

Alternative uses of pre-tax fossil-fuel subsidies per year



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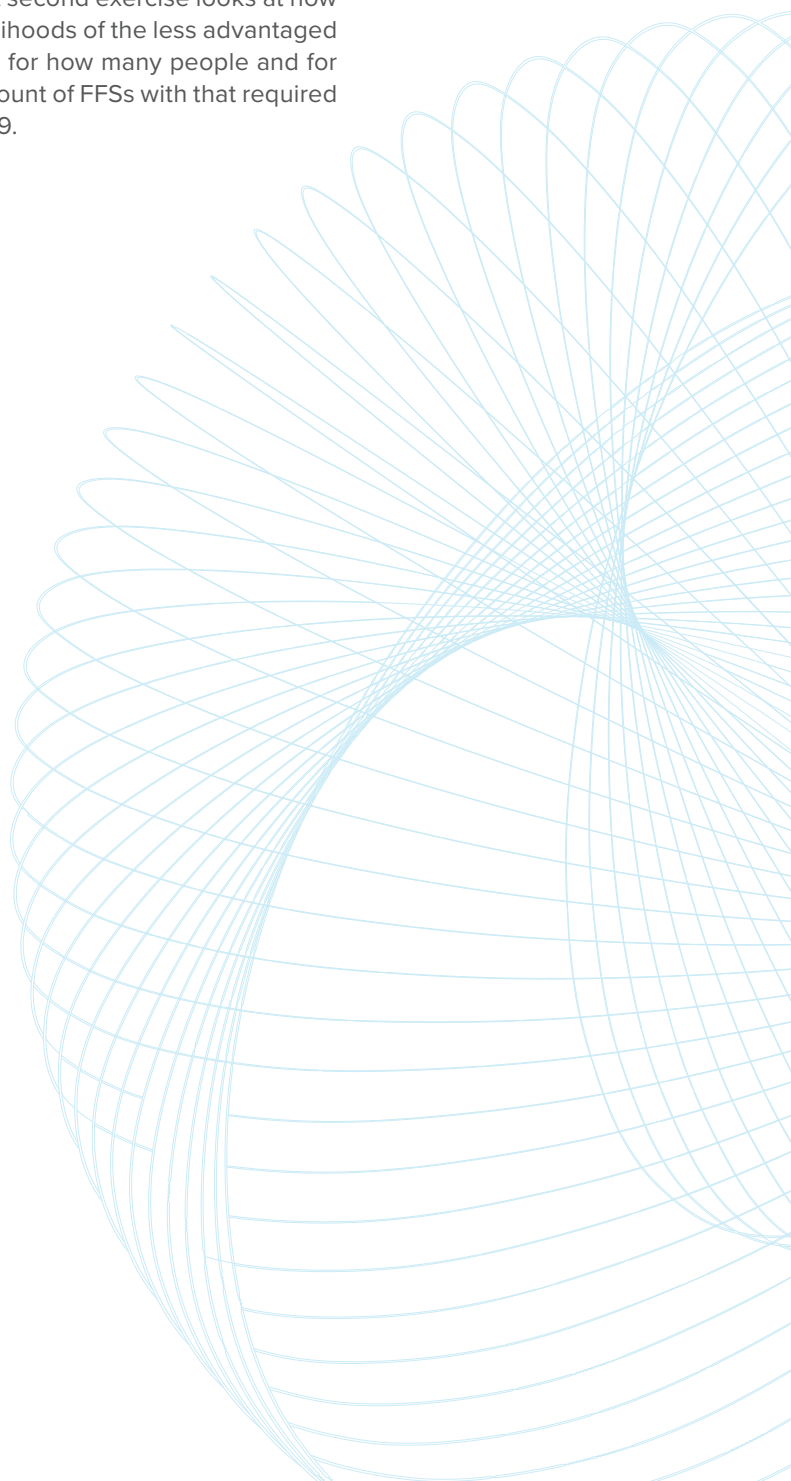
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SUMMARY

This note performs a series of arithmetic comparisons of the estimated global amount of pre-tax fossil-fuel subsidies (FFSs) distributed per year to offer an understanding of what they cost across the developing world. These comparisons illustrate hypothetical alternative uses only, regardless of where the FFSs operate, and they do not suggest any specific policy recommendation or address any political and distributive challenges caused by removing or repurposing FFSs in any country. A first exercise focuses on what is often termed ‘poverty eradication’, which consists of lifting the current incomes of the poor population up to at least the value of the corresponding poverty line. A second exercise looks at how much of basic economic security to protect the livelihoods of the less advantaged groups during the COVID-19 crisis FFSs could pay, for how many people and for how long. Finally, a third exercise compares the amount of FFSs with that required to inoculate the global population against COVID-19.



LIST OF ACRONYMS

| | |
|-------|--|
| EAP | East Asia and Pacific |
| ECA | Europe and Central Asia |
| FFSs | Fossil fuel subsidies |
| GDP | Gross Domestic Product |
| HICs | High-income countries |
| IEA | International Energy Agency |
| IMF | International Monetary Fund |
| LAC | Latin America and the Caribbean |
| LICs | Low-income countries |
| LMICs | Lower-middle-income countries |
| MENA | Middle East and North Africa |
| OECD | Organisation for Economic Co-operation and Development |
| PPP | Purchasing power parity |
| SAS | South Asia |
| SSA | Sub-Saharan Africa |
| TBI | Temporary basic income |
| UMICs | Upper-middle-income countries |

1. HOW LARGE ARE FOSSIL-FUEL SUBSIDIES WORLDWIDE?

Fossil fuel subsidies (FFSs) cover policies that support the production or consumption of fossil fuels through either direct transfers or induced transfers in the form of price support. Consumer subsidies comprise pre-tax and post-tax subsidies. Pre-tax subsidies allow consumers to pay prices (P) below the supply costs (S), i.e., $P < S$, whereas post-tax subsidies occur when prices are below the total of supply costs, plus the cost for fossil fuels' contribution to global warming, local air pollution and other externalities (E), plus the corresponding consumption tax (C), i.e., $P < (S + E + C)$.

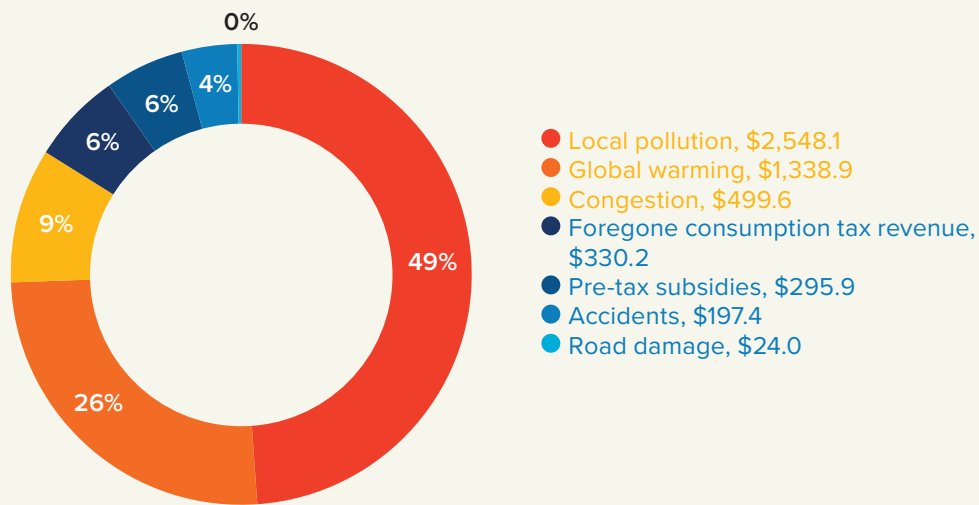
Focusing on post-tax subsidies, the International Monetary Fund (IMF) estimated a global amount of around US\$5.2 trillion in 2017, equivalent to 6.5 percent of the global GDP that year—the largest contributors being (China \$1.8 trillion), US (\$677 billion), Russia (\$573 billion), India (\$239 billion) and Japan (\$179 billion).¹ The global amount is broken down into its main components in Figure 1, revealing that local externalities account for the lion's share of post-tax FFSs: 49 percent is accounted for by under-taxed local air pollution damages; 26 percent by untaxed contributions to global warming; about 13 percent by broader vehicle externalities, including congestion, accidents and road damages; 6 percent by foregone consumption tax; and 6 percent by undercharging for supply costs (i.e., pre-tax subsidies).

This latter component, pre-tax FFSs subsidies, amounted in 2017 to almost \$300 billion, or 0.4 percent of global GDP, according to the IMF (with Iran, China, Russia, Saudi Arabia and Indonesia as the largest contributors), and it is close to the amount estimated for that year by the International Energy Agency (IEA) (Figure 2).² According to the IEA, the amount of pre-tax FFSs in 2017 is among the lowest during the period 2010–2019, which saw a decline from an average estimate of around \$500 billion in the first half of the 2010s; yet, this decline is partially the result of year-to-year volatility in fuel prices rather than of a deliberate effort to withdraw subsidies gradually.

1 The [IMF country-level energy subsidy estimates](#) cover 193 countries, and are the available source with the largest coverage. The IMF methodology consists of a price-gap approach to calculate pre-tax subsidies by multiplying current fuel consumption by the difference between supply and consumer prices. Post-tax subsidies are then estimated using different sources and methodologies to assess global warming damages, air pollution damages and broader vehicle externalities. Producer subsidies are lumped into pre-tax subsidies, although they are relatively small.

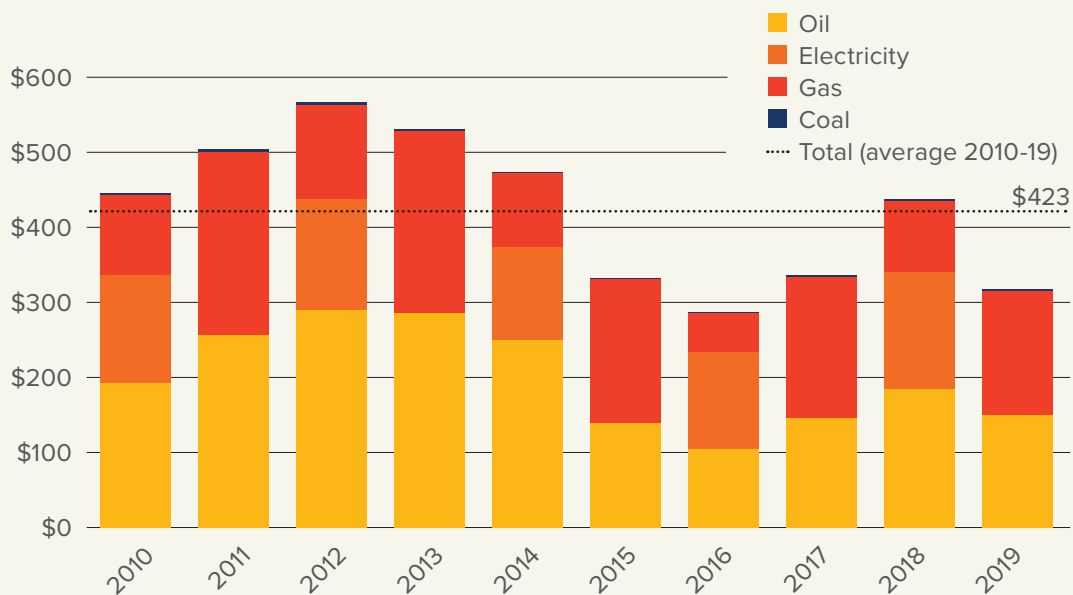
2 The estimates by IEA are limited to fossil-fuel consumption subsidies following the price-gap approach and covering 41 countries that account for half of the worldwide energy consumption. A third important source of data on FFSs is that gathered by the OECD, which covers 43 countries and uses an inventory approach that includes consumer subsidies and direct budgetary support as well as tax expenditures that provide a benefit or preference for fossil-fuel production, either in absolute terms or relative to other activities or products. Taken together, the countries covered by IEA's and OECD's datasets add up to 76. However, the estimates of both datasets and those by the IMF are not strictly comparable.

Figure 1: Composition of global post-tax FFS, 2017 (US\$ billion and percentages of total)



Source: Elaboration based on Coady et al. (2019).

Figure 2. Global pre-tax FFSs and their products (US\$ billion, 2019 prices), 2010–2019

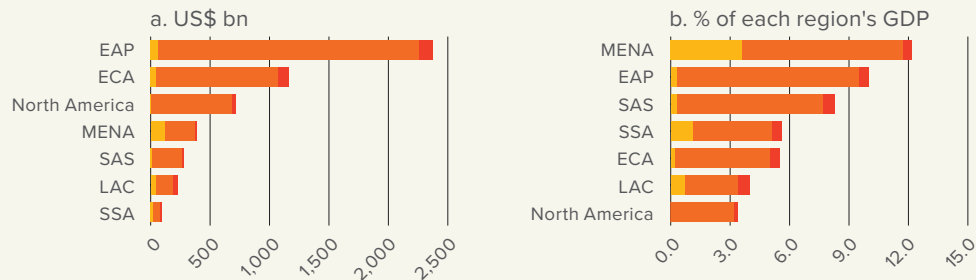


Source: Elaboration based on IEA.

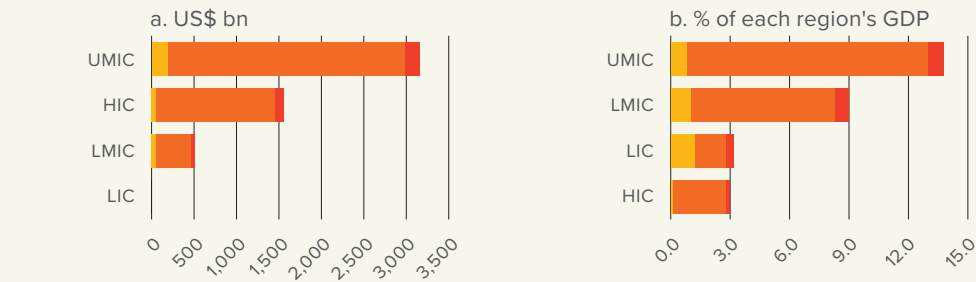
Looking at the geographic incidence of post-tax FFS, these are comparatively large in absolute terms in East Asia and Pacific (EAP) and Europe and Central Asia (ECA), which together accrue almost two thirds of the global figure of \$5.2 trillion, mostly due to the massive contribution of environmental externalities and foregone consumption taxes (Figure 3.1a). Relative to the GDP, however, the Middle East and North Africa (MENA) come first, as post-tax FFSs reach above 12 percent of this region's GDP, followed closely by EAP, where they amount to 10 percent of the region's GDP (Figure 3.1b). In terms of pre-tax FFS, these are the largest in MENA, both in absolute terms and relative to the GDP (3.6 percent), although they are also non-trivial in Sub-Saharan Africa (SSA) and Latin America and the Caribbean (LAC), where they account for almost 1 percent of the GDP.

Figure 3. Post-tax FFSs and their components (US\$ billion and percent of GDP), 2017

3.1. By geographic region



3.2. By income group



- Pre-tax subsidies
- Externalities
- Foregone consumption tax revenue

Source: Elaboration based on Coady et al. (2019). Notes: Geographic regions: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; North America = Canada and the United States; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.

The bulk of post-tax FFSs is concentrated among lower-middle-income countries (LMICs) and upper-middle-income countries (UMICs), which together account for 70 percent of the global amount of \$5.2 trillion, whereas high-income countries (HICs) accrue slightly less than 30 percent (Figure 3.2a). As shown, the contribution of low-income countries (LICs) is virtually negligible (at 0.2 percent of the global figure), but when seen relative to the group's GDP, post-tax FFSs in LICs are as important as in HICs, representing about 3 percent of the GDP in both cases (Figure 3.2b)—notice in panel b that the weight of pre-tax FFSs among LICs (1.2 percent of the group's GDP) is significantly larger than among HICs, where externalities make up most of the post-tax subsidy (2.7 percent of GDP).

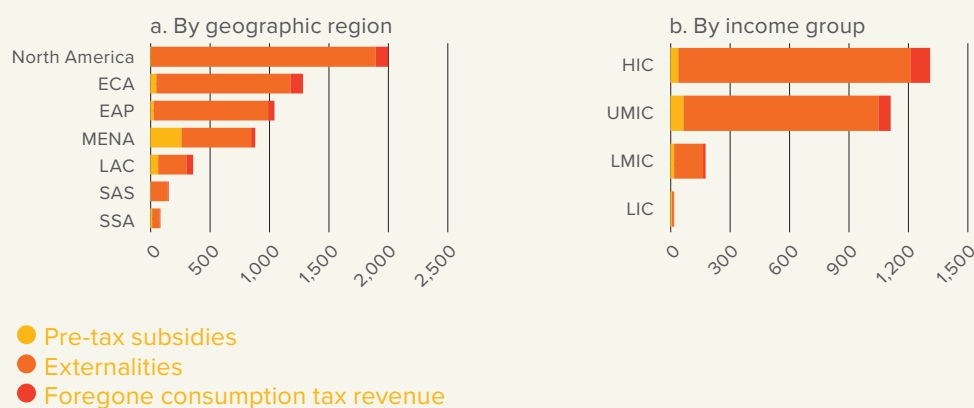


2. WHO BENEFITS MOST FROM FOSSIL FUEL SUBSIDIES?

Figure 4 reveals that individuals in HICs and UMICs benefit from substantially large per capita post-tax FFS, which reach an average of between \$1,100 and \$1,300 and are mostly composed (between 80 percent and 90 percent) of under-taxed consumption externalities. These amounts are about seven times higher than the per capita average observed among LMICs (\$178), whereas the difference with respect to the per capita average among LICs (\$20) can reach more than 60 times. Geographically, those high average levels of per capita FFSs are driven by the corresponding averages observed in North America (Canada and the United States), where the per capita amount reaches almost \$2,000, and in richer countries of ECA and EAP, where the per capita averages range between \$1,000 and \$1,300.

Focusing on only the pre-tax component of FFSs, those individuals located in UMICs, particularly within the MENA region, benefit from the largest per capita pre-tax subsidies. The average per capita pre-tax amount in MENA reaches \$260, whereas that in LAC and ECA, the second and third highest, reaches \$64 and \$51, respectively.

Figure 4. Average per capita post-tax FFSs and their components (US\$), 2017



Source: Elaboration based on Coady et al. (2019). Notes: Geographic regions: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; North America = Canada and the United States; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.

Beyond the large disparities among countries in the amounts of FFSs per capita, there are also substantial differences in terms of who is benefited the most by FFSs within countries. In general, subsidies to energy consumption are intended to protect consumers' purchasing power by keeping the prices of energy lower than the supply cost (i.e., pre-tax FFSs). While lower (subsidized) prices benefit all consumers regardless of their income level, such pre-tax FFSs tend to be low-efficiency and unequalizing tools to give relative protection to the purchasing power of the poorest individuals. As the benefits from energy subsidies are distributed

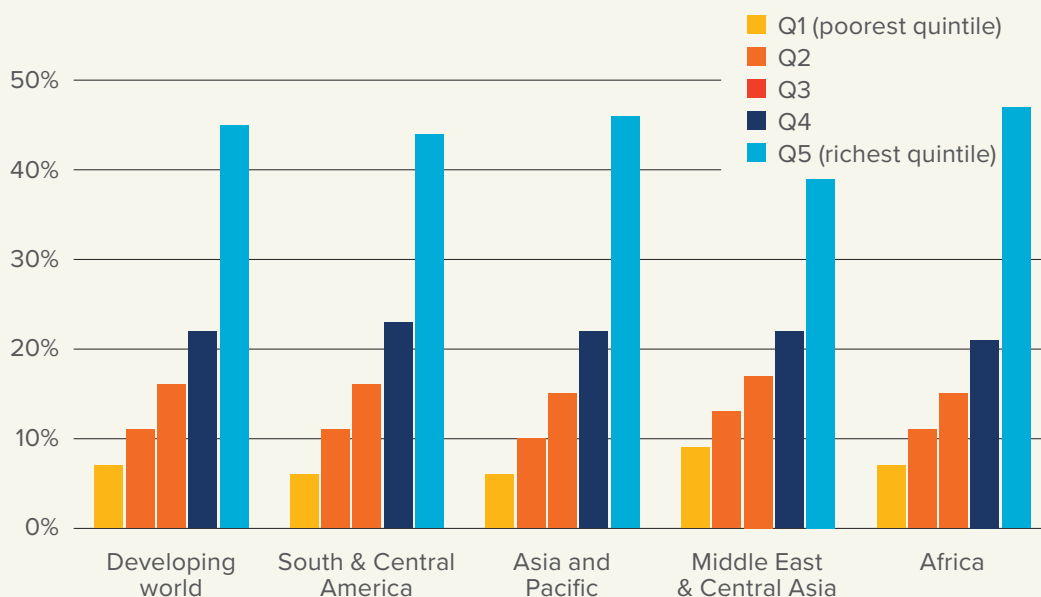
in proportion to household energy consumption, and since the consumption baskets of high-income households are typically more energy-intensive than those of low-income households, pre-tax FFSs are likely to exacerbate within-country income inequality.



Photo: UNDP India

A large body of empirical evidence shows that pre-tax FFSs are poorly targeted and mainly benefit high-income groups. According to Coady, Flamini and Sears's (2015) review of evidence among developing countries, 45 percent of the benefits from pre-tax FFSs go to the richest quintile, while only 7 percent goes to the poorest 20 percent of the population (Figure 5). In other words, the richest quintile takes up more than six times the benefit accrued by the bottom quintile, and such a disparity reproduces across developing regions. The regressivity of these subsidies is even more severe if it is considered that not only do high-income households consume more energy, but they also consume more energy-intensive goods. In a recent study, Oswald, Owen and Steinberger (2020) estimate household inequalities in energy footprints across 86 countries and reveal that consumption among the poorest 10 percent of the population represents 2 percent of final energy footprints and that of the poorest half of the population amounts to less than 20 percent. By comparison, the richest 10 percent consume approximately 40 percent of total final energy.

Figure 5. Distribution of pre-tax FFS benefits by income quintile (percent of total)



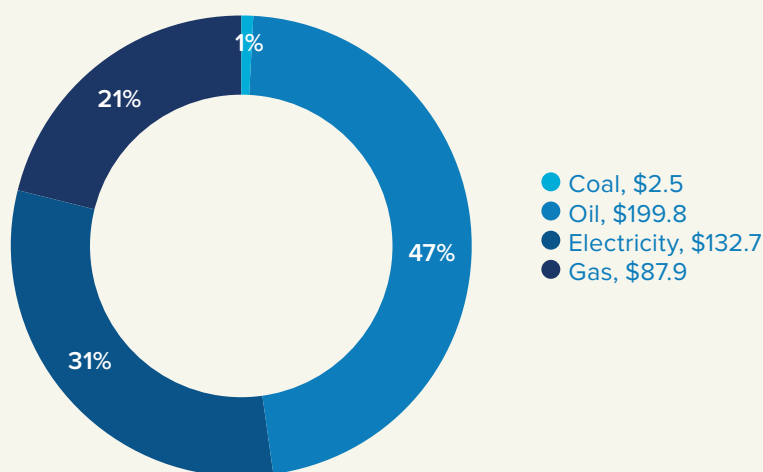
Source: Coady, Flamini and Sears (2015).



3. WHAT COULD THE AMOUNT OF PRE-TAX FFSs BUY?

This section presents some numerical comparisons of what could be paid for across developing countries by repurposing the global amount of pre-tax FFSs, i.e., those induced transfers in the form of price support, with no consideration of the costs of adverse externalities and foregone consumption tax. The exercises focus on poverty alleviation, provision of income support among vulnerable groups and access to COVID-19 vaccines. Notice that the comparisons do not consider the administrative costs associated with achieving these social outcomes. Figure 2 above shows that the annual average of pre-tax FFSs during the period 2010–2019 reached \$423 billion in 2019 prices, and this is the amount to be used in the comparisons. In terms of the composition by main product, it is worth noting that pre-tax subsidies to oil products averaged \$200 billion over that period, representing 47.3 percent of the global amount of \$423 billion; pre-tax subsidies to electricity averaged \$133 billion or 31.4 percent of the total; pre-tax subsidies to natural gas averaged \$90 billion or 20.8 percent of the total; and pre-tax subsidies to coal averaged \$2.5 billion or 0.6 percent (Figure 6).

Figure 6: Average composition of pre-tax FFSs by product (US\$ billions at 2019 prices and percent of total), 2010–2019



Source: Elaboration based IEA.

3.1. POVERTY ALLEVIATION

3.1.1. Computing the required amounts

To estimate the potential for global poverty alleviation from pre-tax FFSs, the required economic resources must first be estimated. This estimation is based on the well-known poverty gap index (Annex A) for the international poverty lines of \$1.90 a day and \$3.20 a day per person (international dollars [PPP\$], 2011 prices).

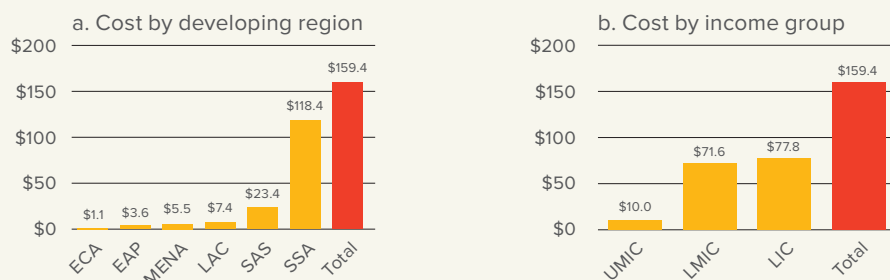
This measure has an appealing interpretation as it provides information on the amount of money that the society would need to ‘lift’ the incomes of the poor up to the level of the poverty line. Suppose that the value of the poverty line is PPP\$3.20 a day and that the per capita shortfall is 0.30, so that the monetized value of this shortfall is PPP\$0.96 a day (i.e., 30 percent of PPP\$3.20 a day). Adding up this monetized average shortfall across the society’s total population, therefore, yields the total monetary amount required to lift the incomes of the poor up to the minimum threshold of PPP\$3.20 a day, which is often interpreted as the amount needed to eradicate poverty assuming a perfect allocation of resources among the poor and no administrative costs.



Photo: UNDP Benin

Based on this measure and household survey data for 132 developing countries, covering 83 percent of the world’s population and 97 percent of the developing world’s population (Annex B), Figure 7 reveals that the total cost of lifting the incomes of those living in extreme poverty up to the equivalent of PPP\$1.90 a day amounts to a total of PPP\$159.4 billion annually at the global level. Of this required amount, almost three fourths would be allocated across countries in SSA, about 15 percent in countries in SAS, 5 percent in LAC and the remaining 6 percent in the rest of regions. Looking at the distribution of the total cost by groups of countries according to their income levels, half of the required resources would be allocated across LICs and about 45 percent across LMICs, with the remaining share equivalent to just PPP\$10 billion across UMICs.

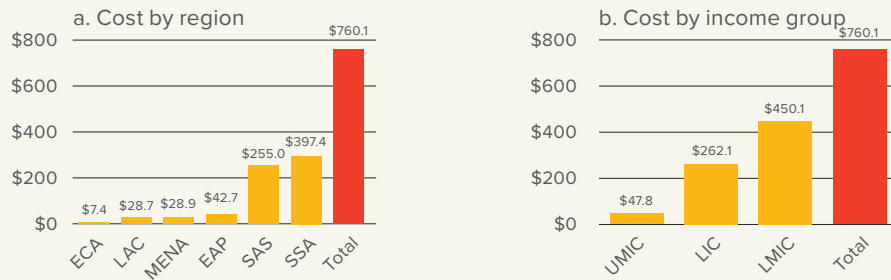
Figure 7. Total cost of lifting the incomes of the poor population up to PPP\$1.90 a day (PPP\$ billion, 2011 prices) by developing region and income group, 2018



Source: Own estimates based on World Bank, PovcalNet. Notes: The amounts correspond to 2018 and are expressed in international dollars (PPP) at 2011 prices. Red bars show the sum of the amounts in yellow bars. Developing regions: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.

Using a higher value of the poverty line, Figure 8 shows that the corresponding cost of lifting the incomes of the global poor up to PPP\$3.20 a day per person is equivalent to PPP\$760 billion annually, with half of the required resources (52 percent) concentrating in South Asia (SAS) and above a third (34 percent) in SAS. By income groups, almost 60 percent of the required resources globally would be allocated across LMICs and just a third across LICs, which is an expected result given the increase in the value of the poverty line as it captures a higher number of people, with higher incomes, living in less poor countries.

Figure 8: Total cost of lifting the incomes of the poor population up to PPP\$3.20 a day (PPP\$ billion, 2011 prices) by developing region and income group, 2018



Source: Own estimates based on World Bank, PovcalNet. Notes: The amounts correspond to 2018 and are expressed in international dollars (PPP) at 2011 prices. Red bars show the sum of the amounts in yellow bars. Developing regions: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.

3.1.2. Lifting the incomes of the poor people with the amount of pre-tax FFSs

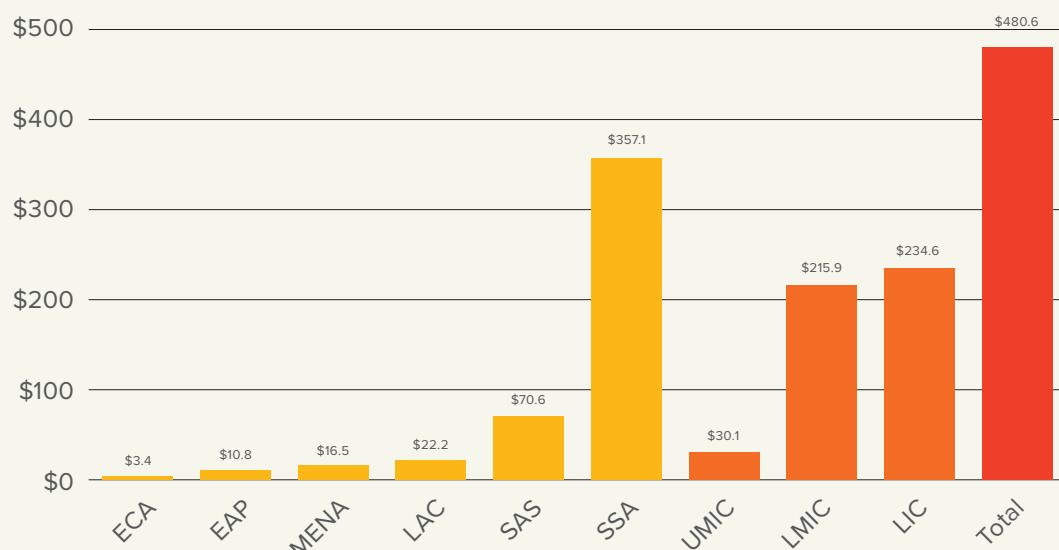
For strict comparability, the annual average of \$423 billion of pre-tax FFSs (2019 prices) is converted to the same monetary units (PPP\$, 2011 prices) as the costs of lifting the incomes of the poor people shown in Figures 7 and 8 above. Note that because of the COVID-19 pandemic's progression and its economic effects, it is likely that the incidence of poverty has already increased relative to pre-crisis levels, and that those who were already poor before the pandemic became poorer. While there is still uncertainty about the true magnitude of the increase in poverty in each country, and in particular about the income losses among the existing poor, the following comparisons take a conservative stance and assume that pre-crisis income levels still provide a relatively good benchmark for the comparison.



Photo: UNDP Lake Chad

By comparing the total amount of pre-tax FFSs with the corresponding total cost of lifting the incomes of the poor, as identified by the PPP\$1.90 a day poverty line, **the amount of pre-tax FFSs could ‘pay’ for three times the annual amount required to ‘eradicate’ global extreme poverty** (Table 1 below)—note that if this ratio of three times is set to replicate in each region and country group, then the amount of pre-tax FFSs must be allocated according to each region’s or group’s relative required amounts to lift the incomes of the extreme poor population (i.e., as in Figure 7 or as in the second column of Table 1); this allocation is shown in Figure 9.

Figure 9: Distribution of the amount of pre-tax FFSs to ‘eradicate’ poverty at PPP\$1.90 a day (PPP\$ billion, 2011 prices) by developing region and income group, 2018



Source: Author estimates based on IEA and World Bank, PovcalNet. Notes: The amounts correspond to 2018 and are expressed in international dollars (PPP) at 2011 prices. Red bar shows the sum of the amounts in either yellow or orange bars. Developing regions: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.

Looking at specific regions and country groups, and whether the total amount of pre-tax FFSs are allocated entirely to each, this amount would be enough to cover the annual cost to lift the incomes of the extreme poor, for instance, 20.5 times in SAS; four times in SSA; six times in LICs; 6.7 times in LMICs; and three times in all LICs and LMICs combined (Table 1). If instead of comparing the total amount of pre-tax FFSs we focus on subsidies to oil products only, then pre-tax **subsidies to oil could ‘pay’ for 1.4 times the total cost of lifting the incomes of the extreme poor globally**. Again, assuming that oil subsidies are allocated entirely to each region and country group, these could cover two times the cost of ‘eradicating’ poverty in SSA, close to 10 times the cost in SAS and around three times the cost in LICs and LMICs. Total pre-tax **subsidies to electricity, on the other hand, would be virtually enough to lift the incomes of all the extreme poor globally up to PPP\$1.90 a day**, and by allocating such subsidies entirely to any specific region, they could cover, for instance, 1.3 times the required resources in SSA, around two times in both LICs and LMICs and up to 6.4 times in SAS.

Finally, pre-tax **subsidies to gas could cover 63 percent of the resources required to eradicate extreme poverty globally or 80 percent of the required amount in SSA**. By the same token, they would be enough to ‘pay’ entirely for the resources needed in either LICs or LMICs or even enough to ‘pay’ for four times the required amount in SAS (Table 1).



Photo: UNDP Democratic Republic of Congo

Table 1. Ratio of pre-tax FFSs to the annual cost of lifting the incomes of the poor population up to PPP\$1.90 a day by developing region and income group, 2018

| | Annual cost | | Ratio fossil-fuel subsidies to annual cost | | | |
|---------------------------------|----------------|--------------|--|------------|-------------|-------------|
| | PPP\$ bn | %GDP | Total FFS | Oil | Electricity | Gas |
| East Asia and Pacific | \$3.6 | 0.01% | 134.4 | 63.5 | 42.2 | 28.0 |
| Europe and Central Asia | \$1.1 | 0.01% | 423.4 | 200.1 | 132.8 | 88.0 |
| Latin America and the Caribbean | \$7.4 | 0.08% | 65.2 | 30.8 | 20.5 | 13.6 |
| Middle East and North Africa | \$5.5 | 0.14% | 88.0 | 41.6 | 27.6 | 18.3 |
| South Asia | \$23.4 | 0.21% | 20.5 | 9.7 | 6.4 | 4.3 |
| Sub-Saharan Africa | \$118.4 | 2.96% | 4.1 | 1.9 | 1.3 | 0.8 |
| Low-income | \$77.8 | 6.61% | 6.2 | 2.9 | 1.9 | 1.3 |
| Lower-middle Income | \$71.6 | 0.35% | 6.7 | 3.2 | 2.1 | 1.4 |
| Upper-middle Income | \$10.0 | 0.02% | 48.1 | 22.7 | 15.1 | 10.0 |
| Developing world (132) | \$159.4 | 0.24% | 3.0 | 1.4 | 0.95 | 0.63 |

Source: Author estimates based on IEA and World Bank, PovcalNet. Notes: The monetary amounts correspond to 2018 and are expressed in international dollars (PPP) at 2011 prices. Annual cost indicates the monetized value of the average shortfall in incomes in each region.

Turning to the comparison with the cost of eradicating poverty according to the second poverty line, **63 percent of the resources needed globally to lift the incomes of the poor up to PPP\$3.20 a day could be covered by the amount of total pre-tax FFSs** (Table 2). Focusing on specific regions and income groups, **the resources needed to ‘eradicate’ poverty at PPP\$3.20 a day could be paid entirely if pre-tax FFSs are allocated to either SSA or to all LMICs combined**; they could ‘pay’ for almost twice the resources needed either in SAS or in all LICs. Moreover,

these subsidies represent 10 times the cost of ‘eradicating’ this type of poverty across all UMICs.

Using pre-tax subsidies to oil products only, these could ‘pay’ for 30 percent of the resources needed to lift the incomes of the poor up to PPP\$3.20 a day, whereas pre-tax subsidies to either electricity or gas could ‘pay’ for 20 percent or 13 percent, respectively (Table 2). The pre-tax subsidies to oil alone could cover eight times the annual cost of lifting the incomes of the poor in either LAC or MENA, and they could ‘pay’ for 90 percent of the cost either in SAS or in LICs. Similarly, using just the pre-tax subsidies to gas, it would be possible to cover twice the cost in EAP.

Table 2: Ratio of pre-tax FFSs to the cost of lifting the incomes of the poor population up to PPP\$3.20 a day by developing region and income group, 2018

| | Annual cost | | Ratio fossil-fuel subsidies to annual cost | | | |
|---------------------------------|----------------|--------------|--|-------------|-------------|-------------|
| | PPP\$ bn | %GDP | Total FFS | Oil | Electricity | Gas |
| East Asia and Pacific | \$42.7 | 0.15% | 11.3 | 5.3 | 3.5 | 2.3 |
| Europe and Central Asia | \$7.4 | 0.07% | 65.2 | 30.8 | 20.5 | 13.6 |
| Latin America and the Caribbean | \$28.7 | 0.30% | 16.7 | 7.9 | 5.2 | 3.5 |
| Middle East and North Africa | \$28.9 | 0.76% | 16.7 | 7.9 | 5.2 | 3.5 |
| South Asia | \$255.0 | 2.34% | 1.9 | 0.9 | 0.6 | 0.4 |
| Sub-Saharan Africa | \$397.4 | 9.94% | 1.2 | 0.6 | 0.4 | 0.3 |
| Low-income | \$262.1 | 22.27% | 1.8 | 0.9 | 0.6 | 0.4 |
| Lower-middle Income | \$450.1 | 2.18% | 1.1 | 0.5 | 0.3 | 0.2 |
| Upper-middle Income | \$47.8 | 0.11% | 10.0 | 4.7 | 3.2 | 2.1 |
| Developing world (132) | \$760.1 | 1.13% | 0.63 | 0.30 | 0.20 | 0.13 |

Source: Author estimates based on IEA and World Bank, PovcalNet. Notes: The monetary amounts correspond to 2018 and are expressed in international dollars (PPP) at 2011 prices. Annual cost indicates the monetized value of the average shortfall in incomes in each region.



Photo: UNDP Peru

3.2. INCOME SUPPORT AMONG VULNERABLE POPULATIONS

3.2.1. Estimating the required amounts

Two scenarios of coverage of income support in the form of temporary basic income (TBI) across developing countries are compared in this section. The first scenario covers 2.8 billion people, of whom 1.1 billion live on less than the poverty line and 1.7 billion have incomes above the poverty line but below a vulnerability threshold. The poverty and vulnerability lines depend on the standard of living of each country, as used in Gray Molina and Ortiz-Juarez (2020), and for the total potential beneficiaries, the total cost of three schemes of cash transfers is compared to the total amount of pre-tax FFSs (as before, such amount is converted to PPP\$ at 2011 prices for strict comparability with the schemes of TBI).

The first scheme considers the cost of topping-up the incomes of 2.8 billion poor and vulnerable people up to the value of their region's vulnerability threshold. Figure 10a reveals that this scheme could cost almost PPP\$200 billion per month, with a third (PPP\$72.8 billion) corresponding to countries in LAC when seen by region, or, if seen by income group, almost half (PPP\$95.8 billion) corresponding to UMICs. The second scheme considers the total cost of transferring to each of the 2.8 billion poor and vulnerable people the equivalent to half the median per capita income in each country (i.e., the income of the typical citizen). Figure 10b shows that this total cost reaches PPP\$257 billion per month, with almost half of it corresponding to LICs (PPP\$28.3 billion) and LMICs (PPP\$99.9 billion) combined. Finally, the third scheme corresponds to the cost of transferring to each poor and vulnerable person a uniform cash benefit of PPP\$5.50 a day, which reaches PPP\$465 billion per month (Figure 10c), with more than half corresponding to countries in SAS and SSA (PPP\$250 billion combined) and half corresponding to LMICs (PPP\$251.8 billion) when organized by income groups.

Figure 10: Monthly cost of TBI schemes for 2.8 billion poor and vulnerable people (PPP\$ billion, 2011 prices) by developing region and income group, 2018

a. Scheme 1: top-up

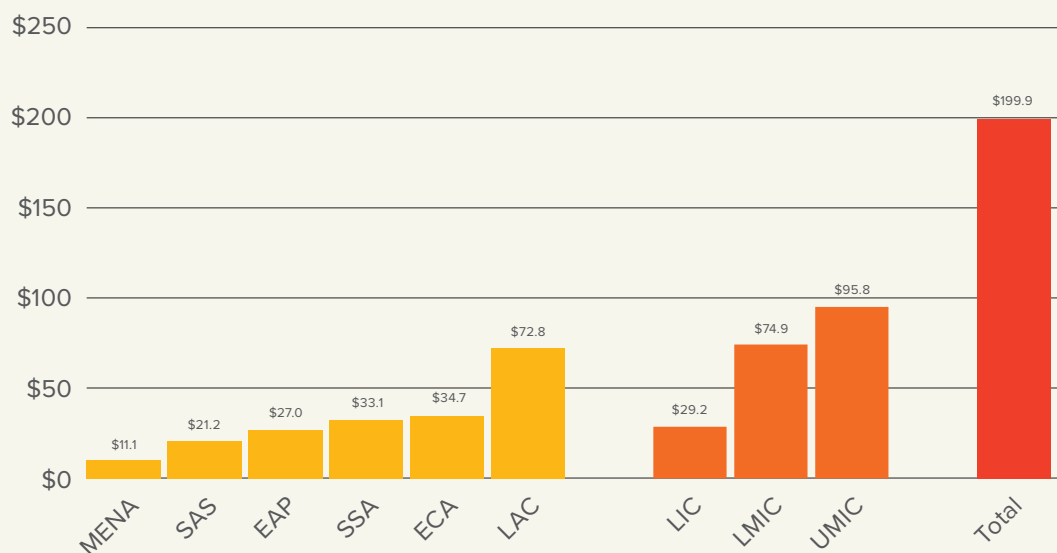
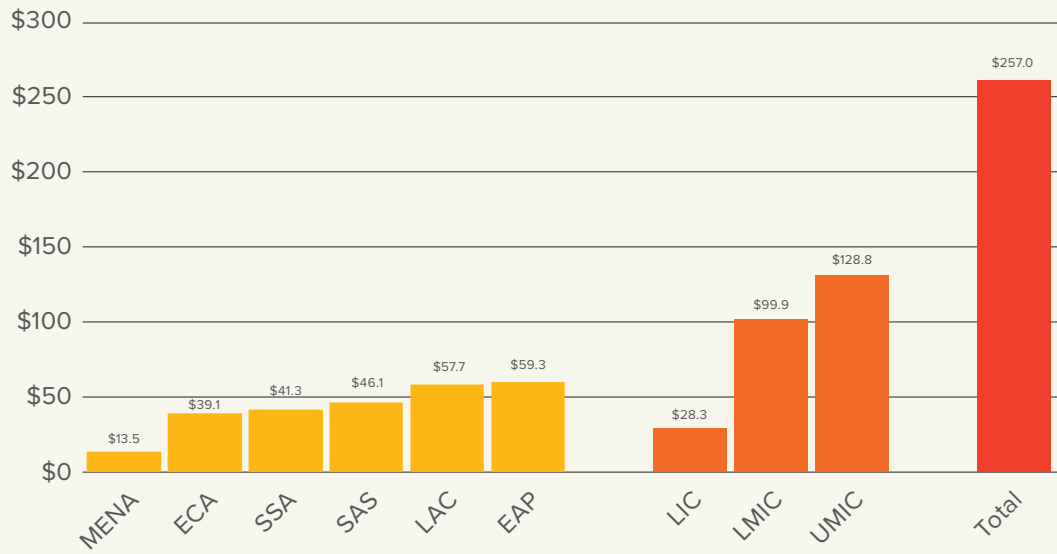
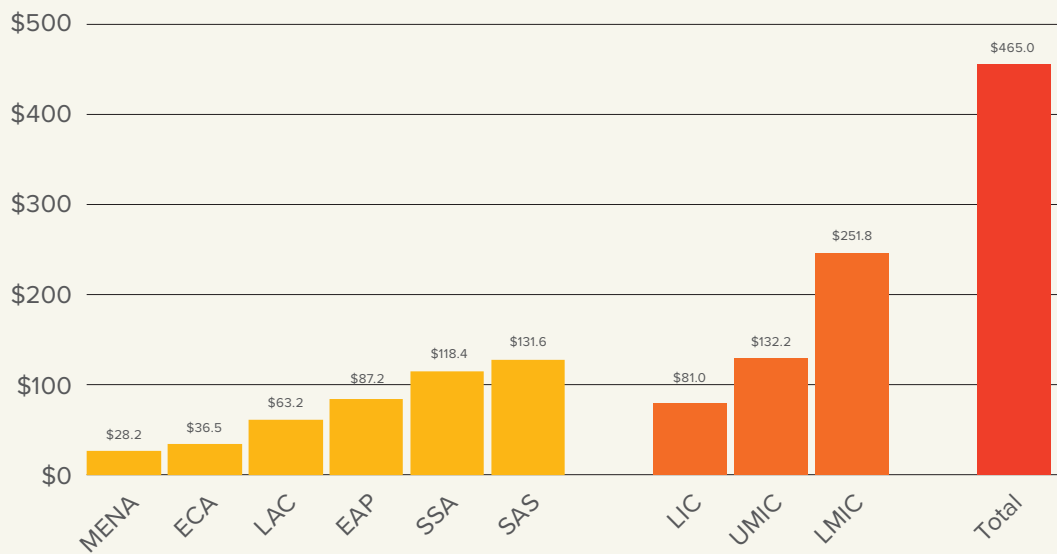


Figure 10: Monthly cost of TBI schemes for 2.8 billion poor and vulnerable people (PPP\$ billion, 2011 prices) by developing region and income group, 2018, cont.

b. Scheme 2: half median income



c. Scheme 3: uniform transfer (\$5.50 a day)



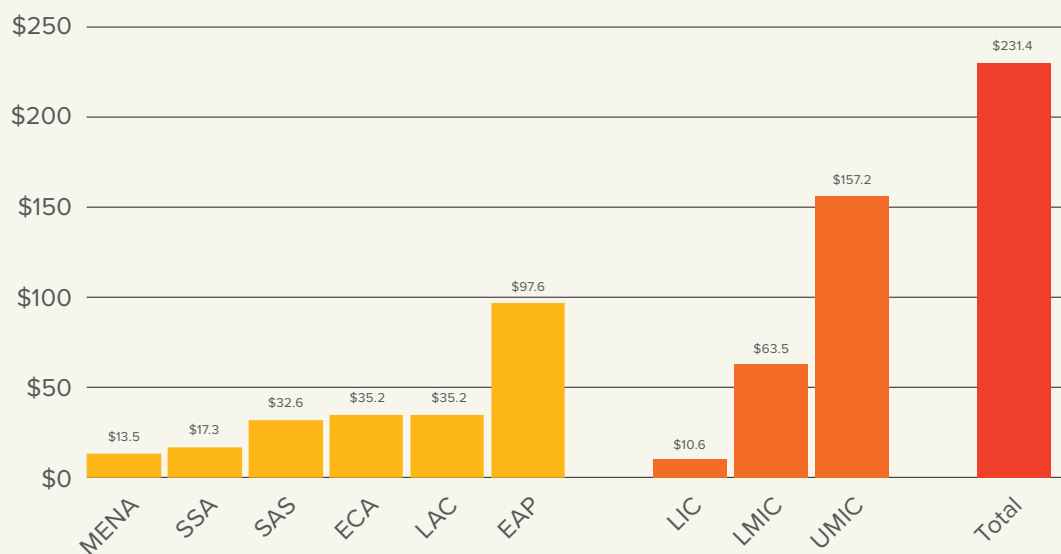
Source: Author estimates based on Gray Molina and Ortiz-Juarez (2020) and World Bank, PovcalNet. Notes: The monetary amounts correspond to 2018 and are expressed in international dollars (PPP) at 2011 prices. Red bar shows the sum of the amounts in either yellow or orange bars. Developing regions: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.



Photo: UNDP Tajikistan

The second scenario of coverage focuses on 2 billion working-age women, as proposed by Montoya-Aguirre, Ortiz-Juarez and Santiago (2021), which implies a universal coverage of this group regardless of their economic status. For this scenario, the total amount of pre-tax FFSs is compared to the total cost of transferring each working-age woman a monthly amount equivalent to half the median per capita income in each country. The total cost of this universal scheme reaches PPP\$231 billion per month (Figure 11), with around 40 percent of it corresponding to countries in EAP and almost two thirds corresponding to UMICs.

Figure 11: Monthly cost of TBI schemes for working-age women (PPP\$ billion, 2011 prices) by developing region and income group, 2018



Source: Author elaboration based on Montoya-Aguirre, Ortiz-Juarez and Santiago (2021). Notes: The monetary amounts correspond to 2018 and are expressed in international dollars (PPP) at 2011 prices. Red bar shows the sum of the amounts in either yellow or orange bars. Developing regions: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.

Finally, in terms of the size of TBI per beneficiary, the monthly amount per person equals PPP\$167.3 under the uniform transfer of PPP\$5.50 a day, and this monthly amount remains unchanged regardless of the size of the coverage scenario and the country where people live. The amounts under the top-up and half-median schemes, on the other hand, vary across countries as they are sensitive, respectively, to the prevailing difference between the incomes of the beneficiaries and the vulnerability threshold and to the standard of living in each country. These monthly amounts are computed as the population-weighted average transfers per beneficiary in each country and aggregated at the regional level and by income groups. Among the 132 developing countries, the transfer equivalent to the top-up scheme is PPP\$61.7 a month per beneficiary or PPP\$110.5 a month if such transfer equals half the median per capita income. Because these schemes are responsive to the prevailing standard of living in each country, monthly transfers for the poorest countries are well below the global figures. This contrasts with regions with higher living standards, where the size of transfers per beneficiary increases significantly.

3.2.2. Topping-up incomes of poor and vulnerable people with pre-tax FFSs

Starting with the first scheme aimed at topping-up the incomes of potential beneficiaries, the amount of **pre-tax FFSs could 'pay' each of the 2.8 billion poor and vulnerable people across the developing world an average of PPP\$61.7 per month for up to 2.4 months** (Table 3).

If the amount of pre-tax FFSs is used to benefit poor and vulnerable people of only a specific region, it could cover 787 million people in SAS with a monthly average of PPP\$26.3 per person for almost two years; 708 million people in SSA with PPP\$45 person/month for 15 months; 378 million people in LAC with PPP\$188 person/month for almost seven months; and 521 million people in EAP with PPP\$46 person/month for almost 18 months. Focusing on specific income groups only, the amount of **pre-tax FFSs could 'pay' a monthly average of PPP\$55.6 per person for 484 million people across LICs for up to 16 months**; PPP\$43.6 person/month for 1.5 billion people in LMICs for up to six months; and PPP\$83.1 person/month for 790 million people across UMICs for up to five months.



Photo: UNDP Bosnia

Table 3: Coverage and amount of TBI per beneficiary under the top-up scheme (PPP\$ per month, 2011 prices), and months that could be covered with pre-tax FFSs by developing region and income group

| | Coverage (million) | Per capita | Months to cover with fossil-fuel subsidies | | | |
|---------------------------------|--------------------|---------------|--|------------|-------------|------------|
| | | | Total | Oil | Electricity | Gas |
| East Asia and Pacific | 521.3 | \$45.6 | 17.8 | 8.4 | 5.6 | 3.7 |
| Europe and Central Asia | 217.9 | \$138.5 | 13.9 | 6.5 | 4.3 | 2.9 |
| Latin America and the Caribbean | 377.7 | \$187.7 | 6.6 | 3.1 | 2.1 | 1.4 |
| Middle East and North Africa | 168.4 | \$54.4 | 43.5 | 20.6 | 13.6 | 9.0 |
| South Asia | 786.7 | \$26.3 | 22.6 | 10.7 | 7.1 | 4.7 |
| Sub-Saharan Africa | 707.6 | \$45.0 | 14.5 | 6.9 | 4.6 | 3.0 |
| Low-income | 484.2 | \$55.6 | 16.5 | 7.8 | 5.2 | 3.4 |
| Lower-middle Income | 1,505.0 | \$43.6 | 6.4 | 3.0 | 2.0 | 1.3 |
| Upper-middle Income | 790.4 | \$83.1 | 5.0 | 2.4 | 1.6 | 1.0 |
| Developing world (132) | 2,779.6 | \$61.7 | 2.4 | 1.1 | 0.8 | 0.5 |

Source: Author elaboration based on Gray Molina and Ortiz-Juarez (2020) and World Bank, PovcalNet. Notes: The monetary amounts are population-weighted averages of country-level figures and correspond to 2018, expressed in international dollars (PPP) at 2011 prices.

Pre-tax **subsidies to oil products, which represent almost half of total pre-tax FFSs globally, could fund the delivery of a one-off payment of PPP\$61.7 to each of the 2.8 billion poor and vulnerable people in the developing world.** But if the value of oil subsidies were allocated to a specific region or income group only, it could pay the corresponding monthly average to each of the beneficiary population for: almost 11 months in SAS; almost seven months in SSA; up to three months in LAC; up to 20 months in MENA; up to eight months in EAP; almost eight months in LICs; and up to three and two months in LMICs and UMICs, respectively.

In the case of pre-tax **subsidies to electricity, the total amount could ‘pay’ for 80 percent of a one-off payment of PPP\$61.7 for 2.8 billion poor and vulnerable people.** If such an amount, which represents almost a third of total pre-tax FFSs globally, were allocated to a specific region only, it could benefit the poor and vulnerable population with the corresponding monthly per capita amount for: up to two months in LAC; up to four months in ECA or SSA; up to five months in EAP; up to seven months in SAS; and a year in MENA. Looking at income groups, subsidies to electricity could ‘pay’ for up to five months if they are allocated to LICs only and for about two months in either LMICs or UMICs.

Finally, pre-tax **subsidies to gas could ‘pay’ for 50 percent of a one-off payment (or, equivalently, two weeks of benefits) of PPP\$61.7 for 2.8 billion poor and vulnerable people across developing countries.** These subsidies represent 21 percent of the global amount of total pre-tax FFSs and, if the amount is allocated to any specific region or income group, they could cover the beneficiary population with the corresponding per capita amount for one month in LAC, for up to nine months in MENA and for between three and five months in either of the remaining regions. Across LICs, pre-tax subsidies to gas could fund this scheme of TBI for up to three months, benefiting 484 million people, or they could ‘pay’ for a one-off cash benefit in either LMICs or UMICs.



Photo: UNDP Sudan

3.2.3. Using the amount of pre-tax FFSs to transfer half the per capita median income of each country to poor and vulnerable people

Moving to the second scheme, which considers a transfer equivalent to half the median income in each country, the amount of total **pre-tax FFSs could pay each of the 2.8 billion poor and vulnerable people across the developing world an average of PPP\$110.5 per month for up to 1.9 months** (Table 4). The latter is equivalent to delivering a one-off payment of PPP\$206.7 on average to each beneficiary.

If total pre-tax FFSs are allocated to a specific region only, they could fund the per capita transfer of about PPP\$59 per month for all the poor and vulnerable people in SAS or SSA for between 10 and 11 months. Alternatively, they could transfer for about eight months either PPP\$139 per beneficiary in EAP or PPP\$164.5 per beneficiary in LAC. **If allocated entirely to MENA, total pre-tax FFSs could pay PPP\$111 monthly to each of the 168.4 million poor and vulnerable for almost three years.** Focusing on income groups, these subsidies could pay a per capita amount of PPP\$58 per person for 17 months if allocated across LICs only, PPP\$68 a month for almost five months if instead they are allocated to LMICs and PPP\$170 a month for almost four months across UMICs.

If this scheme of TBI is funded through the amount of pre-tax oil subsidies, it could 'pay' for 90 percent of a one-off payment of PPP\$110.5 for 2.8 billion poor and vulnerable people, equivalent to PPP\$97.7. The equivalent of oil subsidies could fund the corresponding per capita amount for almost four months if allocated entirely to all the beneficiaries in either EAP or LAC; for almost six months in ECA; for about five months either in SAS or SSA; or for above 16 months in MENA. **Oil subsidies could 'pay' the monthly transfer to each beneficiary for about eight months if allocated entirely across LICs, for up to two months if allocated instead to 1.5 billion people across LMICs or for 1.8 months for a more generous transfer to 790 million people across UMICs.**

Table 4: Coverage and amount of TBI per beneficiary under the half-median income scheme (PPP\$ per month, 2011 prices) and months that could be covered with pre-tax FFSs by developing region and income group

| | Coverage (million) | Per capita | Months to cover with fossil-fuel subsidies | | | |
|---------------------------------|--------------------|----------------|--|------------|-------------|------------|
| | | | Total | Oil | Electricity | Gas |
| East Asia and Pacific | 521.3 | \$138.8 | 8.1 | 3.8 | 2.5 | 1.7 |
| Europe and Central Asia | 217.9 | \$219.4 | 12.3 | 5.8 | 3.9 | 2.6 |
| Latin America and the Caribbean | 377.7 | \$164.5 | 8.3 | 3.9 | 2.6 | 1.7 |
| Middle East and North Africa | 168.4 | \$111.0 | 35.6 | 16.8 | 11.2 | 7.4 |
| South Asia | 786.7 | \$59.5 | 10.4 | 4.9 | 3.3 | 2.2 |
| Sub-Saharan Africa | 707.6 | \$59.2 | 11.6 | 5.5 | 3.6 | 2.4 |
| Low-income | 484.2 | \$58.4 | 17.0 | 8.0 | 5.3 | 3.5 |
| Lower-middle Income | 1,505.0 | \$67.9 | 4.8 | 2.3 | 1.5 | 1.0 |
| Upper-middle Income | 790.4 | \$170.2 | 3.7 | 1.8 | 1.2 | 0.8 |
| Developing world (132) | 2,779.6 | \$110.5 | 1.9 | 0.9 | 0.6 | 0.4 |

Source: Author elaboration based on Gray Molina and Ortiz-Juarez (2020) and World Bank, PovcalNet. Notes: The monetary amounts are population-weighted averages of country-level figures and correspond to 2018, expressed in international dollars (PPP) at 2011 prices.

Pre-tax subsidies to electricity could fund about 60 percent of a one-off payment of PPP\$110.5, equivalent to PPP\$65 for each of the 2.8 billion poor and vulnerable people in the developing world. These subsidies could pay the corresponding per capita transfer to all the corresponding beneficiaries for above two months if allocated entirely either to EAP or LAC; for above three months in either ECA, SAS or SSA; for up to 11 months in MENA; or for up to five months across LICs. Finally, pre-tax subsidies to gas could fund this scheme for about two months in most regions (if allocated entirely to each), with the sole exception of MENA, where they could pay the transfer for up to seven months. Across LICs, pre-tax gas subsidies could deliver the benefit for 3.5 months or a one-off payment across LMICs.

3.2.4. Funding a uniform transfer of PPP\$5.50 a day per poor and vulnerable person in the developing world with pre-tax FFSs

Under a uniform scheme of TBI, the equivalent amount of **total pre-tax FFSs could deliver a one-off payment of PPP\$167.3 a month (PPP\$5.50 a day) for up to 2.8 billion poor and vulnerable people regardless of their country** (Table 5). This transfer could be extended for almost six months if total subsidies were allocated entirely across LICs only, for almost two months across LMICs only or for 3.6 months across UMICs only. Looking at specific regions, the benefit could last for about four months in either SAS or SSA, for five months in EAP, for almost eight months in LAC and for well above a year in either ECA or MENA.

Table 5: Coverage and amount of TBI per beneficiary under the uniform scheme (PPP\$ per month, 2011 prices) and months that could be covered with pre-tax FFSs by developing region and income group

| | Coverage (million) | Per capita | Months to cover with fossil-fuel subsidies | | | |
|---------------------------------|--------------------|----------------|--|------------|-------------|------------|
| | | | Total | Oil | Electricity | Gas |
| East Asia and Pacific | 521.3 | \$167.3 | 5.5 | 2.6 | 1.7 | 1.1 |
| Europe and Central Asia | 217.9 | \$167.3 | 13.2 | 6.2 | 4.1 | 2.7 |
| Latin America and the Caribbean | 377.7 | \$167.3 | 7.6 | 3.6 | 2.4 | 1.6 |
| Middle East and North Africa | 168.4 | \$167.3 | 17.1 | 8.1 | 5.4 | 3.5 |
| South Asia | 786.7 | \$167.3 | 3.7 | 1.7 | 1.1 | 0.8 |
| Sub-Saharan Africa | 707.6 | \$167.3 | 4.1 | 1.9 | 1.3 | 0.8 |
| Low-income | 484.2 | \$167.3 | 5.9 | 2.8 | 1.9 | 1.2 |
| Lower-middle Income | 1,505.0 | \$167.3 | 1.9 | 0.9 | 0.6 | 0.4 |
| Upper-middle Income | 790.4 | \$167.3 | 3.6 | 1.7 | 1.1 | 0.8 |
| Developing world (132) | 2,779.6 | \$167.3 | 1.0 | 0.5 | 0.3 | 0.2 |

Source: Author elaboration based on Gray Molina and Ortiz-Juarez (2020) and World Bank, PovcalNet. Notes: The monetary amounts correspond to 2018, expressed in international dollars (PPP) at 2011 prices.

Oil subsidies, which represent about half of total pre-tax FFSs, could deliver a one-off payment of PPP\$87.1 for all poor and vulnerable people globally, equivalent to 50 percent of the monthly uniform transfer per person. Similarly, pre-tax subsidies to electricity could deliver a one-off payment of PPP\$54.2 for all beneficiaries (30 percent of the monthly per capita amount), whereas a one-off payment funded by gas subsidies only could amount to PPP\$36 per person for all (equivalent to 20 percent of the monthly transfer).

If the total amount of pre-tax oil subsidies is allocated entirely to countries according to their income level, oil subsidies could fund a transfer of PPP\$167.3 for 2.8 months to 484 million poor and vulnerable people across LICs. Or if these subsidies were used to fund this uniform scheme in any specific region, they could benefit the poor and vulnerable people in SAS or SSA for slightly less than two months; those in EAP for 2.6 months; those in LAC for 3.6 months; and those in ECA or MENA for above six months. If pre-tax subsidies to electricity are used instead, these could fund the benefit for between one and two months in either of the former four regions or for between four and five months in either ECA or MENA. Finally, pre-tax subsidies to gas would be enough to deliver a one-off payment of PPP\$167.3 to all beneficiaries across LICs or to all in either EAP or LAC.

3.2.5. Protecting working-age women with cash transfers funded with pre-tax FFS

How could the pre-tax FFSs benefit each of the 2 billion working-age women across the developing world, regardless of their economic status? These subsidies **could pay 2 billion working-age women in developing countries an average of PPP\$110.6 for up to two months** (Table 6)—a monthly transfer equivalent to the weighted average of half the per capita median income of each country.

Table 6: Coverage and amount of TBI (half median per capita income) to working-age women (PPP\$ per month, 2011 prices) and months that could be covered with pre-tax FFSs by developing region and income group

| | Coverage (million) | Per capita | Months to cover with fossil-fuel subsidies | | | |
|---------------------------------|--------------------|----------------|--|------------|-------------|------------|
| | | | Total | Oil | Electricity | Gas |
| East Asia and Pacific | 699.8 | \$138.8 | 4.9 | 2.3 | 1.5 | 1.0 |
| Europe and Central Asia | 159.4 | \$219.6 | 13.7 | 6.5 | 4.3 | 2.8 |
| Latin America and the Caribbean | 212.8 | \$165.0 | 13.6 | 6.4 | 4.3 | 2.8 |
| Middle East and North Africa | 118.9 | \$111.0 | 35.5 | 16.8 | 11.1 | 7.4 |
| South Asia | 548.0 | \$59.5 | 14.7 | 7.0 | 4.6 | 3.1 |
| Sub-Saharan Africa | 290.7 | \$59.2 | 27.8 | 13.1 | 8.7 | 5.8 |
| Low-income | 181.4 | \$58.4 | 45.3 | 21.4 | 14.2 | 9.4 |
| Lower-middle Income | 926.7 | \$67.9 | 7.6 | 3.6 | 2.4 | 1.6 |
| Upper-middle Income | 921.6 | \$170.3 | 3.1 | 1.4 | 1.0 | 0.6 |
| Developing world (132) | 2,029.7 | \$110.6 | 2.1 | 1.0 | 0.7 | 0.4 |

Source: Author elaboration based on Montoya-Aguirre, Ortiz-Juarez and Santiago (2021). Notes: The monetary amounts are population-weighted averages of country-level figures and correspond to 2018, expressed in international dollars (PPP) at 2011 prices.

If used to benefit all working-age women in a specific region only, **total pre-tax FFSs could pay PPP\$59 monthly to each of the 291 million working-age women in SSA for more than two years**; a similar amount to each of the 548 million working-age women in SAS for almost 15 months; PPP\$165 per month to each of the 213 million working-age women in LAC for one year; PPP\$139 per month to each of the 700 million working-age women in EAP for almost five months; and PPP\$111 per month to each of the 119 million working-age women in MENA for three years. Across LICs, **pre-tax FFSs could deliver PPP\$58 per month to 181 million working-age women for almost four years**, whereas a transfer of PPP\$68 per month could be paid to 927 million for almost eight months across LMICs and of PPP\$170 per month to 922 million for three months across UMICs.

Just the amount of pre-tax oil subsidies could deliver a one-off payment of PPP\$110.6 to each of the 2 billion working-age women. And, if these subsidies are repurposed to benefit those in a specific region only, they could benefit with the corresponding monthly amounts all working-age women for seven months in SAS; one year in SSA; six months in either ECA or LAC; above two months in EAP; and 17 months in MENA. By income groups, the benefit could last 21 months across LICs, 3.6 months across LMICs and 1.4 months across UMICs.

The total amount of pre-tax subsidies to electricity could be enough to cover 70 percent of the monthly transfer of PPP\$110.6, equivalent to a one-off payment of PPP\$72.1 on average to each of the 2 billion working-age women in the developing world, whereas the amount of pre-tax gas subsidies could pay a one-off transfer of PPP\$47.8 on average to all, or 40 percent of the monthly transfer. Interestingly, pre-tax **subsidies to electricity alone could fund a TBI of PPP\$58.4 per month for 14 months across LICs, whereas subsidies to gas could do so for about nine months.**



Photo: Bangladesh

3.3. COVID-19 VACCINES

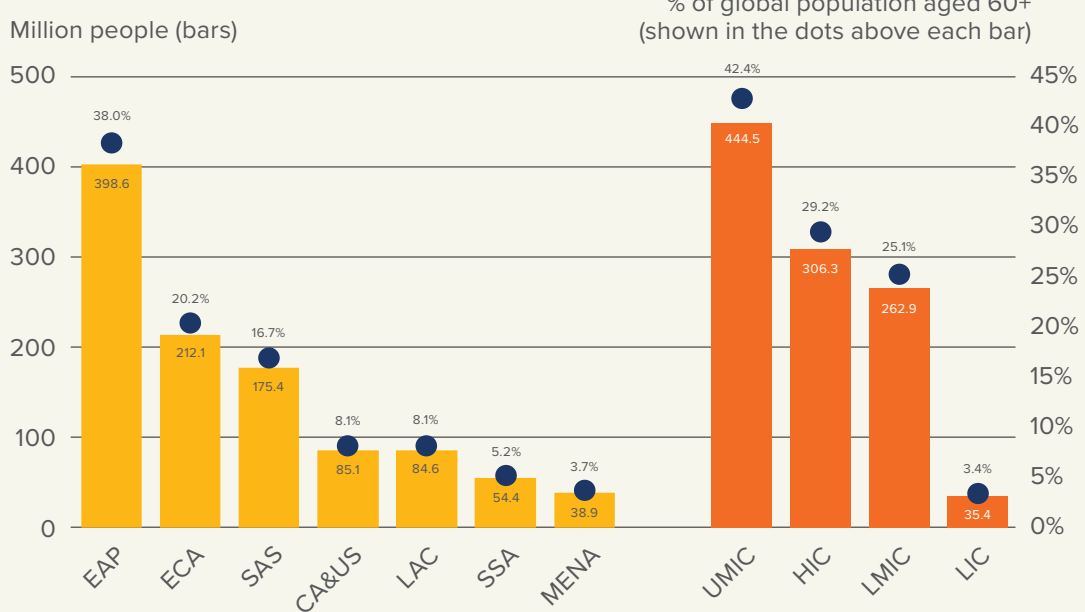
3.3.1. Baseline prices and coverage

According to the United Nations' World Population Prospects, by 2020, there were 7.8 billion people in the world, of whom 13 percent, or 1.05 billion people, were in the priority group for the COVID-19 vaccination, i.e., aged 60 or more, with the lion's share (71.6 percent) living across UMICs and HICs (Figure 12).



Photo: UNDP Comoros

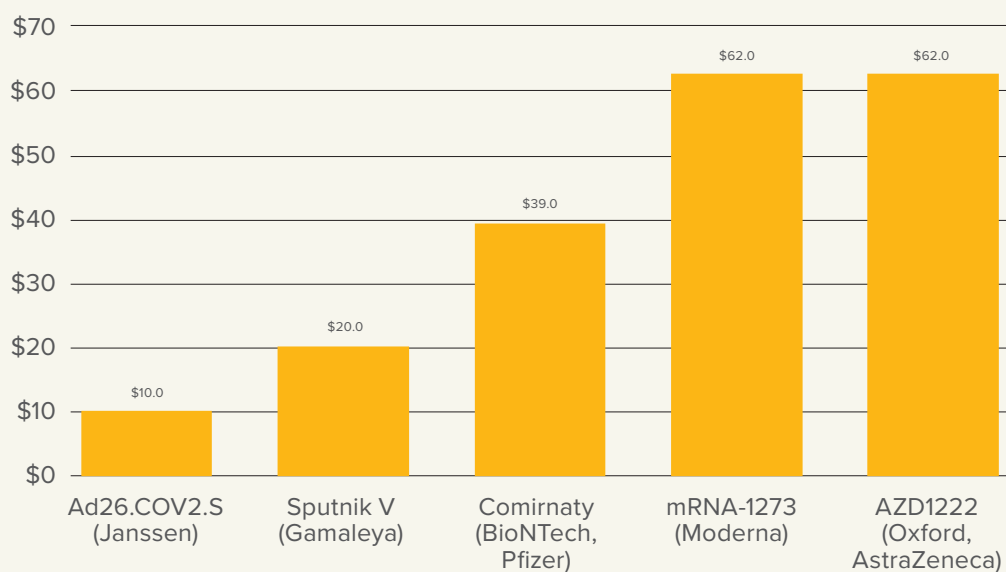
Figure 12: Total population aged 60 or more (million and relative distribution) by geographic region and income group, 2020



Source: Author elaboration based on United Nations, World Population Prospects 2019 (online edition) and the World Bank list of economies (June 2020). Geographic regions: CA&US = Canada and the United States; EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAS = South Asia; SSA = Sub-Saharan Africa. Income group: LIC = low-income; LMIC = lower-middle-income; UMIC = upper-middle-income; HIC = high-income.

To estimate how much it could cost to inoculate both the priority group and the world's population, and how much could be covered if using the amount of pre-tax FFSs to this end, this exercise considers the publicly announced price per dose of the five leading COVID-19 vaccines. As shown in Figure 13, the cost per fully vaccinated person could range from \$10 (2020 prices) for the single-dose Ad26. COV2.S (Janssen) vaccine to \$62 for the two required doses of the mRNA-1273 (Moderna) and AZD1222 (Oxford/AstraZeneca) vaccines.

Figure 13: Costs per fully vaccinated person of leading COVID-19 vaccines and their main characteristics



| Vaccine | Doses | Type | Price per dose |
|------------------------------|-------|------------------|----------------|
| Comirnaty (BioNTech, Pfizer) | 2 | mRNA | \$19,5 |
| mRNA-1273 (Moderna) | 2 | mRNA | \$31,0 |
| Sputnik V (Gamaleya) | 2 | Adenovirus-based | \$10,0 |
| AZD1222 (Oxford/AstraZeneca) | 2 | Adenovirus-based | \$31,0 |
| Ad26.COVID.2.S (Janssen) | 1 | Adenovirus-based | \$10,0 |

Source: Biospace, Johns Hopkins Coronavirus Resource Center, and New York Times Coronavirus Vaccine Tracker. Notes: Average prices announced by manufacturers per fully vaccinated person. Actual prices may vary depending on specific agreements with national governments. Prices are in US dollars.

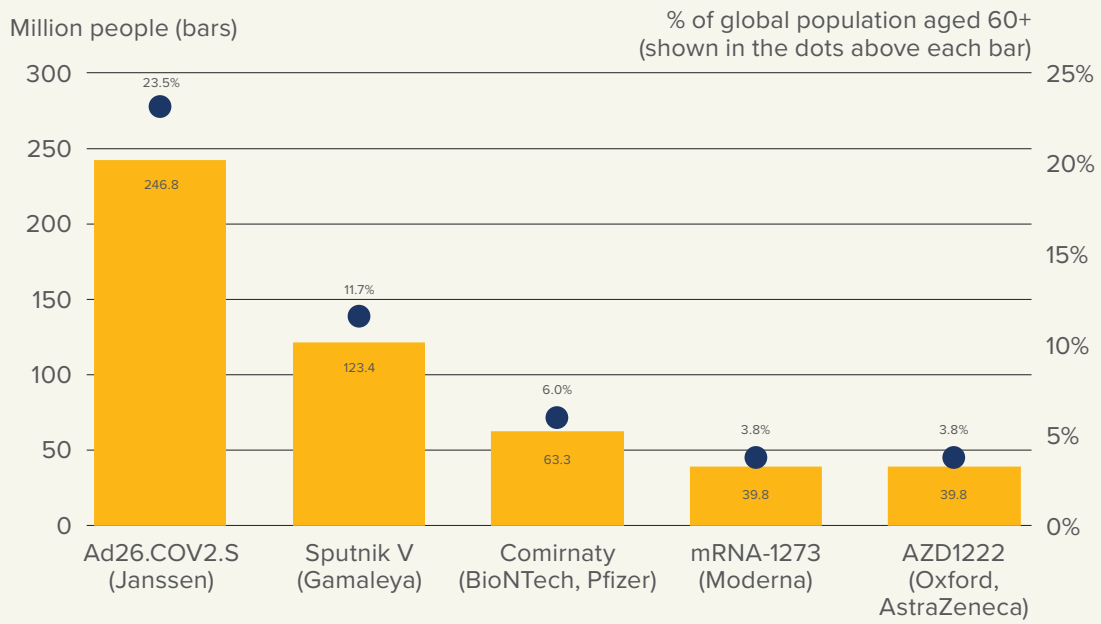
3.3.2. How many people could be vaccinated with the equivalent amount of pre-tax FFSs?

Subsidies to coal

Figure 6 above shows that subsidies to coal averaged a total of \$2.5 billion annually (2019 prices) over 2010–2019, representing just 0.6 percent of the corresponding average annual estimate of \$423 billion in total pre-tax FFS. Using just that relatively small amount, the estimates of the comparison suggest that the pre-tax **subsidies to coal could be enough to fully vaccinate 246.8 million people with the Janssen vaccine, which is equivalent to almost one fourth of the global priority group** (Figure 14). Note from Figure 12 above that this total of 246.8 million potentially vaccinated people represents about 62 percent of all the population aged 60 or more in EAP (398.6 million); more than those in either ECA (212 million) or SAS (175.4 million); and more than those in LAC, MENA and SSA combined (179.9 million).

Figure 14 also reveals that pre-tax subsidies to coal could, alternatively, be enough to fully vaccinate 123.4 million people with the Sputnik V vaccine, which is equivalent to covering all people in the priority group in LAC and MENA combined, or enough to buy mRNA type vaccines to cover between 3.8 percent (39.8 million people) with the Moderna vaccine and 6 percent (63.3 million people) with the Pfizer/BioNTech vaccine.

Figure 14: Total people aged 60 or more that could be inoculated if pre-tax subsidies to coal were used to pay for COVID-19 vaccines, by vaccine manufacturer



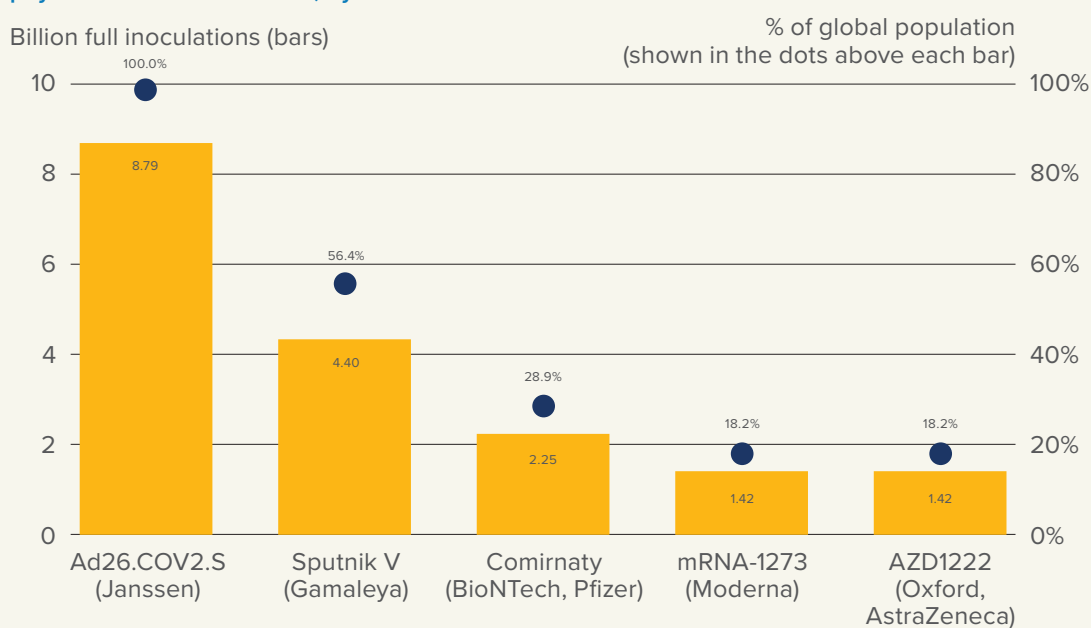
Source: Author calculations based on Figures 12 and 13.

Subsidies to gas

Doing the same exercise but using pre-tax subsidies to gas instead, which account for a fifth of total pre-tax FFSs, and moving to a world coverage setting, the cost of pre-tax subsidies to gas could be enough to vaccinate the entire population of the world, 7.8 billion, with the Janssen vaccine (Figure 15). Based on the pricing of the Sputnik V vaccine, pre-tax **gas subsidies could cover full vaccination schemes for up to 4.4 billion people, more than half of the world's total**, which could cover all the combined population in LICs and LMICs (3.64 billion) or, alternatively, all the combined population in LAC, MENA, SAS and SSA (4.11 billion).

Moreover, using the pricing of, for instance, the mRNA vaccine manufactured by Pfizer/BioNTech, the equivalent of subsidies to gas could buy the two-doses per person for 2.25 billion people (29 percent of the world's population), which is enough to cover almost all the population in ECA (2.39 billion), all the combined population in LAC, MENA and SSA (2.25 billion), all the population of SAS (1.86 billion) or almost two thirds of the total population across LICs and LMICs (3.64 billion).

Figure 15: Total population that could be inoculated if pre-tax subsidies to gas were used to pay for COVID-19 vaccines, by vaccine manufacturer



Source: Author calculations based on Figure 13 and United Nations, World Population Prospects 2019 (online edition).

Subsidies to electricity

As mentioned, subsidies to electricity account for almost a third of total pre-tax FFSs. Using an equivalent amount to cover vaccinating schemes, Figure 16 shows that the cost could allow for the inoculation of twice the entire population of the world (7.8 billion) based on the pricing of the Janssen vaccine, and it could be enough to fully vaccinate 6.6 billion people, or 85 percent of the global population, with the Sputnik V vaccine. The latter amount of people is equivalent to all the combined population in LICs, LMICs and UMICs (6.55 billion) or, if excluding ECA, all the combined population across the remaining regions (6.5 billion).

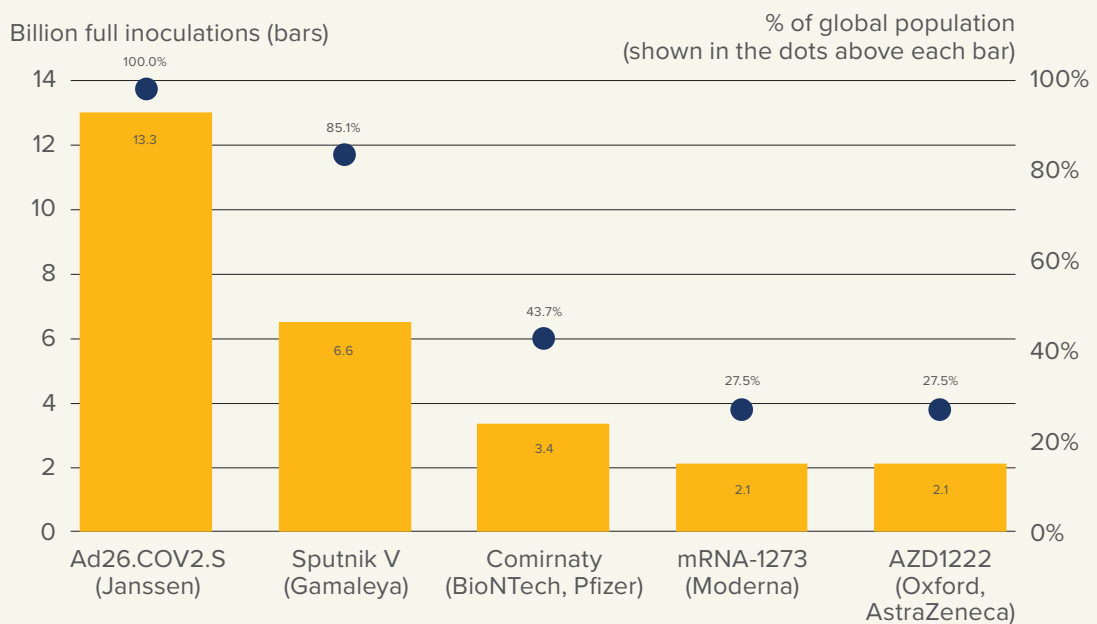
Based on the pricing of the Pfizer/BioNTech vaccine, the amount of pre-tax subsidies to electricity could 'pay' for full dosages for 3.4 billion people, equivalent to 44 percent of the world's population, which is enough to cover either: all the combined population of SAS and SSA (2.99 billion); all the combined population of EAP and ECA (3.31 billion); 97 percent of all the combined population in EAP, LAC and MENA (3.51 billion); or 93 percent of all the population in LICs and LMICs (3.64 billion).

Finally, if the cost of pre-tax subsidies to electricity were allocated to buying full dosages of the Moderna or Oxford/AstraZeneca vaccines, it could cover 2.1 billion people, which represents, for instance, more than the population of SAS (1.86 billion), 90 percent of the population in EAP (2.39 billion people) or 95 percent of the combined population in LAC, MENA and SSA (2.25 billion).



Photo: UNDP Mauritania

Figure 16: Total population that could be inoculated if pre-tax subsidies to electricity were used to pay for COVID-19 vaccines, by vaccine manufacturer



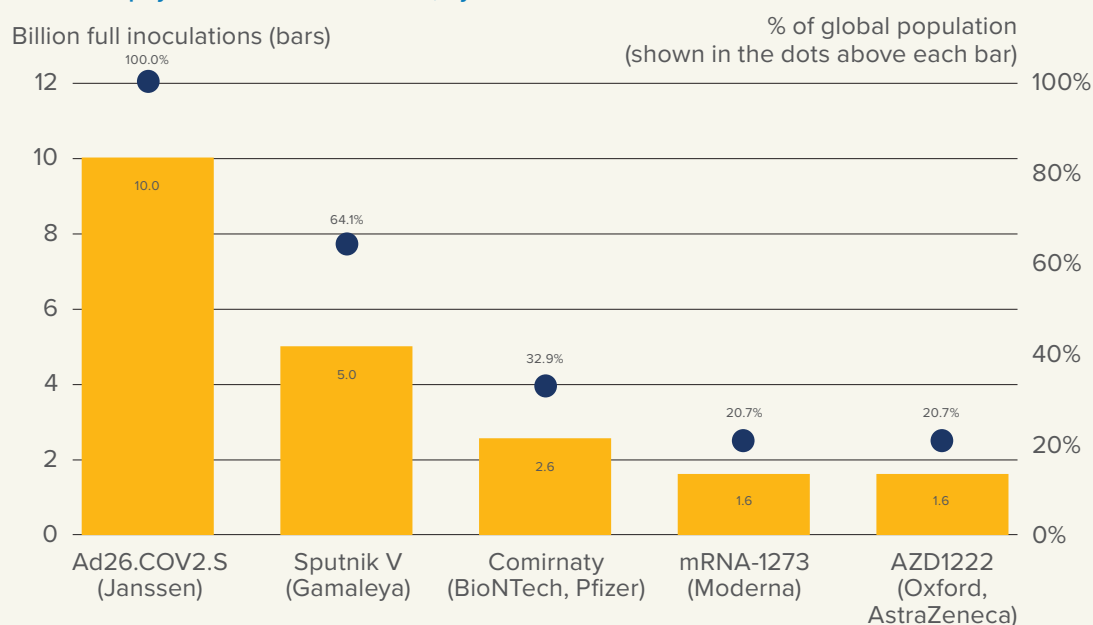
Source: Author calculations based on Figure 13 and United Nations, World Population Prospects 2019 (online edition).

Subsidies to oil products

Pre-tax subsidies to oil account for almost half of global pre-tax FFSs, averaging a total of \$199.8 billion over 2010–2019 (2019 prices). **Using just half of this amount (\$99.9 billion) could be enough to fully vaccinate the world’s population based on the pricing of the Janssen vaccine; up to 5 billion people (two thirds of the world’s total) based on the pricing of the Sputnik V vaccine;** up to 2.6 billion people (a third of the world’s total) with the Pfizer/BioNTech’s vaccine; or about 1.6 billion people (a fifth of the world’s total) with the more expensive Moderna or Oxford/AstraZeneca vaccines (Figure 17).

This volume of Sputnik V inoculations could be, therefore, enough to cover, for instance, 76 percent of the combined populations in LICs, LMICs and UMICs (6.55 billion people) or almost all the combined population in ECA, LAC, SAS and SSA (5.03 billion). Similarly, this volume of Pfizer/BioNTech vaccine could be enough to cover almost 90 percent of the combined population in either LMICs (2.95 billion) or UMICs (2.91 billion), whereas this volume of Moderna or Oxford/AstraZeneca vaccines could be enough to cover either all the population in SSA (1.14 billion) or all the combined population in LAC and MENA (1.12 billion).

Figure 17: Total population that could be inoculated if half of pre-tax subsidies to oil products is used to pay for COVID-19 vaccines, by vaccine manufacturer



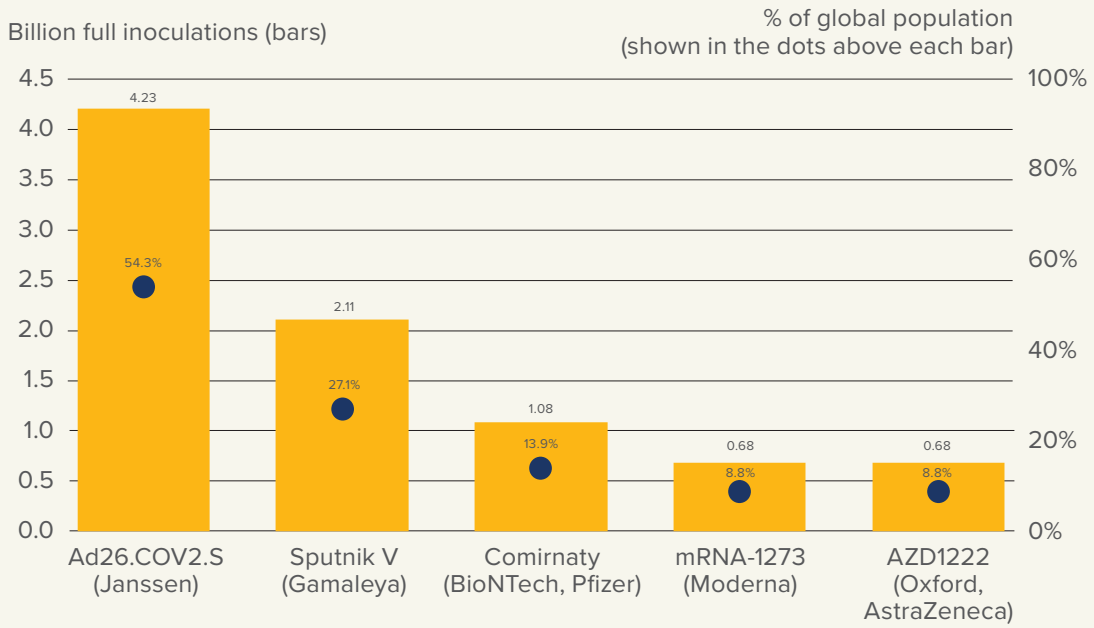
Source: Author calculations based on Figure 13 and United Nations, World Population Prospects 2019 (online edition).

10 percent of pre-tax subsidies to all fossil fuels

Given the previous scenarios, the full amount of total pre-tax FFSs (\$423 billion on average over 2010–2019) would allow for the inoculation of the world’s population many times based on the vaccine options at the lower end of the pricing range, in particular using the Janssen and Sputnik V vaccines. How many people could be fully vaccinated with an amount equivalent to just 10 percent of pre-tax FFSs?³ Figure 18 shows that **just 10 percent of pre-tax FFSs could be enough to fully vaccinate more than half of the world’s population (4.23 billion people) with the Janssen vaccine** or, alternatively, 2.11 billion people (27 percent of the world’s total) with the Sputnik V vaccine, 1.08 billion people (14 percent of the world’s total) with the Pfizer/BioNTech vaccine or 680 million people (almost 9 percent of the world’s population) with either the Moderna or Oxford/AstraZeneca vaccines.

³ A scenario of 20 percent of pre-tax FFSs is almost equivalent to the scenario using pre-tax subsidies to gas only (Figure 15); a scenario of 25 percent is almost equivalent to using half the pre-tax subsidies to oil (Figure 17); or a scenario of 33 percent of total pre-tax FFSs is equivalent to using pre-tax subsidies to electricity only (Figure 16).

Figure 18: Total population that could be inoculated if 10 percent of pre-tax FFSs were to pay for COVID-19 vaccines, by vaccine manufacturer



Source: Author calculations based on Figure 13 and United Nations, World Population Prospects 2019 (online edition).

The volume of people that could be inoculated with the Sputnik V vaccine (2.11 billion) is equivalent to cover almost three fourths of the population across either LMICs (2.95 billion) or UMICs (2.91 billion), and it represents three times the required full dosage across LICs (0.69 billion). That volume would also be enough to cover the combined population in ECA, LAC and MENA (2.04 billion). The total of 1.08 billion people vaccinated with the Pfizer/BioNTech vaccine would represent 1.6 times the entire population in LICs (0.69 billion) and almost the entire population of SSA (1.14 billion). Finally, the 680 million people who could benefit from the Moderna or Oxford/AstraZeneca vaccines represents almost all the combined population across LICs (0.69 billion) or the entire population in LAC (0.65 billion).



Photo: UNDP Columbia

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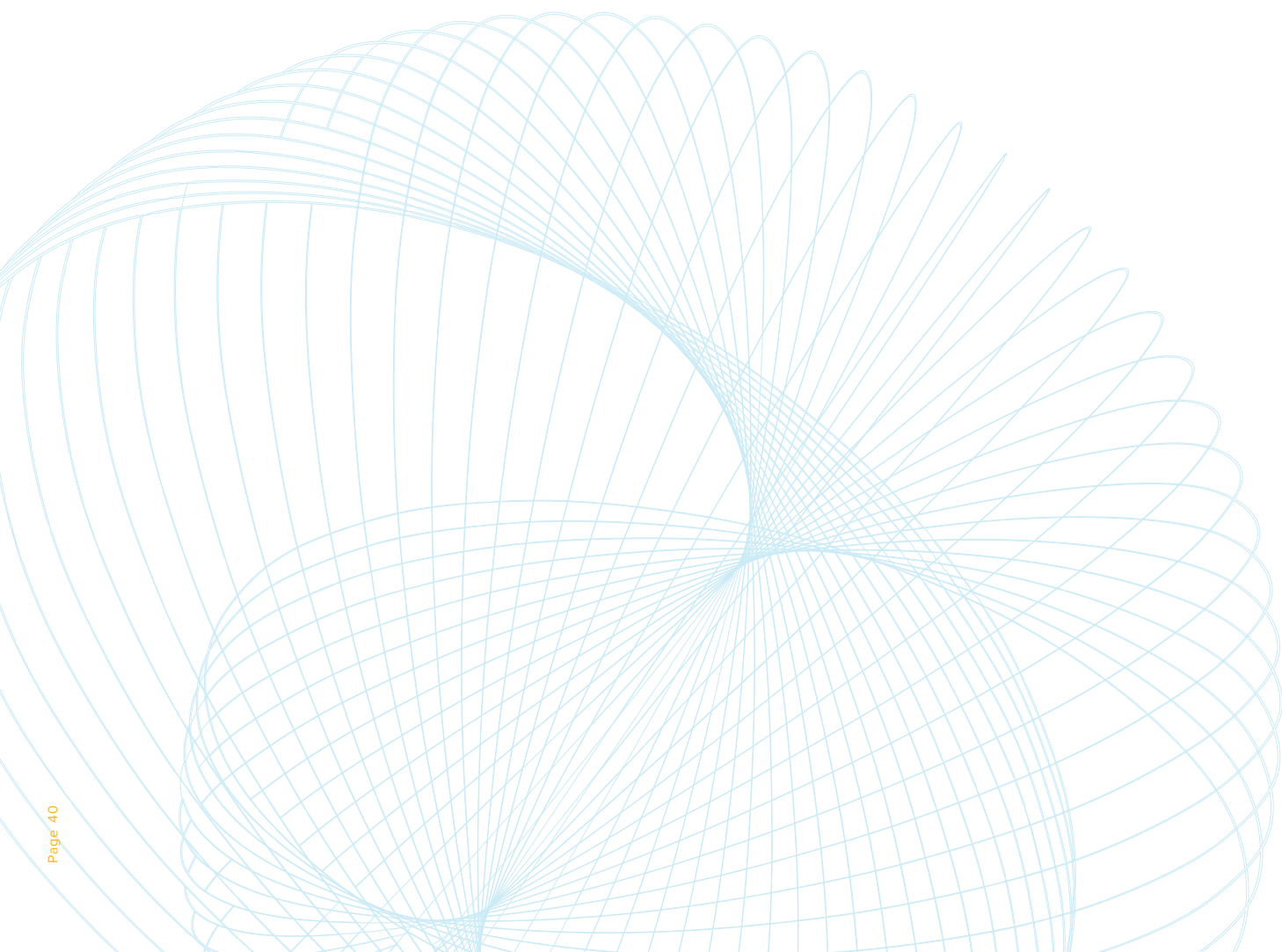
Photo: UNDP Pakistan

ANNEX A: POVERTY GAP INDEX

Following Foster, Greer and Thorbecke (1984), this measure (PG) can be formalized as follows:

$$PG = \frac{\sum_{i=1}^q \left(1 - \frac{y_i}{z}\right)}{n}$$

where z denotes the value of the poverty line, which in the exercises performed in the main text corresponds to the international thresholds of PPP\$1.90 a day and PPP\$3.20 a day per person (PPP\$, 2011 prices); y_i represents the household per capita income of the individual i who is living in poverty—that is, her income is lower than the value of z ; q is the total number of people living in poverty; and n is the total population. In short, this measure first computes for each individual in poverty the shortfall in income as a proportion of the poverty line, which is given by the element $\left(1 - \frac{y_i}{z}\right)$; for instance, a shortfall of 0.30 would indicate that the income of a poor person i is 30 percent below the value of the poverty line. If all the individual shortfalls of the poor population q are added up and then divided by the total population n , poor and non-poor combined, the measure PG then yields the *per capita shortfall*, as a percentage of the poverty line, between the incomes of all the poor persons and the value of the poverty line.



ANNEX B: DATA SOURCE FOR POVERTY GAPS AND TEMPORARY BASIC INCOME SCHEMES

The main data source for the estimations is the World Bank's [PovcalNet](#) tool on harmonized household income and expenditure surveys. The specific data utilized correspond to the downloadable csv files under the 'download economies table' on the web interface, which provides information on per capita income or expenditure measures at 2011 PPP exchange rates, as well as an array of poverty measures for any user-specified poverty line, including the poverty gap ratio measure, or per capita deficit, shown in Annex A. These files include information for 166 developed and developing economies covering around 97 percent of the world's population in 2018.⁴ In 165 economies, the latest available year is 2018, whereas in the remaining one, India, the most recent data corresponds to 2015.

These 166 data points correspond to the country-level series with extrapolations to the most recent year. That is, given that many countries do not have available survey data for every year, the World Bank performs extrapolations, or interpolations, of household per capita income or consumption of the closest survey year to a so-called reference year with the aim of reporting global and regional aggregates of poverty for a given point in time that is common to all countries in the dataset. This procedure assumes that the growth in income or consumption in the survey is distribution-neutral and that it can be approximated by growth in national accounts.

The estimations related to the poverty gap and the different scenarios of temporary basic incomes in this note are restricted to 132 countries that are considered emerging or developing economies, even though some of them are categorized by the World Bank as high-income economies given their level of per capita gross national income. This subset of 132 developing countries covers approximately 83 percent of the world's population in 2018. The list of excluded countries comprises 27 high-income countries and one dependency (Taiwan, China) not included in PovcalNet's geographic regions, plus six high-income countries in Europe and Central Asia.

Excluded 33 high-income and developed countries and one high-income dependency (14 percent of the world's population): Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Arab Emirates, United Kingdom and United States.

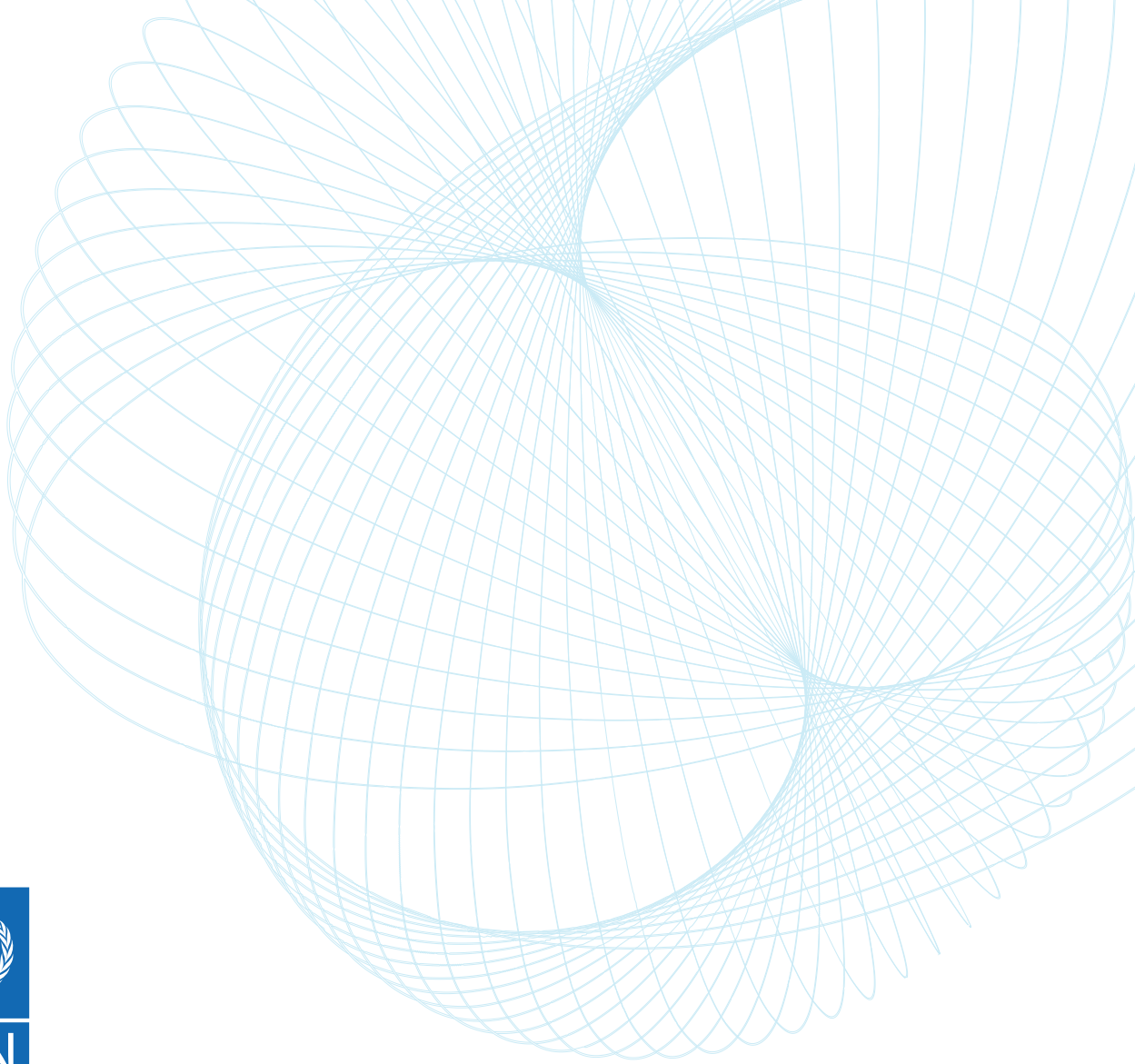
⁴ The remaining 3 percent of the global population is concentrated in 30 countries for which there are no available data allowing estimates of comparable indicators such as those presented in this paper. See list of countries in text.

No available data in 30 countries (3 percent of the world's population):

Afghanistan, Andorra, Antigua and Barbuda, Bahamas, Bahrain, Barbados, Brunei Darussalam, Cambodia, Cuba, Dominica, Equatorial Guinea, Eritrea, Grenada, Kuwait, Libya, Liechtenstein, Marshall Islands, Monaco, Nauru, New Zealand, North Korea, Oman, Palau, Qatar, San Marino, Saudi Arabia, Singapore, Somalia, Saint Kitts & Nevis and St. Vincent & Grenadines.



Photo: UNDP Bangladesh



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