Understanding Common Measures of Disproportionality

This fact sheet was developed to provide illustrations of the measures used to understand disproportionality related to various groups of children and a particular factor or outcome. This document focuses on children grouped by race/ethnicity. However, there are other groups you might also want to review (e.g., gender, dual language learners, children with IEPs). We provide an example of the calculation of these measures using the completion of a Behavior Incident Report (BIR) for a child. These measures of disproportionality are also used to examine other variables of interest, including suspensions, expulsions, or referrals for services.

**Child Composition**

The child composition value is the percentage of children who receive BIRs who belong to a specific focal group.

In the following example, there are a total of 15 children with at least 1 BIR. Of those 15 children, 5 are Black or African American.

To calculate child composition, divide the number of children in your focal group (i.e., group of interest) with at least 1 BIR by the total number of children in the program with at least 1 BIR, including those in the focal group. Following the example above, divide the number of Black or African American children with at least 1 BIR (5) by the number of children with at least 1 BIR (15). This equals 0.33. Multiply this by 100 to get 33%. This value represents the number of children with BIRs from your focal group.

\[
\frac{\text{# of Black or African American children with at least 1 BIR}}{\text{Total # of children with at least 1 BIR}} = \frac{5}{15} = 0.33 \times 100 = 33\%
\]

In the BIRS Excel spreadsheet, this value is compared to the total enrollment for the focal group. If the calculated child composition value exceeds the expected value for the focal group, given the enrollment for that group, an equity alert will be activated. *This alert will remain displayed as the value can only change if enrollment for the group changes significantly.*
Risk and Risk Ratio

Risk measures the percentage of children in a group who have at least one incident. It can be used to assess how much a group is affected by having a BIR. The risk ratio is calculated by comparing the risk of the focal group to the risk of the comparison group. This value is the best single measure to summarize a group’s risk. Please note: At least 15 children are needed in the focal and comparison groups for the risk ratio to be a stable and meaningful measure.

In the following example, there are a total of 45 children enrolled in the program. Of the 45 children, 15 are Hispanic or Latino of any race. This is the focal group. Of the 15 Hispanic or Latino children, 5 have at least 1 BIR. There are 30 children who are not Hispanic or Latino (the comparison group), and of those 30 children, 10 have at least 1 BIR.

First, calculate risk for each group by dividing the number of children in the group with at least 1 BIR by the number of children in that group enrolled in the program. Do this for both the focal group and comparison group. Multiply the resulting value by 100 to get a percentage. Following the example above, divide the number of Hispanic or Latino children with at least 1 BIR (5) by the number of Hispanic or Latino children enrolled in the program (15). This equals 0.33. Multiply this value by 100 to get the risk value of 33%. Next, divide the number of all other children with at least 1 BIR (10) by the number of all other children enrolled in the program (30). This also equals 0.33. Multiply by 100 to get the risk value of 33%.
Next, calculate the risk ratio by dividing the risk of the focal group by the risk of the comparison group. Following the example, divide 33% by 33% to get a value of 1.0. This value is the risk ratio for Hispanic or Latino children.

To interpret the risk ratio value, use the table below. Values of 1.0 can be interpreted as equal risk. In other words, the risk of the focal group is no greater than the risk of the comparison group. Values over 1.0 should be examined further.

### BIR Composition

The BIR composition value examines the number of BIRs for your focal group compared to the total number of BIRs in the program. Unlike the other measures, BIR composition is impacted by children with multiple BIRs.

In the following example, there are a total of 30 BIRs in the program. Of the 30 BIRs, 9 are for Black or African American children. The remaining 21 BIRs are for all other children.

Calculate the BIR composition value by dividing the number of BIRs for the focal group by the total number of BIRs in the program. Following the example above, there are 9 BIRs written for Black or African American children. Divide this value by the total number of BIRs in the program (30). This gives a value of 0.3. Multiply this value by 100% to get the BIR composition value of 30%.

<table>
<thead>
<tr>
<th>Risk Ratio Value</th>
<th>Level of Disproportionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Equal risk</td>
</tr>
<tr>
<td>1.25</td>
<td>25% higher risk</td>
</tr>
<tr>
<td>1.50</td>
<td>50% higher risk</td>
</tr>
<tr>
<td>2.00</td>
<td>Two times higher risk</td>
</tr>
<tr>
<td>2.50</td>
<td>2.5 times higher risk</td>
</tr>
<tr>
<td>3.00</td>
<td>3 times higher risk</td>
</tr>
<tr>
<td>&gt;3.00</td>
<td>Yikes!</td>
</tr>
</tbody>
</table>

*Check for small n if your ratio exceeds 7.0*
Additional Metrics

Multiple metrics are needed to measure disproportionality. Below are additional metrics teams can use to guide discussion and decide when and how to intervene.

**BIR Ratio**

The BIR Ratio is the rate of BIRs for a specific group of children divided by the BIR rate of all other children. A value of 1.0 is considered equal.

**BIR Rate**

The BIR Rate is calculated by dividing the total number of BIRs for a group of children by the number of children enrolled in that group.

**Difference in Child Composition**

The Difference in Child Composition value is calculated by subtracting the child composition value from the percent of child enrollment. Positive values suggest disproportionality.

**Difference in BIR Composition**

The Difference in BIR Composition value is calculated by subtracting the BIR Composition value from the percent of child enrollment. Positive values suggest disproportionality.

**E-Formula**

If a group’s Child Composition is greater than the e-formula value, disproportionality is indicated. This value is designed for “small-n” scenarios.

**BIR System Excel Spreadsheet**

The BIRS Excel spreadsheet calculates the measures presented in this document when users input enrollment counts by all of the demographic variables. An alert is displayed if a value exceeds what is expected for that group indicating there may be an issue of disproportionate discipline. For more information about using the equity alerts and tabs within the spreadsheet please review the Behavior Incident Report System Data Decision-Making Guide.

Equity Profile alerts are displayed on the Program Summary tab of the BIRS Excel spreadsheet to alert the user to review disproportionality measures in the equity profile tabs. Below is an example of how equity alerts are displayed on the program summary tab.

Clicking on an alert will display the corresponding Equity Profile tab. Below is an example of a part of the equity profile. The equity profile has calculated values for each measure in the table as well as statements for each measure displayed by group.
### Race/Ethnicity Equity Profile for Incident Frequency

Report Date: 12/11/2000 11:55

#### Race/Ethnicity Equity Profile

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Number of Children Enrolled at the School*</th>
<th>Number of Children in Group with a BIR</th>
<th>Total Number of BIRs from Group</th>
<th>Group's Percent Enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian or Alaskan Native</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0.7%</td>
</tr>
<tr>
<td>Asian</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>7.2%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>10</td>
<td>1</td>
<td>39</td>
<td>3.6%</td>
</tr>
<tr>
<td>Hispanic or Latino of any race</td>
<td>155</td>
<td>29</td>
<td>392</td>
<td>56.5%</td>
</tr>
<tr>
<td>Native Hawaiian or Other Pacific Islander</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Two or more races</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>7.2%</td>
</tr>
<tr>
<td>White</td>
<td>68</td>
<td>8</td>
<td>298</td>
<td>24.6%</td>
</tr>
</tbody>
</table>

#### Guiding Question 1: Are outcomes equitable for all groups?

- Child Composition
- BIR Ratio
- BIR Rate
- Risk Ratio

#### Guiding Question 2: How big are the disparities?

- Difference in Child Composition
- Difference in BIR Composition
- Risk

#### Guiding Question 3: Which groups are impacted by disproportionate enforcement?

- Child Composition minus the percent of the child enrollment; positive values suggest disproportionality
- BIR Composition minus the percent of the child enrollment; positive values suggest disproportionality

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Each measure is calculated for each group.

Values exceeding what is expected are highlighted.

(Please note: only Child Composition and Risk Ratio columns)

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Statements for each measure by group.

### Understanding Common Measures of Disproportionality

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