “after entry” field events. When the cursor enters a field, the *before* event for that field is run. This occurs so quickly that it will always run before the user has a chance to type anything into the field, hence the “before” description. When the cursor leaves a field; that is, after the user is done entering data into that field – the *after* event for that field is run.

The same distinction can be made at the form, page, and record events. When the form opens, the before event for the form is run; likewise, when a page is opened, the before event for that page is run. Check code can be set to run at these locations to handle special situations.

Commands Overview

The rules that you define using the check code editor are implemented through the use of commands. The available commands are listed below.

Define

Use to create new variables.

Assign

Use to assign the result of arithmetic or string expression mathematics to a variable.

Hide

Use to hide a field from view.

Unhide

Use to make a field visible if it had been hidden previously.

Disable

Use to disable a field. Disabled fields cannot accept user input and are no longer part of the tab order.

Enable

Use to enable a field that was previously disabled.

Highlight

Use to highlight a field in bright yellow, for example, if a data entry error was detected.

Unhighlight

Use to remove any field highlighting that might have been applied.

GoTo

Use alone or in an IF statement to transfer the cursor to a specifically named field or page.

Clear

Use to set the field named to the missing value, as though it had been left blank.

Autosearch

Use to search for one or more matching records.

If

Use to define conditions and/or consequences that result if the conditions are met. An alternative consequence can be given after the ELSE statement.

Execute

Use to execute a Windows program.

Dialog

Use to provide interaction with users. Dialogs can display information and ask for and receive input.

Geocode

Use to offer geocoding services to the form.

Opening the Form

You will not be using the form you created earlier. You will be using a form that has already been created for you to ensure consistent field placement and field naming. To open this form, follow the steps below:

1. Open the Form Designer module from the Epi Info™ 7 menu. If the Form Designer is already open, close any projects that might be open by clicking the **Close Project** button on the toolbar.
2. Click the **Open Project** button on the toolbar. A Windows Open File dialog appears.
3. Navigate to the **Epi Info 7\Resources\Training Projects\Salmonellosis** folder.
4. Select the **Salmonella.prj file** and click the **Open** button. The *Survey_NoCheckCode* Outbreak Form appears on the canvas.

Ensure that the words “Check Code Form, Use in Lessons 2-3” appears in the upper-right corner. If they do not, double-click the **Salmonella_NoCheckCode** item in the **Project Explorer** pane.

Salmonellosis Outbreak Form

Check Code Form
Use in Lessons 2-3

I. PROFILE DETAIL

Last Name	First Name	Parent Name
<input type="text"/>	<input type="text"/>	<input type="text"/>
Gender	Birth Date	Death Date
Female ▾	<input type="text"/>	<input type="text"/>
Age	Race	Ethnicity
<input type="text"/>	American Indian/Alaska N ▾	Hispanic ▾
Street Address	Zip	State
<input type="text"/>	<input type="text"/>	GA ▾
County	Contact Phone	
Morgan ▾	###-###-####	<input type="text"/>

II. CLINICAL

Was the case ill?

Status Investigated Interviewed Symptomatic at Interview

Confirmed ▾ ▾ ▾

Final known outcome Date onset: Date diagnosis Lab report date CHD notified date

Died ▾

III. CASE SYMPTOMS

What symptoms did the patient experience? *Check all that apply.*

Abdominal pain Nausea Other Specify

Diarrhea Vomiting

Fever/chills Asymptomatic

All data contained in this form are fictional and are intended for demonstration purposes only. 9/14/12

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Calculate Age

Recall that you created fields for Date of Birth and Age. You will now create Check Code that will calculate and enter the age of the respondent based on the date of birth and the date of the picnic.

Before starting, however, you need to know when the action of calculating the age and assigning the value should take place. This 'action' can be optionally set to run when certain data entry events have fired. Such data entry events include before and after data has been entered into a field, and for checkboxes and buttons, when the field has been clicked.

Take another look at the form and think of the order in which data are entered. At what point would it make the most sense to calculate the age? It would make the most sense to run the calculation and carry out the assignment *after* the date of birth has been keyed in.

Follow the steps below to add this code to the "after" section of the Date of Birth field:

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking on the + icon to its left. A list of all the fields on page 1 will appear underneath the Page 1 item.
3. Locate **DOB** in the list of fields on Page 1 and expand it by clicking the + icon to its left. A "before" and an "after" item will appear underneath the field.
4. Double click the **after** item underneath DOB (Figure 43). A new field block for the Date of Birth field is created immediately after the line that reads.

```
// add code here
```

5. Click the **Assign** command in the **Command list**. The Assign dialog opens.
6. Select **Age** from the **Assign Variable** drop-down list. The Assign Variable is the field on the form that will accept the result of the calculation.
7. Type the following text into the = **Expression** box as shown in Figure 44:

```
YEARS (DOB, 5/5/2012)
```

NOTE: We are using 5/5/2012 instead of SYSTEMDATE (today's date) because the age calculation needs to be based on the date when the outbreak occurred.

8. Click **OK**. The Assign dialog closes and the ASSIGN command is added to the DOB field block.
9. Click **Save** on the Check Code toolbar to save the check code.

Finished Code:

```
Field DOB
  After
    ASSIGN Age = YEARS (DOB, 5/5/2012)
  End-After
End-Field
```

You have now created a command that will find the difference in years between the date the user typed into the date of birth field and May 5th, 2012, and then assign that value to the Age field. This assignment will occur after the user has entered a value into the date of birth field. After two more check code examples, you will open the form in data entry mode to see the check code in action.

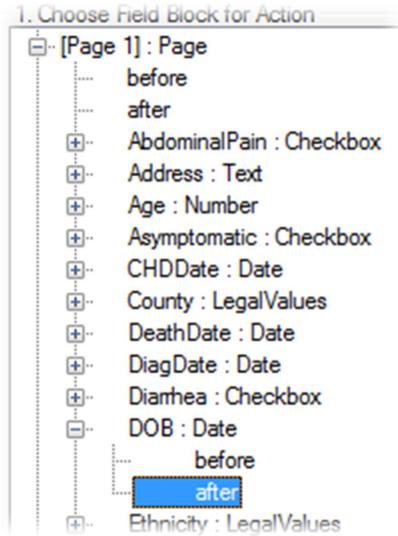


Figure 43

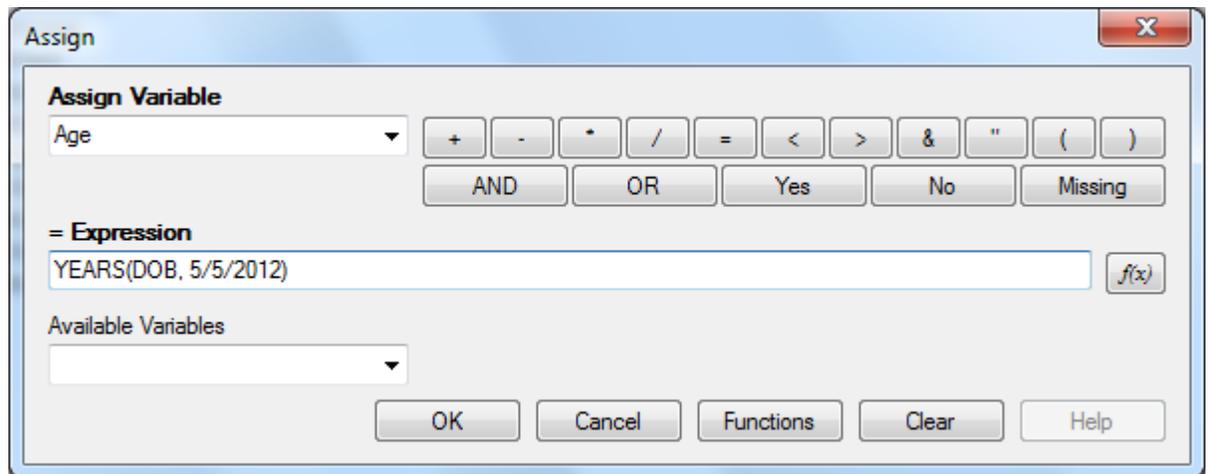


Figure 44

Check for Invalid Dates

In Lesson 1, you learned how to use the **Range** property on date fields to set upper and lower boundaries on what constitutes valid input. One weakness to using the Range property is that you are unable to use other fields on the form or the current system date to specify the upper and lower boundaries. If your date range spans the entire year, for example, it is still possible to enter a date of birth that is several days in advance of the current system date on the computer – a value that is clearly invalid, but nonetheless allowed.

You can create more advanced date comparisons with Check Code to handle these scenarios. In the steps below, you will check if the LabReportDate field contains a value greater than the current system date. If it does, you will explain the problem to the person entering data with a dialog box and then erase their input. The flowchart shown in Figure 45 is a visual representation of this logic.



Figure 45

Follow the steps below to add a validation check to the **LabReportDate** field.

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking the + icon to its left. A list of all the fields on Page 1 will appear underneath the Page 1 item.
3. Locate **LabReportDate** in the list of fields on Page 1 and expand it by clicking the + icon to its left. A “before” and an “after” item appear underneath the field.
4. Double click on the **after** item underneath LabReportDate. A new field block for the Lab Report Date field is created immediately after the line that reads.

```
// add code here
```

5. Click the **If** command in the **Command list**. The **If** dialog opens.
6. Select **LabReportDate** from the **Available Variables** drop-down list. LabReportDate appears in the If Condition box.
7. Click the > button. The > sign appears in the If Condition box.
8. Type “SYSTEMDATE” (without quotes) into the If Condition box, after the > symbol. The If Condition box should appear as shown below after completing this step.

```
LabReportDate > SYSTEMDATE
```

9. Click the command icon next to the THEN box. (All commands issued in the THEN box will be executed when the condition is true.) A list of available commands appears.
10. Select **Dialog** from the list of commands. The Dialog command dialog opens.
11. Type “Error” into the **Title** box.

12. Type "Error: Lab report date is greater than the current date" into the **Prompt** box.
13. Click **OK**. The corresponding syntax for the dialog command appears in the **Then** box in the If dialog.
14. Click the command icon next to the THEN box. A list of available commands appears.
15. Select **Clear** from the list of commands. The Clear command dialog opens.
16. Select **LabReportDate** from the list of fields in the Clear command dialog.
17. Click **OK**. The corresponding syntax for the clear command appears in the **Then** box in the If dialog.
18. Click the command icon next to the THEN box. A list of available commands appears.
19. Select **GoTo** from the list of commands. The Clear command dialog opens.
20. Select **LabReportDate** from the list of fields in the Clear command dialog.
21. Click **OK**. The corresponding syntax for the clear command appears in the **Then** box in the If dialog. The If dialog should appear as shown in Figure 46.
22. Click **OK**. The If dialog closes and the IF command is added to the Lab Report Date field block.
23. Click **Save** on the Check Code toolbar to save the check code.

Finished Code:

```
Field LabReportDate
  After
    IF LabReportDate > SYSTEMDATE THEN
      DIALOG "Error: Lab report date is > than current date" TITLETEXT="Error"
      CLEAR LabReportDate
      GOTO LabReportDate
    END-IF
  End-After
End-Field
```

You have just created a validation check for the lab report date field. After the user enters a value for the field, the value will be checked to ensure it doesn't exceed the current date. If it does exceed the current date, then a dialog box is displayed and the value is erased.

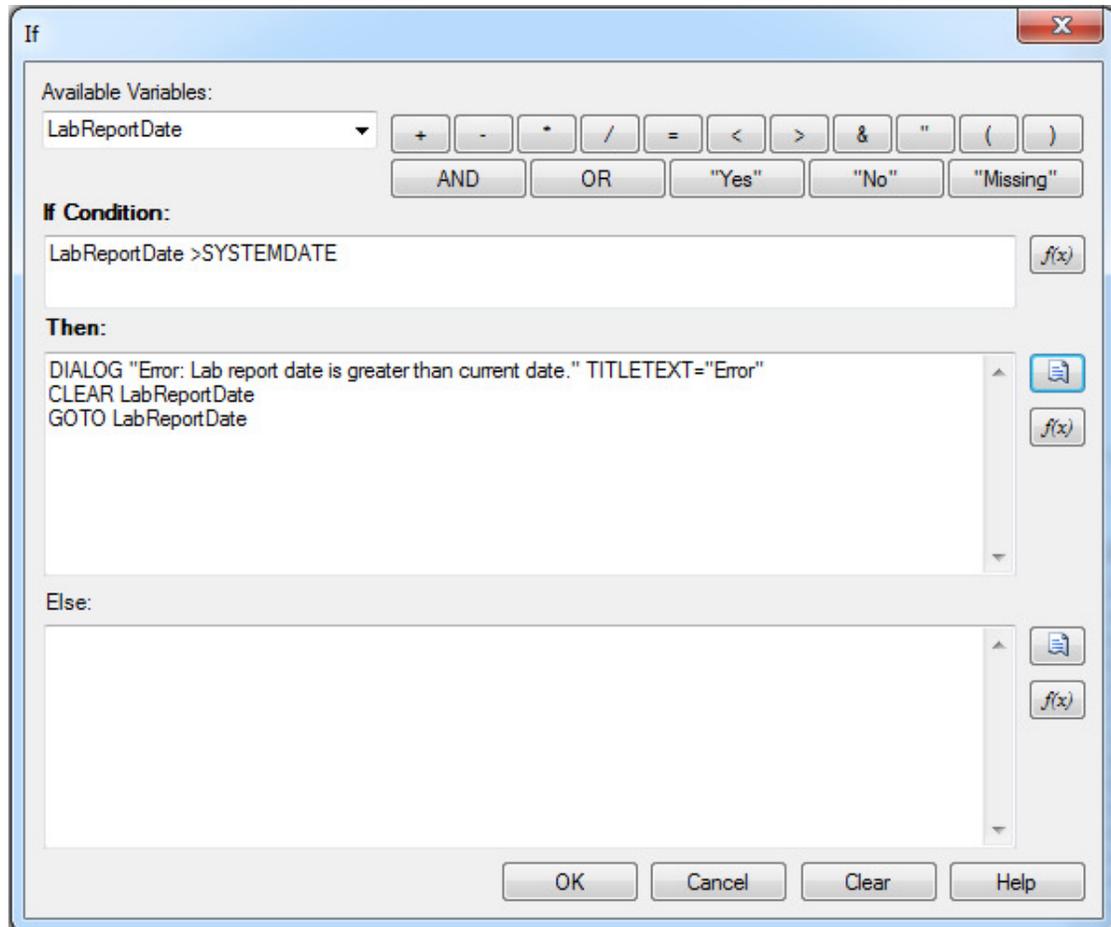


Figure 46

Resource: This video will provide users with information on how to create a skip pattern for a questionnaire in the visual dashboard using an "if, then" statement.

<http://www.youtube.com/watch?v=dxGog4f3zPA&list=PL9B9157E47AB3FDFA&index=22>

Disable a Group Based on Multiple Conditions

You will next create Check Code to disable a group of fields when a specific condition has been met. You will use the IF-THEN-ELSE command to check if the condition is true and DISABLE/ENABLE commands to enable and disable the fields. Disabling fields will prevent the person entering data from interacting with them. Disabled fields are also removed from the page's tab order and offer one way of implementing a skip pattern.

In this survey, respondents were asked if they ate food at noon and if they ate food at 2:00 pm (see Page 3 of the *Salmonella* Outbreak Form). If they respond that they ate food at neither of those two times, then you want to make sure they cannot fill out any of the fields regarding foods that might have been consumed at the company picnic.

First, determine what you want the code to accomplish. If a respondent answers no to both questions, the fields in the 'Picnic Foods Eaten' group should be disabled, preventing them from being filled in. Otherwise, the fields should not be disabled, or if they have already been disabled (i.e. the user changes their answer on the form) then they should be re-enabled.

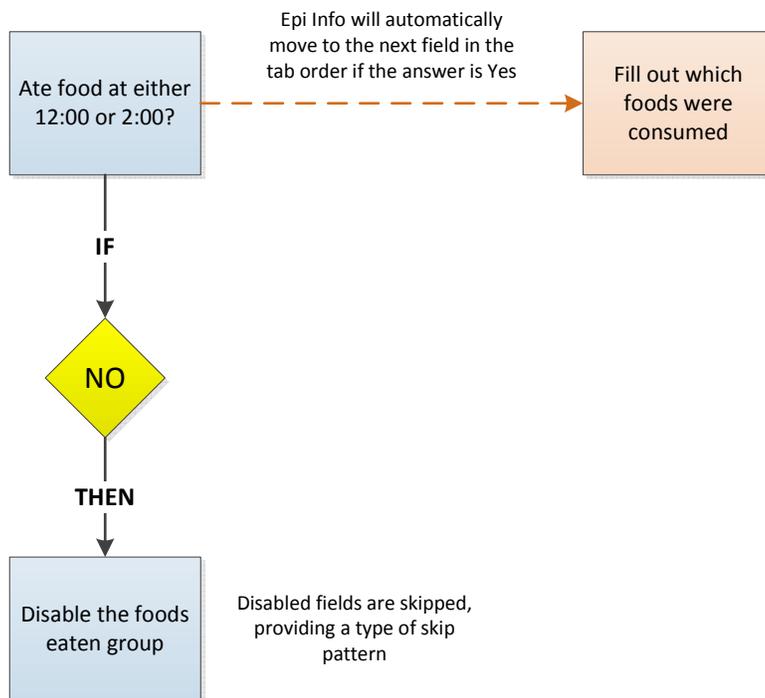


Figure 47

Follow the steps below to add the IF-THEN-ELSE logic to the "after" section of the AteAt2 field:

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 3** in the **Choose Field Block for Action** list and expand it by clicking the + icon to its left. A list of all the fields on Page 3 will appear underneath the Page 1 item.

3. Locate **AteAt2** in the list of fields on Page3 and expand it by clicking the + icon to its left. A “before” and an “after” item appear underneath the field.
4. Double click the **after** item underneath AteAt2. A new field block for the AteAt2 field is created immediately after the line that reads.

```
// add code here
```

5. Click the **If** command in the **Command list**. The If dialog opens.
6. Select **AteAtNoon** from the **Available Variables** drop-down list. AteAtNoon appears in the If Condition box.
7. Click the = button. The = sign appears in the If Condition box.
8. Click the **No** button. The (-) symbol appears in the If Condition box.
9. Click the **And** button. The word “AND” appears in the If Condition box.
10. Select **AteAt2** from the **Available Variables** drop-down list. AteAt2 appears in the If Condition box.
11. Click the = button. The = sign appears in the If Condition box.
12. Click the **No** button. The (-) symbol appears in the If Condition box. The contents of the If Condition box should now appear as such:

```
AteAtNoon = (-) AND AteAt2 = (-)
```

Remember that this condition is checking to see if a false or negative value (represented by the (-) characters) has been entered into both the AteAtNoon and AteAt2 fields. If the condition appears correct, please proceed.

13. Click the command icon next to the **THEN** box. (All commands issued in the THEN box will be executed when the condition is true.) A list of available commands appears.
14. Select **Disable** from the list of commands. The Disable dialog opens.
15. Select **Group_PicnicFoodsEaten** from the list of fields.
16. Click **OK**. The text “DISABLE Group_PicnicFoodsEaten” appears in the THEN box.
17. Click the command icon next to the **THEN** box. (All commands issued in the THEN box will be executed when the condition is true.) A list of available commands appears.
18. Select **Clear** from the list of commands. The Clear dialog opens.
19. Select **Group_PicnicFoodsEaten** from the list of fields.
20. Click **OK**. The text “CLEAR Group_PicnicFoodsEaten” appears in the THEN box. The CLEAR command will set all the values in the group to null in case data was previously entered into the fields.

You have set all of the fields within the Picnic Foods Eaten group on Page 3 to become disabled when both AteAtNoon and AteAt2 have been filled in with “No” values. Any data previously entered will be cleared. However, there is a weakness to this approach. Imagine the following scenario: A user fills in a “No” value for both AteAt2 and AteAtNoon and the Picnic Foods Eaten group is disabled as expected. The user then changes the value in AteAt2 to “Yes.” With the check code you have created, the fields that were disabled would remain disabled even though there is now a “Yes.”

What is needed is another command to run when the condition *is not met*. The ELSE portion of the IF-THEN-ELSE command will be run when the condition is false, and you will place an ENABLE command here to re-enable the Picnic Foods Eaten group in case it had been disabled previously. See Figure 48 for an updated flowchart that explains the new logic.

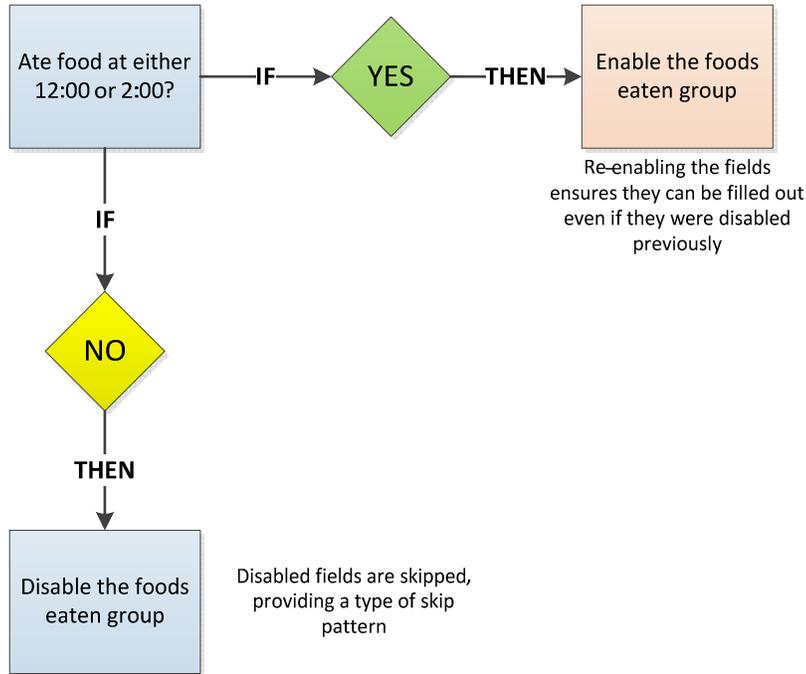


Figure 48

21. Click the command icon next to the ELSE box. (All commands issued in the ELSE box will be executed when the condition is false.) A list of available commands appears.
22. Select **Enable** from the list of commands. The Disable dialog opens.
23. Select **Group_PicnicFoodsEaten** from the list of fields.
24. Click **OK**. The text "ENABLE Group_PicnicFoodsEaten" appears in the THEN box.
24. Click **OK**. The If dialog closes and the IF command is added to the AteAt2 field block.
25. Click **Save** on the Check Code toolbar to save the check code.

Finished Code:

```

Field AteAt2
After
  IF AteAt2 = (-) AND AteAtNoon = (-) THEN
    DISABLE Group_PicnicFoodsEaten
    CLEAR Group_PicnicFoodsEaten
  ELSE
    ENABLE Group_PicnicFoodsEaten
  END-IF
End-After
End-Field
  
```

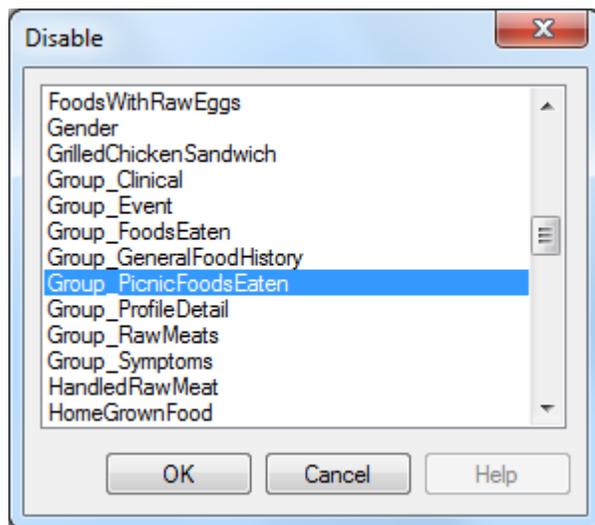


Figure 49

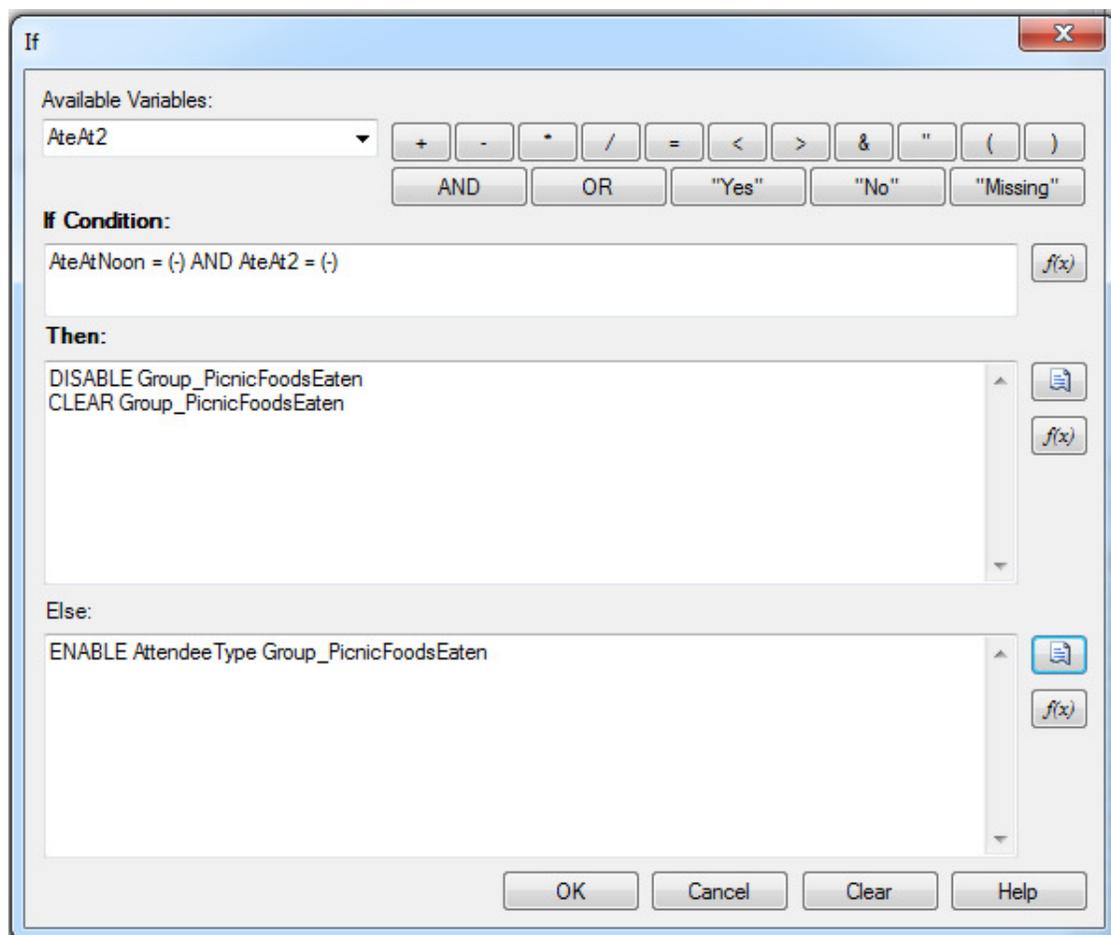


Figure 50

Run Commands When the Page is Loaded

In the previous example, you created check code that disables a group of food items when AteAt2 and AteAtNoon both have “No” values. Recall, however, that the “rules” you create are only enforced at certain times during data entry. The previous example was set to disable the group of food items after the **AteAt2** field had been filled in.

What happens if, during data entry, you navigate to an existing record where AteAt2 and AteAtNoon both contain “No”? Because the cursor wouldn’t visit the AteAt2 field by navigating records, the code you created earlier wouldn’t run. The group box would therefore be enabled even though the condition for disabling it has been met.

To make sure the enable/disable logic runs when you open the page or change records, an additional piece of check code must be added. You will add this code to the *before* event on the page. Recall that the “before” event is run as soon as the page is loaded, a cursor enters a field, or when navigating between records. Follow the steps below to add this code to the before page event of Page 3.

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 3** in the **Choose Field Block for Action** list and expand it by clicking the + icon to its left. A list of all the fields on page 3 will appear underneath the Page 3 item.
3. Double click the **before** item under Page 3. A field block for Page 3 is created.
4. Now follow the steps in the section “Disable a Group Based on Multiple Conditions” starting at step #5. The finished check code is shown below.

Finished Code:

```
Page [Page 3]
  Before
    //add code here
    IF AteAt2 = (-) AND AteAtNoon = (-) THEN
      DISABLE Group_PicnicFoodsEaten
      CLEAR Group_PicnicFoodsEaten
    ELSE
      ENABLE Group_PicnicFoodsEaten
    END-IF
  End-Before
End-Page
```

Show a Warning Dialog Based on Multiple Conditions

You will create Check Code to provide a dialog box and a warning message for the person entering data into the survey. The DIALOG command provides interaction with the data entry personnel from within a program. Dialogs can display information, ask for and receive input, and offer lists for making choices.

You have a drop-down list field called Outcome on Page 1 of the survey. This variable refers to the question "Final known outcome." You want to make sure that if "Died" was selected in the list of outcomes that a date of death has also been provided (the date of death appears earlier on the form). If a date of death has not been provided then a warning message should appear to the person entering data. Because it is possible that someone might have died, but the date of death was unknown at the time the record was first entered, you don't want to prevent data entry from proceeding; thus, showing a dialog is as far as you will go in validating input.

As with the ASSIGN example, first think of where it would make the most sense to add the command to display the dialog. If the intention is to check and see if the date of death is empty when a value of "Died" has been selected in the Outcome field, then the after section of Outcome is the best candidate.

Unlike the ASSIGN example, however, you only want to show the dialog when a specific condition has been met: No value has been entered into Date of Death but a value of "Died" has been entered into Outcome. To run a command or set of commands based on a condition, you first use the IF-THEN-ELSE command.

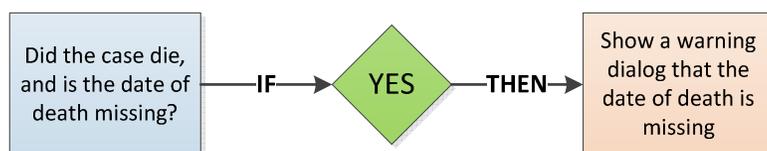


Figure 51

Follow the steps below to add the IF-THEN-ELSE logic to the "after" section of the Outcome field:

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking the + icon to its left. A list of all the fields on Page 1 will appear underneath the Page 1 item.
3. Locate **Outcome** in the list of fields on Page 1 and expand it by clicking the + icon to its left. A "before" and an "after" item will appear underneath the field.
4. Double click on the **after** item underneath Outcome. A new field block for the Outcome field is created immediately after the line that reads:

```
// add code here
```

5. Click the **If** command in the **Command list**. The If dialog opens.

6. Select **Outcome** from the **Available variables** drop-down list. "Outcome" appears in the If Condition box.
7. Click the = button. The = symbol appears in the If Condition box.
8. Type "Died" (with quotes) into the If Condition box.
9. Click the **AND** button. The word "AND" appears in the If Condition box.
10. Select **DeathDate** from the **Available variables** drop-down list. "DeathDate" appears in the If Condition box.
11. Click the = button. The = symbol appears in the If Condition box.
12. Click the **Missing** button. The (.) symbol appears in the If Condition box. The contents of the If Condition box should appear as such:

```
Outcome = "Died" AND DeathDate = (.)
```

13. Click the commands button next to the **Then** box. A list of available commands appears.
14. Select **Dialog** from the list of commands. The Dialog command dialog opens.
15. Type "Warning" into the **Title** box.
16. Type "Warning: Death was specified as the outcome but no date of death was provided" into the **Prompt** box as shown in Figure 52.
17. Click **OK**. The corresponding syntax for the dialog command appears in the **Then** box in the If dialog as shown in Figure 53.
18. Click **OK**. The If dialog closes and the IF command is added to the Outcome field block.
19. Click **Save** on the Check Code toolbar to save the check code.

Finished Code:

```
Field Outcome
  After
    IF Outcome = "Died" AND DeathDate = (.) THEN
      DIALOG "Warning: Death was specified as the outcome but no date
of death was provided." TITLETEXT="Warning"
    END-IF
  End-After
End-Field
```

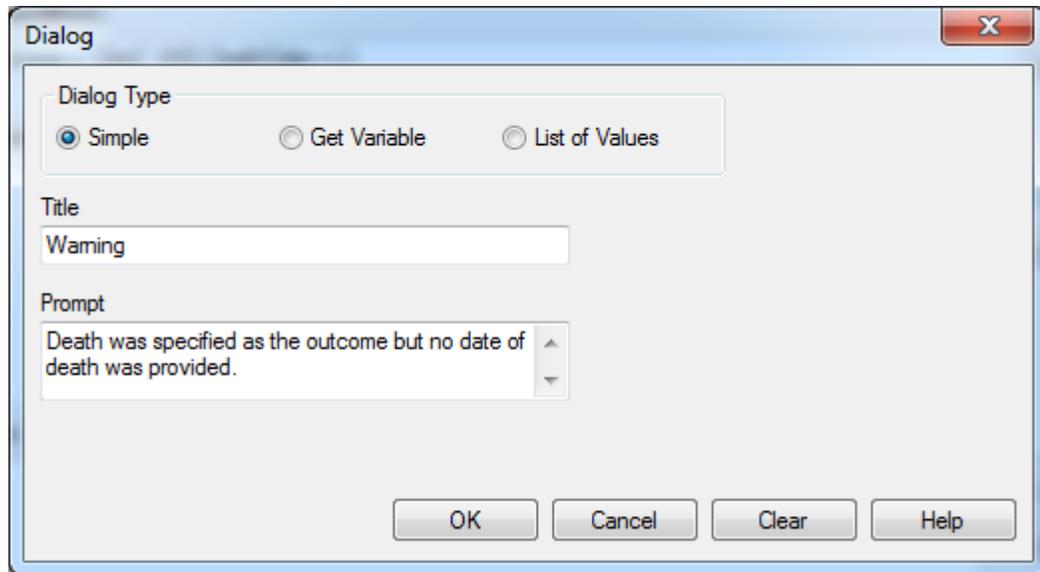


Figure 52

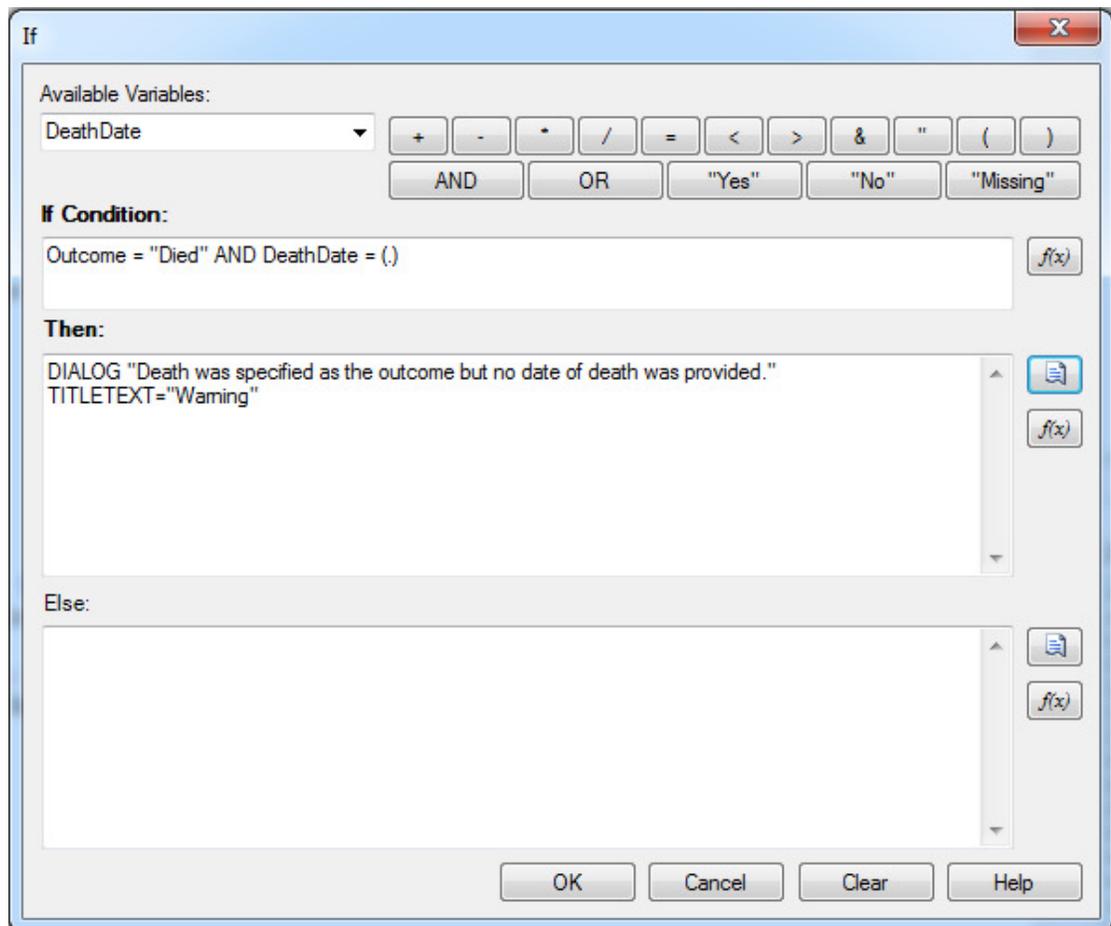


Figure 53

Optional Exercise - Mutually Exclusive Checkboxes

This check code exercise is for intermediate and advanced users.

There is a field called “Asymptomatic” in the Symptoms group box on Page 1. You know that someone who is asymptomatic isn’t experiencing any symptoms. Therefore, you want to make that choice mutually exclusive among the rest of the choices to ensure accurate input. Your intention is to clear the other ‘symptom’ checkboxes when Asymptomatic is selected, and to clear Asymptomatic if any of the other checkboxes are selected.

Unlike the other fields you have worked with in check code, the checkbox field has an additional “click” event in addition to the “before” and “after” events. You will place your code into this event so that the other checkboxes are cleared as soon as the field’s value changes. Because changing the value of any field in the group could cause a scenario in which some other checkbox needs to be cleared (as per the condition above), you will need to add check code to every field in the group.

You will first create the logic for the “Asymptomatic” field. The flowchart below explains what should happen when the field is clicked (either to selected or cleared).

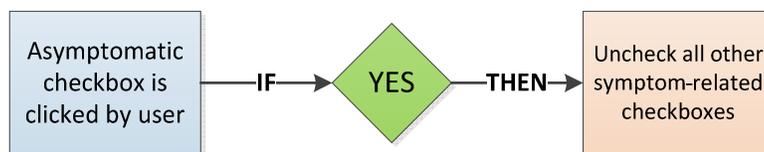


Figure 54

The absence of a “No” condition or an ELSE clause is intentional. If the checkbox is selected, and the click *clears* the box, then does anything need to happen to the other fields in the group? No. Therefore, you only need to be concerned what happens when a click occurs and the click *selects* the box.

Follow the steps below to implement the logic:

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking the + icon to its left. A list of all the fields on Page 1 will appear underneath the Page 1 item.
3. Locate **Asymptomatic** in the list of fields on Page 1 and expand it by clicking the + icon to its left. “Before”, “after”, and “click” items appear underneath the field.
4. Double click the **click** item under Asymptomatic (Figure 55). A field block for the Asymptomatic field is created immediately after the line that reads:

```
// add code here
```

5. Click the **If** command in the **Command list**. The If dialog opens.
6. Select **Asymptomatic** from the **Available Variables** drop-down list. Asymptomatic appears in the If Condition box.

7. Click the = button. The = sign appears in the If Condition box.
8. Click the **Yes** button. The (+) symbol appears in the If Condition box.
9. Click the command icon next to the THEN box. A list of available commands appears.
10. Select **Assign** from the list of commands. The Assign dialog opens.
11. Select **AbdominalPain** from the **AssignVariable** drop-down list.
12. Click the **“No”** button. The (-) symbol appears in the = **Expression** box.
13. Click **OK**. The following syntax appears in the THEN box in the If dialog:

```
ASSIGN AbdominalPain = (-)
```

The code you’ve just created will clear the AbdominalPain checkbox when Asymptomatic is selected. However, there are other checkboxes in the group that also need to be cleared. Follow steps 10 through 13 for each of the following fields, replacing “AbdominalPain” where appropriate:

- ❖ Diarrhea
- ❖ Fever
- ❖ Nausea
- ❖ Vomiting
- ❖ OtherSymptom

When you’re done, the IF command dialog window should look like that shown in Figure 56.

14. Click **OK**. The If dialog closes and the IF command is added to the Asymptomatic field block.

Now, when Asymptomatic is checked, all of the other checkboxes will be unchecked. However, you still need to add code to automatically uncheck Asymptomatic when any *other* symptom is checked. Follow the steps below to do this:

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking the + icon to its left. A list of all the fields on Page 1 will appear underneath the Page 1 item.
3. Locate **AbdominalPain** in the list of fields on Page 1 and expand it by clicking the + icon to its left. “Before”, “after”, and “click” items appear underneath the field.
4. Double click the **click** item under AbdominalPain. A field block for the AbdominalPain field is created immediately after the line that reads:

```
// add code here
```

5. Click the **If** command in the **Command list**. The If dialog opens.
6. Select **AbdominalPain** from the **Available Variables** drop-down list. AbdominalPain appears in the If Condition box.
7. Click the = button. The = sign appears in the If Condition box.
8. Click the **Yes** button. The (+) symbol appears in the If Condition box.
9. Click the command icon next to the THEN box. A list of available commands appears.

10. Select **Assign** from the list of commands. The Assign dialog opens.
11. Select **Asymptomatic** from the **AssignVariable** drop-down list.
12. Click the **“No”** button. The (-) symbol appears in the = **Expression** box.
13. Click **OK**. The following syntax appears in the THEN box in the If dialog as shown in Figure 57:

```
ASSIGN Asymptomatic = (-)
```

14. Click **OK**. The If dialog closes and the IF command is added to the AbdominalPain field block.

Now repeat steps 1 through 13 for each of the following fields, replacing “AbdominalPain” as appropriate:

- ❖ Diarrhea
- ❖ Fever
- ❖ Nausea
- ❖ Vomiting
- ❖ OtherSymptom

You now have a group of checkboxes with mutual exclusivity.

Finished Code:

```
Field Asymptomatic
  Click
    IF Asymptomatic = (+) THEN
      ASSIGN AbdominalPain = (-)
      ASSIGN Diarrhea= (-)
      ASSIGN Fever = (-)
      ASSIGN Nausea = (-)
      ASSIGN Vomiting = (-)
      ASSIGN OtherSymptom = (-)
    END-IF
  End-Click
End-Field
Field AbdominalPain
  Click
    IF AbdominalPain = (+) THEN
      ASSIGN Asymptomatic = (-)
    END-IF
  End-Click
End-Field
Field Diarrhea
  Click
    IF Diarrhea = (+) THEN
      ASSIGN Asymptomatic = (-)
    END-IF
  End-Click
End-Field
Field Fever
  Click
    IF Fever = (+) THEN
      ASSIGN Asymptomatic = (-)
    END-IF
  End-Click
End-Field
Field Nausea
  Click
    IF Nausea = (+) THEN
      ASSIGN Asymptomatic = (-)
    END-IF
  End-Click
End-Field
Field Vomiting
  Click
    IF Vomiting = (+) THEN
      ASSIGN Asymptomatic = (-)
    END-IF
  End-Click
End-Field
Field OtherSymptom
  Click
    IF OtherSymptom = (+) THEN
      ASSIGN Asymptomatic = (-)
    END-IF
  End-Click
End-Field
```

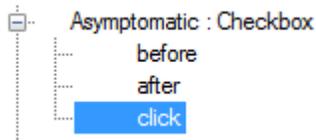


Figure 55

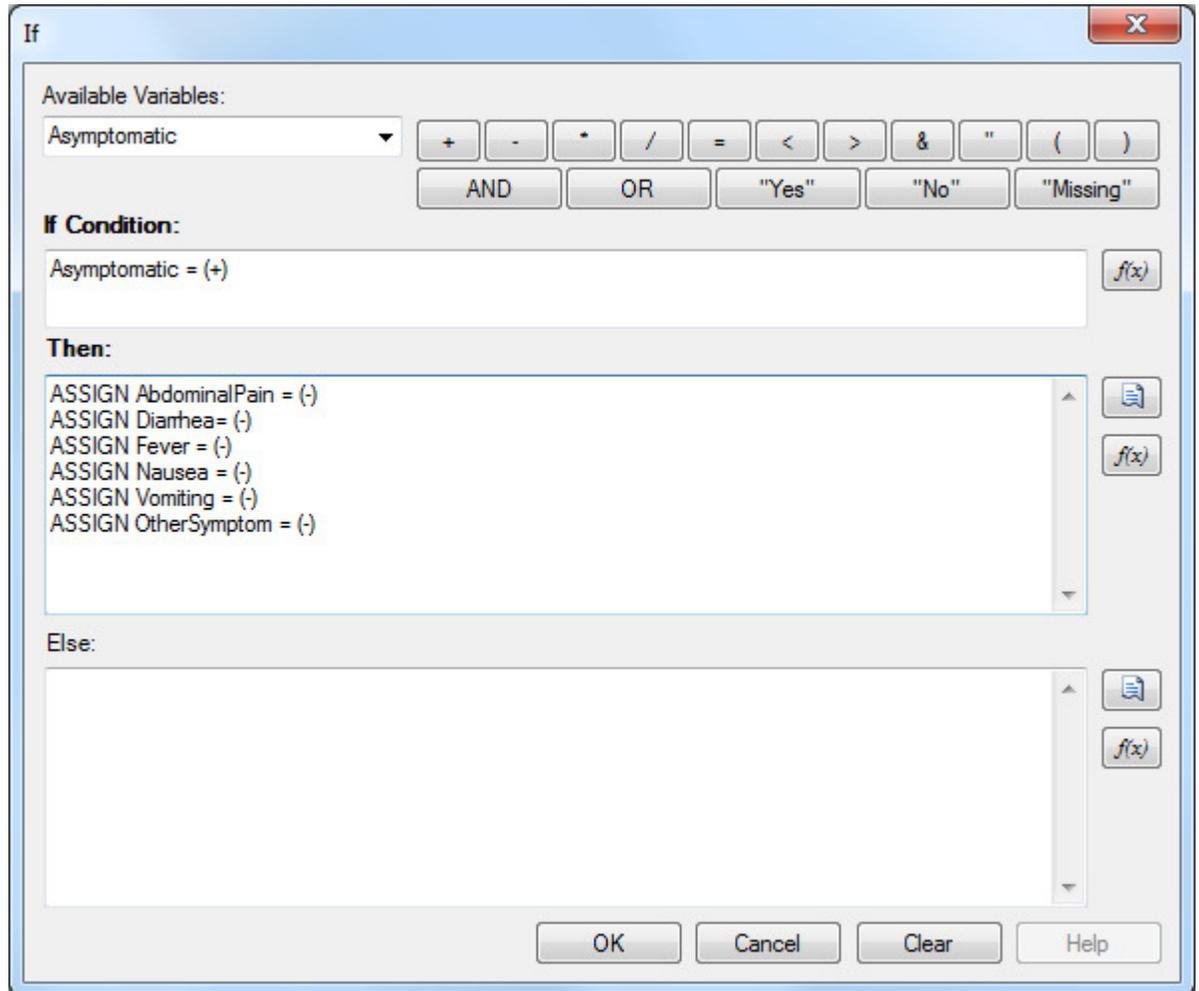


Figure 56

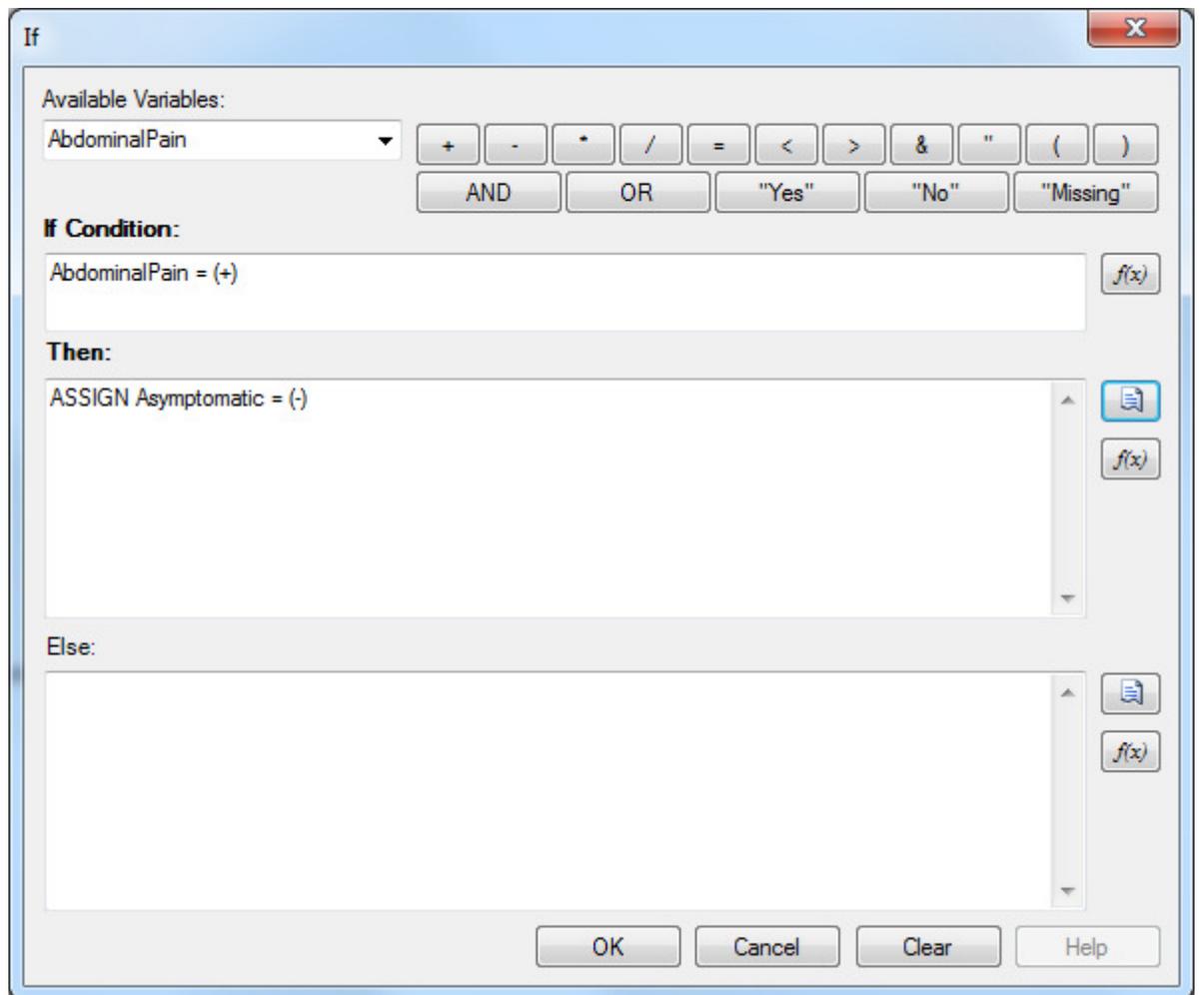


Figure 57

Student Practice

See if you can create the following types of data entry validation logic using check code:

1. If the age of the interviewee (AGE) is less than 18, and no parent has been specified (PARENTNAME), display a warning dialog.
2. If the case was not ill (ILL), disable and clear all of the fields in the Case Symptoms group (GROUP_SYMPTOMS).
3. If the user selects the "Other" checkbox (OTHERSYMPTOM) on Page 1, enable the "Specify" text field (OTHERSYMPTOMSPECIFY); otherwise, disable the "Specify" field and erase its contents.
4. Apply the same logic in #3 to when Page 1 is loaded. That is, the "Specify" field should appear enabled or disabled (based on the value in the "Other" checkbox) as soon as Page 1 opens.

Best Practices using Epi Info™ 7 Check Code

Check Code is fairly straightforward, but does have a number of caveats that if not kept in mind, can make Check Code challenging. This section is intended to address some of these common issues.

Use the **DISABLE** command to implement skip patterns

As noted in this lesson, disabling all fields in-between the one that should be skipped from and the one that should be skipped to is an effective way of implementing a skip pattern. It has the added benefit that the user cannot click into a field that has been skipped and fill it out. An alternative to using the **DISABLE** command is the **GOTO** command. The **GOTO** command will direct the cursor to a specific field. Due to weaknesses in the implementation of the **GOTO** command, its use is not recommended except for advanced users. Make sure to include a **CLEAR** command along with the **DISABLE** command in order to set any values to null if the group field is disabled.

Assign values using proper syntax depending on the field type

When assigning a value to a field, ensure that the value is formatted correctly. Consider the following scenarios using the **ASSIGN** command:

1. Assign the 'Age' field (numeric field type) the value 24
2. Assign the 'Ill' field (Yes/No field type) the value No
3. Assign the 'AteChicken' field (checkbox field type) the value Yes
4. Assign the 'DateOfInterview' field (Date field type) the value 5/5/2012
5. Assign the 'CaseStatus' field (legal values field type) the value "Confirmed"
6. Assign the 'Ethnicity' field (comment legal value field type) the value "H" for Hispanic.

The above scenarios would appear as such in the Check Code editor:

1. `ASSIGN Age = 24`
2. `ASSIGN Ill = (-)`
3. `ASSIGN AteChicken = (+)`
4. `ASSIGN DateOfInterview = 5/5/2012`
5. `ASSIGN CaseStatus = "Confirmed"`
6. `ASSIGN Ethnicity = "H"`

For the number and date field types, no quotes are required around the value being assigned. Text fields (a legal values field is a text field) require quotes around the value. Yes/No fields and checkboxes have special values representing their true and false responses, (+) and (-), respectively.

Summary

During this lesson, you were introduced to the concept of creating data entry validation logic using the Check Code Editor in the Form Designer module. You can now:

- ❖ Navigate the Check Code editor.
- ❖ Use the ASSIGN command.
- ❖ Use the DIALOG command.
- ❖ Disable and enable fields based on conditions.
- ❖ Use the YEARS and SYSTEMDATE functions.

Q&A

Q: Can I calculate the age in days instead of years?

A: Yes. There is a function called DAYS that, when passed two date values, returns the difference in whole days.

Q: Is there a way to calculate the epidemiological week based on a given date?

A: Yes. There is a function called EPIWEEK that, when passed a single date value, returns the corresponding epidemiological week value.

Quiz

The following questions will see how much you have learned about using the Check Code editor.

Questions

1. Check Code can run before or after values are entered in a variable.
 - a. True
 - b. False

2. Using the Program Editor, you can create Check Code that will run across pages or records.
 - a. True
 - b. False

3. Which function could be used to create an age variable based on two different dates?
 - a. ROUND
 - b. YEARS
 - c. TXTTONUM

4. How does a “true” response for both a checkbox field and Yes/No field appear in check code?
 - a. (+)
 - b. (-)
 - c. Yes
 - d. True

- e. "Yes"
5. A *legal values field* called AteCheese contains possible choices "Yes", "No", and "Don't know". What is the correct syntax, using an IF command, to check if the value is "Yes"?
- a. IF AteCheese = Yes THEN
 - b. IF AteCheese = (+) THEN
 - c. IF AteCheese = True THEN
 - d. If AteCheese = "Yes" THEN
 - e. If AteCheese = 0 THEN
 - f. None of the above
6. A form contains a *Yes/No field* called AteBacon. What is the correct syntax, using an IF command, to check if the value is "Yes"?
- a. IF AteBacon = Yes THEN
 - b. IF AteBacon = (+) THEN
 - c. IF AteBacon = True THEN
 - d. If AteBacon = "Yes" THEN
 - e. If AteBacon = 0 THEN
 - f. None of the above
7. A form contains a *Number field* called Age. What is the correct syntax, using an IF command, to check if the value is greater than or equal to 18?
- a. IF Age >= "18" THEN
 - b. IF Age >= 18 THEN
 - c. IF Age > "18" THEN
 - d. IF Age > 18 THEN
 - e. IF Age => 18 THEN
 - f. None of the above

Answers

1. A
2. A
3. B
4. A
5. D
6. B
7. B

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Entering Data

This lesson introduces you to entering data using the Enter module of Epi Info™ 7. You will learn how to enter data for the sample survey, navigate the survey you created in Form Designer, merge data from other investigators, and enter data for the sample survey provided. You will also learn how to search for records from the Enter module. When you enter records in the survey, you populate the data table with information to be used for later analyses.

In Lesson 1, you created an electronic version of the survey you will use to collect data to aid in your *Salmonella* outbreak investigation. In Lesson 2, Check Code was added to speed the data entry process and act as a quality control measure. In Lesson 3, you will begin entering data about the attendees from the company picnic. Data entered in this lesson will be used to create statistics and develop a picture of the population of those who attended the event.

Time to complete: 1 hour (Beginner)

BEFORE YOU BEGIN

Complete Lesson 1

Complete Lesson 2

FIVE GOALS

1. Learn how to navigate the Enter Data module.
2. Enter four records.
3. Create a line list.
4. Import data from an Epi Info™ 7 data package.
5. Create an exposure relationship.

Getting Started with Enter

The Enter Data module can be accessed by clicking Enter Data from the Epi Info™ 7 main menu. You can also access Enter Data through the Form Designer module by clicking the **Enter Data** button on the toolbar. You will use the Enter Data module to enter information into the survey you created in the Form Designer. When you enter data into the form, you populate the data table inside your project. You can navigate from Form Designer to Enter to test your Check Code and Tab Order, but once you create a data table and start adding data, you cannot make changes to field names or field types.

The Enter program displays the form you created, constructs your data table, and controls the data entry process by using the settings and Check Code established in Form Designer. From the Enter Data module, you will enter new data, modify existing data, search for records, and merge data from Epi Info™ 7 data packages. The Find function allows records to be located based on a series of matched variables. As you enter data, the cursor moves from field-to-field and from page-to-page. Navigation is provided for New, Next, Previous, First, and Last records, and through related forms.

The Enter workspace

The Enter workspace consists of several main areas:

1. **Toolbar.** Contains buttons for common features and record navigation.
2. **Page panel.** Shows a list of available pages in the form.
3. **Canvas.** Is where data entry occurs.
4. **Linked records viewer.** Used to link records in an exposure/exposed relationship.

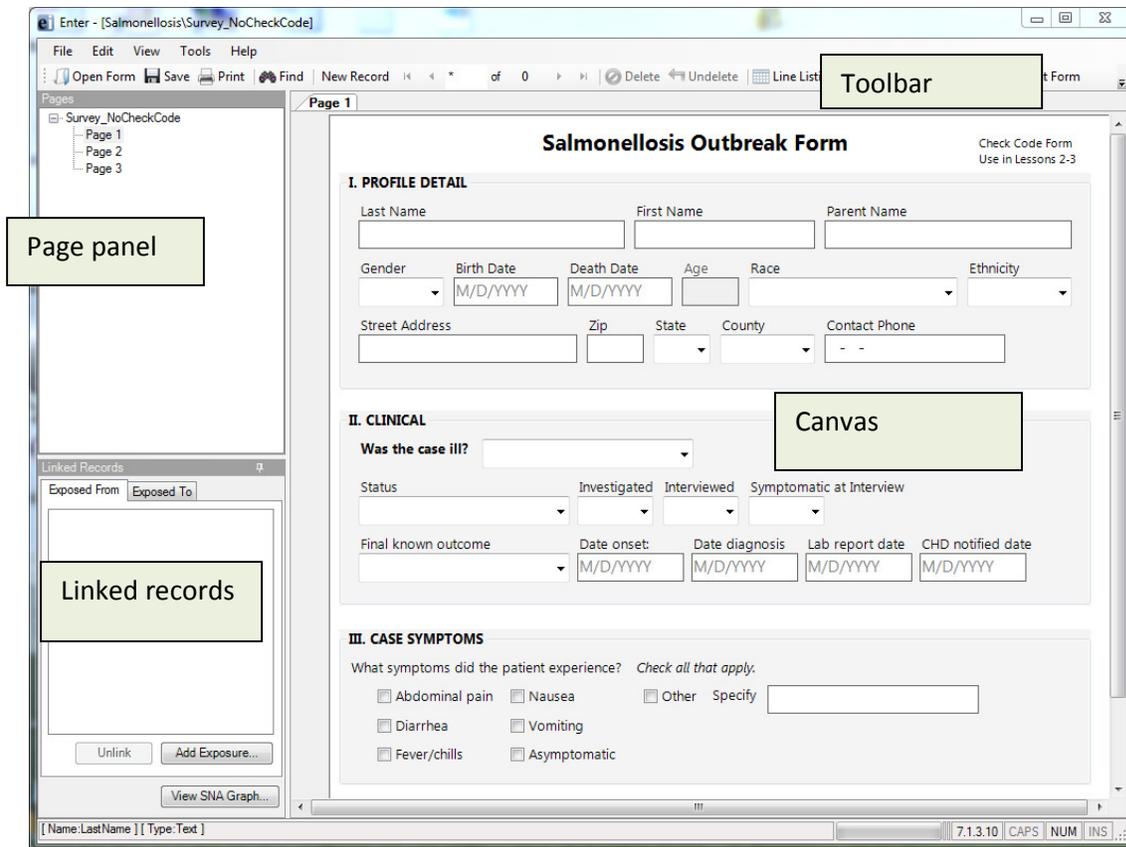


Figure 58

Key features

The Enter module has the ability to:

- ❖ Create new records and edit or soft-delete existing records
- ❖ Display a data dictionary
- ❖ Display an interactive line list, an HTML line list, or a Microsoft Excel-based line list of the entered data
- ❖ Navigate through records or find a specific record
- ❖ Print data entry forms, both with and without showing any data

Note: Printing a form with data will work only on Windows Vista, Windows 7, and later versions.

- ❖ Merge data from other Epi Info™ 7 forms, Epi Info™ 7 data packages, the Epi Info™ mobile application for Android devices, or from the Epi Info™ web survey application
- ❖ Create Epi Info™ 7 data packages
- ❖ Create exposure relationships intended for use in contact tracing
- ❖ Show social network analysis graphs based on exposure relationships

Opening the form

Make sure to use the form you've been working with in Lessons 1 and 2. Follow the steps below to open this form in the Enter module:

1. Open the Epi Info™ 7 main menu.
2. Click the **Enter Data** button. The Enter window opens.
3. Click the **Open Form** button on the Enter toolbar. The Open Form dialog opens.
4. Click the ... (ellipsis) button to browse for an Epi Info™ 7 project.
5. Locate the **Epi Info 7\Resources\Training Projects\Salmonellosis** project directory and open it.
6. Select the **Salmonella** project file and click **Open**. The Open Form dialog populates with a list of available forms in the project.
7. Select **Survey_NoCheckCode** from the list of forms.
8. The Data Tables Properties box appears. Click **OK**. The form is loaded in the Enter window.

Notice you are on Page 1 of the form and are looking to enter data for the first record.

Entering Data into the Form

Enter the following records:

	Case #1	Case #2	Case #3	Case #4
Page 1				
Name (Last, first)	Smith, John	Johnson, Casey	Henderson, Mark	Henderson, Susan
Gender	Male	Female	Male	Female
DOB	01/01/1978	02/22/1979	05/01/1950	12/15/1952
Race	American Indian	Black	White	White
Address	1234 Shady Lane	2345 Shady Grove	3456 Shady Court	3456 Shady Court
State	GA	GA	GA	GA
County	Morgan	Morgan	Morgan	Morgan
Case was ill	Yes	No	Yes	No
Status	Confirmed		Confirmed	
Final Known Outcome	Ill at report time		Ill at report time	
Onset date	5-6-2012		5-7-2012	
Symptoms	Nausea, diarrhea, fever/chills		Abdominal pain, fever/chills	
Page 3				
Attended picnic?	Yes	Yes	Yes	Yes
Ate at Noon	No	Yes	Yes	No
Ate at 2pm	Yes	Yes	No	Yes
Attendee type	Employee	Employee	Relative	Employee
Picnic Foods Eaten	Garden salad, Reuben, peanut butter cookies	Grilled cheese, chocolate chip cookies, potato chips	Chef salad, Reuben, water	Chef salad, egg salad sandwich, iced tea

Merging Data with the Epi Info™ 7 Data Packager

While you entered the four records listed in the previous section, your colleagues in the health department have interviewed some of the picnic attendees and entered records of their own. Once data collection has been completed, the data from all of the investigators must be merged into a centralized “master” data set so it can be analyzed.

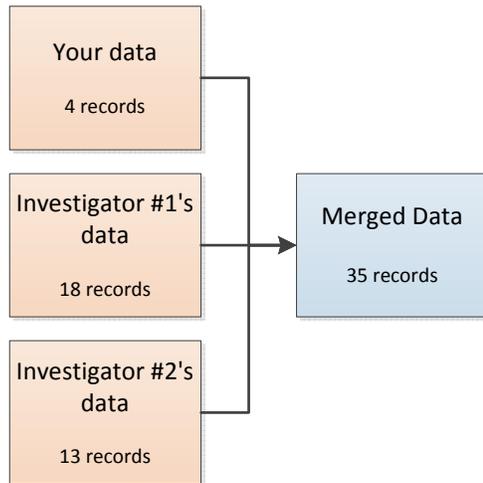


Figure 59

Data packager overview

For those familiar with prior versions of Epi Info™, the traditional data merging capabilities are still present in the Classic Analysis module. However, a simpler way of merging Epi Info™ 7 data can be accessed through the Enter module. This feature is known as the Data Packager.

The Data Packager provides a simple interface for packaging the data you’ve collected into a single compressed and encrypted file. The packager can also optionally de-identify data and filter certain records based on conditions you specify (e.g. specifying that only records entered in the last 7 days should be packaged). Once you’ve sent the package to another user, they would use the Enter module’s **Import from data package** tool to merge the package’s data into their form.

For this to be successful, both sender and recipient *must* have a copy of Epi Info™ 7 installed and *must* have identical (or near-identical) forms. If the form used to create the package differs significantly from the form that will receive the package’s data, the process will not be able to proceed.

Matched and Unmatched Records

The data packager uses each record’s unique ID value to determine if two records match. (Note that the unique ID is assigned to a record when the record is saved and is not normally displayed during the data entry process.) If the import process detects that a record in the data package already exists in the destination form, the record in the destination form is *updated* with the data present in the

data packager. If the import process does not detect that a given record already exists, then the record from the data packager is *appended* to the form.

Imagine a scenario where you're receiving data packages from the same individuals on a weekly basis. Some new records are included in each week's package, but most of the records are the same ones you've been importing each week. Would you want those existing records to be appended each week? Probably not; if they were appended, you would end up with a large amount of duplicate records. A lot of data cleaning might be required to carry out useful analysis. You would likely prefer that those existing records in your data set be *updated* with any new data. For example, a case entered six weeks ago might have died or been re-interviewed, and the record in the investigator's computer was updated. When you import the data package, it will update the corresponding record in your data set with the new information.

To illustrate what would happen for both matched and unmatched records during a data packager import, assume the following scenario exists: Data from Table 3 resides in your data entry form. You have just been given a data package consisting of data from Table 4. You want to merge the data from the data package into your form.

Notice that Case ID #3 exists in both tables. It has a record ID value of 7e88e70c-faa9-4b87-8a96-df403df92fde. The age of the individual is different, however; the data package contains an age of 33 for case #3 while your data set contains an age of 32. After the import process has completed, your database will look like that shown in

Table 5.

Table 3

Record Globally Unique ID	Case ID	Name	Age
01b91724-564e-4473-bfab-6d74a1377e4a	1	John	12
457452f2-ce73-45b7-a50f-024c80184cad	2	Mary	43
7e88e70c-faa9-4b87-8a96-df403df92fde	3	Susan	32

Table 4

Record Globally Unique ID	Case ID	Name	Age
7e88e70c-faa9-4b87-8a96-df403df92fde	3	Susan	33
a5a0e36d-a4df-41cb-a7c1-0ba44a895efe	4	Peter	31
dfc3547c-797a-4516-8f41-f08e6f6e4e0f	5	Andy	76

Table 5

Record Globally Unique ID	Case ID	Name	Age
01b91724-564e-4473-bfab-6d74a1377e4a	1	John	12
457452f2-ce73-45b7-a50f-024c80184cad	2	Mary	43
7e88e70c-faa9-4b87-8a96-df403df92fde	3	Susan	33
a5a0e36d-a4df-41cb-a7c1-0ba44a895efe	4	Peter	31
dfc3547c-797a-4516-8f41-f08e6f6e4e0f	5	Andy	76

The importer determined that of the three records in Table 4, two of those records did not exist in the destination table and therefore appended those records (cases #4 and #5). However, it determined that case #3 already existed in the destination table and so instead of appending it, it updated the destination table's information for case #3. The update is why the resulting data contains an age value of 33 for case #3 instead of 32.

Selecting the Import Type

When importing records from an Epi Info™ data package, you can specify if you want to update and append, update only, or append only. Selecting "Update and append records" will cause the importer to behave as described in the Matched and Unmatched Records section and is the default option.

Selecting "Update records only" will update matching records but skip appending any unmatched records.

Selecting "Append records only" will add any unmatched records and skip updating any records that match.

Encryption and Security

Three security mechanisms are built in to the data packager:

- ❖ File encryption
- ❖ Column data removal
- ❖ Row filtering

File Encryption

The data packager compresses and encrypts the package file that is created. The encryption uses a standard 256-bit symmetric key encryption algorithm provided by the Microsoft .NET Framework v3.5. Specifying a password during the data packaging process is recommended but not required.

Because the encryption keys are stored in the software itself, a determined and/or experienced attacker would be able to determine what the keys are and potentially crack the file very quickly. The encryption on the file is therefore not intended to provide world-class security, but rather, to prevent unskilled eavesdroppers from viewing the file's contents. (Think of it like the deadbolt on your front door; it will keep out the nosy neighbors, but a skilled thief will be able to bypass it without much effort.) For enhanced security, consider using additional encryption software.

Column Data Removal

Removing data from selected columns gives you a way to exclude personally identifiable information (PII) or other confidential information from the package.

Row Filtering

Row filtering can be used to package only certain records. For example, you can package only records where the case status is "Confirmed" and that were interviewed in the last three days.

Creating a data package

You need to send the four records you entered to your supervisor at the health department. Because you will be sending the data over an unsecure e-mail system from the field, you have decided to send only the non-personally identifiable information (PII) in the package.

1. Select **File > Package for Transport...** from the Enter menu. The Package for transport dialog opens.
2. Click the ... (ellipsis) button next to the **Package path** box. A Windows Browse for Folder dialog appears.
3. Select the Desktop from the list of available locations.
4. Click **OK**. The Package path box in the Package for transport dialog is populated with the folder path to the desktop.
5. Type "DemoPackage" into the **Package name** box.
6. Check the **Append timestamp to file name** box.
7. Click the **Remove Data in Fields** button. The Remove Columns from Data Package dialog opens.
8. Select **Survey** from the drop-down list of available forms. The list of fields in the form appears.
9. Use **CTRL+Left Click** to multi-select the following fields:
 - a. Address
 - b. Age
 - c. DOB
 - d. Ethnicity
 - e. FirstName
 - f. LastName
 - g. ParentName
 - h. Phone
 - i. Race

- j. Zip
10. Click **OK**.
11. Type "1234" into the **Password** box.
12. Type "1234" into the **Verify password** box.
13. Click the **Save Script** button. A Windows Save dialog opens.
14. Type "DemoScript" into the **FileName** box.
15. Click **Save**. An informational box appears stating that the script has been saved.
16. Click the **Package** button once. The data packaging process starts.
17. When the packaging process has completed, verify that the last item in the status box contains the words "Package creation complete."
18. Click **Close** to exit the data packager.

You have successfully created an Epi Info™ 7 data package file on the desktop. It does not contain any data for the fields selected in step 9, and saving the packaging script (steps 13-15) means you can quickly re-package the data later using the same settings without needing to go through all of those steps again.

To finish the process, you would attach the DemoPackage.edp7 file (now residing on the desktop) to an e-mail message.

Importing a data package

You have just been sent an Epi Info™ 7 data package containing the remainder of the records for the *Salmonella* outbreak investigation. To start analysis, you need to merge these records with the four you have entered.

1. Select **File > Import Data > From Data Package** from the Enter menu. The Import From Encrypted Data Package dialog appears.
2. Click the ... (ellipsis) button next to the **Encrypted data packages to import** box. A Windows Open File dialog appears.
3. Navigate to the \Resources\Training Projects\Salmonellosis folder.
4. Select **SalmonellaTrainingCaseData_2013-06-17T20-04-48.edp7**.
5. Click **Open**. The file path appears in the **Encrypted data packages to import** box.
6. Type "1234" for the password. The dialog should appear as shown in Figure 60.
7. Click **Import**. The import process begins.
8. When the import process has completed, click the **Close** button. The Enter window refreshes and 150 records appear in the record counter.

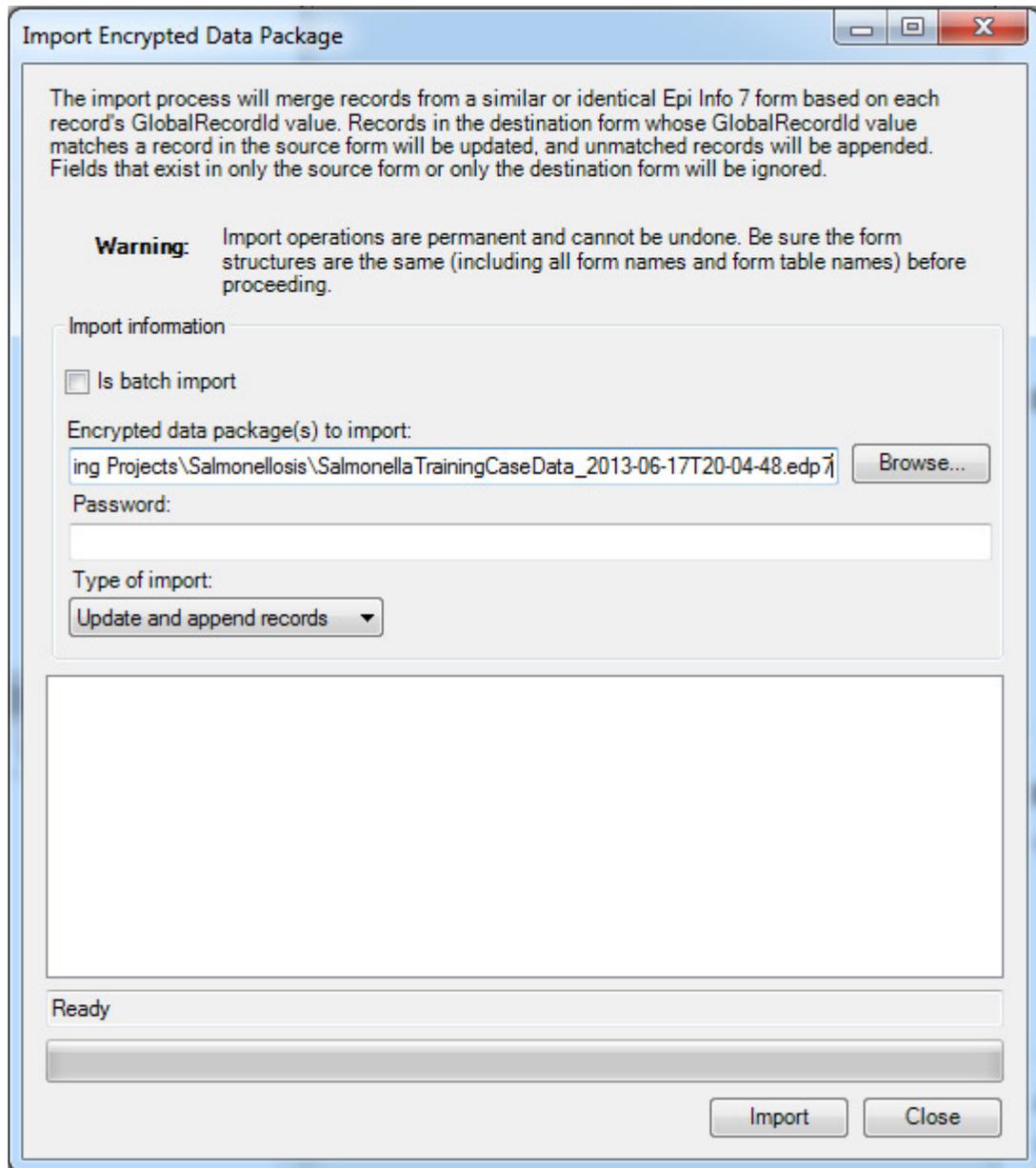


Figure 60

Finding Records

There are two ways to locate specific records in a large data table:

1. From the current record box on the toolbar:



- a. Type the number **3** into the current record field.
- b. Press **Enter**. Record 3 appears on the canvas.

2. From the **Find** window:

- a. Click the **Find** button on the toolbar. The Find records window opens.



- b. Click on the variable *Gender* to search for a record. An entry field appears. Type *Male* into the box.
- c. Click the **Search** button on the Find window's toolbar. A list of records matching the search criteria appear.
- d. Double-clicking on a record's row header will open that record in Enter.

	RECSTATUS	GlobalRecord	FKEY	LastName	FirstName	ParentName	Gender	DOB	DeathDate	Race
▶	1	003b62c6-88	(null)	(null)	(null)	(null)	Male	9/5/1978	(null)	American
	1	00a4419d-37	(null)	(null)	(null)	(null)	Male	8/1/1987	(null)	Black
	1	01034f5a-308	(null)	(null)	(null)	(null)	Male	3/3/1983	(null)	White
	1	011ba049-81	(null)	(null)	(null)	(null)	Male	11/16/1985	(null)	American
	1	012960d4-47	(null)	(null)	(null)	(null)	Male	5/1/1981	(null)	American
	1	012c0484-6d	(null)	(null)	(null)	(null)	Male	12/15/1981	(null)	Black
	1	018536b2-0cf	(null)	(null)	(null)	(null)	Male	11/21/1989	(null)	Black
	1	01abba5d-e9	(null)	(null)	(null)	(null)	Male	11/20/1987	(null)	Other
	1	01b91724-56	(null)	(null)	(null)	(null)	Male	10/23/2001	(null)	White
	1	01f2b697-efaf	(null)	(null)	(null)	(null)	Male	9/1/1979	(null)	Black
	1	01fea344-046	(null)	(null)	(null)	(null)	Male	3/19/1986	(null)	White
	1	02256c0e-24	(null)	(null)	(null)	(null)	Male	12/14/1985	(null)	American

- e. Click **Reset** to clear the search criteria and begin a new search.
- f. When finished, close the Find window.

Note: The current dataset only contains four records. You can open the **Survey_Final** form located in the same project to view a dataset that contains 150 records. To open the form:

1. Click the **Open Form** button on the Enter Data toolbar. The Open Form dialog opens.
2. Click the ... (ellipsis) button to browse for an Epi Info™ 7 project.
3. Locate the **Epi Info 7\Resources\Training Projects\Salmonellosis** project directory and open it.
4. Select the **Salmonella** project file and click **Open**. The Open Form dialog populates with a list of available forms in the project.
5. Select **Survey_Final** from the list of forms.
6. Click **OK**. The form is loaded in the Enter Data window.

Showing a Line List

You have 150 records after importing the data package. Follow the steps below to show a line list in the computer's default web browser:

1. Locate the **Line List** button on the Enter toolbar.
2. Click the down arrow next to the **Line List** button. A list of line list options appears: Interactive, Printable, and Excel.
3. Select **Printable (HTML)** from the list of choices as shown in Figure 61. The line list of data appears momentarily in the computer's default web browser.

You can also send the line list data to Microsoft Excel if Excel is installed on the system:

1. Click the down arrow next to the **Line List** button. A list of line list options appears: Interactive, Printable, and Excel.
2. Select **MS Excel** from the list of choices. The line list of data appears momentarily in Microsoft Excel.

The interactive line list will be discussed in further detail in the Analysis lesson.

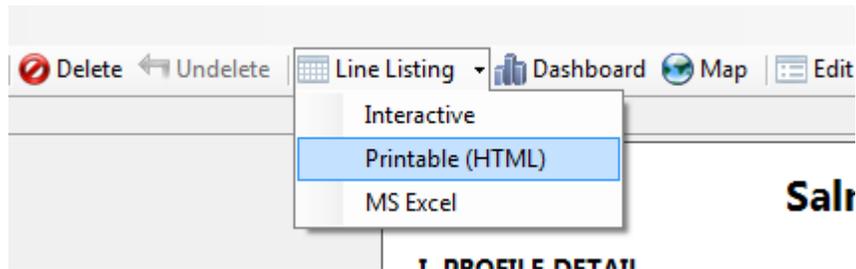


Figure 61

Creating an Exposure Relationship

Note cases #3 and #4 from **Error! Reference source not found.** that you entered earlier. These two cases represent the fictional Mr. and Mrs. Henderson. After further investigation you conclude that Mr. Henderson might have exposed Mrs. Henderson and made her sick. You want to note the exposure relationship during the data entry process.

The Enter module has the ability to link records based on exposure relationships using the **Linked records** panel in the bottom-left corner of the window. The Linked records panel can be used to conduct contact tracing and includes the ability to display a social network analysis graph that visualizes the relationships. Each relationship has a direction of exposure, e.g. one record can expose another or have been exposed by it.

To add an exposure relationship between Mr. and Mrs. Henderson, follow the steps below:

1. Navigate to Mr. Henderson's record.
2. Select the **Exposed To** tab in the **Linked Records** panel as shown in Figure 62.
3. Click the **Add Exposure...** button. The **Find Records** window opens.
4. Select **LastName** from the list of fields. A search box for LastName appears.
5. Type "Henderson" into the LastName field.
6. Click **Search** on the Find window's toolbar. A list of matching records appears.
7. Double-click the record for Susan Henderson. The Find window disappears and an icon representing Mrs. Henderson appears in the Exposed To tab for Mr. Henderson's record.

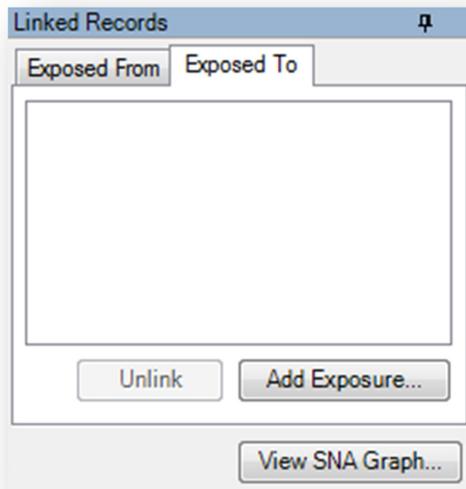


Figure 62

The two records are now linked. The direction of the exposure indicates that Mr. Henderson exposed Mrs. Henderson. To visualize the relationship, click the **View SNA Graph...** button.

Summary

During this lesson, you were introduced to the concept of creating electronic data entry forms using the Form Designer module of Epi Info™ 7. You can now:

- ❖ Navigate the Enter workspace.
- ❖ Enter records.
- ❖ Create a line list.
- ❖ Create and import Epi Info™ 7 data packages.
- ❖ Create exposure relationships.

Q&A

Q: Is there a way to show only selected columns in the line list?

A: There is no way to show specific columns from the line lists in Enter, but this capability does exist in the dedicated analytics modules (discussed in the next lesson).

Q: Can the relationship between two records, created using the Linked Records panel, be “directionless”; That is, can it be neither exposed to nor exposed from?

A: At this time, there is no way to indicate a missing, unknown, or directionless exposure.

Quiz

The following questions will see how much you have learned about using the Enter module.

Questions

1. Records can be added only; existing records can't be edited once saved.
 - a. True
 - b. False
2. A record number can be typed directly into the current record box, and after pressing the Enter key, that record will appear on the canvas.
 - a. True
 - b. False
3. The encryption used in the data packager should not be relied on as the sole source of data security when handling sensitive or personally identifiable information.
 - a. True
 - b. False
4. The Enter module can only import data from other Epi Info™ forms, Epi Info™ data packages, data that came from the Epi Info™ mobile application for Android devices, or data that came from the Epi Info™ web survey tool.
 - a. True
 - b. False

Answers

1. B
2. A
3. A
4. A. Data from other sources, such as Excel files or text files, must be imported into an Epi Info™ 7 project using the Classic Analysis module.

Data Analysis using the Dashboard

This lesson introduces you to the Epi Info™ 7 Dashboard module.

In Lesson 3, you entered case data in a survey to collect information on the *Salmonella* outbreak. In Lesson 4, you will use the Dashboard module to open that data and view it. Once records are loaded in the Dashboard, you can use “gadgets” to both display the data and run statistics. Lesson 4 covers these basic skills and shows you how to open data, which are important skills you will use every time you open the Dashboard module.

Time to complete: 2 hours (Intermediate)

FIVE GOALS

1. Use Dashboard gadgets to show statistical output
2. Create data filters
3. Create new variables with recoded data
4. Create new variables using conditional logic
5. Save the output

Getting Started with the Dashboard

The Dashboard module can be accessed by clicking the **Visual Dashboard** button on the Epi Info™ 7 main menu. The Dashboard can read data files created in Form Designer and other types of databases (e.g., Microsoft Access, Microsoft Excel, text files, and others) and acts as a statistical toolbox providing you with many ways to transform your data and perform statistical evaluations. The Dashboard also provides you with ways to export your data to new file formats (e.g., MS Excel).

Dashboard workspace

The Dashboard window contains several key areas:

1. **The Header.** This section contains several buttons for commonly-used actions, such as setting the data source, opening a canvas file, or saving a canvas file. It also displays the current data source and the current record count.
2. **The Canvas.** The canvas contains any user-specified gadgets. It also contains two permanent gadgets: The data filtering gadget and the data management gadget.
3. **The Status bar.** The status bar appears at the very bottom of the Dashboard window. It displays the number of gadgets on the canvas, the number of fields in the current data set, and has a zoom slider for making the canvas appear larger or smaller.

Figure 63 shows where to find the three sections.

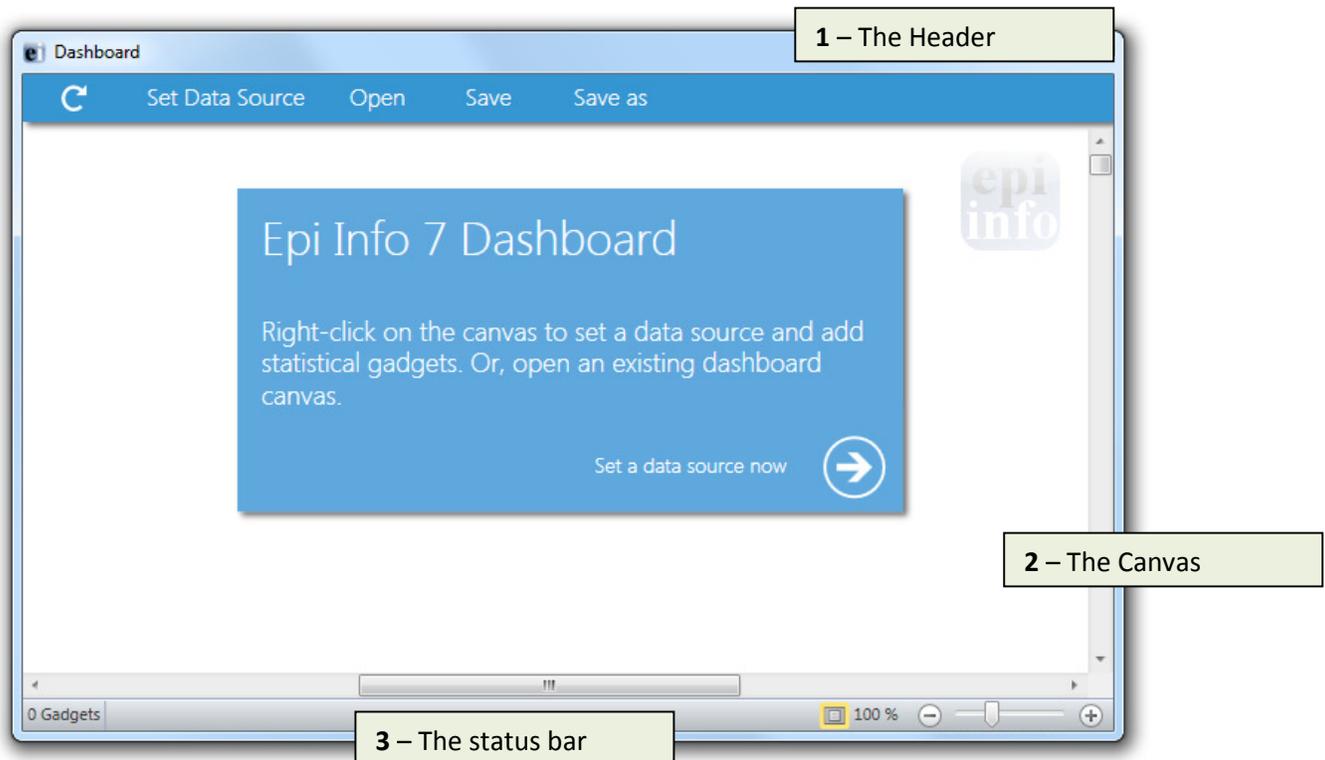


Figure 63

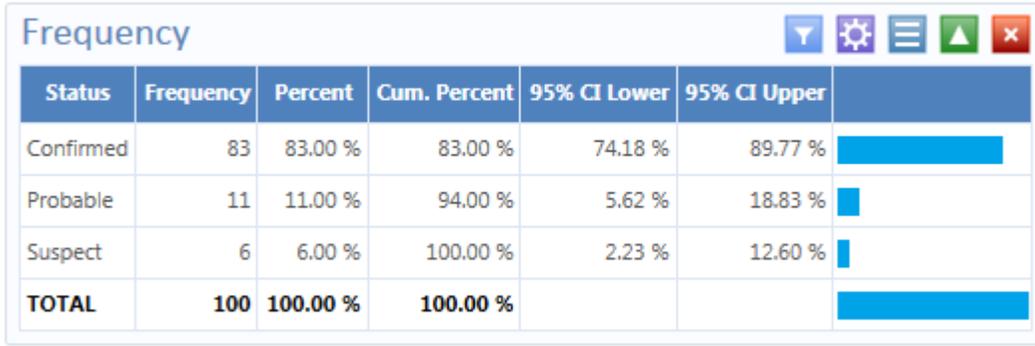
Key features

The Dashboard module has the ability to:

- ❖ Read Epi Info™ 7 project data, Excel spreadsheets, Access databases, and other data formats
- ❖ Filter records
- ❖ Define new variables with recoded values, conditional assignments, or special formatting
- ❖ Display line lists and data dictionaries
- ❖ Display various types of statistical output, including frequencies, 2x2 tables, and regression analysis.
- ❖ Display data visually through the use of charts.
- ❖ Relate data from other data sources
- ❖ Export data to other data formats such as Microsoft Excel

Gadgets Overview

Analysis is carried out in the Dashboard through the use of gadgets. Gadgets are moveable screen elements that perform specific statistical functions. For example, there is a Logistic Regression gadget that can carry out conditional and unconditional logistic regression. Shown in Figure 64 is an example of a frequency gadget.



Status	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper	
Confirmed	83	83.00 %	83.00 %	74.18 %	89.77 %	<div style="width: 83%;"></div>
Probable	11	11.00 %	94.00 %	5.62 %	18.83 %	<div style="width: 11%;"></div>
Suspect	6	6.00 %	100.00 %	2.23 %	12.60 %	<div style="width: 6%;"></div>
TOTAL	100	100.00 %	100.00 %			<div style="width: 100%;"></div>

Figure 64

You can move gadgets around the screen wherever you like. There are also a set of buttons on the top-right corner of each gadget that allow you to interact with them in other ways. These buttons are:

- ❖  **Set Gadget Filter:** Use to set a data filter for the gadget.
- ❖  **Change Gadget Properties:** Use to set which fields the gadget will process.
- ❖  **Set Description:** Use to set a description for the gadget.
- ❖  **Collapse/Expand Gadget Output:** Use to collapse and expand the gadget's output.
- ❖  **Close:** Removes the gadget.

The more commonly-used gadgets are listed below.

Line list

Use to show a line list of the data in the current data source.

Frequency

Use to produce a table showing how data are distributed, the counts of any given interval, and how many records have each value of a selected variable. Confidence limits for each proportion are included.

Means

Use to compute descriptive statistics for a continuous numeric variable. The mean of a set of data is equal to the sum of the data divided by the number of items in the data set. When used with a cross-tabulation variable, it also computes statistics showing the likelihood that the means of the groups are equal. The mean of a yes/no variable is the proportion of respondents answering yes. The Means gadget produces the following statistical tests: parametric tests, Analysis of Variance or ANOVA (for

two or more samples), non-parametric tests, Bartlett's Test for Inequality of Population Variances, Kruskal-Wallis one-way analysis of variance (for two or more samples), and Mann-Whitney/Wilcoxon Two Sample Test.

2x2 / MxN table

Use to create cross-tabulations of categorical variables. The 2x2/MxN gadget can help determine the probability that a risk factor is linked to an outcome. For these values to have their accepted epidemiological meanings, the value representing presence of the exposure (independent value) and outcome conditions (dependent variable) must appear in the first row and column of the table. Epi Info™ Yes/No variables are automatically sorted. Values of the first selected variable will appear across the top of the table, and those of the second one will be on the left margin of the table. Normally cells contain counts of records matching the values in the corresponding marginal labels. For 2x2 tables, the command produces odds ratios and risk ratios. For tables other than 2x2, chi-squared statistics are computed. Chi square for trend tests for the presence of a trend in dose response or other case control studies where a series of increasing or decreasing exposures is being studied. The p-value is the probability that the association between two variables might be because of chance. A low p-value of $<.05$ means the risk factor might be closely associated with the illness.

Chart

Use to display data visually. Supported chart types include epi curve (histograms), pie, bar, column, stacked column, scatter, aberration detection, and Pareto.

Combined frequency

Use to treat a group of fields as if they were a single field for the purposes of generating frequency output.

Matched pair case control

Use to generate matched pair case control statistics.

Linear regression

Use to run linear regression.

Logistic regression

Use to run conditional and unconditional logistic regression.

Opening the *Salmonella* Data

Follow the steps below to open the *Salmonella* outbreak data set.

1. Close the Form Designer and Enter modules if they are open.
2. Open the Epi Info™ 7 menu.
3. Click the **Visual Dashboard** button on the Epi Info™ 7 menu. The Dashboard window opens.
4. Click the **Set Data Source** button. A Set Data Source dialog opens.
5. Select **Epi Info™ 7 Project** from the **Database Type** drop-down list.

Note: Epi Info™ 7 projects are not the only type of data that can be opened in the Dashboard. Note that Excel documents, MySQL databases, and text files are among the supported data formats.

6. Click the ... (ellipsis) button next to the **Data Source** box. A Windows Open File dialog appears.
7. Double-click the **Epi Info 7\Resources\Training Projects\Salmonellosis** folder. The Salmonellosis folder opens.
8. Select the **Salmonellosis.prj** file.
9. Click **OK**. The **Set Data Source** dialog reappears; a list of forms within the project appears in the **Data Source Explorer** list box.
10. Select **Survey_Final** from the **Data Source Explorer** list box.
11. Click **OK**. The data are loaded into the Dashboard.

The Dashboard window's header shows a record count of 309 after completing step 11.

Using the Line List Gadget

The Line List gadget displays the variables of the current dataset with their corresponding data. You can select specific variables from the variables box to narrow the list, or press CTRL+A to select all of the variables. Selecting a group or a page will show all of the variables contained in the group or page, respectively.

Generating a basic line list

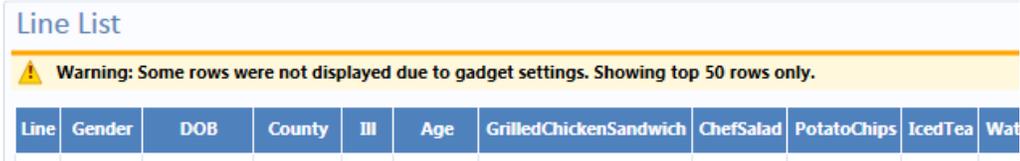
Follow the steps below to create a line list of the current data set:

1. Right-click a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Line list** from the context menu. The line list gadget appears.
3. Use **CTRL+Left Click** to multi-select the following fields:
 - a. Age
 - b. County
 - c. DOB
 - d. Gender
 - e. ILL
 - f. Group_PicnicFoodsEaten

Note: Group fields and pages are displayed at the end of the selection list.

4. Select **Age** in the **Sort variables** drop-down list. Age appears in the **Sort order** box.
5. Click the **Generate Line List** button. The line list is displayed, sorted by Age.

Notice the “warning” message displayed at the top of the output (Figure 65). The warning is stating that the output is limited to 50 rows due to one of the gadget’s settings. The row limit prevents you from accidentally generating a line list of hundreds of thousands of records (which would greatly impair performance).



Line	Gender	DOB	County	ILL	Age	GrilledChickenSandwich	ChefSalad	PotatoChips	IcedTea	Wat
------	--------	-----	--------	-----	-----	------------------------	-----------	-------------	---------	-----

Figure 65

Follow the steps below to modify and re-generate the line list:

1. Click the gear icon  on the gadget’s header panel. The **Line List Properties** panel displays.
2. Type “200” into the **Max rows to display** box.
3. Click the **Generate Line List** button. The line list is displayed, sorted by Age.

Moving and collapsing the line list

The line list gadget can be dragged around the canvas by left-clicking on it, holding the left mouse button down, and then dragging the mouse. Gadgets can be placed anywhere, including on top of other gadgets.

Note: Attempting to drag the line list by clicking on the list's *output* and moving the mouse may not work. If this occurs, try clicking the gadget's header and moving the mouse instead.

Clicking the  icon will collapse the contents of the line list output without close the line list. The benefit to collapsing output is more apparent when many gadgets are on the canvas at once.

Sending line list output to other programs

You can send the line list output to other programs or copy it to the clipboard. To send the line list data to Microsoft Excel, follow the steps below:

1. Right-click on the *output* for the line list gadget. A gadget-specific context menu appears.
2. Select **Send list data to Excel**. The line list data appears in Microsoft Excel after several moments.

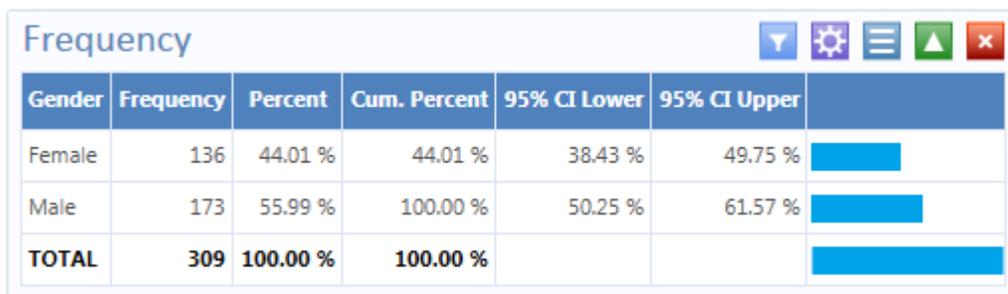
If your computer does not have Microsoft Excel installed, you can select **Send list data to web browser**. Another option on the context menu, **Copy list data to clipboard**, allows you to paste the list's output into other Windows applications. The options for sending gadget data to the web browser, to Excel, and to the clipboard exist in most of the other gadget types.

Using the Frequency Gadget

You will use the Frequency gadget to get a count and view the 95% confidence limits on selected variables. This gadget produces a frequency table that shows how many records have a value for each variable, the percentage of the total, and a cumulative percentage.

Follow the steps below to show a frequency of gender:

1. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Frequency** from the context menu. The frequency gadget appears.
3. Select **Gender** in the **Frequency** drop-down list. The frequency is displayed.



Gender	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper	
Female	136	44.01 %	44.01 %	38.43 %	49.75 %	
Male	173	55.99 %	100.00 %	50.25 %	61.57 %	
TOTAL	309	100.00 %	100.00 %			

Figure 66

Frequency output can be stratified. To stratify the frequency of gender by Ill, follow the steps below:

1. Click the gear icon  to show the **Frequency Properties** panel.
2. Click **Advanced options**. The Advanced options panel displays.
3. Select **Ill** from the **Stratify by** drop-down list.
4. Click **Run**. The frequency output is re-generated with stratified output as shown in Figure 67.

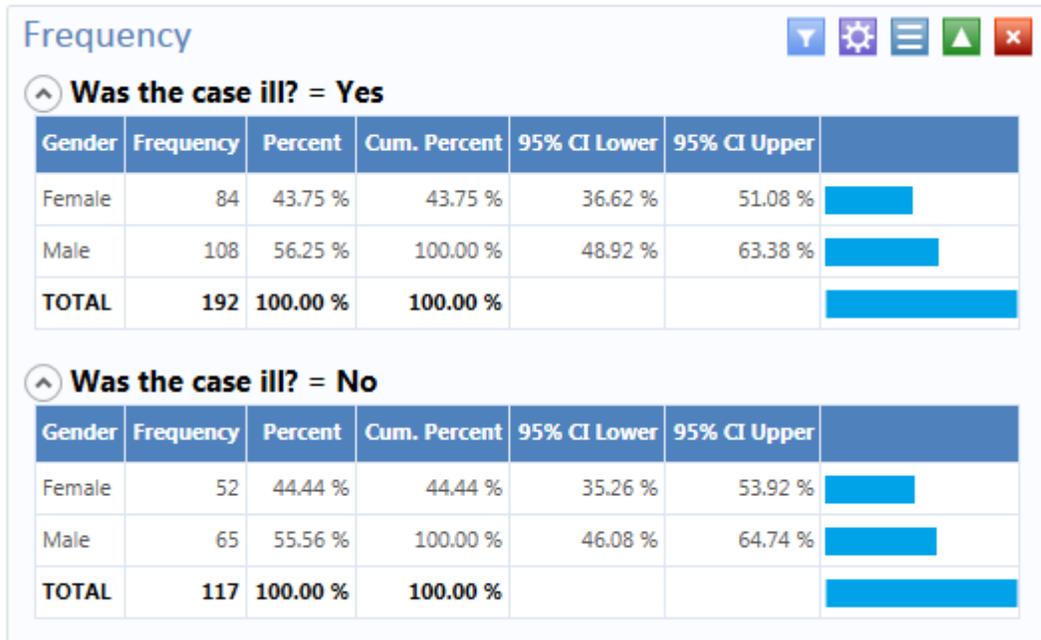
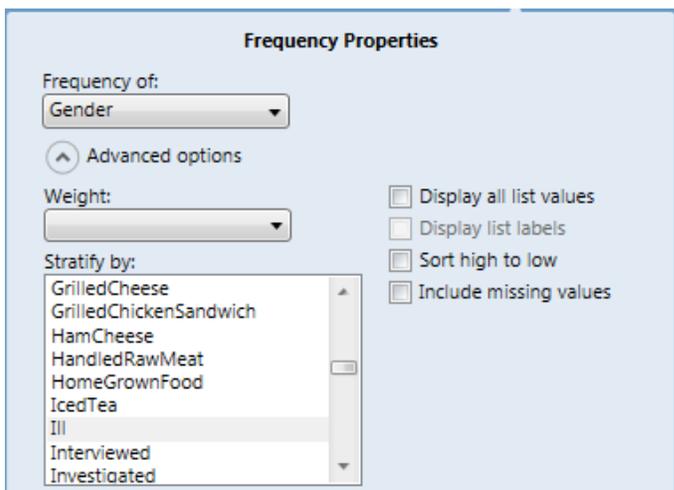


Figure 67

Note: You can collapse each strata by clicking the arrow next to the strata's header.

Additional frequency properties

The following options are available in the Frequency gadget's properties panel as shown in Figure 68.



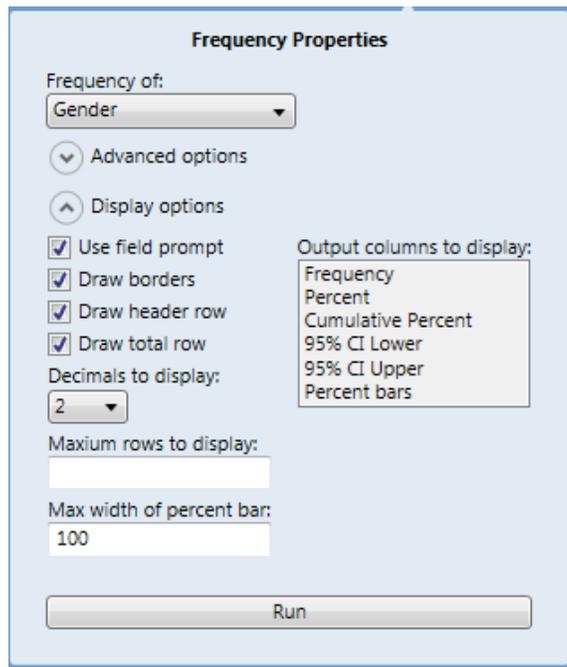


Figure 68

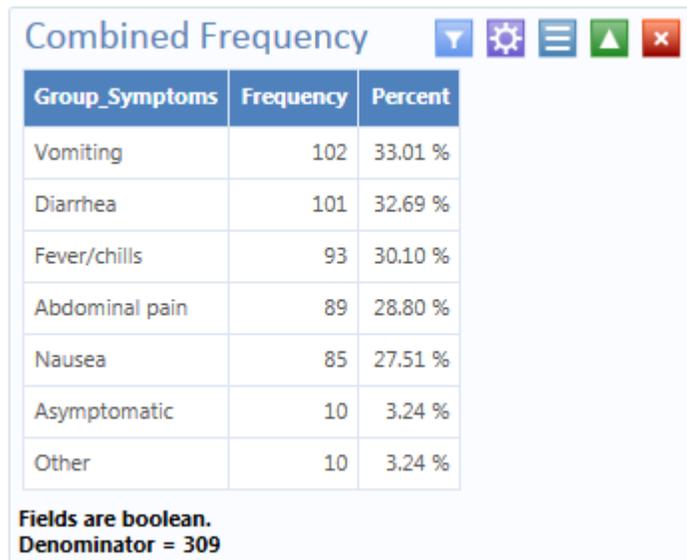
- ❖ **Frequency of:** The field on which to run the frequency.
- ❖ **Weight:** The field to use as the weight variable, for example if aggregate data is being analyzed.
- ❖ **Stratify by:** The field to use for stratifying the output.
- ❖ **Display all list values:** Only applicable when the frequency variable is a drop-down list field in an Epi Info™ 7 project. When selected, the output will show all of the drop-down list values even if they have a count of zero.
- ❖ **Display list labels:** Only applicable when the frequency variable is a Comment Legal field or Option Field in a Epi Info™ 7 project. When selected, the output will show the value and the label for Comment Legal fields and the label for Option fields.
- ❖ **Sort high to low:** Sorts the output from highest frequency to lowest when selected. When cleared, the output is generally sorted alphabetically.
- ❖ **Include missing values:** If selected, missing values are included in the output.
- ❖ **Use field prompt:** Only applicable when the frequency variable is a field in an Epi Info™ 7 project. If checked, the field's *prompt* will appear as the column heading instead of the field name.
- ❖ **Draw borders:** Setting for drawing the frequency's border.
- ❖ **Draw header row:** Setting for displaying the frequency's headers.
- ❖ **Draw total row:** Setting for displaying the frequency's totals.
- ❖ **Decimals to display:** Specifies number of decimal places to display.
- ❖ **Maximum rows to display:** Specifies number of rows to display.
- ❖ **Max width of percent bar:** Width for percent bar column using a % value.
- ❖ **Output columns to display:** Determines which columns in the output are shown. By default, all columns are selected for display.

Using the Combined Frequency Gadget

The combined frequency will run the frequency output (except the confidence intervals and cumulative percent) over a group of variables, treating them as if they were all combined into one variable. When a large number of frequencies are required for analysis, the combined frequency output might provide a simpler way of looking at the results, especially for groups composed of dichotomous fields (e.g. a group of checkboxes).

Follow the steps below to use the combined frequency gadget:

1. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Combined Frequency** from the context menu. The combined frequency gadget appears.
3. Select **Group_Symptoms** in the **Group field** drop-down list. The combined frequency output for the group is displayed as shown in Figure 69.



The screenshot shows a gadget titled "Combined Frequency" with a table of data. The table has three columns: "Group_Symptoms", "Frequency", and "Percent". The data rows are: Vomiting (102, 33.01%), Diarrhea (101, 32.69%), Fever/chills (93, 30.10%), Abdominal pain (89, 28.80%), Nausea (85, 27.51%), Asymptomatic (10, 3.24%), and Other (10, 3.24%). Below the table, it states "Fields are boolean. Denominator = 309".

Group_Symptoms	Frequency	Percent
Vomiting	102	33.01 %
Diarrhea	101	32.69 %
Fever/chills	93	30.10 %
Abdominal pain	89	28.80 %
Nausea	85	27.51 %
Asymptomatic	10	3.24 %
Other	10	3.24 %

Fields are boolean.
Denominator = 309

Figure 69

Calculating Age

Go back and view the line list you created earlier. Observe that the **Age** column lacks data.

What happened? Recall that this data was mostly collected from investigators in the field. The investigators might have excluded age from the data packages they sent to you, or perhaps they were using an older version of the form that didn't include a field for age. Either way, you would like to look at the Age for each respondent.

Because both date of birth and date of interview are known for each record, it's possible to determine the difference in years between these two dates and assign the result to another field. This is done using the **Defined Variables** slide-out gadget on the left side of the screen.

Calculate the age by following the steps below:

1. Move the mouse over the **Defined Variables** box on the left edge of the canvas. The **Defined Variables** slide-out gadget appears as shown in Figure 70.
2. Click **New Variable**. A list of variable options appears as shown in Figure 71.
3. Select **Simple Assignment** from the list of variable options. The **Add variable with simple assignment** dialog opens.
4. Type "Age2" into the **Assign field** text box.
5. Select **Difference in years** from the **Assign type** drop-down list.
6. Select **DOB** from the **Start date** drop-down list.
7. Type 05/05/2012 in the End Date drop down list. The dialog should now appear as shown in Figure 72.
8. Click **OK**. The variable is created and appears in the **Defined Variables** slide-out gadget.
NOTE: We are using 5/5/2012 instead of SYSTEMDATE (today's date) because the age calculation needs to be based on the date when the outbreak occurred.

You might now use the "Age2" variable you specified in step 4. You can verify it's content by generating a frequency using the Frequency gadget. The next exercise will explain how to use the **Means** gadget to find the descriptive statistics about the newly-created Age2 field.

Important: The "Age2" variable is temporary. When you close the Dashboard or change the Dashboard's current data source, it will be destroyed. You will learn later on how to save the variable so that you don't have to redo the above steps each time you want to run statistics on age.

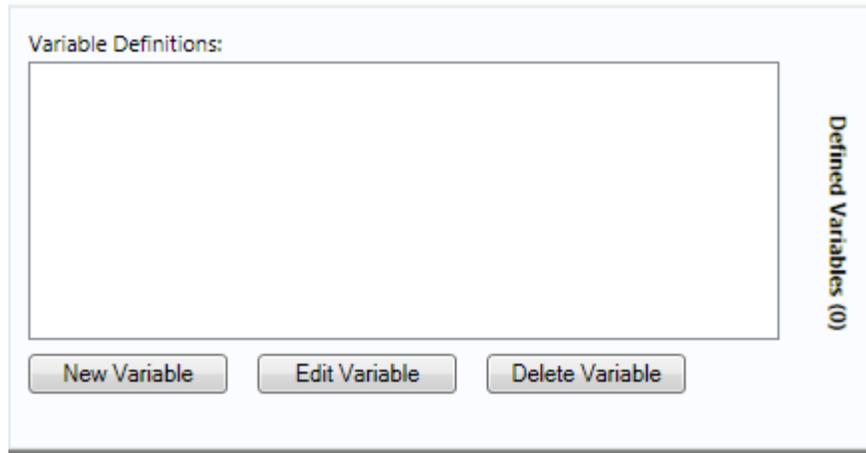


Figure 70

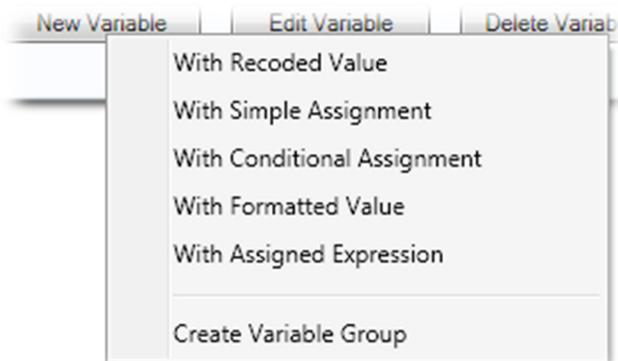


Figure 71

Add Variable with Simple Assignment

Assign field:
Age2

Assignment type:
Difference in years

Start date:
DOB

End date:
05/05/2012

Description of assignment type:
Variable type: Numeric

Finds the difference in years between two dates. Only complete years are assigned. If the actual difference in years is 7.8, the assigned value will be a 7. The starting date should be the the earlier of the two dates, otherwise negative values will be assigned.

OK Cancel

Figure 72

Using the Means Gadget

The Means gadget can be used to obtain an average for a continuous variable. The MEANS command has two formats:

- ❖ If only one variable is supplied, the program produces descriptive statistics.
- ❖ If two variables are supplied, the first variable is numeric and contains the data to be analyzed. The second variable indicates how groups will be distinguished. The output of this format contains descriptive statistics of the numeric variable for each value of the group variable.

Follow the steps below to show descriptive statistics for the Age2 variable you created in the previous exercise:

1. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Means** from the context menu. The means gadget appears.
3. Select **Age2** in the **Means** drop-down list. The summary statistics for Age are displayed as shown in Figure 73.



The screenshot shows a 'Means' gadget window with a table of summary statistics for the variable 'Age2'. The table has 12 columns: Obs, Total, Mean, Var, Std Dev, Min, 25%, Median, 75%, Max, and Mode. The values for Age2 are: Obs: 309, Total: 10251, Mean: 33.1748, Var: 131.7356, Std Dev: 11.4776, Min: 3.0000, 25%: 24.0000, Median: 31.0000, 75%: 39.0000, Max: 66.0000, and Mode: 22.0000. The gadget also includes a title bar with the word 'Means' and several control icons (dropdown, settings, menu, up arrow, close).

	Obs	Total	Mean	Var	Std Dev	Min	25%	Median	75%	Max	Mode
Age2	309	10251	33.1748	131.7356	11.4776	3.0000	24.0000	31.0000	39.0000	66.0000	22.0000

Figure 73

- ❖ **Var:** Represents variance; a measure of the dispersion shown by a set of observations.
- ❖ **Std Dev:** Represents standard deviation; a statistical summary of how dispersed the values of a variable are around its mean.

To determine the average age of those who were and weren't ill, you need to compute the means of age by ill. You will use a cross tabulation variable to compute statistics showing the likelihood that the means of the groups are equal.

1. Click the gear icon  to show the **Means Properties** panel.
2. Click **Advanced options**. The Advanced options panel displays.
3. Select **Ill** from the **Cross tabulate by** drop-down list.
4. Click **Run**. The means output is re-generated with the cross tabulated output. ANOVA statistics are displayed (Figure 74).



Figure 74

- Notice the ANOVA F-Statistic of 8.4567, with P-Value 0.0039. This is a highly-significant p-value, strongly suggesting that the hypothesis of equal ages across Ill categories is an incorrect hypothesis.

- Because Ill has exactly two possible values, T-Test statistics are also produced. The p-values 0.0039 and 0.0040 suggest rejecting the hypothesis of equal ages, whether or not the two groups can be assumed to have equal variances.
- Bartlett's Test tests the assumption of equal variances and with $p = 0.9940$, accepts this assumption.
- If the distribution of the Age2 variable cannot be assumed to be normal, the Wilcoxon Test might be used to compare the two groups. In this example, the Wilcoxon Test also rejects the hypothesis of equivalent ages.

You will now use the Means gadget with a stratification field to group your data by gender.

1. Click the gear icon  to show the **Means Properties** panel.
2. Click **Advanced options** (if not already shown). The Advanced options panel displays.
3. Select **Gender** from the **Stratify by** drop-down list.
4. Click **Run**. The means output is re-generated with the stratified and cross tabulated output. ANOVA statistics are displayed.

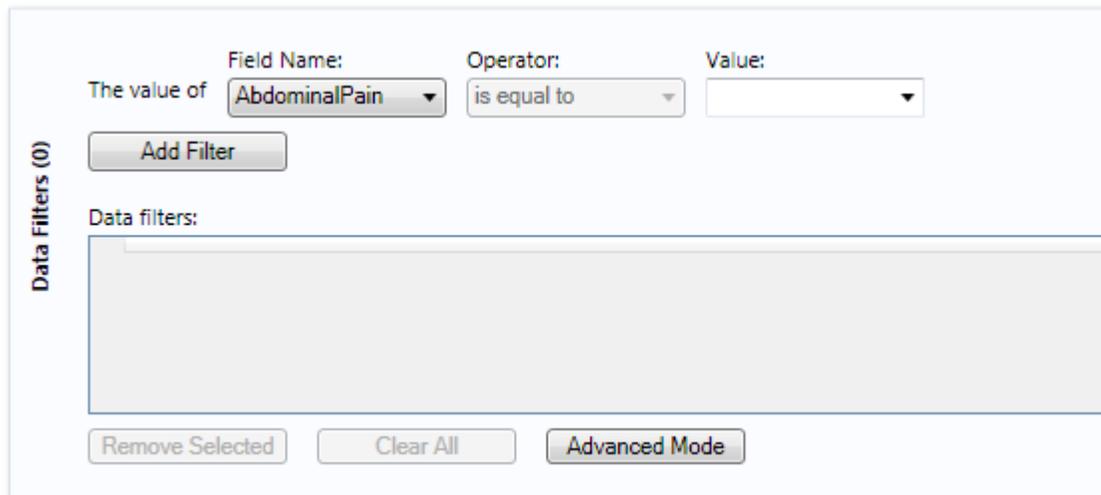
Using Data Filters

You can use the data filter slide-out gadget to specify criteria for data to be included in Dashboard output. Think about the various ways you could divide your data into groups using this feature. From the current data, you could select based on Age, Gender, Zip Code, or any combination of variables, in addition to illness information.

Once you make a selection, it affects *all* the gadgets that are on the canvas. The record counter on the Dashboard's header will always show you the current number of records based on the current filter conditions.

Process only male records in the *Salmonella* data set by following the steps below:

1. Move the mouse over the **Data Filters** box on the right edge of the canvas. The **Data Filters** slide-out gadget appears as shown in Figure 75.
2. Select **Gender** from the **Field Name** drop-down list.
3. Select **is equal to** from the **Operator** drop-down list.
4. Select **Male** from the **Value** drop-down list.
5. Click the **Add Filter** button to add this condition to the list of data filters as shown in Figure 76. The condition appears in the **Data filters** grid view as shown in Figure 77, the record count on the header changes to show 173 records, and the output for all gadgets changes to show only males.



The screenshot shows the 'Data Filters' gadget interface. At the top, it displays 'The value of' followed by three dropdown menus: 'Field Name' (set to 'AbdominalPain'), 'Operator' (set to 'is equal to'), and 'Value' (empty). Below these is an 'Add Filter' button. Underneath is a section labeled 'Data filters:' with a large, empty rectangular area for displaying filter conditions. At the bottom, there are three buttons: 'Remove Selected', 'Clear All', and 'Advanced Mode'.

Figure 75

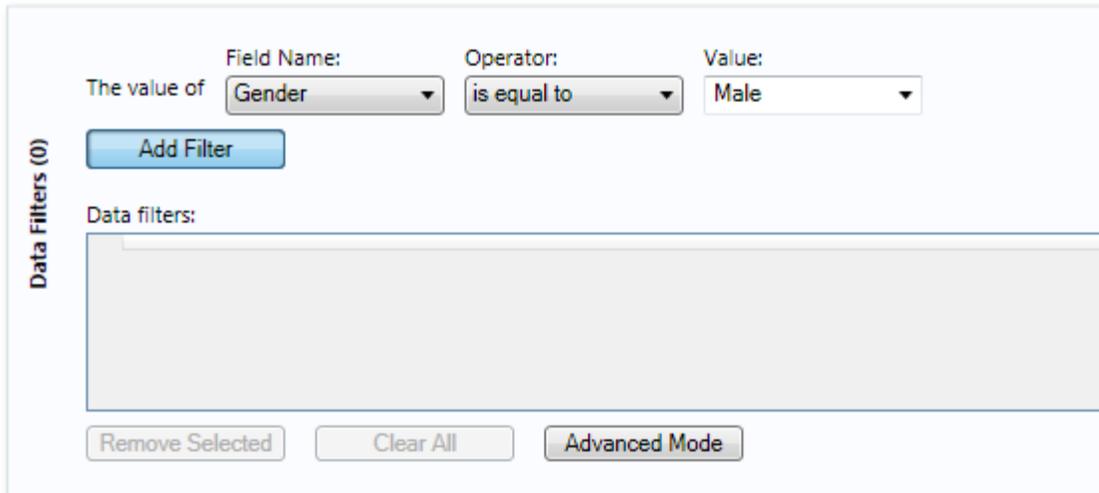


Figure 76

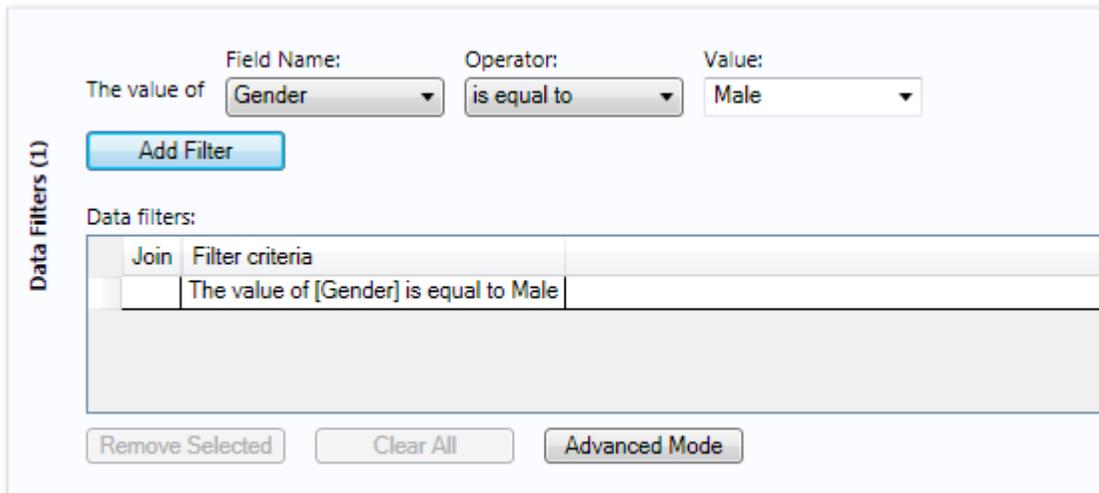


Figure 77

More conditions can be added to filter. Follow the steps below to add a second condition:

1. Move the mouse over the **Data Filters** box on the right edge of the canvas. The **Data Filters** slide-out gadget appears.
2. Select **Ill** from the **Field Name** drop-down list.
3. Select **is equal to** from the **Operator** drop-down list.
4. Select **Yes** from the **Value** drop-down list.
5. Click the **Add Filter** button to add this condition to the list of data filters. A context menu appears asking how this new condition should be joined to the one already present.
6. Select **AND** from the menu as shown in Figure 78. The condition appears in the **Data filters** grid view, the record count on the header changes to show 109 records, and the output for all gadgets changes to show only records that are both ill and male.

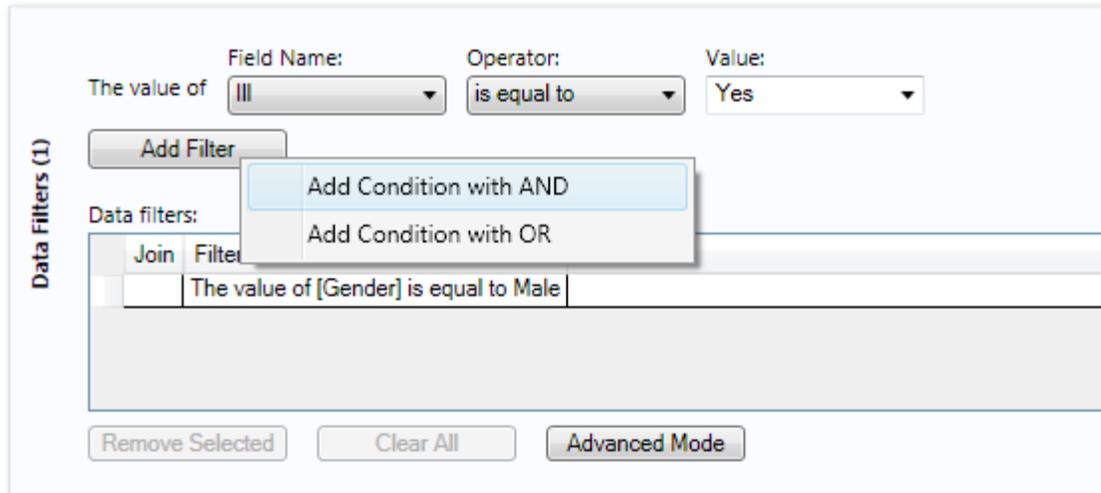


Figure 78

The data filter can be removed at any time. To clear both of the conditions that make up the filter, follow the steps below:

1. Move the mouse over the **Data Filters** box on the right edge of the canvas. The **Data Filters** slide-out gadget appears.
2. Click the **Clear All** button. Both of the conditions are removed, the record count on the header changes to show the original count, and the output is updated for all gadgets on the canvas.

NOTE: You can also incorporate filters at the gadget level. This would only implement the filter into the information presented in the individual gadget. To filter at the gadget level, simply click on the Set gadget filter icon  located on the top right hand corner of the gadget. The interface to incorporate the filter is the same as the one shown above.

Student Practice 1

See if you can find the answers to the following questions. Steps by step instructions and answers are available in the Appendix section of the manual.

1. What racial category (RACE) has the highest frequency in this data set?
2. Does the answer for #1 still hold true when the groups are separated into males and females?
3. How many people drank water (WATER) and ate their meal at 2:00 pm (ATEAT2)?
4. What is the average age of people in this data set by case outcome (OUTCOME) and gender (GENDER)?
- 5.

Creating MxN Tables

You will use the MxN / 2x2 gadget to examine the relationship between two or more categorical values. You want to see if there might be a connection between each person's relationship with the company (employee, relative of employee or friend of employee) and illness.

Follow the steps below to create an MxN table.

1. Ensure all filters have been cleared and that you are working with the full set of 150 records.
2. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
3. Select **Add Analysis Gadget > MxN / 2x2** from the context menu. The Cross tabulation (MxN / 2x2) gadget appears.
4. Select **AttendeeType** in the **Exposure** drop-down list.
5. Select **Ill** in the **Outcome** drop-down list.
6. Click the **Run** Button. The cross tabulation of AttendeeType by Ill appears in Figure 79.
7. Click the gear icon to remove the **Crosstabulation Properties** panel, if needed.

Crosstabulation (MxN, 2x2)

		Ill		
		Yes	No	TOTAL
AttendeeType	Company employee	132 60.00 % 68.75 %	88 40.00 % 75.21 %	220 100.00 % 71.20 %
	Friend of employee	4 44.44 % 2.08 %	5 55.56 % 4.27 %	9 100.00 % 2.91 %
	Related to employee	50 69.44 % 26.04 %	22 30.56 % 18.80 %	72 100.00 % 23.30 %
	Vendor or service worker	6 75.00 % 3.13 %	2 25.00 % 1.71 %	8 100.00 % 2.59 %
	TOTAL	192 62.14 % 100.00 %	117 37.86 % 100.00 %	309 100.00 % 100.00 %

Chi-square	df	Probability
3.8212	3	0.2814

Figure 79

You can stratify the MxN output if needed. Follow the steps below to stratify the output by gender.

1. Click the gear icon  to show the **Crosstabulation Properties** panel.
2. Click **Advanced options**. The Advanced options panel displays.
3. Select **Gender** in the **Stratify by** list box.
4. Click the **Run** button. The stratified cross tabulation appears.

Creating 2x2 Tables

For 2x2 tables, the MxN/2x2 gadget produces odds ratios and risk ratios. You want to determine if a correlation exists between eating certain foods and becoming ill.

1. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > MxN / 2x2** from the context menu. The Cross tabulation (MxN / 2x2) gadget appears.
3. Select **PBJ** in the **Exposure** drop-down list.
4. Select **Ill** in the **Outcome** drop-down list.
5. Click the **Run** button. 2x2 output as shown in Figure 80.



Figure 80

All statistics associated with the table above suggest that PBJ consumption is not associated with illness: The odds and risk ratios are close to 1 and the associated confidence intervals contain 1; and the p-values associated with the chi-squared and exact tests are well above the 0.05 significance threshold.

You could keep creating 2x2 tables for each food item on the form and then compare the odds ratios and risk ratios gadget-by-gadget. Thankfully, Epi Info™ 7 has a much quicker way of generating a series of 2x2 results. Recall that the foods consumed at the picnic were all contained in a group field called **Group_PicnicFoodsEaten**. Follow the steps below to run the 2x2 statistics over the entire group.

1. Click the gear icon  to show the **Crosstabulation Properties** panel.
2. Select **Group_PicnicFoodsEaten** in the **Exposure** drop-down list. Because it is a group field, it will appear at the bottom of the list of fields.
3. Click the **Run** button. The grouped cross tabulation appears with a relative risk chart at the top of the output as shown in Figure 81.

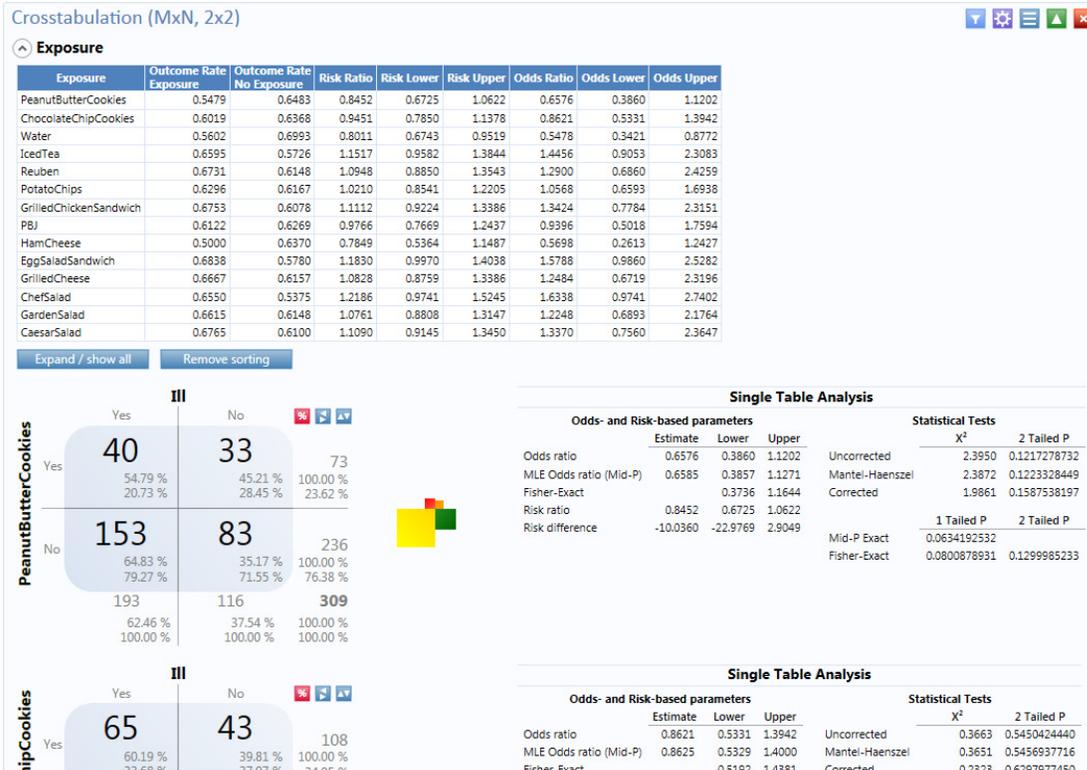


Figure 81

The default grouped output will show one 2x2 table for each row in the chart. You can click on an individual row in the chart to show *only* the corresponding 2x2 table; all of the other 2x2 tables will disappear. To do this, follow the steps below:

1. Left-click on the row titled **PotatoChips**. All of the 2x2 tables except the one for PotatoChips by Ill disappear.
2. Click on the **Expand / show all** button to show all of the 2x2 tables.

The chart can also be sorted by clicking on column headers. To sort by the Risk Ratio, follow the steps below:

1. Left-click on the **Risk Ratio** column header. The chart is sorted by the risk ratio.
2. Click on the **Remove sorting** button to stop sorting by risk ratio.

Additional MxN / 2x2 properties

The following options are available in the MxN / 2x2 properties panel as shown in Figure 82.

Figure 82

- ❖ **Exposure:** The exposure field.
- ❖ **Outcome:** The outcome (cross tabulation) field.
- ❖ **Weight:** The field to use as the weight variable, for example if aggregate data is being analyzed.
- ❖ **Stratify by:** The fields to use for stratifying the output.
- ❖ **Display all list values:** Only applicable when the exposure and/or outcome variables are a drop-down list field in an Epi Info™ 7 project. When selected, the output will show all of the drop-down list values even if they have a count of zero.
- ❖ **Display list labels:** Only applicable when the exposure and/or outcome variable is a Comment Legal field or Option Field in an Epi Info™ 7 project. When selected, the output will show the value and the label for Comment Legal fields and the label for Option fields.
- ❖ **Include missing values:** If selected, missing values are included in the output.
- ❖ **Outcome is continuous:** If the outcome variable is numeric, this option will fill in any missing integer values. This option is mutually exclusive with the “include missing” option.
- ❖ **Show strata summary only:** If stratification is chosen and 2x2 tables are generated, setting this option will show just the stratification summary.
- ❖ **Row / column percentages:** Determines whether to show the row and column percentages in the output.

- ❖ **Smart 2x2 table:** If selected, the 2x2 table attempts to place what it assumes is the 'positive' value into the first position. If cleared, it will sort the values alphabetically.
- ❖ **Horizontal 2x2 summary:** Displays statistical results either horizontally or vertically.
- ❖ **Show strata summary only:** If stratification is chosen and 2x2 tables are generated, setting this option will show just the stratification summary.
- ❖ **Max column name length:** Use to limit the size of very long column headings.
- ❖ **Conditionally cell shading:** Incorporates gradient color shading based on cell numbers.
- ❖ **Break type:** Percent of total or counts for conditional cell shading feature.

Counting Checkboxes in a Group

What if you want to find out how many food items each person consumed? You would first need to count the number of selected checkboxes in the **Picnic Foods Eaten** group for each record. You would then need to place the sum into another field on the form. That field could then be used to calculate the mean and median number of foods eaten using the Means gadget.

You could have set up a counting mechanism in Check Code so that the sum was computed as data were entered. Because data entry has finished, you can instead use the Dashboard's data management features to quickly calculate the sum. Follow the steps below to find the number of selected checkboxes in the Picnic Foods Eaten group.

1. Move the mouse over the **Defined Variables** box on the left edge of the canvas. The **Defined Variables** slide-out gadget appears as shown in Figure 70.
2. Click **New Variable**. A list of variable options appears as shown in Figure 71.
3. Select **Simple Assignment** from the list of variable options. The **Add variable with simple assignment** dialog opens.
4. Type "NumFoodsEaten" into the **Assign field** text box.
5. Select **Count the number of checked checkboxes in a group** from the **Assign type** drop-down list.
6. Select **Group_PicnicFoodsEaten** from the **Group field** drop-down list. The dialog should now appear as shown in Figure 83.
7. Click **OK**. The variable is created and appears in the **Defined Variables** slide-out gadget.

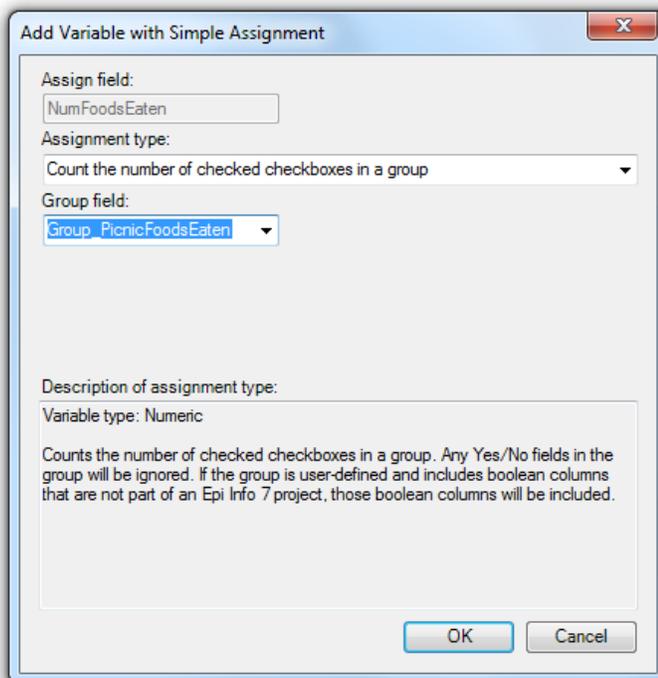


Figure 83

To see what the new variable contains, create a new line list gadget following the steps below:

1. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Line list** from the context menu. The line list gadget appears.
3. Use **CTRL+Left Click** to multi-select the following fields:
 - a. NumFoodsEaten
 - b. Group_FoodsEaten
4. Click the **Generate Line List** button. The line list is displayed as shown in Figure 84.



Line	GrilledChickenSandwich	ChefSalad	PotatoChips	IcedTea	Water	Reuben	EggSaladSandwich	HamCheese	PBJ	GrilledCheese	CaesarSalad	GardenSalad	PeanutButterCookies	ChocolateChipCookies	NumFoodsEaten
1	No	No	Yes	Yes	No	Yes	No	No	No	No	No	Yes	No	Yes	5
2	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No	No	4
3	No	Yes	Yes	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	6
4	No	No	Yes	No	Yes	Yes	No	No	Yes	No	No	No	No	No	4
5	No	Yes	No	No	Yes	No	No	No	No	Yes	No	No	Yes	No	4
6	No	No	Yes	Yes	No	No	Yes	No	No	No	No	Yes	No	Yes	5
7	No	No	No	Yes	No	Yes	No	No	No	No	No	No	Yes	No	3
8	No	No	Yes	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	5
9	Yes	No	No	No	Yes	No	No	No	No	No	No	No	Yes	No	3
10	No	Yes	Yes	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	6
11	No	No	Yes	No	Yes	No	No	No	No	Yes	No	Yes	No	Yes	5
12	No	Yes	Yes	No	Yes	No	Yes	No	No	No	No	No	Yes	Yes	5
13	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	Yes	3
14	Yes	No	No	Yes	No	No	No	No	No	No	Yes	No	Yes	No	4
15	Yes	No	Yes	Yes	No	No	No	No	No	No	No	Yes	No	No	4

Figure 84

The 'Yes' values for each row were added up and are now represented by the value in the NumFoodsEaten column.

Creating Charts Using the Chart Gadget

You will use the Charts gadget to create graphical representations of your data. You can create the following chart types:

- ❖ Column
- ❖ Line
- ❖ Area
- ❖ Pie
- ❖ Aberration detection
- ❖ Pareto
- ❖ Scatter
- ❖ Epi curve chart

Epi curve

To show an epi curve on the date of onset, follow the steps below:

1. Right-click a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Charts > Epi curve chart** from the context menu. The Epi curve chart window appears.
3. Select **OnsetDate** in the **Main Variable:** drop-down list.
4. Click the **Run** button. The epi curve is displayed as shown in Figure 85.

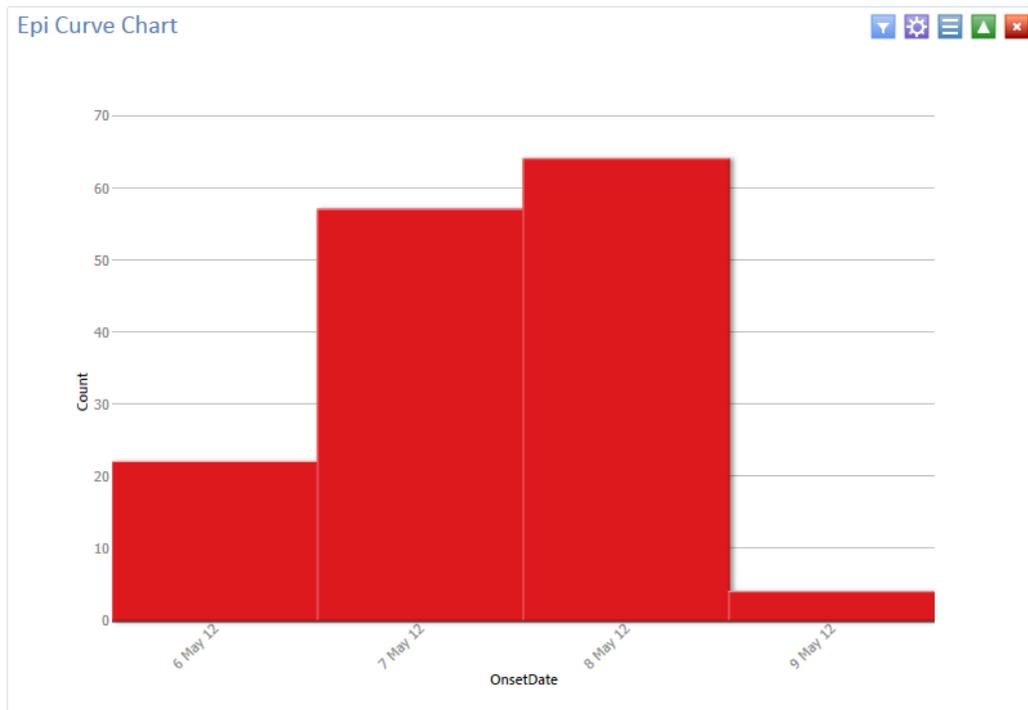


Figure 85

The epi curve can also be stratified, or “stacked”, by selecting a case status variable. Create a stacked epi curve by following the steps below.

1. Click the gear icon to open the chart properties for the epi curve.
2. Click on **Advanced Options**.
3. Click on **Status** in the **Stratify by:** list of fields.
4. Click on **Display Options**.
5. Select the **Show Legend** option under the **Legend** settings.
6. Under the **Labels > Y-axis label:** settings, replace *Count* with *Total Cases*
7. Under the **Labels > X-axis label:** settings, select **Custom** from the drop down list.
8. Under the **Labels > X-axis label:** setting, type *Date of Onset*.
9. Under the **Labels > Chart title:** setting, type *Epi Curve by Case Status*.
10. Click the **Run** button. The epi curve is displayed as shown in Figure 86.

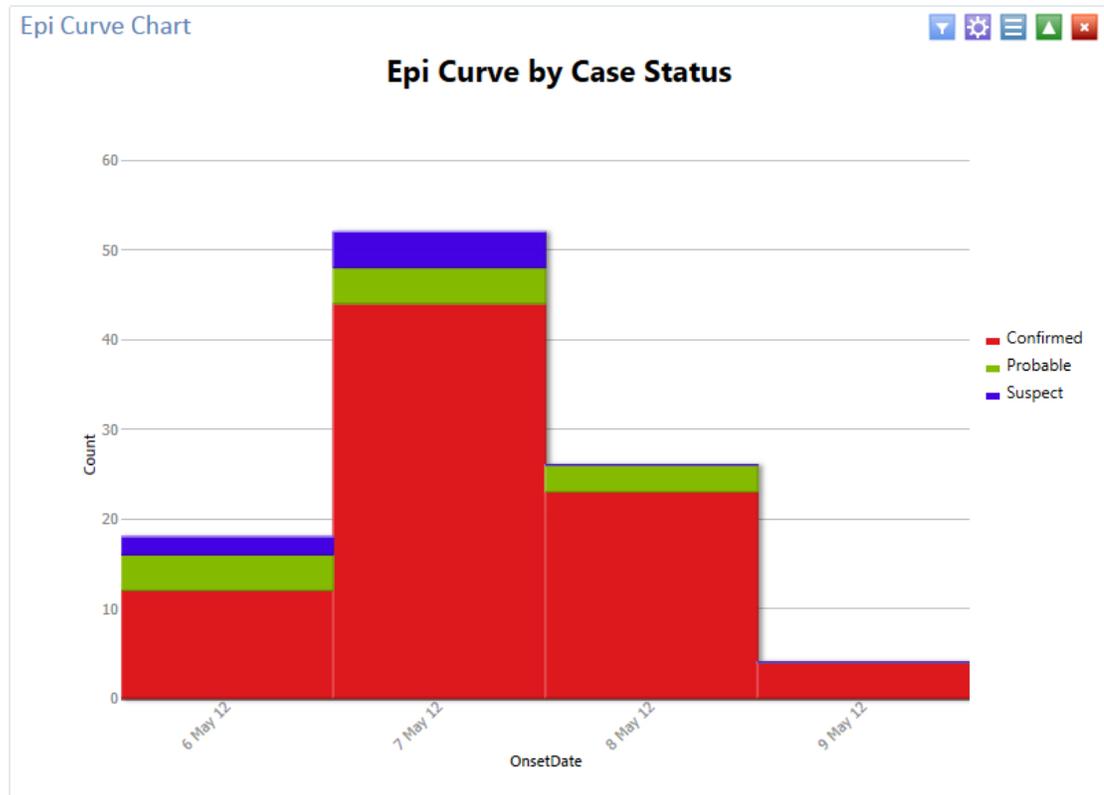


Figure 86

Column chart

To display a column chart of race categories, follow the steps below:

1. Right-click a blank portion of the Dashboard canvas. A context menu appears.

2. Select **Add Analysis Gadget > Charts> Column chart** from the context menu. The Column chart window appears.
3. Select **Race** in the **Main Variable:** drop-down list.
4. Click on **Display options**.
5. Type **-45** in the **X-axis angle** setting
6. Select **Different bar colors** in the **Colors and styles** setting
7. Under the **Labels > Y-axis label:** settings, type *Total Cases*
8. Under the **Labels > Chart title** setting, type *Cases by Race*
9. Click the **Run** button. The chart is displayed as shown in Figure 87.

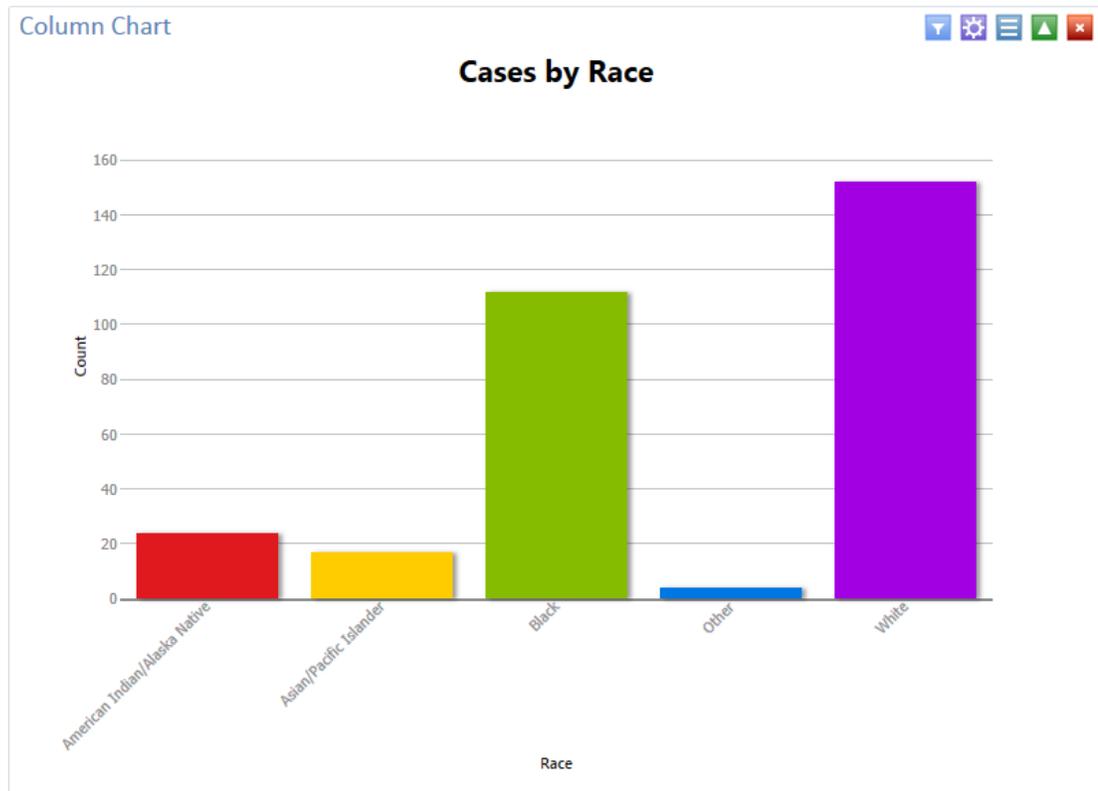


Figure 87

Pie chart

To display a pie chart of case statuses, follow the steps below:

1. Right-click a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Charts> Pie chart** from the context menu. The Pie chart window appears.
3. Select **Status** in the **Main Variable:** drop-down list.
4. Click the **Run** button. The chart is displayed as shown in Figure 87.

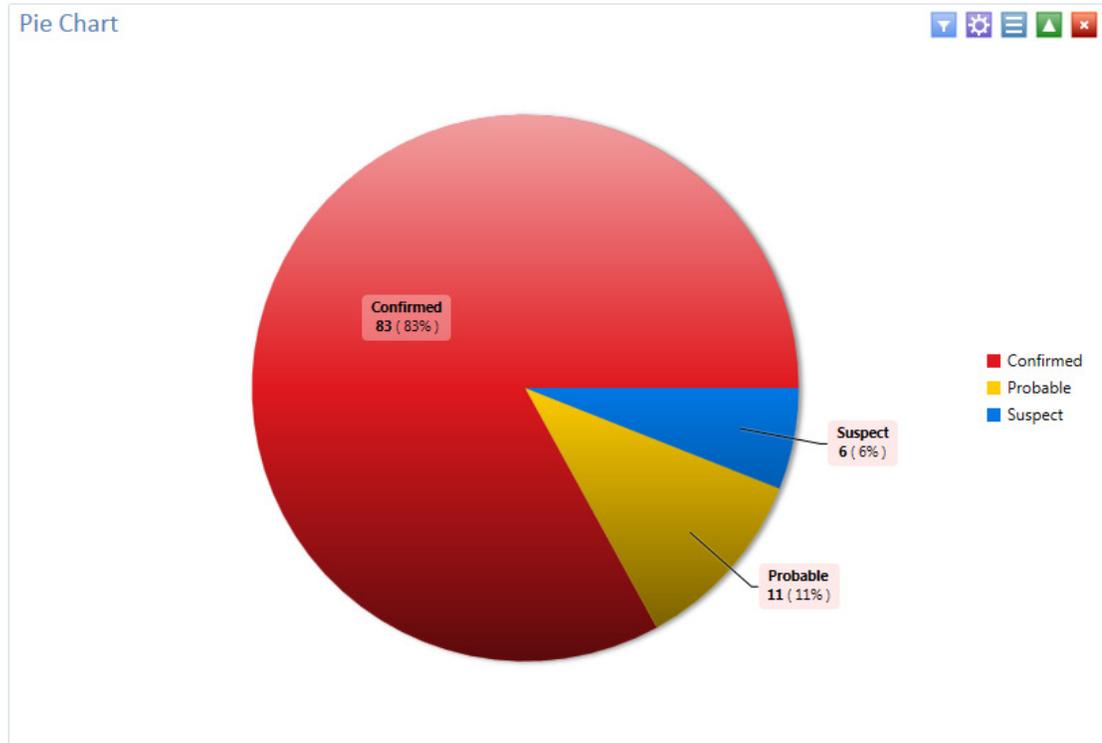


Figure 88

Stacked Column chart

A few exercises ago you created a field called **NumFoodsEaten**. This field contains the total number of selected checkboxes in the **PicnicFoodsEaten** group box on Page 3 of the form. Follow the steps below to show a stacked column chart using this field.

1. Right-click a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Charts > Column chart** from the context menu. The Column chart window appears.
3. Select **NumFoodsEaten** in the **Main Variable:** drop-down list.
4. Click on **Advanced Options**.
5. Click on **III** in the **Stratify by:** list of fields.
6. Click on **Display Options**.
7. Select **Stacked** from the **Composition:** setting
8. Select the **Show Legend** option under the **Legend** settings.
9. Click the **Run** button. The chart is displayed as shown in Figure 89.

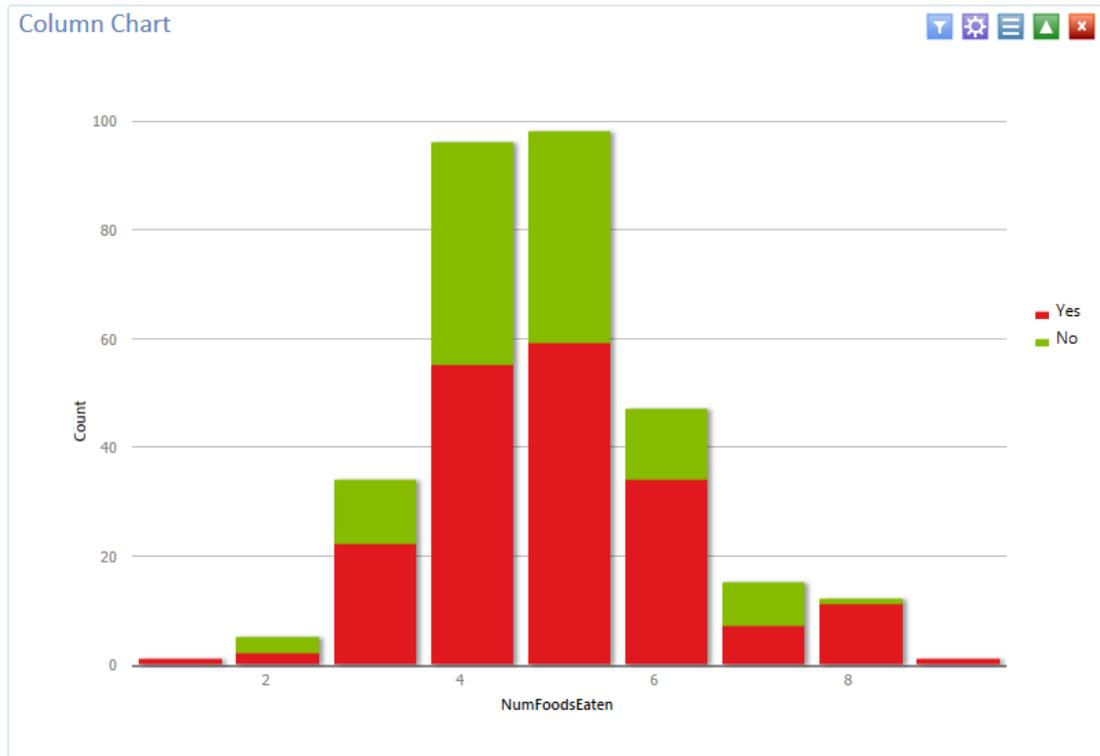


Figure 89

The stacked column is displaying the raw counts, but annotations for each of the values can be inserted into the columns. To show the actual count for each value on the x-axis, follow the steps below:

1. Click on the Configuration panel icon.
2. Select **Show annotations** from the **Colors and styles:** setting
3. Click the **Run** button. The stacked column is displayed as shown in Figure 90.

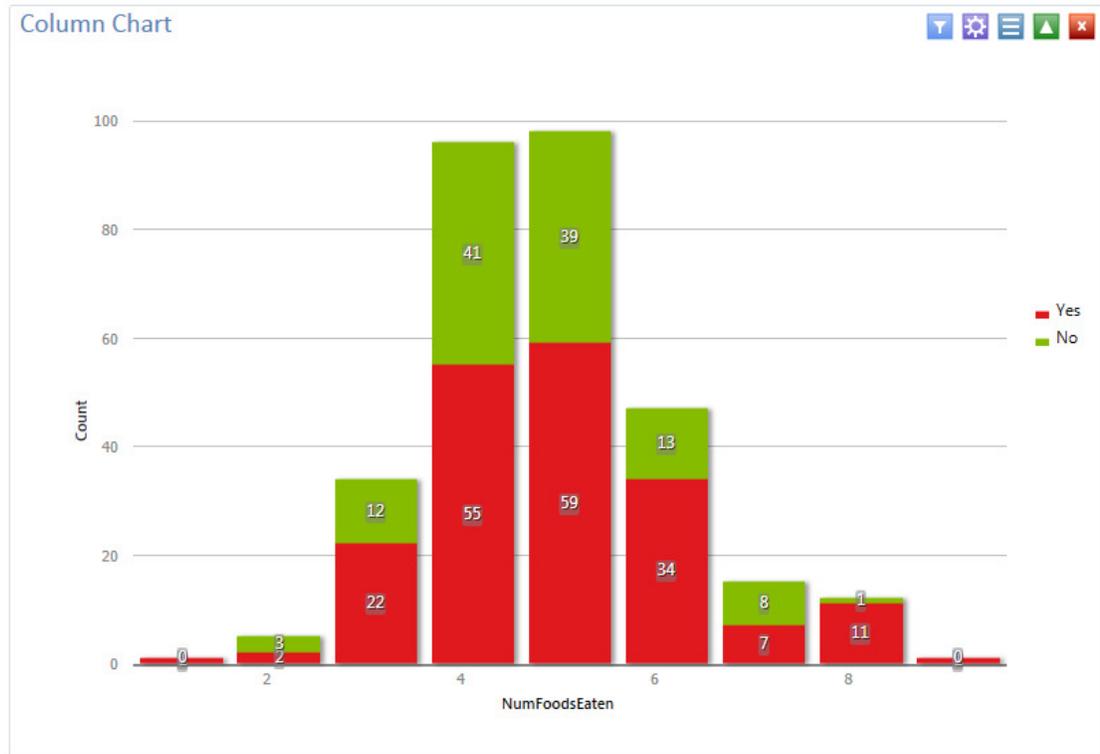


Figure 90

Chart titles and axis labels

You can add a chart title and label the x and y axes. Create a new column chart to experiment with the formatting options by following the steps below.

1. Click a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Add Analysis Gadget > Charts > Column chart** from the context menu.
3. Select **AttendeeType** in the **Main variable** drop-down list.
4. Click on **Display options**.
5. In the **Labels** section, type *Attendee Types* into the **Chart title:** box.
6. In the **Labels** section, type *Salmonella Outbreak* into the **Chart subtitle:** box.
7. In the **Labels** section, type *Total Cases* into the **Y-Axis Label** box.
8. In the **Colors and styles** section, select Deep for the **Color palette:** parameter
9. Click the **Run** button. The column chart is displayed as shown in Figure 90

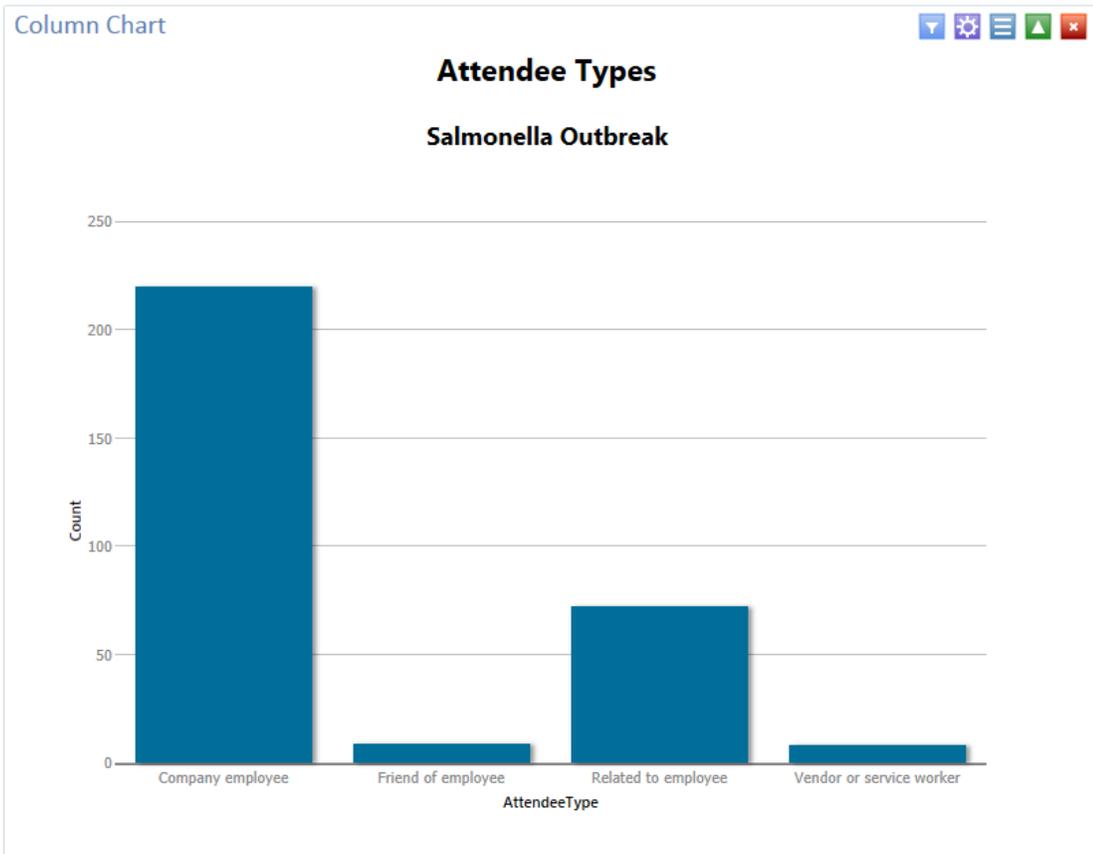


Figure 91

Recoding Data

Creating age groups

You might wish to recode your data from one format to another. Consider the age variable you created earlier in this lesson. Using the Means gadget, you were able to find the mean, median, mode, minimum and maximum values. If you generate a frequency of age, however, the output you see wouldn't be very meaningful; see Figure 92 to get an idea of how this would look. You would likely prefer a breakdown of age by some kind of age categories as shown in Figure 93.

Age2	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper	
3	1	0.67 %	0.67 %	0.02 %	3.66 %	
6	1	0.67 %	1.33 %	0.02 %	3.66 %	
10	1	0.67 %	2.00 %	0.02 %	3.66 %	
13	1	0.67 %	2.67 %	0.02 %	3.66 %	
19	1	0.67 %	3.33 %	0.02 %	3.66 %	
22	14	9.33 %	12.67 %	5.20 %	15.16 %	■
23	6	4.00 %	16.67 %	1.48 %	8.50 %	■
24	13	8.67 %	25.33 %	4.70 %	14.36 %	■
25	6	4.00 %	29.33 %	1.48 %	8.50 %	■
26	7	4.67 %	34.00 %	1.90 %	9.38 %	■

Figure 92

AgeGroup	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper	
0 - <10	4	1.29 %	1.29 %	0.42 %	3.51 %	
10 - <20	7	2.27 %	3.56 %	1.00 %	4.81 %	
20 - <30	117	37.86 %	41.42 %	32.48 %	43.55 %	■
30 - <40	105	33.98 %	75.40 %	28.77 %	39.60 %	■
40 - <50	35	11.33 %	86.73 %	8.12 %	15.53 %	■
50 - <60	35	11.33 %	98.06 %	8.12 %	15.53 %	■
60 - <65	4	1.29 %	99.35 %	0.42 %	3.51 %	
65 - < HIVALUE	2	0.65 %	100.00 %	0.11 %	2.58 %	
TOTAL	309	100.00 %	100.00 %			■

Figure 93

To recode the Age2 variable you created earlier into age categories, as shown in Figure 93, follow the steps below.

1. Move the mouse over the **Defined Variables** box on the left edge of the canvas. The **Defined Variables** slide-out gadget appears.
2. Click **New Variable**. A list of variable options appears.

3. Select **With Recoded Value** from the list of variable options. The **Add recoded variable** dialog opens.
4. Select **Age2** from the **Source field** drop-down list.
5. Type “AgeGroup” into the **Destination field** box.

Note: The **source** field in the Recode dialog is asking for the field that contains the values *to be recoded*. The **destination field** will contain the recoded values.

6. Click the **Fill Ranges** button. The **Fill Ranges** dialog opens.
7. Type 0 into the **Start value** box.
8. Type 65 into the **End value** box.
9. Type 10 into the **By** box. The Fill Ranges dialog should appear as shown in Figure 94.
10. Click **OK**. The Fill Ranges dialog closes and the ranges are populated into the Recode dialog as shown in Figure 95.
11. Click **OK**. The variable is created and appears in the **Defined Variables** slide-out gadget.

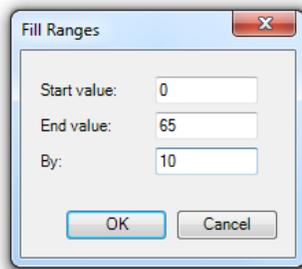


Figure 94

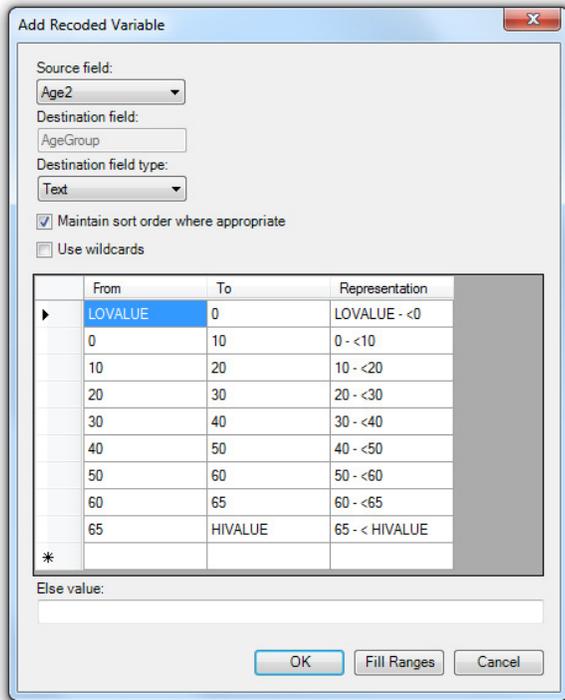


Figure 95

You can now use the **AgeGroup** field in other gadgets, as shown in Figure 96.

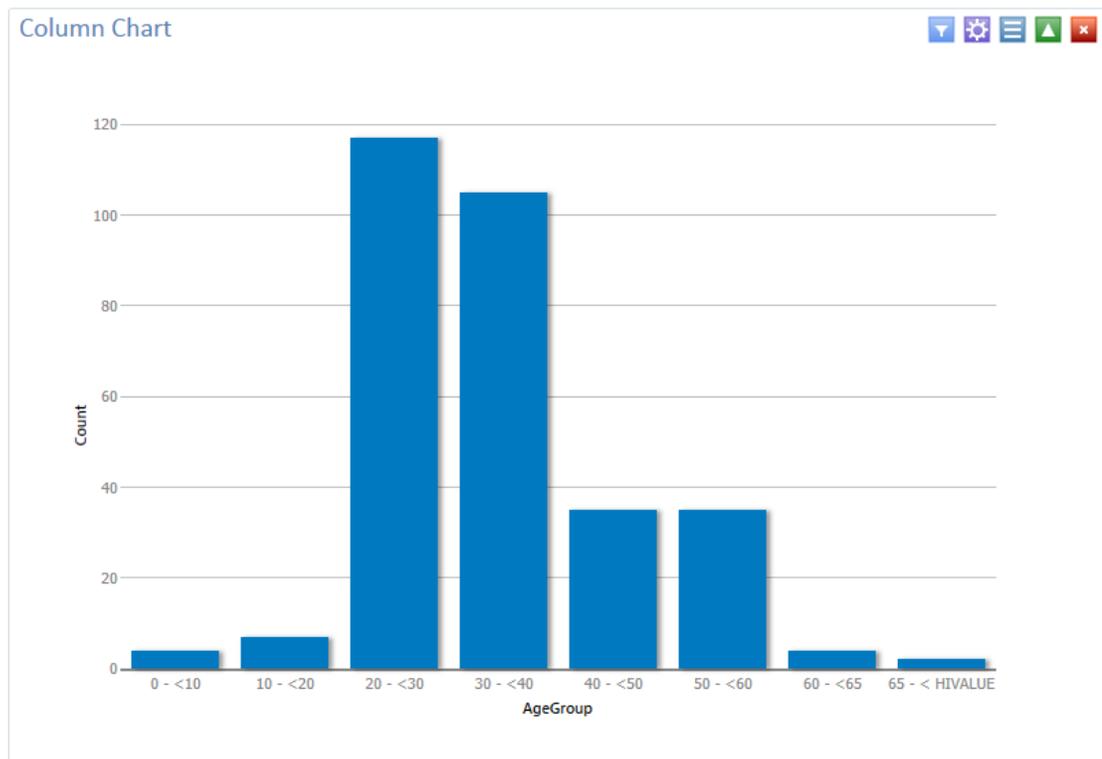


Figure 96

Important: Take care to note the values contained in the **From** and **To** columns in Figure 95. The **From** column contains the lower value and is *inclusive*. The **To** column contains the upper value and is *exclusive*. Hence, the label for the 2nd row in Figure 95 reads, “Zero to less than 10” meaning zero is included in the range for that row, but 10 is not.

Creating a dichotomous variable

In the prior example, you converted a continuous variable (Age) into a categorical variable (AgeGroup). If you want to use a recoded value in a 2x2 table, recoding the data into categories might not be sufficient. Instead, you can recode data into a dichotomous (or “Boolean”) variable that stores either a true or a false and is better suited for use in 2x2 tables.

You will now create a new variable called “IsAdult” that stores a “true” if the age is greater than or equal to 18 or a “false” if the age is 17 or less. Follow the steps below to complete this task.

1. Move the mouse over the **Defined Variables** box on the left edge of the canvas. The **Defined Variables** slide-out gadget appears as shown in Figure 70.
2. Click **New Variable**. A list of variable options appears.
3. Select **With Recoded Value** from the list of variable options. The **Add recoded variable** dialog opens.
4. Select **Age2** from the **Source field** drop-down list.

5. Type "IsAdult" into the **Destination field** box.
6. Select **Yes/No** in the **Destination field type** drop-down list. The **Yes/No** type will specify that you wish the destination field to contain only true and false values.
7. Type *18* into the **From** column on the first row.
8. Type *HIVALUE* into the **To** column on the first row.

Note: Recall from the previous lesson that the **To** column is exclusive, meaning that the range you created in steps 7 and 8 would read, "Zero to *less than 18*."

9. Type 0 into the **From** column on the second row.
10. Type *18* into the **To** column on the last row. The dialog should appear as shown in Figure 97.

Note: The **HIVALUE** keyword represents the maximum possible integer value.

11. Click **OK**. The variable is created and appears in the **Defined Variables** slide-out gadget.

You have just recoded a continuous variable into a dichotomous variable. The resulting variable is now perfectly suited for use in a 2x2 table.

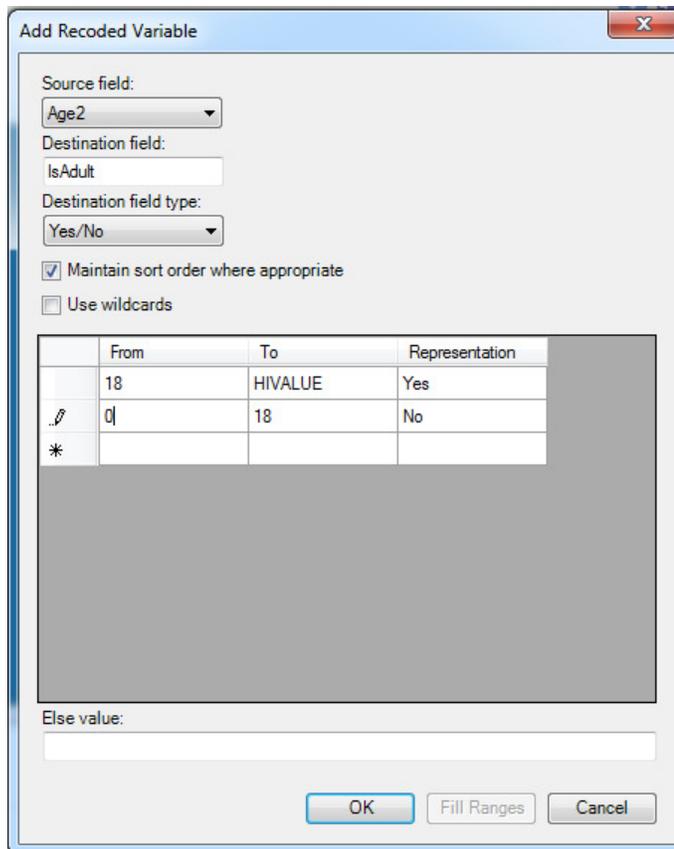


Figure 97

There is an important benefit in using the **Yes/No** field type (see step 6, above) when the desired result is a dichotomous variable. Consider what would have occurred if you had recoded **Age** to **IsAdult** using the **Text** field type instead of **Yes/No**. You could have still specified “Yes” and “No” as the Representations for each category, but when generating statistics, you would see the “No” appear before the “Yes”. This occurs because *text data are generally sorted alphabetically*.

However, Epi Info™ 7 is smart enough to always show the positive value first for fields with the **Yes/No** type. When a frequency of IsAdult is displayed, observe how the “Yes” shows up at the top as expected (Figure 98).

IsAdult	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper	
Yes	301	97.41 %	97.41 %	94.77 %	98.79 %	
No	8	2.59 %	100.00 %	1.21 %	5.23 %	
TOTAL	309	100.00 %	100.00 %			

Figure 98

Combining Variables

Earlier, you learned how to use the Combined Frequency gadget to treat a group of variables as if they were a single variable. However, you might want to combine variables together in such a way that you can use them in other gadgets. Assume that you want to create a new variable that stores a “true” if the record is a male and is over the age of 50, and a “false” otherwise, with the intention of using it in a 2x2 table.

With the current variables in the data set, you cannot easily carry out this type of analysis. Furthermore, using the recoding capabilities would only allow you to recode one variable; it can’t combine two variables together.

The solution is to use the **Conditional Assignment** option. The Conditional Assignment allows you to specify that a variable be assigned a value only when a specific condition is met. (It is quite similar to how the **If Command** works that was covered in Lesson 2.) To create a conditional assignment, follow the steps below.

1. Move the mouse over the **Defined Variables** box on the left edge of the canvas. The **Defined Variables** slide-out gadget appears.
2. Click **New Variable**. A list of variable options appears.
3. Select **With Conditional Assignment** from the list of variable options. The **Add variable with conditional assignment** dialog opens.
4. Type *IsMaleOver50* into the **Assign field** box.
5. Select **Yes/No** from the **Assign field type** drop-down list.
6. Click the **Create/Edit Condition** button. The **Specify assign condition** dialog appears. (This dialog operates in the same way as the Data Filter slide-out gadget.)
7. Select **Gender** in the **Field Name** drop-down list.
8. Select **is equal to** in the **Operator** drop-down list.
9. Select *Male* in the **Value** drop-down list.
10. Click **Add condition**. The condition is added to the **Conditions** grid view.
11. Select **Age** in the **Field Name** drop-down list.
12. Select **is greater than** in the **Operator** drop-down list.
13. Type *50* in the **Value** drop-down list.
14. Click **Add condition**. A context menu appears asking how you would like to add this new condition to the one already present.
15. Select **Add condition with AND**. The condition is added to the **Conditions** grid view. The **Specify assign condition** dialog should now appear as shown in Figure 99.
16. Click **OK**. The Specify assign condition dialog closes and the **Assign condition** box in the Conditional Assign dialog has changed to show the condition you created.
17. Select **Yes** in the **Assign value** drop-down list.
18. Check the **Use Else** checkbox.
19. Select **No** in the **Else value** drop-down list. The Conditional Assign dialog should now appear as shown in Figure 100.

20. Click **OK**. The variable is created and appears in the **Defined Variables** slide-out gadget.

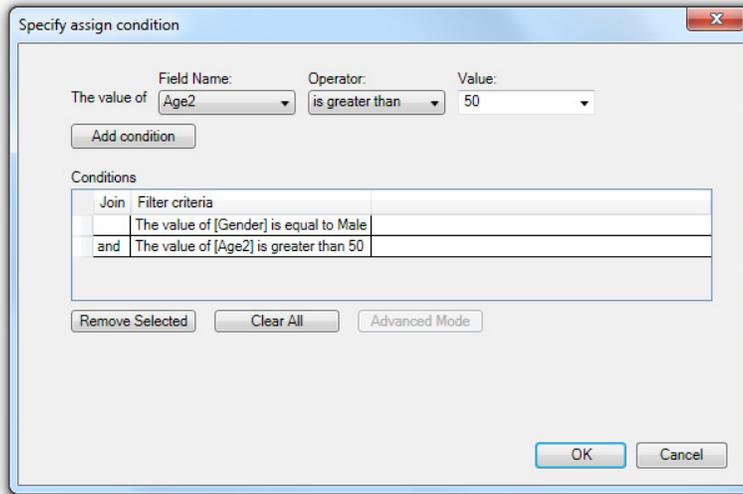


Figure 99

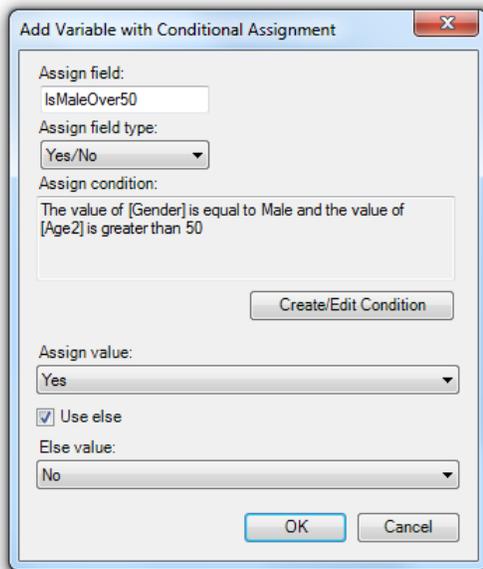


Figure 100

Figure 101 shows a frequency of the **IsMaleOver50** variable.

IsMaleOver50	Frequency	Percent	Cum. Percent	95% CI Lower	95% CI Upper
Yes	21	6.80 %	6.80 %	4.36 %	10.36 %
No	288	93.20 %	100.00 %	89.64 %	95.64 %
TOTAL	309	100.00 %	100.00 %		

Figure 101

Student Practice 2

You've been shown how to display data using gadgets, filter records based on one or more conditions, and manipulate data by creating new variables. Your main objective is to identify the source of this outbreak. Previously, when 2x2 tables were performed on the food items, you noticed that there were multiple food items with OR > 1. Perhaps you need to investigate the ingredients used to prepare the food items. A common ingredient might have been the cause of the outbreak.

Here is a list of the different ingredients that were used to prepare the different items:

- Chef salad- Iceberg lettuce, ham, turkey, egg, cheddar cheese, tomato, carrots, Italian dressing
- Peanut butter and Jelly sandwich- Grape jelly, Jif peanut butter, wheat bread
- Reuben sandwich- Rye bread, corned beef, sauerkraut, Thousand Island Dressing, Swiss cheese
- Grilled Cheese- Cheddar cheese, Provolone, wheat bread
- Egg Salad Sandwich- egg, mayonnaise, relish, white bread
- Ham and Cheese Sandwich- Ham, Provolone, mayonnaise, wheat bread
- Chicken Sandwich- Grilled chicken, honey mustard, lettuce, tomato, wheat bun
- Peanut butter cookies-peanut butter cookie dough
- Chocolate chip cookies- chocolate chip cookie dough
- Water
- Iced tea-water and tea bags
- Potato chips- Kettle chips

In the Visual Dashboard, you can create new variables using Conditional Assignments in order to group food items consumed during the picnic to a specific ingredient. Perform 2x2 tables with these new variables to continue your analysis. Try using the Combining Variables example shown above to create variables for each of the ingredients you consider can be the possible source for the outbreak.

NOTE: Steps to steps instructions for creating this new variable are shown in Student Practice 2 - Lesson 4 of the Appendix.

Saving your Work

You created numerous gadgets, data filters, and variables to aid your investigation. With them, you have produced statistical results that hopefully point to the source of the outbreak. You need to show this information to your supervisors in the health department, which means providing it to them in a format they can open quickly. Keep in mind they might not have Epi Info™ 7 on their computers.

Saving the output as an HTML document

One way to save your work is to convert all of the output to HTML. HTML files can be opened on any computer with a web browser and are easy to print. To save your output to an HTML file, follow the steps below.

1. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Save output as HTML** from the context menu. A **Save As** dialog opens.
3. Type *TrainingOutput* in the **File Name** box.
4. Click **Save**. The file is created and momentarily appears in the computer's default web browser.

Saving the output as an Excel spreadsheet

You can also save the output to an Excel spreadsheet instead of an HTML file (Excel must be installed on the computer for this option to be available). To the output to Excel, follow the steps below.

1. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Send output to > Microsoft Excel** from the context menu. The output appears in Excel momentarily.

Note: Any charts you created in the Dashboard will not appear in the Excel spreadsheet.

Saving the Dashboard canvas

Saving the output to HTML might be useful, but *you cannot use the HTML output to re-create all of your gadgets, filters, and variables*. The HTML output is just a static snapshot of what the Dashboard happened to look like at a particular point in time. If you wanted to see these same results next week, after another 50 cases had been interviewed, how would you do that (without re-doing all of the steps one-by-one)?

Saving the *canvas* allows you to save the gadgets, screen layout, data filters, and any defined variables. A canvas file can be opened over and over again in the Dashboard. Each time it is opened, it will re-connect to the database to get the most up-to-date data. You can thus avoid the manually re-creating the gadgets, filters, and variables each time you want to see the output.

To save your canvas, follow the steps below.

1. Click the **Save** button on the Dashboard header. A **Save As** dialog appears.
2. Type *TrainingCanvas* in the **File Name** box.
3. Click **Save**. The canvas is saved successfully.

To open your canvas at any time, follow the steps below.

1. Click the **Open** button on the Dashboard header. An **Open** panel appears as shown in Figure 102.
2. Click on the **TrainingCanvas.cvs7** item. The canvas opens.

If "TrainingCanvas.cvs7" does not appear in the list as shown in Figure 102, use the **Browse** button to look for it elsewhere on the computer.

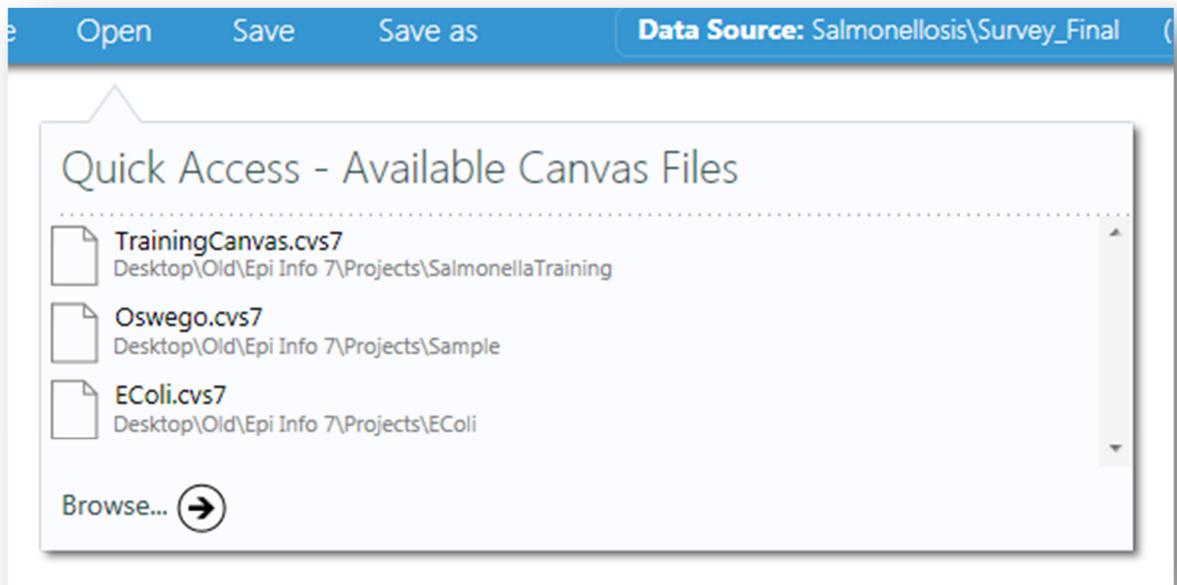


Figure 102

Note: Only canvas files that exist in one of the subfolders underneath the Epi Info™ 7 **Projects** folder will appear in the **Quick Access** list as shown in Figure 102.

Important: It is recommended that the canvas file remain in the same folder in which the data source resides. That is, if the Epi Info™ 7 project is in C:\Temp, then the Epi Info™ 7 canvas file that connects to that project should also be in C:\Temp. Keep this in mind when transferring your canvas files to other users.

The exception is if the canvas is connecting directly to a Microsoft SQL server database; in this case, the canvas file can be placed anywhere.

Saving (Exporting) the data

You might wish to convert the raw data you've been working with to some other format, such as a Microsoft Excel spreadsheet, for analysis in other software programs. Saving the data also allows you to save the contents of the variables you created earlier.

To export your data to an Excel spreadsheet, follow the steps below.

1. Click on a blank portion of the Dashboard canvas. A context menu appears.
2. Select **Export data** from the context menu. An **Export** dialog opens as shown in Figure 103.
3. Select **Microsoft Excel 97-2003 Workbook (.xls)** from the **Output format** drop-down list.
4. Click the ... (ellipsis) button next to the **Connection information** box. An **Open existing data** dialog opens.
5. Click the ... (ellipsis) button next to the **Location** box. A file dialog opens.
6. Navigate to the desktop.
7. Type *TrainingData* into the **File Name** box.
8. Click **Open**.
9. Click **OK**.
10. Type *SurveyData* in the **Destination table** box. (The destination table will become the name of the spreadsheet that is created inside of the Excel workbook.) The **Export** dialog should appear as shown in Figure 105.
11. Click **Export**. The export process completes.
12. Click **Close** to close the **Export** dialog.

Note: In order to open the Excel workbook that was created on your desktop, you may have to close the Dashboard first.

If you open the Excel document on your desktop, you will see the variables you created earlier as part of the data set. Exporting the data is therefore one way of saving any defined variables to disk so that they can be used by other software programs.

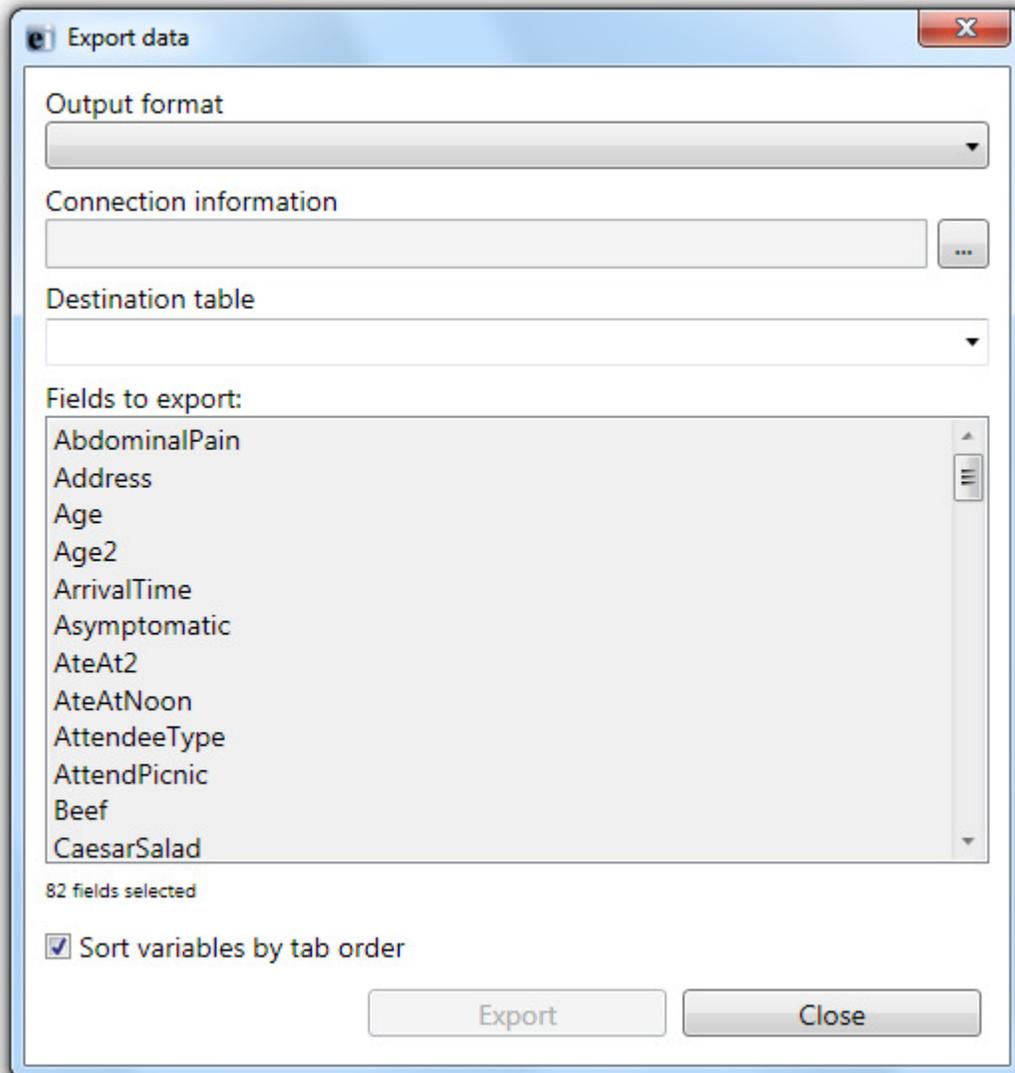


Figure 103

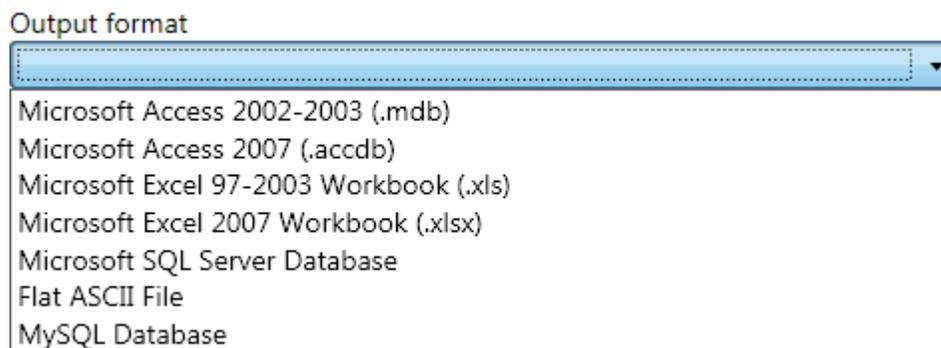


Figure 104

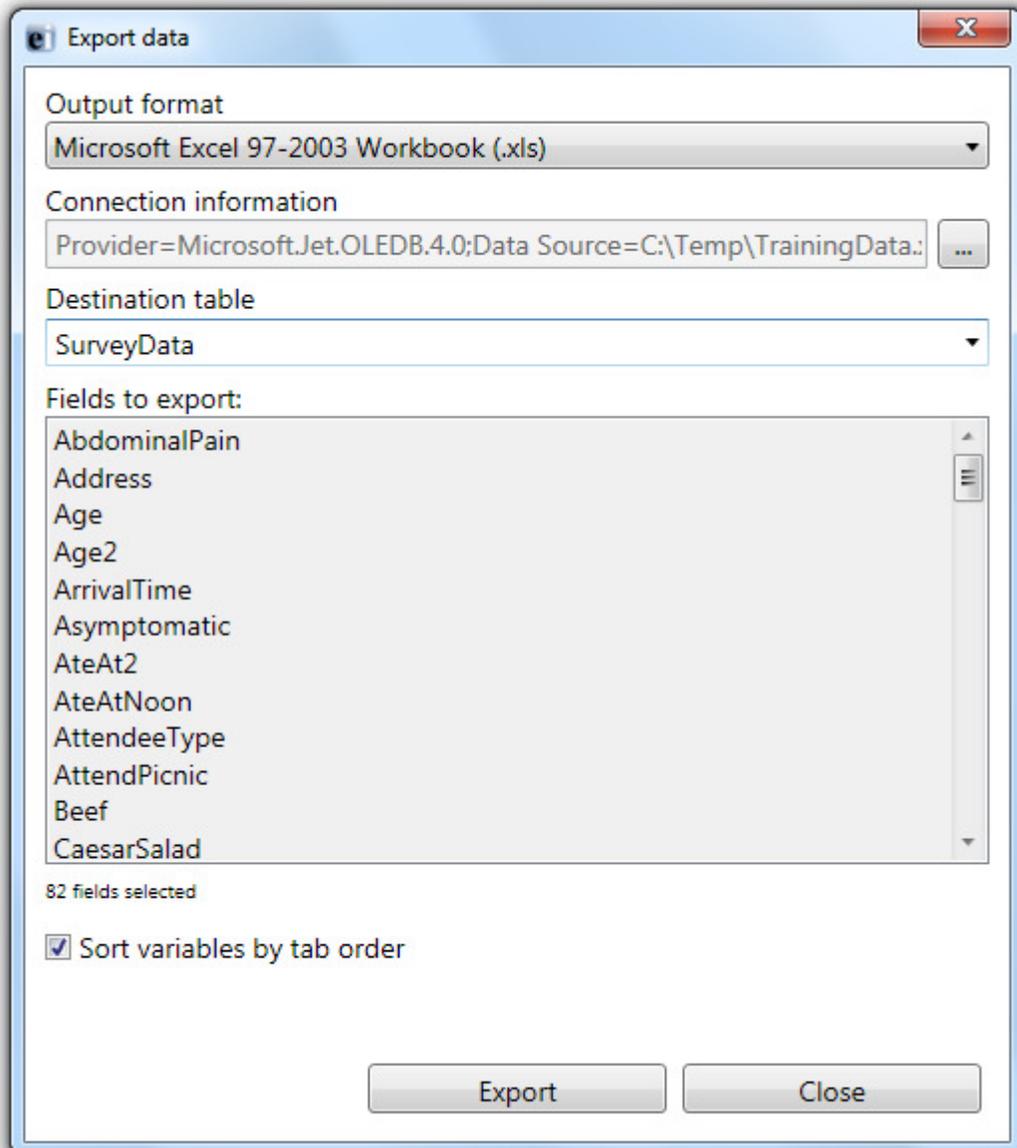


Figure 105

Scenario Conclusion

After investigating the outbreak, epidemiologists have concluded that eggs were the source of exposure. When the team did an inspection of the restaurant kitchen, they noted that the eggs were not stored at the proper temperature and they were not cooked thoroughly. People who ate the egg salad sandwich and the chef salad were more likely to be infected with Salmonella enteritidis since they ate the eggs.

Best Practices Using the Dashboard

Make good use of space

The Dashboard's canvas can quickly become cluttered with gadgets overlapping each other if you're not careful. Make good use of the available vertical space to arrange gadgets logically. Consider using the zoom in/out feature on the bottom right corner of the Dashboard window to see more output at once.

When recoding a variable to two values, use the Yes/No field type

Consider using the Yes/No field type when recoding data into dichotomous values. Doing so ensures that the positive value appears first when generating output. Using the Text field type still allows you to specify "Yes" and "No" as the recoded values, but the "No" might appear first because Text data typically are sorted alphabetically.

When saving the canvas, place it in the same folder as the data source

Placing the canvas in the same folder as the data source ensures that the canvas will be able to reliably connect to the data source no matter which computer it is transferred to.

When saving the canvas, place it in a subfolder underneath Epi Info 7/Projects

Placing the canvas somewhere underneath the Epi Info 7/Projects folder ensures the canvas will appear in the Dashboard's **Quick Access List** of canvas files.

Summary

During this lesson, you were introduced to the concept of creating electronic data entry forms using the Form Designer module of Epi Info™ 7. You can now:

- ❖ Use gadgets to show statistical output
- ❖ Create data filters
- ❖ Create new variables with recoded data
- ❖ Create new variables using conditional logic
- ❖ Save your output

Q&A

Q: Can I use epidemiological weeks in the epi curve chart?

A: Yes. To do this, you need to create a new variable with a **Formatted** value and select the **epi week** option. The variable will then be available when creating the epi curve chart. Note that the epi week variable type currently assumes Sunday is the first day of the week and might not be suitable for non-U.S. locales.

Q: Can I stratify the frequency gadget by more than one variable?

A: Not at this time. Only the MxN / 2x2 gadget can accept multiple stratification variables in this version of the software.

Q: Can I use another field on the form on the right-hand-side of the operator when creating a data filter?

A: Yes. However, you need to click the **Advanced Mode** button in the Data Filter slide-out gadget to do this. The Advanced Mode filter is beyond the scope of this tutorial.

Q: Can I read data sources other than Epi Info™ 7 projects into the Dashboard for analysis?

A: Yes. When setting the data source, notice that the Data Formats drop-down list contains choices for Microsoft Excel, Microsoft Access, Microsoft SQL Server databases, ASCII text files, and MySQL databases.

Q: Can I define my own group fields in the Dashboard so I can take advantage of grouped analysis when analyzing non-Epi Info™ 7 data sources?

A: Yes. When creating a new variable, use the **Create Variable Group** option.

Q: Can I create a new variable with a math expression? For example, I want to assign a variable the sum of five or six other variables.

A: Yes. You can compute the sum in two ways:

1. Create a new variable and use the **Assigned Expression** option. Type the expression directly into the Expression box as shown in Figure 106.
2. Create a group variable containing the variables you want to sum, and then use the **Simple Assignment** option with the **Find the sum of all numeric fields in a group** option as the **Assignment Type**.

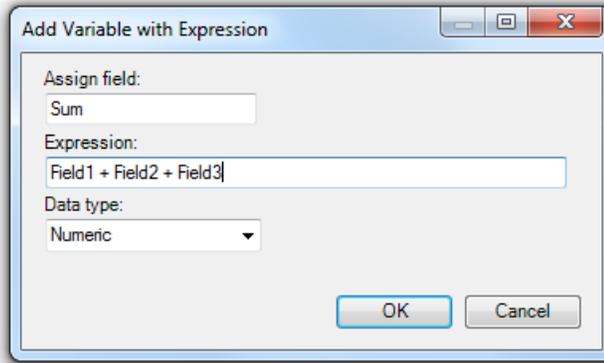


Figure 106

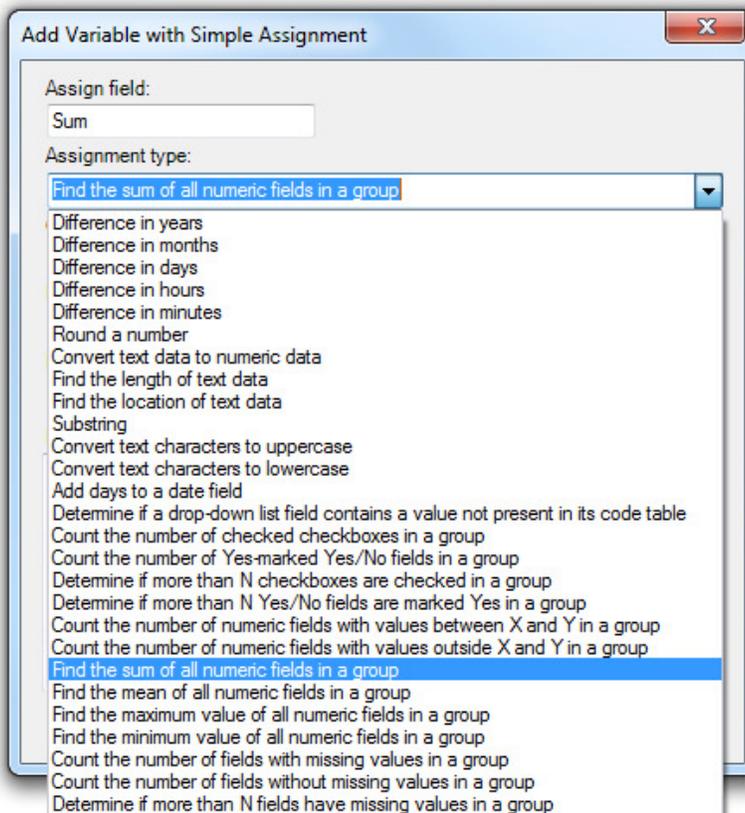


Figure 107

Quiz

The following questions will see how much you have learned about using the Dashboard.

Questions

1. Some gadgets will show results as soon as you select the necessary variables, while others will show results only when you click a button.
 - a. True
 - b. False
2. The Dashboard can open different types of data sources, including Excel spreadsheets and Access databases.
 - a. True
 - b. False
3. The current record count is always displayed on the bottom of the screen.
 - a. True
 - b. False
4. When stratifying output, you can collapse each stratification by clicking on the up arrow next to the strata's header.
 - a. True
 - b. False
5. Grouped analysis can only be done on Epi Info™ 7 projects, since non-Epi Info™ 7 data sources (such as Excel spreadsheets) do not have field groups.
 - a. True
 - b. False
6. The Frequency gadget will show you the minimum and maximum values for continuous data.
 - a. True
 - b. False
7. The output for most gadgets can be collapsed by clicking on the  icon for that gadget.
 - a. True
 - b. False
8. All variables you create are temporary; they are destroyed as soon as the Dashboard is closed.
 - a. True
 - b. False
9. The output for most gadgets can be sent to Microsoft Excel by right-clicking on the gadget's output and selecting the **Send data to Excel** option.
 - a. True
 - b. False
10. What type of defined variable could you use to easily turn continuous data (such as fever temperatures) into categorical data?
 - a. The conditionally-assigned variable type
 - b. The recoded variable type

- c. The simple assignment type
 - d. The assigned expression
11. What type of defined variable could you use to easily count the number of selected checkboxes within a group?
- a. The conditionally-assigned variable type
 - b. The recoded variable type
 - c. The simple assignment type
 - d. The assigned expression
12. What type of defined variable could you use to determine the incubation period of a particular illness?
- a. The conditionally-assigned variable type
 - b. The recoded variable type
 - c. The simple assignment type
 - d. The assigned expression
13. What type of defined variable could you use to combine two variables together?
- a. The conditionally-assigned variable type
 - b. The recoded variable type
 - c. The simple assignment type
 - d. The assigned expression
14. You created a new variable called “IncubationPeriod” and want to work with the data contained in this variable in an Excel spreadsheet. What method of saving the data would you use?
- a. Save the canvas file
 - b. Save the output as HTML
 - c. Send the output to Excel
 - d. Export the data to Excel
15. You have placed numerous gadgets on the Dashboard’s canvas and applied several data filters to generate statistical results. You plan on collecting 50 more records during the coming week and want to show the output using the updated data. What method would allow you to do this without having to re-create your gadgets and data filters?
- a. Save the canvas file
 - b. Save the output as HTML
 - c. Send the output to Excel
 - d. Export the data to Excel
16. You’ve created several frequencies and charts on the Dashboard and want to send the output to your supervisor. What is the best method of saving the output so it can be easily opened by the supervisor?
- a. Save the canvas file
 - b. Save the output as HTML
 - c. Send the output to Excel
 - d. Export the data to Excel

Answers

1. A
2. A
3. B. The record count is always displayed, but it appears at the **top** of the screen.
4. A
5. B. You can create your own groups in the Dashboard in order to take advantage of the grouped analysis features regardless of the data source.
6. B. Use the Means gadget to find the minimum and maximum values for continuous data.
7. A
8. A
9. A
10. B
11. C
12. C. You would use the simple assignment type with “difference in days” or “difference in hours.”
13. A
14. D. Choice A would save the variable to a canvas file so it could be re-created, but it won’t save the data, and the canvas file format can’t be opened in Excel. Choices B and C would save any output from gadgets on the canvas but wouldn’t save the underlying data in the variable.
15. A
16. B. Choice C would allow you save the output to Excel, but as noted earlier, charts in the Dashboard are not transferred to Excel. Thus, Choice B is the only option.

Representing Data with Maps

This lesson introduces you to the Epi Info™ 7 Map module.

For this lesson, data adapted from a survey used at a local health department in the state of New York to support an asthma initiative will be utilized. A paper survey was created and data were collected around schools in the county to investigate asthma incidence at local schools. Student's demographics, symptoms information and school activities information were captured in the survey.

In Lesson 5, you will use Epi Map to create a combination of maps to look for relationships between income and asthma, incorporating additional layers to the map to identify the locations of regional hospitals and schools.

This lesson covers the basic information needed to create maps, understand the Epi Map workspace, and the different options available to edit and customize maps.

Time to complete: 1 hour (Beginner)

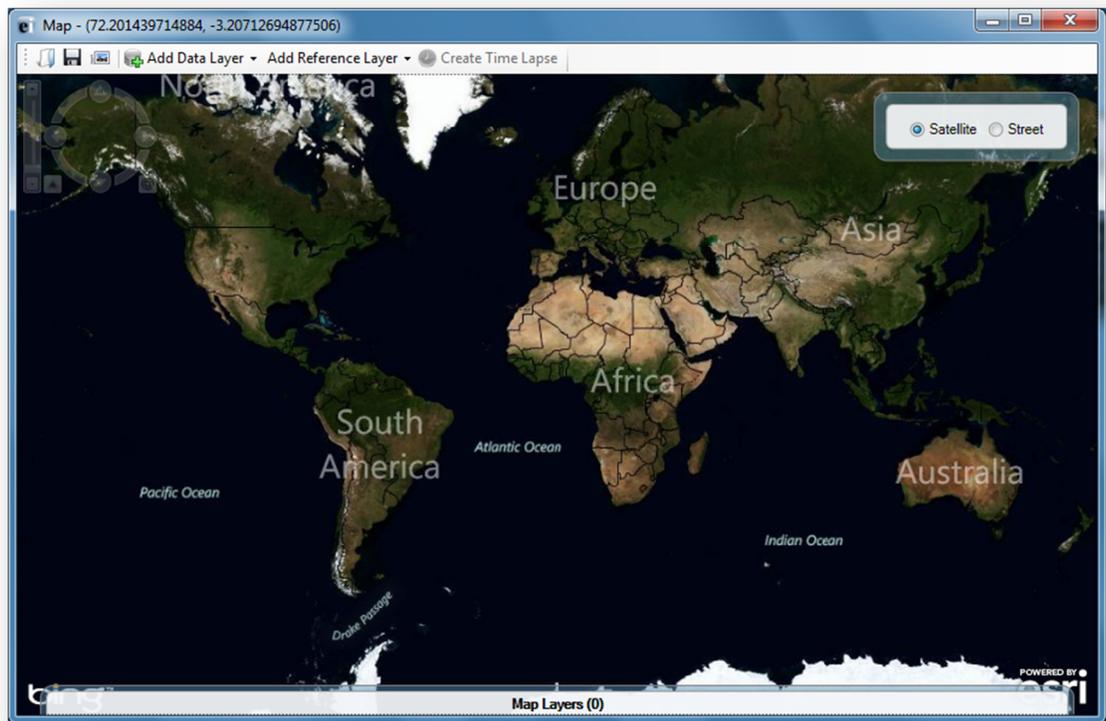
FIVE GOALS

1. Create a choropleth map of median income for the surveyed region.
2. Create a case cluster map that shows the correlation between income and asthma cases.
3. Incorporate additional layer to show the location of hospitals in the surveyed region.
4. Incorporate additional layer to show the location of schools in the surveyed region.
5. Create an image of the map to illustrate on a presentation.

The Epi Map Workspace

1. From the Epi Info 7™ main menu, click **Create Maps** or select **Tools>Create Maps** to open the Epi Map module.

Here's an example of the Epi Map workspace.



Navigating Epi Map

Most of the work in Epi Map requires map layers to be constructed with shapefiles and related data variables or latitude and longitude coordinates captured in a database. You will use the Add Data Layer functionality

to add, remove, or re-order layers. Once a map is displayed, you will be able to filter certain criteria, add additional data, add points, zones and labels to a map.

Maps can be saved as .MAP files that are editable and can be opened in Epi Map. Maps can also be saved as a portable network graphic (.png) file and used in presentations and in other programs.

Other features are also accessible through the Epi Map menu bar. The following options are available in the Epi Map menu.

Open a map file

Interactive maps created and saved in Epi Map can be opened using this menu option.

Save file as a map

This option allows users to save current map as an interactive map. Users will be able to open this file as many times as needed without having to select data sources and regenerate data layers. If the data source is updated, changes will be reflected in the map.

Save file as a graphic

This option allows users to save the map displayed in the current Epi Map session as a portable network graphic (.png) file.

Add data layer

Allows you to incorporate different types of data into one single map.

Add reference layer

Allows you to add a reference layer without any associated data needed.

Create time lapse

Based on a date field from your dataset, this feature allows you to plot points into your map using a motion effect to represent the order of occurrence based on the value of a date field.

Maps Types

The following maps can be generated using Epi Map.

Choropleth

Use to categorize features into equal ranges or counts (quantiles) that are color-coded to indicate changes in the data. In this lesson, you will create a choropleth map that illustrates income data for the region.

Case Cluster

Allows users to show different points based on levels of classification (e.g., male, female). In this lesson, you will create a case cluster map that shows the physical household locations of the children interviewed based on addresses captured for each household. You will also draw the locations of hospitals and schools based on latitude and longitude data.

Dot Density

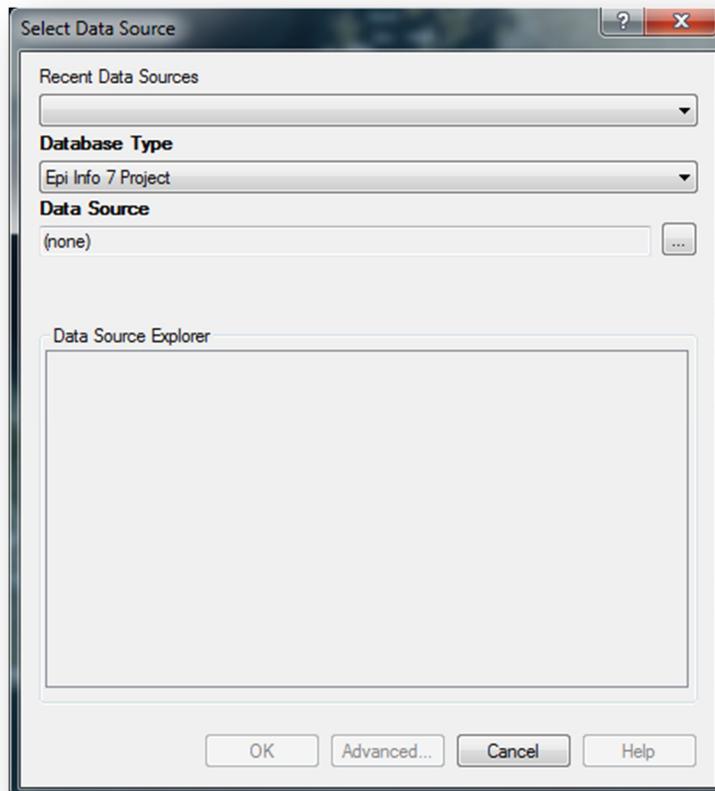
A map type that uses dots or points to show a comparative density of features over a map based on values stored in polygon layer attribute fields. Dot density is an effective method to visualize concentrations of quantitative data. In a dot density map, the dots are all the same size and do not represent actual point locations of data.

Creating a Choropleth Map

In this lesson, you will create and customize a choropleth map and save it as a .map7 interactive map file.

The schools in the survey cover a ZIP code region containing a variety of demographics. To determine whether you have more cases of asthma in certain income brackets, you will create a choropleth map of the regions using income data and then map cases of asthma from the school survey onto the map. This will help you determine if a link exists between income and asthma in the students from the survey. First, create the choropleth map and then plot the case-based data on to the map.

1. Open **Epi Map**.
2. Click the **Add Data Layer** menu option and select **Choropleth>With Shape File Boundaries**. The Select Data Source window opens.



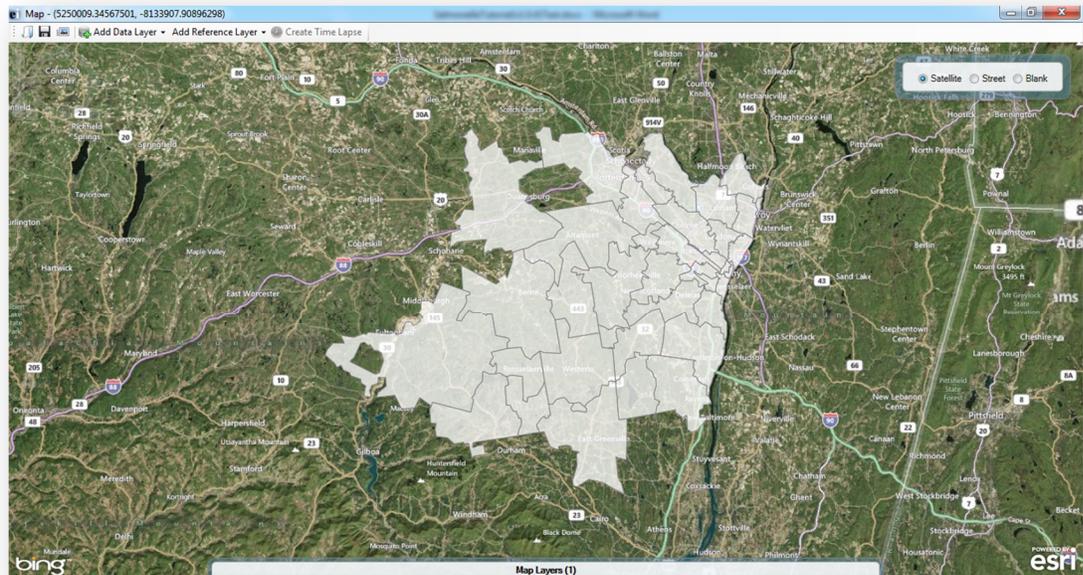
❖ Maps work using a series of layers. To start, you must add your region layer.

3. Select MS Access 200-2003 as the Database Type.
4. Locate the file **albany_demogz.mdb** in the **Epi Info 7/Resources/Training Projects/Community Health Assessment** folder.
5. Click **Open**. The Select Data Table From dialog box opens.

- ❖ The demographic project has two tables. One contains income data and the other race and ethnicity data. You want to create a choropleth map using the income data. The income table contains a series of zip codes and the median income and per capita income for those zip codes. The median income is the value of family income with 50% of families above the value and 50% of the families below the value. Per capita income is the total income for that zip code divided by the population.

6. Select **INCOME**.
7. Click **OK**.
8. Click on the **Browse Shape File** button.
9. Locate the file **ALBZCTA_region.shp** in the **Epi Info 7/Resources/Training Projects/Community Health Assessment** folder.
10. Click **OK**.
 - ❖ The map shape appears in the workspace and the layer appears in the Map Manager.

Note: Epi Info™ 7 can also generate maps using KML files. KML is a file format used to display geographic data in an Earth browser such as Google Earth, Google Maps, and Google Maps for mobile. KML uses a tag-based structure with nested elements and attributes and is based on the XML standard.

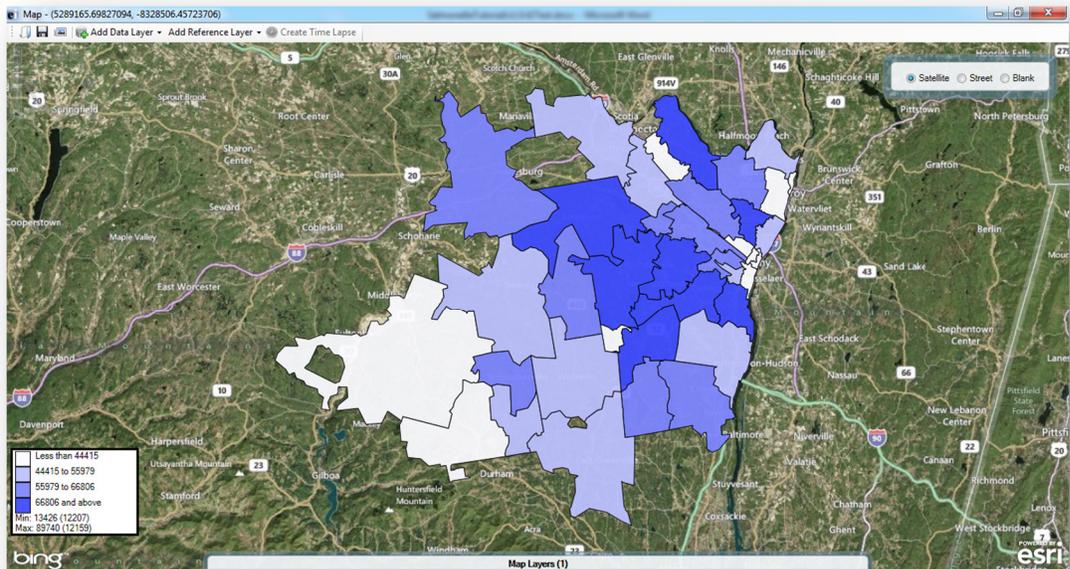


11. The Select Shape, Data and Value fields dialog box opens.



12. Keep the number of classes at **4**. The number of classes shows how many divisions or groups into which your data will be divided on the map.
13. From the Shape Key Field drop down list, select **Zip**.
 - ❖ This is the field inside the shape file that matches your data.
14. From the Data Key Field drop down list, select **ZIP**.
 - ❖ This is the field inside your data that matches the shape file.
15. From the Value Field drop down list, select **MEDIANFAMILY**.
 - ❖ This is the data field to be mapped.
 - ❖ **NOTE:** Information on zip code 12007 is not contained in the demographic project file.
16. The choropleth map appears. Notice the legend contains the color codes for the median family income per zip code. The darkest color represents the highest income range and the lightest color represents the lowest.

Your map should look like the following:



Changing Map Properties

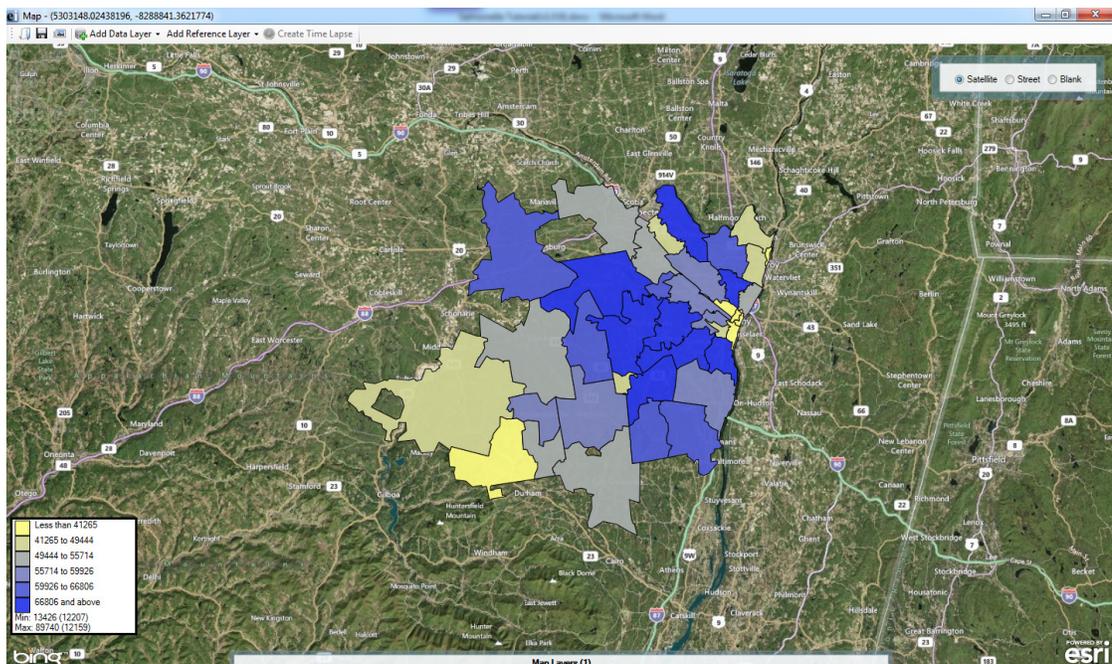
Notice that your legend contains a breakdown on information based on four divisions of data. To extend the ranges and further customize the map, you can complete the following.

1. To view the information on the current layer, place your cursor around the Map Layer slide-out gadget located in the bottom section of the screen.



2. To change the number of classes, select **6**. As mentioned before, the number of classes listed shows how many divisions or groups into which your data will be divided on the map.
3. The color legend on the bottom shows the lightest to darkest colors for the map codes and allows changing the colors on the map. Use the color dialog box to change colors inside the map. Experiment with the different colors.

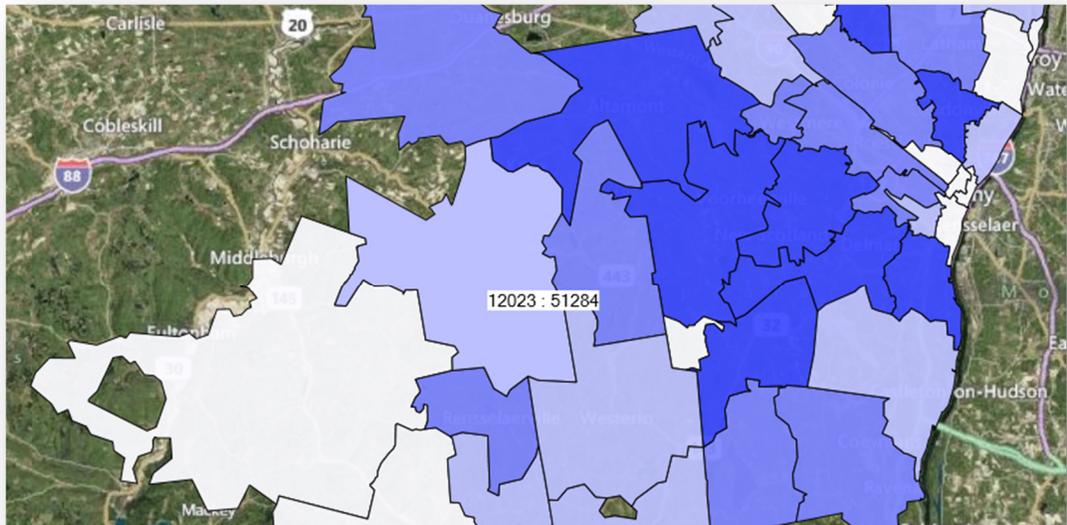
Your map should look similar to the following:



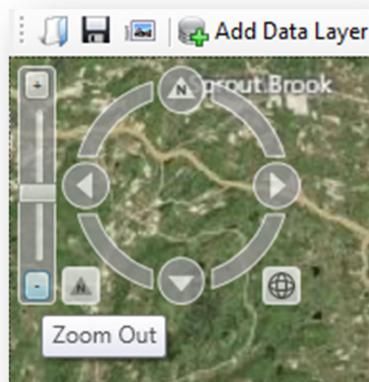
Viewing Map Information

Displaying values

The ALBZCTA_region shape file contains census data as part of the associated .dbf file. Use your mouse button to hover over different map regions and the value associated with the data file will be displayed (as shown below):



You can use the Zoom In/Zoom Out control located on the left hand side of the screen to change the dimensions of the map.



Saving a Map File

Save your map in interactive mode as a .map7 file for future editing.

Click on the floppy disk icon  located in the top right hand corner of the Epi Map menu. The Save Map File window opens.

1. Name your file **IncomeAsthma**.
2. Click **Save**.
3. Close **Epi Map**.

Creating a Case Cluster Map

Case cluster maps can be made if you have geographic data for the longitude and latitude measurements of your map corresponding to the region. Latitude and longitude coordinates are developed with GIS tracking information.

In this lesson, we will first map the location of the households of the children interviewed. We will then incorporate an additional layer to map the hospital and school locations in the region. We will use different colors to represent these categories into the map. This will help illustrate which zip codes had more cases of asthma and the income for those zip codes.

First, we will incorporate the location of the households.

1. From the top menu, select the **Add Data Layer> Case Cluster** option.
2. Select Epi Info 7™ as the Database Type.
3. Locate the **Community Health Assessment.PRJ** file in the **Epi Info 7/Resources/Training Projects/Community Health Assessment** folder.
4. Select the **PreInterventionSurvey** form.
5. Click **OK**.
6. The Latitude and Longitude window opens. Select **Latitude** from the Latitude drop down list.
7. Select **Longitude** from the Longitude drop down list.

Epi Map will immediately display the household locations on the map. The locations are represented with red dots.

- ❖ Notice that large clusters of cases appear as bigger circles with the total case count contained inside of them.
- ❖ Notice that an additional layer has been added to the workspace.
- ❖ You can switch between street and satellite views using the selector located in the top-right corner of the map window.
- ❖ The case cluster map was placed on top of the income choropleth. Does the map indicate a correlation between income and asthma in the survey data?
- ❖

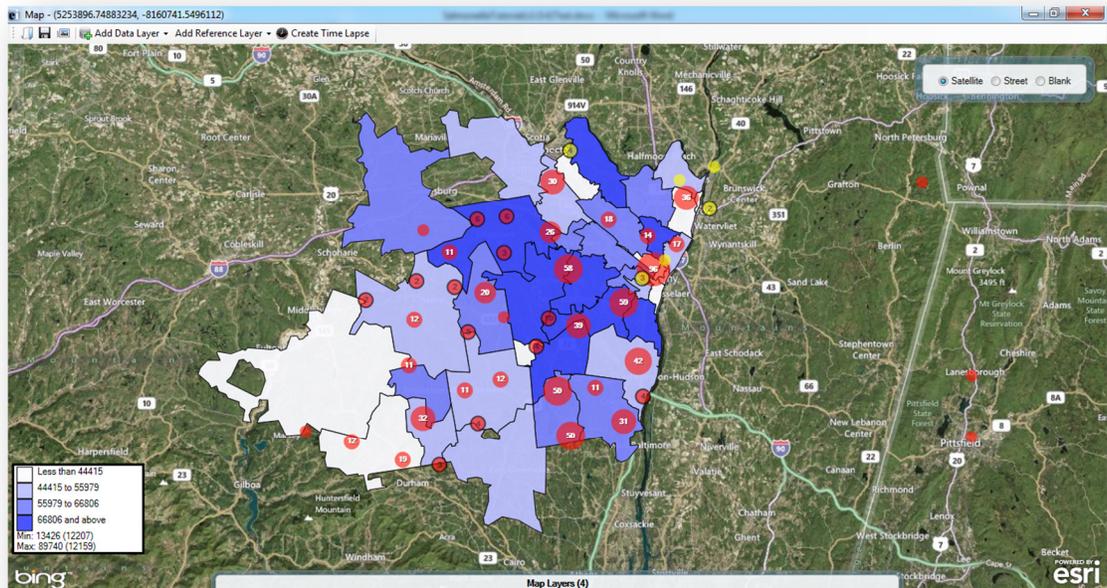
Adding More Layers: Hospitals

Using latitude and longitude measurements, we will now incorporate an additional layer to represent hospitals in the area. This would allow us to demonstrate if there is a lack of healthcare facilities in the region.

Add the hospital points to the map

1. Select the **Add Data Layer>Case Cluster** option from the top menu.
2. Select MS Access 200-2003 as the Database Type.
3. Locate the file **CommunityHealthAssessment.mdb** in the **Epi Info 7/Resources/Training Projects/Community Health Assessment** folder.
4. Click **Open**.
5. Click **OK**.
6. Select the **HospitalPoints** table.
7. Click **OK**.
8. The Latitude and Longitude selection window opens. Before selecting the corresponding fields, let's click on the color palette to replace the red default color with a different color.
9. Select any color from the palette (except red). Click **OK**.
10. Select **LAT** from the Latitude drop down list.
11. Select **LON** from the Longitude drop down list.

This map will immediately be displayed incorporating the new layer. Your map might look like this:



- ❖ When you save the points as a new layer, they will appear in the Map Manager as an editable layer.
- ❖ In the list of layers, the hospital layer must be the top layer. You can move layers up and down using the Map Layer control in the bottom section of the Epi Map workspace. Use the up and down arrows to move layers accordingly.

Adding text to a map

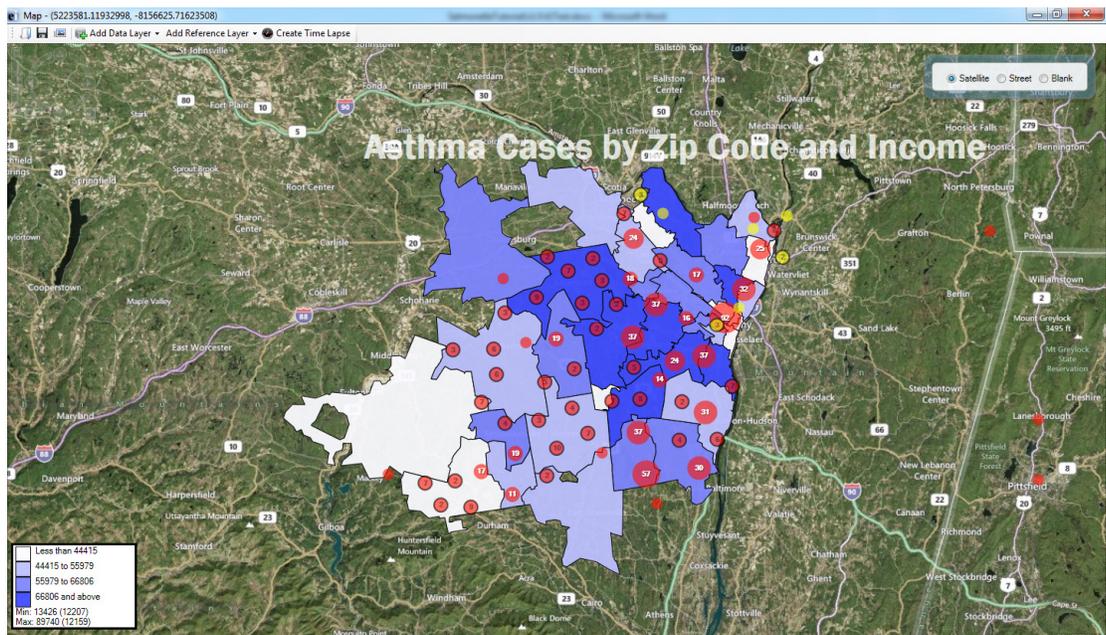
You will create a title for the asthma and income map.

1. From the Epi Map workspace, right click on the exact area where you would like to place a Map Title. A series of options will be available. Select **Add label**. The Add label dialog box opens.

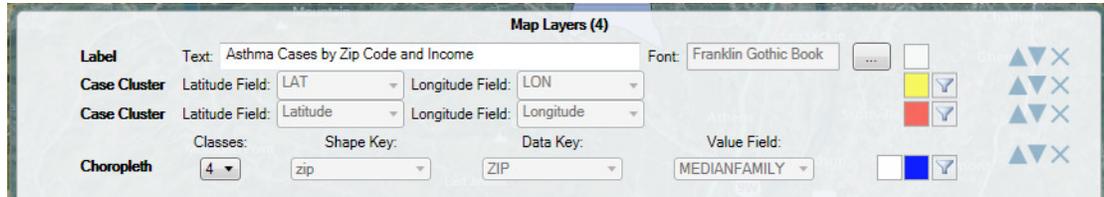
2. In the Text field, type **Asthma Cases by Zip Code and Income**.



3. Click on the ellipsis button to modify font settings. Select a font.
4. Select font type and font size.
5. Click **OK**. The title appears on your map in the exact location where you right clicked.



- ❖ Once the label has been created, a new layer is displayed in the bottom section of the Epi Map workspace. To make any modifications to your label, retrieve the layer and make the desired modifications.
- ❖ Please note that the label can't be dragged and moved around the map. You would need to delete the layer and create a new layer placing the label on the desired location.
- ❖ Notice that a new layer has been added to the Map Layer gadget.



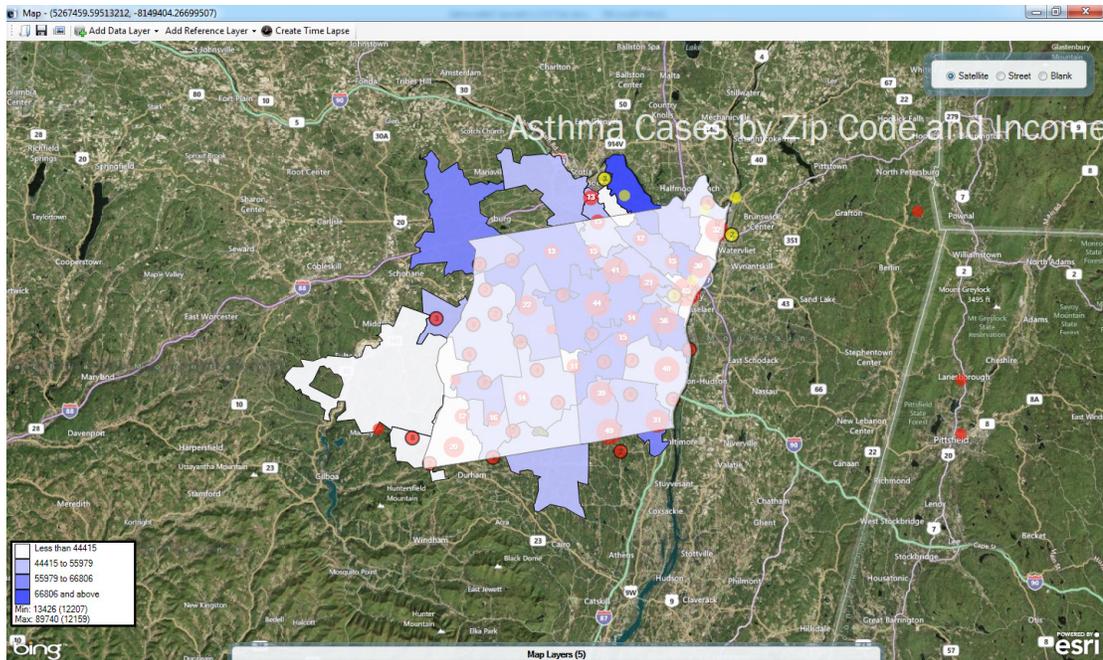
- ❖ To remove the label, retrieve the corresponding layer and click on the **X**.

Adding a Reference Shape Layer

The data and zip codes contained in the survey information crossed county lines. To see how this affects the locations of the schools in the survey, you can place the county shape over the region shape.

1. Select the **Add Reference Layer > From Shape File** option from the top menu.
2. Select **From Shape File**.
3. Locate the file **Albany County Boundary_region.shp** in the **Epi Info 7/Resources/Training Projects/Community Health Assessment** folder.
4. Click **Open**.

The map should look similar to the following:



- ❖ In the list of layers, move the latest layer three levels down in order to display the different stratifications properly. You can move layers up and down using the Map Layer control located in the bottom section of the Epi Map workspace. Use the up and down arrows to move layers accordingly.

Saving a Map as a Graphic File

To save a map to be used in presentations or documents, save it as a .png file.

1. Click on the picture frame  icon.
2. Name the file **SchoolPointsMap**.
3. Click **Save**.
4. Close **Epi Map**.

Student Exercise

You have been shown how to incorporate layers into a map. In this exercise, you will add a layer to represent the locations of the schools that students are attending. Navigate to the **Epi Info 7/Resources/Training Projects/Community Health Assessment** folder. In the database **CommunityHealthAssessment.mdb**, find a table called **SchoolPoints**. Use these data.

Student Practice – Step By Step Instructions

Student Practice- Lesson 1

The table below contains a list of the additional fields that were incorporated into the form. Feel free to create your form following this format or create your own fields.

Prompt/Question	Variable Type	Variable Name	Other
Page 1			
Parent Name	Text	ParentName	
Birth Date	Date	DOB	
Death Date	Date	DeathDate	
Ethnicity	Legal Values	Ethnicity	Use values: Hispanic Non-Hispanic Do not sort.
Zip	Text	Zip	
State	Legal Values	State	
County	Legal Values	County	
Investigated	Yes/No	Investigated	
Interviewed	Yes/No	Interviewed	
Symptomatic at Interview	Yes/No	SymptomaticAtInterview	
Final known outcome	Legal Values	Outcome	
Date onset:	Date	OnsetDate	
Date diagnosis	Date	DiagDate	
Lab report date	Date	LabReportDate	
CHD notified date	Date	CHDDate	

Prompt/Question	Variable Type	Variable Name	Other
Page 2 (OPTIONAL)			
Did the patient prepare or handle any raw meat during the 3 day exposure period?	Yes/No	HandledRawMeat	
If yes, please specify	Label/Title		
Poultry	Checkbox	RawPoultry	
Beef	Checkbox	RawBeef	
Pork	Checkbox	RawPork	
Shellfish	Checkbox	RawShellfish	
Did the patient consume any of the following during the 3 day exposure period?	Label/Title		
Poultry	Yes/No	Poultry	
Beef	Yes/No	Beef	
Pork	Yes/No	Pork	
Fish	Yes/No	Fish	
Shellfish	Yes/No	Shellfish	
Eggs	Yes/No	Eggs	
Nuts	Yes/No	Nuts	
Peanut butter	Yes/No	PeanutButter	
Food from speciality butcher/specialty market	Yes/No	SpecialityButcher	
Foods with raw eggs (cake mix, salad dressings, etc.)	Yes/No	FoodsWithRawEggs	
Food at a group meal (party, wedding, business meeting, potluck, etc.)	Yes/No	FoodAtGroupMeal	
Food at an outdoor setting (picnic, barbecue, etc.)	Yes/No	FoodAtOutdoorSetting	
Unpasteurized milk or milk products	Yes/No	UnpasteurizedMilk	
Raw or unpasteurized cheese (queso blanco, queso fresco, etc.)	Yes/No	UnpasteurizedCheese	
Raw produce	Yes/No	RawProduce	
Unpasteurized juice or cider	Yes/No	UnpasteurizedJuice	
Food from produce stand, roadside vendor, mobile stand, concession stand, or truck	Yes/No	ProduceStandOrVendor	
Home slaughtered/home grown food	Yes/No	HomeGrownFood	
Untreated/unfiltered water	Yes/No	UntreatedUnfilteredWater	

Prompt/Question	Variable Type	Variable Name	Other
Page 3			
Did the patient attend the Acme Company picnic on May 5th, 2012?	Yes/No	AttendPicnic	
Ate food served at 12:00 pm?	Yes/No	AteAtNoon	
Ate food served at 2:00 pm?	Yes/No	AteAt2	
Attendee type	Legal Values	AttendeeType	Use values: Company employee Related to employee Friend of employee Vendor or service worker Other Do not sort.
The following foods and drinks were served at the picnic. Select all that were consumed.	Label/Title		
Chef salad	Checkbox	ChefSalad	
Caesar salad	Checkbox	CaesarSalad	
Garden salad	Checkbox	GardenSalad	
Grilled cheese sandwich	Checkbox	GrilledCheese	
Egg salad sandwich	Checkbox	EggSaladSandwich	
Ham and cheese sandwich	Checkbox	HamCheese	
Grilled chicken sandwich	Checkbox	GrilledChickenSandwich	
Potato chips	Checkbox	PotatoChips	
Peanut butter and jelly	Checkbox	PBJ	
Reuben sandwich	Checkbox	Reuben	
Iced tea	Checkbox	IcedTea	
Water	Checkbox	Water	
Chocolate chip cookies	Checkbox	ChocolateChipCookies	
Peanut butter cookies	Checkbox	PeanutButterCookies	
Arrival Time	Time	ArrivalTime	
Departure Time	Time	DepartureTime	
Case Comments	Multiline	Comments	

Student Practice - Lesson 2

You will be using a form that has already been created for you to ensure consistent variable placement and variable naming. To open this form, follow the steps below:

1. Open the Form Designer module from the Epi Info™ 7 menu. If the Form Designer is already open, close any projects that might be open by clicking the **Close Project** button on the toolbar.
2. Click the **Open Project** button on the toolbar. A Windows Open File dialog appears.
3. Navigate to the **SalmonellaTraining** folder that you copied to the desktop in the File Setup phase.
4. Select the **Salmonella.prj file** and click the **Open** button. The *Survey_NoCheckCode* form appears on the canvas.
5. Ensure that the words “Check Code Form, Use in Lessons 2-3” appears in the upper-right corner. If they do not, double-click on the **Salmonella_NoCheckCode** item in the **Project Explorer** pane.

Task 1: Using conditional Statements

If the age of the interviewee is less than 18, and no parent has been specified, display a warning dialog.

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking on the + icon to its left. A list of all the fields on page 1 will appear underneath the Page 1 item.
3. Locate **DOB** in the list of fields on Page 1 and expand it by clicking on the + icon to its left. A “before” and an “after” item will appear underneath the field.
4. You will notice that the after event is in bold font. This represents that there is check code currently associated with this field and event.
5. Click on the **after** item underneath DOB.
6. The cursor will be placed on the first line of the check code block for the AFTER event.
7. Press then END key to place your cursor at the end of the line
8. Press the Enter key. This should place your cursor on the next line.
9. Click the **If** command in the **Command list**. The If dialog opens.
10. Select **Age** from the **Available Variables** drop-down list.
11. Click on the < button. The < operator appears in the If Condition box.
12. Type 18.
13. Click on the AND button. The AND operator appears in the If Condition box.
14. Select **ParentName** from the **Available Variables** drop-down list.
15. Click on the = button. The = sign appears in the If Condition box.
16. Click on the “Missing” button. The (.) symbol appears in the If Condition box.
17. Click on the command icon  button next to the THEN box. A list of available commands appears.
18. Select **DIALOG** from the list of commands. The DIALOG window opens.

19. Type Alert in the Alert section of the window.
20. Type **You are less than 18 years old but no parent name has been provided. Please verify the information.**
21. Click **Ok**.
22. Click on the command icon  button next to the THEN box once again. A list of available commands appears.
23. Select **GOTO** from the list of commands. The GOTO dialog opens.
24. Select ParentName from the list of fields.
25. Click **Ok**.
26. Click **Save** on the Check Code toolbar to save the check code.

Your finished code should look like this:

```
Field DOB
  After
    ASSIGN Age = YEARS(DOB, 5/5/2012)
    IF Age <18 AND ParentName = (.) THEN
      DIALOG "You are less than 18 years old but no
parent name has been provided. Please verify the information."
TITLETEXT="Alert"
      GOTO ParentName
    END-IF
  End-After
End-Field
```

Task 2:Using Enable/Disable with group fields

If the case was not ill, disable all of the fields in the Case Symptoms group.

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking on the + icon to its left. A list of all the fields on page 1 will appear underneath the Page 1 item.
3. Locate **Ill** in the list of fields on Page 1 and expand it by clicking on the + icon to its left. A “before” and an “after” item will appear underneath the field.
4. Double click on the **after** item underneath ILL. A new field block for the Ill field is created
5. Click the **If** command in the **Command list**. The If dialog opens.
6. Select **Ill** from the **Available Variables** drop-down list.
7. Click on the = button. The = sign appears in the If Condition box.
8. Click on the **No** button. The (-) symbol appears in the If Condition box.
9. Click on the command icon  button next to the THEN box. A list of available commands appears.
10. Select **DISABLE** from the list of commands. The DISABLE dialog opens.
11. Select Group_Symptoms from the list of fields.

12. Click **Ok**.
13. Click on the command icon  button next to the THEN box once again. A list of available commands appears.
14. Select **CLEAR** from the list of commands. The CLEAR dialog opens.
15. Select Group_Symptoms from the list of fields.
16. Click **Ok**.
17. Click on the command icon  button next to the ELSE box. A list of available commands appears.
18. Select **ENABLE** from the list of commands. The DISABLE dialog opens.
19. Select Group_Symptoms from the list of fields.
20. Click **Ok**.

Your finished code should look like this:

```
Field I11
  After
    //add code here
    IF I11 = (-) THEN
      DISABLE Group_Symptoms
      CLEAR Group_Symptoms
    ELSE
      ENABLE Group_Symptoms
    END-IF
  End-After
End-Field
```

Task 3: Using Enable/Disable and Clear with Fields

If the user checks the “Other” checkbox on page one under the Symptoms section, enable the “Specify” text field; otherwise, disable the “Specify” field and erase its contents.

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking on the + icon to its left. A list of all the fields on page 1 will appear underneath the Page 1 item.
3. Locate **OtherSymptom** in the list of fields on Page 1 and expand it by clicking on the + icon to its left. A “before”, “after” and “click” items will appear underneath the field.
4. Double click on the **click** item underneath OTHERSYMPTOM. A new field block for the OtherSymptom field is created.
5. Click the **If** command in the **Command list**. The If dialog opens.
6. Select **OtherSymptom** from the **Available Variables** drop-down list.
7. Click on the = button. The = sign appears in the If Condition box.
8. Click on the **No** button. The (-) symbol appears in the If Condition box.

9. Click on the command icon  button next to the THEN box. A list of available commands appears.
10. Select **DISABLE** from the list of commands. The DISABLE dialog opens.
11. Select **OtherSymptomSpecify** from the list of fields.
12. Click **Ok**.
13. Click on the command icon  button next to the THEN box once again. A list of available commands appears.
14. Select **CLEAR** from the list of commands. The CLEAR dialog opens.
15. Select **OtherSymptomSpecify** from the list of fields.
16. Click **Ok**.
17. Click on the command icon  button next to the ELSE box. A list of available commands appears.
18. Select **ENABLE** from the list of commands. The DISABLE dialog opens.
19. Select **OtherSymptomSpecify** from the list of fields.
20. Click **Ok**.

Your finished code should look like this:

```
Field OtherSymptom
  Click
    //add code here
    IF OtherSymptom = (-) THEN
      DISABLE OtherSymptomSpecify
      CLEAR OtherSymptomSpecify
    ELSE
      ENABLE OtherSymptomSpecify
    END-IF
  End-Click
End-Field
```

Task 4: Using Enable/Disable and Clear with Fields

Apply the same logic in #3 to when page one is loaded. That is, the “Specify” field should appear enabled or disabled (based on the value in the “Other” checkbox) as soon as page one opens.

1. Click the **Check Code** button in the Form Designer. The Check Code Editor window opens.
2. Locate **Page 1** in the **Choose Field Block for Action** list and expand it by clicking on the + icon to its left. A list of all the fields on page 1 will appear underneath the Page 1 item.
3. This time, locate the “before” and “after” items underneath Page 1.
4. Double click on the **before** item underneath Page 1. A new field block for the Page is created.
5. Click the **If** command in the **Command list**. The If dialog opens.
6. Select **OtherSymptom** from the **Available Variables** drop-down list.
7. Click on the = button. The = sign appears in the If Condition box.

8. Click on the **No** button. The (-) symbol appears in the If Condition box.
9. Click on the command icon  button next to the THEN box. A list of available commands appears.
10. Select **DISABLE** from the list of commands. The DISABLE dialog opens.
11. Select **OtherSymptomSpecify** from the list of fields.
12. Click **Ok**.
13. Click on the command icon  button next to the THEN box. A list of available commands appears.
14. Select **CLEAR** from the list of commands. The DISABLE dialog opens.
15. Select **OtherSymptomSpecify** from the list of fields.
16. Click **Ok**.
17. Click on the command icon  button next to the ELSE box. A list of available commands appears.
18. Select **ENABLE** from the list of commands. The DISABLE dialog opens.
19. Select **OtherSymptomSpecify** from the list of fields.
20. Click **Ok**.

Your finished code should look like this:

```
Page [Page 1]
  Before
    //add code here
    IF OtherSymptom = (-) THEN
      DISABLE OtherSymptomSpecify
      CLEAR OtherSymptomSpecify
    ELSE
      ENABLE OtherSymptomSpecify
    END-IF
  End-Before
End-Page
```

Student Practice-Lesson 4

Determine the answers to the following questions.

1. What racial category has the highest frequency in this data set?
 - a. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
 - b. Select **Add Analysis Gadget > Frequency** from the context menu. The frequency gadget appears.
 - c. Select **Race** in the **Frequency** drop-down list. The frequency is displayed.

ANSWER: White with 152 cases or 49.19%

2. Does the answer for #1 still hold true when the groups are separated into males and females?
 - a. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
 - b. Select **Add Analysis Gadget > Frequency** from the context menu. The frequency gadget appears.
 - c. Select **Race** in the **Frequency** drop-down list.
 - a. Click on **Advanced options**. The Advanced options panel displays.
 - b. Click on the **Gender** from the **Stratify by** drop-down list.
 - c. Click on **Run**. The frequency output is re-generated with stratified output.

ANSWER: Yes, the answer for #1 still holds true.

White and Female: 62 or 45.59%

White and Male: 90 or 52.02%

3. How many people drank water and ate their meal at 2:00 pm?
 - a. Move the mouse over the **Data Filters** box on the right edge of the canvas. The **Data Filters** slide-out gadget appears.
 - b. Select **Water** from the **Field Name** drop-down list.
 - c. Select **Yes** from the **Value** drop-down list.
 - d. Click the **Add Filter** button to add this condition.
 - e. Select **AteAt2** from the **Field Name** drop-down list.
 - f. Select **is equal to** from the **Operator** drop-down list.
 - g. Select **Yes** from the **Value** drop-down list.
 - h. Click the **Add Filter** button to add this condition to the list of data filters.
 - i. Select Add Condition with AND from the two options provided.
 - j. The condition appears in the **Data filters** grid view and the records count on the header changes.

ANSWER: 88

4. What is the average age of people in this data set by case outcome and gender?
 - a. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
 - b. Select **Add Analysis Gadget > Means** from the context menu. The means gadget appears.

- c. Select **Age2** in the **Means Of** drop-down list.
- d. Click on **Advanced options**. The Advanced options panel displays.
- e. Select **Outcome** in the **Cross-tabulate by:** drop-down list.
- f. Click on **Run** button.
- g. Right-click on a blank portion of the Dashboard canvas. A context menu appears.
- h. Select **Add Analysis Gadget > Means** from the context menu. The means gadget appears.
- i. Select **Age2** in the **Means Of** drop-down list.
- j. Click on **Advanced options**. The Advanced options panel displays.
- k. Select **Gender** in the **Cross-tabulate by:** drop-down list.
- l. Click on **Run** button.

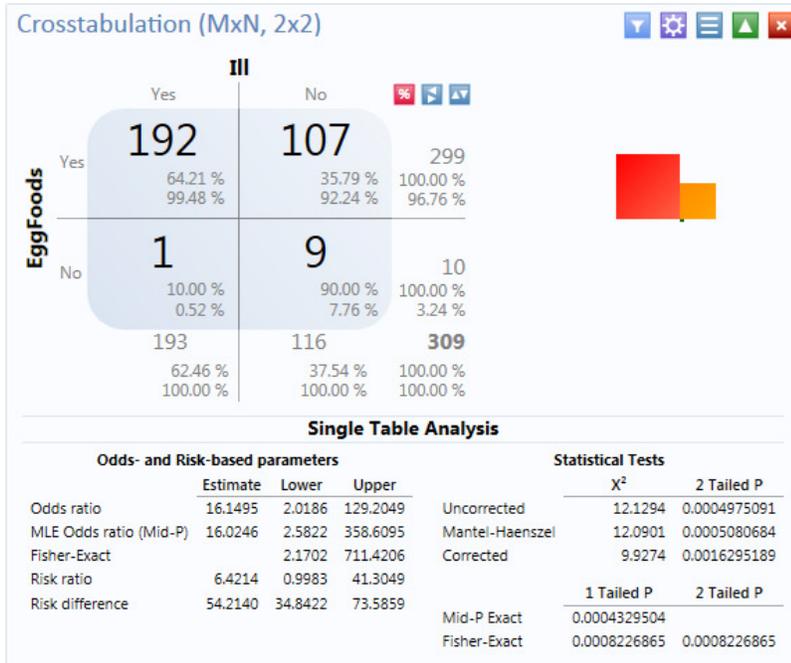
ANSWER: Outcome= Ill At Time Of Reporting	Avg. Age=31.09
Outcome=Recovered	Avg. Age=30.55
Outcome=Unknown	Avg. Age=22
Gender= Male	Avg. Age=32.7
Gender=Female	Avg. Age=33.65

Student Practice-Lesson 4

In order to create a new field to group food items to a specific ingredient, you will need to create the conditional assignment option of the Visual Dashboard. In order to do so, complete the following steps:

1. Move the mouse over the **Defined Variables** box on the left edge of the canvas. The **Defined Variables** slide-out gadget appears.
2. Click **New Variable**. A list of variable options appears.
3. Select **With Conditional Assignment** from the list of variable options. The **Add variable with conditional assignment** dialog opens.
4. Type *EggFoods* into the **Assign field** box.
5. Select **Yes/No** from the **Assign field type** drop-down list.
6. Click the **Create/Edit Condition** button. The **Specify assign condition** dialog appears. (This dialog operates in the same way as the Data Filter slide-out gadget.)
7. Select **ChefSalad** in the **Field Name** drop-down list.
8. Select **is equal to** in the **Operator** drop-down list.
9. Select **Yes** in the **Value** drop-down list.
10. Click **Add condition**. The condition is added to the **Conditions** grid view.
11. Select **EggSaladSanwich** in the **Field Name** drop-down list.
12. Select **is equal to** in the **Operator** drop-down list.
13. Select **Yes** in the **Value** drop-down list.
14. Click **Add condition**. A context menu appears asking how you would like to add this new condition to the one already present.
15. Select **Add condition with OR**. The condition is added to the **Conditions** grid view. Click **OK**. The Specify assign condition dialog closes and the **Assign condition** box in the Conditional Assign dialog has changed to show the condition you created.
16. Select **Yes** in the **Assign value** drop-down list.
17. Check the **Use Else** checkbox.
18. Select **No** in the **Else value** drop-down list.
19. Click **OK**. The variable is created and appears in the **Defined Variables** slide-out gadget.

Now you can use this variable as your Exposure field using 2x2 tables to evaluate the association of consuming eggs (EggFoods) and getting ill. Notice the results. Several of these statistics suggest that consumption of Egg Foods is associated with illness:



- While the 95% confidence for Risk ratio does contain 1, the lower limit is very close to 1.
- Each of the chi-squared tests has a highly-significant (<0.01) p-value.
- Each of the exact tests is highly significant.

Student Practice-Lesson 5

Let's incorporate an additional layer to the map we created in Lesson 5.

1. Select the **Add Data Layer>Case Cluster** option from the top menu.
2. Select MS Access 200-2003 as the Database Type.
3. Locate the file **CommunityHealthAssessment.mdb** in the **Epi Info 7/Resources/Training Projects/Community Health Assessment** folder.
4. Click **Open**.
5. Click **OK**.
6. Select the **SchoolPoints** table.
7. Click **OK**.
8. The Latitude and Longitude selection window opens. Before selecting the corresponding fields, let's click on the color palette to replace the red default color with a different color.
9. Select any color from the palette (except red). Click **OK**.
10. Select **LAT** from the Latitude drop down list.
11. Select **LON** from the Longitude drop down list.

The map will immediately get displayed incorporating the new layer. Your map should look like this:

