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# UIS Workshop on Education Financing

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# Educational Finance Indicators



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# Indicators derived from UIS QB

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- Government expenditure on education as % of total government expenditure
- Government expenditure on education as % of GDP
- Expenditure on primary (secondary, tertiary) as % of expenditure on education
- Expenditure per pupil, per level (as % of GDP per capita, in PPP\$)
- Expenditure by nature: Share of spending on teacher salaries, other current expenditure, capital expenditure

# How does UIS derive indicators

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## 1. Public expenditure on education as % of total government expenditure

$$= \frac{\textit{Total expenditure on education from the government}}{\textit{Government expenditure from all sectors}}$$

## 2. Public expenditure on education as % of GDP

$$= \frac{\textit{Total expenditure on education from the government}}{\textit{Gross domestic product}}$$

- ✓ Total government expenditure from data reported to UIS or the IMF
- ✓ GDP data from the World Bank

# How does UIS derive indicators

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## 3. Educational expenditure in primary (secondary, tertiary, etc.) as % of total educational expenditure

$$= \frac{\textit{Government expenditure on an education level (ex. primary, secondary)}}{\textit{Government expenditure on education on all levels}}$$

## 4. Public expenditure per pupil as a % of GDP per capita

$$= \frac{\frac{\textit{Total expenditure on an education level (ex. primary, secondary)}}{\textit{Number of pupils in that level}}}{\textit{Gross domestic product per capita}}$$

- ✓ Expenditure on education as reported to UIS
- ✓ GDP per capita data from the World Bank



@ [UIS data centre](http://uis.unesco.org), download data to compare how your country performs compared to others in your region

The screenshot shows the UIS Data Centre website interface. The browser address bar displays <http://www.uis.unesco.org/DataCentre/Pages/BrowseEducation.aspx>. The page features a navigation menu on the left with categories like LITERACY, SCIENCE, TECHNOLOGY AND INNOVATION, CULTURE, COMMUNICATION AND INFORMATION, STATISTICAL CAPACITY BUILDING, DATA CENTRE, VIEW PROFILES, BROWSE BY THEME, CREATE A DATASET, DOCUMENT LIBRARY, UIS QUESTIONNAIRES, FACT SHEETS, GLOSSARY, and ABOUT UIS. The main content area is titled 'Key Tables' and lists various educational indicators under the 'Education' category, including 'Education (full dataset)', 'Out-of-school children', 'Entry', 'Participation', 'Progression', 'Completion', 'Literacy', 'Educational attainment', 'International student mobility in tertiary education', 'Human resources', 'Financial resources', 'Expenditure on education as % of GDP', 'Expenditure on education as % of total government expenditure (all sectors)', 'Expenditure by level of education', 'Expenditure by nature as % of total expenditure in public institutions', and 'Government expenditure per student'. A 'QUICK LINKS' section on the right provides access to a 'Guide to education statistics', 'Frequently Asked Questions about education statistics', and a 'Glossary'. A 'CUSTOM DATA' section offers a 'Create a dataset' link, and a 'CATALOGUES' section provides a link to 'View learning assessments catalogue'. Social media sharing icons for Facebook, Twitter, LinkedIn, and Pinterest are visible on the right side of the page. The Windows taskbar at the bottom shows the time as 6:34 PM.

# Salient points for policy making, based on Government expenditures

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- Indicators on government expenditure may suggest how important education is for a country – for example when comparing priority between countries.
- Indicators suggest relative importance of different levels compared to total education spending. For example, where the economy is expanding, higher/more technical level skills may be needed and more may have to be spent on secondary and post-secondary levels of education.
- Combined with private and international expenditures provides information on the relative contribution of the private sector (including households)



# Financing in Education 2030 agenda

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1. Education expenditures by pupil/student, education level and financing source
2. Average teacher salary relative to other professionals (requiring comparable level of training and qualification)
3. Percentage of total education expenditure borne by households
4. Percentage of total aid to education allocated to low-income countries
5. Number of higher education scholarships awarded by beneficiary country
6. Percentage of countries which have an explicit formula-based policy reallocating education resources to disadvantaged populations
7. Volume of official development assistance (ODA) flows for higher education scholarships by beneficiary country.

<http://www.uis.unesco.org/Education/Documents/tag-proposed-thematic-indicators-post2015-education-agenda.pdf>

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# Estimation of missing data

# Why imputation of missing data?

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**Key education finance indicators require availability of specific data per education level:**

- ✓ *Total expenditures in education and by source (Government, private, international)*
- ✓ *Number of teachers and mass salary*
- ✓ *Number of students*
- ✓ *Mass salary of non-teaching staff*
- ✓ *Cost for administrative services and capital expenditures, etc.*

➤ **All these data are not always readily available, hence the necessity to use estimates for the calculation of the indicators of interest through compensation procedures.**

# Compensation procedures

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Generally applied to micro data such as school census surveys data, households-based surveys data, etc where three different situations occur:

- i) non coverage:
  - ✓ weighting adjustments based on an external data source
- ii) total non-response
  - ✓ weighting adjustment
- iii) item non-response
  - ✓ Imputations, by assigning values for missing responses

# Somme imputation procedures

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Two classes of imputations (i. use of auxiliary variables, and ii. a randomization process is used in assigning imputed values:

1. Deductive imputation
2. Mean imputation overall
3. Random imputation overall
4. Mean imputation with classes
5. Random imputation with classes
6. Hot-deck imputation
7. Flexible matching imputation
8. Predicted regression imputation (Education sector review studies, estimates of number teachers in lower secondary and in upper secondary in countries where both cycles happen to be mixed or separate; using number of students as explanatory variable)
9. Random regression imputation
10. Distance function matching

# Splitting expenditure data by level (Use of auxiliary variables)

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## Four main choices:

1. Wage bill estimate (number of teachers + average salary by level and grade)
2. Number of teachers by level
3. Number of students by level
4. Based on already split expenditure

# Splitting spending by education levels

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## *In this order:*

### 1. Assign easy items

- Ex. if a Ministry is responsible for tertiary education, all of its expenditure can be allocated to tertiary education

### 2. Focus on largest expenditure item(s)—usually staff compensation

- If expenditure reports do not separate the teacher wage bill by education level, need to look at payroll and other HR documents to estimate

### 3. Use qualitative analysis of remaining programmes + where needed, help from enrolment data

- What does the programme do? Who benefits?

### 4. Remaining unallocated items (ex. general administration) can be split following already allocated proportions

# Splitting the wage bill

Splitting the wage bill based on teachers per level and average teacher salary

Available information	G1-6 (primary)	G7-9 (lower-secondary)	G10-12 (upper-secondary)	Total G1-12
Number of teachers by grades	100	80	50	230
Total salary expenditure in Ministry of Education	unknown	unknown	unknown	\$150,000
Average teacher salary	\$400	\$600	\$700	

Estimation				
Estimated salary mass per level	\$40,000	\$48,000	\$35,000	\$123,000
Estimated shares per level	33%	39%	28%	100%
Applying share per level to actual total salary mass	\$48,780	\$58,537	\$42,683	\$150,000

$$33\% \times \$150,000 = \$48,780$$

$$39\% \times \$150,000 = \$58,500$$

$$28\% \times \$150,000 = \$42,000$$

$$33\% \times (\$150,000 - \$123,000) + \$40,000 = \$48,910$$

$$39\% \times (\$150,000 - \$123,000) + \$48,000 = \$58,530$$

$$33\% \times (\$150,000 - \$123,000) + \$35,000 = \$43,910$$



# Using enrolment data

- Assumes unit/pupil costs are the same across levels, which is rarely true

	Primary	Lower-secondary	Upper-secondary	Total line-item
Available information	unknown	unknown	unknown	\$150,000
Estimation	\$65,217	\$52,174	\$32,609	\$150,000

	G1-6 (primary)	G7-9 (lower-secondary)	G10-12 (upper-secondary)	Total G1-12
Number of pupils by grades	100,000	80,000	50,000	230,000
Estimated resource allocation	43%	35%	22%	100%

$$43% * \$150,000 = \$ 65,217$$

# Allocation based on spending already allocated

- Good option when main items have already been split, and what is left is admin. costs, ministry, research, etc.

	Pre-primary	Primary	Lower-secondary	Upper-secondary	Post-secondary non-tertiary	Tertiary	Unknown/unallocated	Total
Expenditure	50	500	300	150	25	600	250	1875
Share of total expenditure	3%	27%	16%	8%	1%	32%	13%	
Share out of allocated expenditure	3%	31%	18%	9%	2%	37%		
Expenditure unknown/not allocated reallocated by ISCED	8	77	46	23	4	92	0	250
All expenditure reallocated by level	58	577	346	173	29	692	0	1875

$$31% * \$250 = \$77$$

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# Exercises

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**Thank you**  
[www.uis.unesco.org](http://www.uis.unesco.org)