Chapter 6 Calculating Weighted Risk Ratios and Weighted Total Removals Per Child Ratios

Introduction

As discussed in the Considerations section for the risk ratio (Chapter 4), risk ratios may not be comparable across districts when districts have substantially different demographic distributions. The risk for all other children (i.e., the risk for the comparison group) is influenced by the racial/ethnic composition of the district. Each racial/ethnic group contributes to the risk for the comparison group in proportion to its size relative to the entire comparison group. Therefore, two districts may have identical patterns of risk for their racial/ethnic groups, but substantially different risk ratios because their district-level racial/ethnic demographic distributions differ.

For example, suppose that the ID risk is 2% for White children, 1% for Hispanic/Latino children, and 5% for Black or African American children. If a district has a large majority of White children (e.g., 80% White, 10% Black or African American, and 10% Hispanic/Latino), then the risk ratio for White children would be about 0.67; however, in a district with a large majority of Hispanic/Latino children (e.g., 80% Hispanic/Latino, 10% White, and 10% Black or African American), the risk ratio for White children would be about 1.38. Such variation in risk ratios between districts with identical risk may be problematic from a policy perspective.

The weighted risk ratio addresses this limitation by standardizing district racial/ethnic distributions based on state-level demographics. It combines district-level information about risk with state-level demographics to produce standardized risk ratios that can be compared across districts. In this chapter, we provide examples of how to calculate the weighted risk ratio for identification (Example 6.1) using all other children as the comparison group. We also provide examples of how to calculate the weighted risk ratio for placement (Example 6.2) and suspension/expulsion (Example 6.3) using all other children with disabilities as the comparison group.

The weighted TRPC ratio is similar to the weighted risk ratio. The weighted TRPC ratio compares the average number of disciplinary removals per child for children with disabilities from a specific racial/ethnic group to that of a comparison group weighted according to state-level demographics. We provide an example of how to calculate the weighted TRPC ratio (Example 6.4) using all other children with disabilities as the comparison group.

It should be noted that the examples in this chapter focus on applying a specific methodology to one disability category, one educational environment category, and two discipline categories; as noted in Chapters 1 and 2, states will need to do more than analyze the data in these four categories in order to meet the requirements for B9 and B10 and significant disproportionality.

The general equation for the risk ratio for identification is:

Weighted Risk Ratio

$$= \frac{(1 - p_i)R_i}{\sum_{j \neq i} p_j R_j}$$

Where R_i is the district-level risk for racial/ethnic group *i*, and p_i is the state-level proportion of children from racial/ethnic group *i*. R_j is the district-level risk for the *j*-th racial/ethnic group, and p_j is the state-level proportion of children from the *j*-th racial/ethnic group.

The weighted risk ratio uses the district-level risk for the racial/ethnic group for the numerator and a "weighted" risk for all other children for the denominator. The risk in the numerator is adjusted to account for the proportion of children in the racial/ethnic group at the state-level. The weighted risk for all other children in the denominator uses the district-level risks for each racial/ethnic group in the comparison group, weighted according to the racial/ethnic demographics of the state.

To continue the example from above (assuming that the ID risk is 2% for White children, 1% for Hispanic/Latino children, and for 5% for Black or African American children), if the state has 70% White children, 10% Hispanic/Latino children, and 20% Black or African American children, then the weighted risk ratio for White children would be calculated as:

$$\textbf{Weighted risk ratio}^{9} = \frac{(1 - 0.70)\,(0.02)}{(0.10)\,(0.01) + (0.20)\,(0.05)} = 0.55$$

Example 6.1 Identification

In this example, the weighted risk ratio answers the question, "What is a specific racial/ethnic group's risk of receiving special education and related services for a particular disability as compared to the risk for all other children when the risk ratio is weighted according to the racial/ethnic demographics of the state?""

QUESTION
In District 5, what was the risk for Black or African American children receiving special education and related services for ID as compared to the risk for all other children when the risk ratio is weighted according to the racial/ethnic demographics of State A?

1. First, using the child count data and enrollment data for District 5 in Exhibit 1, calculate the ID risk for each racial/ethnic group.
   - Calculate the ID risk for Black or African American children in District 5 (do not round the results):

$$\textbf{Risk} = \frac{\text{Black or African American children in ID category}}{\text{Enrolled Black or African American children}} = \frac{316}{6{,}224} = 0.050771$$

   - Calculate the ID risk for Hispanic/Latino children in District 5 (do not round the results):

$$\textbf{Risk} = \frac{\text{Hispanic/Latino children in ID category}}{\text{Enrolled Hispanic/Latino children}} = \frac{121}{6{,}002} = 0.020160$$

   - Calculate the ID risk for American Indian or Alaska Native children in District 5 (do not round the results):

$$\textbf{Risk} = \frac{\text{American Indian or Alaska Native children in ID category}}{\text{Enrolled American Indian or Alaska Native children}} = \frac{11}{311} = 0.035370$$

   - Calculate the ID risk for Asian children in District 5 (do not round the results):

$$\textbf{Risk} = \frac{\text{Asian children in ID category}}{\text{Enrolled Asian children}} = \frac{18}{1{,}213} = 0.014839$$

9 In this chapter, risks are left as decimals rather than converted to percentage to simplify the calculation for the adjustment factor in the numerator of $(1 - p_i)$.

- Calculate the ID risk for Native Hawaiian or Other Pacific Islander children in District 5 (do not round the results):

$$\textbf{Risk} = \frac{\text{Native Hawaiian or Other Pacific Islander children in ID category}}{\text{Enrolled Native Hawaiian or Other Pacific Islander children}}$$

$$= \frac{21}{212}$$

$$= 0.099057$$

- Calculate the ID risk for White children in District 5 (do not round the results):

$$\textbf{Risk} = \frac{\text{White children in ID category}}{\text{Enrolled White children}}$$

$$= \frac{732}{34{,}897}$$

$$= 0.020976$$

- Calculate the ID risk for children reported as two or more races in District 5 (do not round the results):

$$\textbf{Risk} = \frac{\text{Children reported as two or more races in ID category}}{\text{Enrolled children reported as two or more races}}$$

$$= \frac{3}{3{,}175}$$

$$= 0.000945$$

2. Next, using enrollment data in Exhibit 1, calculate the proportion of children enrolled in State A who are in each racial/ethnic group.

- Calculate the proportion of children enrolled in State A who are Black or African American by dividing the number of Black or African American children enrolled in State A by the number of children enrolled in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Enrolled Black or African American children}}{\text{All enrolled children}}$$

$$= \frac{73{,}653}{414{,}836}$$

$$= 0.177547$$

- Calculate the proportion of children enrolled in State A who are Hispanic/Latino by dividing the number of Hispanic/Latino children enrolled in State A by the number of children enrolled in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Enrolled Hispanic/Latino children}}{\text{All enrolled children}}$$

$$= \frac{69{,}672}{414{,}836}$$

$$= 0.167951$$

- Calculate the proportion of children enrolled in State A who are American Indian or Alaska Native by dividing the number of American Indian or Alaska Native children enrolled in State A by the number of children enrolled in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Enrolled American Indian or Alaska Native children}}{\text{All enrolled children}}$$

$$= \frac{1{,}991}{414{,}836}$$

$$= 0.004799$$

- Calculate the proportion of children enrolled in State A who are Asian by dividing the number of Asian children enrolled in State A by the number of children enrolled in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Enrolled Asian children}}{\text{All enrolled children}}$$

$$= \frac{13{,}934}{414{,}836}$$

$$= 0.033589$$

- Calculate the proportion of children enrolled in State A who are Native Hawaiian or Other Pacific Islander by dividing the number of Native Hawaiian or Other Pacific Islander children enrolled in State A by the number of children enrolled in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Enrolled Native Hawaiian or Other Pacific Islander children}}{\text{All enrolled children}}$$

$$= \frac{1{,}424}{414{,}836}$$

$$= 0.003433$$

- Calculate the proportion of children enrolled in State A who are White by dividing the number of White children enrolled in State A by the number of children enrolled in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Enrolled White children}}{\text{All enrolled children}}$$

$$= \frac{238{,}875}{414{,}836}$$

$$= 0.575830$$

- Calculate the proportion of children enrolled in State A who are reported as two or more races by dividing the number of enrolled children reported as two or more races in State A by the number of children enrolled in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Enrolled children reported as two or more races}}{\text{All enrolled children}}$$

$$= \frac{15{,}287}{414{,}836}$$

$$= 0.036851$$

3. Calculate the weighted risk ratio:

$$\textbf{Weighted risk ratio} = \frac{(1 - \text{state Black or African American proportion}) \times \text{district Black or African American ID risk}}{\begin{array}{c}(\text{state Hispanic/Latino proportion} \times \text{district Hispanic/Latino ID risk}) + \\ (\text{state American Indian or Alaska Native proportion} \times \text{district American Indian or Alaska Native ID risk}) + (\text{state Asian proportion} \times \text{district Asian ID risk}) + \\ (\text{state Native Hawaiian or Other Pacific Islander proportion} \times \text{district Native Hawaiian or Other Pacific Islander ID risk}) + (\text{state White proportion} \times \text{district White ID risk}) + \\ (\text{state children reported as two or more races proportion} \times \text{district children reported as two or more races ID risk})\end{array}$$

$$= \frac{(1 - 0.177547) \times 0.50771}{\begin{array}{c}(0.167951 \times 0.020160) + (0.004799 \times 0.035370) + (0.033589 \times 0.014839) + \\ (0.003433 \times 0.099057) + (0.575830 \times 0.020976) + (0.036851 \times 0.000945)\end{array}}$$

$$= \mathbf{2.529501}$$

ANSWER

In District 5, Black or African American children were 2.53 times as likely as all other children to receive special education and related services for ID when the risk ratio is weighted according to the racial/ethnic demographics of State A.

Example 6.2 Placement

In this example, the weighted risk ratio answers the question, "What is a specific racial/ethnic group's risk of receiving special education and related services in a particular educational environment category as compared to the risk for all other children when the risk ratio is weighted according to the racial/ ethnic demographics of the state?"

QUESTION

In District 8, what was the risk for Hispanic/ Latino children with disabilities receiving special education and related services inside the regular classroom < 40% of the school day as compared to the risk for all other children with disabilities when the risk ratio is weighted according to the racial/ethnic demographics of State A?

1. First, using the educational environment and child count data for District 8 in Exhibit 2, calculate the < 40% educational environment risk for each racial/ ethnic group.

- Calculate the < 40% educational environment risk for Hispanic/Latino children with disabilities in District 8 (do not round the results):

$$\textbf{Risk} = \frac{\text{Hispanic/Latino children in <40\% category}}{\text{Hispanic/Latino children with disabilities}}$$

$$= \frac{98}{778}$$

$$= 0.125964$$

- Calculate the < 40% educational environment risk for American Indian or Alaska Native children with disabilities in District 8 (do not round the results):

$$\text{Risk} = \frac{\text{American Indian or Alaska Native children in <40\% category}}{\text{American Indian or Alaska Native children with disabilities}}$$

$$= \frac{0}{17}$$

$$= 0.000000$$

- Calculate the < 40% educational environment risk for Native Hawaiian or Other Pacific Islander children with disabilities in District 8 (do not round the results):

$$\text{Risk} = \frac{\text{Native Hawaiian or Other Pacific Islander children in <40\% category}}{\text{Native Hawaiian or Other Pacific Islander children with disabilities}}$$

$$= \frac{2}{4}$$

$$= 0.500000$$

- Calculate the < 40% educational environment risk for Asian children with disabilities in District 8 (do not round the results):

$$\text{Risk} = \frac{\text{Asian children in <40\% category}}{\text{Asian children with disabilities}}$$

$$= \frac{18}{156}$$

$$= 0.115385$$

- Calculate the < 40% educational environment risk for White children with disabilities in District 8 (do not round the results):

$$\text{Risk} = \frac{\text{White children in <40\% category}}{\text{White children with disabilities}}$$

$$= \frac{257}{2{,}520}$$

$$= 0.101984$$

- Calculate the < 40% educational environment risk for Black or African American children with disabilities in District 8 (do not round the results):

$$\text{Risk} = \frac{\text{Black or African American children in <40\% category}}{\text{Black or African American children with disabilities}}$$

$$= \frac{101}{752}$$

$$= 0.134309$$

- Calculate the < 40% educational environment risk for children with disabilities reported as two or more races in District 8 (do not round the results):

$$\text{Risk} = \frac{\text{Children reported as two or more races in <40\% category}}{\text{Children reported as two or more races with disabilities}}$$

$$= \frac{26}{146}$$

$$= 0.178082$$

2. Next, using child count data in Exhibit 2, calculate the proportion of children with disabilities in State A who are in each racial/ethnic group using the data in Exhibit 2.

- Calculate the proportion of children with disabilities in State A who are Hispanic/Latino by dividing the number of Hispanic/Latino children with disabilities in State A by the number of children with disabilities in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Hispanic/Latino children with disabilities}}{\text{All children with disabilities}}$$

$$= \frac{5{,}789}{40{,}244}$$

$$= 0.143848$$

- Calculate the proportion of children with disabilities in State A who are American Indian or Alaska Native by dividing the number of American Indian or Alaska Native children with disabilities in State A by the number of children with disabilities in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{American Indian or Alaska Native children with disabilities}}{\text{All children with disabilities}}$$

$$= \frac{190}{40{,}244}$$

$$= 0.004721$$

- Calculate the proportion of children with disabilities in State A who are Asian by dividing the number of Asian children with disabilities in State A by the number of children with disabilities in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Asian children with disabilities}}{\text{All children with disabilities}}$$

$$= \frac{1{,}308}{40{,}244}$$

$$= 0.032502$$

- Calculate the proportion of children with disabilities in State A who are Black or African American by dividing the number of Black or African American children with disabilities in State A by the number of children with disabilities in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Black or African American children with disabilities}}{\text{All children with disabilities}}$$

$$= \frac{10{,}052}{40{,}244}$$

$$= 0.249776$$

- Calculate the proportion of children with disabilities in State A who are Native Hawaiian or Other Pacific Islander by dividing the number of Native Hawaiian or Other Pacific Islander children with disabilities in State A by the number of children with disabilities in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Native Hawaiian or Other Pacific Islander children with disabilities}}{\text{All children with disabilities}}$$

$$= \frac{124}{40{,}244}$$

$$= 0.003081$$

- Calculate the proportion of children with disabilities in State A who are White by dividing the number of White children with disabilities in State A by the number of children with disabilities in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{White children with disabilities}}{\text{All children with disabilities}} = \frac{20{,}886}{40{,}244} = 0.518984$$

- Calculate the proportion of children with disabilities in State A who are reported as two or more races by dividing the number of children with disabilities reported as two or more races in State A by the number of children with disabilities in State A (do not round the results):

$$\textbf{Proportion} = \frac{\text{Children with disabilities reported as two or more races}}{\text{All children with disabilities}} = \frac{1{,}895}{40{,}244} = 0.047088$$

3. Calculate the weighted risk ratio:

$$\textbf{Weighted risk ratio} = \frac{(1 - \text{state Hispanic/Latino proportion}) \times \text{district Hispanic/Latino <40\% risk}}{\begin{array}{c}(\text{state American Indian or Alaska Native proportion} \times \text{district American Indian or Alaska Native <40\% risk}) + (\text{state Asian proportion} \times \text{district Asian <40\% risk}) + \\ (\text{state Black or African American proportion} \times \text{district Black or African American <40\% risk}) + \\ (\text{state Native Hawaiian or Other Pacific Islander proportion} \times \text{district Native Hawaiian or Other Pacific Islander <40\% risk}) + (\text{state White proportion} \times \text{district White <40\% risk}) + \\ (\text{state two or more races proportion} \times \text{district children reported as two or more races <40\% risk})\end{array}$$

$$= \frac{(1 - 0.143848) \times 0.125964}{\begin{array}{c}(0.004721 \times 0.000000) + (0.032502 \times 0.115385) + (0.249776 \times 0.134309) + \\ (0.003081 \times 0.500000) + (0.518984 \times 0.101984) + (0.047088 \times 0.178082)\end{array}}$$

$$= \textbf{1.076803}$$

ANSWER

In District 8, Hispanic/Latino children with disabilities were 1.08 times as likely as all other children with disabilities to receive special education and related services inside the regular classroom < 40% of the school day when the risk ratio is weighted according to the racial/ethnic demographics of State A.