



# GRADE

User guide – version 3.22.1 updated January 2026

Bernadette O'Hare, Stephen Hall and Stuart Murray

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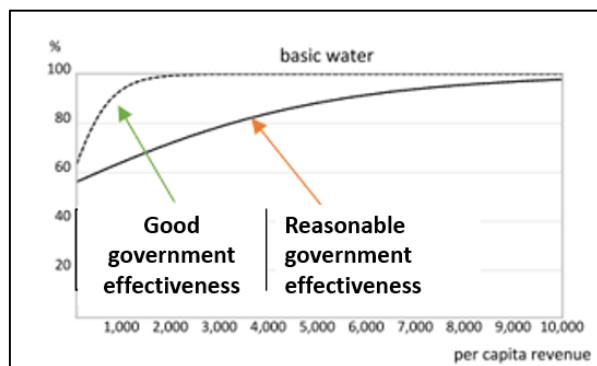
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## Introduction

Studies have shown that governments spend more on public services, such as schools and hospitals, when they have more revenue. The Government Revenue and Development Estimations (GRADE) allows the user to 'translate' the impact of an increase or decrease in government revenue on access to several Sustainable Development Goals (SDG) indicators in an individual country.

Research underpinning the GRADE tool models the effect of government revenue on SDG indicators, including basic and safe water, basic and safe sanitation, school attendance, number of teachers, child and maternal survival, access to electricity, safe fuels, and social protection. These indicators were selected because they are critical for economic and social development and are fundamental rights.<sup>1</sup> The data also indicate that governance indicators strongly affect the relationship between government revenue and SDG indicators, and that additional revenue has a much greater impact on well-governed countries (Figure 1).



**Figure 1 The effect of governance on the effectiveness of government spending**

GRADE employed unbalanced panel data modelling for 217 countries between 1996-2022. SDG indicators were expressed as percentages, ranging from 0 to 100. A linear relationship between revenue and these variables would not be appropriate because it would not respect these boundaries. We employ a logistic function as the correct specification for the model. In contrast, a standard panel logistic function would impose the same shape 'S' curve for all countries, which is inappropriate. **We augmented the logistic function parameters with measures of governance quality, which allowed each country to have a different 'S' shape as its government's quality varied.** Additional revenue has a much more significant impact in lower-income countries than in high- or upper-middle-income (higher-income) countries, and as per capita revenue increases, the possible gains decline rapidly.

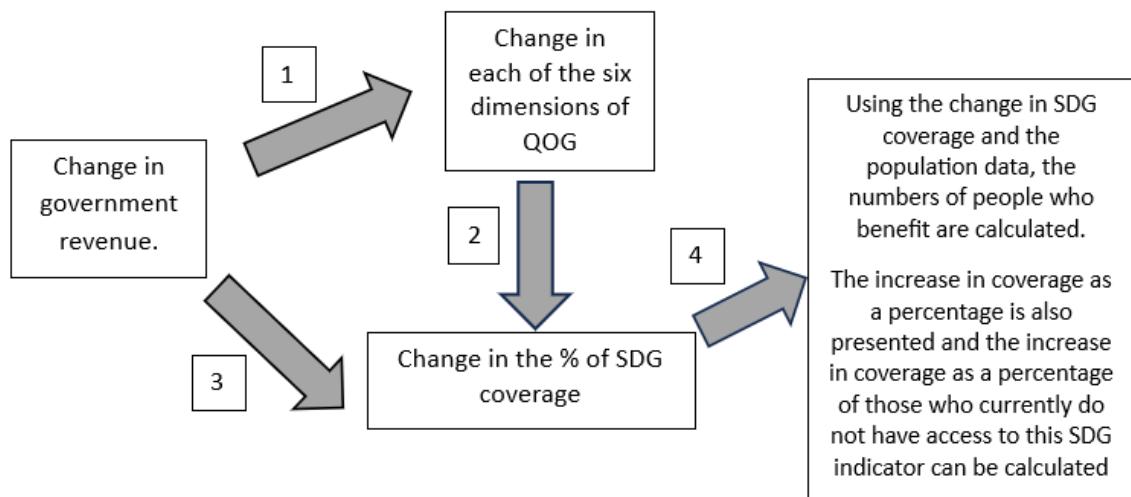
**However, governance indicators also respond to increased revenues.** We used two contrasting econometric methodologies to quantify the effects of an increase in government revenue per capita on governance quality indicators <sup>2</sup>. The results show that increasing government revenue significantly affects governance indicators, yielding a remarkably consistent picture over a ten-year horizon.

<sup>1</sup> The Impact of Government Revenue on the Achievement of the Sustainable Development Goals and the Amplification Potential of Good Governance. *Cent Eur J Econ Model Econom* 2022; **14**: 109-29. [The Impact of Government Revenue on the Achievement of the Sustainable Development Goals and the Amplification Potential of Good Governance](#)

<sup>2</sup> A Model to Explain the Impact of Government Revenue on the Quality of Governance and the SDGs <https://www.mdpi.com/2227-7099/11/4/108>

This effect was incorporated into the model and online visualisation (Figure 2). The critical insight gained is that there is important feedback from government revenue to governance and from governance to government revenue.

Over time, as governance improves, government revenue will increase, further improving governance and forming a critical virtuous cycle.



**Figure 2 Schematic diagram showing how changes in government revenue and governance impact SDG indicators in the GRADE online model.**

#### Frequently Asked Questions about the GRADE

##### Why do we use government revenue per capita?

The GRADE uses government revenue per capita rather than, say, health spending per capita for two reasons.

1. A better understanding of the relationship between government revenue per capita and SDG indicators is helpful because the policies and practices of other governments, multinational organisations, corporations and banks may influence government revenue. By contrast, international actors are less likely to influence government spending, except for the International Monetary Fund (IMF) and donors in highly aid-dependent countries.

**Therefore, the tool can be used to quantify the impact of the policies of one country or an intergovernmental organisation on SDG progress or human rights in another country.**

2. Government revenue per capita also reflects the ability of governments to spend across all sectors. Many studies have focused on only one aspect of social spending, such as health or education. However, sectors outside the health sector account for much of the increased survival rates in all countries. For example, spending on education increases maternal literacy, which is known to improve child survival.

## **Does GRADE assume that governments spend additional revenue on specific sectors?**

**No.** All governments allocate resources according to their national priorities and development plans. GRADE models the relationship between government revenue and SDG indicators and, therefore, assumes that governments will spend the same amount of additional revenue as they have in recent years. Additionally, health benefits and reductions in mortality are likely to result from increased spending in multiple sectors.

## **Do all countries benefit the same when revenue increases?**

**No.** A given amount of additional revenue does not increase access to SDG indicators or reduce survival rates in different countries by the same amount for each country. Governance indicators strongly affect the relationship between government revenue and SDG indicators. Additional revenue has a much greater impact on well-governed countries (Figure 1), where there is considerable scope for improvement in countries with low per-capita revenues.

The reasons for this are as follows.

1. In wealthy and high-income countries, the average government revenue per person is more than 100 times larger than that in low-income countries. Therefore, additional income in low-income countries is more significant. For example, in 2016, the average government revenue per person was \$80 in low-income countries, \$380 in lower-middle-income countries, \$1250 in upper-middle-income countries and \$12,750 in high-income countries. Thus, an additional 200 million in revenue in a low-income country with a population of 10 million will increase government revenue per capita by \$20, an increase of 25%. In comparison, in a high-income country, the average increase is 0.16 %. Thus, extra revenue will go much further in terms of access to services that contribute to health and ultimately save lives.
2. Gains are smaller at different stages of a country's developmental trajectory. The reason for this is that reducing high child mortality rates, for example, from 150 to 75 per 1000 live births, involves reducing more easily preventable deaths by, for example, ensuring that more people have access to clean water, sanitation, and primary healthcare. However, reducing child survival rates from 20 to 10 per 1000 live births involves reducing fewer preventable deaths and requires more advanced healthcare services.

## **Which Government Revenue per capita data does GRADE use?**

For the GRADE modelling, we used the Government Revenue (GR) data from the UNU WIDER Government Revenue Dataset (GRD)<sup>3</sup>, the most recent update (August 2023). The UNU WIDER GRD dataset includes general and central government revenue, and we used the former because the latter underestimates total revenue in fiscally decentralised states. In addition, data which include and exclude grants are available, and we used the total general government revenue, excluding grants, as this variable best reflects the capacity of domestic revenue. For the same reason, we used data that included social contributions to the model.

Where there was missing data for government revenue per capita, excluding grants and including social contributions, but there was data for excluding grants, excluding social contributions or including grants, excluding social contributions or including grants including social contributions, we used the differences between each year to interpolate from a known data point for government revenue per capita excluding grants, including social contributions.

Where there were data in the GRD on revenue we used WDI revenue/GDP

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<sup>3</sup> UNU WIDER Government Revenue Dataset ([GRD](#))

## Which source is used for the Gross Domestic Product?

The GRD expresses all data as a percentage of GDP in LCU, which we express as % GDP in constant 2015 USD, taken from the World Development Indicators (**last downloaded in June 2025 and last updated by WDI on 7<sup>th</sup> January 2025**) to produce a GR per capita in constant 2015 USD.

## How do we produce simulations up to 2050?

The latest data available for each SDG indicator and government revenue per capita were extended to 2050 to allow future simulations.

These **extensions were carried out in a purely mechanical way** by extrapolating the data using half the growth rate over the last five years of actual data. We have halved the growth rate, as in many cases, the last five years of actual data exhibit an abnormal growth rate.

These extended data **should not be considered a forecast of what will happen in each country** in the future. These are simply provided to facilitate simulations over the future period.

In a linear model, the simulation effect will be unchanged by the base values; the GRADE model is not linear, but the simulation effects will still be very similar for different bases.

## Which currency does GRADE use?

The model uses constant 2015 USD; therefore, if additional revenue is input, it should be converted to 2015 USD. There is a tool on the website which allows deflation, adapted from FRED <sup>4</sup>.

## Which source is used for SDGs?

These data were obtained from the World Development Indicators<sup>5</sup>.

## What sources are used as governance indicators?

GRADE uses the [Worldwide Governance Indicators](#)

## After an increase in revenue, when do benefits accrue?

There is a lag period after an increase in revenue, however increased government revenue significantly affects the governance indicators and yields a remarkably consistent picture over a ten-year horizon<sup>6</sup>. This effect was incorporated into the model.

Note: The online visualisation shows the long-run effect of additional revenue on governance instantaneously.

## Where can the data used in these models be obtained?

At the bottom of the visualisation, select 'advanced', and there is a button to download the data in either CSV or Excel. The Excel sheet also contains notes on these data.

## Could additional revenue negatively impact progress toward the SDGs?

In a handful of countries, for a few indicators (usually basic water and sanitation), additional revenue yields negative results. This is not a problem with the modelling but is coming out of the data and indicates that governance needs to improve in addition to revenue. Each SDG indicator is estimated separately and therefore fits the data in its own way. Where governance is poor, some indicators may have a negative effect and others a positive effect. This was determined using historical data.

<sup>4</sup> <https://fred.stlouisfed.org/series/GDP/>

<sup>5</sup> [World Development Indicators](#)

<sup>6</sup> A Model to Explain the Impact of Government Revenue on the Quality of Governance and the SDGs  
<https://www.mdpi.com/2227-7099/11/4/108>

### If there is additional revenue, does it impact all SDGs?

**Yes.** Additional revenue impacts all SDGs differently in each country, depending on the country's priorities and its level of development. Thus, SDGs which are not modelled in GRADE will also (generally) improve with additional revenue and will impact outcomes such as child and maternal survival. For example, improved roads can improve accessibility to healthcare.

### Why do these estimates fluctuate over time?

Government revenue per capita, governance quality, and population vary between years; therefore, the estimates differ over time.

### What is the 'best' estimate for each SDG indicator?

This depends on **the indicator** and **the number of years** with available data, or if you plan to use the data from a single year and assume it is the same over several years, that is, you wish to project it over several years.

#### 1. The indicator (Table 1)

When data on revenue changes are available across several years, both cumulative and single-year estimates may be presented, depending on the indicator. For example, cumulative or single-year figures may be used for the number of additional children who survive

If only one year is selected, the final year is preferred because it captures the maximum projected impact of improved governance and service coverage.

Note that in countries where the intervention coverage nears 100%, the number of new beneficiaries may decline in the latter years of the projection period due to saturation effects, and this should be noted in the reporting.

**Table 1. Presenting the indicators**

Indicator	Presenting for one year/annual impact	Presenting the impact over more than one year
Under-5 deaths averted	The number of averted deaths in one year	The total number of averted deaths over x years
Maternal deaths averted	The number of averted deaths in one year	The total number of averted deaths over x years
Children <5 who no longer experience stunting	The number of additional children who are not stunted in one year	The cumulative number of children who are not stunted (multiplying the number of children who are not stunted by the number of years) over x years
Additional hospital beds	The number of additional hospital beds in one year	Present the number in the final year
Additional nurses	The number of additional nurses in one year	The cumulative number of additional nurse years over x years
People with increased access to social protection	The number of people with access to social protection in one year	The cumulative number of people who have access to social protection over x years
Additional children in upper secondary education	The number of additional children attending school in one year	The cumulative number of additional child school years (multiplying the number of additional children in primary school in one year by the number of years) over x years
Additional children in lower secondary education	The number of additional children attending school in one year	The cumulative number of additional child school years (multiplying the number of additional children in lower secondary school in one year by the number of years) over x years

Additional children in primary education	The number of additional children attending school in one year	The cumulative number of additional child school years (multiplying the number of additional children in upper secondary school in one year by the number of years) over x years
Additional upper-school teachers (number)	The number of additional teachers in one year	The cumulative number of additional teacher school years (multiplying the number of additional teachers in school in one year by the number of years) over x years
Additional lower-school teachers (number)	The number of additional teachers in one year	The cumulative number of additional teacher school years (multiplying the number of additional teachers in school in one year by the number of years) over x years
Additional primary-school teachers (number)	The number of additional teachers in one year	The cumulative number of additional teacher school years (multiplying the number of additional teachers in school in one year by the number of years) over x years
People with increased access to electricity	The number of additional people with access to electricity in one year	Present the number in the final year
People with increased access to basic water	The number of additional people with access to basic water in one year	Present the number in the final year
People with increased access to basic sanitation	The number of additional people with access to basic sanitation in one year	Present the number in the final year
People with increased access to clean fuels	The number of additional people with access to clean fuels in one year	Present the number in the final year

### Where can I find the code used to drive the Web tool?

The source code is freely available on GitHub at <https://github.com/stuwilmur/GRADE-DOH>.

### How can I use the model in my software or calculations?

The current webtool does not expose an API, and the code which drives it is not specifically designed for repurposing. To overcome this, a new version of the model was developed which is designed to be freely reused by developers and those wishing to perform calculations. It is freely available as a pair of npm packages.

- grade-doh-model: packages the model calculations: <https://www.npmjs.com/package/grade-doh-model>
- grade-doh-data: bundles the base data: <https://www.npmjs.com/package/grade-doh-data>

Note that newer versions of the model may produce results which differ slightly from the older versions owing to differences in the precision of the model equation constants used and changes in the data from the WDI. The GitHub repositories for both packages are publicly available at

<https://github.com/stuwilmur/GRADE-DOH-model> and <https://github.com/stuwilmur/GRADE-DOH-data>.

See the following resources to begin with the model:

- JSFiddle example, showing the model and data being imported from a CDN: <https://jsfiddle.net/5732nc8y/3/>
- Grade-doh-model user guide on Observable: <https://observablehq.com/@grade/model-user-guide>

- a simple example Notebook in Observable, to show the package being used to perform largely the same tasks as the webtool, with relative ease: <https://observablehq.com/@grade/calculator-tool>.

### **Who funded the research underpinning GRADE?**

The GRADE project is supported by the University of St Andrews, Scottish Funding Council, Global Challenges Research Fund, Professor Sonia Buist Global Child Health Research Fund, and Medical Research Council Impact Acceleration Account (MRC IAA).

## Using the GRADE Model – a step-by-step guide

On the [GRADE](#) homepage<sup>7</sup>, select the tab, called Model.

# The GRADE Tools

As government revenue increases, the percentage of people with access to the Sustainable Development Goals (SDGs) / fundamental rights increases, by country. See our tools, which can be accessed by clicking on the images.

**Guides for using the GRADE tool**

See [Frequently Asked Questions and User Guide](#)  
[Ask ChatGPT - GRADE Model Guide](#)  
Watch the video - What if ... [The government of Angola had additional revenue equivalent to debt service in 2020](#) (3 min)

**Future Projections**

Effects for multiple indicators  
Angola: final effects in 2030

Indicator	Value (%)
Child & Family services	100
Universal primary & lower secondary education, both sexes, total	97
Universal primary & lower secondary education, both sexes, female	97
Universal primary & lower secondary education, both sexes, male	97
National primary & lower secondary education, both sexes, total	92
Share in GNI from foreign governments	22
People with increased access to health care	100
People with increased access to basic water	95
People with increased access to basic sanitation	95
People with increased access to basic electricity	95

To use, click on the graph. These tools can be used for single- and multi-country analysis. Input using the panels on the left side of the screen.

The following **five panels** will be used

1. **Country**
2. **Revenue**
3. **Effect of governance**
4. **Projection period**
5. **Outcome**

## Conducting a single country analysis

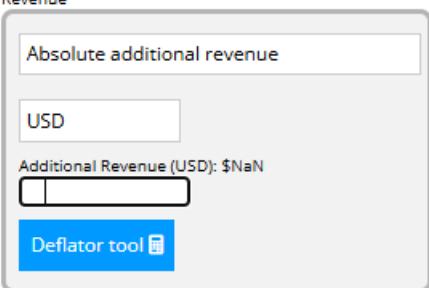
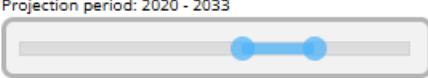
**Panel 1: Country**

Country  
Select from the list or click the map  
(Click oceans to reset the view)  
Angola

Select the country of interest from the drop-down list.

**Panel 2: Revenue**

<sup>7</sup> GRADE <https://medicine.st-andrews.ac.uk/grade/>

	<p>Estimates of additional revenue can be entered from the drop down in any of the following ways. GRADE uses constant 2015 USD. (see below)</p> <ol style="list-style-type: none"> <li>1. Absolute additional revenue in USD, Millions of USD, or Billions of 2015 USD</li> <li>2. Additional revenue per capita in 2015 USD</li> <li>3. Increase as a percentage of government revenue per capita.</li> <li>4. Upload as a CSV file is most useful if carrying out a multiple-country analysis, see below) but also useful if analysing data for a single country that varies with time (e.g. debt service).</li> <li>5. Estimates expressed in current USD should be converted to constant 2015 USD to allow for comparability over time. This can be done using an appropriate deflator tool. The <a href="#">deflator tool</a> can be used for this.</li> </ol>						
<p><b>Angola</b></p> <p>Projection for 2020 - 2020</p> <p>2020</p> <table> <tr> <td>Current Gov. rev. per capita:</td> <td>\$491.1</td> </tr> <tr> <td>New Gov. rev. per capita:</td> <td>\$494.09</td> </tr> <tr> <td>Increase in Gov. rev. per capita:</td> <td>0.61%</td> </tr> </table>	Current Gov. rev. per capita:	\$491.1	New Gov. rev. per capita:	\$494.09	Increase in Gov. rev. per capita:	0.61%	<p>The tool can also be used to calculate the <b>percentage increase in government revenue per capita by inputting the absolute amount</b> and selecting the year when there was this increase – the panel will show this as a percentage.</p>
Current Gov. rev. per capita:	\$491.1						
New Gov. rev. per capita:	\$494.09						
Increase in Gov. rev. per capita:	0.61%						
<p><b>Panel 3: The effect of governance</b></p> <p>Effect of governance</p> <ul style="list-style-type: none"> <li>Impact of revenue</li> <li><input checked="" type="radio"/> Impact of governance and revenue combined</li> </ul>	<p>This panel was reinstated in the 3.22.1 version to allow users to isolate the impacts of additional revenue on governance. However, for most purposes, it is recommended to select the <b>'impact of governance and revenue combined'</b>. This setting captures the full effect of additional revenue, including its influence on governance and subsequent outcomes on the SDGs (corresponding to step 1,2 and 3 in figure 2). To isolate the impact of revenue alone, (corresponding to step 3 in figure 2), select the <b>'impact of revenue'</b>.</p>						
<p><b>Panel 4: Projection period</b></p>							
<p>Projection period: 2020 - 2033</p>  <p>If estimates are available for only a single year, but the associated losses or gains in government revenue are expected to occur over multiple years (e.g., from tax abuse), these can be projected over several years.</p>	<p>Adjust the start and end slider buttons according to the years when data is available.</p>						

If the losses/gains vary a lot between years (for example debt service) these can be uploaded as a CSV file and downloaded in excel, by selecting Advanced → Multiple country projection → the country

Country

Select from the list or click the map  
(Click oceans to reset the view)

Revenue

Use CSV file

**Upload revenue CSV**

My revenue data is specified as:

Absolute additional revenue

Advanced

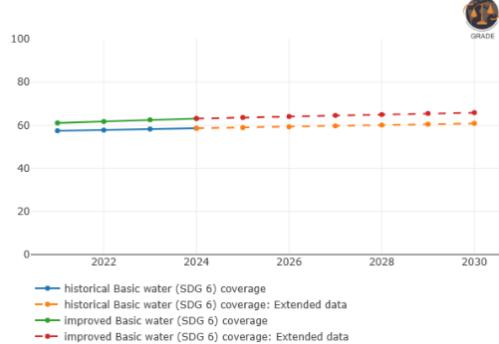
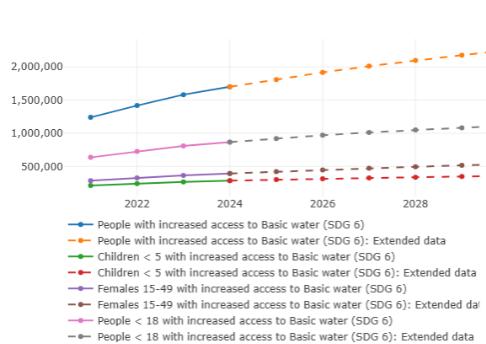
Multiple-country projection

Countries to project and export

**Download projection data** Clear all

## Panel 5: Outcome

<p>Outcome</p> <div style="border: 1px solid #ccc; padding: 5px; width: 100%; height: 30px; margin-bottom: 10px;"></div> <p>The projection: This appears on the panel on the right and can be plotted as the population numbers or as percentage coverage results. Use the radio button to toggle the plot between the population results and the coverage in percent. Estimations based on WDI data appear as solid lines. Estimations based on projections appear as dashed lines.</p>	<p>Select the outcome or SDG indicator of interest.</p>
	<p>The plot can be <a href="#">downloaded</a> as a PNG file, or the data can be downloaded as an excel file, which also includes the governance data.</p>



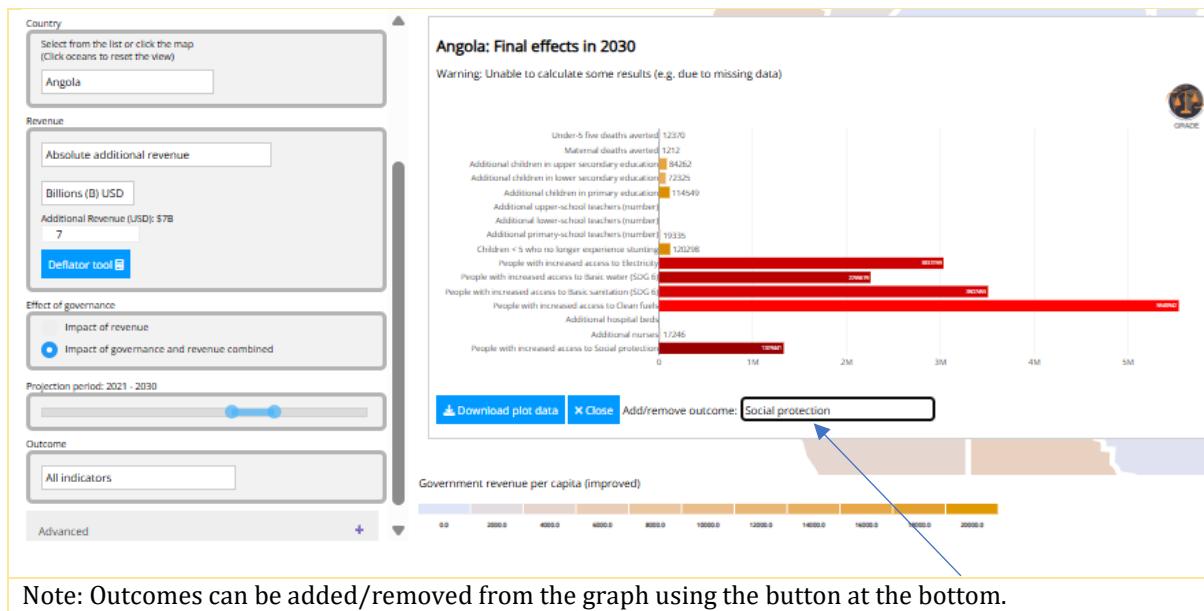
## Population results

## Coverage results

### Multiple outcomes for one country

<p>Outcome</p> <div style="border: 1px solid #ccc; padding: 5px; width: 100%; height: 30px; margin-bottom: 10px;"></div> <p><b>Multiple indicators</b></p>	<p>For multiple outcomes for one country, select multiple outcomes in the outcomes panel (first one on the dropdown).</p>
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The projection will appear in the panel on the right; see below for an example from Angola. The graph shows the number of people who will benefit in the final year.



Note: Outcomes can be added/removed from the graph using the button at the bottom.

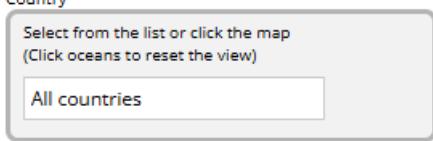
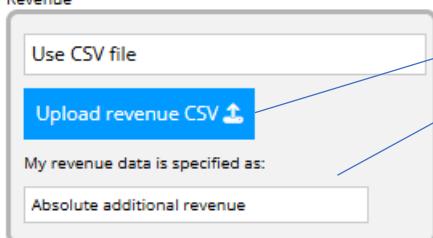
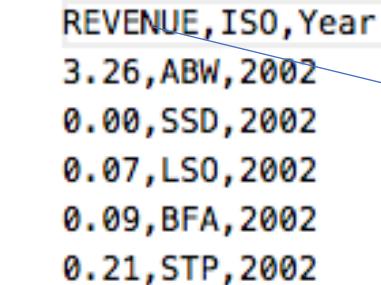
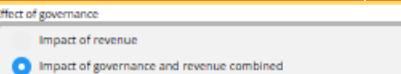
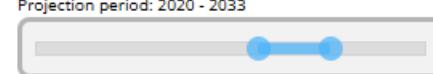
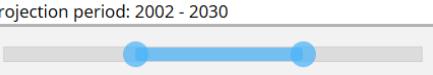
**To present the cumulative numbers (Table 1), for multiple outcomes for one country.**

Select the **Download plot data** button for the data in an Excel spreadsheet for each indicator.

Next to the absolute number, the proportion of those who do not have access to this SDG/human right is available for each of the indicators. The Additional Government Revenue required to save each child's life is available.

Under-5 five deaths averted	Cost per under-5 life saved	Proportion of under- 5 children who do not survive	Additional Proportion of those in upper secondary education	Additional Proportion of those in lower secondary education	Additional Proportion of those not have access to Upper- secondary school attendanc e	Additional Proportion of those in primary education	Additional Proportion of those who do not have experience stunting	Additional Proportion of those who are stunted	Reduction in stunting with increased access to Electricity	People with increased access to Basic water (SDG 6)	Proportion of those who do not have access to Basic water (SDG 6)	People with increased access to Basic sanitation (SDG 6)	Proportion of those who do not have access to Basic sanitation (SDG 6)	People with increased access to Clean fuels	Proportion of those who do not have access to Clean fuels			
12208	638467.6	0.138185	90355	0.075883	80402	0.08738	132798	0.174191	137050	-0.04264	3679003	0.197968	2145698	0.121266	3065760	0.154202	6063648	0.284981

## Conducting a multi-country analysis

<b>Panel 1: Country</b>	
	Country panel: select 'All countries' from the drop-down list.
<b>Panel 2: Revenue</b>	
	<p>Select 'Use CSV file' and select the blue <b>Upload revenue CSV</b> button.</p> <p>Indicate how the revenue is specified: This can be</p> <ol style="list-style-type: none"> <li>absolute additional revenue in 2015 USD,</li> <li>additional revenue per capita in 2015 USD or</li> <li>increased revenue as a percentage of government revenue</li> </ol>
	<p>Upload data for multiple countries as a CSV file in the format shown on the left.</p> <p>Column 1 'REVENUE' (indicating how the revenue is specified).</p> <p>Column 2 "ISO" detailing the country's ISO-3 code.</p> <p>Column 3 "YEAR" listing the year in which the increase in revenue began.</p>
<b>Panel 2: Effect of governance</b>	
	Generally, select ' <b>the impact of governance and revenue combined</b> '
<b>Panel 4: Projection period</b>	
	Adjust the start and end slider buttons according to the years when data is available.
	Projection period: Adjust the start to coincide with the CSV file and end slider to coincide with the period of interest

If estimates are available for only a single year, but the associated losses or gains in government revenue are expected to occur over multiple years (e.g., from tax abuse), these can be projected over, for example ten years. Projecting revenue changes over time allows for the impact of the increase in revenue on governance indicators, and therefore on development outcomes.

## Panel 5: Multi-country Outcome

### Single outcome

Outcome	<input type="text" value="Basic water (SDG 6)"/>	Select the outcome or SDG indicator of interest.
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### Multiple outcomes

Outcome	<input type="text" value="All indicators"/>	Choose all indicators
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Advanced	<input type="button" value="+"/>	Select the advanced button
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Advanced	<input type="button" value="-"/>	After selecting the advanced button, a drop down will appear, here select the <b>Multiple-country projection</b>
Multiple-country projection	<input type="button" value="+"/>	
Governance quality	<input type="button" value="+"/>	
Target SDG	<input type="button" value="+"/>	
Data sources	<input type="button" value="+"/>	

Countries to project and export	<input type="text" value="All countries"/> <input type="button" value="X All"/> <input type="button" value="Download projection data"/> <input type="button" value="Clear all"/>	Here select the <b>Download projection data</b> button download projection data – expect a very large dataset!
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## Other options in Advanced

### The Advanced button

Advanced	<input type="button" value="-"/>	The governance quality button allows for the tweaking of governance indicators to demonstrate the impact of a change in governance on outcomes. This option can be used if the impact of revenue only has been selected in Panel 2.
Multiple-country projection	<input type="button" value="+"/>	
Governance quality	<input type="button" value="+"/>	
Target SDG	<input type="button" value="+"/>	
Data sources	<input type="button" value="+"/>	

	<p>The Target SDGs button allows estimates of the cost of increasing the coverage of the SDG indicators in individual countries.</p> <p>The Data sources button allows download of the population data and government revenue data used in GRADE and if excel is downloaded there is a sheet with information outlining updates and sources of data.</p>
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## Appendix:

### Econometric Research underpinning GRADE model

Hall, S. G., & O'Hare, B. (2025) A Model of the Impact of Government Revenue and Quality of Governance on the Pupil/Teacher Ratio for Every Country in the World. *Econometrics*, 13(4), 46. <https://doi.org/10.3390/econometrics13040046>

Hall, S. G., & O'Hare, B. (2025) A Model of the Impact of Government Revenue and the Quality of Governance on Electricity and Clean Fuel Use. *Economies*, 13(6). <https://doi.org/10.3390/economies13060148>

Hall, S. G., & O'Hare, B. (2024) A model of the impact of government revenue and quality of governance on schooling. *International Journal of Educational Development*, 108. <https://doi.org/10.1016/j.ijedudev.2024.103055>

Hall, S., & O'Hare, B. (2023) A Model to Explain the Impact of Government Revenue on the Quality of Governance and the SDGs. *Economies*, 11(4). <https://doi.org/10.3390/economies11040108>

Hall, S., Lopez, M., Murray, S., & O'Hare, B. (2022) Government revenue, quality of governance and child and maternal survival. *Applied Economics Letters*, 29(16), 1541–1546. <https://doi.org/10.1080/13504851.2021.1963408>

Hall, S. G., & O'Hare, B. (2022) A model to explain the impact of government revenue on the quality of governance and the SDGs (WIDER Working Paper, Vol. 2022). UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2022/236-2>

O'Hare, B., & Hall, S. G. (2022) The Impact of Government Revenue on the Achievement of the Sustainable Development Goals and the Amplification Potential of Good Governance. *Central European Journal of Economic Modelling and Econometrics*, 14(2), 109–129. <https://doi.org/10.24425/cejeme.2022.142627>

Hall, S., Illian, J., Makuta, I., McNabb, K., Murray, S., O'Hare, B. A. M., Python, A., Zaidi, S. H. A., & Bar-Zeev, N. (2021) Government Revenue and Child and Maternal Mortality. *Open Economies Review*, 32(1), 213–229. <https://doi.org/10.1007/s11079-020-09597-0>

## Uses of the GRADE tool

1. Alex Maitland, OXFAM - [How much have billionaires made during Davos this week?](#)
2. OXFAM - [The Billionaire wealth tracker](#)
3. Global Initiative on Economic and Social rights (2025) [Prioritising People in Fiscal Policy: Challenging Austerity, Reclaiming Public Services and Upholding Human Rights in Kenya](#)
4. Global Initiative on Economic and Social rights (2025) [Prioritising People in Fiscal Policy: Challenging Austerity, Reclaiming Public Services and Upholding Human Rights in Ghana](#)
5. [Open Letter to Ministers of Finance and Governors of Central Banks, the Governors and Alternate Governors of the World Bank Group and International Monetary Fund, and the Leaders of the International Financial Institutions](#) (Used ACETs [Reforming the Global Architecture data](#))
6. African Centre for Economic Transformation (ACET) [Reforming the Global Architecture](#)
7. [T20 Policy Brief South Africa 2025 – The Potential for SDRs and Reducing Outflows on SDG Progress](#)
8. [Weathering the storm: poverty, climate change and social protection](#): Report of the Special Rapporteur on extreme poverty and human rights, Olivier De Schutter
9. [Financing Social Protection Floors: Contribution of the Special Rapporteur to Financing for Development 2025](#)
10. [An assessment of the impact of gaps in global governance on children's rights in Malawi in the context of the climate emergency](#) Submission to CESCR – International Covenant on Economic, Social and Cultural Rights 76 Session (Sep. 2024)
11. An analysis of the impact of debt service on human rights – [GRADE DEBT Briefs](#) (August 2024)
12. Debt Justice – [The Real Debt Crisis A Decade of Austerity](#)
13. [Financing Child Rights in Malawi](#) BMC Public Health (Peer-reviewed)
14. [Joint Submission to the UN Independent Expert on Foreign Debt – Current challenges to financing for development, including education.](#)
15. Submission to [the Universal Periodic Review of the United Kingdom and Northern Ireland](#) to highlight the cross-border impact of the UK's tax policies.
16. Submission to the [Special Rapporteur on the Right to Education](#).
17. [Using Tax systems and policy: Crucial for good health and good governance](#) A briefing Paper from the United Nations University International Institute for Global Health
18. [Profit shifting from Nigeria to Europe: The impact on human rights](#) *PLOS Global Public Health* (Peer Reviewed)
19. [The Principles of Tax Justice and the Climate Crisis in Africa's Resource-Rich Nations](#)
20. [Over 18 million girls missing school in Africa as continent loses USD29 billion in education funding through flawed taxation](#)
21. [Breaking out of the Bubble to Transform Education Financing](#)
22. [Joint Civil Society submission in respect of the CERDs review of the UK](#)
23. [Litany of failure: the OECD's stewardship of international taxation](#)
24. [Tax Expenditure and the Sustainable Development Goals](#) *Sustainable Development* (Peer-reviewed)
25. [How can corporate taxes contribute to sub-Saharan Africa's Sustainable Development Goals \(SDGs\)? A case study of Vodafone](#) *Globalization and Health 2023*. (Peer Reviewed)

26. [Submission to the UN Secretary-General Tax Report 2023: Promotion of inclusive and effective tax cooperation at the United Nations](#)
27. [Universities of St Andrews and Leicester – Input to the 2023 UN Tax Report.](#)
28. [Tax Abuse – The Potential for the Sustainable Development Goals](#) *PLOS Glob Public Health* 2022. (Peer-reviewed)
29. [Tax Justice & Human Rights: The 4 Rs and the realisation of rights.](#)
30. [UN calls on Netherlands to account for tax policy impact on child rights.](#)
31. **Second submission** to the UNCRC on [Ireland's Responsibility for the Impacts of Cross-border Tax Abuse on the Realisation of Children's Economic, Social and Cultural Rights](#) by a coalition of advocacy organisations using [new GRADE evidence](#) in 2022
32. **First submission** to the UNCRC on [Ireland's Responsibility for the Impacts of Cross Border Tax Abuse on the Realisation of Children's](#) Economic, Social and Cultural Rights by a coalition of advocacy organisations in 2020
33. [Submission](#) to the Independent Expert on Foreign Debt by the Tax and Education Alliance, the Tax Justice Network, the Global Alliance for Tax Justice, Action Aid, and the Global Campaign for Education and Education International.

Definitions for the SDGs used in GRADE <sup>8</sup>

**Basic drinking water services:** the percentage of the population drinking water from an improved source, provided that the collection time is not more than 30 minutes for a round trip. This indicator encompasses both people who use basic drinking water and those who use safely managed drinking water. Improved water sources include piped water, boreholes or tube wells, protected dug wells, protected springs, and packaged or delivered water.

**Safely managed drinking water services:** the percentage of the population using drinking water from an improved source accessible on-premises, available when needed, and free from faecal and priority chemical contamination.

**Basic sanitation services:** The population using at least improved sanitation facilities not shared with other households. This indicator encompasses both people who use basic sanitation services and those who use safely managed sanitation services. Improved sanitation facilities include flush/pour flush to piped sewer systems, septic tanks, pit latrines, ventilated improved pit latrines, composting toilets, or pit latrines with slabs.

**Safely managed sanitation services:** the population using improved sanitation facilities that are not shared with other households and where excreta are safely disposed of in situ or transported and treated offsite. Improved sanitation facilities include flush/pour flush to piped sewer systems, septic tanks, pit latrines, ventilated improved pit latrines, composting toilets, or pit latrines with slabs.

## Education

**School attendance** – Here, we use UNESCO<sup>9</sup> estimates of out-of-school rates for primary, lower, and upper secondary schools to model the impact of government revenue and governance on in-school rates or school attendance. To estimate the number of children who would benefit from an increase in government revenue, we used the percentage change at each level of education and multiplied this by the school-age population for that level <sup>10</sup>.

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<sup>8</sup> The World Bank. [World Bank Open Data | Data](#)

<sup>9</sup> UNESCO Out of School rates <https://education-estimates.org/out-of-school/data/>

<sup>10</sup> UIS School age population <http://data.uis.unesco.org/index.aspx?queryid=3847>

## The Worldwide Governance Indicators

The WGI reports aggregate and individual governance indicators for over 200 countries and territories since 1996 for six governance dimensions (see Table 1). These are composite indicators based on more than 30 data sources. First, individual questions from the underlying sources were assigned to one of the aggregate indicators. The compilers then rescale the data to make them comparable across sources using an unobserved component model. The resulting composite measures are units of a standard normal distribution with a mean of zero, ranging from -2.5 to +2.5, and higher values correspond to better governance <sup>11</sup>.

**Table 1: Definitions of dimensions of Quality of Governance Worldwide Governance Indicators**

Dimension of Governance	What it captures
Control of corruption	Perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests
Government effectiveness	Perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies
Political stability	Perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism
Regulatory quality	Perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development
The rule of law	Perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence
Voice and accountability	Perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media

<sup>11</sup>The Worldwide Governance Indicators <https://www.worldbank.org/en/publication/worldwide-governance-indicators>