State Systemic Improvement Plan: Planning and Conducting Data Analysis

This document was developed to help technical assistance (TA)providers and state staff in planning and documenting data analysis. The intended audiences include state staff and national, state, and local TA providers () who are involved in the data analysis for the State Systemic Improvement Plan (SSIP) .

This tool is designed to help states:

1. Define and limit the scope of analysis for the SSIP.

* Some states have many options for data analysis. The development of a plan for data analysis will help identify and limit the analyses to those most relevant to the critical questions in the state related to child and or family results, and to identify data quality issues with those data.

1. Develop a plan for data analysis.

* A plan for data analysis is a roadmap for generating data tables and relating the state’s findings to the development of the SSIP.

1. Track alternative hypotheses and additional analyses as they are generated.

* States might find that they need additional analysis as they examine the first set of analyses. When this happens, they need to add the additional to the analysis plan and document the additional findings. With an analysis plan in hand, it will be much easier to describe the data analysis process and results to others.

4) Summarize the findings and document the location of the analyses.

# The data analysis for the SSIP proceeds through several stages.

***1. Plan and conduct broad data analysis.*** In the broad data analysis stage, states look at their existing data across a number of potential State Identified Measureable Results (SIMRs). The findings from the broad data analysis are considered along with what was learned from the infrastructure analysis to determine what result or cluster of results would be most justifiable as the focus of the SSIP. More information about the broad data analysis can be found at <http://ectacenter.org/eco/assets/docs/SSIP_child_outcomes_broad_data_analysis_template_FINAL.docx>

***2. Plan and conduct in-depth analysis***. After completing the broad data analysis and considering the potential impact and feasibility of potential SiMRs, the state will plan additional analyses to limit the breadth of the SSIP data analysis efforts and intensify the detail. To ensure that the state’s data analysis efforts are focused and result in the information needed to develop a high quality SSIP, the state will want to develop a plan for drilling down into the relevant findings from the broad data analysis. While a plan for data analysis is beneficial for structuring and guiding all levels of data analysis, it is extremely helpful to develop a plan before starting in-depth data analysis. See below for a list of suggested discussion prompts to help think through questions and priorities related to the in-depth analysis. These questions need not be asked in this order nor are they all always required or relevant for everyone.

Discussion prompts for In-depth analysis

Based on the broad analysis, what child or family outcomes is the state looking into for in-depth analysis? Focus the questions below on these outcome(s).

1. Does the state have concerns about data quality that limit the state’s ability to interpret the data?
2. What factors might be related to performance on the child or family outcome? Consider characteristics of the:
3. Child
4. Family
5. Provider
6. Program
7. Were there changes over time in the characteristics/factors above that might be related to state performance on the child or family outcome over time (e.g., an increase in the percent of families participating in early intervention that are Spanish-only speakers.)?

Root cause analysis is conducted to identify contributing factors that help answer the question of why low performance is occurring. The objective is to determine what is happening, why it is happening, and what to do to reduce the likelihood that it will continue. These contributing factors explain the problem and suggest how it can be addressed.

* Root cause analysis may identify one or more contributing factors, which may be interrelated.
* The root cause analysis should identify something that the state can influence and control, that is, a factor that is actionable.

1. Is any information already known about the factors identified above?
2. Would looking at additional information about these factors possibly identify one or more root causes that could be addressed within the timeframe of the SSIP?
3. What are the state’s hypotheses about what is driving differences in the child and/or family outcomes across various dimensions, including characteristics of the child, family, or program characteristics?
4. What data are available in the state data system to answer questions about any of these hypothesized relationships?

***3. Summarize Findings.*** After the state completes the planned analyses, the findings need to be summarized so that they can be shared with stakeholders and OSEP. The summary of the findings should include:

* The questions/problem statements addressed
* Hypotheses about questions/problem statements
* Analyses and results generated to address the question/problem statement
* Possible root causes that are suggested by the analysis

Here are a list of discussion prompts to think about in summarizing the findings. These questions need not be asked in this order nor are they all always required / relevant for everyone.

Discussion prompts for summarizing data analysis

1. What was learned from the data analysis about each of the state’s questions?
2. Which of the state’s questions could or could not be answered?
3. When the findings were not was expected, what are the alternative hypotheses to explain the findings?
4. Could poor data quality have contributed to unexpected findings?
5. Where can the state get more information to answer the key questions?

# Essential Elements of a Data Analysis Plan and Documentation

A data analysis plan provides descriptive information about analyses the state is planning to conduct. The following elements should be included in the plan – the order may vary and should be tailored to fit the questions and resources.

1. Purpose of the intended analysis
2. Description of the general topic of analysis
3. Details for the analysis that specify
4. What – the specific topic that is being analyzed.
5. Why –the hypotheses or rationale behind the analyses
6. How –the specific variables that will be used, the types of analyses to be done (e.g., descriptive percentages and numbers, meaningful difference comparisons, chi squared comparisons), the order in which the analyses will be done
7. Documentation of decisions and findings

For additional ideas, see <http://ectacenter.org/eco/assets/pdfs/AnalyzingChildOutcomesData-GuidanceTable.pdf>

To assist states in developing an analysis plan and documenting their findings and analytic decisions, we have developed three examples. These examples have different formats because there is no one right way to present an analysis plan and to capture the key findings of the analys

# Examples of Different Ways to Plan and Document Data Analyses

Three examples of data analysis plans and documentation are included in this appendix section. There are different ways to plan, structure, and document the data analysis, but they all lead to the same end, which is to structure analytic activities to create an efficient process and organize information to facilitate writing the SSIP.

**Example 1** presents an approach for planning in-depth data analyses and additional data collection. It is written in outline form and includes the purpose of the analysis; a description of the broad topic of analysis; the general rationale behind the analysis; details for the **in-depth** (drill down) analyses that include what (variables), why (hypothesized), and how (compare percentages) the analyses will be done; and the plan for documenting findings and decisions. In addition, it includes a section that articulates the benefits and challenges of a new planned **data collection**, including the estimated effort required. It also discusses **data quality** considerations and activities to address them.

**Example 2** is a template that incorporates steps and information involved in planning and documentation of the data analyses in table format. It is a working document and is organized into two sections for the **broad** (completed) and **in-depth** (in progress) data analyses. Each section includes (1) the purpose of the analysis; a description of the topic of analysis; (2) the rationale behind the analysis; details on the on the analyses that include what will be analyzed (e.g., child outcomes, socioemotional skills, data quality child/provider/program characteristics); (3) why these factors will be analyzed (hypotheses about relationships and drivers of differences); (4) how the analyses will be done (compare percentages); (5) and documentation of the analyses, results and interpretation. It provides a template for analysis planning that includes things to think about in order to develop hypotheses, and a template to describe the analysis, record results, organize files, and track status.

**Example 3** is an example of a data analysis template for **in-depth** data analysis. It is written in outline form and includes the purpose of the analysis, the question to be answered or addressed by the analysis and the subgroups and factors to be examined. For each subgroup, the plan documents the (1) data and comparison to be made, (2) hypothesis or expectation, and (3) result of the analysis. The plan also includes potential **follow-up analyses** to be conducted.

These three examples are meant to illustrate different ways to go about planning a data analysis and documenting the findings that will all lead to the same end – completing your analyses so you can write your SSIP Phase I plan!

## Example 1– Example of Planning Data Analyses and Additional Data Collection

1. Area of Focus: Improving capacity of families and providers to support infants social emotional development
   1. Child Outcome – Positive Social Emotional Skills
   2. Rationale – Fifty-five percent of children who are younger than 1 year old enter EI and are identified as having positive social emotional skills that are at or above age expectations. At exit, 10% of these children are found to be below age expectations in positive social emotional skills.
   3. Additional drill down that can be completed with the information currently in the Data Management System
      1. Compare the percent of children that make greater than expected gains in positive social emotional skills by
         1. Size of program – hypothesis: more children will make greater than expected gains in smaller programs
         2. Length of time in program AND age at entry – hypothesis: Children that enter the program younger than 1 year old and stay in the program between 6 month to a 1 year will be less likely to make greater than expected gains than those that enter the program younger than 1 year old and stay in the program longer.
      2. Compare the percent of children that enter at age expectations in positive social emotional skills (COS rating 6 + COS rating 7/total with a rating) by:
         1. Disability AND age at entry – hypothesis: Children with disabilities where lower levels of impairment are expected (e.g. low birth weight) will be more likely to enter the program functioning at age expectations.
   4. Additional collection of information not currently in the Data Management System
      1. How well has each program supported the family’s ability to support their child’s social emotional development?
         1. Questions to be answered by the data collection:
            1. What practices are providers using to assess social emotional skills? What strategies are providers using to improve social emotional skills?
            2. What do families perceive or experience in the program related to supporting their child’s social emotional development?
            3. What strategies do families report are most helpful for them in supporting their children’s social emotional skills?
         2. Data Collection Method - Collect data through interview of a small sample of providers and families.
         3. Benefits of Data Collection - We currently do not have information on the practices that providers use to support families in supporting their child’s social emotional skills. This would give us a general picture of those practices and the perceived effectiveness of the strategies reported by families.
         4. Challenges of Data Collection – We would need to develop an interview protocol that would be useful to capture this information. The interviews would add an additional burden on families. Collecting the data would add an additional burden to state staff responsible for ensuring that the data are collected.
         5. Estimated effort required
            1. Develop interview protocol – this would require putting together a team including at least one topical expert and families. The draft interview protocol would need to be piloted and revised.
            2. Administer interview – Staff will need to be designated to conduct the interviews and enter the responses into a data base. The data base would need to be developed.
            3. Analyze interview responses – Data will need to be cleaned and prepared for analysis. Data will then need to be put into tables for review by state and program staff. At least one staff member will need to read thorough all of the interviews to identify themes.
      2. Review the frequency and quality of Social Emotional outcomes in the IFSPs.
         1. Questions answered by this data collection
            1. What percentage of children served have social emotional outcomes included on the IFSP?
            2. Are teams writing high quality outcomes in the area of social emotional?
         2. Data Collection Method – record review of a sample of IFSPs pulled from the Data Management System.
         3. Benefits of data collection –
            1. Will provide information on the frequency and quality of IFSP outcomes around social emotional development.
            2. If social emotional outcomes on the IFSP are not high quality, it would point to an area for improving practice.
         4. Challenges of the data collection
            1. State staff time will be required to complete the task.
         5. Estimated effort required
            1. Develop a record review protocol. Depending on available resources this might be a simple adaptation of another tool or could be a more time intensive if the tool is developed from scratch.
            2. Use of programmer resources to sample and pull the IFSPs for review
            3. Use of staff time to complete the record review protocol for the selected records.
            4. Use of staff time to summarize and table the results of the review.
   5. Data Quality Considerations
      1. The data currently collected on child disability is not complete, it is not updated as the child moves through the program and it is inconsistently coded across regions. One activity in place to improve the quality of this data is sharing the reports of child outcomes by disability back to the local programs.
      2. Some of the assessments used to estimate children’s social emotional functioning are not sensitive to delays in this area particularly in very young children. We are working with programs to identify and recommend assessments that are more appropriate.
   6. Documentation
      1. Results of the analyses will be documented in separate files, with filenames inserted at the end of each hypothesis/question in this document.
      2. Decisions made to change the planned data analysis will be documented in the plan, including the date the change was made and rationale behind it.

## Example 2 – Example of a Data Analysis Plan in Table Format

1. Broad data analysis of child outcomes (positive social skills and relationships; knowledge and skills; actions to meet needs)
   1. Purpose: used in conjunction with the infrastructure analysis to determine what result or cluster of results would be most justifiable as the focus of the SSIP.
   2. Objectives:
      1. Determine whether state results differ compared to national results for summary statement 1 (SS1) and summary statement 2 (SS2).
      2. Determine whether there are upward or downward trends in SS1 & SS2 for the state over the available years of data.
      3. Determine whether one of the outcomes exhibits poorer performance than the others on SS1 & SS2.
      4. Note: If one of the child outcomes in the state differs from national results more than the others, shows a more notable downward trend, and/or exhibits poorer performance, that outcome could be a candidate for the State-identified Measurable Result (SIMR)
   3. Analysis planning and documentation

| Analysis Description | Results/Notes (include filenames) | Status |
| --- | --- | --- |
| * + 1. Compare state to national percentages on SS1 & SS2 for child outcomes (1 = socioemotional, 2 = knowledge & skills, 3 = actions to meet needs) | See [filename of data document/graphs/etc.].  FFY13/SFY14 Data indicate that the state is below the nation on all 3 outcomes for both SS1 & SS2. Percentage point differences are as follows:  SS1 SS2  OC1-SE: -8 -11  OC2-KS: -5 -7  OC3-AN: -4 -8 | Completed |
| * + 1. Compare state to national percentages for SS1 & SS2 broken down by ITCA eligibility categories (the state is closest to B & C) | See [filename of data document/graphs/etc.].  Category B: FFY11/SFY12 data indicate the state is below ITCA eligibility category B states for SS1 OC1-SE, and higher for the other 2 outcomes. For SS2, the state is below ITCA eligibility category B states on all 3 outcomes. Percentage point differences are as follows:  SS1 SS2  OC1-SE: -3 -9  OC2-KS: +2 -6  OC3-AN: +3 -6  Category C: FFY11/SFY12 data indicate the state is below ITCA eligibility category C states for SS1 OC1-SE, and higher for the other 2 outcomes. For SS2, the state is below ITCA eligibility category C states on all 3 areas. Percentage point differences are as follows:  SS1 SS2  OC1-SE: -1 -6  OC2-KS: +3 -3  OC3-AN: +4 -5 | Completed |
| * + 1. Examine state trends from FFY08-FFY12 in SS1 and SS2 for all 3 outcomes | See [filename of data document/graphs/etc.].  For SS1, OC1 is below the other 2 outcomes for all 5 years, with FFY12 being slightly lower than FFY08. The only significant yearly difference was a drop from FY10-FY11 on OC2, and the overall difference from FY08-FY12 was significantly lower for OC2. In the last 2 years, OC1 increased by 4 percentage points, while OC2 increased by 3, and OC3 decreased by 4.  For SS2, OC1 is above the other 2 outcomes for all 5 years, and all 3 outcomes were lower in FFY12 than in FFY08. The only significant yearly difference was a drop from FY10-FY11 on OC2, and the overall difference from FY08-FY12 was significantly lower for OC2. In the last 2 years, OC1 has increased by 5 percentage points, OC2 has remained steady, and OC3 has decreased by 2 percentage points.  Qualitative information from providers suggests that SS2 might be inflated due to provider reluctance to give lower ratings if parents do not share the provider’s concern in that area. | Completed |
| * + 1. Determine whether differences between years, across the entire FFY09-FFY12 period, and over the last 2 years were statistically meaningful at the p < .10 level. | Used the meaningful differences calculator, results stored in [filename of data document/graphs/etc.].  Note that the N for SS1 should be smaller than the N for SS2 given that the denominator for SS1 only includes OSEP progress categories a, b, c, & d, while the denominator for SS2 also includes category e. | Completed |
| * + 1. Determine whether differences between years, across the entire FFY09-FFY12 period, and over the last 2 years were statistically meaningful at the p < .10 level. | Used meaningful differences calculator, results stored in [filename of data document/graphs/etc.]. | Completed |

* 1. Interpretation of data and SiMR decision
     1. [include description about the ongoing statewide initiative focusing on socioemotional development]
     2. [add in key points from above]
     3. State selected OC1, socioemotional skills, as the broad focus of the SIMR.

1. In-depth data analysis of socioemotional skills.
   1. Purpose: identify characteristics or subgroups that demonstrate better or poorer performance on OC1 that may suggest ways to refine the SiMR, root causes for poor performance, and/or ideas for improvement strategies.
   2. Rationale: narrow the universe of child, provider, and program factors/characteristics to be analyzed to those that establish a more focused SiMR and/or suggest root causes and/or improvement strategies.
   3. Analyses planning:
      1. Things to think about
         1. Are there concerns about data quality that our ability to interpret the data?
         2. What characteristics and other factors might be related to performance on the child outcome?
            1. Child
            2. Family
            3. Provider
            4. Program
         3. What trends in the characteristics/factors above might be related to state performance on the child outcome?
         4. Is any information already known about the relationships between these characteristics/factors and child outcomes, or trends in characteristics/factors that could influence state performance?
         5. Would additional information about these factors possibly identify one or more root causes that could be addressed within the timeframe of the SSIP?
         6. What are the state’s hypotheses about what is driving differences in the child outcome across child, family or program characteristics?
         7. What data are available in the state data system to answer questions about any of these hypothesized relationships?
      2. Develop hypotheses

| **Issue** | **Brainstorm** | **Trends** | **What is already known?** | **Data available or additional info needed?** | **Hypothesized relation to SE outcomes?** | **Hypothesized drivers of differences?** |
| --- | --- | --- | --- | --- | --- | --- |
| Data Quality | * + - Implementation of COS process     - Rating done by single rater or team? Who are the raters? | No data | No method for ongoing refreshers/new staff  Anecdotally, SE (OC1) is the area people are least comfortable rating; “self-doubt” in having knowledge and experience to rate this area and discuss with families (recognizing family cues; questions to ask). | * Need to collect data on COS implementation and training – program survey? * Inter-rater reliability tools from Part C in [STATE NAME] | Data quality varies across programs; depends on tools used & provider background & expertise in rating that particular area. | Uneven data quality may drive differences between subgroups of children. |
| Characteristics/ factors | * + - * Child         + CAPTA vs non-CAPTA         + Level / frequency of services (# of home visits)         + IFSP service types         + Rural/urban         + Age         + Gender         + Reason for eligibility         + Referral reason         + Length of time enrolled         + Who child lives with       * Provider         + Service provider discipline         + Training in SE development       * Program         + Training on COS process         + Assessment tools         + Region         + % of CAPTA kids in region |  |  |  |  |  |

* + 1. From the hypotheses generated regarding the issues above, select those that 1) we think are most likely to be true and/or yield actionable findings; 2) we have or can get the data that are needed to answer the questions; and 3) are most likely to identify one or more root causes that could be addressed within the timeframe of the SSIP.

1. Analyses planning and documentation

| **Analysis Description** | **Results/Notes (include filenames)** | **Status** |
| --- | --- | --- |
| 1. Data quality:    1. Completeness    2. Compare the “out of range values” (i.e., >10% in category a; >65% in OSEP category e) of data for OC1 to OC2 & OC3    3. Look at ratings below 1 year of age compared to older (completeness, out of range values and category distributions) | There is no variation in completeness of data across the 3 outcomes for all 5 years of available data.  See [filename of data document/graphs/etc., OSEP Categories worksheet]. Graph of OSEP categories indicates no out of range data, but category e for SE is 36%, compared to 15% for action & 10% for knowledge. This doesn’t reflect the anecdotal information that people have the most concerns about children in this area and don’t feel as well-prepared to address this area. Might be something to include in further data gathering (program survey and/or conversations).  Other states have shared that this is a struggle (accurately rating children < 1 in the SE area; see [STATE NAME] power point for potential analyses). | 1. Complete 2. Complete – consider for qualitative data collection 3. Consider which analyses to do |
| 1. Look at SS1 & SS2 stratified by    1. Program    2. Region    3. Program factors | 1. Program comparison to state: see [filename of data document/graphs/etc., Program Level SS1 & SS2 worksheet]. For OC1, 15 of the 43 programs are too small (N < 10) for comparison to the state on SS1, and 14 are too small for SS2. For programs with N>10, 9 programs differed significantly from the state on SS1 (4 lower, 5 higher), and 12 programs differed significantly from the state on SS2 (5 lower, 7 higher). Six of the programs differed significantly from the state on both SS1 and SS2 (all higher). 2. Region: | In process |
| 1. Look at OSEP Progress Categories stratified by (e.g., child, family, provider factors): |  |  |

## Example 3 – Example of In-Depth Data Analysis Plan

In-Depth Data Analysis Plan

Purpose: Conduct in-depth data analysis of potential State Identified Measureable Result (SiMR), taking action to meet needs. Describe the analyses to be conducted by subgroups and characteristics to refine the SiMR, substantiate the selection of the SiMR, and inform root cause analysis.

1. Question: What contributes to low performance in actions to meet needs?
   1. Race/ethnicity
      1. Proposed analyses: (1) Examine the number of children who exited with a score of 6 or 7 on action to meet needs by child race/ethnicity (White, Black, Asian, Latino, Other)and (2) calculate the percentages of children who increased or decreased between entry and exit by child race/ethnicity.
      2. Hypothesis: Do not necessarily have clear expectations about race/ethnicity but would like to document differences or disparities.
      3. **Result:** A few meaningful differences were found by child race. Specifically, fewer Latino children exited with a score of 6 or 7 and increased in actions to meet needs than White children.
      4. Documentation: [file name for file containing the analysis]
   2. Child Gender
      1. Proposed analyses: (1) Compare the number of children who exited with a score of 6 or 7 on action to meet needs by child gender (male/female) and (2) calculate the percentages of children who increased or decreased between entry and exit by child gender.
      2. Hypothesis: There are no gender differences for action to meet needs.
         1. Note: If there are differences by gender, follow-up analysis would be to look at a proxy for eligibility criteria to see if males are being identified and served for different eligibility criteria (are the differences due to gender or an associated variable?).
      3. **Result:** Expectations were somewhat supported. Specifically, more females were rated as exiting with a score of 6 or 7 and increased in action to meet needs than males.
   3. Age at entry
      1. Proposed analyses: (1) Examine the number of children who exited with a score of 6 or 7 on action to meet needs by age at entry and (2) Examine whether they increased or decreased between entry and exit by age at entry.
         1. Age groupings: Use the following age groupings: 0-3 months (very early); 3-6, 6-12, 12-8, 18-24, and 24 or later.
      2. Hypothesis: The expectation is that children in services longer are often those with a more severe disability or delay and are less likely to exit at age expectations and have lower outcomes ratings. Thinking about population of children that were less involved, the expectation is that if they are served earlier, they will have more positive outcomes. Need to be able to disentangle severity from age at entry to test the relationship between length of service and outcome.
      3. **Result:** Expectations were partially supported. Some meaningful differences were found for children who entered services very early (at 0-3 months) compared to those who entered later (12-18, 18-24, and 24months or later).
   4. Age at exit
      1. Proposed analyses: Compare the percentage of children with exit ratings of 6 or 7 for children who exit at 30-36 months and are referred to Part B with the children who exit with the percentage with 6 or 7 for those who exit at younger ages. Hypothesis: The expectation is that children with more severe disabilities will exit near 36 months and who are referred to Part B will have fewer children with ratings of 6 or 7.. There is an expectation that kids with less severe delays may be exiting prior to 36 months with more children exiting with age expected behavior in action to meet needs..
      2. **Results**: Expectations were generally supported. Children who 36 months at exit and referred to Part B were less likely to exit with a score of 6 or 7 compared with children who exited at younger ages.
   5. Duration of services
      1. Proposed analyses: Compare children who received services for 6-12 months to those who received services for 13 to 21 months and 24-30 months. Hypothesis: There is an expectation that children receive services for longer periods of time are more severely involved and who may be further below age expectations in taking actions to meet needs.
      2. **Results:** Expectations were generally supported. Children who spent 6-12 months in service were more likely to exit with a score of *6 or 7* in taking action to meet needs than children who were services for 12-18, 18-24, 24-30 months.
      3. Potential follow-up analysis: Correlating age at entry and length of time in service.
         1. Question: Are children who enter early more likely to be in service longer?
         2. Hypothesis: If a child with eligibility by developmental delay enters earlier, expect that they are going to be in the system for less time and have better outcomes.
   6. Socioeconomic Status (SES)
      1. Proposed analyses: Compare children who receive Medicaid vs. Non-Medicaid children as proxy for SES.
      2. Hypothesis: The expectation is that those children who are on Medicaid likely have lower SES and experience more environmental risk factors than those who are not and may experience lower outcomes.
      3. **Results:** TBD