Crash Data Contributing Factors Analysis

Every crash involves several roadway, vehicle, and person level contributing factors. A contributing factors analysis involves tallying the elemental factors involved in a crash to determine any trends or frequently involved topics that could be addressed by a safety program. For example, a contributing factors analysis could help answer questions such as: how many vehicle occupants in serious crashes were using seat belts, how many crashes occurred in a curve or at an intersection, what types of crash is most common, or how many severe crashes occurred. Such analysis is helpful to conduct in preparation for development of a Safety Plan.

In order to conduct a contributing factor analysis you must have access to a table of crash data. Many law enforcement agencies collect crash data using a standard form with pre-defined data elements (or contributing factors). The Model Minimum Uniform Crash Criteria (MMUCC) provides recommendations of contributing factors to collect on a crash report. More information on this standard can be found at https://www.nhtsa.gov/about-mmucc

You could tally contributing factors manually. Below are instructions for an electronic solution that will enable you to tally contributing factors in Microsoft Excel.

Contributing Factors Analysis using Excel

**Directions:** Excel has a feature called “Pivot Tables” that can tally data tables quickly. Pivot tables can also compare the overlap of two factors.

**To set up a Pivot table:**

1. Open the MS Excel file that contains your crash data.
2. Find the data to be analyzed and click anywhere in the data table.
   a. What data level do we want? (Crash, Vehicle, Person)
3. Choose the (1) “Insert” menu tab and then choose the (2) “Pivot Table” tool.

   ![Figure 1. The Insert Menu](image)

4. The “Create Pivot Table” dialog box should appear. Check that (1) the appropriate data range was entered and (2) “New Worksheet” is selected. Then push the (3) “OK” button.

   ![Figure 2. Create Pivot Table Dialog](image)
5. A new sheet should be added to your Excel file with the Pivot Table setup displayed (see Figure 3).

To analyze data using a Pivot Table:
Next, we need to select factors to analyze and how to count them.

1. Identify what you want to count. (Some options: Pedestrians, fatalities, injuries, crashes, etc.)
2. Drag the item you identified in step 1 from the (A) list of pivot table fields to the (B) “Values” area.
3. Ensure that the proper function is being performed (Sum, Count, etc.). To do this,
   a. Click the small arrow next to the item in the values area
   b. Choose “Value Field Settings”
   c. In the “Value Field Settings” dialog box, choose the method you want to use to obtain values. Then push “OK”.
4. The pivot table should now display a number that corresponds to your selections in step 3.
5. Now, identify the contributing factor category that you want to tally in the (A) list of Pivot Table Fields. (Examples: Weather, light conditions, type of crash, etc.)
6. Drag the item to the (C) “Rows” area.
7. The pivot table should now show your data in a table. Select an item label and type to change it (especially if the label is a code rather than a meaningful word).
8. To change to another contributing factor simply click and drag an item from the (C) “Rows” area until an X is displayed. Then go back to Step 4 to select your next contributing factor category.

Additional Tips & Tricks

**Matrix:** You can also cross two variables to form a matrix rather than a simple tally. A common matrix would be to put a contributing factor in the rows and the crash severity in the columns.

9. Identify the item “SEVERITY_C” in the (A) list of Pivot Table Fields. Drag this item to the (D) “Columns” area.
10. The pivot table should now show your data in a matrix with Severity along the top and your selected contributing factor down the left side. Creating tables like these can allow you to quickly identify any trends that should be addressed in a safety plan.

**Nesting:** You can nest items within your table to examine more than two factors at once. To do this, drag an additional factor to the Columns or Rows area. This can be useful for large groupings like “Urban vs. Rural.”
**Grouping elements:** You can group items to see their total combined. To do this select multiple items in the pivot table. Then, right click on one of the items and choose “Group”. In the (C) “Rows” area notice that the group has created a new item. You can drag the original item out of the box to remove it – leaving behind only the grouped view. Try this with “light condition” by grouping dawn and dusk.

**Digging Deeper:** To investigate any item in further detail just double click on a number in a pivot table. This will create a new data table that only shows cases related to the number you double clicked. You can create a new pivot table to process this subset of data.

Crash Trees are a useful way to keep track of your thought process as you work with subsets of data tables. An example of a crash tree is provided here. The information in each box could be obtained using a pivot table if the element exists in your original data table. Also, this example crash tree is just one way of breaking down crash data. Depending on the statistics you want and the data that you have available your crash tree may follow a different breakdown.