Pre-Primary Data and Measurement for Impact

TECHNICAL GUIDE ON DATA FOR IMPACT IN EARLY CHILDHOOD EDUCATION

Consortium for Pre-primary Data and Measurement in Africa

ECD measure   USAID FROM THE AMERICAN PEOPLE

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List of acronyms

CPDMA   Consortium on Pre-Primary Data and Measurement

ECC   Early Childhood Commission (Jamaica)

ECD   Early Childhood Development

ECE   Early Childhood Education

EMIS   Education Management Information Systems

GPE   Global Partnership for Education

MELQO   Measuring Early Learning Quality and Outcomes

MICS ECDI   Multiple Indicator Cluster Survey Early Child Development Index

NCDC   National Child Data Centre (Malaysia)

PIPS   Performance Indicators in Primary School (Australia)

QRIS   Quality Rating and Improvement Systems (USA)

SDG   Sustainable Development Goals

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Overview

Early childhood education (ECE) is expanding in many parts of the world. Nevertheless, there are notable concerns about access and quality in ECE. The availability of good data and well-designed measurement plays a key role in raising awareness of both the current strengths and remaining challenges in reaching the twin goals of equity and access in ECE. This technical guide provides a starting point for assessing the status of early childhood data and measurement.

The guide outlines a framework for developing and using high-impact data in ECE systems. Borne out of USAID's recent education policy which includes ECE, it is intended for teams of professionals working at the country level on measurement and data issues related to early childhood programs, investments, or policies in sub-Saharan Africa. To move toward a data-driven ECE systems, the framework proposes four essential steps: (1) identify the purposes of ECE data, including places where data may have impact; (2) define data feedback loops; (3) address the mechanics of measurement; and (4) apply to policy and practice. The design of these four steps, which can become the building blocks for country projects, is informed by the experience in ECE data and measurement of global and country-level experts.

Defining Terms

Data: Quantitative or qualitative information relevant to ECE, including information on enrollment in ECE, teacher qualifications, children's learning and development, parent perceptions, and other aspects of ECE.

Data feedback loops: Ongoing processes in which data leads to changes in behavior or decision-making.

Measurement: The process of collecting data to measure progress toward specific goals or targets.

Research: Systematic collection and analysis of information designed to further explore a problem or inform a theory.

Program evaluation: Systematic collection and analysis of information to evaluate how effectively a program is operating. Program evaluations are typically more focused in scope than research.

Early childhood education (ECE): Programs, both private and public, that offer education to young children before the start of primary school outside of their homes.

Introduction and background

Science has clearly demonstrated the importance of early childhood development in lifelong learning and well-being. Interventions addressing health, nutrition, and cognitive stimulation, and especially those that address multiple components of child development, have been shown to positively affect children's learning and development across countries. In response to the strong science on the impact of early childhood development interventions, many countries have increased investments in early childhood education (ECE). It is now important for countries to focus attention on implementing ECE well and tracking progress toward meeting national and global goals for young children.

Data play an integral role in taking evidence-based practices to scale across populations (Yoshikawa, Wuermli, Raikes, Kim & Kabay, 2018). In the field of ECE, much more data is now needed as many countries have seen the impact of specific interventions or programs on child development and, in response, have begun planning to expand or implement these services to reach all children. To make high-impact investments and to ensure that ECE is reaching its goal of promoting equity for all children, governments and policy makers need reliable data to document ECE quality, child outcomes, and access to ECE. Decisionmakers need data to routinely monitor the quality of services; provide feedback to parents, teachers, schools and policymakers on the quality of ECE services and children's learning; and to make decisions on where to invest scarce resources for the greatest impact on behalf of young children.

The demand for ECE data comes from multiple sources. The Global Partnership for Education (GPE), for example, has identified data as a critical element of building education sector plans; the United Nations Sustainable Development Goals (SDGs) have identified data indicators to track progress toward Target 4.2, focused on early childhood; and more and more countries have initiated work on quality assurance systems and the routine measurement of early childhood development and learning. While all of these entities share an interest in ECE, those asking for ECE data may have different purposes in mind for making use of the data, which in turn means the landscape of needed ECE data and measurement is complex.

The Consortium for Pre-Primary Data and Measurement in Africa (CPDMA) was initiated in 2018 to focus on using data to improve ECE systems, including capacity-building in data and measurement. In a recent survey of member states, for example, GPE found that many countries identified gaps in their own capacity to collect, analyze, and apply data to ECE. CPDMA was designed to assist countries in integrating their priority needs for ECE data with expertise obtained from a larger, global consortium of individuals and organizations that have relevant expertise.

In its first year, CPDMA worked with four countries in sub-Saharan Africa to convene taskforce teams of government partners, universities, civil society actors, and USAID missions. Through an interlinked process of working directly with country taskforce teams and global experts, CPDMA helped the countries identify their existing resources and needs for ECE data; identified barriers to building data-driven systems; and recommended ways to build sustainable models for promoting data use within countries. Collecting and analyzing data on ECE takes considerable time and effort, yet the biggest and most critical challenge is *using* the resulting data to make positive changes in the ECE system. This requires several types of capacity, beginning with clear purpose for ECE data; identifying how and when the data are intended to lead to changes in behavior; attending to the technical elements of measurement, such as adapting or building locally relevant tools; analyzing both new and existing data that are relevant to the question at hand; and perhaps more critically, sharing the information and applying the findings in ways that lead to more effective ECE systems.

This technical guide is intended for USAID country offices and ECE stakeholders, policymakers, and users of data to improve their ECE policies and programs. It draws on the experiences and lessons that emerged from CPDMA, and it takes a broader look at collecting high-impact data and developing relevant analysis that could lead to policy and programmatic improvement. It is intended both to provide an overview of the data issues that matter in ECE and to guide country teams through a process of defining the purposes and uses of ECE data and measurement in a country.

This document includes lessons from the work of four taskforce countries: Ethiopia, Liberia, Rwanda, and South Africa. In 2019, each country taskforce team completed an ECE data use toolkit, which has informed the technical guide. Finally, the attached diagnostic toolkit offers countries a systematic way to be more strategic in their approaches to ECE data. It can help country teams build upon their existing data to maximize its value, leverage data to take advantage of policy or change windows (such as during a sector review, development of education sector plans, curriculum review, or development of standards, etc.), and enhance planned projects by linking data needs and users rather than collecting data for a single purpose alone.

This guide provides a basic overview of key issues in ECE data. Section 1 provides background, clarifying both the context of ECE data and the goals data systems should have to achieve impact. Section 2 drills down further into the question, what is the purpose of data in an early childhood system? It also outlines the diagnostic steps needed to identify data needs. Section 3 focuses on "feedback loops" in data use and application. Section 4 addresses the mechanics of measurement, including the nuts and bolts of selecting culturally relevant tools, collecting data, and analyzing it. Section 5 addresses the ways to ensure that data is deployed to effect policy and practice improvements and includes case studies. The guide concludes with a set of recommendation in Section 6.

1.1 *Setting the context for ECE data*

Emphasis on the importance of ECE data has grown in recent years, due to several trends: the increase in funding for preprimary education and other types of early childhood programs (although the overall amount of funding that goes to ECE is still very small); the desire for local evidence to make the case for increased ECE investments; and the inclusion of ECE in the SDGs, under Target 4.2, which is focused on early childhood development prior to the start of primary school. These trends also take place within a larger dialogue on the importance of moving toward data-driven systems and the emphasis on using data to support quality implementation of ECE programs as they are taken to scale (Yoshikawa et al., 2018).

What do we mean by "ECE data"? Data in ECE refers to a range of data points that are relevant to the inputs, outputs, and outcomes of ECE.

- **Input data** include information such as teacher qualifications, the cost of ECE services, and the structural conditions that characterize ECE (such as the number of facilities and where they are located).
- **Output data** include information such as the number of children who are attending ECE, the number of trained teachers, and the number of days that ECE facilities are delivering services. More critically, they include the quality of ECE services, such as the pedagogical techniques of the teachers, the amount of and access to materials within the classrooms, and other indicators of ECE quality.
- **Outcome data** refer to the goal of ECE: improving learning for children. Table 1 provides examples of types of such early childhood education data. Briefly, outcome data help answer the question, "Does the intervention work?" while input and output data answer the question, "How did it work?"

While emphasis is sometimes placed on outcome data that demonstrate the impact of ECE – such as the impact of ECE on children's learning, either at one point in time or over time – input and output data are critical for achieving the goals of ECE, especially when scaling programs over a population (Yoshikawa et al., 2018). Input and output data are also sometimes easier to act on, because they indicate how well programs are being implemented and what areas need further attention to ensure that outcomes are eventually produced.

A note on Sustainable Development Goals

Within the adopted Sustainable Development Goals (SDGs), there are two "global indicators" that are used to monitor progress toward national, regional, and global goals for young children: the percentage of children under age five who are *developmentally on track* (an outcome indicator) and the percentage of children who are *enrolled in preprimary education* (an output indicator). Data on these two indicators are collected to monitor progress toward Target 4.2. The percent of children developmentally on track is collected through the Multiple

Indicator Cluster Survey Early Child Development Index (MICS ECDI) administered by UNICEF. Data on access to preprimary education are collected through administrative data systems by country governments and are compiled and reported by the UNESCO Institute for Statistics. These two global indicators are designed to be narrow in scope and globally comparable or relevant across all countries. As a result, they should be considered complementary to the more detailed national-level information that, ideally, includes a broader range of inputs, outputs, and outcomes (for example, children's nutritional status).

Table 1. Data for Early Childhood Education: Constructs, Sources, Methods, and Relevance

	Constructs Measured	Data source	Sample included	Representative?	How are the data collected?	What information is provided? How are data used for action or change in the system?
IINPUT	SYSTEM	Monitoring Systems & Education Management Information Systems (EMIS)	School/ classroom level	Yes	• Education officers and monitors collect information on structure • Costing data come from education ministries	Information on: • Teacher qualifications • Costing data and cost-effectiveness information Used to: • Allocate funding and resources
OUTPUT	ACCESS	Education Management Information Systems (EMIS)	School level	Yes (but only across children who are enrolled in schools)	• Education officers/school administrators/teachers collect information, which feeds into regional and national EMIS	Information on: • Enrollment and attendance • Pupil-teacher ratios • Basic teacher background • Equity: access data disaggregated by gender, region, SES, marginalized groups, etc. Used to: • Determine effectiveness in learning outcomes • Policy decision on human and financial resources
OUTCOMES	QUALITY OF ECE SETTINGS (SCHOOLS, NGOS, COMMUNITY-BASED PROGRAMS)	Research studies and program evaluations	Specific samples based on research questions (i.e., exposure to interventions)	Depends on the sampling framework	• Trained observers often conduct observations of classrooms • Teachers, directors and/or parents may fill out surveys on program practices and perceived quality	Used to: • Reveal patterns between quality and child development • Identify weaknesses in the system to improve policies • Determine whether the program/intervention is working • Help define quality standards
		Standards and quality assurance/ monitoring systems	Classroom-level reports in state-monitored schools	Ideally, representative of all ECE settings, depending on which settings are included in government monitoring system	• State inspectors or monitors conduct routine visits to ECE settings • Not all ECE settings may be included: If the state only monitors formal pre-primary, for example, then NGO and community-based preschools will not be included	Used to: • Ensure government and public accountability • Manage/improve performance • Inform parental choices • Inform policy discussions

CHILD DEVELOP-MENT AND LEARNING	Summative child outcome data or screening and diagnostic assessments	Child level in classroom/ program	If all ECE settings included or conducted in first year of primary school, representative of all children attending school.	• Teachers or trained observers report on children's learning and development	Used to: • Provide information on how to help individual children • Program-level child outcome data can be used to determine whether the program/intervention is working
	Formative child outcome data	Child level in classroom	N/A. Because formative data are typically used to inform instruction for individual children, data may not be reported at the group level	• Teachers collect information on children to be used for pedagogical purposes only	Child checklists and portfolios can be used: • As tools for parents and teachers to track progress and differentiate instruction, and • As quality indicators
	National/regional early learning assessments	Child level at regional/ national level	Can be representative, but only if all children are enrolled/attending school when the assessment is administered. (Ensuring representative samples is critical for equity in measurement.)	• Trained assessor (not teacher) to objectively and accurately measure young children's development. • Information on families requires household visit or family interview.	Used to: • Provide information on how children are doing relative to learning standards or benchmarks • If accompanied by household information, provide information on child and family characteristics; can also reveal inequities
	Population-level measures	Population level (sample based)	Yes. Population-level surveys have the highest probability of including all children within a population.	• Uses census-based household surveys, which are the most accurate way to obtain information about all children • While direct observation can be used, most household surveys rely on parent reporting	Used for: • Global or national monitoring of progress to inform policy improvements

What are the various types of studies? Different purposes of measurement influence the tools selected to measure and the desired impact of the data. These purposes can include the following:

- Population-level monitoring: To provide an overview of ECE quality or child development across a population;

- Screening and diagnostic: To identify individual children's learning and development needs to refer for special services or to diagnose a problem;

- Program evaluation: To assess the program impact and areas for improvement within a program;

- Formative assessment: To gauge the overall learning within a classroom; and

- Research: To assess hypotheses and inform theories on child development and learning.

Study designs influence how the data can be interpreted. Two elements of study design are especially important: whether the study yields representative data (goal a) and whether the study can demonstrate causal inference (goal b).

Representative studies are those in which the sample is designed to index the underlying population, so that estimates from the study do not advantage any particular subgroup within the population. Population-level monitoring is ideally representative in nature, based on sampling techniques that ensure that all children have an equal chance of being included in the study. Program evaluations and research studies can also be representative, but only if the sample is specifically designed to reach this goal.

Causal inferences, which are necessary to show whether it was the intervention itself that led to impacts on development and not some other factor(s), can be derived when studies randomize the intervention. Causal study designs are possible for program evaluations and research studies (when random assignment is used).

As outlined in greater detail in the Toolkit, in most countries there is a range of different types of data and measurement initiatives underway. While it may be possible to use the data

from one type of initiative to inform another purpose (for example, using data from program evaluations to inform population monitoring or vice versa), there can also be risks in crossing purposes. For example, data from population monitoring are not specific enough to inform program evaluations. Likewise, samples from program evaluations are usually not representative of the population more broadly, so it may be inaccurate to extrapolate their findings across a larger population.

Implicit in much of today's dialogue on the use of data in ECE is the intent to use data to promote equity, which is a central goal of the SDGs and an implicit goal in many ECE investments. Each type of data can play a role in promoting equity, if studies are well designed. For example, population monitoring can promote equity by tracking populations that may not receive adequate resources, program evaluations can help identify which program models are most effective, especially for at-risk populations, and screening and diagnostic tools can identify individual children who may need additional support to thrive.

In sum, there are several types of ECE data and several ways in which they are used. For many countries, the research questions on ECE that data and measurement can inform may change as ECE systems become more developed. A country may begin with questions about whether ECE has an impact and conduct program evaluations or research studies with an outcome focus. It may then move to answer questions on how to successfully implement high-quality, high-impact ECE programs. And finally, it may track the impact of ECE at scale across the population, an effort that requires a systematic approach to collecting data on inputs, outputs, and population-level monitoring of child development.

1.2 Goals for ECE Data Systems: Data implications of early childhood development

Early childhood, starting at conception and proceeding through age six, marks a unique period of development due to the rapid physical and neurological growth that takes place during

this timeframe. Young children are also highly sensitive to a range of environmental conditions, including the degree of stimulation from parents, environmental toxins including water and air quality, adequacy of nutrition and health care, and household resources. All these factors work together to affect young children's development and learning, which in turn have long-term implications for children's education, health, and overall well-being.

The unique characteristics of young children's development influence the way we should think about and utilize data. As teams consider the purposes of measurement and data use in their ECE systems, the following related goals, as well as the objectives specific to their context, are recommended.

Goal 1: Ensure that children's rights are always protected and that equity is enhanced by making it a top priority to ensure that data accurately represent all children within the country and do so in a holistic manner.

Children's rights must rest at the heart of the system. At a minimum, this means avoiding high-stakes testing in public school systems, where children may be denied services or punished based on scores, and avoiding the use of data to make decisions about where or when children should attend school. It also means building data systems that protect the confidentiality of children and families by removing any possible identifying information from children's records before making data available for analyses or reporting.

A key element of protecting children's rights is ensuring that the content and structure of any assessments of child development accurately index their skills. For some children, this may mean offering assessments in their mother tongue; for all children, this means ensuring alignment between what is assessed and what is taught, so that all children have equal opportunity to demonstrate their skills on an assessment.

Data systems must take a holistic view of early childhood development. At a minimum, data on child health and nutrition as well as data on access to and quality of learning environments should be collected in parallel with information on child development and

learning. Equity can be enhanced by collecting information about children's gender, location, family characteristics, or other information so that data can be analyzed to identify inequities.

Goal 2: Create systems that focus on improvement, not just accountability.

Data collection and monitoring are useful if they lead to improvement in the quality or scope of services provided to young children. Monitoring and data systems must have clear and direct links to professional development for ECE teachers; to channels for sharing information with teacher training institutions; and to resources to address challenges with buildings or materials. As with child assessment, measures of program quality should align with quality standards, curricula, and teacher training.

Sometimes it is assumed that simply having the data will lead to action, but often it is necessary to thoroughly map the data that will be collected, beforehand, to specific actors, and to define which decisions the data will help inform. A data feedback loop, in which data are reported back to programs and teachers in an understandable, actionable way, should be clearly established and supported. Going through this process helps to make sure data are used to inform improvement. ECE programs should be viewed not just as sources of data but also as consumers.

Goal 3: Create systems that produce open and transparent data to inform parents, schools, policymakers, and other stakeholders. Data on ECE should be transparent and available to all relevant stakeholders in the country. What is required to make data available may differ by population. In some cases, publishing the information online or through print media is sufficient; in other cases, text messaging or the use of other strategies to reach a broad population may be required to disseminate data to remote populations.

Goal 4: Engage the community in the design and implementation of the data system.

For maximum return on the investment in data, engaging community members in the design and implementation of the data system is critical. Stakeholders should have a say in defining what is included, how the data are used, and what will be asked of children, teachers, and parents in the process of collecting data. Community members can also be involved in

reflecting on the data analyses and interpretation as well as planning for program improvements and supports.

Goal 5: Focus on sustainability from the start, by ensuring the integration of data into EMIS and other ongoing surveillance systems, and actively developing partnerships with other ministries, NGOs, and universities engaged in ECE.

Leveraging existing systems, perhaps modeled after those used for primary education, can contribute to a more successful transition and capacity-building. It is important that the highest levels of government champion the initiative and that the department within the ministry tasked with collecting and managing the data has a clear mandate, the motivation, and the resources to produce high-quality data. In addition to high-level buy-in, if efforts are truly government-driven there must be a strong advocate for ECE data working internally at the technical levels within the system.

Goal 6: When designing measures, consider cultural priorities and contextual influences alongside the findings of developmental science.

In some situations, existing measures may have already been developed and tested within a country that can serve as a starting point for national monitoring or measurement tools. In other situations, it may be necessary to adapt and validate tools developed elsewhere within a country before using them at the national level. Either way, integrating cultural priorities with developmental science will leverage the best of what has been learned at the global level while building on local strengths and priorities. It is important to invest in a careful assessment of the cultural relevance of tools before taking such tools to scale across populations.

1.3 ECE "Data for Impact" Framework

To maximize the impact of ECE data, it is important to begin the planning process by asking what impact the data are likely to have and on whom. The idea behind all data-driven systems is the concept of a feedback loop, that is, the idea that people will change their behavior, ideas, and decisions in response to feedback generated through objective data. However, the process of moving toward data-driven decision-making is often challenging due to a number of

barriers, including lack of capacity to use data well; time constraints; lack of support for using data; and data that do not provide enough detailed information to guide forward movement.

Figure 1 outlines a framework for early childhood data for impact. This process outlined in this framework was piloted by the CPDMA taskforce country teams in 2019. Those using this framework begin by laying a foundation for data use, first by building a team that cuts across different types of agencies and different early childhood sectors. Their next step is to identify where the data are intended to impact early childhood policy or practice or which "feedback loop" within the system the data are intended to address. They then proceed to designing and applying the mechanics of measurement, such as selecting and adapting tools and collecting and analyzing the data. The final step is to apply the data to practice.

Figure 1: Data for Impact Framework
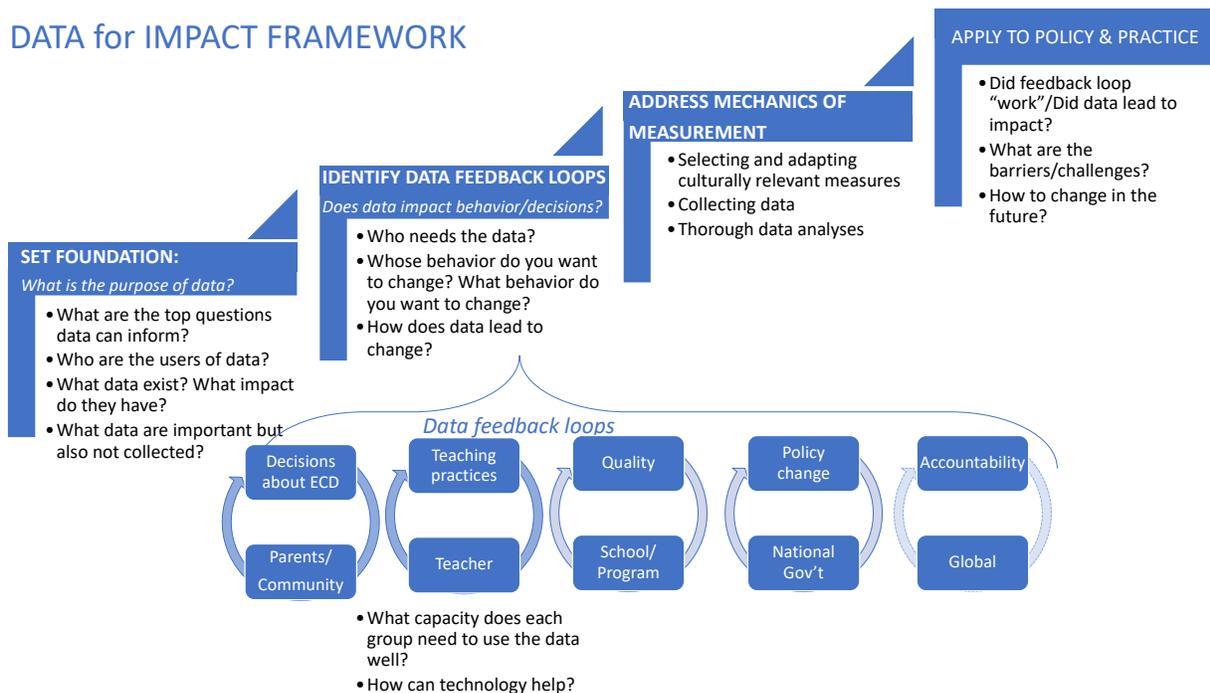
Source: Consortium for Pre-primary Data and Measurement in Africa

Building the foundation: What is the purpose of data and where are data needed?

2.1 Create interdisciplinary "data teams"

Data can be a powerful force in moving ECE systems forward. However, to be able to generate and use data well, there must be a strong team in place to define the top purposes for collecting data; to select and adapt appropriate instruments; to build appropriate capacity for analyzing data; and to provide pathways for data to be used to influence professional development and other elements of ECE systems.

The foundation for data use rests on building relationships that will ensure that data are perceived to be relevant to key ECE questions, that is, to be both valid and useful. Because of the intersectoral nature of early childhood systems, we recommend creating a "data team" comprising individuals representing various types of organizations, various sectors, and diverse perspectives of the ECE system. Teams should include policymakers, researchers, and implementers to allow for linkages among data generation, synthesis, and application. The purpose of this team is twofold: to define where data will be most useful within the ECE system and where data are needed but not presently available; and to reflect on where and how existing data efforts have either led to change within the ECE system or not – so that future efforts can be more effective.

Existing research identifies several conditions that help ensure that data are used to inform decision-making across different levels of early childhood systems. While the quality and technical strength of the data are undoubtedly important, other factors influence how and when data are used: strong and positive relationships between those who are generating the data

and those who are using the data; encouraging people's sense of competence in using data; and autonomy, or the ability of people to determine their own purposes in using data all help contribute to a culture of data use (Guss et al., 2013).

If they are to make use of a set of data, policymakers must first view those data as relevant to their context and their decisions. ECE data are often not included in education sector plans. This has been hypothesized to be partly due to policymakers focusing only on data they perceive as directly relevant to their decision-making while overlooking studies and other sources of data that may be viewed as farther afield from immediate decisions on ECE. As we will discuss in the next section, the value of the data depends heavily on the users' perceptions of the feedback that the data will provide them with. Given the way ECE data are currently being used, it is clear that there is a need for more relevant data. Judging the relevance of data is especially critical, since program evaluations and other studies are often designed and driven by funders who may not share the same understanding of the need for data that local policymakers have (Custer et al., 2018).

2.2 Diagnostic steps to understand data needs

Once a data team is formed, it may be useful to conduct a diagnostic data mapping to understand where current data are to be found, how they are currently used, and where data are needed. The CPDMA Diagnostic Toolkit, contained in Annex A, offers suggestions for conducting such a data mapping. It can also serve as a tool to aid country data teams in defining the purpose of their data and in outlining the questions countries may want to answer concerning ECE. Once a data mapping is completed, teams can start to identify gaps in the system and prioritize where resources are needed.

To guide countries through the initial phases of building a data-driven ECE system, we identified four diagnostic steps, detailed in Annex A and outlined in Figure 2 below. Developed in the first year of the CPDMA, these four steps are intended to serve as a starting point for discussion on how governments, multilateral development institutions, researchers, and others

can work together to develop data processes that promote action at different levels of ECE systems. The steps focus on data relevant to child development, learning, and quality in ECE programs. They emphasize moving in the direction of developing ongoing, sustainable monitoring systems focused on data that can be used to improve ECE, specifically by influencing policy decisions, improving professional development, improving learning environments, improving teaching practices, or helping to better inform families on quality in ECE settings and child development. Details and examples of each of these steps and guiding questions are included in the complete toolkit in Annex A.

Figure 2: Four Diagnostic Steps to Generating and Using High-Impact Early Childhood Education Data

STEP 1.	STEP 2.	STEP 3.	STEP 4.
Define purpose of ECE data	Determine what data exist and how they are being used	Identify gaps and resources needed	Plan for high impact data: prioritizing gaps to fill
• What are the questions we want to answer? • What are the goals and purpose of the data? • How will these goals be achieved?	• What data exist on child outcomes, quality, and contextual factors? • Who collects the data? • Who has access? • How is it used? • Is there a monitoring tool?	• What data are missing that could help us answer the questions in Step 1? • Are there any barriers to collecting, analyzing and disseminating data? • Are some groups unable to access data? • Are data aligned with curriculum and instruction? • What resources need to be in place?	• How to use existing data better? • How to align data/measurement to open policy windows? • How to incorporate better measurement and data use into existing projects or programs?

Source: Consortium on Pre-primary Data and Measurement in Africa

Define feedback loops: What do we know about how and when data leads to impact?

3.1 Applying principles of implementation science to ECE data and measurement

The basic idea behind a data-driven system is to enable people to use the data to provide feedback on what's working and what is not working, and then use that information to adjust and improve on the effectiveness of ECE over time. A central requirement, therefore, is to define how and where you expect the data to lead to behavior change.

While research on high-impact data within ECE is nascent, we can offer some guidance on how to think about feedback loops within ECE systems. For example, data can be focused at the classroom or program level (referred to as "service delivery level" below), to provide information to teachers on the quality of services or how children are learning. It can also be provided at the school level (also a "service delivery level"), for example to compare progress across schools or to provide school-specific feedback on the extent to which classrooms are meeting expected standards for quality and children are meeting expectations for learning. Data can be focused at the national, regional, or global level (referred to as the "policy level"), often through large-scale monitoring, which provides feedback on how well national policies and programs are working in improving quality and access to ECE.

3.2 Types of users and feedback loops

Data can be used at each level of an ECE system to influence change in behavior or decision-making on behalf of young children. The ways different stakeholders engage with data depend on both the types of data they may have access to and the types of decisions they will be making. Below and in Figure 3 we have outlined the various users of data and what type of data they may find valuable.

Figure 3. ECE Data Users and Data Use, by Type of User, With Country Examples

	Type of Data User	Data Needs	How are data used to make decisions?	Types of Data/Tools	Examples (see case studies in Section 5.1)
Service-delivery level	**Parents** *(representing the children or "consumers")*	Information on how their child is learning and the quality of the ECCE programs available to them	• Decide which school/program to send child to • Adjust early learning practices at home	• Program level information summarizing quality or child learning	• India private ECCE choice • Australia PIPS • Jamaica quality standards • South Africa Grow ECD
	Teachers	Information on the learning levels of children in their class, their background characteristics, and the quality of their teaching and the learning environment	• Understand strengths/ weaknesses as teacher and adjust classroom practices • Cater teaching to individual child based on learning needs	• Program level data • Individual child assessments • Data from coaching tools	• Trinidad Tobago • Australia PIPS • Ghana data dashboard • South Africa Grow ECD
	School Administrators	Information on the learning levels of children in their school, their background characteristics, and the quality of the teachers and learning environments in the school	• Prioritize training areas for teachers	• Program-level data • Data from coaching tools	• Australia PIPS • Jamaica quality standards compliance • Ghana dashboard • South Africa Grow ECD
Policy level	**District/ Regional Supervisors**	Information on the learning levels of children in their district, the overall quality of the teaching and learning environments, and whether this varies by the children's background or by school	• Allocate resources and support to programs/teachers	• Program evaluations, routine monitoring tools	• Jamaica quality standards compliance • Ghana data dashboard
	Early Childhood Departments	Information on learning levels of children, quality of teaching and learning environments, how learning outcomes and quality vary by the children's background or by school, some information on financing and resources, and trends over time	• Allocate resources • Inform improvements to curriculum, standards, teacher training policies	• Population level studies • National/regional assessments	• Jamaica monitoring standards • Rwanda NECDP dashboard
	National Policymakers/ Ministries of Education	High-level reports of the state of ECCE and whether it is improving or declining over time.	• Monitor system to prioritize/allocate funding to areas most in need	• Nationally/regionally representative studies (MELQO) • Monitoring systems/databases	• Ethiopia & Tanzania MELQO • Malaysia NCDC • Ghana dashboard • Rwanda NECDP dashboard

Source: Consortium on Pre-primary Data and Measurement in Africa

PIPS: Performance Indicators in Primary School; NCDC: National Child Data Centre; MELQO: Measuring Early Learning Quality and Outcome; NECDP: National Early Childhood Development Program

The following are all examples of data feedback loops:

- National policymakers in ministries responsible for oversight of early childhood education programs use data for resource allocation; for evaluating the effectiveness of existing policies and clarifying where new approaches may be needed; and for tracking progress toward equity across regions and populations of children.

- Teacher training institutions use outcomes and quality data to improve professional development programming to cater to the needs of the pre-primary population.

- Curriculum developers use data on learning and teaching quality to better align curricula and guidance to students' needs.

- School districts use data for some of the same reasons – to identify areas of effectiveness and challenge, and to inform professional development.

- Teachers benefit from information on child development and learning and from feedback on the quality of ECE.

- Parents use data on child development and learning and on ECE quality to make decisions on which facilities to use and how to support children's learning at home.

- Advocates and other stakeholders use data on early childhood development to influence public opinion or policymakers' views of the importance of early childhood education.

With the push toward implementation of evidence-based practices in ECE, there is an increasing need for feedback loops that ensure ECE data leads to impact. Creating a tight feedback loop between policy and practice requires routine sharing of information and ongoing data on how well programs are being implemented in a trusting and transparent manner (Metz and Bartley, 2015). Feedback loops can begin with specific programs designed to test effective methods for providing feedback to parents, teachers, practitioners and policymakers, and then can be expanded as programs grow, develop, and reach more children.

Mechanics of measurement

4.1 Selecting and adapting measurement tools

An important element of measurement is the selection of measurement tools. Guidance on how to select tools, and the various tools that have been developed, is available through the World Bank's *Toolkit for Early Childhood Measurement*[1]. In general, many tools to measure ECE systems have been developed, ranging from routine reporting of access indicators that are collected through the United Nations system to measures of quality in ECE and child development for research or ongoing monitoring. It is critical to adapt tools to the local context in order to generate useful data, especially when they have not been developed locally. Adapting tools requires taking a careful look at their content, aligning them with local standards and

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[1] http://documents.worldbank.org/curated/en/384681513101293811/A-toolkit-for-measuring-early-childhood-development-in-low-and-middle-income-countries

guidelines, and testing them within the local context as part of a piloting process before using them in a large sample.[2]

4.2 Collecting/generating data

Especially for young children, having data on family environments, children's health status, and other family and child characteristics can be critical for fully understanding ECE. The generation of data is becoming easier and more frequent in many places, due to the increased emphasis on data and the benefits of technology-enabled data generation and analyses.

At the same time, in many situations data collection can be a costly element in moving toward a data-driven system. The most valuable data–such as on the quality of learning environments and on children's learning—are still the most difficult to collect. Sample studies in which the smallest possible sample is collected are one route forward, and they are also essential to carefully consider why the data are being collected and who will use them before embarking on large-scale data collection efforts.

Various government and research agencies are likely to collect data relevant to early childhood, including:

- **Ministries of education,** which may collect information on access and enrollment in early childhood education through a school census, although those data may only cover formal pre-primary education. Ministries of education may also oversee the registration and monitoring of early childhood settings, which may yield data on the quality of settings if that information is routinely collected and analyzed. These data are nationally representative.
- **Ministries of health**, often in partnership with international organizations, may collect information on children's health and nutrition status through routine household surveys. This information is essential for defining both the strengths young children have and the

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[2] More information on the adaptation of tools can be found at ecdmeasure.org, through the MELQO portal.

challenges they face in a given country. These data are typically nationally representative.

- **Nonprofit organizations** may collect information on enrollment and effectiveness of early childhood education programs or specific interventions. Although this information may not be nationally representative, it may provide a deeper and more comprehensive look at the quality of education and the impact on child development.

- **Researchers at universities** may also have data on early childhood education through program evaluations or research studies. As with research conducted by nonprofit organizations, university-based work often provides a deeper look at the quality of settings and its effects on child development. Studies and program evaluations can provide a jumping-off point for creating monitoring tools.

- **Multilateral organizations** may have sources of data or may have provided funding for program evaluations or research studies that, in turn, can serve as a starting point for discussions, by identifying what information on child development may be most critical to collect over time.

4.3 Analysis of data

Data analysis is another critical step in maintaining useful and relevant data. In addition, the interpretation of data requires teams to review the data, discuss its possible implications, and plan for recommendations and next steps. A challenge that analysis poses, however, is finding ways to build analytic capacity and sustain it over time. Staff turnover can mean that there are periods when there are no staff with the necessary skills or experience. To handle ECE data well, data analysts must also have training in early childhood development and in ECE quality.

Working with local universities, national statistics offices, and other groups with strong analytic capacity can help ensure that data are analyzed in ways that lead to interpretable and applicable results. Several agencies have built up resources for developing these skills, including the UNESCO Institute for Statistics and its Global Alliance to Monitor Learning.[3]

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[3] http://gaml.uis.unesco.org/

Applying results to policy and practice

For data to be used, results from analysis must be shared widely and in easily digestible formats. Once results are complete, the data team mentioned in the first step can be mobilized to help present the results and ensure their application to policy and practice. There are several advantages to using data for policy and program improvement, most of all to promote the shared goals of equity and access to quality education, but institutional context has profound implications for how and when data are used. Although education data may already be available, for example, many policymakers do not rely on such data or else refer to it only as one point among many when deciding policy (Custer et al., 2018). Data from population-level monitoring, program evaluations, and research studies must be communicated effectively to make an impact on policy, and findings from new studies should be placed within the context of existing data (Lombardi, 2018).

5.1 Case studies and examples of data feedback loops in ECE

The following cases provide examples of how ECE data are being leveraged by different types of users around the world. First, several examples of the use of service-delivery-level data are presented from India, Trinidad and Tobago, and South Africa. We then explore examples from Rwanda and Malaysia, and others where national ministries use ECE data to monitor the early childhood system, followed by examples from Ethiopia, Peru, Indonesia, and Tanzania, which have recently conducted nationally or regionally representative research studies to gather baseline information on quality and outcomes. Finally, we present several examples from Ghana, Australia, and Jamaica, where data are used by stakeholders at multiple levels.

A. Data feedback loops for parents, teachers and schools

For high impact, parents, teachers and schools need support in how best to understand and use data and information about early childhood. Parents and schools use information on child development and quality to make decisions. Parents may use program-level information on

how their child is learning and on the quality of preschool programs to decide which program to send their child to. Teachers may use child outcome data to understand the learning levels of children in their classrooms to tailor teaching based on individual needs. Teachers and school administrators may use program-level data on quality to understand teaching strengths and weaknesses and improve classroom practices.

As seen below in the case of India, in order to make informed decisions about preschool quality and their individual child's development, parents must be equipped with knowledge about how children learn and what qualities in schools contribute to children's learning. Teachers also must have adequate knowledge about how best to interpret child and classroom data. In order to effectively use data, a data-driven culture must be established so that teachers feel empowered and capable of effectively interpreting and using data to improve their practice. As discussed in the case of Trinidad and Tobago, simply having tools and systems for data is only the first step; teachers need training and support for effective data feedback loops. The example from South Africa provides valuable insight into how data can drive change within school systems.

India: Parent use of data on perceived quality and child learning to select preschools

In India, 86 percent of children from urban low-income families attend low-cost private ECE programs. A recent study of more than 4,000 low- and middle-income families in India revealed that parents are making decisions about which school to send their child to based on child development and quality indicators (FSG, 2015). However, the study found that, due to lack of knowledge about how young children develop and learn, many parents base their decisions on environmental and child characteristics that are not associated with holistic, long-term learning and development. The majority of parents look for specific markers when selecting ECE programs and monitoring the progress of their children, such as children's ability to speak English (rather than the local language), recite poems (as a form of rote memorization), and write letters and numbers. However, these markers exclude important outcomes related to social and emotional learning, cognitive development, and physical well-being. Further, word-of-mouth recommendations about quality indicators are the key driver for school choice. Nearly all low-

income parents in the study (98 percent) placed value on academic program characteristics such as homework and exams, which are inappropriate for young learners.

Trinidad and Tobago: *Teacher tracking of child development through formative assessments*

In Trinidad and Tobago, the government provides standardized record-keeping tools and encourages the use of child portfolios so that teachers can track progress and areas that need additional support.[4] Planning time is also allotted for teachers to provide an opportunity to record and use data. Teachers report using data to assess children's development and learning and to communicate with parents about children's progress. Data are also used to identify and accommodate children with special needs. In addition, teachers use data to assess the quality of their own teaching through self-reflection and collaborative reflection with fellow teachers.

While the country's data-driven decision-making approach is promising, several challenges have emerged. Teachers express that they face difficulties in adequately using data due to their limited skills in data use and management. Further, there has yet to be a system established to easily and digitally store and retrieve the data (much of the information is still collected on paper). Issues have also arisen around the transmission of data for continuity between preprimary and primary school. Primary-school teachers either do not receive the information from preprimary teachers or receive it but do not trust it.

There have also been cases where teachers misuse child assessment data. For example, some teachers have reported comparing or rewarding children based on exit assessment scores rather than on progress throughout the school year. Background data on children, such as their home learning environments or their parents' employment, have also occasionally been used to make biased conclusions about children's needs based on stereotypes. In addition, challenges have arisen because teachers do not always have access to resources to diagnose and make referrals for special needs. While data on special needs may be collected, there is not an established system in place to consistently address the special needs of children, especially those in remote schools.

[4] For more information, see Abdul, Figaro-Henry, and Suepaul, 2018.

South Africa*: Using data to ensure quality in private ECD centers*

        Grow Educare Centers, a chain of ECD centers in South Africa serving disadvantaged communities, has built data into the core of its operating model. Grow Educare works with privately owned and operated ECD facilities to ensure quality, employing a data-driven approach and ensures that all Grow Educare Centers are meeting service delivery standards and quality/learning outcomes. All stakeholders (parents, teachers, principals, administrators) use and contribute to an app, which promotes proactive decision-making and consistent quality monitoring. The app provides an opportunity for ongoing data feedback loops, as parents, teachers, principals, and administrators interact with real-time data from their ECD centers.

        Grow Educare also recently used the Measuring Early Learning Quality & Outcomes (MELQO) tools to understand quality and learning outcomes and then used the results to improve its programming, for example by adjusting the curriculum. The MELQO tools will be used to monitor outcomes over the next three years.

B. Data feedback loops at national and global levels

        At the policy level, government ministries use ECE data to understand the overall status of national ECE systems. Data can help ministries track progress over time and prioritize investments to areas most in need. Data used at the national level can be collected through program evaluations or research studies, as is the case with the MELQO initiative, as well as through national monitoring systems and databases, as in the case of Malaysia and Rwanda. The examples below demonstrate that having data on child development and quality is an important first step and can catalyze discussions on a system's strengths and areas for improvement. However, limited information is available about how policy-level data are ultimately translated into system improvements.

Rwanda:* A national data system envisioned to support intersectoral coordination*

        The multi-sectoral work of Rwanda's National Early Childhood Development Program (NECDP) requires an integrated data system that reflects an intersectoral approach to young children's development, cutting across health, nutrition, social protection, and early childhood education. NECDP has recently established a dashboard for early childhood development to hold different public institutions accountable for their work in this field. Seven national agencies

contribute to the dashboard, each using distinct indicators aligned with its own sectoral priorities. The data feedback loop exists at the national level, where national line ministries and agencies report and hold each other accountable on their respective sectoral progress in early childhood development programming.

Malaysia: A national system for monitoring data on children, childcare centers, and teachers

The National Child Data Centre (NCDC) in Malaysia piloted an early childhood development (ECD) database in 2014 that includes data on children, childcare centers, and teachers (Sultan Idris Education University, 2017). The center has a central depository system that monitors the progress of children from birth to age four in the government ECE program (known as PERMATA). It uses a child development checklist that includes six developmental milestones as well as biodata and other information on special needs, health, and family. It also collects basic data on childcare centers and teachers, such as information on classes and teachers' educational backgrounds, although it does not collect information on quality outcomes. Users at all levels access the system: the national government monitors all information in the NCDC; the National Child Development Research Centre reports on progress and conducts research on child growth and development; state and district administrative agencies administer data from their own states/districts; and each childcare center can view data from its own center to monitor the progress of its teachers and children. The system also provides information to researchers and experts and can be used to generate reports on child development and program quality. It can be accessed from a tablet or a mobile phone.

Peru, Indonesia, Ethiopia and Tanzania: Use of early childhood data tools to create snapshots of national ECE systems

The global MELQO instruments were developed by an international consortium and designed to be feasible, actionable tools to address child development and learning and the quality of learning environments in the preschool years. As of 2019, the tools have been used in more than 35 countries around the world. In Indonesia and Peru, instruments were especially useful in defining quality in preprimary classrooms so efforts could be made to improve curricula and teacher training.

Teams of government officials and researchers in Peru, Indonesia, and Tanzania have all engaged deeply with the MELQO tools to collect early childhood data through national research studies. Experiences from the three countries have revealed several important lessons about ECE data use (Raikes, Anderson, and Sayre, 2018). Beyond the national studies, in Tanzania, MELQO tools were also used to evaluate a large-scale preschool quality intervention, *Fursa kwa Watato*. Results from this evaluation underscored the importance of ongoing professional development for teachers and the need to address school conditions, including overcrowding, lack of materials, and lack of trained teachers.

To help inform national policies related to child development and quality of preschools, Ethiopia undertook a national study using the MELQO tools to measure children's development and learning and common practices and pedagogical techniques within preschools. This study yielded several important outcomes, including new measurement tools that were translated and tested in multiple local languages, policy-relevant information on children's learning, and increased insight into practices in preschool settings. Results indicated that less than 20 percent of preschool classrooms were using recommended pedagogical practices. Despite the value of the data and adapted tools, budget constraints have prevented the national roll-out of the tools as part of a national assessment. Researchers from Ethiopia have expressed that having locally adapted tools has been an important achievement for early childhood measurement in the country.

Several conclusions emerge from the experiences of effective data-driven systems. First, a champion within the government is essential to ensuring proper application of findings for policy change. In addition, emphasis on data generation should be matched with investments in capacity building to ensure that data are adequately analyzed and applied. Finally, in addition to technical support to accurately quantify the relationship between children's development and classroom quality, strong local capacity is also required to interpret results within a local context and identify priority areas for policy improvement.

C. Data feedback loops at multiple levels of ECE systems

ECE systems can be most effective when data are used at multiple levels, but this requires considerable coordination and buy-in. ECE data systems should be cohesive, and information must be streamlined for effective use. Country stakeholders sometimes face issues of "drowning in data," a situation in which the data exist but are not well understood or effectively used for systemic changes. As demonstrated in the examples of Australia and Jamaica (below), in well established systems stakeholders at the service-delivery and policy levels can use data for various purposes to inform their decision-making. In both countries, data on child outcomes and quality are used by parents, teachers, and policy-level stakeholders and contribute to well-functioning ECE systems.

Ghana: Comprehensive dashboards supporting high-quality reading instruction

To support the implementation of an ambitious initiative to improve reading in the early primary grades, the Ghana Education Service instituted a dashboard that provides monitoring data on fidelity of implementation, teacher best practices, coaching, school-based inset meetings, teacher/pupil absenteeism, pupil progress in reading achievement, quality of school/head teacher and teacher support. The data from this dashboard are available to all, intended to provide support to the schools, the Ghana Ministry of Education, regional and district education directors, coaches, and school monitors. Data were intended to address four questions:

1. How are pupils progressing in learning to read in Ghanaian languages?
2. How effectively are teachers implementing the reading program in KG2, P1, and P2?
3. Which schools are meeting achievement and fidelity of implementation standards that are aligned with the Ghana national standards?
4. Did the performance of pupils in P1 differ depending upon whether they attended the same school during the previous KG2 academic year?

Data were critical in identifying where additional support was needed to fully implement the reading program. As a result of the quick and comprehensive monitoring, the program has been effective in raising reading levels among children throughout Ghana. Government officials identified five lessons for implementing similar approaches in other countries: (1) identify three to five key questions on quality education and learning that capture information that is actionable

and can inform policy; (2) determine which data can reasonably be gathered on a regular basis and are able to provide information to inform answers to the questions asked; (3) balance accountability with support for schools; (4) ensure that data can be understood and acted upon at different levels: classroom, school, district, regional, and national levels; and (5) create a designated team and office for managing the hardware and software, updating and improving the system over time. Because the reach of this system stretches across the country, it has elements of feedback loops at multiple levels of the system.

Australia: Teachers', school administrators', and policymakers use of child assessment data to tailor learning experiences in the classroom.

In Australia, schools implement Performance Indicators in Primary School (PIPS) to assess the early reading, phonics, and numeracy skills of children in their first year of primary school, once at the beginning of the school year and once at the end of the school year (Tymms et al., 2014). School principals and teachers receive school and class reports of PIPS results to assist them in planning learning and teaching. In addition, PIPS data are used to identify students who may need extra support. Parents and teachers receive student reports that summarize how individual children are performing (indicating whether a student's performance is below, at, or above expected standards) across reading, phonics, and numeracy dimensions. Teachers engage with parents to discuss their child's progress and areas of support to promote her future learning.

As of 2016, 400 schools across Australia were using PIPS as a monitoring system. The PIPS system is also used in the United Kingdom, the Netherlands, New Zealand, and Scotland. In addition to being used at the school level, PIPS results have also been examined by international researchers from Australia and United Kingdom to understand key trends in school performance in the first year of formal schooling. Besides supplying child-level and school-level information for providers and administrators, the PIPS data sets can provide valuable information to national policymakers about the effectiveness of ECE programs and policies.

Jamaica: A data monitoring system for tracking and publicizing compliance with quality standards

The Jamaican Early Childhood Commission (ECC), an agency within the Ministry of Education, coordinates all early childhood programs and policies in the country. One of the ECC's legislated roles is the supervision and regulation of all public and private early childhood institutions. These institutions are inspected twice a year to check compliance with detailed operational quality standards, which include guidelines for staffing, developmental and education programs, interactions and relationships with children, physical environment, equipment and materials, health, nutrition, safety, child rights, family and community engagement, administration, and finance (World Bank, 2013).

Data related to compliance with standards are used by the ECC and service providers on an ongoing basis. Effective monitoring and data use are largely attributed to commitment at the ground level. Development officers, who are hired and trained by the ECC, work in the field to provide technical assistance and support to early childhood institutions in reaching minimum quality standards. Using a national software system, the development officers can easily report ground-level indicators that are linked to targets within the Jamaican National Strategic Plan for ECD. This allows national policymakers to engage with the data to monitor and act on policy progress. In addition, the general public, particularly parents, also have the opportunity to engage with the data, as inspection reports are made publicly available online and provide detailed information on each institution's compliance with standards.

United States*: Quality Rating and Improvement Systems (QRIS)*

Quality Rating and Improvement Systems began in the United States in the 1990s as a national framework for ECE systems at the state level. QRIS provides a way to set standards for quality across a variety of criteria. The data collected through QRIS are used by programs to guide decisions regarding quality improvements and supports and are used by parents (consumers) to inform their childcare decisions.

Currently, 49 states have developed a QRIS, and each state determines its own criteria, although there are many similarities across states. The federal government also provides a national learning network and resource guide. In a QRIS, ECE programs are given a rating (typically from "1" to "5," like a hotel or restaurant rating) that corresponds to how well the

program meets specific standards. The criteria in QRIS typically cover staff qualifications, use of curriculum, family partnerships, quality environment and interactions (often measured by ERS), program structure (such as policies, procedures, and administration). Programs with higher ratings are often allowed to receive higher rates of subsidy, and states often provide technical assistance (such as coaching) and other supports (such as grants for materials or to be used to increase staff education) to encourage improvements and higher ratings. Several research studies have demonstrated that participation in QRIS has resulted in improvement in quality over time across a variety of programs—public, private, home-based, and center-based (e.g., Yazejian and Iruka, 2015).

5.2 Key elements for effective policy and service-delivery data feedback loops

In examining the literature and examples from around the world, the following lessons have emerged about effective data feedback loops.

Data should be accessible to stakeholders at all levels of the system to effect change.

Often, data are not available to those who work directly with children and parents. Even in the United States, when data systems are not in place, it can be very challenging for stakeholders to access assessment or quality observation data (Marsh, Pane, and Hamilton, 2006). The real and perceived quality and validity of data also affect whether teachers will use the data (as in the case of Trinidad and Tobago, where primary school teachers did not trust data collected by pre-primary teachers). Efforts to make data transparent should be carefully balanced with efforts to protect the rights of children, families and teachers, by masking any individually identifying data and working closely with stakeholders to define how and when data should be shared.

An improvement-oriented, data-driven culture should be established, particularly in ECE settings.

Even if data are available, a data culture may not be in place so that stakeholders can appropriately engage with the data. This may especially be true for data on monitoring ECE settings, which might not be shared or used by teachers and school officials to improve the quality of ECE settings. In countries without a history of measurement, priority is sometimes placed on generating data using tools and approaches developed outside the countries where they are used, a practice that decreases data's relevance and impact. Even when data are generated and data reports exist, without a culture of data use stakeholders at various levels will not appropriately engage with the data.

Because establishing a data culture, especially within schools, is often challenging, some suggestions may be in order. Evidence from the United States (Marsh, Pane, and Hamilton, 2006; Ordóñez-Feliciano, 2017) suggests that the following important components should be in place:

- Incentives can be established to effectively use data (such as rating systems).
- Professional development opportunities around data-driven decision-making can empower and enable teachers to become comfortable understanding and engaging with data.
- Adequate time and flexibility should be allotted for teachers to engage with data. Often, teachers face pressure to follow the pace of the curriculum and do not feel they have the flexibility to adjust following a curriculum based on data findings about effectiveness.
- The organizational culture and leadership of schools and districts influence patterns of data use. When administrators at higher levels demonstrate commitment to data-driven decision-making and establish a vision for effectively engaging with data, this can affect data use behaviors at lower levels.
- Teacher buy-in is crucial; teachers should not only understand how to use data systems and interpret results but also understand why the data matter.

Researchers, NGOs, and practitioners can be effective partners with government in generating new insights.

In many cases, researchers in low- and middle-income countries appear to be the primary users of data, and information does not necessarily get into the hands of the people who might

use it to make decisions at the policy or classroom level. Individuals or organizations who can effectively engage with various stakeholders can help translate data-driven evidence into policy change (Results for Development, 2018). Much of the available literature regarding international data on child development and quality summarizes findings from ECE measurement tools but does not explain how these findings can be translated into change or improvement. There is a need for partnerships that bring together researchers and other key players in the system, from national and regional policymakers to teachers and school administrators.

Advocacy and knowledge dissemination efforts should help all consumers of data better understand developmentally appropriate quality and outcomes.

In many countries, there is often a gap between having data and knowing what to do to improve learning. As seen above in the case of India, despite being able to access information on quality or early learning outcomes, families or other stakeholders do not necessarily have the knowledge or resources to appropriately interpret this information. Building data users' understanding of what good-quality early learning looks like is critical to ensuring the effective interpretation and application of data. Teachers should be supported in their need to understand data and in their role of using data to improve their practice.

Recommendations to build future knowledge

While the CPDMA taskforce countries' experience and other examples presented in this paper shed some light on the opportunities and challenges of effectively using data within ECE systems, there is still much to be learned on how to build systems that will encourage change. We present several important recommendations as the global early childhood community moves forward to translate data to impact.

Use developmental science to define what should be measured in data systems, while balancing with context.

Before generating any data, it is essential to make sure the right things are being measured. Measurement efforts, either for research or monitoring purposes, should be grounded in developmental science. At the community and school levels, systems must have the users in mind and ensure that not only researchers but also parents and teachers themselves are equipped with knowledge about how their children learn. Investments should be made in local tool development to appropriately balance between insights on child development emerging from research across the world, while capturing the unique circumstances and priorities that may arise in each setting.

Expand the knowledge base on high-impact data feedback loops, especially at the national level.

This paper presents several examples of how programs and governments have facilitated the use of data, with varying degrees of effectiveness. There is a need to build on this knowledge base and look systematically not only at how data are used around the world but also at how data use has ultimately translated to improvements at the program and policy levels. Further research and impact evaluations can broaden our understanding of the impact of effective data use on early childhood systems.

Align investments in data generation and use with the priorities of the broader ECE system.

Local stakeholders and external partners can work together to find appropriate entry points to improve ECE data use. It is important to keep in mind that effective data consumption does not happen overnight but requires considerable buy-in, coordination, and capacity. Effective data generation and use often follow substantial program investments and clarification of intersectoral approaches. In other words, successful ECE data use is often just one of the ingredients of an already established and well-coordinated early childhood system. In both Australia and Jamaica, for example, data are generated and used within landscapes where considerable investments and expertise already exist within the respective ECE systems. Data systems must align with existing priorities and follow programmatic investments. Further, what

is measured should be defined locally. Leverage points will be missed when data are defined solely by outside entities.

Build capacity for all consumers of data to interpret and apply early childhood data.

The capacity for data consumption is challenging, and capacity-building efforts are needed for all consumers of data, from the service-delivery level to the policy level. At the service-delivery level, teachers and school administrators, for example, must be equipped with the skills not only to comprehend information on quality and child outcomes but also to determine how to use this information to improve classroom practices. Advocacy efforts for parents and ongoing professional development opportunities for teachers and administrators can focus on instilling a culture of data-driven decision-making. This data-driven culture and capacity is also needed for policy-level stakeholders. Regional and national early childhood officials and policymakers should have ample opportunities to engage with and ask questions about existing data, as well as give input on the design, implementation, and follow-up of data generation efforts. Partnerships and networks that connect researchers, ministry officials, and other users of data can expand capacity and facilitate synergies between research and practice.

Annex A. Diagnostic Toolkit for High-Impact Early Childhood Education Data Generation and Use

Step 1: Define the purpose and users of data

As a first step of a country diagnostic, the purposes of early childhood data should be defined. Country data teams should consider the questions they want to answer with ECE data, the goals of data, and how these goals can be achieved. CPDMA taskforce countries began this process by bringing together a diverse country team that represented various stakeholders including representatives from ministries of education, universities, NGOs, multilaterals, and other partners. By having representation from various entities, differing priorities, approaches, and ideas about data could be shared and discussed. At this step, many questions should be raised without concern for prioritizing or narrowing down in focus. The purpose of this step is to consider all the various ways that data may be used to inform ECE systems, regardless of whether those data currently exist for a country.

Data, gathered as part of measurement, research, or program evaluation, help address many types of questions. Below, in Figure A-1, we outline some examples of questions that country teams generated as part of CPDMA and that other countries may consider. The questions are organized into broad categories that reflect a variety of data priorities.

Figure A-1. Examples of questions to be answered with ECE data

Quality	Child Outcomes	Workforce	Access/Inclusion	ECE System
o How has ECE improved since the introduction of X policy? o How to measure success/quality of program? How to define "acceptable quality"? o How effective is the curriculum? o Which pre-primary classrooms (compare modalities) meet minimum standards? o Which parts of quality are most important for child learning? o Which teaching resources are available (for school-based, community-based, home-based centers)? o How do studies conducted on ECE programs inform programming and policy formulation and identify appropriate approach ?	o Are learning outcomes of those who completed pre-primary better than those without or with home-based ECD or parenting education alone? o How do we know that children are ready for school? o How do student-teacher interactions contribute to students' productivity/ learning? o How do levels of school readiness compare e.g., private vs. public schools; rural vs. urban settings?	o Do teachers have the necessary knowledge and skills to support children's school readiness? o How effective is initial teacher training and continuous professional development? o What is the availability of trained ECE teachers and caregivers by qualifications and experiences? o Are higher education institutions offering relevant training to provide quality ECE? o How many providers have received training? o How many ECE practitioners have the minimum qualifications?	o Are there adequate facilities to meet the demand for ECE services? o Do teachers have specialized training to cater to children with special needs? o To what extent is children's attendance in ECE programs regularly observed and checked? o What are the reasons for increase/decrease of enrollment? o How many learners of each age group are participating in ECE programs?	o How to improve coordination of interventions in pre-primary? o How to improve parenting? What is the value of parental contribution? o How to increase school leadership support for pre-primary? o What are the challenges and the assets that differ depending on rural vs. urban context? o Is there collaboration between schools and communities/ parents? o Are parents engaged in parental education/are parents aware of their children's progress in early learning? o What are the funding gaps in running ECE programs in the country?

Source: Consortium on Pre-primary Data and Measurement in Africa

STEP 1 QUESTIONS FOR CONSIDERATION

1. **Make a list of the questions you want to answer with ECE data. This can be a long list at first that gets narrowed down over time. Make sure to include questions that various stakeholders in the system might have.** Refer to Figure 3 in the Technical Guide for examples of stakeholders and the types of data they require. You may also want to refer to national policy statements outlining goals for ECE programs or pre-primary education.

Question	Who is asking?
Ex. Which ECE programs are of acceptable quality? What are some challenges/assets between urban and rural contexts? To what extent are teaching resources available for the different modalities (school-based, community based and home-based)?	*Parents, inspectors, policymakers, implementing partners, donors, etc.*

2. **Write a brief goal and purpose statement for ECE data in your country. This will guide your work as a member of the consortium and also the project you pursue. Discuss with the other taskforce members from your country and decide on a collective statement.** If a similar statement already exists in national policy documents, please write that here.

PERSONAL GOAL

Examples:

Ex 1. To ensure improved quality and equitable access to ECE by all the intended beneficiaries in a coordinated and sustainable manner.

Ex 2. To generate current and reliable data that will inform evidence-based policy, planning and implementation of programs in the ECE sub-sector.

My goal and purpose statement for ECE data:

COLLECTIVE GOAL

Examples:

Ex 1. The data will be used by the government and ECE stakeholders in the planning and resource allocation to increase equitable access and quality pre-primary education

Ex 2. The data will be used to plan and focus resources to the highest-need target groups for optimal results in terms of increasing access, improving quality, and enhancing equity.

Our country team's goal and purpose statement for ECE data:

STEP 2: Define what data exist

In this step, teams are encouraged to conduct a data map to understand which data are collected, by whom, how these data are shared and used, and how this information currently informs decisions. This step also begins to pull in information about existing monitoring systems as one key area where data may be leveraged to support ECE systems improvements. CPDMA teams worked on this step by pulling together all of their own available data, conducting online reviews of data collected by others and reaching out to partners to request information about their data collection, reports, and other details about data use. By doing so, the teams found many additional sources of data that were not publicly distributed or easily accessible online but were very useful in understanding the current ECE landscape in their country. Doing this also provided opportunities for conversations around very recent data collection efforts and planned work. This task also helps to further build collaboration within countries as groups begin to work together to leverage multiple sources of information, often collected in silos, to inform efficient ways to use the data and move forward.

Table 1 in the technical guide outlines the various types of data, how they are collected, and how they might be used within an ECE system. For example, data on ECE quality may be collected from a subset of classrooms each year by government inspectors to provide accountability. These data may also be given to programs to provide feedback and guidance around compliance or program improvement. Besides quality and learning data, other types of data in ECE systems may include information on enrollment and access, dosage (e.g., time children spend in ECE settings), teacher background and qualifications, and education inputs (e.g., number of teachers, school expenditures, etc.) to provide an overview of the ECE system.

In this step, as teams document which data currently exist, they could consider existing policies, standards, and other resources as the foundation on which to build or expand an ECE data system. These include ECE policies, quality standards, child development standards, licensing or regulatory standards for public or private ECE programs, information management systems, current reporting requirements, monitoring systems, teacher preparation and professional development institutes, and multi-sectoral partners. Also consider recent research or data collected by others for program impact studies, household surveys, or other efforts

undertaken by country partners. While the goal may be to have ongoing data collection of quality and/or learning outcomes for children, these one-time data sources can be used to help inform what ongoing monitoring or potential scaling of these efforts may be most effective and informative.

In many countries, multiple sources of data may be available, but there may be few opportunities for stakeholders to look across findings to create a comprehensive view of quality of settings and child development. Collaboration among the multiple sources of data, with the potential to link different types of data for the same child together, can provide a more complete picture of the child's learning and development within an early childhood setting and home environment. CPDMA teams often found that there were many sources of data that other partners would benefit from accessing to inform their own work. Data sharing and dissemination do not always occur or are delayed. By documenting data sources and access, oftentimes the data and/or tools needed to answer questions (such as those generated in Step 1) already exist or partially exist, and then the work becomes accessing and using those data rather than trying to build a new data collection system or collecting additional data. This step is important in making the most out of available data to inform ECE systems, which is necessary to complete Step 3, identifying data gaps and needs and further exploring how existing data can be better or additionally utilized.

CPDMA country teams found that this step was an ongoing process and, even as they moved through subsequent steps, they maintained and added to a repository of available data, reports, presentations, and organizations collecting ECE data. This process was helpful for the teams and it also can become a resource for other country partners who wish to review ECE data for the country. Sometimes there are summaries of these research reports, and one CPDMA country (as part of a proposed project) identified summarizing available research as an important outcome and useful resource for the future.

STEP 2 QUESTIONS FOR CONSIDERATION

1. **Conduct a data map. Who has collected data relevant to early childhood in your country? What type of pre-primary data on quality or learning exist in your country? Please include any type of data (data from governments, external organizations, monitoring, program evaluations or other studies, etc.)**

Type of data	Who collected the data? (agency/org)	Who has analyzed/synthesized the data?	Who has not analyzed/synthesized the data but might be interested?	How have these data been disseminated/ shared?
Ex. ECD Audit	*Department of Social Development*	*Department of Social Development; Department of Basic Education; Innovation Edge; universities*		*As a report; in research reports*

2. **Summarize the key resources in place that are part of your ECE system. Map how these systems align and work together to provide a framework for ECE programs.**

Ex 1. Key resources available are ECE curriculum, professional development framework and guidelines for opening an ECE school. There is also a policy of child protection.

3. **Who has conducted ECE studies, and what might they be able to offer when moving to data-driven ECE systems?**

Ex 1. World Bank

4. **Conduct a "users" map: Who has access to the ECD data? (See Figure 3 in technical guide)**

Data user (e.g., parents, teachers, school admin, district ed officers, policymakers)	How do they access data?	How are they using data to make decisions?

Ex 1. Policymakers	*Meetings, database, and Internet*	*Data are really used to plan teacher professional development*
Ex 2. Teachers	*Limited access through Internet*	*N/A*

5. **Are there any groups that do not have access to the data?**

6. **Where is there highest leverage for change in behavior due to ECE data?**

7. **Describe the current monitoring system procedures. Do monitoring tools exist? Who collects this information and how is it used?**

STEP 3: Identify gaps and resources needed

After understanding what currently exists in a data system, teams can identify either (a) what data are missing to answer questions and/or (b) how existing data can be better utilized. Teams should consider how data can be used for impact in the system. Are there data feedback loops where data are reported to programs, teachers, parents, or policymakers in an understandable, actionable way? How can data be used to inform improvements in ECE quality, learning, and equity?

As discussed above, data can be useful at multiple levels of the system. Before identifying what types of data are needed, it is important to clarify who will/could use the data, and for what purpose. Before defining how and where new or existing data can be useful, it is important to clarify which entities have responsibility for collecting and analyzing data on early childhood education. By completing the previous steps, teams will be well-informed when considering what type of data may help inform decisions and be relevant and valuable to entities

working within the ECE systems. Completing those steps also makes these discussions more focused and avoids making recommendations that would duplicate existing or planned efforts.

It should be noted that, even if stakeholders have access to data, it doesn't necessarily mean they are *using* the data for change. Discussions about identifying gaps and resources may include areas of focus for capacity-building, particularly around data analysis, dissemination, and use.

CPDMA teams used their knowledge of existing data and how it was being used, along with their ECE data questions, to begin to think about areas of focus and need. These discussion were very broad and far-reaching in terms of scope and time but then narrowed down to what could be done more easily, through sharing data or making revisions to specific processes, coupled with upcoming country activities (such as a systems audit or household survey) that could have the most impact in a relatively short time. This led to the next step, which is to identify potential projects or actions.

STEP 3 QUESTIONS FOR CONSIDERATION

1. **Mapping existing data to your identified purposes**

Use this table to map the key questions identified in Step 1 to the types of data currently being collected.

Key question (Step I)	Types of existing data (Step II)	Do the current data completely answer the question? If not, what else is needed?

2. **Are data aligned with curriculum and instruction?**

3. **Data system design**

Is there a system designed for the collection and management of pre-primary data?

       Yes   **In Progress**   **No**

If you responded **yes** or **in progress**, please answer the following questions to provide more detail about the data planning and management:

- Is there a diagram to help explain the data system visually?
- Who is responsible for managing the system?
- Does the system include unique identifiers for children and organizations or an established matching process to ensure accurate information?
- How does the system ensure privacy and confidentiality?
- Does the system adequately meet the need to access data for decision-making?

4. **Financial resources for data**

Is there funding available or earmarked for pre-primary data collection, management, and monitoring activities?

Yes   In Progress   No

If you responded **yes** or **in progress**, please answer the following questions to provide more detail about the data planning and management:

- What funding is available?
- What is the process and who can access the funding?

5. **Stakeholder engagement for pre-primary data**

Is there engagement across different sectors and/or with different stakeholder for pre-primary data activities?

Yes   In Progress   No

If you responded **yes** or **in progress**, please answer the following questions to provide more detail about the stakeholder engagement:

- Who are key stakeholders working in relevant areas and what is their role in pre-primary data and measurement activities?
- Is there a multisectoral group or early childhood taskforce that meet regularly to discuss activities that include pre-primary data?
- *Reflection question: Which stakeholders should participate in the taskforce activities and how should they be included? How will the taskforce communicate the work to the relevant stakeholders?*

6. **Data governance**

Is there a formal documented preprimary data policy or is the collection of pre-primary data included in a broader pre-primary policy?   **Yes   In Progress   No**

If you responded **yes** or **in progress**, please answer the following questions to provide more detail about the data governance policy:

- What is the policy?
- Does the policy describe who has authority over the data, i.e. a leadership structure?
- Is there a data governance manual that defines how data is used, who can access data, definitions of terminology to create a common language, and the roles and responsibilities of different stakeholders?

STEP 4: Plan for high-impact data: Prioritizing gaps to fill

As a final step, teams are encouraged to reflect on their data mapping and priorities for data and measurement to develop a plan for high-impact data. Potential new projects should match policy expectations and other possible uses of data. Teams should strategically consider open policy windows, including top ministerial interests, ongoing research projects, and other places where momentum may propel efforts forward. In many cases, building on existing data, rather can collecting new data, may be the best option. Figure A-2 presents some sample country projects that build on existing early childhood data.

Upon reaching Step 4 of this diagnostic toolkit, country teams should have a good grasp of the "Foundation" step in the ECE Data for Impact framework. As teams move forward, they should also consider the remaining pieces of the framework, including defining data feedback loops, addressing the mechanics of measurement, and application to policy and practice.

Figure A-2. Sample projects for data teams

With population-level data (eg MICS, DHS)	• Create **data dashboard** w/ high-level messages from population survey, along with more country specific indicators. • Identify **new modules** that could/should be added to the next administration of the survey. • Explore **secondary data analyses** to uncover more information on key areas/topics. • Conduct **workshop w/ policymakers** to synthesize: what data tell us about where we are and where we want to go?
With Ministry of Education data…	• **Identify top themes** on school functioning/quality or child development and prepare **dissemination information and/or workshops for teachers.** • Work with **citizen-led assessments** or other groups to integrate ECE data into existing surveys of education. • Create **pilot program to share data directly with teachers** as part of improvement. • **Conduct focus groups** to hear directly from teachers, school administrators, others on what data would be most useful to them over time, or other issues of **data use or definitions of quality**. • Make results accessible to laypeople- **create briefs/hand-outs for ECE stakeholders** summarizing complex national reports- explain how findings can be applied to classroom- level. • Design a national **quality rating and improvement system**.
With program-level or research data..	• Translate research tools into **monitoring tools**. • Develop a **simple way to share data on quality and aggregated child outcomes for the ECE programs** in a city/town/village to inform choice (e.g. posting ratings physically on the buildings, in the newspaper, via SMS, etc.) • Interpret and disseminate previous research. • Design interventions for professional development.

Annex B. Helpful Resources

Association for the Development of Education in Africa Inter-Country-Quality Node for Early Childhood Development (ADEA ICQN-ECD)

The ICQN-ECD, hosted by the Ministry of Education in Mauritius, is an intergovernmental organization for policy dialogue and collaborative action among African Ministers of Education and strategic partners advancing the ECD agenda in Africa.

Bernard vanLeer Foundation "Get Ready for Data!" toolkit

Toolkit produced by the Bernard vanLeer Foundation the Open Data Institute to help stakeholders make practical decisions with early childhood data. Tool provides guidance on important considerations for planning a data-informed project or policy, including strategy, data collection and use, and ethics and engagement.

Consortium on Pre-primary Data and Measurement (CPDMA)

CPDMA is an initiative supported by USAID that builds on global investments in early childhood education by convening a network of government officials, researchers and other stakeholders interested in pre-primary data and measurement. The emphasis is on exploring how we can use data to help improve children's learning in the years before they enter formal schooling. CPDMA is working in partnership with existing networks in the region, including ADEA and the Africa Early Childhood Network (AfECN) to determine the best ways to build upon existing efforts.

ECD Measure

ECD Measure provides the tools, resources and community that empower governments, non-profit organizations and researchers to build feasible, efficient and reliable early childhood development measurement systems. The ECD Measure group is comprised of professionals with a broad range of expertise working in multi-lateral organizations, research institutions, and philanthropy. In addition to facilitating CPDMA, ECD Measure works on various US-based and international early childhood research initiatives. The ECD Measure website hosts the MELQO portal as well as a blog and resources on early childhood measurement and data.

UNESCO Global Alliance to Monitor Learning (GAML)

GAML is an alliance of global stakeholders designed to improve learning outcomes by supporting national strategies for learning assessment and measuring progress towards education targets within the SDGs. It is hosted by the UNESCO Institute for Statistics.

Toolkit for Measuring Early Childhood Development in Low- and Middle-Income Countries

The World Bank's toolkit provides practical guidance on child development measures for use in low- and middle-income countries. The tool walks users through the process for selecting, adapting, implementing, and analyzing early childhood tools and data.

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