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Measuring SDG indicator 4.c.5 and the role of the UNESCO Institute for Statistics

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Prepared by Kevin Macdonald



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1. Introduction

The 2016 Global Education Monitoring (GEM) Report summarizes the main difficulties of comparing teacher salaries with those of other similarly educated professions and subsequently measuring SDG Indicator 4.c.5¹ (UNESCO 2016: 337). Statutory or administrative data on teacher salaries may be the most accessible data source but they generally do not apply to private institutions and may omit contract teachers. Also, they may not be readily available in contexts with low reporting capacity especially where salaries are determined or paid sub-nationally. Labour force survey (LFS) data, on the other hand, provide representative data on salaries on all types of teachers as well as similarly educated workers, allowing a comparison as stipulated by SDG Indicator 4.c.5; however, labor force surveys may not be available for all countries, and the sample size of teachers may be too small to make meaningful inferences about the population of teachers, especially disaggregated by level of schooling. Despite these limitations, the authors of the 2016 GEM express a preference for using labour force survey data and suggest the “establishment of an inter-agency mechanism with the support of the International Labour Organization” (UNESCO 2016:339).

The purpose of the present study is to pick up from where the 2016 GEM left off and review, propose and compare specific measures of SDG Indicator 4.c.5. Three sources of measures are discussed: LFS data, government administrative and statutory sources, and large scale international student assessments. For each of these three sources, previous or ongoing methodologies are reviewed, the advantages and disadvantages are discussed, and specific measures, their implementation and role for the UIS are proposed.

This review concludes that, consistent with the 2016 GEM, LFS data provides the only feasible method to measure SDG Indicator 4.c.5 strictly as stipulated. LFS have limitations, and if a country's LFS data is unable to provide a measure for SDG Indicator 4.c.5, administrative and statutory sources and large scale international learning assessment data may provide an alternative measures teacher salaries, albeit an imperfect one. However, measures derived from administrative and statutory sources and potential international student assessment data would be an essential complement to LFS data for policy dialogue on SDG Indicator 4.c.5 progress. Table 1 summarizes proposed measures for SDG Indicator 4.c.5 from each of these three sources as well as advantages and disadvantages, cost and feasibility. The role of the UIS is therefore not restricted to data collection, but rather it would also have to leverage its convening power and involve other actors to ensure measurement of SDG Indicator 4.c.5.

¹ Indicator 4.c.5 is defined as, “average teacher salary relative to other professions requiring a comparable level of qualification”.

2. Measures Derived from Labour Force Surveys

Methodology used in the literature

Studies comparing teacher salaries with those of other occupations using (LFS) data generally apply methods from labour economics to try to make a comparison on the basis of a counterfactual: the average wage a teacher would receive in alternate occupations. These studies typically estimate earnings comparisons with a modified Mincerian earnings function (see Equation 1 below) which estimates the difference in wages controlling for years or level of schooling, experience or age, gender, and other relevant observable characteristics (e.g.: Allegretto & Mishel 2018; Rivas & Lavarreda 2008; Saavedra 2004; Liang 2000). Econometric methods initially used to measure wage discrimination have also been applied in order to decompose how much of the wage difference is due to observable characteristics including wages and experience and how much is due to unobservable characteristics; this latter portion is often interpreted as how much teachers are under or over-paid. The most common decomposition method applied to teacher salaries is the Oaxaca (1973)-Blinder (1973) method (e.g.: Asadullah 2006; Mizala & Romaguera 2005; Hernani-Limarino 2005; Herrero et al. 2004; Piras & Savedoff 1998). Recent work by Mizala and Ñopo (2016; 2011) apply a non-parametric extension of the Oaxaca-Blinder decomposition to identify a more accurate counterfactual wage for teachers.

Table 1. Summary of approaches to measure SDG Indicator 4.c.5

Data source	Labour force (or similar) surveys (LFS)	Government administrative data (actual salaries)	Government statutory sources	International student assessments
Measure definition	Estimated monthly and hourly earnings of teachers relative to other workers (expressed as a ratio) controlling for differences in educational attainment, experience, gender (Mincer model)	Actual annual and hourly public school teacher earnings relative to those of similarly educated workers	Statutory annual and hourly earnings of a public school teacher with typical qualifications and 15 years' experience relative to those of similarly educated workers	Estimated monthly and hourly teacher earnings relative to those of similarly educated workers based on teacher questionnaire data
Main advantages	Only source of data that provides an estimate of SDG Indicator 4.c.5. Proposed method consistent with existing literature comparing teacher salaries using LFS	Essential for policy dialogue on SDG Indicator 4.c.5 progress	Essential for policy dialogue on SDG Indicator 4.c.5 progress	Provides an alternative measure of teacher salaries to LFS data
Main disadvantages	Small sample size of teachers may result in insufficient statistical power to make comparisons; annual earnings generally not measured	1. Provides salaries for public school teachers only 2. Requires LFS data for comparator salaries	1. Provides salaries for public school teachers only 2. Requires LFS data for comparator salaries	1. Teacher salary estimates available only for assessed grades 2. Requires LFS data for comparator salaries



Data source	Labour force (or similar) surveys (LFS)	Government administrative data (actual salaries)	Government statutory sources	International student assessments
Currently available measures	Several published studies (primarily in Latin American countries) have estimated earnings differences. These typically use Mincerian model estimates or some variation (including decompositions) with some exceptions. The variation in methods and model specification limit comparability across studies.	<p>1. Teacher salaries: UIS data on expenditure on teacher compensation and FTE classroom teachers provides an approximate measure but is not suitable as it substantially over-estimates teacher salaries (see discussion in text below)</p> <p>2. Comparator salaries: ILOSTAT monthly and hourly earnings for professionals (which includes teachers) but not by education level</p>	<p>1. Teacher salaries: UIS data on statutory salaries of teachers with typical qualifications and 15 years' experience (mid-career earnings following OECD).</p> <p>2. Comparator salaries: ILOSTAT monthly and hourly earnings for professionals (which includes teachers) but not by education level</p>	<p>1. Teacher salaries: PASEC 2014 included a question on teacher's monthly earnings. 2. Comparator salaries: ILOSTAT monthly and hourly earnings for professionals (which includes teachers) but not by education level</p>
Proposed new analysis and data required	Standardized Mincer model estimated for LFS datasets (following approach by Montenegro and Patrinos 2014 for estimating comparable returns to education)	<p>1. Teacher salaries: (a) Total expenditure on gross salaries (UIS definition); (b) statutory working hours per year</p> <p>2. For comparator salaries: (a) LFS earnings of working population by level of education, (b) proportion of FTE teachers by level of education attained to construct a weighted comparator wage (as in OECD education at a glance)</p>	<p>1. Teacher salaries: statutory working hours per year</p> <p>2. For comparator salaries: (a) LFS earnings of working population by level of education. (b) the education level of the statutory salaries reported to UIS (teacher with typical qualifications and 15 years' experience) in order for the comparator salary to be of workers with the same education level</p>	<p>1. Teacher salaries: (a) question on salaries in the teacher questionnaire; (b) question on hours worked during corresponding timeframe</p> <p>2. Comparator earnings: (a) LFS earnings of working population by level of education</p>
New data collection approach	Three potential approaches: 1. UIS commissioned study 2. Call on ILO 3. Call on research community Each approach would use the same data sources but they vary by who does the analysis	Additional questions in UIS data collection on gross salary payments, statutory annual working hours, and educational attainment of FTE teachers. For working population earnings by education level: same approaches as for LFS	Additional question in UIS data collection on statutory annual working hours and education level of teacher with typical qualifications and 15 years' experience. For working population earnings by education level: same approaches as for LFS	Call on international student assessment administrators to include question on teacher salaries. For working population earnings by education level: same approaches as for LFS



Data source	Labour force (or similar) surveys (LFS)	Government administrative data (actual salaries)	Government statutory sources	International student assessments
Cost of data collection and burden on countries	No burden to countries as LFS data already collected, UIS commissioned study would be expensive. ILO may be less expensive due to its ongoing work with LFS data. Relying on research community would require oversight / consensus building by UIS.	Requires governments to run reports on teacher salary expenditure and collect / report teacher education levels. May require aggregating figures from sub-national jurisdictions. Additional cost to UIS for piloting and collecting additional questions.	Little additional burden for countries if they already report salaries for teachers with typical qualifications and 15 years' experience, though only about 30 countries do. Additional cost to UIS for piloting and collecting additional questions.	Little additional burden to countries that already participate in international student assessments, but would require international student assessment administrators to develop and pilot a new teacher questionnaire item
Feasibility	If data collected by UIS or ILO, depends on budget availability. Feasible for research community as it already estimates earnings differences.	Requires countries to have the capacity to provide payment data on gross earnings (UIS definition) and educational attainment of teachers. ILOSTAT already provides statistics on earnings by occupational level and employment by education level; it would be feasible for ILOSTAT to provide data on earnings by educational level.	Requires countries to have the capacity to provide educational attainment of teachers. Data already collected for statutory salaries but low response rate for salaries of teachers' with 15 years' experience (higher for starting salaries). For earnings of working population by education level, see previous column.	Feasible as PASEC 2014 collected this data. For earnings of working population by education level, see previous column

Notes:

1. All proposed measures would be expressed as ratios of teacher salaries relative to comparator salaries following OECD Education at a Glance and would be disaggregated by level of education taught whenever possible
2. Both annual and hourly salaries would be included. Hourly earnings provide a measure how much teaching is valued while annual salaries provide a measure of the attractiveness and value of the teaching profession. LFS measures would be monthly as annual salaries are generally not measured. Hourly measures can be removed in order to improve feasibility.
3. For actual salaries and salaries derived from international student assessment data, the comparator salary would be a weighted average of the salaries of the working population by level of education. The weights would be the proportion teachers in each education level; the subsequent weighted average comparator salary is therefore comparable in terms of education as specified by SDG Indicator 4.c.5. This is the same approach used by the OECD Education At a Glance.
4. Additional data collection for comparator salaries (including the proportion of FTE teachers by educational attainment and earnings of the working population by level of educational attainment) is proposed to provide a measure adhering to SDG Indicator 4.c.5; however, a second best approach would be to compare to the salaries of professionals or those of the tertiary educated working population.
5. Following OECD Education at a Glance, statutory salaries for 15 years' experience instead of starting salaries are proposed because 15 years' experience represents mid-career salaries (i.e.: to reflect an average of teachers' salaries). Starting salaries are not proposed because comparable starting salaries for other professions are not easily measured.



These studies tend to find a range of differences in teacher salaries including positive, negative and inconclusive differences. The sign (positive or negative) and the magnitude of the differences have been attributed to the control population (e.g.: all workers or only professionals as in Mizala & Ñopo 2016), the variables included (e.g.: controlling for geographic location as in Taylor 2008), and whether the wages are specified as hourly, weekly, monthly or annually (e.g.: discussions in Allegretto & Mishel 2018; Podgursky & Tongrut 2006; Liang 2000). This latter point on is of particular relevance for cross country comparisons. Teachers in many countries work fewer hours compared to other professionals or may not work during certain seasons; hence, comparing annual or monthly salaries would provide information about how relatively well paid being a teacher is, excluding earnings from secondary occupations which teachers often have, especially in lower income countries. Hourly earnings, by contrast, provide information about how well compensated teaching as an activity is. Both are important to gauge the attractiveness of the teaching profession and how well it is compensated relative to other professions.

Advantages and disadvantages

The chief advantage of using LFS data is the potential to measure SDG Indicator 4.c.5 in its strictest sense: econometric modeling can provide an estimate of the difference between those employed as teachers and others controlling for differences in education. Another advantage of LFS data is that an estimate for all teachers can potentially be estimated regardless of type of institution (public or private) or employment status (full-time, part-time, contract), except in cases where teaching is a secondary occupation and data about secondary occupations is not included. Measures of earnings would be comparable between teachers and non-teachers, and various other factors, including location of teaching (sub-national regions, urban and rural areas) can be controlled for to help produce a fair comparison.

The main disadvantage is that teachers typically comprise a small percent of the workforce (UNESCO 2016:338; Liang 2000) which can lead to small sample sizes of teachers. A small sample size would reduce the ability to statistically identify differences between teacher salaries and non-teacher salaries conditional on education, even if such differences do indeed exist in the population. For example, a small sample size may yield a large confidence interval for an estimate of the salary difference leaving researchers unable to conclude whether there is no difference in salaries or large differences. In such cases, no meaningful inference can be made about the salary difference in the population. Large confidence intervals are not necessarily a problem if the salary difference is also large. How prevalent would this problem be in LFS data globally? While it is not possible to answer this question prior to actually estimating salary differences, Liang 2000 presents estimates of wage differences for several Latin American countries using a Mincerian earning function model. Of the 12 datasets she analyzed, hourly earnings differentials were not statistically significant for three countries and annual salary differentials were also not statistically significant for three countries. The remainder had statistically significant differences as well as quite large confidence bounds, ranging from 7.5 to 21 percent of non-teacher salaries.

A second disadvantage of using LFS to measure differences in earnings between teachers and other workers is that many LFS do not collect data on annual earnings. Typically, a LFS survey collects data on how much an individual earned in the past two weeks or past pay period which can be converted to monthly earnings or hourly earnings by dividing by the number of hours worked if it is recorded. For example, ILOSTAT publishes tables on hourly and monthly earnings derived from LFS data but not annual earnings, though the number of countries and surveys with hourly earnings is smaller than the number with monthly earnings. Monthly earnings are not a substitute for annual salaries for teachers because

in many countries, teachers are not working a full year; hence, comparisons of monthly earnings of teachers to other workers would overstate comparisons using annual earnings.

A third disadvantage is analytical burden. LFS data analysis is typically done by economists with expertise in econometrics, complex survey design and labour or education economics. Estimating statistics using a large number of LFS surveys requires an analyst to become familiar with the sampling design of the survey, the questionnaire structure for employment, earnings and educational attainment as well as some knowledge of country context. If national occupational codes are used, the analyst must study the coding system to identify how teachers are coded. In some cases, LFS data has been standardized, for example the World Bank's I2D2 dataset².

Table 2. Percent difference in hourly earnings between teachers and non-teachers controlling for experience, age and other characteristics (Mincer earnings function, Liang 2000)

Country	Hourly Earnings			Annual earnings		
	Estimate	95% confidence interval		Estimate	95% confidence interval	
Bolivia	n.a.	n.a.	n.a.	-31.6***	-36.8	-26.0
Brazil	-6.8**	-12.1	-1.1	-29.5***	-33.6	-25.3
Chile	n.a.	n.a.	n.a.	-17.3***	-22.0	-12.3
Colombia	22.1***	17.4	27.0	-4.9***	-8.5	-1.1
Costa Rica	16.2***	7.4	25.7	n.a.	n.a.	n.a.
Ecuador (urban)	-23.7***	-29.4	-17.4	-30.9***	-34.9	-26.7
El Salvador	9.4***	3.2	16.0	-19.7***	-24.3	-14.9
Honduras	33.6***	23.6	44.5	n.a.	n.a.	n.a.
Panama	12.7***	6.3	19.6	-4.9*	-10.3	0.9
Paraguay	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uruguay (urban)	10.5***	4.2	17.2	-13.1***	-18.0	-7.8
Venezuela	8.3*	0.2	17.2	-8.6*	-15.5	-1.1

Source: Liang 2000; author's conversion to percentages and calculation of the 95% confidence interval. Statistical significance at the 1, 5, and 10 percent levels denotes as ***, **, and *, respectively. Liang 2000 did not report non-statistically significant differences defined as higher than 10 percent; they are denoted n.a. in this table.

Another potential limitation of using LFS data note in the 2016 GEM is low coverage of countries. The number of countries with usable LFS datasets is not clear, though the availability of data through ILOSTAT is discussed in the subsequent section which provides a lower-bound estimate of data availability. Among these, it is not known how many have an occupational coding system that identifies teachers (the international occupational coding system, ISCO, does include teachers and many countries either use this system or an adaptation of it). However, because LFS data is the only source of nationally representative comparator wages as required by SDG Indicator 4.c.5, low coverage of LFS data is a limitation for all measures of SDG Indicator 4.c.5.

² However, the occupational codes have not been standardized for most datasets so it is not possible to identify teachers without substantial review of national occupational coding systems, unless ISCO is used.



Proposed measures

One approach to derive a measure for SDG Indicator 4.c.5 from LFS data would be to follow similar attempts for deriving comparable estimates of the return (i.e.: wage premia) to education from LFS data. As with research estimating teacher wage differences, most studies estimating the returns to education rely on some variation of the Mincerian earnings function (e.g.: see Patrinos & Psacharopoulos 2010 for a review). However, the variation in the estimated models limits the ability to interpret published estimates as an indicator. To overcome this limitation, Montenegro and Patrinos (2014) estimate the same Mincerian earnings function model for 819 LFS datasets from 139 countries or economies in order to provide a comparable measure of returns to education.

The proposed measure of SDG Indicator 4.c.5 derived from LFS data would be to follow the approach of Montenegro and Patrinos (2014), and estimate the same Mincerian earnings function model with a teacher indicator variable. As discussed previously, the Mincerian model or variations of it have been used in most studies comparing teacher salaries with those of other workers. This SDG Indicator 4.c.5 measure would comprise of estimates for both hourly and monthly earnings differences as well as their confidence bounds. The Mincerian model to be estimated would be defined as

$$\ln(y_i) = \beta_{i,0} + \beta_{i,1}T + \beta_{i,2}S + \beta_{i,3}F + \beta_{i,4}E + \beta_{i,5}E^2 + u_i \quad (1)$$

where y_i denotes earnings, i denotes either hourly or monthly (both would be estimated), T denotes whether the individual is a teacher, S denotes his or her years of schooling, F denotes whether the individual is female, E denotes his or her experience, and u denotes an error term. The natural exponential function of the coefficient for T , $e^{\beta_{i,1}}$, is the ratio of teacher's hourly or monthly salaries to those of other workers, controlling, as specified by SDG Indicator 4.c.5, for education but also experience and gender. While SDG Indicator 4.c.5 does not explicitly include similarly experienced earners or gender, the importance of experience and gender as a determinant of earnings is well-known and may differentiate teachers from other workers especially in contexts of rapid enrollment expansion. However, in some surveys, the number of years of schooling is not available, and consequently an alternative model would be to replace the years of schooling with binary variables denoting levels of educational attainment which could differ by survey. The definitions of earnings and occupation (e.g.: teacher) would follow ILO standards; already, many LFS datasets use either the International Standardized Classification of Occupations (ISCO). They also follow the ILO definition of gross earnings which matches the UIS's (and OECD's) definition of teacher salaries.

The argument to use Mincerian earnings function estimates as measures for SDG Indicator 4.c.5 is *not* because this is the most advanced method but rather because it would be the most *transparent*: economists regardless of field would understand it and—most importantly—instantly understand its limitations. Newer and potentially more accurate methods have and will continue to arise in the research on teacher salary differences. The best method of today is highly debatable, would require detailed study to understand its limitations, and likely to be supplanted by an even better approach in the future. An indicator is, by definition, only meant to be indicative; hence, a methodology that is transparent would be more appropriate than one that is (temporarily) cutting edge and not widely understood.

Implementation and role of the UIS

Three approaches are proposed to implement this measure of SDG Indicator 4.c.5 as described in Table 1. For all three, the first step would be to conduct a consultation with the research community to gain consensus or revisions to the proposed measure. All three approaches are not mutually exclusive, and implementing this measure may require combining them to maximize coverage. Note that all three approaches would in general utilize the same data, but they vary by who would conduct the analysis of the data.

The first approach would be for the UIS to commission researchers to estimate the model for existing LFS data. This would be expensive for the UIS as the resulting dataset would need to be updated as new LFS data becomes available. In many ways this would also duplicate work by the ILO which already uses countries' LFS data to provide estimates for ILOSTAT. The second approach would be for the UIS to call on the ILO to estimate this model as part of its ongoing analysis of LFS data. ILOSTAT currently publishes various indicators that it calculates from LFS data received from countries³. To extend their routine analysis to estimate the Mincerian model, the LFS data would need to be standardized. The ILO already generates summary statistics of earnings and education; the additional standardization would involve defining teachers in each survey's occupational coding. Identifying teachers may be time consuming if a national coding system rather than the International Standard Classification of Occupations (ISCO) is being used, especially if the occupational coding is in a local language. Next, the Mincerian model would need to be run for each dataset and the statistics collected. The third approach would be for the UIS to call on the research community to provide the indicator, leveraging existing work by the research community on teacher salary differences. The UIS would establish and lead a (volunteer) peer review committee from the research community and issue a call for papers defining the model and estimation method, for example as proposed in equation (1); these papers should be limited in length to allow for quick peer review.

3. Measures Derived from Administrative and Statutory Sources

Given that public education is typically the predominant education provider, comparing public sector salaries to those of the other similarly educated professionals would be essential for policy dialogue on SDG Indicator 4.c.5 progress. LFS data can provide these estimates; however, low sample size of teachers may prevent meaningful inference for the sub-population of public teachers especially disaggregated by level of education taught. Administrative and statutory sources would provide alternative measures, and because these sources are from government administrative records as well as official pay-scales, they reflect policies that governments are able to affect.

The OECD *Education at a Glance* series presents essentially the only ongoing publication of comparisons of teacher salaries with those of other occupations using statutory or administrative data. The OECD and Eurydice appear to be the only two organizations that annually publish internationally comparable teacher salaries from statutory or administrative sources (UIS collects this data but does not publish it). A review by Fredriksson (2008) identified a number of studies prior to the OECD *Education at a Glance* and Eurydice which compared teacher salaries internationally using administrative sources and teacher

³ See <https://ilostat.org/about/data-collection-and-production/>

union data with the latest being published in 1993⁴. Given these efforts are now quite dated and that the Eurydice data collection is now conducted jointly with the OECD, this section focuses on the OECD *Education at a Glance* methodology.

OECD Education at a Glance

The OECD's 2018 Education at a Glance published three tables comparing teacher salaries with those of other occupations (OECD 2018a: Tables D3.2a, D3.2b, and D3.2c); this description focuses on the 2018 edition as previous editions published the same or similar data. OECD (2018a) Table D3.2a presents comparisons using actual teacher salaries; while, Table D3.2b presents comparisons using statutory teacher salaries (see Figure 1 below for excerpts). Table D3.2c presents actual teacher salary comparisons disaggregated by age and gender. All three tables disaggregate by the level of schooling taught by teachers.

Teacher salaries are defined as employee's gross salary including pre-tax income including social security and government pension paid by the employees and excluding employer taxes and contributions to social security. Actual salaries comprise all work related payments including "annual bonuses, results-related bonuses, extra pay for holidays and sick-leave pay" (OECD 2018a:372) and exclude income derived from sources not directly related to teaching. Statutory salaries used in Tables D3.2b are defined as "statutory salaries of teachers with 15 years of experience and most prevalent qualifications (regardless of age) in public institutions," where the "most prevalent qualifications" refers to the "level of qualifications and training held by the largest proportion of teachers". This definition is intended to proxy for mid-career teachers. To collect both statutory and actual teacher salaries data, "experts in each country fill in electronic (Excel) questionnaires, making reference to the various laws and regulations that are in place nationally" (OECD 2018c:20). Data sources vary by country but generally include payroll data (e.g.: France) and government accounting systems (e.g.: Estonia) for actual salaries and government legislation (e.g.: Portugal), public service remuneration regulations (e.g.: Korea), and collective agreements with teacher unions (e.g.: Canada) for statutory salaries.

To account for variations in pay scales either sub-nationally or within levels of education, countries often report weighted averages. For example, Australia surveys its sub-national jurisdictions to collect salary data and weights it by the number of government teaching staff in each jurisdiction (OECD 2018b:196). In Denmark, teacher salary scales within primary level education differ between teachers of class 0 ("børnehaveklasse") and teachers of classes 1 to 6; a weighted average of teacher salaries of these two pay scales is reported (OECD 2018b:198).

OECD tables D3.2a and D3.2b compare teacher salaries with those of other occupations as a ratio between the average of teacher salaries (in the numerator) and the average of salaries of other occupations (in the denominator). Two sets of ratios are presented. In the first set, the denominator is a weighted average of three average salaries of workers in the country: the average salary of ISCED 5 graduates, of ISCED 6 graduates and of ISCED 7 and 8 graduates. The weights assigned to each of these three averages are the proportion of teachers in each of these three education categories. In the second set of ratios, the denominator is the average salary of all tertiary educated workers (ISCED 5 to 8). Including both methods of calculating the ratios as well as both actual and statutory teacher salaries

⁴ These include: the World Confederation of Organizations in the Teaching Profession studies in 1978, 1980, and 1986, the German Institute for International Education Research study in 1976, a study by the American Federation of Teachers in 1993 and by Lärarförbundet in Sweden in 1993.

increases the coverage of indicators for OECD members and partners as not all countries were able to report some of the numerator or denominator values. The source of the earnings data for workers by level of education used in the denominator are from national labour force surveys with specific statistics reported to the OECD (OECD 2018c:20). In cases when salary data for other occupations is not available for the year corresponding to that of the teacher salary, a previous year’s average salary is used and adjusted for inflation (OECD 2018a:373).

Figure 1. Excerpts from OECD Education at a Glance 2018

Table D3.2a. Actual salaries of teachers and school heads relative to earnings of tertiary-educated workers (2016)

Ratio of salary, using annual average salaries (including bonuses and allowances) of teachers and school heads in public institutions relative to the wages of workers with similar educational attainment (weighted average) and to the earnings of full-time, full-year workers with tertiary education.

	Notes	Year of reference of latest available data on earnings of tertiary-educated workers	All teachers									
			Actual salaries, relative to earnings for full-time, full-year similarly educated workers (weighted averages, 25-64 year-olds)				Actual salaries, relative to earnings for full-time, full-year workers with tertiary education (ISCED 5 to 8, 25-64 year-olds)					
			Pre-primary	Primary	Lower secondary, general programmes	Upper secondary, general programmes	Pre-primary	Primary	Lower secondary, general programmes	Upper secondary, general programmes		
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
OECD Countries												
Australia		2016	m	m	m	m	0.92	0.93	0.93	0.93		
Austria		2016	m	m	m	m	m	0.76	0.90	0.97		

Table D3.2b. Teachers' statutory salaries relative to earnings of tertiary-educated workers (2017)

Ratio of salary, using statutory salaries of teachers with 15 years of experience and most prevalent qualifications (regardless of age) in public institutions relative to the wages of workers (25-64 year-olds) with similar educational attainment (weighted average) and to the earnings of full-time, full-year workers (25-64 year-olds) with tertiary education.

	Notes	Year of reference of latest available data on earnings of tertiary-educated workers	Statutory salaries of teachers with 15 years of experience and most prevalent qualification, relative to earnings for full-time, full-year similarly educated workers (weighted averages)				Statutory salaries of teachers with 15 years of experience and most prevalent qualification, relative to earnings for full-time, full-year workers with tertiary education (ISCED 5 to 8)					
			Pre-primary	Primary	Lower secondary, general programmes	Upper secondary, general programmes	Pre-primary	Primary	Lower secondary, general programmes	Upper secondary, general programmes		
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
			OECD Countries									
Australia		m	m	m	m	m	1.02	1.02	1.02	1.02		
Austria		2016	m	m	m	m	m	0.67	0.70	0.77		

Advantages and disadvantages

Because SDG Indicator 4.c.5 aims to compare teacher salaries with those of other occupations, deriving teacher salaries from administrative or statutory sources does not offer a complete alternative to labour force survey data as labour force survey data is still needed to estimate wages of comparator occupations. The primary advantage of using administrative or statutory sources for teacher salaries is that it provides a measure of teacher salaries when existing labor force survey data are unable to; this occurs if teachers are not adequately defined in the labour force surveys occupational coding or, more likely, because the sample of teachers is too small to make meaningful inference. This is especially true



when trying to compare the salaries of teachers of different levels of education with those of other occupations which would require a large sample of teachers. A second advantage is that government is often the largest provider of education in countries and often determines the salaries of teachers. Even if labor force surveys can provide general comparisons of teacher salaries with those of other occupations, having administrative and statutory teacher salaries will necessarily be an important part of policy dialogue within countries about attaining SDG Indicator 4.c.5. A third advantage to note is that administrative and statutory salaries may be available more frequently, especially in countries which do not have annual labour force surveys as in many developing countries; however, the comparator salaries would still rely on latest rounds of labor force survey data and may need to be adjusted to account for price inflation (OECD 2018a:373). Finally, how public institution teachers' salaries compare to those of other workers, particularly the attractiveness of public institution teaching, is generally of interest because of equity as the poorest students generally attend public institutions rather than private ones.

Relying on administrative and statutory sources for teacher salaries to make comparisons with other occupations poses several disadvantages. First, this source typically only includes public institutions and consequently excludes large proportions of students in some countries including those in private schools. Second, for reporting actual teacher salaries, governments must have the administrative capacity to generate the necessary reports from their accounting systems, in particular those that are compatible with the definition of comparison wages. Governments in developing country contexts may not have the capacity to generate sophisticated reports on teacher salaries, especially if it relies on data produced by sub-national or local-level entities. Third, for reporting statutory salaries, the regulatory framework for teacher remuneration must be well established, up-to-date and reflecting *de facto* payment process in the country. In many developing countries, payments may not be made or may be made to teachers very late, teachers may not have the necessary qualifications for a particular pay grade, and teachers may be absent from school earning an additional salary in a second job. The statutory framework must also be compatible with the definition of salaries being collected; for example, while the definition of salaries in the OECD *Education at a Glance* includes employee contributions to social security and pensions, many countries were unable to report statutory salaries that included these contributions (OECD 2018b:224).

Collecting data on statutory salaries can also involve considerable analytical burden that is unlike statistics derived from government accounting systems or EMIS. For example, consider computing the statutory salary of a teacher with 15 years of experience and a master's degree. To answer this question, an individual would not only need to be aware of the relevant legislation and regulations affecting teacher salaries but would also need sufficient expertise to be able to interpret the laws and regulations to answer this hypothetical question. Typically, studies on laws and regulations in countries collect not only specific answers to questions but also copies of the relevant laws and regulations for quality assurance (e.g.: see the World Bank SABER programme). These laws and regulations are typically in national languages which makes it very difficult for an organization like UIS to validate. The analytical burden increases if, as in the OECD *Education at a Glance*, weighted averages of data from statutory salaries are needed due to variation in pay scales either sub-nationally or within levels of education. The analytical burden, in this sense, can be thought of as a sliding scale: increasing the accuracy of a response requires more analysis of laws and regulation. For example, the OECD *Education at a Glance* collects data only on full-time teachers; theoretically, statutory data could also be collected on part-time teachers and contract teachers, but the analytical burden would have been too costly.



Finally, to measure SDG Indicator 4.c.5, comparator salaries of similarly educated workers would need to be available. The ILO publishes earnings data by occupation and economic activity but currently not education level. The average salary of professionals, as teachers are classified, is the closest comparator salary available through ILOSTAT, and Table 3 presents the percent of countries weighted by primary-age population with professional monthly earnings after 2013, excluding India and China. While coverage is relatively high in Latin America and the Caribbean and Asia and the Pacific, coverage is quite low in Sub-Saharan Africa and the Arab States. As a result, indicators derived from administrative and statutory sources would require analysis of LFS data beyond the number of countries that ILOSTAT currently offers, especially to increase coverage in the poorest countries.

Table 3. Percent of countries (weighted by primary-aged population) with ILOSTAT data on professional monthly earnings after 2013*

All regions	54.9
Sub-Saharan Africa	29.5
Arab States	33.4
Asia and the Pacific	78.3
Europe and North America	60.4
Latin America and the Caribbean	82.5

Note: *These figures exclude India and China which have LFS data but earnings data is not available through ILOSTAT. Note other countries also have LFS data but it may not be available through ILOSTAT.

Proposed measure: actual teacher salaries relative to similarly educated workers

Following the OECD *Education at a Glance*, the preferred measures of SDG 4.c.5 for public sector teachers derived from government statutory or administrative sources would be (1) actual teacher salaries relative to similarly educated workers and (2) statutory salaries of teachers with typical qualifications and 15 years' experience relative to similarly educated workers. These measures are defined as ratios between teacher salaries and comparator salaries. The UIS already collects data on statutory salaries and data to approximate actual teacher salaries; the preferred measures would be comparable with those of the OECD's *Education at a Glance*. To attain the preferred measures, additional data collection by the UIS as well as additional data from LFS beyond what ILOSTAT currently publishes would be required as described below. Note that not all of these data requirements are needed; even if only some are feasible, those additions would help improve measures that are currently available using UIS data.

For actual teacher salaries, an approximate measure of SDG Indicator 4.c.5 for public sector teachers can be computed using existing data collected by UIS and published by ILOSTAT.

A teacher salary can be calculated using data from three indicators collected by the UIS: (1) teaching staff compensation as a percent of expenditure by education level, (2) government expenditure by education level as a percent of GDP, and (3) number of classroom teachers by education level taught in full-time equivalents (FTE). With data on a country's nominal GDP in local currency, these three indicators can be combined to calculate teaching staff compensation (in local currency) per FTE teacher as an approximate teacher salary. A comparator salary can be approximated by to the average (annualized) monthly salary of professionals published by ILOSTAT in local currency. Table 4 presents this approximate measure for primary school teachers for every country with available data and compares the resulting ratio to that of the OECD *Education at a Glance* where possible. Note that, following the OECD, if the comparator salary



is not available for the year when the approximate actual teacher salary is available, the latest comparator salary is used and adjusted by the consumer price index (if no previous data is available, a future salary is used and deflated by the consumer price index). 30 countries have sufficient data to compute the approximate teacher salary of the numerator and 22 of these have professional earnings reported by ILOSTAT for the denominator.

Table 4. Currently available measure based on teaching staff compensation per FTE classroom teacher (primary school teachers)

Country	Year	Teaching staff compensation per FTE classroom teacher (local currency)	Monthly earnings of professionals (ILOSTAT, local currency)	Ratio to annualized (monthly x 12) earnings	OECD Education at a Glance Actual salaries of all teachers, relative to earnings for full-time, full-year similarly-educated workers (same year)
Africa					
Cabo Verde	2015	840,273	53,443	1.31	n.a.
Eswatini	2014	101,222	6,854	1.23	n.a.
Gambia	2012	57,605	4,697	1.02	n.a.
Zimbabwe	2013	7,054	348	1.69	n.a.
Asia and the Pacific					
Malaysia	2012	38,964	3,813	0.85	n.a.
Maldives	2014	153,040	12,504	1.02	n.a.
Europe and North America					
Austria	2015	65,728	3,799	1.44	0.72
Belgium	2014	62,174	4,413	1.17	0.85 / 0.91*
Bulgaria	2013	26,481	1,173	1.88	n.a.
Cyprus	2015	65,169	2,616	2.08	n.a.
Estonia	2013	17,483	1,214	1.20	0.94
Finland	2014	52,839	4,077	1.08	0.91
Ireland	2013	76,471	4,804	1.33	n.a.
Lithuania	2015	15,281	865	1.47	0.88
Luxembourg	2014	119,007	5,778	1.72	1.08
Malta	2015	39,112	2,150	1.52	n.a.
Portugal	2015	43,302	1,274	2.83	1.33
Romania	2015	45,516	3,419	1.11	n.a.
Slovakia	2015	28,177	1,256	1.87	0.62
Switzerland	2014	177,778	8,205	1.81	n.a.
Latin America and the Caribbean					
Ecuador	2015	11,227	887	1.05	n.a.
Guyana	2012	845,938	87,399	0.81	n.a.

Note: *French and Flemish communities, respectively. Teaching staff compensation per FTE classroom teacher is calculated as (teaching staff compensation as a percent of expenditure on primary education x expenditure on primary education as a percent of GDP x nominal GDP) / (FTE classroom teachers in primary). Teaching staff compensation as a percent of expenditure on primary education and expenditure on primary education as a percent of GDP are obtained from UISSTAT, FTE classroom teachers in primary education was collected in UIS education questionnaire A9; nominal GDP was obtained from the IMF WEO October 2018.

There are three limitations with this currently available measure. First, the measure of teacher salary does not conform to the UIS (or ILO) definition of earnings because it includes employer contributions to



social security and pensions. Second, it is not clear whether “teaching staff” and “classroom teachers” are equivalent by definition. Third, the comparator salary is not defined by having the same level of qualification as stipulated by SDG Indicator 4.c.5; however, ISCO defines professionals based on skills suggesting that teachers would have similar skills as those of other professionals. In addition, average salaries of professional occupations would include those of teacher salaries as well. Table 5 compares this currently available, approximate measure of actual teacher salaries relative to professional salaries with the OECD *Education at a Glance*’s actual teacher salaries relative to similarly educated workers for the noted year. This comparison is possible in eight countries. In all cases, the approximate measure is higher than that of the OECD. For six countries, the approximate measure suggests that teacher salaries are higher than comparator salaries while the OECD indicator suggests the opposite. This is explained in part by the approximate measure’s numerator including employer contributions to pension which the denominator excludes. Given that the currently available approximate measure differs substantially from the OECD indicator, this currently available approximate measure may not be suitable as a measure of SDG Indicator 4.c.5 for public sector teachers.

Table 5 presents additional data required to calculate the preferred measure of actual teacher salaries relative to similarly educated workers. The preferred actual salary measure would require total gross teaching staff salaries excluding employer contributions to social security and pension programmes in order to reflect the UIS and OECD definitions of teacher salaries. The corresponding number of FTE teachers would also have to be collected in order to for the UIS to compute an average salary per FTE teacher. An alternative approach would be for the country to report to the UIS average teacher salaries. This is the approach used by the OECD *Education at a Glance*, and countries calculate average actual teacher salaries in a number of different ways. This alternative approach is more flexible for countries but requires a certain amount of capacity to be able to provide such a measure.

Table 5. Actual salaries: currently available indicator, a preferred indicator, and additional data needs

Currently available indicator

1a. Total teaching staff compensation per FTE classroom teachers by ISCED level taught relative to average professional salaries

Data used:

Numerator

- a. teaching staff compensation as a percent of expenditure by education level (from UIS.STAT)
- b. government expenditure by education level as a percent of GDP (from UIS.STAT)
- c. nominal GDP in local currency (IMF WEO 2018 October)
- d. total number of full-time equivalent classroom teachers by ISCED level (UIS questionnaire A9)

Denominator

- a. Average monthly earnings (x12) of professionals (ILOSTAT)
-

Preferred indicator

1b. Actual teacher salary by ISCED level taught relative to similarly educated workers, annual and per statutory hour

Additional data needed to improve existing indicator

Numerator

- a. total teaching staff gross salaries -- to match the UIS / OECD definition of salaries
- b. or average actual teacher salary (UIS definition) to allow flexibility in methodology as by the OECD
- c. full-time teacher statutory hours per year (teaching + other duties) -- to provide earnings per hour

Denominator

- a. proportion of teachers by ISCED qualification for each ISCED level taught -- to define a comparator salary
 - b. earnings by ISCED qualification from labour force surveys -- to compare on the basis of education
-

Following the OECD, the denominator would require the UIS to collect the proportion of teachers by educational attainment by each level of teaching and would require data from LFS on average salaries of workers by educational attainment. As a comparator salary, the OECD uses an average of workers' earnings by educational attainment weighted by the proportion of teachers by educational attainment (OECD 2018a: 370). The OECD also uses average tertiary educated worker salaries, in order to increase coverage. If LFS data is not available for a particular year, the most recent LFS data would be used and adjusted for price inflation following the OECD's method. The preferred measure for actual teacher salaries relative to similarly educated workers would then be defined as

$$\frac{y_i^a}{12 \times \sum_j p_{i,j} w_j} \quad (2)$$

where y_i^a denotes average actual teacher salaries for education level i being taught, $p_{i,j}$ the proportion of teachers teaching level i whose highest level of education attained is level j , and where w_j denotes the average monthly gross earnings of workers aged 25 to 64 whose highest level of education attained is level j . Education levels would be defined by ISCED and earnings of workers would be defined as gross earnings following the ILO standards. Following the OECD, a weighted average is used as the denominator in order to account for differences in the education distribution of teachers from those of other workers. For example, if 25 percent of teachers have completed secondary education and 75 percent have completed post-secondary education, then the appropriate comparator salary would be 25 percent times the average salary of workers with secondary education and 75 percent times the average salary of workers with post-secondary education. The comparator salary is, in this sense, the average for an individual with similar education as a teacher.

Proposed measure: statutory teacher salaries relative to similarly educated workers

The preferred measure derived from statutory sources is statutory salaries of teachers with typical qualifications and 15 years' experience relative to similarly educated workers. A measure using salaries of teachers with 15 years' experience is preferred to statutory starting salaries because it is difficult to estimate comparable starting salaries from LFS data. In addition, 15 years' experience represents mid-career salaries as a proxy for average salaries of teachers. This is the approach used by the OECD *Education at a Glance* for comparing statutory salaries to those of other workers (see Table 3).

The UIS already collects data on statutory salaries for teachers with typical qualifications and 15 years' experience. A measure of SDG Indicator 4.c.5 for public sector teachers derived from statutory salaries can be currently calculated as a ratio between this UIS indicator and the average salaries of professionals published by ILOSTAT.

Table 6 presents statutory salaries of primary school teachers with typical qualifications and 15 years' experience relative to professional earnings for countries with available data. 29 countries reported statutory salaries of primary school teachers with typical qualifications and 15 years' experience to the UIS. 11 of these also have average earnings of professional workers with which to calculate the measure.

**Table 6. Currently available measure based on statutory salaries (primary school teachers)**

Country	Year	Annual statutory salary for a teacher with typical qualifications and 15 years' experience (local currency)	Monthly earnings of professionals (ILOSTAT, local currency)	Ratio (to annual earnings)
Africa				
Cameroon	2018	2,050,000	216,525	0.79
Liberia	2016	24,975	9,984	0.21
Mauritius	2018	412,425	38,171	0.90
Rwanda	2018	7,655,000,000	202,519	3150.00
Arab States				
Jordan	2018	8,500	671	1.06
Palestine	2018	54,972	2,579	1.78
Asia and the Pacific				
Mongolia	2018	3,852,727	1,133,997	0.28
Philippines	2017	347,742	26,293	1.10
Europe and North America				
Albania	2018	677,400	67,888	0.83
Latin America and the Caribbean				
Costa Rica	2018	9,700,000	1,163,276	0.69
Ecuador	2017	18,746	904	1.73

Note: Annual statutory salaries of teachers with typical qualifications and 15 years' experience is collected in the UIS education questionnaire A11

Table 7 summarizes additional data needed to calculate the preferred statutory measure of SDG Indicator 4.c.5. The main limitation of the currently available indicator presented in Table 7 is that the denominator is the average salaries of professionals rather than similarly educated professionals. In order to compare teacher salaries with similarly educated workers, the comparator salary would be for workers with the same level educational attainment for teachers with typical qualifications and 15 years' experience. This requires data on the level of educational attainment for teachers with typical qualifications as well as earnings of other workers by level of education.

Table 7. Statutory salaries: currently available indicator, a preferred indicator, and additional data needs**Currently available indicator**

2a. Statutory salary for a teacher with typical qualifications and 15 years of experience by ISCED level taught relative to average professional salaries

Data used:**Numerator**

a. annual statutory salary of a teacher with typical qualifications and 15 years of experience

Denominator

b. Average monthly earnings (x12) of professionals (ILOSTAT)

Preferred Indicator

2a. Statutory salary for a teacher with typical qualifications and 15 years of experience by ISCED level taught relative to similarly educated workers

Additional data needed to improve existing indicator

Denominator

a. Education level (ISCED) included in "typical qualifications" as defined for UIS education questionnaire A11 -- to select appropriate comparator salary

b. Earnings by ISCED qualification from labour force surveys -- to provide a correct comparator salary on the basis of educational attainment

The preferred measure of SDG Indicator 4.c.5 derived from statutory sources would be defined as

$$\frac{y_i^s}{12 \times w_k} \quad (3)$$

where y_i^s denotes the statutory salary of teachers with typical qualifications and 15 years' experience and w_k denotes the average monthly earnings for workers with the same level of educational attainment as teachers with typical qualifications and 15 years' experience.

Implementation

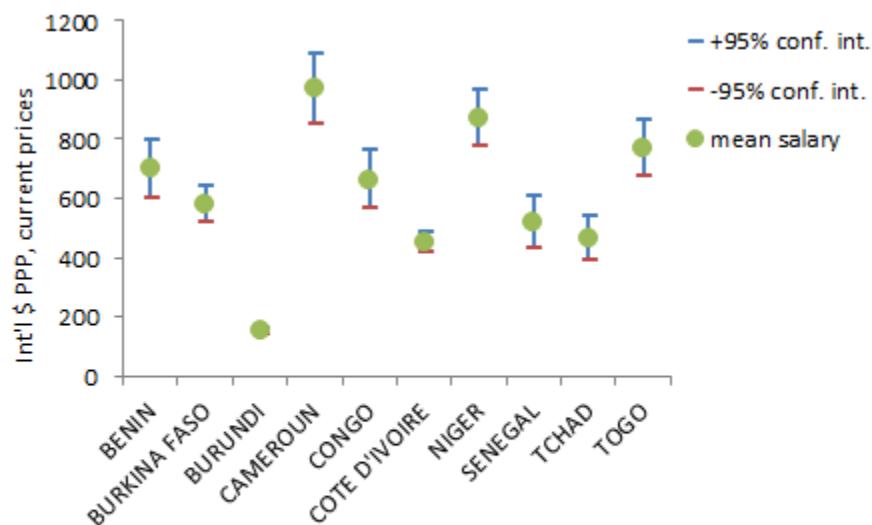
Both preferred measures require additional data collection by the UIS as well as additional data from LFS sources. The additional UIS data collection would be implemented following the UIS procedures for adding questions to the UIS questionnaire (including feasibility study and piloting as needed). However, if it is not feasible to attain this additional data from the UIS questionnaire, an alternative approach would be to call on international development partners conducting studies of education finance (e.g.: public expenditure reviews) to produce required teacher salaries as part of their work. To obtain the additional data needed for the comparator salaries, any of the approaches discussed for LFS data in Table 1 would suffice: the UIS commissioning data collection, calling on the ILO or calling on the research community.

4. Measures Derived from International Student Assessments

An alternative source of teacher salary data is large scale international student assessments. To the author's knowledge, only PASEC 2014 collected teacher salary data and there has been no attempt made to compare this data with the earnings of other occupations. This source of teacher salaries would be advantageous in contexts where the sample of teachers in LFS data is too small to make meaningful inference or where teachers cannot be identified in the LFS data. Another advantage is that assessments by PASEC and SACMEQ cover some of the poorest countries in the world. These assessments typically collect data from a teacher's questionnaire and with the exception of PISA are representative of teachers as classes are a stage of the sample design. They also encompass a large number of countries with TIMSS, PIRLS, PISA, PASEC and SACMEQ including 118 countries at least once since 2000 as well as several sub-national entities. A measure of SDG Indicator 4.c.5 could be estimated the same way as actual salaries discussed above by using estimates of teacher salaries from international assessments as a substitute for actual salaries. The main limitation of this data source is that international student assessments are typically representative of one or two grade levels (e.g.: 4th and 8th grades in TIMSS) or a specific age group (e.g.: 15 year-olds in PISA).

Figure 2 presents estimated monthly mean salaries and confidence intervals using PASEC 2014, converted into PPP international dollars. Only Cameroon and Togo have ILOSTAT data on monthly earnings for professionals, and both countries' ILOSTAT data are for the same year as the PASEC assessment, 2014. For Cameroon and Togo, mean teacher salaries are 9 percent higher and 43 percent lower than professional salaries, respectively. Confidence intervals range from -5 to +22 percent of professional earnings in Cameroon and from -50 to -36 percent for Togo. For Togo, the confidence bounds are consistent with those in the LFS estimates presented in Table 2 with which meaningful inferences could be made.

Figure 2. Mean teacher salaries and 95% confidence bounds estimated from PASEC



Source: author's calculations using PASEC 2014. Mean wages and confidence intervals have been converted into PPP using PPP conversion rates published in the IMF WEO 2018 October Edition

Table 8 compares estimated public school, 6th grade teacher salaries from PASEC 2014 with statutory salaries of primary teachers with 15 years' experience collected by the UIS. The salary estimates from PASEC 2014 have been adjusted for inflation by the consumer price index for each country. Salary estimates between these two sources would differ for a variety of reasons, including different years of experience and qualifications among those sampled in PASEC. Large differences exist for Cote d'Ivoire and Senegal as well as Cameroon. Salaries in most countries in this table are denoted in CFA (West or Central African which are pegged at parity), and as a result, the statutory salaries provided to UIS for Senegal and Cote d'Ivoire appear to be outliers as the salaries estimated from PASEC are similar to others.

To leverage data collection from teachers in the large-scale international student assessments, the UIS would need to coordinate efforts across student assessment programs. Adding additional questions would require buy-in from scientific committees of the assessment programmes, consultation from national partners within these programmes, and development and piloting of potential questionnaire additions. Given that teachers' salaries are now among the SDG indicators, there may be considerable interest from administrators of assessment programmes. There are also other international data collection efforts from schools that may also be leveraged including the OECD TALIS and World Bank Service Delivery Indicator surveys.

Table 8. Estimated 6th grade public teacher salaries from PASEC 2014 (adjusted for inflation) compared with UIS collected statutory salaries of primary school teachers with 15 years' experience and typical qualifications (local currency)

	Average public 6th grade teachers, PASEC 2014 (adjusted for inflation)	UIS statutory salaries of primary teachers with 15 years' experience and typical qualifications	difference
Benin	1,898,890	2,751,420	-31%
Burkina Faso	2,003,795	2,815,098	-29%
Burundi	1,320,322	1,920,000	-31%
Cameroon	3,247,871	2,050,000	58%
Congo	1,771,386	m.	m.
Cote d'Ivoire	1,352,674	217,109	523%
Niger	2,487,814	2,820,648	-12%
Senegal	1,144,087	11,625,000	-90%
Tchad	1,570,393	m.	m.
Togo	2,173,337	m.	m.

5. Other Considerations

The use of teachers' salaries data has so far been discussed in comparison with those of other occupations following the specification of SDG Indicator 4.c.5. However, if salary data were to be presented alone, then adjustments would need to be made to convert to a comparable currency. UIS currently uses a method to convert government expenditure statistics into purchasing power parity, and the same approach would be recommended for teacher salaries. Figure 1 uses conversion factors published by the IMF World Economic Outlook. Technically, purchasing power varies within countries as well; poverty surveys for example adjust household consumption by local price deflators to create a comparable estimate of poverty rates across a country. A similar approach would need to be done using labour force survey data, though typically this may not be feasible given a lack of price data within these types of surveys (unlike consumption surveys) or substantial analytical burden to compute or derive these weights from other surveys. Other approaches include presented teacher salaries as a ratio to GDP per capita and to a national poverty line. As noted by the 2016 GEM, the ratio of teacher salaries to GDP per capita may be misleading because the ratio tends to decline with economic development as the relative price of educated workers declines. Poverty line concepts are typically based on household per capita consumption rather than earnings of individuals, and comparisons to the poverty line would not necessarily be indicative of the attractiveness of the teaching profession as this would depend on the earnings of other occupations regardless of the poverty line.

6. Conclusion

A result of this review of methodologies and data sources for measuring SDG Indicator 4.c.5 is that LFS data is the only source that can provide a true measure of the difference between teacher salaries and those of other workers. Administrative and statutory sources as well as international student assessments provide alternatives with limitations but would still require LFS data for comparator salaries. However, measures of public sector teacher salaries derived from administrative and statutory sources would be essential for policy dialogue on SDG Indicator 4.c.5 progress given the size of the public



education sector and that these salaries are typically the result of policy decisions. International student assessments have the potential at the very least to offer measures of teacher salaries in some of the poorest countries in the world.

Currently, the research community provides estimates of SDG Indicator 4.c.5 through comparisons of teacher earnings with those of other workers for a variety of countries though the different methods and models limits comparability. A measure close to SDG Indicator 4.c.5 for public school teachers using currently collected data on statutory salaries of teachers with typical qualifications and 15 years' experience compared to professional earnings is possible; however, it is only available for 10 or 11 countries depending on level of education taught and the comparison is not based on education as the indicator specifies but rather skills used. Additional data collection and analysis would be required to develop comparable measures that adhere more strictly to the specification of SDG Indicator 4.c.5.

The role of UIS differs by source of data and modality for implementing additional data collection and analysis. The next steps for UIS leadership would be to conduct a consultation on the proposed measures, especially those derived from LFS data. For deriving a measure from LFS data, the UIS would need to decide which modality of data collection (or combination) to pursue. For deriving measures from administrative and statutory sources, the UIS would need to decide whether to pursue additional data collection, and for measures derived from international student assessments, the UIS would have to reach out to assessment programme administrators. Given the broad range of data-sources, the UIS would not just act as a data collector but would also need to leverage its convening power to ensure measurement of SDG Indicator 4.c.5.



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