Measuring Equity in Education

REVIEW OF THE GLOBAL AND PROGRAMMATIC DATA LANDSCAPE

Education Equity Research Initiative
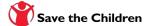

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*The **Education Equity Research Initiative** is a collaborative partnership formed by research and program implementing organizations with the common objective of advancing research to inform policy and programming on the effective ways of strengthening equity in and through education systems.*

Contents

Acronyms

DHS	Demographic and Health Surveys
ECD	Early childhood development
EMIS	Education Management Information System
IPUMS	Integrated Public Use Microdata System
LSMS	Living Standards Measurement Survey
MICS	Multiple Indicator Cluster Survey
PAL Network	People's Action for Learning Network
PASEC	Programme d'Analyse des Systèmes Educatifs de la CONFEMEN
PISA	Programme for International Student Assessment
PIRLS	Progress in International Reading Literacy Study
PRIDI	Programa Regional de Indicadores de Desarrollo Infantil
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
SDGs	Sustainable Development Goals
SES	Socio-economic status
SSME	Snapshot of School Management Effectiveness
TERCE	Tercer Estudio Regional Comparativo y Explicativo
TIMSS	Trends in International Mathematics and Science Study
TransMonEE	Transformative Monitoring for Enhanced Equity
UIS	UNESCO Institute for Statistics
UNGEI	United Nations Girls' Education Initiative
UNICEF	United Nations Children's Fund
WG	Washington Group on Disability Statistics
WHO	World Health Organization
WIDE	World Inequality Database on Education

Introduction

The Education Equity Research Initiative (also referred to as *the Equity Initiative*) aims to inform policy and programming on effective ways of strengthening equity in and through education systems. It will build on past and existing research and analytical efforts to create a comprehensive, shared understanding of the causes and effects of inequity in education, and of successful strategies to increase equality in education outcomes. The Equity Initiative is comprised of a set of interrelated research work streams: Measurement and Metrics, Learning and Retention, Conflict and Fragility, and Finance and Resource Allocation.

The Measurement and Metrics work stream will contribute to developing an understanding of inequality and equity in education by producing clarity in definitions and in measurement. This work stream will establish priority dimensions and indicators of equity; develop needed tools, protocols and measurement methodologies; establish common approaches to data analysis; and set a common agenda for data collection and reporting that will allow for a more comprehensive examination of the drivers of inequality in education and the effectiveness of equity-oriented policy and programming solutions.

As a first step, the Measurement and Metrics working group has undertaken a review of the current equity measurement landscape. This report presents the results of the landscape review, covering data collected by international sources and within development projects. The present document serves as an attempt to bring together information on the types of group disaggregation available for education data, the extent to which group measures are comparable, and how (and whether) they are being used to analyze education equity. In doing so, the landscape review aims to create a common reference point for the Equity Initiative as it moves forward with its research agenda.

Definitions

Inequity and inequality are widely recognized as challenges for education systems and societies more broadly, but the terms vary in their conceptualization and usage. In the context of the Equity Initiative, *inequality* is defined as a disparity in educational outcomes, including school access, retention and progression, and learning. *Equity* concerns inputs and is defined as a reassessment and redistribution of resources (human, institutional, and financial) in education with the goal of reducing or eliminating systematic inequality in outcomes. In this sense, equity is a path to achieving *equality*. It follows that *inequity* is a failure of a program, policy, or intervention to provide every child with an equal opportunity to obtain a quality education. Some degree of educational inequality is often inevitable and indeed acceptable (Arneson, 1989; Cohen, 1989; Dworkin, 1981), though what constitutes a reasonable amount of inequality remains unclear, with systematic inequality a greater concern than differences in outcomes resulting from personal choices.

More specifically, it is important to understand the extent to which inequalities coincide with group boundaries, an indication of how much social circumstances determine educational opportunities and subsequent outcomes (Benavot, 2015, August 20). This emphasis on understanding how children's background characteristics shape their education is reflected in the definitions of equity used by some international data sources. For example, the Programme for International Student Assessment (PISA) states that equity is "providing all students, regardless of gender, family background or socio-economic status, with similar opportunities to benefit from education. For example, the stronger the impact of a

student's socio-economic status on his or her performance, the less equitable the school system" (OECD, 2013, p. 27).

The concept of inequality between groups is termed horizontal inequality (Stewart, 2000) and is the focus of this review, which attends primarily to understanding how group or background characteristics are measured and to what extent they are used to assess disparities between groups.[1] Specifically, we look at what groups are considered and how they are defined by global data sources, like population censuses and household surveys, and by monitoring, evaluation, and research within development programs implemented by various organizations. Of the many group categories and background characteristics regularly associated with limitations, ones commonly measured include gender, urban-rural residence, region, poverty and social status, and ethnicity. The Sustainable Development Goals (SDGs) draw attention to additional categories, including persons with disabilities and migrants, while others point to challenges faced by child laborers, lower castes, and orphans. It is beyond the scope of this review to consider all these dimensions of disparity, and we concentrate specifically on the measurement of poverty, ethnicity, and disability, which are widely recognized as essential dimensions of educational disparity but measured irregularly.[2][3]

Methodology

To better understand current measurement practices related to educational inequality, this landscape review explores the background characteristics international sources and implementers of development programs collect data on and to what extent they are employed in analyses of educational equity. More specifically, the review addresses the following questions:

◊   What student-level (or youth-level) background characteristics do sources collect and report data on?
◊   Do sources conceptualize and measure key background characteristics in the same way?
◊   Do sources use key background characteristics as dimensions for equity analyses? What types of equity analyses are being done?

The review is broken into two main parts: a review of international data sources and a review of organizations' practices in collecting data to help monitor equity within development projects. The *global review* considers international data sources and initiatives, drawing conclusions from a desk review of recent reports and data collection instruments used by household survey programs, learning assessments, and databases of school census and population census data. The sources covered are documented in Table 1 along with the education topics they commonly address. Additionally, we drew

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[1] Stewart uses the term horizontal inequality to refer to inequalities between identity-based groups, such as ethnic or religious groups. We use the term more broadly to refer to inequalities between any groups. The term represents a contrast to *vertical inequality*, which refers to inequality across all individuals in a society, a concept that measures such as the standard Gini coefficient capture.

[2] It is important to note that comparability urban-rural residence and region across surveys is compromised by use of different definitions of urban and rural settings and of different sets of subnational regions in survey design. These challenges warrant attention but more detailed investigation of them is outside the scope of the current review.

[3] For additional discussion of dimensions of vulnerability, including for conflict-affected populations and different groups of migrants, see UNESCO (2016) and UIS (2016).

on publications from initiatives working to improve measurement, such as The Washington Group on Disability Statistics and recommendations from the United Nations Children's Fund (UNICEF) on the inclusion of disability questions in school censuses. Finally, we noted offerings in international databases—specifically the World Inequality Database on Education (WIDE), the Education Policy and Data Center (EPDC) database, and the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database (UIS.Stat), and the World Bank's EdStats—that extend the use of global data sources by producing group estimates and inequality measures for public consumption beyond those available directly from the sources. The international databases draw heavily on many of the data sources we directly review, and they provide a very rough gauge of the availability and comparability of data that can be used to measure educational disparities.

Table 1. Global data sources reviewed[4]

	Data source	Education topics commonly addressed			
		Access	**Retention**	**Learning**	**Attainment**
Household survey programs	**DHS** (Demographic and Health Surveys)	x	x		x
	MICS (Multiple Indicator Cluster Surveys)	x	x		x
	LSMS (Living Standards Measurement Survey)	x	x		x
	PRIDI (Programa Regional de Indicadores de Desarrollo Infantil, focuses on early childhood development only)	x		x	
Learning assessments	**PISA** (Programme for International Student Assessment)			x	
	TIMSS (Trends in International Mathematics and Science Study), **PIRLS** (Progress in International Reading Literacy Study)			x	
	PAL (People's Action for Learning) Network	x		x	
	SACMEQ (Southern and Eastern Africa Consortium for Monitoring Educational Quality)			x	
	PASEC (Programme d'Analyse des Systèmes Educatifs de la CONFEMEN)			x	
	TERCE (Tercer Estudio Regional Comparativo y Explicativo)			x	
Administrative data – school census (aggregated as global or regional resource)	**UIS** (UNESCO Institute for Statistics)	x	x		
	TransMonEE (Transformative Monitoring for Enhanced Equity)	x	x		

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[4] For more information on the structure and contents of these data sources see UIS (2004) for a description of household survey and administrative data sources and see Cresswell, Schwantner, and Waters (2015) for descriptions of different learning assessments.

Administrative data – population census	**IPUMS** (Integrated Public Use Microdata System)	x	x

It is important to note that the databases and data sources considered do not represent an exhaustive survey of available international resources. The selected data sources are widely used in global and national monitoring, and the databases are major databases of education statistics. Other databases, such as ones from UNICEF and the United Nations Girls' Education Initiative (UNGEI), draw on similar sets of sources (mainly household surveys) and offer the same dimensions of inequality as the databases we cover so we do not review them explicitly. A second caveat is that data sources are constantly evolving and revising their data collection tools. This review looks at the landscape based on tools used in recent data collection, which may have evolved over time or may be amended for future efforts.

The *review of programmatic efforts* relies on information collected during eleven interviews with eleven organizations and analyses of the data collection tools they shared (see Table 2 for a list of participating organizations). A purposeful sample of organizations involved in the Equity Initiative, as well as a few non-member organizations that were part of the same networks of practitioners were included in the target list. Interviewees had familiarity with data collection across a range of projects within their organization or with larger scale data collection efforts as part of wider donor activities (such as data collections as carried out by PAL Network partners). There were a total of five different interviewers from FHI 360 and Save the Children.

Table 2. Organizations interviewed for the programmatic review

ASER (PAL Network partner)[5]
Chemonics
Creative Associates International
FHI 360
Mango Tree
RTI International
Save the Children
SIL International
UWEZO (PAL Network partner)
World Education
World Vision

Interviews covered the types of measurement tools developed, types of data collected at the student level, dimensions of equity used for disaggregation of student-level data, metrics used to track inequality, input-based measures collected, the regularity of tracking and monitoring, and research design considerations related to equity analysis. The most common tools that organizations use and shared were learning assessments such as Early Grade Reading Assessment (and related mathematics and writing assessments), Literacy Boost, the Functional Literacy Assessment Tool, and ASER/UWEZO. Respondents also mentioned more general tools linked to household and community surveys, as well as surveys of head teachers and school administrators, and school/classroom observations. It is important

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[5] ASER and UWEZO were surveyed in the desk review of international sources and interviews with program sources.

to note that our analysis of tools is based on only five tools that were shared, and that these were sometimes project-specific rather than indicative of general organizational approaches.

Throughout this initial landscape review, emphasis was placed on the collection and analysis of dimensions of equity at the student level, as a priority over data and frameworks that focused on community, school, or system-level variables. Particular focus was placed on identifying institutional tools and practices associated with the measurement of three key dimensions of equity: poverty, ethnicity, and disability, which were deemed to be relatively less well defined, as compared to other common dimensions. The next section presents the key takeaways from this review.

Findings on equity dimensions

Review of global data sources

In this section, we look at specific background characteristics measured by international data sources before turning to those measured within development programs. We consider the characteristics that organizations present in their reports in conjunction with education analyses they use. Of the many topics that influence equity and that organizations collect data on, we focus particularly on measures related to poverty, ethnicity, and disability.

Measuring poverty

Resource deprivation, whether economic or social in nature, may constrain educational opportunities in the absence of social policies that effectively offset them, making poverty groups important to consider in equity analyses. International organizations define and measure poverty in diverse ways that vary in conceptualization and complexity of measurement, though some measures are more popular and widely used than others.

One measurement approach emphasizes *economic well-being*, which international and regional sources of education data often gauge through indices of household wealth. This approach is taken by DHS, MICS, and PRIDI, among other sources. The choice of index components varies by survey and often includes some country-specific items. DHS, which operates primarily in low and middle income countries, commonly considers flooring type, water source, toilet facilities, electricity, radio, television, telephone, refrigerator, vehicle type, the number of people per sleeping room, land ownership, and employment of a domestic servant (Rutstein & Johnson, 2004). The factors PISA uses, which often include internet access, a dishwasher, number of cars, and number of bathrooms (Cresswell et al., 2015), reflect its focus mainly in wealthier countries. One challenge with wealth indices is ensuring the relevance of components across a country. DHS, for example, faced criticism that its wealth indices were biased towards urban areas and has since revised its approach, sometimes using certain variables only for urban and rural areas and then combining the separate indices (Rutstein & Staveteig, 2014).

Whereas wealth indices rate relative welfare within a country, and someone in the poorest group in one country may not be among the poorest in another, other measures of economic welfare can be more readily used to assess absolute poverty against international standards. One example is household consumption measures, typically used in LSMS, which can be linked to absolute poverty lines (Porta, Arcia, Macdonald, Radyakin, & Lokshin, 2011). However, asset-based approaches, like the ones discussed above, simplify data collection and are therefore less costly to include, because they involve data on fewer items, many of which are already assessed for other purposes. Others add that household

consumption, as well as income, are unstable in developing contexts, and that the structure of a house and assets provide a better, more far-sighted perspective on welfare (Porta et al., 2011; Rutstein & Johnson, 2004). Nevertheless, some see absolute measures as particularly important in developing settings where large portions of populations live in poverty and doing relatively well may still mean living in impoverished conditions (Smits, 2015, January 27). With this in mind, DHS is experimenting with the development of the Comparative Wealth Index, an absolute measure of wealth comparable across countries and over time (Rutstein & Staveteig, 2014). In the same vein, Smits and Steendijk (2015) developed the International Wealth Index for use with DHS, MICS, and other surveys that is constructed much like relative wealth measures but based on assets generally considered important around the world.

Socio-economic status (SES) extends consideration of poverty beyond purely economic measures, though in practice SES indices are very similar to wealth indices. For sources of education data on children and youth, this often means developing indices based on household assets as well as parents' education, and sources like SACMEQ and UWEZO Uganda take this approach. Other sources include additional factors. LLECE, for example, has questions on parents' occupation and household income. The PISA Index of Economic, Social, and Cultural Status is calculated from three other indices that assess household wealth, home education resources, and cultural resources as well as measures of parental education and numbers of books at home.

Table 3. Poverty measures used by international sources

Concept measured	Measures used by sources of education data	Sources with at least one measure in concept area
Economic welfare	Wealth (based on household structure, assets, and service access) Consumption	DHS, LSMS, MICS, PISA, PRIDI
Socio-economic status	SES indices are similar to wealth indices but, in addition to household structure, assets, service access, or income, may include: ◊ Parents' education ◊ Parents' occupational status	LLECE, PAL Network, PASEC, PISA, SES
Social or cultural capital	Parents' education or literacy skills Parents' occupational status Immigrant/migrant background Home literacy and learning environment: ◊ Availability of books or other reading materials in the home ◊ Adult interactions with children ◊ Parents' support for education ◊ Parents' expectations for education ◊ Parents' interest in reading ◊ Home educational resources ◊ Cultural possessions ◊ Nurturing home environment	DHS, LLECE, LSMS, PAL Network, PASEC, PIRLS, TIMSS, PISA, PRIDI

Some data sources, including DHS and MICS, PISA, TIMSS, and PIRLS, use *indicators of social and cultural capital* in addition to composite measures of economic status or SES. These measures gauge deprivation in resources related to social integration and the value placed on education in the home that do not

always overlap with economic disparity but tend to shape educational opportunities and outcomes. Table 3 lists examples of indicators of social and cultural capital used in major international data sources, such as parents' education and occupational status, the immigrant background of the child and family, and a range of indicators related to home educational resources, from books in the home to parents' educational expectations for a child.[6]

Most global data sources collect information on parents' education levels, which is important because more educated parents tend to place higher value on the education of their children and are better able to assist with homework and supporting the development of academic skills. Parental education is most often assessed as the highest level of education completed by each parent. PASEC and at least one PAL Network survey gauge this as parental literacy instead. In the case of PASEC, students were asked to report whether their parents could read or not while in one example from UWEZO parental literacy was tested (though that is not the approach UWEZO typically uses to measure parental education). An additional difference is that some parental education measures look at the education of both parents (e.g., PASEC, PIRLS and TIMSS, and PISA) while others focus specifically on the education of the mother (e.g., PRIDI, some PAL Network partners, some MICS reports).

With exposure to print and reading practice essential to developing literacy skills, measures of home literacy and learning environments have become common in learning assessments, though they take several forms and are sometimes used as background characteristics rather than in analyses with educational outcomes. Most often, learning assessments ask about the number of books or reading materials in the home, though the selection options (number ranges of books, bookshelves filled) and the types of materials included (books, reference volumes, magazines, computers, etc.) varies. MICS and PRIDI both include questions related to adult-child interactions in the home for children under five, though in the case of MICS these are used as indicators of early childhood development rather than as dimensions of disparity in analyses of learning. In contrast, PRIDI does look at parent-child interactions as part of their nurturing environment index in relation to child development outcomes.

Finally, we briefly mention the measurement of migration status in global data sources. Migration status is an important dimension of inequality in its own right. We discuss it under the theme of poverty because internal and international migrants, where they are perceived as outsiders, often face challenges accessing and succeeding in school due to overt discrimination or language or cultural barriers in education, factors tied to social status and resources. The 2016 Global Education Monitoring Report draws attention to four important types of migrants, international migrants, international migrants, those internally displaced, and refugees, all of which need more widespread and regular monitoring as groups vulnerable to education disadvantage (UNESCO, 2016). In terms of what is currently available, two learning assessments, LLECE and PISA, collect and use information on whether a student was born in another country and present education analyses by migration status. Population censuses sometimes collect information on migration and could be a resource for analyzing inequality, though comparability across countries is imperfect and education data available from censuses is often limited to attainment, attendance, and literacy. Montgomery et al. (2016) observe that there is currently

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[6] See Cresswell et al. (2015) for a detailed review of the measurement of socio-economic variables, as well as other background characteristics, in major learning outcomes assessments.

a lull in household survey collection of migration information—DHS recently suspended collection of migration statistics and MICS is only beginning to gather this information, though MICS does intend for data to be disaggregated by migration status in accordance with the SDGs. In short, the use of migration as a dimension of educational inequality is limited but will hopefully be expanded in the near future.

Overall, measures of poverty or social standing are widely used in global data sources. Nearly all such sources include a composite index of economic or socio-economic well-being, though the specific items included in these measures vary by data source, country, and time. Measures of social and cultural resources are also common, particularly measures of parental education. Other measures, like home literacy environments or migration status are measured less frequently and not always used to assess educational equity even when measured. Nevertheless, a crucial constraint on the availability of poverty measures is that, while nearly ubiquitous from individual-level (or household-level) data collection, poverty is a difficult dimension of inequality to gather data on at the school level. As a result, national administrative data from school censuses rarely include it. Given the prominence of administrative data to local and global monitoring in education, this means that the use of poverty measures in equity analyses is far from universal (UIS, 2016).

Box 1. Reliable reports?

Who reports educational status and background characteristics impacts the reliability of information. The household head is often best positioned to report on household assets and indicators of social and cultural capital. Data sources without a household or parent interview must wrestle with how, and whether, to collect socio-economic status, especially from younger children. For example, PASEC2014 notes the challenge of collecting information on parental education and home resources from early primary grade students, and they use different measures for Grade 2 and Grade 6 students, opting to ask Grade 2 students whether a parent can read (rather than their education level) and whether there are any books in the home (rather than an estimate of quantity) (PASEC, 2015). Like PASEC, RTI has encountered challenges soliciting accurate reports from students about adult household members' literacy and education levels in its monitoring, evaluation, and research activities. In fact, when RTI compared student reports in Nigeria to reports from households, they found that children reported much higher levels of education and literacy than adults themselves did, a validity issue that has led RTI to stop asking children this question (personal communication, July 28, 2016).

On the other hand, the household head is not always the most accurate source for certain child factors, like age or schooling experiences, perhaps especially if s/he is not a parent or primary caregiver. This may present a challenge for household surveys, like DHS and MICS, that rely on reporting from the household head for information on the education and characteristics of children. Research is inconclusive about how measurement is impacted by who responds. For example, research into the effect of household survey design on labor statistics in Tanzania finds that child labor estimates based on proxy responses from the household head or another family member were not significantly different from those based on self-reports (Dillon, Bardasi, Beegle, & Serneels, 2012); however, there were differences for estimates of adult labor statistics (Bardasi, Beegle, Dillon, & Serneels, 2011).

Measuring ethnicity

Another important dimension of equity is ethnicity (or religion, language, or race) as disparities between identity groups may suggest discriminatory policies and or unfair resource allocation.[7]

Household surveys and population censuses are an important source of information on ethnicity. When collecting information on group affiliations, household surveys and population censuses ask respondents to report their ethnicity and enumerators document responses, usually relying on predesignated group codes. However, *who* reports varies by survey.[8] The model household questionnaire for the fifth round of MICS asks the ethnicity, religion, and/or mother tongue of the household head, which may then be used as background characteristics for other household members. Where MICS employs this approach, its reports make clear that the background characteristic represents the ethnicity of the household head. Inclusion of this ethnicity question makes MICS surveys a prominent source of data on ethnic and religious disparities in the WIDE database for certain indicators, like out of school rates. By contrast, the universe for DHS ethnicity questions is typically more limited, with ethnicity or religion addressed in the women's and, if used, the men's individual questionnaires.[9] This restricts the population receiving the question to those 15-49 years old and, in some cases to the ever-married population, making it most readily usable for looking at disparities in adult educational attainment.

In censuses, there is even greater diversity in the reporting of ethnicity, which might be reported for all persons (e.g., Mongolia 1989), citizens (e.g., Ghana 2000 and 2010, Mongolia 2000), or for restricted ages (e.g., Bolivia 2001, which asks the ethnicity of persons ages 15+). Moreover, some censuses and household surveys do not ask about ethnicity. Others in the same country ask about ethnicity in some surveys and religion in others, limiting comparisons over time.

Even when ethnicity, religion, or language is measured repeatedly over time, the groups identified might vary. For example, 1989 and 1999 censuses in Vietnam list roughly 50 groups, most of which are common to both surveys, whereas the 2009 census includes only three categories: Kinh (the ethnic majority group), other ethnic group, and unknown. Shifting categories result from design differences or changes in the social relevance of certain categories. Modern conceptualizations of ethnicity tend to see ethnic identities as simultaneously malleable and durable, with the social or political relevance of certain categories evolving over time (Brown & Langer, 2010). In quantifying the concept of ethnicity, surveys must wrestle with the challenge of assigning blurry concepts concrete codes and must negotiate occasional tensions among feasibility of measuring many groups, relevance, and comparability over time.

Other sources of education data, such as PISA, UWEZO, and LLECE, also collect information related to ethnic background. As with censuses and household surveys, all must determine which dimensions of

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[7] The concepts of ethnicity, religion, and language are inter-related. Ethnicity is sometimes used as an umbrella term, with religion or language as key identity markers for an ethnic group, and sometimes the concepts are distinguished. Throughout this section we often use ethnicity in its broader sense, referring to all three concepts.
[8] MICS and DHS surveys each collect data using several questionnaires that can be linked at the household or individual level. One questionnaire module is used with the household head, who reports on the home and provides basic information about each family member. Additional modules include ones used with adult women and, sometimes, adult men.
[9] MICS also asks questions about ethnicity in individual adult questionnaires.

diversity to measure. For some data sources, this is driven by the relevance of certain social divisions—all countries have some degree of ethnic, religious, and linguistic diversity but those cleavages do not always drive disadvantage. In Latin America, for example, indigenous status is an important social division with ramifications for educational inequality, and LLECE, PRIDI, as well as censuses and household surveys in many Latin American countries ask about it.

For learning assessments, language is of particular interest because command of the language of instruction is a strong determinant of academic performance (Brock-Utne, 2007). PISA asks students to report the language they usually speak at home, collecting data on a range of languages but grouping them into two categories for reporting purposes: the language of the test and another language. PIRLS and TIMSS do similarly, reporting whether the child spoke the language of the test before starting school or not. LLECE and UWEZO also collect information on home language. These sorts of simplified minority/majority classifications anticipate which categories are likely to influence inequality and present educational outcomes accordingly.

In sum, data sources that include a measure of ethnicity take a common basic approach to measuring it. Participants are asked to identify their group membership and responses are recorded, usually against predetermined, survey-specific coding schemes.[10] The bigger challenge is whether an ethnicity question is included and whether categories are comparable over time. Also, as with poverty measures, ethnicity is a difficult concept to measure without individual- or household-level tools.

Measuring disability

Disability is measured infrequently and conceptualized inconsistently, more so than other equity dimensions reviewed in this report. Encouragingly, international efforts led by The Washington Group on Disability Statistics and UNICEF have championed measurement of this overlooked dimension, resulting in important methodological gains, with greater conceptual harmony and more widespread collection of disability data likely to be realized in the near future. Meanwhile, the SDGs call for equal educational access and inclusive schooling environments for persons with disabilities, further strengthening demand for more and better data in this area. In this section, we first discuss challenges to disability measurement and then promising recent developments.

Population censuses are important sources of data on disability and educational attainment, and sometimes literacy and attendance as well. As national sources, they reflect local understandings of disability and priorities for data collection, which sometimes inhibit international comparisons. Peters (2008) observes that countries in the Global South often define four types of disability related to physical impairment, vision, hearing, and mental abilities whereas countries in the Global North may define more than 12 categories (e.g., the United States). IPUMS, which works to harmonize data from over 270 censuses, uses 15 different variables to synthesize the diverse disability questions asked in census data, which concern disability status, physical disabilities, intellectual and learning disabilities, mental health challenges, and effects on daily life (see Table 4). Even when responses can be harmonized under a common variable, like disability status, IPUMS cautions that comparability across surveys is complicated by differences in questionnaire phrasing, what counts as a disability (e.g., some

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[10] One exception is UWEZO assessments, which sometimes left open the home language category and had enumerators write in the response. While this avoids the need to predetermine relevant groups and confine responses to those groupings, it complicated data management and utilization.

censuses include chronic diseases under disability), and how severe a condition must be to be labeled a disability.[11] Peters (2008) adds that the social stigma of identifying oneself or a family member as disabled leads to underreporting in some settings.

School censuses are another important but irregular source of data on disability and education. In a review of 40 countries, UNICEF (2014a) found that just over half collected information on disabled students in EMIS questionnaires. Among those that did, there was variety in what was measured and how. The Transformative Monitoring for Enhanced Equity (TransMonEE) database, created by the UNICEF Innocenti Research Centre in 1992, aggregates data from national sources from countries in Eastern Europe and Central Asia, and is one of the few international resources reporting data on education and disability. It reports numbers of students with disabilities enrolled in schools from 22 countries from 2006-2014 and documents the challenges with comparability of data, including that enrollment figures for several countries reflect enrollment in "special schools" only and that within-country definitions of disability have sometimes changed over time (UNICEF, 2015).

Table 4. Approaches to measuring disability in censuses

Category	Variables available from IPUMS
Disability status	Disability status
	Origin of disability
	Rehabilitation of disability
Physical challenges	Blind or vision-impaired
	Deaf or hearing-impaired
	Mute or speech-impaired
	Disability affecting lower extremities
	Disability affecting upper extremities
Intellectual and learning disabilities; mental health[12]	Mental disability
	Psychological disability
Effects of disability in daily life	Personal care limitation
	Disability limiting mobility
	Work disability
	Employment disability

Source: List of variables from IPUMS with our categories applied

Tracking the enrollment of disabled students, as EMIS questionnaires do, is paramount to planning for equitable education, but understanding the extent to which disabled children and youth are excluded from education is of equal importance where school participation is not universal. Indeed, disabled populations are among the most educationally marginalized, and an estimated 90% of children with disabilities are out of school in developing countries (UNICEF, 2014b), though it is hard to know the true magnitude of the problem given the scarcity of data.

Household survey programs, such as MICS and DHS, are important sources of data on out of school populations; they tend to collect data more often and in more standardized ways than population

[11] For more detail, see IPUMS metadata documentation on disability variables at
https://international.ipums.org/international-action/variables/group?id=dis.
[12] While intellectual and learning disabilities and mental health issues encompass a broad range of conditions, often very disparate ones, we group them because they are considered under the same question in some censuses.

censuses, but the data they provide on child disability, when available, is not typically used in conjunction with education data. MICS has offered a child disability module since the second round of surveys in the early 2000s and is the principal provider of comparable data on the topic, with 22 countries using child disability modules during the second round of MICS (2000-2001), 26 during the third round of MICS (2005-2007), and 6 new countries during the fourth round of MICS (2009-2012) (Cappa, Petrowski, & Njelesani, 2015). The MICS child disability module used in these early rounds is designed for children ages 2-9 (ibid.), overlapping with early childhood school ages and early primary school ages only. It assesses disability prevalence but is not commonly used to gauge educational equity.

Looking beyond current challenges with the availability and comparability of disability data, we can expect an improved data landscape in the near future. The Washington Group on Disability Statistics (subsequently referred to as The Washington Group) was created in 2001 and is comprised of individuals from national statistical offices, UN agencies, and representatives from organizations working with persons with disabilities. It promotes the collection of disability statistics and has produced tools to support consistent measurement across a range of sources, including national censuses and household surveys. Their short set of recommended questions is intended to measure adult disability and asks about six types of impairment—vision, hearing, walking, remembering, self-care, and communication—and their severity using a four-point scale ranging from "no difficulty" to "cannot do at all."[13] The short set is designed for use with adults and has been adopted in over fifty countries (Mont, 2014, December 4).

The Washington Group and UNICEF are also developing modules for gathering data on child disability, which will be of particular importance to future analysis of equity in education. The final version of two modules that have been under development will be released this year; they will be incorporated into the sixth round of MICS and available for use in other surveys and sources. The first of these address child functioning and disability and is based on the WHO International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY).[14] It has separate questionnaires for children ages 2-4 and ages 5-17 covering a range of topics including vision, hearing, walking, and communication (see Table 5 for all domains planned) (Crialesi, De Palma, & Loeb, 2015). A second module addresses the inclusivity of education, asking parents to report on issues such as attitudes towards disability and the accessibility of school environments for a disabled child (see Table 5 for all topics addressed) (Cappa, De Palma, & Loeb, 2015). Additionally, UNICEF has prepared recommendations for addressing disability in EMIS questionnaires and stresses the importance of disaggregating by type of disability and severity as well as counting children with multiple disabilities. It also advises collecting information on the availability of supports for difficulties, like whether children with vision difficulties have glasses and children with hearing impairment have hearing aids, as well as school factors related to inclusivity (UNICEF, 2014a).

Although final versions of these modules have not been released yet, the Washington Group and UNICEF recommendations have already been influential. We found that some PAL Network surveys echoed the recommendations made by UNICEF and the Washington Group and that recent PASEC

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[13] The Washington Group short set of questions is available at http://www.cdc.gov/nchs/washington_group/wg_questions.htm along with additional documentation and protocols.
[14] See the WHO ICF-CY manual at http://apps.who.int/iris/bitstream/10665/43737/1/9789241547321_eng.pdf for more information and descriptions of different domains.

questionnaires asked about visual impairments using a similar approach. Nevertheless, until these recommendations are fully adopted, the landscape of disability data remains bleak. Several learning outcomes data sources, including PISA, PIRLS, and TIMSS, do not collect data on disability and do not test children with severe disabilities. It is also not yet clear how many countries will measure disability through DHS, which is preparing a disability module countries can elect to include (DHS, 2014, November 25). Perhaps most importantly, while many organizations recognize disability as an important challenge to equity, it tends to be discussed as a background characteristic of youth or student populations rather than analyzed as a dimension of inequality. Consequently, the challenge ahead is not only collecting more and better data on disability, particularly child disability, but also doing more with that data. By drawing needed attention to persons with disabilities as an educationally disadvantaged group, the SDGs will hopefully inspire greater attention to disability as a dimension of inequality.

Table 5. Topics addressed in forthcoming UNICEF/Washington Group child disability modules

Questionnaire	Topics
Module on child functioning and disability, ages 2-4 (Crialesi et al., 2015)	Vision Hearing Walking Communication/comprehension Learning Behavior Playing Dexterity/fine motor skills
Module on child functioning and disability, ages 5-17 (Crialesi et al., 2015)	Vision Hearing Walking Communication/comprehension Learning Behavior Remembering Attention Relationships Self-care Emotions Coping with change
Module on inclusive education (Cappa, De Palma, et al., 2015)	Attitudes towards disability Accessibility of school (physical trip to school) Accessibility, inclusivity, and services within the school Affordability of education Reasons a child is out of school

Summing up global measurement of key dimensions: Insights from global databases

The contents of international databases provide a rough gauge of how available and comparable education statistics are by different dimensions of inequality. Often, where a dimension is not reported in these databases, it is unavailable or measured inconsistently across countries and sources. To provide an approximate, if somewhat imprecise, sense of data availability and comparability, in Table 6 we note the dimensions of education inequality that major international databases, ones that aggregate data

across the multiple sources discussed earlier in this review, report. We focus on four databases—WIDE, EPDC, UIS.Stat from UIS, and EdStats from the World Bank—and their insights into the data landscape.

WIDE, established by the Education For All Global Monitoring Report in 2012, has been a leader in broadening access to data on inequalities in educational outcomes. The database allows in-depth exploration of disparities across indicators related to school access, completion, and learning, and—in keeping with its emphasis on inequality—it offers the widest range of inequality dimensions of the databases included in Table 6. The WIDE database includes breakdowns of statistics by gender, urban-rural residence, region, wealth, ethnicity and religion, and language. As for the other databases, the EPDC database offers breakdowns by gender, urban-rural residence, subnational region, and wealth, and the databases from UNESCO and the World Bank both present education statistics by gender, urban-rural residence, and wealth. UNESCO notes that it plans to offer additional breakdowns, including disability and indigenous status, in the future through its eAtlas for Education 2030.

Table 6. Availability of different dimensions of inequality for education statistics from major international databases (solid fill indicates availability for at least some indicators)

	WIDE	EPDC	UIS.Stat	EdStats (World Bank)
Gender	■	■	■	■
Urban/rural location	■	■	*Household survey data only*	■
Subnational region	■	■	■	
Wealth or SES	■	■	*Household survey data only*	■
Social or cultural capital				
Ethnicity, religion, indigenous status	■	■		
Language	■	■		
Disability				
Notes	Beyond what is available in WIDE, the 2016 Global Education Monitoring Report provides statistical tables that report gender and wealth breakdowns, as well as measures of inequality in these areas and statistics	EPDC offers a special dataset with attainment data by ethnic and religious group.	The UNESCO eAtlas for Education 2030 will include parity indices for gender, urban/rural, wealth, disability status, indigenous status, conflict-affected.	EGRA results presented for the relevant area, group, and language. PASEC results presented for students according to whether they attended preschool.

for the poorest girls
and boys.

Each database aggregates data from a slightly different set of sources, though they mainly draw from the sources discussed in previous sections of this review: household surveys (namely DHS and MICS); international and regional learning assessments; and national administrative data, such as population censuses and school censuses. Taken together, these databases shed light on the availability and relative comparability of different dimensions of inequality. It is notable that gender, urban-rural location, and wealth are ubiquitous across the databases. For wealth, this is consistent with findings from our review of international data sources, which showed that measures of poverty are widely available and are conceptualized similarly, though details of measurement, such as the number and type of assets included in wealth indices and how education levels of parents are documented does affect the comparability of these dimensions.

Data on ethnicity and language are available regularly only from WIDE. While the landscape review found that measures of language or ethnicity are fairly common across sources and general conceptualizations and approaches to measurement are similar, differences in how responses are documented and whether questions focus on ethnic group, religion, or language means that data sometimes cannot be compared even within the same country, making ethnicity complicated to use in international comparisons.

Two dimensions—indicators of social and cultural capital and of disability status—are largely absent from international databases at present. For social and cultural measures, this reflects choice rather than availability, as statistics related to parental educational levels, for example, are fairly common though not perfectly comparable. The absence of disability as a dimension more likely reflects the relative scarcity of disability data and the limited comparability of what is available. However, work by the Washington Group and UNICEF means we can anticipate greater availability and comparability of data in the coming decade.

An important caveat is that the databases in Table 6 have *some* education statistics by the different dimensions noted. Availability for *all* statistics is not possible given what administrative data sources, household surveys, and learning assessments currently collect information on. A more detailed breakdown across different categories of education statistics, such as participation and learning outcomes, would reveal a more complex and discouraging picture. In a survey considering the readiness of countries to measure global education indicators for the SDGs, UIS (2016) found that even gender is not fully available—only 85% of countries surveyed have the proposed SDG education indicators available by gender. Furthermore, only 19% of countries have them by disability status and only 14% by wealth. While this review has highlighted the many limitations of current disability data, its relative availability compared to wealth reflects the fact that it can be collected both in household surveys and in school censuses. In contrast, wealth is widely collected from individual-level or household-level questionnaires (like household surveys and learning assessments) but is difficult to collect in school censuses in the absence of individual-level records (Ibid).

Finally, it is important to note that we sometimes encountered additional dimensions of inequality not discussed in this review. For example, UWEZO and PASEC report learning differences between students

in public and private schools. PASEC also examined student engagement in child labor as an important category. Orphanhood can influence educational equity, and DHS presents attendance ratios comparing children by survivorship of parents (DHS, 2014). Additionally, UIS (2016) stresses the importance of considering conflict exposure when assessing equity, and the SDGs have called for greater attention to migration status, which receives only brief mention in this review given the relative scarcity of data on the topic. Indeed, these and other vulnerabilities are also of potential importance to inequity, though less commonly assessed than the dimensions considered in this landscape analysis. The programmatic review, which we now turn to, also brought up additional factors that could provide the basis for future reviews.

Review of program data sources

Interviews with development organizations suggest the state of equity measurement within educational programs implemented by development organizations is broadly similar to international sources. One important difference is that the education data collected by development organizations depends on the nature of a project or intervention and was more diverse than in international sources. For example, one organization interviewed is dedicated to collecting data on student effort and engagement under the rationale that these factors are strongly correlated with desired classroom outcomes. Another organization collects data on school and home environment and student safety. Largely working in conflict-affected contexts, this organization captures information on how safe students felt in their home and school environments, and how this is associated with positive outcomes.

Program data collection uses individual-level student or youth surveys less often than global sources. Within programs, the most common type of data collected at the child level is reading ability along with background information gathered during assessments. Below we discuss the approaches programs take when measuring these background characteristics. The discussion is based on a series of interview tools that organizations working as part of the Equity Initiative submitted upon request. It is supplemented with a review of Snapshot of School Management Effectiveness (SSME) tools that are available on the EdData[15] website. These are student-level questionnaires designed to supplement EGRA outcomes, and are relatively standardized across instruments. As with the global analysis, we pay particular attention to poverty, ethnicity, and disability as key equity dimensions. Table 7 presents a summary of program approaches to measuring poverty, ethnicity, and disability based on the tools shared during the interview mapping and provides a subjective judgement about their level of comparability.

Table 7. Program approaches to measuring poverty, ethnicity, and disability[16]

Type	Availability	Level of comparability	Notes
SES	High	Medium-high	Most tools ask about a series of household assets (usually 8-10 or more); one tool asked for a qualitative judgement of status. No tools asked about household consumption or income.

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[15] www.eddataglobal.org

[16] It is important to note that these observations are based on only five tools, often representing program-specific (rather than organizational) approaches to measurement.

Home literacy environment	Medium	Medium-low	Included in half of the tools through questions about possession of reading materials (e.g., newspapers, books, computers) or activities (e.g., does parent read to you?).
Parent's education level	Medium	High	Commonly assessed using questions such as whether a parent attended and what was the highest level a parent attended.
Ethnicity and language	High	High	Tools most typically ask about language spoken at home or language that child is assessed in. One tool asked about religion and ethnicity explicitly.
Disability	Medium-low	Medium	Only two tools ask about disability; those tools request information about the presence of different types of impairments (e.g., visual, auditory) and appear to often be judged by the enumerator, an approach that creates the potential for bias.

Measuring poverty, ethnicity, and disability

Most programs assessed *poverty* using indices of SES. Like global sources, the majority of programmatic approaches based these indices on questions related to household assets (usually 8-10 or more) indicative of relative wealth. While approaches are conceptually similar, the number of factors included in indices and the specific household assets asked about vary by source. Additionally, one organizational tool asks for a qualitative judgement of SES. No organizations interviewed use tools that ask about household consumption or income.

Regarding measures related to social or cultural capital, organizations commonly collect data on the education levels of parents, asking, for example, whether a parent attended school or about the highest level a parent attended. SSME tools typically ask about the literacy levels of parents. Additionally, most of the program data collection tools reviewed capture data on a child's home literacy environments, such as how many books or newspapers are in the home and whether a family member reads to the child or helps with homework. As mentioned earlier in the review (see Box 1), who reports what information has consequences for the validity of information, with an analysis by one organization revealing significant discrepancies between student and adult household member reports of household literacy and education levels. One consequence is that it can be much harder to gather information about poverty from school-based surveys of students than from household surveys involving an adult.

Ethnicity, in terms of ethnic group or religious affiliation, is rarely tracked by programs. One tool asks about it explicitly, but many organizations commented on the difficulty of collecting information on the topic of ethnicity in some countries and contexts due to the political sensitivity of the topic. More commonly, program tools inquire about the language spoken at home or the language that a child is assessed in, in a way similar to many international learning assessments.

Organizations observed that *disability* is often not captured, or not captured well, in current data collection by programs. Nevertheless, many mentioned it as a topic of great importance to equity, and Plan International and CMB Australia-Nossal Institute Partnership for Disability Inclusive Development have prepared guidance for programs on gathering and using disability data (2015). The recommendations emphasize the importance of collecting information on different types of impairments, environmental and cultural obstacles to inclusion of disabled persons, and of disaggregating disability by characteristics such as age or gender. They point to the Washington Group

short set (as well as the extended set) of questions as a tool for assessing adult disability and to the forthcoming UNICEF and Washington Group Module on Child Functioning and Disability as a resource to use for youth, outlining considerations for programs planning to use or adapt these tools. With the Australian Department of Foreign Affairs and Trade and the UK Department for International Development increasingly interested in program analyses that consider disability, Plan International and the CBM-Nossal Partnership anticipate more widespread collection and reporting of data in this area.

Other dimensions measured

Some tools attempt to document everything about students while others emphasize short instruments that investigate a few specific topics in depth. Beyond poverty, ethnicity, disability, and other common topics like gender, urban-rural residence, and region, a few organizations assess student academic and school background, such as whether children attended pre-primary school or whether they receive remedial support or after-school tutoring. The SSME tools are relatively standardized in terms of the constructs captured and wording of the questionnaires. All of these tools ask about pre-primary attendance, the literacy levels of parents, whether the child ate breakfast, and a handful of other factors including feedback from teachers and parents.

During interviews, organizations felt that orphanhood, like disability, is an important category of exclusion in some countries, one that does not receive the emphasis needed, and indeed no projects discussed track it. Overall, organizations reported that the nature of data collection and the background characteristics that programs collect data on largely reflect donor or project requirements, meaning that greater donor demand for data on disability, orphanhood, or other important areas would prompt more widespread reporting on these areas.

Types of equity analyses being done

How do international and programmatic sources analyze and present educational disparities? Most commonly, averages for different population groups are shown comparatively though without explicit use of an inequality metric. These provide an accessible view of disparity, one that could be readily quantified using parity measures where desired.

Averages for multiple, overlapping group categories, for example for the poorest boys and girls, are less common but increasingly available. They are important, because the intersection of multiple dimensions of disparity compounds vulnerability and disadvantage (Kabeer, 2010). WIDE is a major source for such comparisons, and the database facilitates interactive exploration of several intersecting dimensions, as is the 2016 Global Education Monitoring Report (UNESCO, 2016), the EPDC database the UIS database (UIS.Stat), and the World Bank education database (EdStats), with household surveys a major source for this data. Reports from household surveys (i.e., DHS and MICS) themselves also present tables with data broken down by multiple groups, though most commonly for gender and another inequality dimension.

Where estimates of parity are provided, they are usually presented as ratios comparing educational outcomes for men and women and are available for many indicators in the Global Education Monitoring Report and in the UIS.Stat database and for some indicators, usually related to attendance, in DHS and MICS reports. Among program sources, one organization mentioned using a specific equity measure of gender parity on student learning outcomes. Additionally, international assessments, including PISA, PASEC, and PIRLS/TIMSS present score differences between groups and tests of significance, as some

program sources also do. Besides gender, urban-rural disparities and differences between students in public and private schools are among the factors commonly compared.

Learning outcomes sources also conduct other types of analyses related to inequality. Both PISA and LLECE, for example, look at the percentage of variation in test performance that can be explained by socio-economic status with these measures used in equity discussions in reporting (LLECE, 2015; OECD, 2013).[17] Some program sources mentioned conducting regression analyses as well.

As assessments of overall inequality in outcomes, several learning outcomes data sources, like TIMSS, PASEC, UWEZO, and ASER, document the distribution of scores or test performance across a population. In another example, the World Bank EdStats database includes Gini coefficients for mean years of schooling as a measure of vertical inequality, one not widely used in education outside of research.

While these measures provide an indication of inequality, it is important to note that **equity is not often the main focus of analyses** in international or program reporting. However, there is widespread acknowledgement of the importance of equity and a desire to do more, which came through particularly clearly in interviews with organizations. With those efforts and the momentum generated by the SDGs, inequality analyses will hopefully become a more regular and systematic part of global and program monitoring.

Conclusion

Many international entities and donors are calling for greater measurement of inequality and equitable student level outcomes, and the SDGs emphasize the importance of monitoring equity globally. Similarly, many programs and practitioners recognize the importance of measuring changes in student-level inequalities. Despite this, what group characteristics different organizations collect data on, how they measure those characteristics, and how they use those characteristics to better understand educational inequality remains relatively unsystematic.

In terms of what group dimensions are measured, we observe:

- Gender, urban-rural locality, region, poverty, ethnicity, and increasingly disability are dimensions commonly cited as important for gauging inequality in educational access and outcomes. Measures of poverty, ethnicity, and disability tend to be measured in more diverse ways than gender, urban-rural locality, and region (though those dimensions are not without measurement and comparability issues[18]) and, for that reason, are the focus of this review.
- *Poverty measures* are widely employed in individual-level (or household-level) data collection, though this is a difficult dimension to collect data on at the school level, as in national school censuses, meaning that important gaps remain for monitoring educational disparities related to poverty. In terms of the different types of measures that provide an indication of resource deprivation, this review examined the following:
  - *Wealth and socio-economic status* is most commonly assessed in international and program sources through asset-based indices, which usually account for household

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[17] The PISA analysis considers SES at the student level while the LLECE analysis considers SES at the school level.

[18] For example, definitions of urban and rural are often not clear or consistent across data sources.

possessions, household construction, and access to key services. Socio-economic indices may additionally include social or cultural factors, such as parents' education. While the general approach to developing these indices is similar across sources, different sources may vary in the number and type of assets or factors they include and often assess at least a few country and survey-specific items.

- *Measures of social or cultural status*. International and program data sources often consider indicators of social or cultural status, often in addition to relative wealth. Measures of parental education levels and books in the home came up repeatedly during our review, though the thresholds used sometimes varied. For example, in wealthier countries questions about books often included more nuanced (and higher) ranges of books and questions about specific types, like reference books, whereas in some low-income contexts the central concern was whether a child had any books at home. Questions of social and cultural status are inherently sensitive to context and therefore tricky to establish common metrics for.

- In general, approaches to measuring *ethnicity* are broadly similar—an individual or family member is asked to report group affiliation or home language and responses are recorded under established group codes. However, not all surveys choose to include a question on ethnicity and the type of group affiliation that is most relevant—ethnic, religious, or linguistic—varies by region and country, complicating measurement. Additionally, approaches to *reporting* ethnicity also vary. For household surveys, such as DHS and MICS, ethnicity is most typically presented as a background characteristic rather than as a dimension of educational inequality, though international programs, such as the WIDE database, and researchers can use it for that purpose. Other sources, especially major learning outcomes assessments, often report ethnicity by grouping students according to majority and minority status. This is regularly done by home language—whether a student speaks the language of the assessment at home or not—which has the benefit of simplifying comparisons across countries and establishing which students are likely to be at an educational disadvantage. As with wealth, ethnicity is a difficult concept to measure without individual- or household-level tools.

- Censuses and surveys historically measured *disability* in disparate ways, if at all, that varied in the types of disabilities assessed, whether data could be disaggregated by type of disability, and what threshold determined disability status. Disability statistics, where available, are usually presented as background characteristics rather than as dimensions of educational inequality. Efforts by the Washington Group on Disability Statistics, established in 2001, and UNICEF, among others, are leading to greater consensus in how adult and child disability can be measured comparably.

- Decisions on the population dimensions a data source gathers data for and reports on are complicated by tensions between contextual relevance and comparability within a country and over time. A further concern is what can realistically be collected, which may be impacted by sample size, considerations about questionnaire length, and who will report (a young child? the household head?).

- Overall, dimensions of inequality remain largely unstandardized across datasets produced by programs and international sources. Of course, different data collection efforts have different purposes, but there is room for improvement in standardization for how different characteristics are collected.

On the types of equity analyses being used by international and programmatic sources, we find:

- Ultimately, all global sources of education data reviewed offer estimates of disparity in access to education and/or learning outcomes across at least some key group dimensions. However, global sources rarely establish explicit frameworks for assessing equity in education or provide deeper analyses of equity. The measurement of equity is often not the sole focus of organizations in measuring the impact of their projects. Similarly, data gathered on the equity effects of programs remains unsystematic and tends to be limited to simple mean comparisons for groups.

- For programs, the decision to monitor equity is usually made at the request of donors. It is clear that if there is to be a more thorough focus on equity, it will have to come from donors and be built into the fabric of a program.

- Tools are not necessarily developed with the purpose of measuring equity in programs. They may capture the background characteristics of participants, but this information is often not used to look at changes in inequality over the span of projects.

- Collecting data in general, and even more so on equity, has many challenges, most commonly a lack of time and resources. At the project-level, respondents raised concerns about adding additional strain onto project staff and about ensuring that tools developed maintained a high quality standard. Moreover, there is a hesitation to collect data on disparities that the project team has no funding or intention to act on.

- While some organizations, such as PISA, TERCE, and ASER, do provide rich discussions of what their results signify for equity, the development of equity assessments remains an important need. Global efforts such as the UIS International Observatory on Equity and Inclusion in Education are working to address this need.

More comparable data on key dimensions of inequality and greater use of such data in equity assessments is achievable. The growing consensus around the measurement of adult and child disability stemming from Washington Group and UNICEF efforts indicates that greater harmony in measurement is theoretically possible. International attention to the measurement of other dimensions, like poverty and socio-economic status, migration, ethnicity and language, urban-rural residence, and region, could yield improved comparability of data on those areas as well. Moreover, greater agreement on equity measures and assessments in education, a topic that has been and continues to be widely discussed, could mean better use of the data that we already have.

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Appendix A: Snapshot of poverty measures used by international data sources

Color coding of measures:	Economic welfare	Socio-economic status (SES)	Social and cultural capital

Source	Measure	Description	Tools and resources
DHS	Wealth	Each wealth index is survey-specific and is based on the structure of the home and household assets, such as the type of dwelling, access to water, electricity, and indoor plumbing, and whether the household has certain durable goods. The index is prepared using principal components analysis. DHS sometimes includes some variables specific to urban or rural areas, a process meant to address critiques that the Wealth Index was biased towards urban areas. Separate urban and rural indices are then combined into a single index using regression. The wealth index measures relative wealth within a country. DHS is developing a Comparative Wealth Index (CWI) as an absolute measure of poverty intended to be comparable across countries and time.	◊ Description of how wealth index was created for each survey ◊ DHS model questionnaires for Phase 7 (2013-2018) ◊ Overview of wealth index ◊ Rustein, S. & Staveteig, S. (2014). Making the Demographic and Health Surveys wealth index Comparable (DHS Methodological Reports No. 9). Rockville, Maryland: ICF International. ◊ Rutstein, S.O. & Johnson, K. (2004). The DHS wealth index (DHS Comparative Report No. 6). Calverton, Maryland: ORC Macro.
	Parents' education	This information is collected through self-reports of the highest level and grade of education completed from parents or from the household head. The information is available for children whose parents were interviewed in the Woman's or Man's Questionnaire or listed in the Household Questionnaire. It is not a standard background characteristic presented for education data in DHS reports, but it is more common for certain child health and nutrition indicators.	
LLECE	Index of socio-economic level	Based on socio-economic, demographic, and cultural characteristics. Includes questions on family education levels, income, occupation, household construction and assets, and service access.	◊ TERCE reports on learning achievements and associated factors ◊ Cresswell, J., Schwantner, U. & Waters, C. (2015). A Review of international large-scale assessments in education: Assessing component skills and collecting contextual data. Washington, D.C./OECD Publishing, Paris: The World
	Parents' education	The family questionnaire asks the level of education a child's mother and father completed.	
	Parental support for education	Indicated by parents following up with child about school, offering praise, and supporting their child's learning.	

Appendix A: Poverty measures

Source	Measure	Description	Tools and resources
		Bank, PISA.	
	Migrant status	In the student questionnaire, students are asked whether they were born in the country they currently live in or not. In the family questionnaire, parents are also asked whether they were born in the country or not and whether their child was. If parents report that a child was not born in-country, they are then asked when the child moved to that country, with a range of time frames provided as response options.	
	Books in the home	The family questionnaire asks about the number of books in the home. The item reads:	
LSMS	Consumption	LSMS measures household composition and use of durable, semi-durable, and non-durable goods, including housing and spending on food, to construct measures of annual household consumption. Consumption can be used as an absolute measure linked to a poverty line. LSMS reports often define three groups: nonpoor, poor, and extremely poor. One criticism of consumption measures is that they fluctuate within households and therefore may not provide an accurate representation of permanent economic welfare.	◊ World Bank LSMS website ◊ World Bank repository of LSMS documentation for example questionnaires, such ones from the 2009-10 Ghana survey
	Parents' education	Like other household surveys, LSMS data can be used to link education levels of parents to children.	
MICS	Wealth	MICS uses an asset-based wealth index constructed similarly to the DHS wealth index.	◊ MICS survey tools and model questionnaires

Appendix A: Poverty measures

Source	Measure	Description	Tools and resources
	Parents' education	MICS includes questions about parents' education similar to DHS. Mother's education (or primary caretaker's education) is more regularly used as a background characteristic for education indicators, such as attendance, than in DHS reports.	
PAL Network assessments	SES	PAL Network countries define their own measures. The UWEZO Uganda SES measure uses information on the physical structure of a home (e.g., type of walls), mother's education, access to services (e.g., electricity), and household assets (e.g., televisions and animals).	◊ Cresswell, J., Schwantner, U. & Waters, C. (2015). A Review of international large-scale assessments in education: Assessing component skills and collecting contextual data. Washington, D.C./OECD Publishing, Paris: The World Bank, PISA.
	Parents' education	Although PAL Network country assessments are not standardized, they commonly collect information on the education of the mother or both parents. For example, ASER and UWEZO countries often ask if a child's parents attended school and, if so, what class or level they attended. In one round, UWEZO Uganda tested mothers' literacy skills with UWEZO test items.	◊ PAL Network survey tools
	Books in the home	As with other measures, whether this is included and how it is measured vary by country. In the 2011 Tanzania household questionnaire, the household head is asked whether there are any books, apart from children's books, in the home. Response options are yes or no. In the 2012 ASER India household questionnaire asks about reading materials in the home. One question asks whether the household gets a daily newspaper (yes/no). A second question asks whether there is any other material reading materials available (e.g., books, magazines, religious texts) (yes/no).	
	Computer knowledge	The 2012 ASER India household questionnaire asks whether anyone in the household knows how to use a computer (response options are yes or no).	
PASEC	SES	PASEC groups students by living standards as poor, intermediate, or rich (Cresswell et al., 2015). In the 2011-12 Vietnam assessment, multiple correspondence analysis is used to construct an index of household possessions to measure SES. The index includes indicators related to the physical household structure, possessions (e.g., a refrigerator), availability of ICT (e.g., phone, television, radio, and computer), types of transportation, and books in the home.	◊ Cresswell, J., Schwantner, U. & Waters, C. (2015). A Review of international large-scale assessments in education: Assessing component skills and collecting contextual data.

Appendix A: Poverty measures

Source	Measure	Description	Tools and resources
	Parents' literacy	In PASEC2014, students report whether their parents can read or not. One report groups children into three categories: whether neither parent can read, one of the two parents can read, or whether both parents can read.	Washington, D.C./OECD Publishing, Paris: The World Bank, PISA.
	Books in the home	In PASEC2014, students report the availability of books in their home. For 2nd graders, this is collected as two categories: no books and one or several books. For 6th grade students, this is collected as four categories: none, enough books to fill a bookshelf, enough books to fill two bookshelves, and enough books to fill a bookcase.	◊ PASEC report for 2011-12 diagnostic assessment in Vietnam ◊ PASEC 2014 results and conceptual frameworks
PIRLS, TIMSS	Parents' occupation	In the home questionnaire, the following question is asked: What kind of work do the child's father (or stepfather or male guardian) and mother (or stepmother or female guardian) do for their main jobs? For each, the enumerator checks one of the following options, choosing the one that represents the last job a parent had if s/he is not currently working: a) Has never worked for pay b) Small business owner c) Clerk d) Service or sales worker e) Skilled agricultural or fishery worker f) Craft or trade worker g) Plant or machine operator h) General laborers i) Corporate manager or senior official j) Professional k) Technician or associate professional l) Not applicable	◊ Cresswell, J., Schwantner, U. & Waters, C. (2015). A Review of international large-scale assessments in education: Assessing component skills and collecting contextual data. Washington, D.C./OECD Publishing, Paris: The World Bank, PISA. ◊ PIRLS AND TIMSS 2011 questionnaires
	Parents' education	The home questionnaire asks: What is the highest level of education completed by the child's father (or stepfather or male guardian) and mother (or stepmother or female guardian)? For each, the enumerator checks options based on ISCED levels.	
	Home Resources for Learning scale	In PIRLS 2011 this is based on information collected from parents and students about home resources. The scale is broken into different groupings: many resources, some resources, and few resources.	

Appendix A: Poverty measures

Source	Measure	Description	Tools and resources
	Parents Like Reading scale	In PIRLS 2011, this is measured with data on parental responses to seven statements about reading and how often they read for pleasure.	
	Number of books in the home	PIRLS 2011 asks about number of children's books and number of books.	
	Availability of home features that aid studying	PIRLS 2011 asks about whether students have an internet connection and their own room.	
	Parents' expectations for the education of their children	Parents state the highest degree they expect their child to attain.	
PISA	Index of economic, social, and cultural status (ESCS)	The ESCS index is constructed from the following: parents' education, index of household wealth, index of home educational resources, index of cultural possessions, and the number of books at home.	◊ Cresswell, J., Schwantner, U. & Waters, C. (2015). A Review of international large-scale assessments in education: Assessing component skills and collecting contextual data. Washington, D.C./OECD Publishing, Paris: The World Bank, PISA.
	Highest education level of parents	PISA collects information on the education level of the mother and of the father, based on ISCED classifications. PISA constructs a variable representing the highest education level of either parent as well as well as a variable corresponding to the number of years of schooling represented by that level.	◊ PISA background questionnaires for students, school principals, and parents
	Index of household wealth	The wealth index is constructed from information students reported on whether they had their own room and their home had Internet access, a dishwasher, a DVD player, and other items specific to each country. The index also considers how many of the following are in the home: televisions, cell phones, computers, cars, and bathrooms.	
	Index of home educational resources	This index considers the availability of the following at home: a desk and quiet place to study, a computer to use for school assignments, educational software, books that assist with schoolwork, and reference books.	
	Index of cultural possessions	This index looks at whether students have classic literature, volumes of poetry, and art in the home.	
	Books in the home	Reported number of books in the home, presented as ranges in the number of books.	
	Immigrant background	In the student questionnaire, students are asked, "In what country were you and your parents born?" and directed to make selections for themselves, their mother, and their father from a list of country options.	

Appendix A: Poverty measures

Source	Measure	Description	Tools and resources
	Status of parents' occupations	PISA collects information on the occupations of students' parents and codes the status level of those occupations.	
PRIDI	Wealth index	The wealth index is presented in five quintiles. The index is based on characteristics of and assets in the home, access to basic services, and a ratio of household members to bedrooms.	◊ PRIDI instruments ◊ PRIDI results report, conceptual framework, and technical annex
	Nurturing environment index	This index is presented as five quintiles. It takes into account the number of children's books in a home, how often there is adult interaction with the child, home routines, and hygiene routines of the child.	
	Maternal education	The following question and codes from the child and home survey is used to collect information on the highest level of education of the mother or primary caregiver, father, and siblings who live in the home: ¿Cuál es su máximo nivel educativo? 00=Sin educación formal 01=Educación inicial (especificar Nº de años completados) 02=Educación primaria (especificar Nº de años completados) 03=Educación secundaria (especificar Nº de años completados) 04=Educación post-secundaria (extensión, cursos cortos) 05=Educación superior no universitaria incompleta (técnica, suboficiales, pedagógica o artística) 06=Educación superior no universitaria completa (técnica, suboficiales, pedagógica o artística) 07=Educación universitaria incompleta (incluir escuela de oficiales) 08=Educación universitaria completa (incluir escuela de oficiales) 09=Educación universitaria postgrado incompleta (maestría, doctorado) 10=Educación universitaria postgrado completa (maestría, doctorado) 77=No sabe 88=No contesta	
SACMEQ	SES	SES scores are constructed from variables reported by students related to home possessions, parents' education, and household construction and utilities (lighting, floor, wall, and roof). Rasch scaling is used to construct the SES score. SACMEQ collects data on a range of student background characteristics related to	◊ Cresswell, J., Schwantner, U. & Waters, C. (2015). A Review of international large-scale assessments in education: Assessing component skills and

Appendix A: Poverty measures

Source	Measure	Description		Tools and resources
		poverty, such as the number of books in the home, but SES is the main characteristic presented in reports with education outcomes.		collecting contextual data. Washington, D.C./OECD Publishing, Paris: The World Bank, PISA.
			◊	SACMEQ III questionnaires

Appendix A: Poverty measures

Appendix B: Snapshot of ethnicity measures used by international data sources

Color coding of measures: | Typically reported by individual groups | | Typically reported by minority/majority grouping |

Source	Measure	Description	Tools and resources
DHS	Ethnicity, religion	Some DHS surveys include country-specific questions about ethnicity and/or religion in the Woman's and Man's Questionnaire. Ethnicity and religion are not standard background characteristics presented with education data in DHS reports. The EPDC Education Inequality and Conflict (EIC) Dataset offers educational attainment data and measures of inequality in educational attainment for young adults by religion and ethnicity extracted from DHS surveys. The final report for the DHS survey conducted in Kenya in 2014 includes both religion. The following items are taken from the Woman's Questionnaire in the appendix:	◊ [DHS model questionnaires for Phase 7 (2013-2018)](#) ◊ [Final report for Kenya 2014 DHS](#)

QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
What is your religion?	ROMAN CATHOLIC .... 1 PROTESTANT/ OTHER CHRISTIAN . 2 MUSLIM .... 3 NO RELIGION .... 4 OTHER _____ 6 (SPECIFY)	
What is your ethnic group / tribe?	EMBU .... 01 KALENJIN .... 02 KAMBA .... 03 KIKUYU .... 04 KISII.......................... 05 LUHYA .... 06 LUO .... 07 MAASAI .... 08 MERU .... 09 MIJIKENDA/ SWAHILI .... 10 SOMALI .... 11 TAITA/ TAVETA .... 12 OTHER _____ 96 (SPECIFY)	

Appendix B: Ethnicity measures

Source	Measure	Description	Tools and resources
LLECE	Language	The family questionnaire asks multiple questions about language and indigenous status: What language the parents usually speak at home and what language they usually use with the child. For each, multiple language options are listed. LLECE reports this as whether a child speaks an indigenous language or Spanish.	◊ [TERCE reports on learning achievements and associated factors](#)
MICS	Ethnicity, religion, mother tongue	Some MICS surveys have country-specific questions about ethnicity, religion, and/or mother tongue. Some surveys include one or more group measures while others don't include any. Unlike DHS, these questions are included in the household questionnaire as well as in the adult questionnaires. MICS uses the ethnicity/religion/mother tongue of the household head as a background characteristic for several indicators. As an example, questions used in the household survey from the Malawi 2013-14 MICS read:	◊ [MICS survey tools and model questionnaires](#) ◊ [Final report for Malawi 2013-14 MICS](#)

HOUSEHOLD CHARACTERISTICS

HC1A. WHAT IS THE RELIGION OF THE HEAD OF THIS HOUSEHOLD?	Catholic....01 CCAP....02 Anglican....03 Seventh Day Adventist....04 Other Christian....05 Muslim....06 No Religion....07 Other religion (*specify*) _____ 96
HC1C. TO WHAT ETHNIC GROUP DOES THE HEAD OF THIS HOUSEHOLD BELONG?	Chewa....01 Tumbuka....02 Lomwe....03 Tonga....04 Yao....05 Sena....06 Nkhonde....07 Ngoni....08 Other ethnic group (*specify*) _____ 96

Appendix B: Ethnicity measures

Source	Measure	Description	Tools and resources
PAL Network assessments	Language	Measures vary by country, but a language variable is sometimes assessed. An example UWEZO sample items reads: Some PAL Network assessments, especially ASER India, which was conducted in 16 regional languages in 2012, are offered to students in a wide range of local languages.	◊ PAL Network survey tools
PIRLS, TIMSS	Language	In the home questionnaire, parents are asked about the language a child spoke at home before starting school. Reports group respondents according to whether they did or did not speak the language of the test at home before beginning school. The test item reads:	◊ PIRLS AND TIMSS 2011 questionnaires
PISA	Language	In the student questionnaire, students are asked, "What language do you speak at home most of the time?" and directed to select their response from a list of options. PISA also collects information on the language of the test for comparison. In reports, PISA uses language information to create two groups: students who speak the test language at home and those who don't.	◊ PISA background questionnaires for students, school principals, and parents
PRIDI	Language	The child and home survey asks for the top three languages that each family member in the household uses. Reports group children into children who speak indigenous languages and those who speak Spanish.	◊ PRIDI instruments ◊ PRIDI results report, conceptual framework, and technical annex

Appendix B: Ethnicity measures

Appendix C: Snapshot of disability measures used by international data sources

Source	Measure	Description		Tools and resources
Washington Group on Disability Statistics and UNICEF	Disability	The Washington Group, which was founded in 2001, is comprised of individuals from national statistics offices, UN agencies and representatives from organizations that represent persons with disabilities. The Group has been responsible for the development of survey questionnaire modules related to the measurement of persons with disabilities, and has been successful in getting governments to track data related to disability measurement in the population. In 2009 the Group began collaborating with UNICEF to incorporate modules related to child disability in MICS and other surveys. This includes a forthcoming module on child functioning and disability for children ages 2-17, and a module on environment and school participation to examine barriers to education. Both modules have undergone field testing and are expected to be finalized and shared in 2016. Intended for adults, a short set of questions on disability asks about health related difficulties in six areas: Seeing, hearing, walking, remembering or concentrating, self-care, and communicating. For each area, response options are: No – no difficulty; Yes – some difficulty; Yes – a lot of difficulty; Cannot do at all.	◊ ◊	The Washington Group on Disability Statistics website The Washington Group short set of questions on disability
EMIS	Disability	National EMIS programs sometimes measure disability but have done so in diverse ways. A UNICEF technical report observes that, of 40 countries reviewed, 19 did not collect any information on disability. The 21 that did varied in definitions of disability and the detail of measurement. UNICEF prepared recommendations to standardize measurement in EMIS programs to support the collection of comparable and actionable statistics. UNICEF advocates collecting data on type of disability, severity, children with multiple disabilities, and disaggregated by gender. A basic example module for identifying students with disabilities reads:	◊	UNICEF webinar and booklets on inclusive education (see webinar and booklet 6 for discussion of disability measurement in EMIS)

Appendix C: Disability measures

Source	Measure	Description	Tools and resources
		Beyond student information on disability, UNICEF advocates collecting data on environmental factors at schools related to inclusivity.	
Census	Disability	Population censuses have historically conceptualized and measured disability in diverse ways, if at all, depending on national needs. With the development of Washington Group recommendations for questions on disability in censuses, there is increasingly greater alignment of measures. The variety of measures that have been employed by censuses is conveyed by the list of disability variables available from IPUMS International, an organization that reviews, harmonizes, and makes available data from 277 censuses in 82 countries (as of May 2016). IPUMS offers a range of different variables related to disability along with descriptions of coding, coverage, and comparability for each as well as census question items on their website.	◊ IPUMS International disability variables and metadata ◊ IPUMS International homepage

Appendix C: Disability measures

Source	Measure	Description	Tools and resources
PAL Network	Disability	Several PAL Network countries have begun including questions on disability in data collection, but the approach and depth of detail varies by country and survey. The following are examples of what is being collected or has been collected in the past: ASER Pakistan now includes questions on disability adapted from the Washington Group and UNICEF recommendations. They collect information on whether children have moderate to severe challenges with "seeing, hearing, walking, caring, understanding or remembering." The questionnaire also gathers information on whether children have glasses, hearing aids, and other supports. The 2015 results report observes that translation of disability questions, especially related to the concept of caring, was a challenge in certain languages. The 2015 UWEZO questionnaire asks the following question: Does the child have any known disability? The response options are yes or no. **In an earlier survey year, UWEZO Uganda conducted a vision test for children during the household survey, which is a unique instance of data collection using testing to measure visual disability, particularly useful in situations where a child's disability is unknown to the family or school.** The 2010 Tanzania household questionnaire asks the household head whether s/he has children with disabilities. If yes and if they are of school age, the questionnaire asks whether they are in school and, if not, why. The 2012 Kenya household questionnaire asks whether each child surveyed has a disability and, if so, what type. The options are visual, hearing, physical, and mental.	◊ [PAL Network survey tools](#) ◊ [ASER Pakistan 2015 results report for rural areas](#)
PASEC	Disability	PASEC2014 asked about two types of physical disability, vision and hearing. For vision disabilities information was collected on whether a student had glasses. More specifically, PASEC2014 reported: ◊ Whether students have no visual disability, have a visual disability and wear eyeglasses, or have a visual disability and do not wear eyeglasses. ◊ Whether students have a hearing disability or do not have a hearing disability.	◊ [PASEC report for 2011-12 diagnostic assessment in Vietnam](#) ◊ [PASEC 2014 results and conceptual frameworks](#)

Appendix C: Disability measures

Source	Measure	Description	Tools and resources
PRIDI	Disability	PRIDI includes questions about vision and hearing problems; however, these indicators were not presented in its main results report.	◊ [PRIDI instruments](#) ◊ [PRIDI results report, conceptual framework, and technical annex](#)
	Height-for-age score	PRIDI compares non-stunted children to stunted children determined by a height-for-age score based on a child's age, gender, and height. This draws on the 2006 World Health Organization information on child growth.	
	Health	PRIDI groups children in poor health and children in good health. This variable is based on reports from the mother. The "good health" group includes children whose mothers reported that they were in excellent, very good, or good health. The "poor health" group includes the children reported to be in somewhat good or bad health.	

Appendix C: Disability measures