Concealing Counts of 5 or Fewer Cases

Condition 7 of the Terms of Access to Restricted Community Counts Data states, "I will avoid reporting or publishing, or indirectly revealing (such as by subtraction), any information that contains counts of 5 or fewer cases except when using data from my own center for purposes consistent with its internal policies and procedures." This applies to tables, figures and text in the data presentation and includes counts of zero.

Two common ways to avoid revealing small counts are collapsing categories of the characteristic and suppression of the small count(s). Examples of each are given below. In these examples, the characteristic is primary insurance coverage, and the categories are the different types of insurance. Each table shows the distribution of the type of primary insurance coverage in a hypothetical sample of 1,000 people.

Because our rule requires counts of 5 and fewer to be concealed, the smallest quantity allowed to be presented is 6. Furthermore, the sum of the counts of categories that are manipulated to conceal one or more small counts within the categories of a characteristic should be at least 5. This calculation is illustrated in the suppression examples.

Collapsing Categories of the Characteristic

Collapsing categories is the practice of combining two or more categories of a characteristic into a single category. Three categories (Indian Health Service, Uninsured, Unknown) in Original Table 1 have 5 or fewer cases and should not be shown. Because the sum of the small counts (3+1+1) is 5, these three categories can be displayed on a single row as in Example A.

Original Table 1. Distribution of Primary Insurance Type in My Sample

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	112	11.2
Military Health Care	24	2.4
State Programs	17	1.7
Indian Health Service	3	0.3
Uninsured	1	0.1
Unknown	1	0.1

Example A. Collapsed Table 1.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	112	11.2
Military Health Care	24	2.4

State Programs	17	1.7
Indian Health Service, Uninsured, or Unknown Insurance Type	5	0.5

If it is not important to distinguish between some categories that have counts greater than 5, the categories with small counts can be combined with one or more of those. For example, two other categories (State Programs, Military Health Care) in Original Table 1 each have more than 5 cases but together account for less than five percent of all cases. If it is not important to distinguish between these five categories (State Programs, Military Health Care, Indian Health Service, Uninsured, and Unknown), they can be combined into a single category as shown in Example B.

Example B. Collapsed Table 1.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	112	11.2
Other[§]	46	4.6

[§]Includes State Programs, Military Health Care, Indian Health Service, uninsured, and unknown insurance type.

Suppression

Suppression is the practice of including a category of a characteristic in a presentation, but not showing the count of cases that fall into that category. Primary suppression is suppressing the counts that are themselves smaller than the smallest quantity allowed to be presented (small counts). Secondary (or complementary) suppression is suppressing counts that are equal to or greater than the smallest quantity allowed, to prevent small counts from being calculated when the audience knows the total number of cases.

When a category of a characteristic is included in a table, but its count is suppressed, a symbol is displayed in place of the count. The meaning of the symbol is explained in a footnote.

Original Table 2.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	114	11.4
Military Health Care	24	2.4
State Programs	17	1.7
Indian Health Service	3	0.3

In Original Table 2, only one category has a small count. In Example C, the small count alone is suppressed. However, this is not enough to prevent the audience from deriving the small count by subtracting the counts that *are* displayed from the total.

Example C. Inadequately Suppressed Table 2.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	114	11.4
Military Health Care	24	2.4
State Programs	17	1.7
Indian Health Service	*	*

*Counts of 5 or fewer are suppressed to protect participant confidentiality. Other counts may be suppressed to prevent derivation of these counts by subtraction.

When the count of only one category is small, the counts of at least two categories must be suppressed to prevent derivation of the small count. If column totals are presented, the counts of at least two rows (categories) in the column with the small count must be suppressed. If row totals are presented, the counts of at least two columns (categories) in the row with the small count must be suppressed. If row and column totals are presented in a single table, in each row and each column in which a small count occurs, at least two counts must be suppressed.

In example D, primary suppression has been applied to the count for Indian Health Service and secondary suppression has been applied to the count for State Programs. The audience can calculate that 20 (1000-(453+389+114+24)) participants are covered by the Indian Health Service or by State Programs, or some combination of these. However, the audience cannot tell how many (if any) fall into each of the suppressed categories.

Example D. Adequately Suppressed Table 2.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	114	11.4
Military Health Care	24	2.4
State Programs	*	*
Indian Health Service	*	*

*Counts of 5 or fewer are suppressed to protect participant confidentiality. Other counts may be suppressed to prevent derivation of these counts by subtraction.

Often, secondary suppression is applied to the next smallest count in the table. However, any category with a non-small count can be selected for secondary suppression. It will sometimes make sense to suppress a category with a larger count instead of the next smallest.

Original Table 3.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	109	10.9
Military Health Care	24	2.4
State Programs	17	1.7
Indian Health Service	3	0.3
Uninsured	4	0.4
Unknown	1	0.1

Original Table 3 contains three categories with small counts. The sum of the small counts is 8 (3+4+1). Eight is greater than 5, so only primary suppression is required in Table 3, as shown in example E.

Example E. Suppressed Table 3.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	109	10.9
Military Health Care	24	2.4
State Programs	17	1.7
Indian Health Service	*	*
Uninsured	*	*
Unknown	*	*

*Counts of 5 or fewer are suppressed to protect participant confidentiality. Other counts may be suppressed to prevent derivation of these counts by subtraction.

Original Table 4.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	113	11.3
Military Health Care	24	2.4
State Programs	17	1.7

Indian Health Service	2	0.2
Uninsured	1	0.1
Unknown	1	0.1

Like Original Table 3, Original Table 4 has three categories with small counts. However, the sum of the small cells in Original Table 4 is 4 (2+1+1). Four is less than 5. For this table, both primary and secondary suppression are required, as shown in example F. The three small counts are suppressed along with the non-small count of State Programs.

Example F. Suppressed Table 4.

Primary Insurance Type	Number	Percent
Commercial Insurance	453	45.3
Medicare	389	38.9
Medicaid	113	11.3
Military Health Care	24	2.4
State Programs	*	*
Indian Health Service	*	*
Uninsured	*	*
Unknown	*	*

*Counts of 5 or fewer are suppressed to protect participant confidentiality. Other counts may be suppressed to prevent derivation of these counts by subtraction.

Original Table 6. Distribution of Primary Insurance Type by Patient Employment Status in My Sample

Primary Insurance Type	Employed Full Time # (%)		Employed Part Time # (%)		Not Employed # (%)		Employment Status Unknown # (%)		Total # (%)	
Commercial Insurance	272	(27.2)	136	(13.6)	35	(3.5)	10	(1.0)	453	(45.3)
Medicare	24	(2.4)	47	(4.7)	311	(31.1)	7	(0.7)	389	(38.9)
Medicaid	17	(1.7)	35	(3.5)	57	(5.7)	3	(0.3)	112	(11.2)
Military Health Care	12	(1.2)	6	(0.6)	6	(0.6)	0	(0)	24	(2.4)
State Programs	5	(0.5)	5	(0.5)	4	(0.4)	3	(0.3)	17	(1.7)
Indian Health Service	2	(0.2)	1	(0.1)	0	(0)	0	(0)	3	(0.3)
Uninsured	1	(0.1)	0	(0)	0	(0)	0	(0)	1	(0.1)
Unknown	0	(0)	0	(0)	0	(0)	1	(0.1)	1	(0.1)
Total	333	(33.3)	230	(23.0)	413	(41.3)	24	(2.4)	1000	(100)

Original Table 6 presents the cross tabulation of two characteristics, Primary Insurance Type and Employment Status. It has 21 counts that require primary suppression; those counts are highlighted in light gray. For some rows and columns, the sum of the counts requiring primary suppression is less than

5. In those rows and columns, secondary suppression of at least one other count is required. The counts that are candidates for secondary suppression are highlighted in dark gray.

Excluding the column headers, the two top rows, Commercial Insurance and Medicare, require no primary suppression.

The third row, Medicaid, requires primary suppression of the count in the Employment Status Unknown column only. At least one other count in this row requires secondary suppression.

The fourth row, Military Health Care, requires primary suppression of the count in the Employment Status Unknown column only. At least one other count in this row requires secondary suppression.

The fifth row, State Programs, requires primary suppression of the counts in all columns except the last (the row total).

The sixth through eighth rows, Indian Health Service, Uninsured and Unknown, require primary suppression of the counts in all columns.

The ninth row, the column totals, requires no primary suppression.

Excluding the row headers, the first through fourth columns (Employed Full Time through Employment Status Unknown), require primary suppression of the counts in rows five through eight. The fourth column, Employment Status Unknown, also requires primary suppression of the counts in rows three and four.

The fifth column, the row totals, requires primary suppression of the counts in rows six through eight.

The sum of the counts that require primary suppression in the first column, Employed Full Time, is 8 (5+2+1+0); no secondary suppression is needed in this column.

The sum of the counts that require primary suppression in the second column, Employed Part Time, is 6 (5+1+0+0); no secondary suppression is needed in this column.

The sum of the counts that require primary suppression in the third column, Not Employed, is 4 (4+0+0+0); at least one other count in this column requires secondary suppression.

The sum of the counts that require primary suppression in the fourth column, Employment Status Unknown, is 7 (3+0+3+0+0+1); no secondary suppression is needed in this column.

The sum of the counts that require primary suppression in the fifth column, the row totals, is 5 (3+1+1); no secondary suppression is needed in this column.

Example G. Suppressed Table 6.

Primary Insurance Type	Employed Full Time # (%)	Employed Part Time # (%)	Not Employed # (%)	Employment Status Unknown # (%)	Total # (%)
Commercial Insurance	272 (27.2)	136 (13.6)	35 (3.5)	10 (1.0)	453 (45.3)

Medicare	24	(2.4)	47	(4.7)	311	(31.1)	7	(0.7)	389	(38.9)
Medicaid	*	*	35	(3.5)	57	(5.7)	*	*	112	(11.2)
Military Health Care	12	(1.2)	6	(0.6)	*	*	*	*	24	(2.4)
State Programs	*	*	*	*	*	*	*	*	17	(1.7)
Indian Health Service	*	*	*	*	*	*	*	*	*	*
Uninsured	*	*	*	*	*	*	*	*	*	*
Unknown	*	*	*	*	*	*	*	*	*	*
Total	333	(33.3)	230	(23.0)	413	(41.3)	24	(2.4)	1000	(100)

*Counts of 5 or fewer are suppressed to protect participant confidentiality. Other counts may be suppressed to prevent derivation of these counts by subtraction.

Suppressing the count at the intersection of Military Health Care and Not Employed satisfies the secondary suppression requirement for both that row and that column. The sum of counts suppressed for Military Health Care is now 6 (6+0); the sum of counts suppressed for Not Employed is now 10 (6+4). On the Medicaid row, the count of persons employed full time has been secondarily suppressed because it is the next smallest count. Other choices could have been made.

The table in example G is largely empty. An alternative is to collapse some categories (as in example B) and then apply suppression, if necessary:

Example H. Collapsed Original Table 6.

Primary Insurance Type	Employed Full Time # (%)		Employed Part Time # (%)		Not Employed # (%)		Employment Status Unknown # (%)		Total # (%)	
Commercial Insurance	272	(27.2)	136	(13.6)	35	(3.5)	10	(1.0)	453	(45.3)
Medicare	24	(2.4)	47	(4.7)	311	(31.1)	7	(0.7)	389	(38.9)
Medicaid	17	(1.7)	35	(3.5)	57	(5.7)	3	(0.3)	112	(11.2)
Other[§]	20	(2.0)	12	(1.2)	10	(1.0)	4	(0.4)	46	(4.6)
Total	333	(33.3)	230	(23.0)	413	(41.3)	24	(2.4)	1000	(100)

[§]Includes State Programs, Military Health Care, Indian Health Service, uninsured, and unknown insurance type.
*Counts of 5 or fewer are suppressed to protect participant confidentiality. Other counts may be suppressed to prevent derivation of these counts by subtraction.

There are two counts in the collapsed original Table 6 that require primary suppression. They occur in the same column. The sum of their counts is 7 (3+4) so no secondary suppression is required in that column. However, because there is only one small count in each row, secondary suppression of at least one other count is required in the rows for Medicaid and Other.

Example I. Collapsed and Suppressed Original Table 6.

Primary Insurance Type	Employed Full Time # (%)		Employed Part Time # (%)		Not Employed # (%)		Employment Status Unknown # (%)		Total # (%)	
Commercial Insurance	272	(27.2)	136	(13.6)	35	(3.5)	10	(1.0)	453	(45.3)

Medicare	24	(2.4)	47	(4.7)	311	(31.1)	7	(0.7)	389	(38.9)
Medicaid	17	(1.7)	35	(3.5)	*	*	*	*	112	(11.2)
Other[§]	20	(2.0)	12	(1.2)	*	*	*	*	46	(4.6)
Total	333	(33.3)	230	(23.0)	413	(41.3)	24	(2.4)	1000	(100)

[§]Includes State Programs, Military Health Care, Indian Health Service, uninsured, and unknown insurance type.

*Counts of 5 or fewer are suppressed to protect participant confidentiality. Other counts may be suppressed to prevent derivation of these counts by subtraction.

In Example I, the relatively large count of Not Employed at Medicaid is secondarily suppressed. Other choices could have been made. However, if the counts that are secondarily suppressed in each row are not in the same column, another count in each of those columns will also have to be suppressed, for a total of 6 suppressed counts instead of 4. Another option would be to display the data only for participants with known employment status, as in Example J.

Example J. Distribution of Primary Insurance Type by Patient Employment Status Among 976 People with Known Primary Insurance Type in My Sample

Primary Insurance Type	Employed Full Time # (%)		Employed Part Time # (%)		Not Employed # (%)		Total # (%)	
Commercial Insurance	272	(61.4)	136	(30.7)	35	(7.9)	443	(45.4)
Medicare	24	(6.3)	47	(12.3)	311	(81.4)	382	(39.1)
Medicaid	17	(15.6)	35	(32.1)	57	(52.3)	109	(11.2)
Other[§]	20	(47.6)	12	(28.6)	10	(23.8)	42	(4.3)
Total	333	(34.1)	230	(23.6)	413	(42.3)	976	(100.0)

[§]Includes State Programs, Military Health Care, Indian Health Service, uninsured, and unknown insurance type.