

Complementary Suppression

Minimum N-Size for Groups

Historically, Colorado has applied a minimum N-size of 16 to group size for achievement results. Schools and disaggregated groups needed to have at least 16 students in order for CDE to report their assessment data.

In 2014, acknowledging the increased sophistication around data, CDE recognized the need for what is referred to as complementary suppression. Complementary suppression is applied when a group has its data masked because another group doesn't meet the N-size of 16, and the first group's results could be determined through simple calculations. Below is mock data that shows the issue.

	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5
School A	32	7	8	8	6	3
Males	19	4	4	5	4	2
Females	<16	-	-	-	-	-

Through simple subtraction, the results for female students can be easily determined. See below:

	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5
School A	32	7	8	8	6	3
Males	19	4	4	5	4	2
Females	School minus male = 13	School minus male = 3	School minus male = 4	School minus male = 3	School minus male = 2	School minus male = 1

Therefore, both males and females must have at least 16 students in order to report out either group.

School Complementary Suppression

The issue also can be seen with schools within districts. Starting with the 2015 CMAS: PARCC data, complementary suppression was also applied to overall school-level data. If one school has data suppressed, at least one other school must have its data suppressed to ensure that the first school's data cannot be calculated by subtracting the known schools from the district results.

	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5
District A	163	30	30	40	50	13
School A	100	23	20	24	25	8
School B	<16	-	-	-	-	-
School C	50	4	6	13	23	4



	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5
District A	163	30	30	40	50	13
School A	100	23	20	24	25	8
School B	District minus School A minus School C=13	District minus School A minus School C=3	District minus School A minus School C=4	District minus School A minus School C=3	District minus School A minus School C=2	District minus School A minus School C=1
School C	50	4	6	13	23	4

Therefore, another school's data also has to be suppressed.

	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5
District A	163	30	30	40	50	13
School A	100	23	20	24	25	8
School B	<16	*	*	*	*	*
School C	*	*	*	*	*	*

Performance Level and Complementary Suppression

As both the Board and legislature discussed their expectation for increased data privacy, CDE consulted with the Privacy Technical Assistance Center (PTAC), part of the U.S. Department of Education. PTAC clarified that minimum N-sizes should be applied to groups as a whole, as well as individual cells (Level 1, Level 2, etc.) within the group. Performance level suppression began with the CMAS: PARCC 2015 assessment data release. In 2016, in order to report individual performance level results, a minimum of 4 students is required. Again, complementary suppression comes into play. Knowing how many students are in a group means that any one performance level can be calculated if all other performance levels are reported.

	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5	Levels 4/5
School D	60	6	8	10	33	-	36

Level 5 can be calculated by subtracting Levels 1, 2, 3 and 4 from the total score or just by subtracting Level 4 from the combined Levels 4/5.

	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5	Levels 4/5
School D	60	6	8	10	33	Levels 4/5 minus Level 4 = 3	36

So, we need to suppress Level 4 and Level 5 to prohibit the identification of any specific cell size less than 4.

	Total Number of Valid Scores	Level 1	Level 2	Level 3	Level 4	Level 5	Levels 4/5
School D	60	6	8	10	-	-	36