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# **Disparity Index Computation Database User's Manual**

*Prepared for:*

Justice Research and Statistics Association

*Prepared by:*

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## Introduction

The Disparity Index Computation Database allows users to assess the level of racial/ethnic disparity at various stages of the criminal justice system process (i.e., disproportionate minority representation). This database can be used to determine whether a disparity exists and, in most cases, it can help determine where in the process disparity is being introduced.

The database is a single-user Microsoft Access system designed to handle one interpretation of one system process. The database can handle multiple categorizations of cases within that process, and the interpretation can include up to 250 system process steps.

Although the database can be used to assess disparity in any system, the examples used in this manual demonstrate the functionality of the database as it pertains to the assessment of racial disparity in the juvenile justice system.

### *The Basics*

This manual is intended to be accessible to everyone, including those who have not tried to assess disproportionate minority representation (DMR) before and those who have never before worked with MS Access. For those who have had some exposure to DMR or Microsoft Access, there are sections of this manual that will appear to be overly simplistic. For others, the manual may be complex at first. Given that assessing DMR is a complex problem, we decided to confront the complexity, but to try to keep that complexity in the manual and not in the database. Once you get through this manual, you will find the database easy to use.

Two things may help you have an easier time as you progress through this manual.

- 1) Make a copy of the database as a “tutorial” database.<sup>1</sup> Go to the forms as you read about them in this documentation, so you can more easily see what is being discussed.
- 2) Photocopy the flow chart on page 2. It will be easier to follow the examples given in this documentation as we use Illinois’ juvenile justice system process as the example.

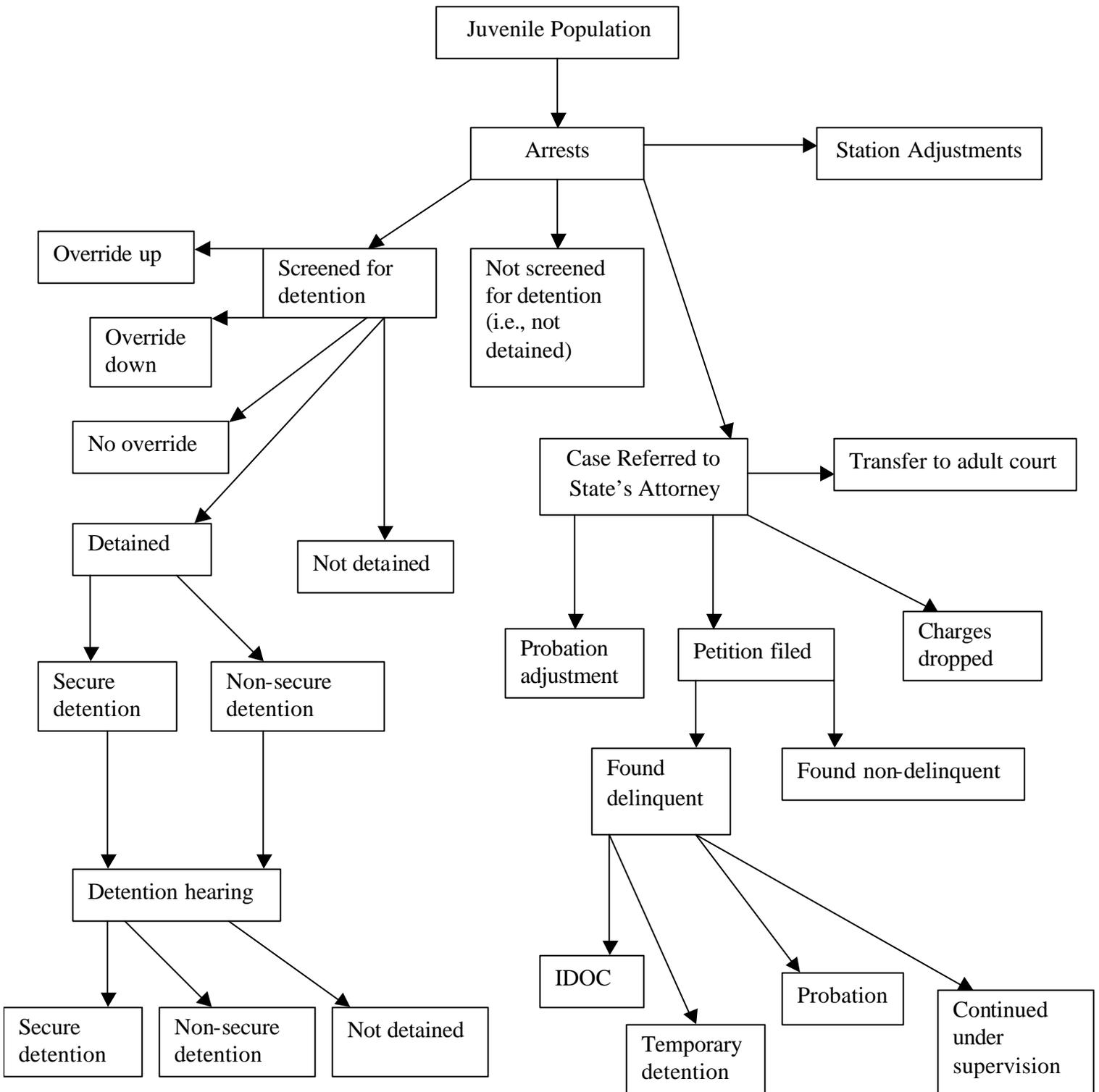
### *A Flow Chart of Illinois’ Juvenile Justice System Process*

To help the user learn how to use the database to assess DMR in a justice system process, Illinois’ juvenile justice system process is used as an example. The flow chart in Figure 1 shows some of the paths a minor’s case can take in a juvenile justice system.

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<sup>1</sup> The database file can be copied in the same way as any Microsoft file. We also recommend that you make a copy of the original for backup purposes. Further, if you wish to deal with multiple systems or multiple interpretations of the same system, you can make a copy of the database file and use the copy to create the new interpretation.

**Figure 1: Example Flow of a Juvenile Justice System<sup>2</sup>**



<sup>2</sup> As juvenile justice system professionals will notice, the flow chart used in this document does not capture all the possible paths of the juvenile justice system process. This flow chart was created with the specific purpose of aiding the user in understanding the functions of the database.

### *The Decisions the User Must Make*

The user decides what events in the system to track (i.e., grid points) and what variables will be used (e.g., race, ethnicity, sex, etc.).

#### *Grid Points*

These are the decision points and outcomes at which the user wants to assess levels of disparity. For example, an arrest (a decision point) can result in a station adjustment (an outcome) or a referral to court (both an outcome and a decision point). In addition to the description of the grid point, the user needs to number the grid points. Although it is not required, it makes sense to number the grid points in a manner that is consistent with the flow of the system.

#### *Variables*

The database was created with three variables already programmed for the user: race, ethnicity, and sex. Later in the manual, the procedure to be followed for creating new variables, including interactions between multiple variables, will be discussed.

#### *Reports*

The database is pre-programmed to give the user an option between two reports, a “Main Report” and a “Point-to-Point Report.” These reports show the representation and disparity indices at every point in the system (Main Report) or between any two points selected by the user (Point-to-Point Report). Both reports show both indices of disparity in the system; one based on the population at large (Representation Index) and the other based on the population at the previous point in the process (Disparity Index).

#### *Main Report*

This report will automatically provide the user with the Representation Index (RI) and the Disparity Index (DI) for every decision point and outcome in the system, by each variable selected by the user (i.e., race, ethnicity, sex, etc.).

#### *Point-to-Point Report*

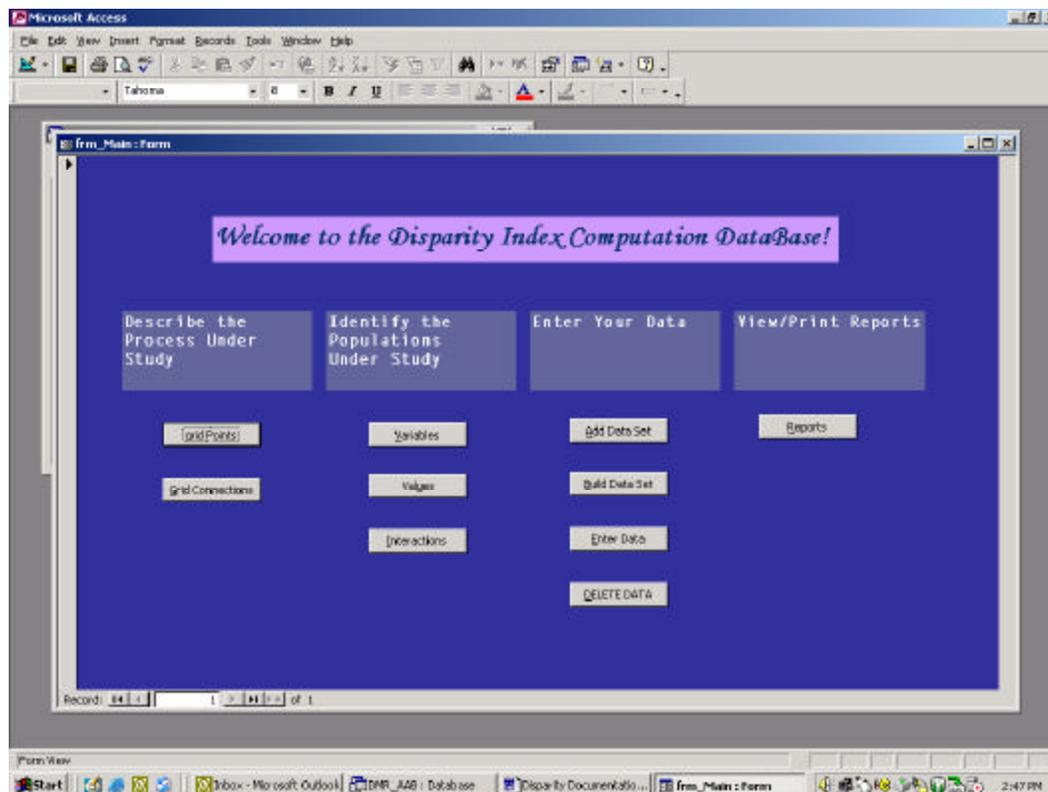
This report limits its analysis to any two points in your system. For example, the user may want to know if disparity is evident for the outcomes of the cases that reached the “delinquency petition filed” stage. This is useful if disparity is identified at the “delinquency petition filed” stage and the user wants to know if further disparities are introduced in the system after delinquency petitions are filed. In this example, the origin point is “delinquency petition filed” point and the destination point is any point that comes after the “delinquency petition filed” point. This report allows users to narrow the focus of a report to the points of the system in which they are most interested.

## *Using the Database*

Before using the database, users must have Microsoft Access installed on their computer or network. Fortunately, using this database does not require the user to know very much about Microsoft Access.

To open the database, double click on the icon (if loaded to your desktop) and you will see the Main Form. Many different forms will open for you as you work with the database.

**Figure 2: Main Form of the Database**



The database is designed to make the process of entering data and assessing disparity in a system quick and easy. However, getting to the point of data entry and assessing disparity requires considerable thought as to the flow of the system and subsequent availability of data for each decision point in the system.

It is strongly recommended that the user create a flow chart to help understand how cases move through the system. Of specific importance are the points in the system where decisions are made (i.e., decision points) to keep the juvenile in the system, versus diverting the juvenile out of the system, and where less punitive and more punitive decisions are made. These are the decision points where disparity is of most concern. Put another way, it is important for juvenile justice system personnel to understand where they are treating youth differently, and why that is the case. This database allows the user to answer the first of these two important questions.

Once you have an image of the process (i.e., a flow chart), you can begin to build the database that will allow you to enter the data for each of the decision points identified in the flow chart. The database has been programmed to look at all your grid points and variables and creates all the records you need for creating a new data set.

If the user discovers errors in the flow chart or specification of the decision points and issues the “BUILD IT!” instruction, the user will have built the data set improperly and the program will produce incorrect results. The system provides you a way to get out of this trap quickly. When the user realizes this, the user can hit the “DELETE DATA” button, pick the data set to delete, and delete it. Then, the user can fix whatever was wrong, hit “BUILD IT” again, and the problem will be gone. This loss of time will be about two minutes. However, if you spent an hour’s worth of time entering data AFTER the undesirable “BUILD IT” command, this data entry will also need to be repeated. Therefore you should try to get your system entered correctly before hitting the “BUILD IT” button.

Understanding the process and getting it defined in a computer-friendly way is the hard part. Once this is done, entering the data into the computer is not difficult.

### *Recreating your juvenile justice system*

In the example provided earlier in this manual, a flow chart of the juvenile justice system process was created to guide the identification of grid points (i.e. decision points and possible outcomes). The database is preset to include general population and arrests as points at which data must be entered in order to assess disparity in a criminal justice system. From the flow chart, users can identify the points at which they will enter data. More importantly, the flow chart can be used to guide the creation of grid point connections; essentially the paths that a case can follow through the system. Any link between two decision points or outcomes is a grid point connection.

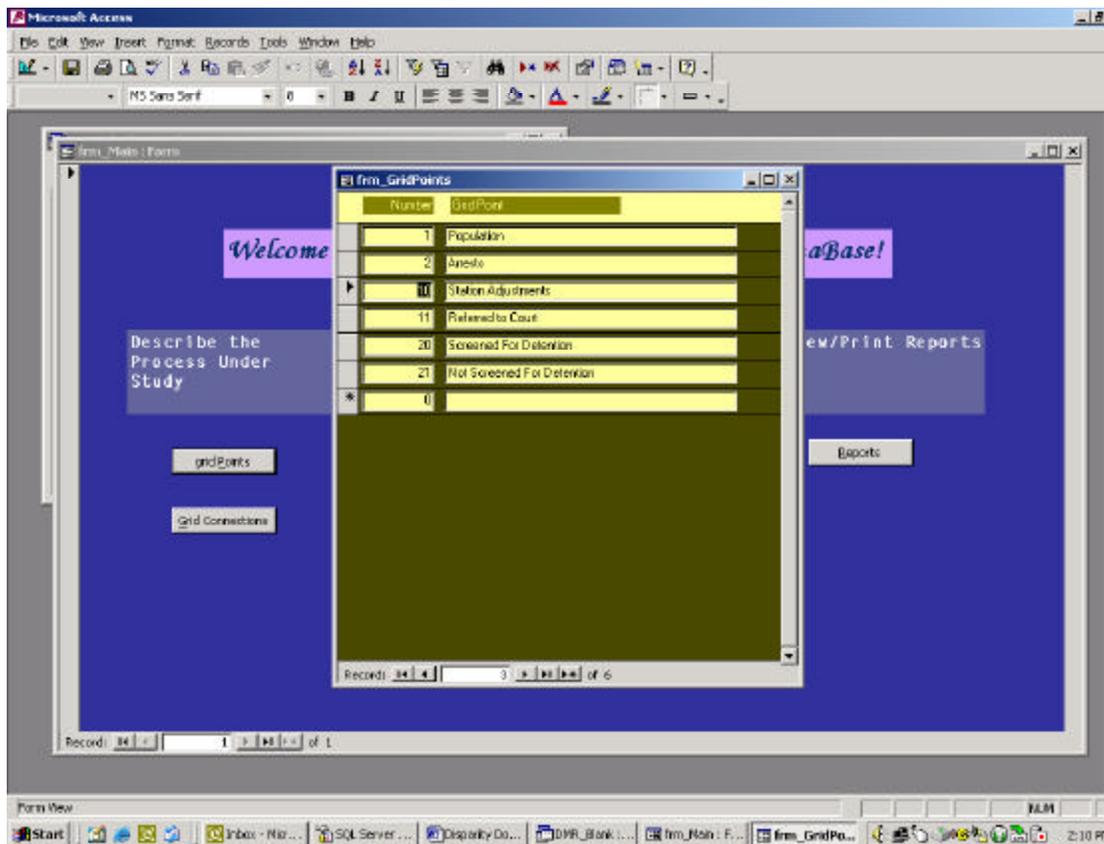
### *Identifying the variables by which disparity will be identified*

Already included in the database are the variables: race, ethnicity, and sex. These variables will allow the user to assess disparity by these characteristics. Of course, the user chooses the variables of interest, and the flexibility of this database allows the user to identify other variables (e.g., participation in an intervention program) by which disparity can be assessed.

### *Entering the Grid Points*

After you have identified the decision points in the process, the outcomes of the process, and the connections between them, you are ready to begin constructing your database. Click the “Grid Points” button on the main form to begin. The form shown in Figure 3 will appear.

**Figure 3: Grid Point Entry Form**



The two fields are the number of the grid point and the description of it. Using your flow chart as a guide, the user should enter in the grid point number and grid point description for all the decision points and outcomes in this table. Although the order in which the grid points are entered isn't important (later you will enter the connections between grid points), following a logical order is recommended.

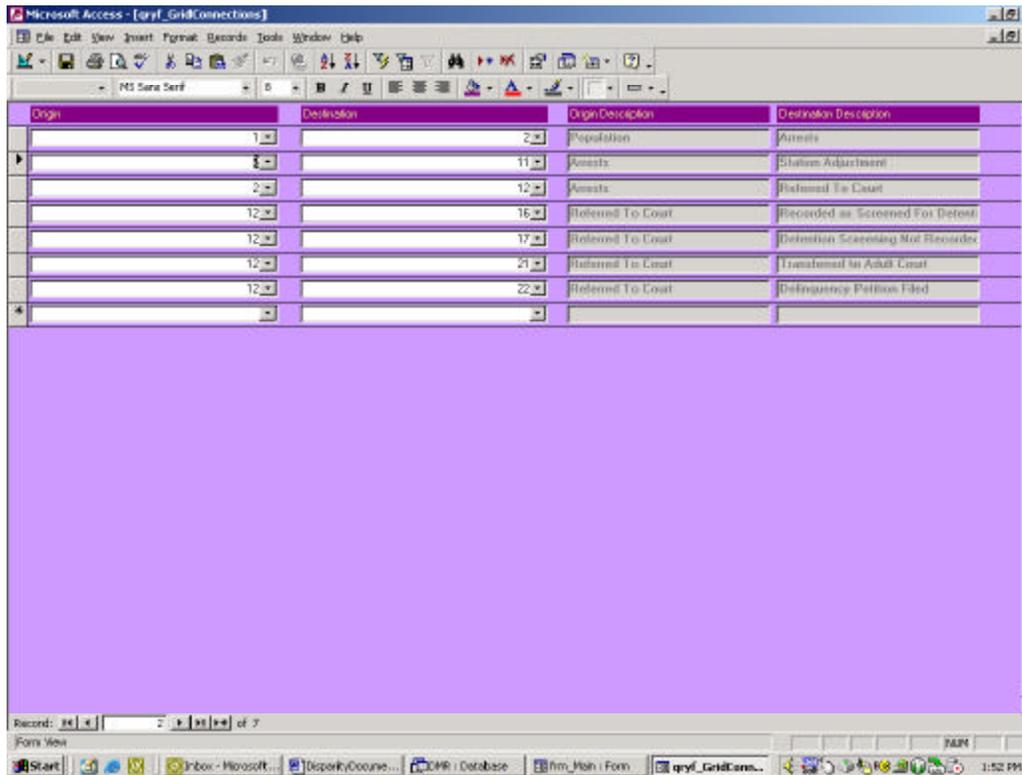
Grid point 1 is always population – you aren't supposed to change that. Grid point 2 is "Arrests" – you should not change the number of grid point 2, but if the first event to occur to your population is something other than Arrests, you can change the title as you choose.

### *Entering the Grid Connections*

Grid connections are the links between two grid points in the system. In our example flow chart, the possible outcomes stemming from the filing of a delinquency petition are the youth being found delinquent or the youth being found non-delinquent. By entering the connections (represented as arrows on our flow chart) you allow the computer to determine how the grid points are connected. The connection between Grid Point 1 and Grid Point 2 has already been entered for you.

After clicking the "Grid Connections" button at the bottom of the left column of the main screen, you will see the screen shown in Figure 4.

**Figure 4: Example Grid Connections Screen**



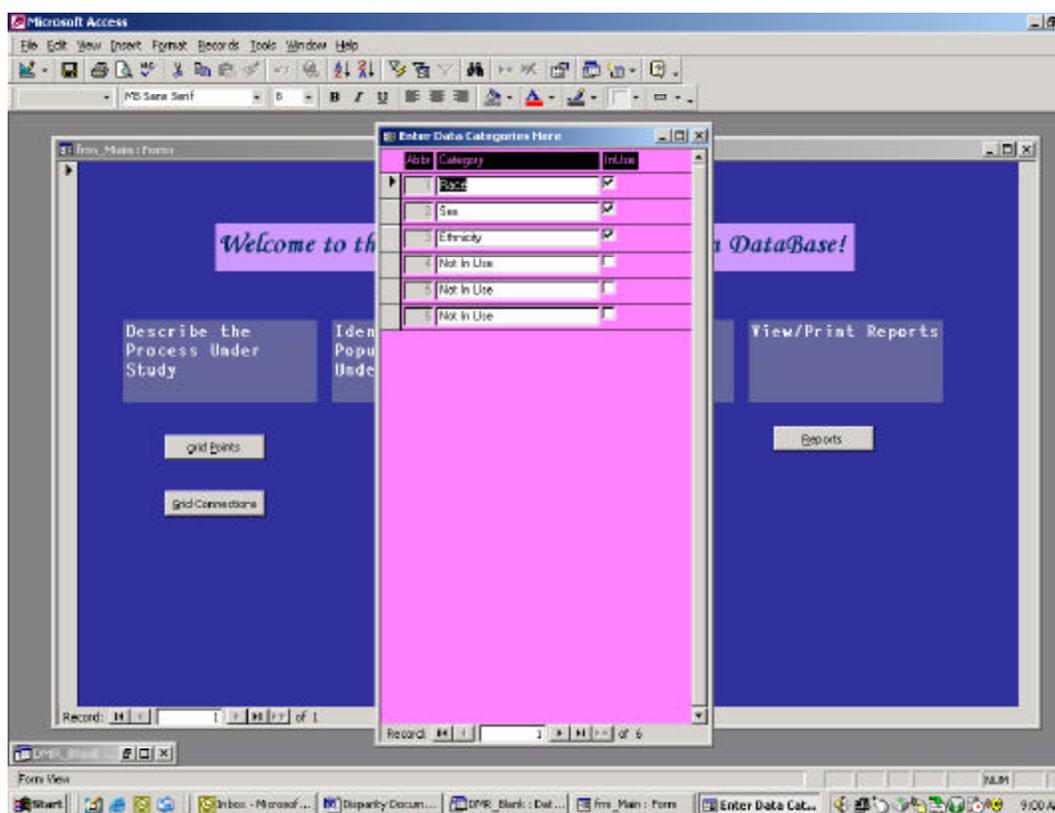
For every arrow on your flow chart, you will type the number of the origin point in the “origin” field, and the number of the destination point in the in the “destination” field. The gray shaded boxes to the right of the screen will tell you the names of the fields you have selected. It is important to remember that if you have set up the flow chart as we recommend with lower numbers flowing into higher numbers, every destination point must have a number higher than its origin point.

*Entering the variables*

Although the database is programmed with race, ethnicity, and sex already as pre-established variables, the user has the ability to enter other variables of interest. For example, if the user is interested in disparity by age or level of income, the user can create these variables and the database will calculate indices based on these variables. For example, in Cook County, IL, there are important differences in the populations of Chicago and the surrounding suburbs. In our assessment of racial disparity in Cook County’s juvenile justice system, we not only looked at racial disparity, but also racial disparity by sex and location.

To enter the names of the variables you create, click the “Variables” button on the main page. The screen shown in Figure 5 will appear.

**Figure 5: Variable Name Screen**



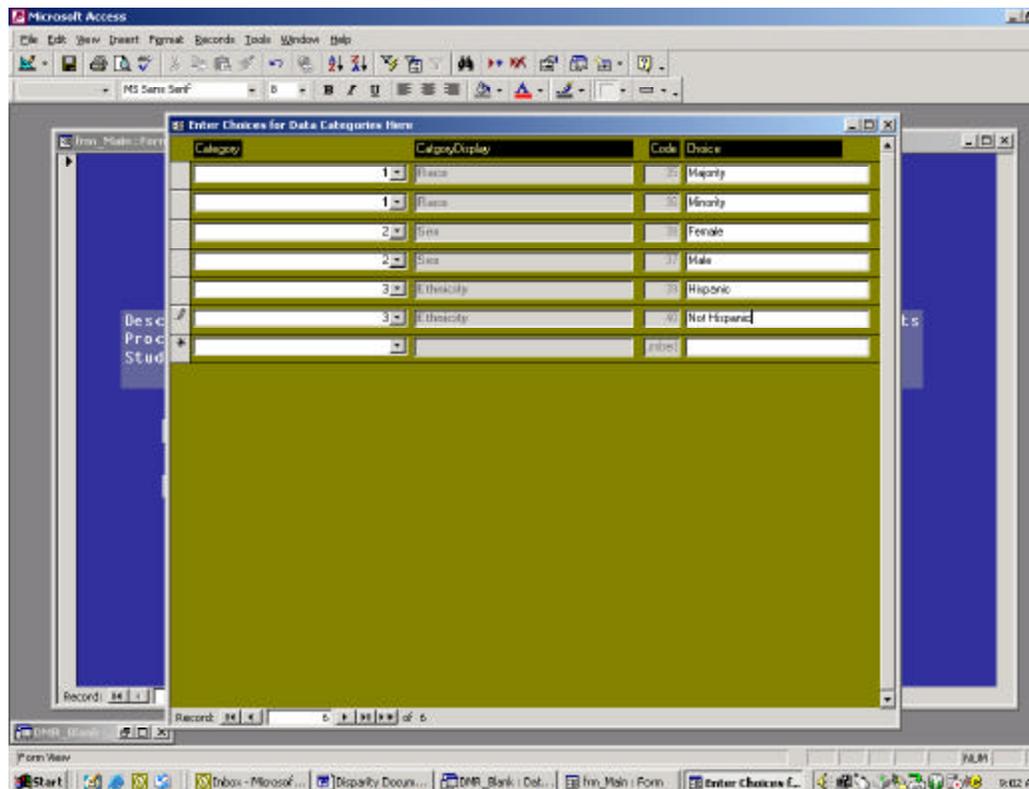
As can be seen, there are spaces for you to enter up to six variable names. To use a variable in the analysis, the user needs to type in its name and click on the “In Use” check box to indicate that it is a variable that will be used in the analysis.

This form will not allow the user to delete or add any records. Users will always have exactly six variables available, although all of them do not have to be used. If the user would like to do analysis of disparity by more than the three new variables for which there is room (remember that race, sex, and ethnicity are three variables that are preprogrammed), any of the preprogrammed variables can be deleted and new values added. For example, if the user wanted to conduct disparity analysis on race, ethnicity, age, income, felony/misdemeanor, and location, the sex variable can be deleted to make room for one of the other variables. Another option would be to copy the master database and conduct separate analyses in separate databases. Either of these options will allow the user to succeed in the analysis.

#### *Entering values for the variables*

Once the variables have been entered, for any new variable(s) the user must identify the values to be used (e.g., for the Sex variable we have male and female. For your new variables, you need to tell it what the choices are.). To get to the form in which values are to be entered, the user should click on the button titled “Values” on the main form of the database. The user can then enter the numbers corresponding to the variables that have been created.

**Figure 6: Example Form for entering variable values**



Of the four columns on the form, the user is required to enter only two. In the first column the user inputs the number of the variable of interest. For each variable value that exists the user must enter the variable number. For example, if “Participant in Training Program” is a variable the user created and it has two values (e.g., Participant, Non-Participant), the number corresponding to the sex variable must be entered twice. The database will use the second column to display the name of the variable the user has entered. The third column is an internal computer code. In the fourth column the user enters the text names of the variables. You can also modify the pre-programmed variables on this form. For example, if you have some data in which race is not supplied, you might need to add a “Not Known” value to the race variable.

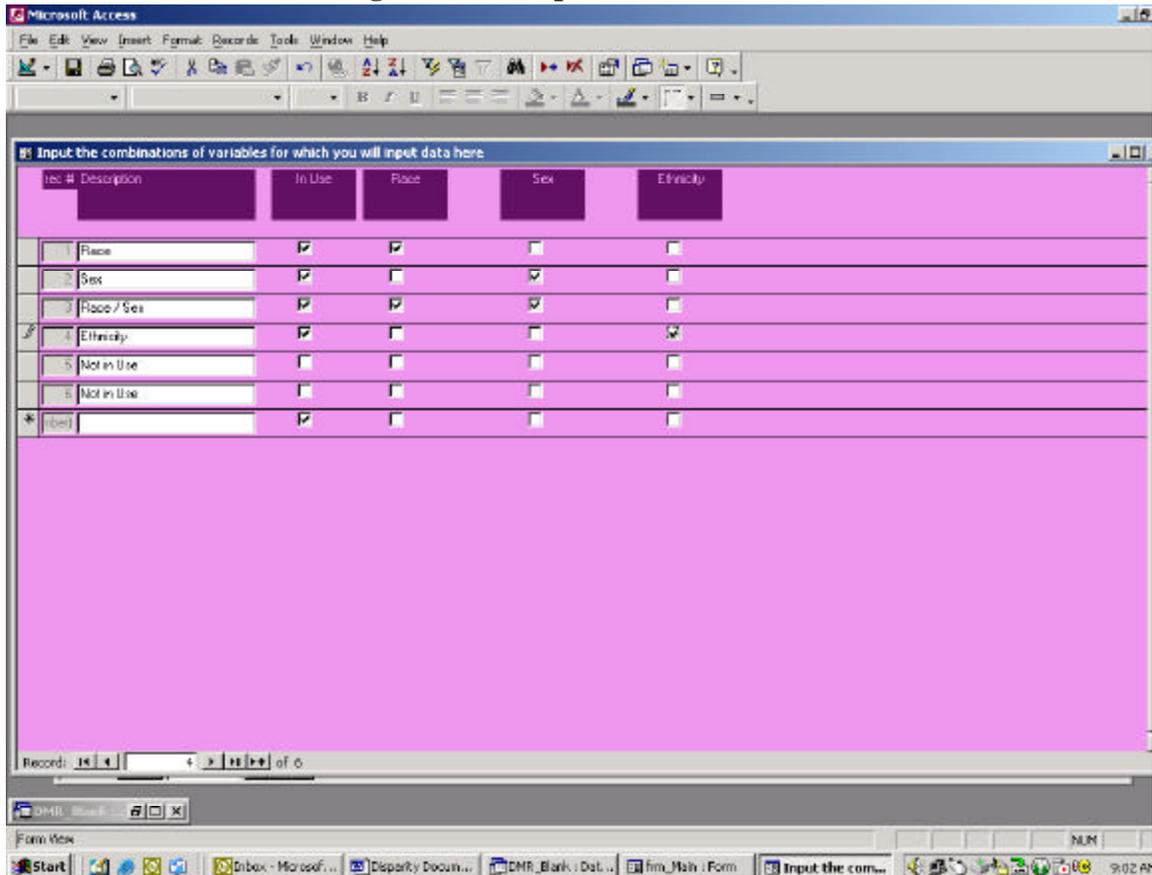
### *Combining variables*

The database also allows users to identify combinations of variables to be used in the analysis. For example, in addition to assessing disparity by race and sex, the user may want to know the disparity indices for interactions between these terms. In our report for Cook County, we not only assessed disparity by race, sex, and location, we also developed disparity indices for the combination of these variables (e.g., female African-American, male African-American, female White, male White, etc.).

By clicking on the button titled “Interactions” on the main form, the user can review the variables selected for analysis and create new variables that are combinations of existing

variables. In the example screen in Figure 7, across the top of the form are the variables that have been identified as being used for analysis. To create a new variable that is a combination of two or more pre-existing variables, users need to fill in the new variable name in the first column and check the boxes in the row pertaining to the new variable that is under the pre-existing variables. In Figure 7, a race/sex variable has been created.

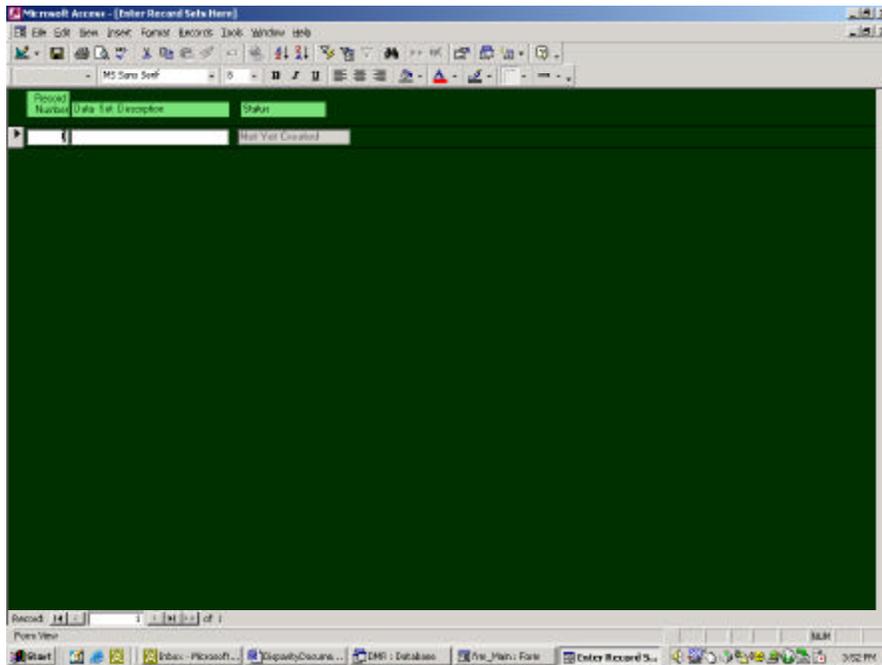
**Figure 7: Example Interactions Screen**



### *Building the Data set*

After creating your system, naming the decision points and outcomes, and defining the variables of interest, the database will create a form into which the user can enter the data. The first step is to name the data set. Often different data sets will represent different years, of data. Thus, if you have data from 2000 and 2001, you can get reports for both years without needing to re-enter you flow chart and variable choices. You will just create one data set for 2000, and another for 2001. When 2002 data are available to you, you will be able to create another data set for that. These are the steps you will follow. Click the button on the main form labeled, “Add Data Set.” Figure 8 shows the form that will appear after clicking “Add Data Set.”

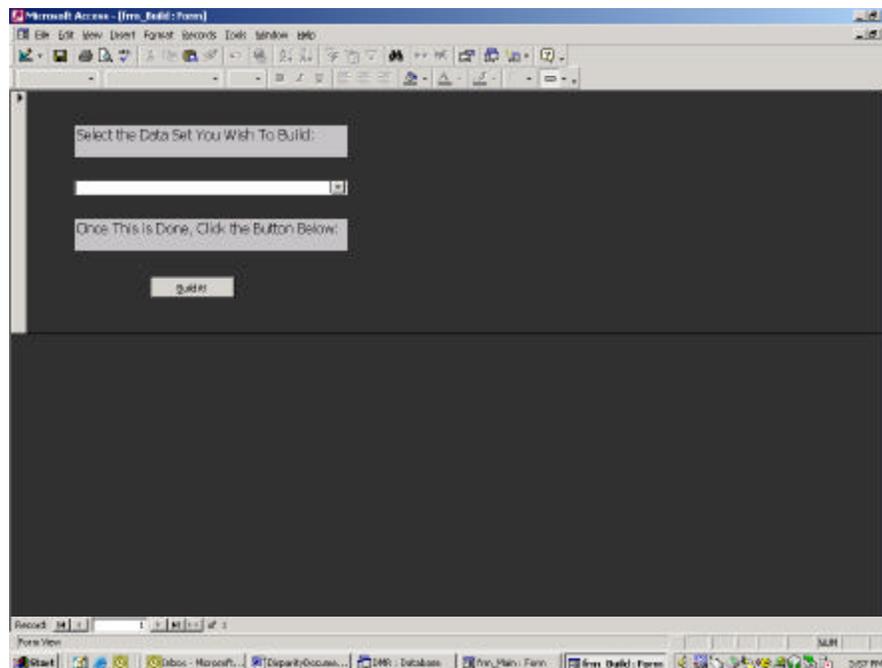
**Figure 8: “Add Data Set” Form**



Note that the gray shaded “Status” area indicates that the data set has not yet been created. Once you have named the data set, the user can close this form. After the data set has been named, the next step is to instruct the database to build the data set.

After clicking the button titled “Build Data Set,” the screen in Figure 9 will appear.

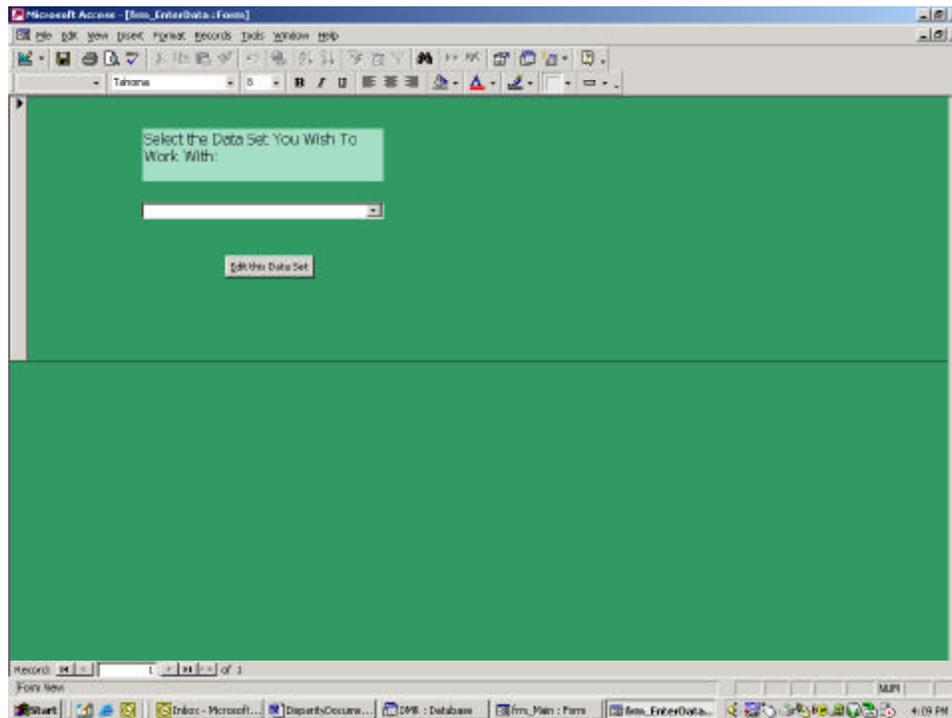
**Figure 9: “Build Data Set” Screen**



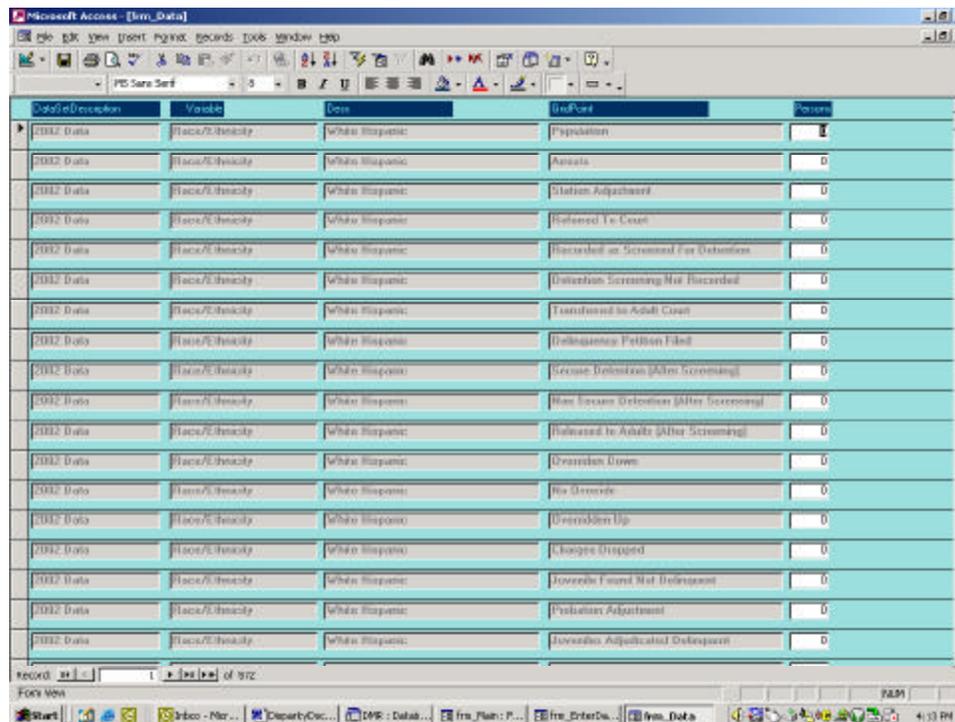
The user should use the drop down box to select the data set to be built. The next step is to click on the “Build It!” button. The data set will be built and the user will be returned to the main screen.

To enter data into a data set, users should click on the “Enter Data” button and a screen similar to that in Figure 10 will appear. On this screen all the user needs to do is select the data set into which the user wants to add data. If the data set has not been built yet, the name of the data set will not appear. Once users have selected the data set with which to work, they should click “Edit this Data Set” to make the data entry form appear (see Figure 11 for an example).

**Figure 10: “Enter Data” Screen**



**Figure 11: Data Entry Form Screen**



### Creating Reports

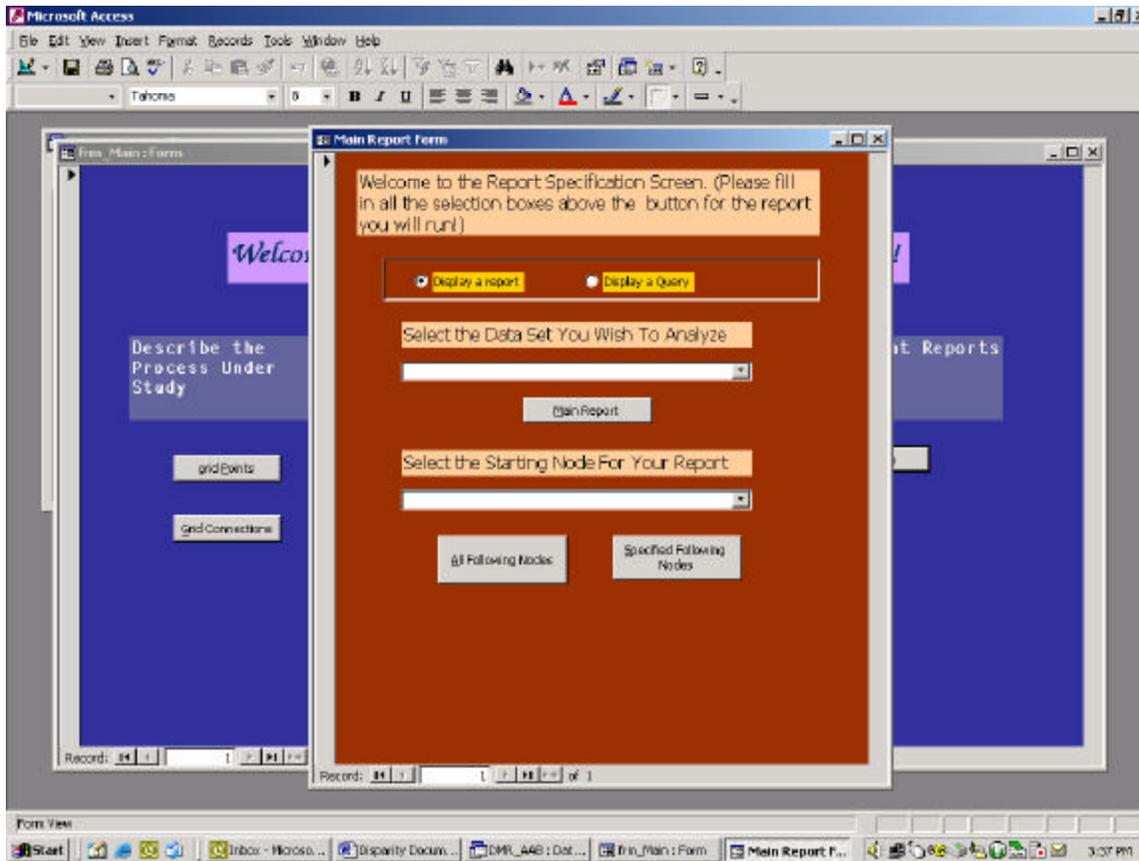
As discussed earlier, users are able to generate two different reports from their data, a “Main Report” and a “Starting Point Report.” The “Main Report” will display the Representation Index and Disparity Index for all decision points and outcomes in the user’s system. The “Starting Point Report” displays the Representation Index and Disparity Index for a destination point (i.e., the point at which disparity is to be assessed) based on the user’s selection of an origin point (i.e., the starting point at which the Representation Index and Disparity Index will be calculated).

By clicking on the “Reports” button, a report specification screen will appear (see Figure 12). This screen asks users to identify the data set from which the reports are to be generated. After identifying the data set, users have a choice between the “Main Report” and the “Starting Point Report.” After clicking on the button titled “Main Report,” the database will calculate the Representation Index and Disparity Index for all the points in the system and display them on screen. If the user wants a “Starting Point Report,” where a grid point is used as the starting population, the user will select the starting node. Then the user can click the

button for “All Following Nodes” or can select which following nodes to analyze by clicking on the “Specified Following Nodes” button.

For the “Main Report” and the “All Following Nodes” report, the user can select “Display a Query” instead of as “Display a Report.” This is done in the radio control box at the top of the form. If “Display a Query” is chosen, the results will be formatted for downloading to a spreadsheet or other analysis package. “Display a Report” is better for viewing on the screen or printing.

**Figure 12: Report Specification Screen**



## Example Reports

The “Main Report” generated by the database shows the Representation Index and the Disparity Index for each point in the system by each variable selected for analysis. Figure 13 is an example of a “Main Report.” The “Main Report” and the “Point-to-Point Report” are formatted similarly. These reports are straightforward, giving the user the variables used in the report, the population, the number individuals at the previous point in the system, the number of individuals at each point in the system, and the Representation Index and Disparity Index for each variable.

**Figure 13: Example of Main Report**

## *Disparity Index DataBase Main Report*

### *Test Data*

	<i>Population</i>	<i>Persons at Previous Point(s)</i>	<i>Persons at This Grid Point</i>	<i>Disparity By Population (DI)</i>	<i>Disparity From Previous Point(s) (RI)</i>
<b>Arrests</b>		<b>Race</b>			
Majority	400,000	400,000	3,333	0.73	0.73
Minority	100,000	100,000	2,357	2.07	2.07
<i>Summary for Arrests (2 detail records)</i>					
	500,000	500,000	5,690		
<b>Screened</b>		<b>Race</b>			
Majority	400,000	3,333	3,193	0.73	0.99
Minority	100,000	2,357	2,307	2.1	1.01
<i>Summary for Screened (2 detail records)</i>					
	500,000	5,690	5,500		
<b>Not Screened</b>		<b>Race</b>			
Majority	400,000	3,333	140	0.92	1.26
Minority	100,000	2,357	50	1.32	0.64
<i>Summary for Not Screened (2 detail records)</i>					
	500,000	5,690	190		
<b>Detained</b>		<b>Race</b>			
Majority	400,000	3,193	2,927	0.71	0.98
Minority	100,000	2,307	2,205	2.15	1.02
<i>Summary for Detained (2 detail records)</i>					
	500,000	5,500	5,132		
<b>Not Detained</b>		<b>Race</b>			
Majority	400,000	3,193	266	0.9	1.25
Minority	100,000	2,307	102	1.39	0.66
<i>Summary for Not Detained (2 detail records)</i>					
	500,000	5,500	368		

## Interpreting Representation and Disparity Indices

Generally speaking, the interpretation of the Representation Index and Disparity Index are very straightforward. Any Representation Index or Disparity Index over 1.0 indicates over-representation. Any Representation Index or Disparity Index under 1.0 indicates under-representation. A Representation Index or Disparity Index of 1.0 indicates no disparity. The important point to remember is that the Representation Index is based on the general population. For example, the formula used to calculate the Representation Index based on minority group status is:

$$\text{Representation Index (RI)} = \frac{\text{Percent of Minority Group at Juvenile Justice Decision Point}}{\text{Percent of Minority Group in Juvenile Population}}$$

The Disparity Index is based on the population “at risk” for further participation in the system. In other words, the Disparity Index is adjusted for the composition of the population at the point immediately preceding the point being assessed. For example, the formula used to calculate the Disparity Index based on minority group status is:

$$\text{Disparity Index (DI)} = \frac{\text{Percent of Minority Group at Juvenile Justice Decision Point}}{\text{Percent of Minority Group at Previous Juvenile Justice Decision Point}}$$

In this way, the Disparity Index can tell you the degree to which disparity in the system is added to, or negated by each point in the system.

Still, the representation and disparity indices are subject to a great deal of interpretation. The database can tell you what the indices are, but cannot tell why they are what they are. For example, the database cannot tell the user whether the arrests of a disproportionate proportion of people from a group are appropriate. If criminal offenders disproportionately come from Group X, one would expect that they would also disproportionately be arrested. In addition, the database cannot determine whether the disparity in the distribution of station adjustments is a good thing or not. If Group X offenders are more likely to be arrested for less serious crimes than Group Y offenders, one may hope that Group X offenders are diverted out of the system at the arrest stage at a higher rate than Group Y offenders. In other words, although this database can identify disparity in the justice system, it does not control for frequency of crime, seriousness of crime, past offending history, etc. Remember, this database is to be used to assess disparity, not explain disparity. Knowing if disparity exists is just the first step to addressing Disproportionate Minority Representation.





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