



The Spending Challenge for Reaching the SDGs in Sub-Saharan Africa

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Accepted: 23 August 2022 / Published online: 11 October 2022

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Abstract

This paper documents the additional spending that is required for sub-Saharan Africa (SSA) to achieve meaningful progress in Sustainable Development Goals (SDGs) by 2030. Benin and Rwanda are presented in detail through case studies. The main lessons are (i) average additional spending across SSA is significant, at 19% of GDP in 2030; (ii) countries must prioritize their development objectives according to their capacity to deliver satisfactory outcomes, (iii) financing strategies should articulate multiple sources given the scale of additional spending, and (iv) strong national ownership of SDGs is key and should be reflected in long-term development plans and medium-term policy commitments.

Keywords Sustainable development goals · Fiscal policy · Sub-Saharan Africa

JEL Classification I15 · O15 · O23

Résumé

Cet étude documente les dépenses supplémentaires nécessaires afin que l'Afrique sub-Saharienne (en anglais: « sub-Saharan Africa», SSA) réalise un progrès significatif dans les objectifs de développement durable (en anglais, « Sustainable Development Goals», SDGs) d'ici à 2030. Le Benin et le Rwanda sont présentes de façon détaillée à travers des études de cas. Les leçons principales sont: 1. Les dépenses additionnelles requises en SSA sont approximativement 19% du PIB en 2030; 2. Les pays doivent prioriser les objectifs de développement en base à leur capacité d'y réussir de façon convenable; 3. Le financement des stratégies devrait inclure plusieurs sources, compte tenu de l'échelle des dépenses supplémentaires nécessaires; 4. Une forte appropriation

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nationale des SDGs est clé; elle doit être représenté soit dans les plans de développement à longue durée, soit dans les engagements de politique à moyen terme.

Introduction

Sub-Saharan Africa (SSA) faces considerable development challenges. Rapid population growth, high-persistence of inequality (Odusola et al. 2017)¹, and prevalence of fragility (Calderon et al. 2019)² in certain countries explain a very slow decline in the level of extreme poverty³ from 54% in 1990 to 41% in 2015 while global extreme poverty was reduced from 36 to 10% (Fig. 1a). Other regions have experienced much larger reductions of their extreme poverty rates: over the same period, extreme poverty has decreased from 62 to 2% in the Asia and Pacific region—driven by the reduction of extreme poverty in China and India—and from 14 to 4% in the region of Latin America and Caribbean. Some progress has been achieved in maternal, infant, and child mortality. But life expectancy at birth in SSA countries is lagging than in other regions of the world with an average of 60 years against 74 across the rest of the world (Fig. 1b). More needs to be done to provide universal access to education, health, electricity and potable water, and improve the quality of infrastructure.

In 2015, SSA has embraced, at the highest political level, the Addis Ababa Action Agenda to finance development and the Sustainable Development Goals (SDGs). Building on progress achieved under the Millennium Development Goals, the SDGs offer a wide-range of development targets to build a world free of poverty and deprivation, conscious of the planet's limits. This sustainable development agenda is consistent with the Africa Union's Agenda 2063 that seeks to accelerate the implementation of past and existing continental initiatives for growth and sustainable

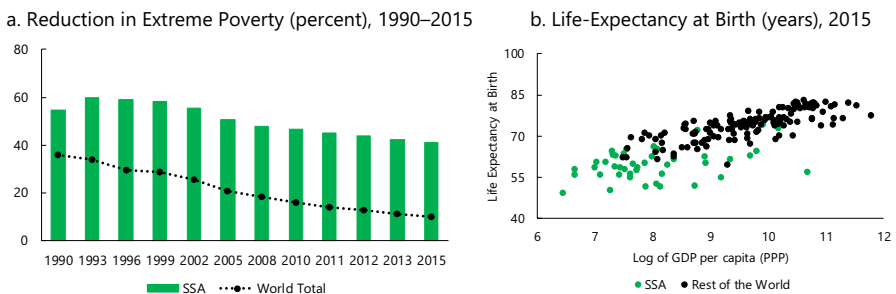


Fig. 1 Extreme poverty and life expectancy at Birth in Sub-Saharan Africa. *Source* authors' calculation on IMF FAD Expenditure Assessment Tool (EAT) and World Bank data

¹ 10 of the 19 most unequal countries in the world are from Africa.

² In 2017, 28 percent of the total population in sub-Saharan Africa lived in countries with fragile situations. We adopt the World Bank's definition of fragility: "Fragile situations include countries or territories with: (i) a harmonized Country Policy and Institutional Assessment (CPIA) rating of 3.2 or less; and/or (ii) the presence of United Nations and regional peacekeeping or peacebuilding missions with the exclusion of border monitoring operations, during the past three years."

³ i.e., ratio of population living with less than US\$1.90 a day.



development. SSA countries are in the process of aligning their own national development plans to the SDGs.

This paper argues that a first and key step in operationalizing a strategy to achieve the SDGs is the costing of spending required to achieve high development outcomes. Building on a methodology developed by the IMF to quantify such additional spending in five sectors—education, health, water and sanitation, roads and electricity—this paper presents global estimates for SSA. Spending estimates for Benin and Rwanda are discussed in detail, as well as their sectoral costing.

Additional spending needs to achieve the SDGs are considerable in many SSA countries. Relative to the region's GDP, the median sub-Saharan African country must spend an extra 18.8% in 2030 in education, health, water and sanitation, roads, and electricity to achieve high development outcomes. These needs are shared equally between human and social investment and physical capital investment. Additional spending estimates cover both public and private spending in each sector.⁴ Therefore, SSA countries will need to mobilize all sources of financing—public and private, internal and domestic—to achieve the SDGs. Beyond financing challenges, strengthening national ownership of development goals and improving governance and the business environment are also critical.

Benin and Rwanda are two low-income SSA countries with spending estimates comparable to the SSA average; they demonstrate the multifaceted challenges faced by SSA countries. Benin and Rwanda spending estimates are, respectively, 21 and 19% of GDP in 2030. Despite facing challenges of comparable size, Benin and Rwanda have different current development outcomes reflecting differences in economic endowment, economic policies, and resilience to various shocks, and calling for different investment priorities in the future. Indeed, Benin has been a stable country since the 1990s while Rwanda went through some periods of fragility in early 1990s which translated into Benin having a GDP per capita 1.7 times higher than Rwanda's during the same period. However, since the mid-1990s, Rwanda has managed to record a sustained growth stronger than Benin's, reducing the GDP per capita gap between the two countries to a factor of 1.1. In addition, while Benin is currently on par with SSA average along key state capacity and development indicators, Rwanda overperforms relative to other SSA peers (Table 1).⁵ Beyond these differences, the two countries share some characteristics: (i) they show strong ownership of the UN goals with national development plans well aligned with the SDGs, and (ii) they are experiencing important development progress even if large gaps remain.

The rest of the paper is organized as follows: Section II provides an overview of the performance of SSA countries with respect to the SDGs and the findings of the additional spending required to close the gap. Sections III deepens on the cases of Benin and Rwanda. Section IV concludes with key lessons on how to operationalize costing estimates at the regional and country levels.

⁴ After 2030, education and health spending would be mostly recurrent, while infrastructure spending would decrease to cover depreciation of the capital stock built through 2030.

⁵ Between 1996 and 2017, Benin recorded an average growth rate of 4.4 percent against 8.1 percent in Rwanda.



Table 1 State capacity and development in Benin and Rwanda

	Benin	Rwanda	SSA average
Life expectancy at birth (2016)	60.9	67.1	60.4
Government effectiveness (2017) (from 2.5 (worst) to 2.5 (best))	- 0.6	0.3	- 0.8
Control of corruption (2017) (from 2.5 (worst) to 2.5 (best))	- 0.5	0.6	- 0.7
Tax-to-GDP ratio (2017)	13.2	15.5	13.6

Source Authors' calculations on World Bank Worldwide Governance Indicators and World Development Indicators



Fig. 2 SDG composite index and human development index, by Regions. Source Authors' calculations on data from the SDG Index and Dashboards Report 2019 and UNDP Human Development Index

Development Outcomes and Spending Estimates in Sub-Saharan African Countries

Overview of Development Outcomes

Current development performance of SSA countries, as measured by the SDG global index and the Human Development Index, is lagging that of all other regions in the world. There is more variation across SSA countries in current development achievements than in any other region in the world (Fig. 2a). But the majority of SSA countries have an SDG global index score lower than the median score in all other regions, with the median SDG index score across SSA countries on average 25% lower than the median in other region (Fig. 2a). With US\$1574 of income per capita (US\$3906 in PPP terms) in 2018, sub-Saharan Africa remains the poorest region in the world. This income gap largely explains SSA overall development gap with an average index of Human Development averaging 0.52 compared to 0.76 in the rest of the world (Fig. 2b).

In all five sectors at the core of sustainable and inclusive growth—health, education, roads, electricity and water and sanitation—SSA median outcomes are behind medians across EMEs. In the selected five sectors, there is large variation in



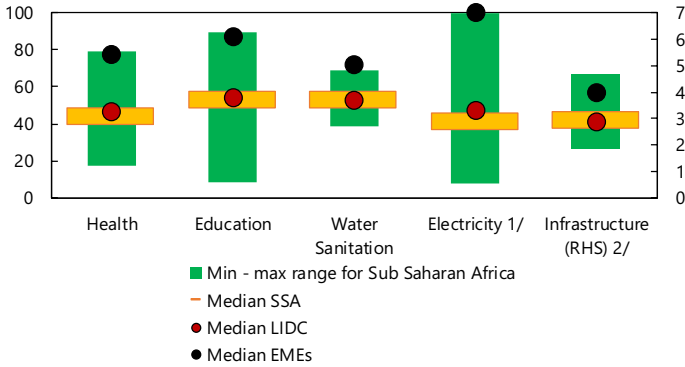


Fig. 3 Sub-Saharan Africa performance in selected SDGs. *Source* Authors’ calculations on data from the *SDG Index and Dashboards Report 2019*. 1 Indicator: Access to electricity (percentage of population). 2 Indicator: Quality of Infrastructure. *Note* These indicators range between 0 (lowest outcome) and 100 (highest outcome). For infrastructure, the index takes values between 0 (lowest outcome) and 7 (highest outcome)

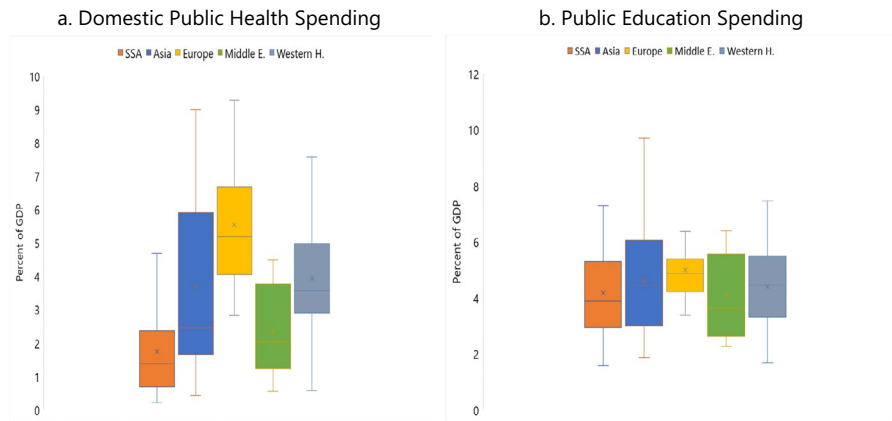


Fig. 4 2015 Public expenditure in health and education. *Source* Authors’ calculations using World Development Indicators, World Bank

development outcomes across sub-Saharan African countries, except in water and sanitation where most SSA countries concentrate around an average SDG score of 49 out of 100 (Fig. 3).

Additional progress will require boosting investment in human, social and physical capital, beyond current expenditure levels. In education and health, public expenditure averaged 4.6 and 2.8% of GDP, respectively, in 2015 across SSA countries and these levels have only slightly increased since 2000. While in health SSA average is lagging other emerging economies’ average of 4.2% of GDP, the education average across SSA countries is slightly above that in other EMEs—reaching 4.1 in 2015 (Fig. 4a and b)—also reflecting differences in demographics



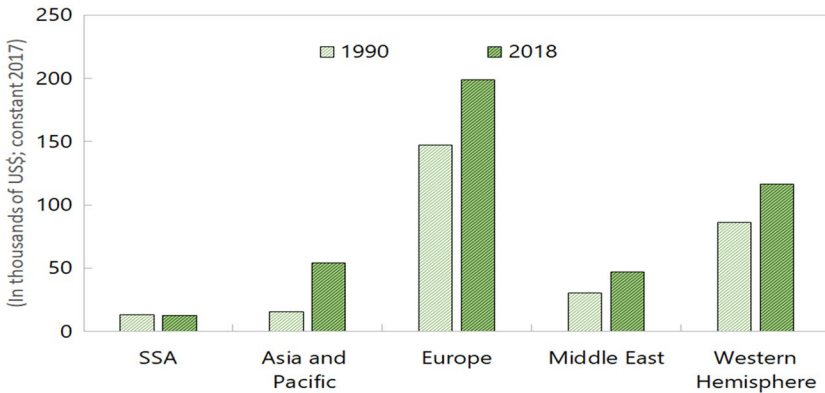


Fig. 5 Public real capital stock per capita. *Source* Authors' calculations using Penn World Table 10.0

with a much younger SSA population. In infrastructure, the average real capital stock per capita remained almost flat between 1990 and 2015, while it has increased on average by 5.4% and 3.4% per year in other LIDCs and emerging markets, respectively, over the same period (Fig. 5).

While overall performance is lagging in SSA, a few indicators show that important progress has been achieved in the past three decades. Between 1990 and 2017, net primary enrollment rate has increased by almost 30 percentage points and infant mortality has been halved (Table 2). Decent progress in primary healthcare and in the containment of communicable diseases has contributed to a 22% increase in life expectancy at birth. Access to electricity has improved. However, half of SSA population still lacks access to reliable electricity which slows down considerably the development of the region.

Large outcome dispersion suggests that high development performance is reachable by SSA countries. Rwanda, for instance, ranks relatively high with respect to the quality of its infrastructure, with a score of 4.7 compared to a median score of 2.9 across SSA countries. However, high-performing SSA countries reach only median levels achieved by emerging economies.

Additional Spending Estimates

Estimates of the spending required to reach the SDGs for 37 SSA countries are derived following the methodology developed by Gaspar et al. (2019). The methodology quantifies the annual cost of achieving high SDG performance in five sectors—education, health, water and sanitation, electricity, and roads—(Box 1). Estimates correspond to the additional total expenditure required in the year 2030 compared to what countries spend in 2016; they are reported as percentage points of 2030 GDP and refer to *total* expenditure, i.e., public and private.⁶ Since

⁶ For education and health, results are reported as the difference between the share of 2030 GDP in spending consistent with high performance and the current level of spending as a share of 2030 GDP. For physical capital, the spending to close the infrastructure gap between 2019 and 2030 is annualized and expressed in percent of 2030 GDP.



Table 2 SSA: performance in selected SDGS indicators

	1990	2000	2010	2017
	53	60	74	78
Infant mortality rate (per 1,000 live births)	108	93	65	52
Life expectancy at birth (years)	50	51	57	61
Access to electricity (percent of population)		26	34	45

Source World Development Indicators, World Bank

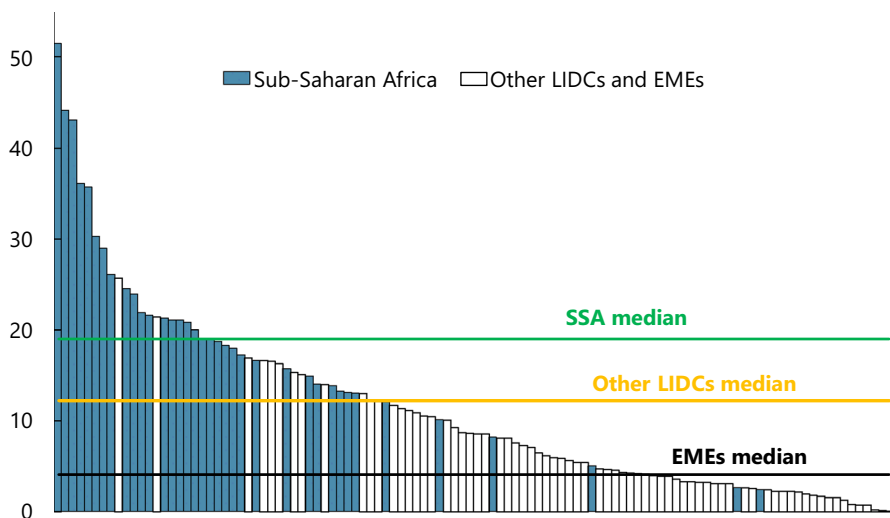


Fig. 6 Additional spending estimates in 2030, by income group. (percentage points of GDP). Source Authors' calculations based on Gaspar et al. (2019)

high-performing countries with comparable levels of GDP per capita are used as benchmarks for each country, costing estimates assume high spending efficiency and can be interpreted as a lower spending floor needed to achieve the benchmarked progress in SDGs.

The median SSA country faces additional spending of about 19% of GDP, which is almost four times larger than other typical low-income and developing or emerging country.⁷ The median additional cost required to achieve high performance in the selected five SDGs is estimated at 19% of SSA GDP in 2030 larger than the median additional spending estimated at 12% of GDP and 4% of GDP for non-SSA LIDCs and EMEs respectively (Fig. 6).

Additional spending among SSA countries is equally driven by required investment in social and human capital and investment in physical capital. Total needs

⁷ Gaspar et al. (2019).



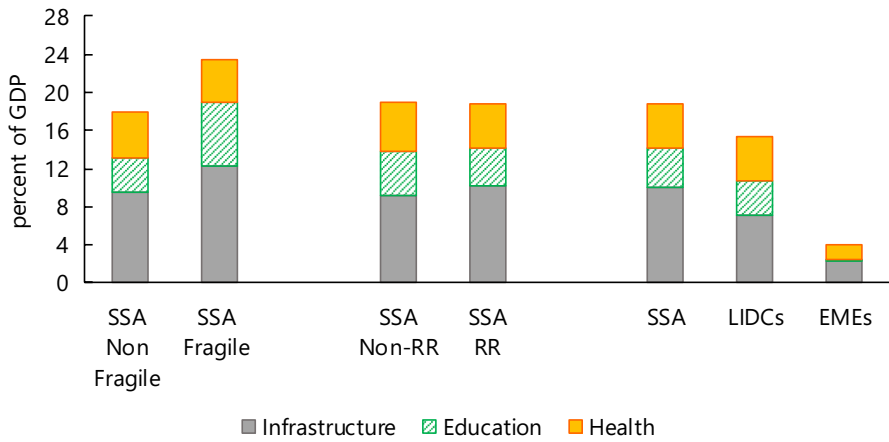


Fig. 7 Additional Sectoral Spending Estimates in 2030, by SSA and income group (percentage points of GDP). *Source* Authors’ calculations based on Gaspar et al. (2019). *Note* “RR” stands for “Resource Rich” countries and “Non-RR” for “Non-Resource Rich” countries

across the five selected sectors are equally distributed between the human capital sectors—with health and education needs representing about 9% of GDP—and the physical capital sectors—with needs in water, electricity and roads summing up to 10% (Fig. 7). Additional physical infrastructure investments are 40% higher than average infrastructure needs across LIDCs and four times more than the EMEs’ average.

There is substantial variation of spending estimates across SSA countries. Variation across SSA countries reflects heterogeneity in the levels of development and other country’s circumstances. For example, with 24% of GDP in 2030, fragile countries have a 6 percentage points higher additional spending requirement than non-fragile SSA countries due to higher political, economic, and social pressures. However, there is no major difference between resource-rich and non-resource-rich countries.

Population dynamics and the initial level of development explain most of the differences in additional spending between SSA countries and other countries:

- **In education**, additional spending needs in SSA countries average 4.2% of 2030 GDP, against 0.3% in other LIDCs and EMEs. SSA countries’ demographics explain 91% of the difference of additional spending needs with other LIDCs and EMEs. Indeed, SSA countries are expected to have a much larger share of student age population in 2030 (almost half the population with 47%) compared to other LIDCs and EMEs (30%).⁸

⁸ Countries are mapped for the benchmarking according to three 2016 GDP per capita buckets: (i) between USD 0 and 3,000, (ii) between USD 3,000 and 6,000, and (iii) between USD 6,000 and 15,000. These buckets are used to derive benchmarked inputs. High-performing low-income developing countries are those with an SDG4 education index above 80.



- **In health**, additional spending needs in SSA countries average 4.7% of 2030 GDP, against 1.5% in other LIDCs and EMES. Almost half the difference in spending needs between SSA countries and other LIDCs and EMES is driven by their lower GDP per capita, which requires a costlier combination of health staff density and salaries in proportion to GDP per capita than for other LIDCs and EMES. The rest is driven by other factors, including the differences in the current share of non-compensation spending in total spending.⁹
- **In roads**, additional spending needs in SSA countries average 6.9% of 2030 GDP, against 0.9% in other LIDCs and EMES. SSA countries' lower 2030 GDP per capita and initial lower RAI explain 84% of the difference in additional spending needs between now and 2030 compared to other LIDCs and EMES.¹⁰¹¹

Box 1. Costing Methodology in Five SDG Sectors

The methodology developed by Gaspar et al. (2019) follows three steps: (i) identifying the main cost parameters, including inputs and their associated unit costs; (ii) benchmarking the cost parameters to their levels in countries with comparable GDP per capita and reaching high development outcomes today; and (iii) estimating the spending levels associated with these benchmarks, given individual country's GDP per capital and population growth projections until 2030.

Education Total spending for education can be expressed as a function of the number of teachers, teacher salaries, and the shares of non-compensatory current expenses and capital spending. All these main inputs are benchmarked against median values observed today in countries with comparable per capita income and high education outcomes. Education spending in 2030 is then estimated using the corresponding benchmarked main inputs and unit costs and countries' projections for economic growth and school-age demographics, assuming full enrollment for at least 2 years of preprimary and tertiary education, and 12 years of primary and secondary education.

Health Likewise, total spending in health is calculated as a function of doctor salaries, number of doctors and other medical personnel, the ratio of non-doctor to doctor wages, and the shares of non-compensatory current expenses and capital spending. All these main inputs are benchmarked against median values observed today in countries with comparable per capita income and high health-care outcomes. Health spending in 2030 is then estimated based on the benchmarked parameters using countries' projections for growth and demographics.

⁹ The assumed enrollment rates are consistent with target rates of 50% for preprimary and tertiary education, and 100% for primary and secondary education.

¹⁰ The ratio of non-doctor to doctor wage is assumed to be 0.5; shares of capital and other current spending to total spending are imputed using the World Bank income group averages.

¹¹ High-performing low-income developing countries are those with an SDG3 health index above 70.



Roads Road density—proxy for road network—is regressed on variables capturing the size and structure of the economy, including GDP per capita, population density, agriculture and manufacturing sector shares in the economy, urbanization rate, and the World Bank’s Rural Access Index (RAI), for a cross section of low-income countries and emerging economies. The RAI is used as the proxy for adequate access to the transport system. Using the regression results, additional kilometers of roads needed to ensure road access for all are estimated, proxied by raising the RAI to at least 75% in LIDCs, while accounting for projected changes in population and GDP per capita through 2030. The total cost of the additional road network is derived by multiplying the estimated additional kilometers by the unit cost of constructing one kilometer—set at a minimum of USD 500,000, following Imi et al. (2016) unless country-specific estimates suggest otherwise—and accounts for depreciation.

Electricity Additional electricity network corresponds to a 100% access of projected population in 2030, while accounting for an increase in per capita consumption in line with GDP per capita. The total cost of the additional electricity network is estimated using the unit cost per kilowatt of generation capacity set by the World Bank (2013) at USD 2250.

Water The cost of providing basic access to improved water and sanitation is derived using the WASH World Bank methodology described in Hutton and Varghese (2016). The model estimates the cost of meeting the water, sanitation, and hygiene (WASH)-related targets of SDG 6, using unit costs calibrated at the country level, including costs for capital investment, operations, and major capital maintenance to sustain the life span of the infrastructure created.

Benin and Rwanda Case Studies

Benin

Benin’s main development plans are all anchored in the achievement of the SDGs. Two key reports formalize the government’s commitment to SDGs: the *Programme d’Actions du Gouvernement* (PAG, 2016–21) and the *Plan National de Développement* (PND, 2018–2025).¹² The PAG identified three big levers that could help Benin meet the objectives of the 2030 Agenda for Development: priority projects, 45 flagship projects (*projets phares*), and structural reforms.¹³ The PND integrates

¹² Another important document is the *Programme de Croissance pour le Développement Durable* (PC2D, 2018–2021). The PC2D builds on the orientations of the PAG and the priority SDG targets retained by the government and operationalizes the PND. The PC2D provides also a framework to facilitate the dialog between the government and donors for the financing of the SDGs.

¹³ In addition, a work on the linkages between the PAG with the prioritized SDG targets in the different sectors was carried out by the Ministry of Planning and Development.



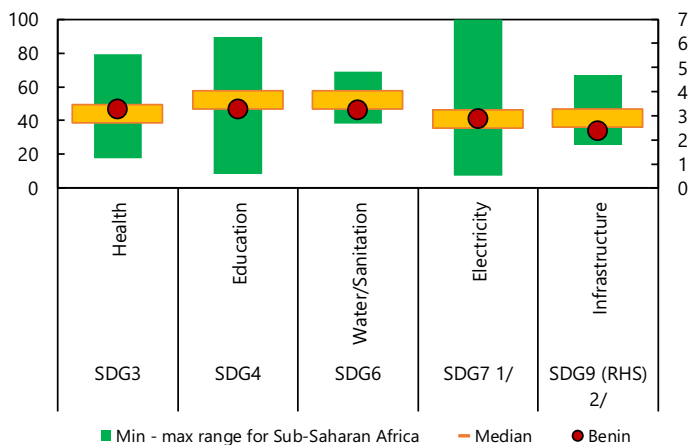


Fig. 8 Benin: 2018 performance in selected SDG sectors. *Source:* Authors' calculations using Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. in *SDG Index and Dashboards Report 2019*. 1 Indicator: Access to electricity (percentage of population). 2 Indicator: Quality of infrastructure (RHS)

strategic guidelines that support ministries in formulating their sectoral development programs consistent with the SDGs, thus becoming the reference for all development initiatives in the next eight years. In addition, the definition of all cross-cutting themes in the PND is based on the SDGs.¹⁴ An analysis based on the Rapid Integrated Assessment—a tool developed by the UNDP to facilitate mainstreaming of SDGs into national and local plans—shows that the Benin's strategic documents are at least aligned at 70% with the SDGs (République du Benin, 2017a and 2017b). In addition, since 2017, the government of Benin have started publishing voluntary national reviews of progress on the SDGs.

Benin has made progress on key SDGs. On education, Benin has among the highest net primary enrollment rate in SSA, at about 96% in 2018. On health, steady implementation of measures providing social assistance and support for vulnerable groups (free health measures for cesarean, cases of malaria among pregnant women, care for children aged 0–5, etc.) enabled Benin to achieve performance in terms of accessibility and quality of health services. Access to improved water source in rural areas has increased from 57.2% in 2010 to 67.7% in 2015. In urban areas, access has reached 84.8% in 2015 from 58.7% in 2010 (République du Benin, 2018a). Finally, Benin has recently made progress on the construction of paved roads.

Despite this progress, Benin is far from reaching the SDGs (Fig. 8). For example, on education, various indicators that measures the efficiency and the quality of the education system are weak: access rates from primary to secondary school is only 66%; completion rates in the secondary and tertiary are 45% and 28%, respectively

¹⁴ The PND is organized around four major themes, namely (i) the human capital and well-being of the populations; (ii) economic growth: productivity and competitiveness; (iii) the environment, climate change, and territorial development; and (iv) governance.



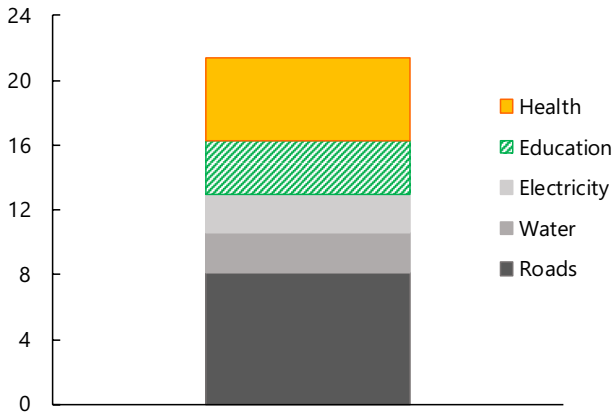


Fig. 9 Benin: estimates for the additional spending in 2030, by sector (percent of 2030 GDP). *Source* Authors' calculations based on Gaspar et al. (2019)

(République du Benin, 2017c). In addition, because of repetition and drop-out, a high proportion of children—27% of 9 to 17 years-old—are out of school. Benin also performs poorly with respect to the expected years of schooling and literacy rate of 15–24-year-olds, suggesting a low quality of the education system. In 2016, only 19.7% of the population has access to improved sanitation (SDSN, 2017) even though the length of gutters has doubled in one year to reach 34.8 km in 2015 and only 41.4% of Benin's population has access to electricity.

Given these challenges, the additional spending to achieve the SDGs in the five selected sectors is considerable—about 21% of GDP in 2030. Appendix 1 provides detailed sectoral estimates and results are summarized below (Fig. 9):

- In education**, Benin would need to spend 8.7% of its GDP on education (US \$395 per student) by 2030 compared to a current spending on education equivalent to 5.5% of GDP (US\$135 per student). This reflects (i) a decline in the ratio of student to teacher to 15.1 from 22.4 today and (ii) a decline in the share of teacher compensation in total spending from 60 to 45% to make room for an increase in other current and capital expenditure. Given the already high enrollment rate, the additional spending reflects an allocation of spending geared toward improving the quality of the primary school notably through recruiting more teachers. There is also a need to improve the enrollment rate and the quality of the secondary and tertiary education.
- In health**, Benin would need to spend about 9.3% of its GDP on health (US\$119 per capita) by 2030 compared to a current total spending on health equivalent to 4.2% of GDP (US\$33 per capita). This reflects recruiting: (i) 8 times more doctors and (ii) 4 times more support staff than today. This reflects current weak performance in health. For this purpose, the *Assurance pour le renforcement du capital humain (ARCH)* project is launched with the objective of providing universal health insurance scheme (Box 2).



- **In roads**, there is room to improve access particularly for those in rural areas. We estimate that Benin would need to build 12,276 km of road, thus requiring an additional spending equivalent to 8.1% of the country GDP (of which 1.9% of GDP for maintenance cost) in 2030. Road transportation is, by far, the most used transport mode in Benin: 93% of transport of people and 73% of transport of goods (AfDB, 2017). However, despite the preponderance of road as the main mean of transport, paved roads account only for 45% of total roads and Benin lags against key comparators (Fig. 8). Therefore, the authorities consider the development of infrastructure as their priority. In fact, transport-related infrastructure is going to account for 25% of all investment under the PAG.
- **In electricity**, providing universal access is feasible despite many challenges. Given current low access to electricity in Benin, important investment is needed to ensure universal access to affordable, reliable, clean, and modern energy services by 2030. Therefore, electricity-related infrastructure is going to account for 10% of all investment under the PAG. The annual cost to reach universal access in Benin is estimated at 2.4% of GDP. Currently, domestic production of electricity meets only 12% of the domestic consumption and Benin relies mostly on imports from neighboring countries (Côte d'Ivoire, Ghana, and Nigeria) to fill the gap. Several factors explain this situation, among them (i) the cost of importing electricity is much lower than the cost of generating electricity domestically and (ii) local production is hampered by the low tariffs that only partially cover the cost of production and low price of imported electricity.
- **In water**, the total cost of reaching universal access to safe and affordable drinking water and adequate sanitation is estimated at 2.5% of GDP per year—0.8% in water and 1.7% in sanitation—through 2030. Sanitation accounts for 70% of the total estimation because only about 20% of the population has access to improved sanitation. Benin aims to reach universal access water—both in rural and urban areas—by 2021 under the PAG. To this end, 3 out of the 45 flagship projects of the PAG are related to this goal.

Box 2. Benin: The Universal Health Insurance System

In May 2017, the government of Benin adopted the legal framework establishing a new social protection system (*Assurance pour le Renforcement du Capital Humain*, ARCH) with the aim of ensuring effective and affordable social insurance to the Beninese population, especially the poor (40% of the total population). ARCH contains four services: universal health insurance, training, credit provision, and pension insurance for people in the informal sector.

The health insurance is the main component of ARCH and its implementation is the most advanced. In 2019, the government started a pilot phase in three regions by identifying and testing the system on the poorest populations. The insurance is expected to be progressively expanded to the rest of the population and become fully operational by 2022.



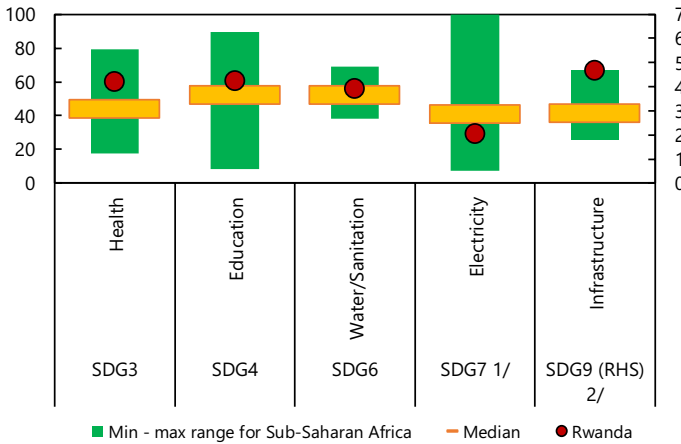


Fig. 10 Rwanda: 2018 performance in selected SDG sectors. *Source* Authors’ calculations using Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. in SDG Index and dashboards report 2019. 1 Indicator: access to electricity (percentage of population). 2 Indicator: quality of infrastructure (RHS)

Studies about financing and implementation are being conducted with the assistance of USAID and the World Bank. The system is expected to be self-financed, except for poor populations who will benefit from a public subsidy to cover their insurance premium.
 Source: IMF (2019a).

Rwanda

The Rwandan development strategy, i.e., the National Strategy for Transformation (NST), has been structured to align with the SDGs. SDG targets have been brought into the NST (Republic of Rwanda, 2017), which runs from 2017–2024 and is part of a larger Vision 2050, with the help of development partners. Line ministries have already produced comprehensive sectoral strategies and preliminary estimates of sectoral spending needs for achieving the NST and are in close dialog with development partners (UNICEF, U.K. Department for International Development (DFID), Enabel, the World Bank, WHO, Global Fund for Health) to refine these estimates and prioritize their action plan. However, sector-specific costing estimates have not been reconciled with top-down multiyear rough budget estimates of NST implementation and baseline data are still being collected to provide a more comprehensive diagnostic of the current situation in many SDG-related sectors.

Rwanda has delivered impressive development outcomes in the past 20 years, allowing the country to be broadly on par with—and in some instances, outperforming—other SSA countries with respect to the SDG performance indicators. Despite its low GDP per capita, life expectancy at birth reached 65 years in 2015, more than most SSA countries (Fig. 10). This is due to important progress in reducing infant and maternal mortality rates, cut to 1/5th between 2000 and 2016, thanks to the use



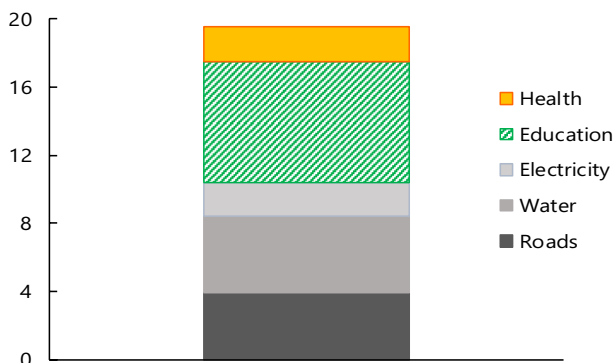


Fig. 11 Rwanda: estimates for the additional spending in 2030, by sector (percent of 2030 GDP). *Source* Authors' calculations based on Gaspar et al. (2019)

of home-grown approaches and new technology that have enabled efficient use of public resource to improve healthcare access and delivery.¹⁵ In education, progress has been achieved at the primary level where gross enrollment rate now reaches 100% and the rate of out-of-school children is low. The overall infrastructure quality ranks relatively well but it masks sectoral disparities and the challenge of reliable access to water and electricity.

Despite good progress to date, meeting the SDGs in a meaningful way will be challenging because gaps remain between NST goals and current basic service delivery. For instance, as of 2016, 38% of children still suffered from stunting and access to health facilities with qualified staff remained low; secondary gross enrollment rate remains low at 40% and the quality of education is still a serious problem; and only 13% of the population has access to safely managed sanitation (which includes containment through safe collection, treatment, and end use/disposal) and 43% to electricity.¹⁶

These important challenges are reflected in the sizeable additional spending required to meet the SDGs in the five selected sectors that amounts to about 19% of GDP in 2030. Appendix 1 provides detailed sectoral estimates and the results are summarized below (Fig. 11):

- **In education**, required spending to meet the SDGs is the largest, estimated at 7% of 2030 GDP. Performance in education, as assessed by SDG index 3 (*SDG Index and Dashboards Report 2019*), reaches 61, just above the SSA median. Due to lack of data on test scores, this achievement mainly reflects access rates rather than quality of education. At 3.6% of GDP, current public spending is rel-

¹⁵ For example, the government is using health clinics as the first line for service delivery in rural areas, while also signing a contract to deliver blood supplies via drone. Also, using artificial intelligence as a health diagnostic tool is being customized and tested on a large scale in the country.

¹⁶ Rwanda does not participate in regional or international learning assessments.



atively low and translates into student-to-teacher ratios higher than that observed in peer countries with better performance in education—41 vs. 15 students per teacher. The NST for education is an important step toward filling this gap. By 2030, the Rwandan government plans nearly to double current spending in education, to reach 6.3% of GDP. The bulk of the extra spending is planned for hiring more teachers to reduce the student-to-teacher ratio, especially at the primary level, where repetition rates are higher. However, our analysis suggests that more would be needed to reach high performance in education in 2030.

- **In health**, Rwanda currently achieves better outcomes than the median peer in the comparable income group, but we estimate that an additional 2% of GDP should be spent by 2030 to reach top-level performance. While its current mix of doctors vs. other health workers has allowed for this relatively good outcome, our analysis suggests that an overall increase in the number of health workers, mostly doctors, would be needed to bring Rwanda to the level of high-performing peer countries. The NST for health will be an important step to narrow the gap, but more would be needed to achieve the best outcomes. By 2024, the government plans to increase per capita public spending on health by 36%, from US\$38 to US\$52 per capita per year. More granular data on spending composition (in Rwanda and comparator countries, e.g., for compensation vs. other spending) would enable better analysis on the desirable allocation of such spending.
- **In roads**, additional required spending is estimated at about 4% of 2030 GDP. The rural access index for roads—RAI, used as a proxy for high sectoral performance—is relatively low in Rwanda, due largely to the poor quality of existing roads. Rwanda's RAI is 52 out 100, as only 5% of the current road network is paved and only 10% reaches all-season riding quality. Given its population density, most of Rwanda's investment will comprise upgrading and maintaining existing roads, especially in remote and high areas.
- **In electricity**, universal access would require an additional spending of 2% of GDP. Rwandan electricity sector is in a relatively unique situation of current excess capacity and low access to electricity with 43% of households having electricity access. Assuming that 60% of all new connections will be on-grid while 40% will be off-grid and projecting electricity consumption will increase at the annual rate of 9%—reaching 730 kWh in 2030 from an average of 238 kWh in 2016—universal access cost is estimated at 2% of GDP.
- **In water**, based on the World Bank WASH costing model, Rwanda would need to spend 4.5% of GDP per year to safely provide water to all households and provide fixed-point latrines to all. This estimate is broadly in line with the authorities' own costing exercise which is based on current service coverage gaps, especially in rural areas, and with a large share of spending accounted for by projections for a growing urban population with increased water consumption.



Going Forward: Operationalizing Costing Estimates

Tailoring Costing Estimates to Individual Countries

Variation of additional spending across SSA countries signals value in tailoring estimates at the country level. The costing methodology provides a solid framework that enables SSA countries to compare their development strategy to what SDG high-performing peers operationalize in health, education, and key infrastructure areas. This benchmarking provides useful insights on sectoral input mix and potential spending efficiency gains that can help SSA countries design their own development strategies. However, countries may wish to tailor some cost parameters to better mirror the country circumstances, while remaining consistent with their sustainable development commitments. These parameters include, for example, the unit cost to build a km of road or the unit cost to generate one kilowatt of electricity. Countries may also wish to tailor their “input mix” such as the student-to-teacher ratio or the number of doctors per 1,000 population.

Tailoring the costing methodology to countries requires a good understanding of national development challenges and should be discussed at length with the authorities and other relevant stakeholders. Beyond quantitative estimates of additional spending, the costing exercise can help catalyze and coordinate ongoing different workstreams of development partners and ground a country’s development agenda on solid and shared knowledge of its development needs and priorities. For instance, in both Benin and Rwanda, the analyses were refined during two costing missions that visited Cotonou and Kigali in 2018. The missions met with officials from different ministries including line ministries and representatives of financial and development partners to discuss national development needs and priorities.

A key step in the costing at the country level is to establish clear baselines by which progress going forward can be measured and monitored. For example, in Rwanda, line ministries and development partners have been working together to gather the data necessary to assess where the country currently stands with respect to each SDG target. In education, for example, the authorities and UNICEF and UKDFID have established a common template to refine baseline data and goals to cost their strategy. In Benin, the authorities first prioritized the SDGs that best fit their context. They estimated development needs with the support of technical and financial partners. The next step should be to integrate identified and costed development needs into a Medium-Term Expenditure Framework (MTEF) and into a medium-term financial strategy (MTFS). However, more generally, 60% of all 17 SDG indicators are currently not documented in SSA countries and when data exist it is often outdated or does not allow comparability across countries (SDG Center for Africa, 2019). This lack of updated baselines complicates evidence-planning and threatens transparency on implementation and development progress.



Short-Term Implications of SDG Costing in SSA: Prioritize, Raise Resources, and Spend Efficiently

Many projects compete over limited resources: costing spending gaps can help rank existing projects according to countries' priorities and their capacity to deliver. The SDG costing enables countries to have a transparent and rapid appreciation of additional spending required to meet their development goals in key sectors for human, social, and physical capital. Spending gaps can be mapped to existing sectoral projects, that line ministries must then sort and rank according to an implementation timeline, commensurate to additional financing means and capacity to ramp-up service delivery. One of the key challenges going forward will also be to reduce access gaps to key infrastructure and education and health services, while ensuring quality services across rural and urban areas. For instance, prioritizing the provision of reliable access to potable water in urban areas should not come at the cost of not providing reliable water and sanitation services to rural or remote areas. Progressive national development strategies are thus key to leave no one behind and SSA governments must balance prioritization of development plans with the risk of deepening access inequalities.

The costing can be used to quantify current financing gaps and create the necessary impetus for governments to mobilize all sustainable financing sources available. Given the magnitude of additional spending estimates, SSA countries must mobilize sizeable financing beyond domestic sources. Ramping up domestic resources should be at the core of SSA countries' strategy to finance the SDGs. With an average tax-to-GDP ratio of about 14% in 2017, SSA countries have room to increase tax revenues over the medium term and reach the average of 18% for emerging economies. However, additional tax revenues will not be enough to cover additional investments required to reach the SDGs by 2030. Delivering on official development assistance targets, and prioritizing donors' funds to SSA can help close development gaps in many countries. Finally, creating an enabling environment to attract private investment is necessary.

A Comprehensive and Sustainable Financing Strategy Must Rely on Efficient Spending

SDG costing estimates assume not only more, but also more efficient spending. This should encourage countries to delve into the production function of development outcomes and optimize delivery processes. Because if countries fail to raise their spending efficiency, then additional spending required to reach the SDGs will be much larger. Focusing on the *public* delivery of the additional spending required, strengthening current public financial management systems is necessary in many SSA countries to ensure that additional spending is spent effectively and efficiently. Increasing spending in the medium term by an additional 19% of GDP would require substantial improvement in the capacity to deliver public services and to plan and execute the budget. For example, assuming the current public-private split in education and health continues, Benin and Rwanda are expected to more than double public spending in each of these sectors by 2030. For example, Benin has benefited of a



Capacity Development mission from the IMF in 2017 and 2019 on how to improve the efficiency of its public capital investment.¹⁷

Medium- to Long-Term Implications of SDG Costing in SSA: Towards SDG Budgeting?

The 2030 spending estimates can help governments anchor their medium-term budget strategy. The assessment of additional spending to reach the SDGs offers a frame to discuss and commit to spending and financing paths that are both sustainable and commensurate to development needs. In Rwanda, the medium-term expenditure framework includes a subset of the aggregated costs documented in sectoral National Strategy for Transformation (NST), chosen according to the authorities' assessment of absorptive capacities, and current and projected additional revenues. This prioritization and medium-term strategy can help build the broad consensus that is required to anchor citizens' expectations about the delivery of public services over the next decade.

In the short term, presenting part—or all—of a government's budget according to a functional classification could help strengthen the accountability in delivering the SDGs. Indeed, a functional reporting would help ground development narratives into transparent and readable budgeting. Beyond budgeting, in 2019, the Inter-Agency Task Force on Financing for Development has identified the main building blocks for operationalizing broader financing frameworks called Integrated National Financing Strategy (INFF) (UN, 2019).¹⁸ Among them, improving political stability to reduce or eliminate pockets of fragilities, promoting good governance to favor ownership of the development objectives by citizens and improving the business environment are as important as anchoring development objectives into medium-term budgeting.

Another important step is the mapping of spending estimates with commensurate resources. Country authorities should lay out a credible financing strategy for their development plan articulated around a clear public/private investment split in each sector. In Rwanda, financing the government's NST will be challenging, reflecting (i) limited potential for additional tax revenues in the medium term—of about 2 to 3% of GDP, and (ii) a declining trend in official development assistance (ODA) not compensated by increasing private investment.¹⁹ Rwanda's MTEF reflects this financing challenge and includes “contingent” spending items that would materialize provided additional resources are being raised in the medium term, on top of resources already included in the MTEF. In any case, delivering the SDGs would

¹⁷ The authorities are focusing on the following four areas: (i) strengthening the institutional framework; (ii) ensuring the availability and sustainability of financing; (iii) improving the preparation, selection, and implementation of projects (specifically by publishing their selection criteria); and (iv) ensuring sustainable investments.

¹⁸ In 2015, all countries have agreed with the need to design INFFs in support of nationally owned sustainable development plans.

¹⁹ IMF Staff Report for the Rwanda Article IV Consultation (2019b).



require more than allocating occasional windfall to key development investments. In Benin, for instance, there is significant room to increase tax revenue by implementing tax policy reforms that exploit further the potential of consumption taxation, particularly VAT and excises.²⁰ Benin authorities are also implementing many reforms to boost private investment.²¹ But despite these reforms, the participation of the private sector remains limited. Further analysis is required at the country level to understand how national development plans are aligned with (i) well-assessed spending needs translated into operational sectoral objectives and (ii) a comprehensive financing strategy detailing the respective private and public sectors' roles.

Appendix

Details on the Costing Methodology

The detailed sectoral costing below follows the methodology developed by Gaspar et al. (2019). It is based on an input–outcome approach, which assumes that development outcomes are a function of a mix of main cost factors. For Benin and Rwanda, the methodology sets the levels of key cost factors and the associated unit costs at the values observed in countries with 2016 levels of GDP per capita below US\$3,000 that reach high development outcomes.

Education. Total spending for education can be expressed as a function of the number of teachers, their wages, share of non-compensatory current expenses, and share of capital expenses. The methodology sets benchmarked values for these main cost factors at the median values observed in 2016 in countries with GDP per capita below US\$3,000 and high education outcomes, i.e., with an SDG index score above 80 in education. Next, for Benin and Rwanda, the education spending in 2030 is estimated using benchmarked values and unit costs and the country's projections for economic growth and school-age demographics (Appendix Table 3). In 2030, full enrollment is assumed for at least 2 years of preprimary and tertiary education and 12 years of primary and secondary education.

Health. Total spending for health can be expressed as a function of the number of doctors and other medical personnel, doctor and other health staff salaries, the share

²⁰ IMF Staff Report for the Benin Article IV Consultation, Fourth Review under the ECF (2019a).

²¹ Key reforms include (i) improving the business environment for example by launching an online land use registry; (ii) enacting a PPP law in 2017 to attract private sector participation; and (iii) introducing governance reforms for example through the creation of commercial courts. In addition, since October 2017, Benin became a full participant in the G20 Compact with Africa (CWA) in the hope of bolstering private sector financing.



Table 3 Estimates of total education spending in 2030 in Benin and Rwanda

	GDP per capita \$0–\$3000			Rwanda		Benin	
	AI	Low performance	High performance	2016	2030	2016	2030
GDP per capita 1210	1210	1045	2172	734	1363	791	1206
Main factors							
Students per teacher ratio 30	30	32	15	41	15	22	15
Teacher wages (ratio to GDP per capita)	2.8	3.7	2.1	1.5	2.1	2.7	2.1
Other current and capital spending (% total spending)	44	44	55	71	55	40	55
Student age population (% total population)	56.9	57.7	39.2	57	47	46	39
Enrollment rate (preprimary to tertiary)				51	73	70	73
Results							
Total education spending (percent of GDP)	7.6	9.7	9.8	3.6	10.7	5.5	8.8
Spending per student (USD 2018 or latest)	203	219	674	89	441	135	395
SDG4 index	54	47	86	61	>80	47	>80

Source Authors' calculations tailoring the costing methodology of Gaspar et al. (2019) to Benin and Rwanda



Table 4 Estimates of total health spending in 2030 in Benin and Rwanda

	GDP per capita \$0–\$3000			Rwanda		Benin	
	AI	Low performance	High performance	2016	2030	2016	2030
GDP per capita	1210	915	2172	734	1363	791	1206
Main factors							
Doctors per 1000 population	0.14	0.09	0.91	0.06	0.91	0.15	0.91
Other medical personnel per 1000 population	1.46	1.33	4.26	2.83	4.26	1.44	4.26
Doctor wages (ratio to GDP per capita)	19.8	22.8	10.4	16.1	10.4	14.1	10.4
Other current and capital spending (% total spending)	70	70	62	71	71	71	71
Results							
Total health spending (percent of GDP)	6.0	5.6	7.6	8.2	10.2	4.2	9.3
Per capita spending (USD 2018 or latest)	72	52	165	60	148	34	119
SDG3 index	49	47	75	61	70–80	47	70–80

Source Authors' calculations tailoring the costing methodology of Gaspar et al. (2019) to Benin and Rwanda

of non-compensatory current expenses, and the share of capital expenses. The methodology sets benchmarked values for these main cost factors at the median values observed in 2016 in countries with GDP per capita below US\$3,000 and high health outcomes, i.e., with an SDG index score above 70 in health. Next, for Benin and Rwanda, health spending in 2030 is estimated based on benchmarked values, using country-specific projections for economic growth and demographics (Appendix Table 4).

Roads. A regression is used to derive the determinants of network needs. Road density is regressed on variables capturing the size and composition of the economy, including GDP per capita, population density, agriculture and manufacturing sector shares in the economy, and urbanization rate, as well as the Rural Access Index (RAI), for a cross section of low-income developing countries and emerging market economies. Using the regression results, estimates for additional kilometers of roads needed to ensure road access for all (proxied by raising the RAI to at least 75%) are derived for Benin and Rwanda, accounting for projected changes in population and GDP per capita through 2030. Then, total cost of the additional road network and depreciation is computed country's idiosyncratic inputs on unit costs and current baselines (Appendix Table 5).

Electricity. For each country, additional spending corresponds to the additional electricity network needed to provide electricity access to 100% of the projected population by 2030, while accounting for an increase in per capita consumption in



Table 5 Estimates of roads spending in 2030 in Benin and Rwanda

	GDP per capita \$0–\$3000		Rwanda		Benin	
	All	High perform- ance	2016	2030	2016	2030
GDP per capita	1210	2172	734	1363	791	1206
Main factors						
Road density (km per km ²)	164	406	191	678	142	277
Population density (pop per km ²)	75	89	504	640	104	138
Unit cost (USD per km)	–	–	1,100,000		609,905	
Results						
Additional annual spending (percent of 2030 GDP) of which depreciation (percent of 2030) 1.5 3.0	–	–	–	3.9	–	8.1
Rural access Index (RAI)	54	> 75	52	> 75	32	> 62.5

Source Authors' calculations tailoring the costing methodology of Gaspar et al. (2019) to Benin and Rwanda

Table 6 Estimates of electricity spending in 2030 in Benin and Rwanda

	Rwanda		Benin	
	2016	2030	2016	2030
GDP per capita	734	1363	791	1206
Main factors				
Access to electricity (percent of population)	43	100	41	100
Annual consumption (kWh)	238	730	266	815
Results				
Additional annual spending (percent of 2030 GDP)	–	2.0	–	2.4

Source Authors' calculations tailoring the costing methodology of Gaspar et al. (2019) to Benin and Rwanda

line with real GDP per capita in Benin and Rwanda. The total cost of the additional electricity network is then computed by multiplying it by the unit cost per kilowatt, which is set at US\$2,250, following World Bank (2013) (Appendix Table 6).

Water. The estimates of the cost to provide basic and improved access to water and sanitation are derived using the WASH World Bank methodology (Hutton and Varughese 2016). The model has unit costs calibrated at the country level (Appendix Table 7).



Table 7 Estimates of water and sanitation spending in 2030 in Benin and Rwanda

Rwanda	Ending OD	Basic			Safely managed		Total SDG
		Water	Sanitation	Hygiene	Water	Sanitation	
Annual cost (million USD)	7	31	37	15	41	120	229
Annual cost (percent of GDP)	0.07	0.3	0.4	0.2	0.4	1.3	2.5
Benin							
Annual cost (million USD)	1	31	61	10	163	131	382
Annual cost (percent of GDP)	0.00	0.4	0.7	0.1	1.9	1.5	4.5

Source: Authors' calculations based on the WASH World Bank methodology

Note: The total for Benin excludes the costing for 'Ending OD' and 'Hygiene'

Declarations

Conflict of interest This research has not been funded and there is no conflict of interest.

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