Escaping the low-financing trap

Strategies for sustainable educational development in low-income countries

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About the author

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Acronyms

CREATE	Consortium for Research on Educational Access, Transitions and Equity
DFID	Department for International Development
DLI	disbursement linked indicator
DRC	Democratic Republic of Congo
DT	Dakar Target
ECD	early childhood development
ESD	education for sustainable development
FCDO	Foreign, Commonwealth and Development Office
GDP	gross domestic product
GEMR	Global Education Monitoring Report
GER	gross enrolment rate
GIR	gross intake rate
GNI	gross national income
GNP	gross national product
GPE	Global Partnership for Education
GPI	gender parity index
GST	general sales tax
IIEP	International Institute of Educational Planning
ILO	International Labour Organization
LIC	low income country
LMIC	low middle income country
K-12	kindergarten to grade 12
MDG	Millennium Development Goal
NER	net enrolment rate
OECD	Organisation of Economic Co-operation and Development
OOSC	out-of-school children
PCR	primary completetion rate
PPE	pre-primary education
SDG	Sustainable Development Goal
SED	sustainable educational development

STP	Sao Tome and Principe
SSA	sub-Saharan Africa
SSEA	South and South-East Asia
TVET	technical and vocational education
UIS	UNESCO Institute of Statistics
UMIC	upper middle-income country
UNESCO	United Nations Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund
UPE	universal primary education
VAT	value-added tax
WCEFA	World Conference on Education for All
WEF	World Education Forum

Executive summary

This report identifies and addresses the financing challenge for education systems in low- and low middle-income countries (LICs and LMICs), with a particular focus on sub-Saharan Africa (SSA).

The core narrative is:

- There is a low-financing trap which has meant that many countries, especially in SSA, have had static levels of public investment in education as a proportion of government budgets and of gross domestic product (GDP) over the last two decades.
- A taxonomy of countries identifies three bands of financial effort for investment in education. These are less than 3%, between 3% and 5%, and over 5% of GDP. Individual countries tend to remain in the same band of expenditure on education over time, and only those in the highest band are likely to be able to finance the ambitions of United Nations Sustainable Development Goal 4 (SDG4) for education with domestic revenue.
- Mission creep has meant that SDG4 now commits countries to universal enrolment kindergarten to grade 12 (K-12), much higher participation in Technical and Vocational Education (TVET) and expanded higher education that would require massive increases in funding.
- The 'learning crisis' is in large part a financing crisis. The expenditure needed to achieve global goals (SDG4) cannot be financed from domestic revenue in countries that collect less than 15% of GDP in revenue, and substantial fiscal reforms are needed.
- No imaginable amount of external assistance would be sufficient to support the recurrent costs of SDG4, and the appetite for aid to education is softening.
- Most finance will come from domestic resources, not aid, in all but the poorest countries.
- Substantial gains in access, participation and learning are possible from enhanced efficiency and effectiveness.
- Improving access and learning can happen if global and national goals are reset to reflect achievable outcomes suited to different country circumstances and a differentiated approach is taken to supporting countries at different levels of development.
- Grant aid can play a significant role in catalysing such gains but only if it changes its purposes and moves beyond filling gaps and delivering services directly to the most marginalised; it needs to shift towards catalytic support for system-level change that can be sustained from domestic resources.
- Strategically targeted budget support is becoming more attractive.
- External assistance has to be demand-led, co-owned (which probably means co-financed except in the poorest countries), and contracted with the expectation of viable exit routes.
- A new commitment is needed to the Paris aid effectiveness principles of ownership, alignment, harmonisation, managing for results and mutual accountability.
- Plans have to be matched to realistic appraisals of resources available and the basic arithmetic of school leavers and labour markets.
- The Sustainable Development Goals for education have to be reconfigured to resonate with diverse national priorities and identify achievable targets that can be financed.
- Accelerating the development of fiscally balanced states is central to sustainable educational development since this is the only way to generate reliable revenue streams that can fund public goods including education systems.

A new policy dialogue is needed to catalyse escape from low-financing traps for education and reduce the need for aid in future. This means investment in enhanced efficiency and effectiveness, and new goals and targets tailored to realistic capacities and resources. Financing is needed that accelerates progress towards becoming fiscal states that balance revenue, borrowing and expenditure, as defined in Chapter 1.

This research responds to five main questions. They are:

1. How have education systems developed over recent decades and how have patterns of access and participation changed since the commitments made at the World Education Forum in Dakar and in the Millennium Development Goals (MDGs) in 2000?
2. How have patterns of public spending on education evolved and are some countries stagnating in a low-financing trap?
3. What additional demands do the Sustainable Development Goals create for financing education, and to what extent can these be met from existing revenue?
4. What is the basic arithmetic of education financing? How does this translate into demand for financing, and what does it reveal about benchmarks for necessary levels of investment?
5. What challenges and policy options exist to address the low-financing trap, enhance educational efficiency and effectiveness, increase domestic revenues and accelerate progress towards sustainable educational development goals?

Each of these questions is addressed in this report.

The first question is explored in Chapters 2 and 3. Education indicators across SSA paint a picture of a very diverse continent including over 50 countries with a wide variation in size, wealth and education system development. Access to education is near-universal in some systems and far from being achieved in others. Demographic transition, a critical issue for future demand for public services, has yet to take place in most countries but is happening in some. There has been progress on gender parity in enrolments, but many inequalities remain to be addressed. How to train and employ enough qualified teachers is critical to questions of how to reduce costs per learner to levels that allow universal participation at secondary level and above. The analysis in Chapter 3 offers unique insights into how participation has been changing over time, and draws attention to the dynamic aspects of system transitions to higher levels of participation and their financial implications. It also highlights how important the specificities of different systems are, and the need to place diagnoses of the demand for finance in a systems context. A definitive typology locates countries in five different profiles of participation that shape investment strategies.

The second research question is addressed in Chapter 4. Over the last two decades the proportion of GDP allocated to education has averaged about 4% across SSA. Government expenditure has fluctuated around 15% of GDP. Tax revenues have improved but remain at low levels, limiting government expenditure on education. There is evidence of a low-financing trap that has constrained countries from responding to sustained advocacy to allocate more than 6% of GDP and 20% of government budgets to education. The MDGs and Dakar Targets could not be financed for less than these levels of commitment. A taxonomy of education investment levels indicates that most countries are not on track to achieve these levels of financing.

The third question is addressed in Chapter 5. The Sustainable Development Goals promulgated in 2015 have replaced the MDGs and Dakar Targets of 2000. They propose a demanding set of outcomes by 2030, including universal enrolment over 13 years from kindergarten to grade 12 with financial implications much larger than the global goals agreed in 2000. They include expanded technical and vocational education, greater and more equitable access to higher education, universal literacy, investment in buildings and infrastructure, international scholarship programmes and a qualified teacher for every child. The new agenda calls on governments to increase education spending dramatically in ways which are unlikely to be sustainable and are therefore beyond the reach of many low-income countries. This is a result of a kind of 'mission creep', with ever-more ambitious goals being set regardless of whether they can be financed, and often without any clear sense of what the trade-off and opportunity costs are of adopting longer and longer lists of goals.

The fourth question is the concern of Chapter 6. This presents the fundamental algorithm that determines the finance needed to support different levels of participation at different educational levels. Using typical country data on enrolment rates, numbers of school-age children and costs per learner at different levels, the amount of GDP needed for education recurrent spending can be estimated for different groups of countries. The result is to demonstrate that between 6% and 7% of GDP is required. This can only be achieved if government expenditure (and hence domestic revenue) is more than 20% of GDP and the allocation of public funds to education is of the order of 30% (20% of 30% = 6%). The rest of the chapter identifies capital costs, notes the constraints on teacher costs, and charts the challenge for public budgets supported by domestic revenue. Aid will be part of the story but aid to education is now shrinking. It is an order of magnitude or more too small to close the gaps between what would be needed and what is plausibly available to achieve SDG4. Thus, most financing will continue to come from domestic revenue. Aid may accelerate this process of reducing financial shortfalls but only if it is reconceived to catalyse accelerated development rather than to fill gaps that require recurrent expenditure to be supported indefinitely.

The fifth question frames Chapter 7. This identifies seven challenges for future education financing. The low levels of allocation of public expenditure have to be addressed. A taxonomy of education investment identifies the countries that need to invest more. Enhanced efficiency and effectiveness are critical to sustained educational development. Efficient systems manage the flow of learners so that all learners enrol on schedule for their age and graduate without significant repetition or drop-out. Effective systems ensure learning at levels determined by national curricula and imply higher levels of investment in pedagogy, learning resources and infrastructure necessary to manage progression and realise educational goals for all learners. The measures needed are country- and system-specific and could result in far more access and learning at affordable costs. Out-of-school children's needs have to be addressed and clarity is needed as to whether children above the legal age of work should be regarded as out of school. Financing teachers is a central issue for sustainable systems and has to be tailored within plausible resource envelopes linked to teacher supply, deployment and emoluments. So also is consistent investment in institutional capacity-building that can lead to more effective implementation of change. Structural issues that determine system effectiveness and efficiency (e.g. school cycle length, size and time on task)

may need review. Aid and concessional lending should promote the development of fiscal states on which sustainable development depends.

The analysis in this report yields a set of 10 recommendations. These need to be considered collectively as there are many possible synergies. Recommendations 1–5 and 9 and 10 derive directly from this analysis. Recommendations 6–8 are necessary complements of needs to increase efficiency and effectiveness in ways that can be supported catalytically.

Recommendation 1. Educational investment effort
Review indicators of investment in education by country (education as a proportion of public expenditure, education as a proportion of GDP, public expenditure as a proportion of GDP, shortfalls relative to national goals and SDG targets); locate countries on the taxonomy of effort and profile financing needs; match planned outcomes to level of educational effort over plausible time scales.

Recommendation 2. Unlock the low-financing trap by supporting social contracts between governments and those they govern, with support from coalitions of the willing including development partners. The need is to increase domestic revenue and spend more on education to ensure at least 6% of GDP is available to finance public systems with equitable and gender-balanced access, adequate staffing and learning infrastructure, and cost-effective composition of educational expenditure.

Recommendation 3. Revise SDG4
Revisit SDG4 and develop nationally determined priorities and costed targets to be financed predominantly from domestic revenue with contextually located priorities; scale and phase targets into goals that are achievable especially in relation to out-of-school children; adopt targets that are domestically owned not exogenously driven.

Recommendation 4. Review the cost per learner
Review costs of learning, especially at secondary and higher education levels, to facilitate more participation at affordable costs; pedagogic and organisational reforms are needed that generate public costs per learner below 15% of GDP per capita at primary, 20% at lower secondary and 25% at upper secondary. Adequate numbers of qualified teachers need to be financed within a viable public sector budget envelope.

Recommendation 5. Manage flows of learners
Analyse and monitor flows of learners through systems and into labour markets to identify bottlenecks, zones of exclusion and indicators of inefficiency in order to smooth flows, reduce push out, manage learning more efficiently, and lower costs per completing learner.

Recommendation 6. Invest in curriculum development and formative assessment
Develop curricula differentiated for different learners and grounded in learning capabilities and educational outcomes that have utility for development; embed formative assessment into pedagogy and systems for managing learning on schedule, and thus increase the efficiency of flows.

Recommendation 7. Reform high-stakes examination systems
Reform high-stakes examinations systems to reduce their adverse effects on narrowing curricula, generating shadow school systems, increasing costs of education to households, and triggering drop-out and push out related to low performance; managing the under-performance of learners is as important as managing examination success.

Recommendation 8. Generate decision-oriented information systems

Revitalise information systems that link data collection and analysis to decision-making and allow iterative development planning that includes frequent feedback and adjustment linked to agreed indicators of progress and judgements of those things that cannot be measured quantitatively.

Recommendation 9. Promote fiscal reform

Promote fiscal effort to invest more in public education systems and enhance domestic revenue arising from economic growth, greater yields from existing taxation, fiscal drag, growth in modern sector employment and withholding taxes and Pay As You Go (PAYE), more revenue from value- added tax (VAT) and general sales tax (GST), modernisation of property taxes, expanded natural resources and extractive industry levies, more efficient corporate tax collection, and anti-corruption measures including Tax Identification Numbers (TIN) and a General Programme for Money Laundering (GPML). The ambition is to encourage development strategies that reduce financial dependence and accelerate progress towards fiscal state status.

Recommendation 10. Develop new modes of external assistance

Develop modes for external assistance that promote catalytic aid that accelerates educational development within a framework of sustainable financing from domestic revenue focused on system-level changes that are resilient and likely to have enduring impact on efficiency and effectiveness and outlast grants and concessional finance. New modalities have to recognise that grants cannot finance recurrent expenditure safely or sustainably, and that lending is limited by indebtedness and prudent borrowing against future revenues. Project modalities for grant aid have to pass tests of sustainability.

In conclusion

Education financing in SSA is at a watershed. If the next decade is like the last two, the SDG4 targets for 2030 will not be met and financing will remain stagnant at levels far short of what is necessary. The UN Scientific and Cultural Organisation (UNESCO) is projecting that benchmark spending will remain at about 4% of GDP and 15% of the government budget in SSA (UIS/GEMRb, 2022: 136). This is far below the minimum needed for SDG4 of 6% of GDP and 20% of the government budget. Precious domestic revenue needs to be complemented by aid focused on catalysing development that can be sustained with the resources available. A return to consistent economic growth is likely to be central to sustainable gains in access and learning along with appropriate fiscal policy. Aid effectiveness principles need to be revitalised to reflect growing sentiments that ownership, alignment, harmonisation, managing for results, and mutual accountability are central to durable outputs and outcomes, as enshrined in the Paris accords on aid effectiveness.

The basic arithmetic of education financing makes a compelling case to use domestic resources, grant aid and concessional financing to enhance efficiency and effectiveness, and facilitate the development of fiscal states that can mobilise sufficient domestic finance for education. The challenge to the Bretton Woods institutions, and to bilateral development partners, is to provide more aid of a different kind than in the past to catalyse system-level changes that accelerate progress and reduce future dependence on aid. The UN Transforming Education Summit in September 2022 has to rise to the challenge posed by the lessons from past initiatives. Financing 'gaps' need durable solutions. More resources

should be directed towards catalytic reforms that lead to educational development that is financially sustainable. This really would be a game changer to escape the low-financing trap, match aspirations to achievable goals, and promote endogenous development strategies that can translate educational development promises into development realities.

A detailed synthesis of the findings of this report is contained in Chapters 7 and 8 and these should be read alongside this Executive Summary.

1 Introduction and setting the scene

1.1 Introduction

This research explores recent patterns of educational financing in low-income countries. It has a special focus on sub-Saharan Africa (SSA) since that is where problems of educational financing are most prevalent. The analysis uncovers historic patterns of participation and funding and profiles the likely levels of demand generated by the aspirations of national governments and commitments to the Sustainable Development Goals for education (UNESCO, 2015). The 'learning crisis' identified by the World Bank (2018) and others is in large part a 'financing trap' which has led to a fundamental mismatch between ambition, aspiration and expectations for educational development and the domestic resources needed to finance recurrent costs and pay for capital expenditures (Lewin, 2023b). The challenge is to understand the basic arithmetic of educational financing that is sustainable, mobilise domestic revenues and catalyse reforms that can increase efficiency and effectiveness.

The agenda advanced by UNESCO's Sustainable Development Goal 4 (SDG4) (UNESCO, 2015: 18) for education is now so ambitious that it will not be achieved by 2030. It creates an unprecedented demand for additional educational resources that cannot be financed with likely volumes of government expenditure or possible amounts of aid or concessional borrowing. This should have been clear in 2015. Core goals, e.g. universalising access to primary education, have not been achieved more than 50 years after the first global goals for education in SSA were promulgated at the African Ministers regional conference in Addis Ababa in 1961. The target date for achievement has sequentially shifted from 1980, to 2000, to 2015, and now to 2030. At the same time, the range of expectations has expanded to include universal pre-school, secondary education up to grade 12 and mass access to TVET and higher education.

The SDG4 framework is of diminishing value to governments and development partners. There is a real risk that unrealisable goals of relevance to some and little relevance to others will lead to poor decision-making and allocative inefficiencies. The SDGs are at best a list not a strategy, now have an unmanageable scope and do not have clearly articulated theories of development that speak to national circumstances. They need revisiting (Lewin, 2021b).

New perspectives are needed to sequence a pathway towards sustainable educational development (SED) that can be financed by domestic revenue streams. This requires the development of fiscal states able to meet the costs of public goods like education from domestic revenues and prudential external assistance. Grants, loans and other forms of concessional finance can accelerate development but are limited in magnitude, risk unsustainable debt and dependence, and compromise the accountability of governments to those they govern.

Increased GDP per capita is not in itself sufficient to create fiscal states. One of the orthodox definitions of a fiscal state (Bak et al., 2021: 1) is 'a state whose public revenue base is dominated by tax revenue and loans, and where the relationship between taxation and external and domestic borrowing is balanced and thereby sustainable and characterised by interdependence'. Fiscal states have to have a balanced relationship between taxation and borrowing as dominant revenue

sources, and this distinguishes them conceptually from other types of state, e.g. tax, debt and rentier states (ibid.). Tax states depend almost exclusively on direct and indirect tax for income, indebted states are habitual borrowers and often have a history of default and rescheduling, and rentier states derive disproportionate amounts of income from natural resources or other national assets. LICs and LMICs can be any of these types of state or hybrids with elements of more than one type.

Historically, states that can access commercial borrowing have been classified as fiscal states (Moore et al., 2018: 34). Defining fiscal states in terms of their credit-worthiness is a purely economic consideration. The broader problems of public education financing are embedded in the political economy of development choices. Not all countries that transition from LIC to LMIC will necessarily prioritise public investment in general, and education in particular. The question is what is the borrowing for and how might it contribute to development? Fiscal states collect revenue and contract loans to be repaid from revenue to finance public services. Fiscal states should have a social contract with taxpayers to exchange public services for taxation.

This research report maps the key issues. It provides analytic reflections, identifies more achievable goals, gives insight into the dynamics of system reform, and highlights the need to adopt investment strategies that catalyse reforms that enhance efficiency and effectiveness. The challenges are many. They invite a different gaze that looks beyond the interventions of the last three decades and revisits the assumptions that underpin aid to education as development takes place across a world dramatically divided by new social, economic and health inequalities.

1.2 Setting the scene

Over the last 30 years, well over half a trillion dollars has been directed towards aid to education, much of which has focused on countries in SSA. Burnside et al. (2000), Easterly (2007) and Moyo (2010), Akmal et al. (2021) and many others have voiced disquiet about the limited impact of aid in contrast to many who continue to advocate for more aid (e.g. Sachs, 2006; IFFEd, 2016). Despite repeated rhetorical prioritisation, public education in SSA remains desperately under-funded in many countries, especially in the poorest and in those that have a weak track record of financing services for public benefit. Participation rates in school remain far from universal, and no more than half of all children successfully complete lower secondary school with appropriate levels of achievement in most low- and low middle-income countries (LICs and LMICs) (UIS/GEMR, 2022). This slows development, diminishes social well-being, adversely affects employability and fundamentally contributes to inter and intra national inequalities.

Universal access to quality education is a right under many international conventions endorsed by UN member states since 1948. These rights are not only ends in themselves but are also a means to invest in the knowledge and skills that underpin the economic development needed to finance public services. Investment in education is at the heart of development strategies in all LICs and LMICs and most recently was fully endorsed by the adoption of SDG4. The majority of the population in LICs and LMICs in SSA depend on the state to finance education services at low cost to households so that participation is not rationed by price. Those close to the poverty line live in households which cannot finance education costs from discretionary income. Democratic governments have a social contract with their

people to finance public services efficiently and effectively. Autocratic political economies sooner or later have to be mindful to provide enough investment in public services for a modern state to function, however inequitably.

Various estimates have been made of the difference between the amounts governments in LICs and LMICs raise in revenue and the amounts they would need to achieve the goals set by SDG4. For SSA in this paper we estimate the shortfall is between $35 billion and $40 billion a year in LICs and LMICs and rising. Official Development Assistance (ODA) to SSA for education has been running at about $2 billion a year. This is far short of the amounts necessary to meet demand. The largest single global fund, the Global Partnership for Education, was replenished in 2021 with about $4 billion over the five-year period 2021–2025. Most financing to meet development goals will necessarily be generated from increased domestic revenue and from enhanced efficiency and effectiveness.

The outcomes anticipated by SDG4 no longer look attainable for most LICs and LMICs with current patterns of progress, financing and cost structures. It is therefore timely to see how the financing of education systems in countries in SSA has been changing, and assess the extent to which gains in efficiency and effectiveness can mitigate constraints on domestic revenue and flows of concessional financing. Simultaneously, realistic development policy must highlight the need for increased domestic revenue and the development of fiscal states that match educational development plans to realise flows of resources that are sustainable.

1.3 Research questions and methods of enquiry

This research has five main research questions. They are:

1. How have education systems developed over recent decades, and how have patterns of access and participation changed since the commitments made at the World Education Forum in Dakar and in the Millennium Development Goals in 2000?
2. How have patterns of public spending on education evolved and are some countries stagnating in a low-financing trap?
3. What additional demands do the Sustainable Development Goals create for financing education, and to what extent can these be met from existing revenue?
4. What is the basic arithmetic of educational financing? How does this translate into demand for financing, and what does it reveal about benchmarks for necessary levels of investment?
5. What challenges and policy options exist to address the low-financing trap, enhance educational efficiency and effectiveness, increase domestic revenues and accelerate progress towards sustainable educational development goals?

Each of these questions is addressed in this report. The first question is explored in Chapters 2 and 3, the second in Chapter 4, the third in Chapter 5, the fourth in Chapter 6 and the fifth in Chapter 7.

The methods used to collect and collate insights and evidence included:

- A review and critical commentary on key documentation on educational finance produced by multi- and bilateral agencies, non-governmental organisations (NGOs) and other development agencies.

- Analysis of secondary time series data on aid, participation, attainment and finance held in data sets at the World Bank, UNESCO Institute of Statistics and other institutions.
- Development of projection models to explore the basic arithmetic of educational financing.
- Interviews with key stakeholders who have held or are holding strategic positions related to aid to education.

The main source of cross-national data for this analysis is the online database of the World Bank, which is used as a source unless otherwise stated. The downloads were in 2021 and the classifications, e.g. low and low middle income, sub-Saharan Africa, are those used by the World Bank as are the definitions of variables.

1.4 Organisation of the report

This report is organised in eight chapters. Chapter 2 provides a status report using key indicators of educational development. Chapter 3 profiles how participation and flows of learners through education systems have increased as a result of global initiatives to promote Education for All. Chapter 4 complements this description with an analysis of how public finance has evolved since 2000 and identifies patterns of expenditure and revenue generation. Chapter 5 outlines the rising expectations that global goals have placed on countries to finance mass education systems from kindergarten to grade 12 (K-12) and invest in quality. Chapter 6 explores the basic arithmetic of educational finance and projects the implications for public finance of the new global goals and comments on their feasibility. Chapter 7 identifies seven challenges that will shape how education is financed in low-income countries over the next decade, with special reference to SSA. Chapter 8 summarises conclusions and identifies ways forward.

2 Status report on education

After five decades of independence, and massive volumes of external assistance, SSA has the largest proportion of children who do not attend pre-school or primary, the smallest proportion of its population completing secondary schools, and the largest challenges in financing mass higher education of any region of the world (UNESCO, 2020). The challenges of funding educational development have many dimensions, some specific to the continent and others found across the developing world. Financial sustainability is fundamental to cumulative development, balanced investment and national identity.

The profile of countries at different levels of national income in SSA on key indicators[1] determines the scope and starting points for the challenges over the next decade and beyond.[2] This chapter provides an overview of the status of education systems as a precursor to more detailed exploration of how education systems and their financing has been changing.

The UNESCO Institute of Statistics (UIS) and the World Bank collate the most comprehensive database on education systems. Data from 47 countries in SSA has been used to generate estimates for key parameters for every country. Some fragile states do not have data that can be used reliably (e.g. Somalia, South Sudan) and are therefore generally excluded from the data set. Large federal states, e.g. Nigeria, may have problems aggregating data from states in a robust way. Differences between countries in education system can make some comparisons difficult. The number of upper middle income countries (UMICs) in SSA is small, making averages over-dependent on particular cases. Some data sets contain outliers that need considered treatment. The data used is for 2019 wherever possible and most downloads were in 2021. Where data was not available for 2019/20, the latest year data has been used as far back as 2016. Averages are arithmetic rather than weighted to simplify understanding. Missing cases have been adjusted based on the best information available.

2.1 GDP and educational expenditure

There are 23 low-income SSA countries (GDP/capita below $1,045), 18 lower middle income countries (GDP/capita $1,045–2,535) and 6 upper middle-income countries (GDP/capita above $2,535 and below $12,535 in the SSA data set). The number of LICs has been falling. Fifteen SSA countries became LMICs from being LICs in the period 2001–2018 (Steinbach, 2019) as a result of economic growth. This growth averaged 5.5% in the transitioning countries pre-Covid-19. Other LICs are on a pathway to becoming LMICs and some LMICs may become UMICs.

The total GDP of SSA is about $1.7 trillion. It is very unevenly distributed. Fully 45% of GDP, or $960 billion, is located in only two countries – Nigeria and South Africa. A further 5% each is contributed by Kenya, Angola and Ethiopia. Only 12 countries account for 80% of total GDP. This concentration of wealth creates imbalances in the resources available. Every country has fixed costs that must be met, e.g. of a national curriculum, textbook production and assessment institutions,

1 Data is for the last year available from the UNESCO Institute of Statistics (UIS) or from the World Bank.

2 Low-income countries (LICs), lower middle-income countries (LMICs) and upper middle-income countries (UMICs) as defined by the World Bank thresholds for GDP per capita.

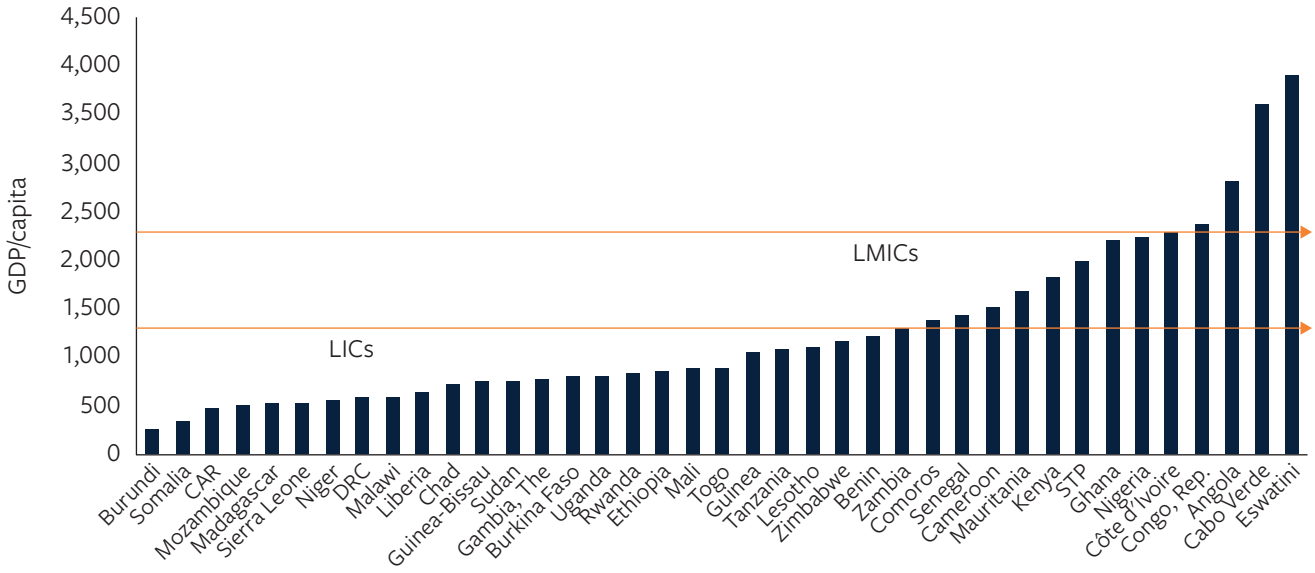
inspectorates, teacher training facilities and higher education institutions. These are not easily scaleable in small and very small countries. Financing needs are shaped by economies of scale, so size is important.

LICs in SSA have an average GDP per capita of about $670 and LMICs about $1,950. UMICs average over $7,700[3] (Figure 1). LMICs are on average a little less than three times richer than LICs and UMICs about eleven times richer on a per capita basis. These differences in GDP per citizen translate into very varied capacity to finance public education systems and into very different costs for educational development and for teachers' salaries. Countries also differ greatly in size and public administration capacity, in the economic endowments that shape development strategies, and in the political economies of translating aspirations into development realities in ways that are fit for purpose. Global goals and targets must therefore be translated to suit very different circumstances if they are to be nationally owned and linked to realistic resource envelopes.

Expenditure on education in LICs averages about 3.8% of GDP, in LMICs 4.2% and in UMICs over 5%. Education spending as a proportion of total government expenditure averages 15% in LICs and LMICs and 19% in UMICs.

Education expenditure as a percentage of GDP and as a percentage of government expenditure is shown in Figure 2. These are key indicators of educational effort and are the core indicators used by SDG4 on financing. The range of actual commitments to education is from below 2% to as much as 10% of GDP. Governments in SSA allocate between 6% and 35% of their public spending to education (Table 1).

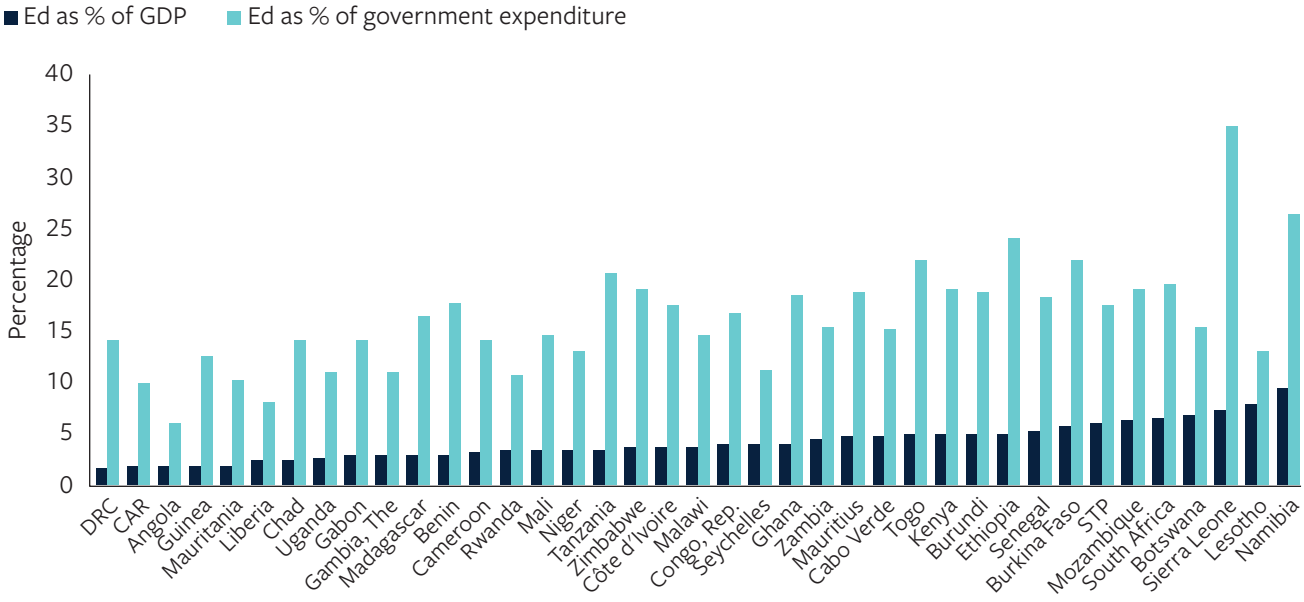
Figure 1 GDP per capita of LICs and LMICs in SSA



Source: UIS/World Bank. 2019 or latest year available

3 There are only six UMICs in the data set, so average values are less reliable than for LICs and LMICs, especially where there are gaps in the data set.

Figure 2 Education as % of GDP and of government budgets



Source: UIS/World Bank, 2019 or latest year available

Table 1 GDP, GDP per capita and expenditure on education

	GDP US$ '000	GDP/capita US$	Ed as % GDP	Ed as % govt exp
LIC	363,300	670	3.8	15.5
LMIC	967,600	1,950	4.2	15.4
UMIC	424,700	7,720	5.0	18.8
Total	1,755,600			

Source: World Bank dataset

2.2 Demography

SSA has a population of about 1.1 trillion split fairly evenly between LICs (49%) and LMICs (45%), with only 6% in the small number of UMICs. Over 28% of the total is accounted for by two countries – Nigeria and Ethiopia. If the Democratic Republic of Congo (DRC), South Africa, Tanzania and Kenya are included, then they account for 50% of the total population. These are the countries with the greatest financing needs for education.

Demographic transition will be critical (Canning et al., 2015). About **470 million** inhabitants are in the 0–14-year-old age group and of school age or below. A single age cohort is between 30 million and 35 million children. LICs have slightly more people and children than LMICs, and overall the **child** population is growing at 2.1% p.a. in LICs and 1.6% in LMICs, with a range from zero to over 3% (Table 2).

Table 2 Population and child population

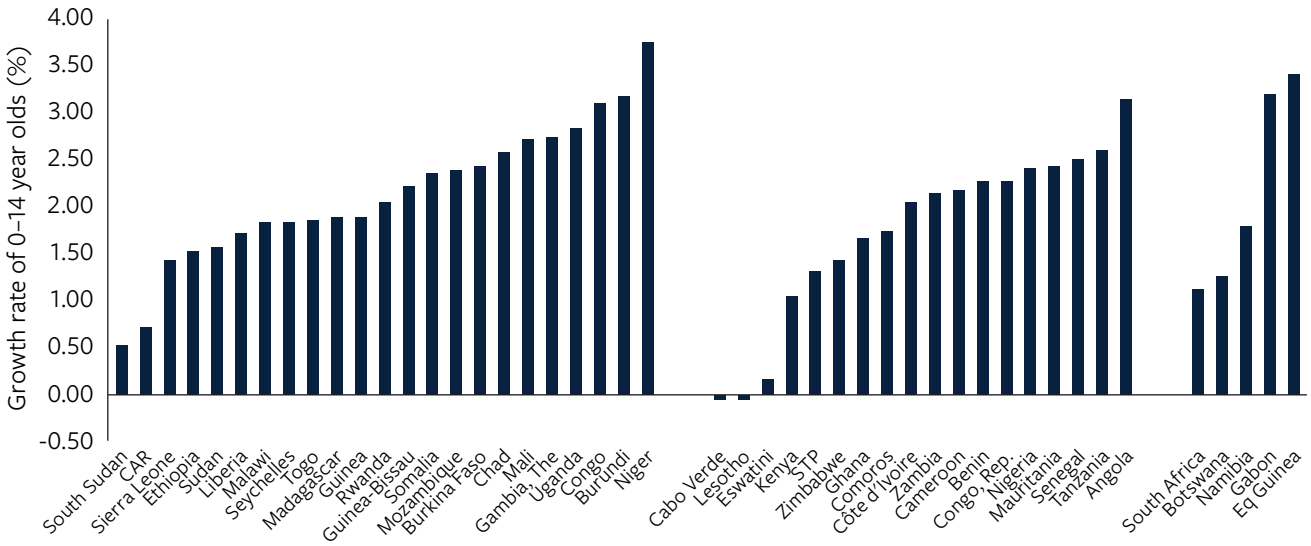
	Population	Population growth rate	0–14 yr population	0–14 yr population	Child population growth rate
	Million	%	Million	%	%
LIC	538	2.6	233	43.6	2.1
LMIC	501	2.2	213	40.4	1.6
UMIC	68	1.9	20	31.8	1.3
Total	1,106		467		

Source: World Bank dataset

Five countries account for more than half the primary school age population of SSA. These are DRC, Ethiopia, Nigeria, Tanzania and Uganda. Nigeria and DRC have very poor and incomplete national statistics and no data on out-of-school children, repeater rates and other basic indicators that is reliable. This means aggregated statistics for SSA can be misleading. Judgement has to be used to compensate for missing data.

The child population is growing more slowly than the total population and is expanding at about 1.8%. This average conceals a wide range, from below 1.5% to over 3% (Figure 3). Systems that have to grow at 3% need to double the number of school places and teachers every 22 years with pro rata implications for expenditure. Demographic transition to low population growth is not expected in much of SSA until 2040 or beyond. Southern Africa is likely to see falls in the growth of the child population first, followed by some East African states. The current single age cohort being born in SSA is about 35 million. By 2030 it will reach 45 million and by 2050 more than 50 million. These are the children who will need school places and financing will have to keep pace with this demand.

Figure 3 Population growth rate 0–14 years old, LICs, LMICs and UMICs



Source: UIS/World Bank, 2019 or latest year available

Without demographic transition the population of children is high relative to working age adults. The 0–14-year-old group constitutes about 44% of all people in LICs, 40% in LMICs and only 32% in UMICs. Richer countries have fewer children per adult. LICs have higher population growth rates than LMICs, which in turn have higher rates than UMICs. This is true for the population as a whole and for the school age group. As countries become richer it will become easier for them to finance education systems as the number of dependent children to adults diminishes. Importantly, lower growth rates in the school age group means that demand for new school places and additional teachers is reduced, with consequences for the amount of financing needed. Over time demographic transition may generate increasing services related to ageing populations.

2.3 Participation

Enrolment rates are shown in Table 3. Pre-school access is far from universal in SSA with a gross enrolment rate (GER)[4] of only 24% in LICs. LMICs and UMICs appear to provide pre-school for about 50% of children. This may be an underestimate since much pre-school is private and may not be included in surveys. If it is fee paying it is likely to exclude the poorest. There are no standard definitions of pre-school and what is included varies between countries, making comparisons difficult. The magnitude of costs that fall on public budgets is also difficult to ascertain for reasons that include: i) disparate forms of provision through many different modalities; ii) local financing from fees and contributions as well as local government budgets; iii) varying availability, length and quality; iv) widely different methods of recruiting and employing staff; and v) private provision outside of public accountability.

Net entry rates to primary education across SSA average around 60%, meaning that about this proportion of those of entry age, most commonly six years, register at schools. Most of the remainder of each age cohort will enter school in grade 1 over-age in subsequent years. Some may enter under-age, especially in richer countries and where pre-school is not available and working parents can use enrolment as a substitute for child care.

Primary GERs average 100% or more (LICs 108%, LMICs 100% and UMICs 106%). This is because GERs compare total enrolments in primary with

Table 3 Enrolment rates at pre-school and primary school

	Pre-school GER	Net entry rate	Primary GER	Primary NER	Over-age in primary	Primary completion
	%	%	%	%	%	%
LIC	23.9	57.7	107.7	74.1	18.7	67.1
LMIC	50.5	60.3	100.1	86.3	15.5	78.0
UMIC	48.6	61.1	106.2	93.4	8.6	90.6

Source: World Bank dataset

4 GER is the number enrolled of any age compared to the number in the age cohort for the grade.

the number in the appropriate age cohort, and thus include over-age children who have entered late and/or repeated grades. About 30% of countries have GERs at primary below 95%, and nearly two-thirds exceed GER 98%. Net enrolment rates (NERs), which only count those in the appropriate age range, are consistently lower and average 75% in LICs, 86% in LMICs and over 90% in UMICs. This gives some indication of how many are over-age.

The data indicates that between 15% and 20% are over-age in LICs and LMICs, meaning they are more than two years older than the appropriate age for their grade. SSA has a young population with high dependency rates. In countries where repetition remains common many children are over-age within grades. All education systems in SSA are predominantly organised with monograde curricula that assume whole classes are of the same age, and that lesson content and process can be common across class groups of children. The estimates of the numbers over-age are almost certainly conservative – under-reporting is likely and verification often difficult without birth certificate information. Over-age enrolment is likely to contribute to low completion rates (Lewin, 2007).

Enrolments at secondary level are much lower than at primary level, indicating that many do not make the transition to lower secondary (Table 4). GERs at secondary level overall are 38% and 54% in LICs and LMICs respectively. UMICs have higher enrolment rates, but the averages are unreliable since there are so few countries with data. NERs are between 20% and 30% lower than GERs indicating much over-age enrolment. LICs have completion rates suggesting nearly two-thirds of children fail to complete on schedule. In LMICs the proportion is a little over 40% of the age group.

Enrolment rates at tertiary level are much lower than in school systems. Historically most tertiary systems have limited access through high-stakes examinations. In addition, the direct and indirect costs have excluded many of the poorest. On average GERs in LICs at tertiary level are only 7% and a little less than double this in LMICs. Tertiary enrolments have been growing fast, especially in LMICs that have had consistent economic growth.

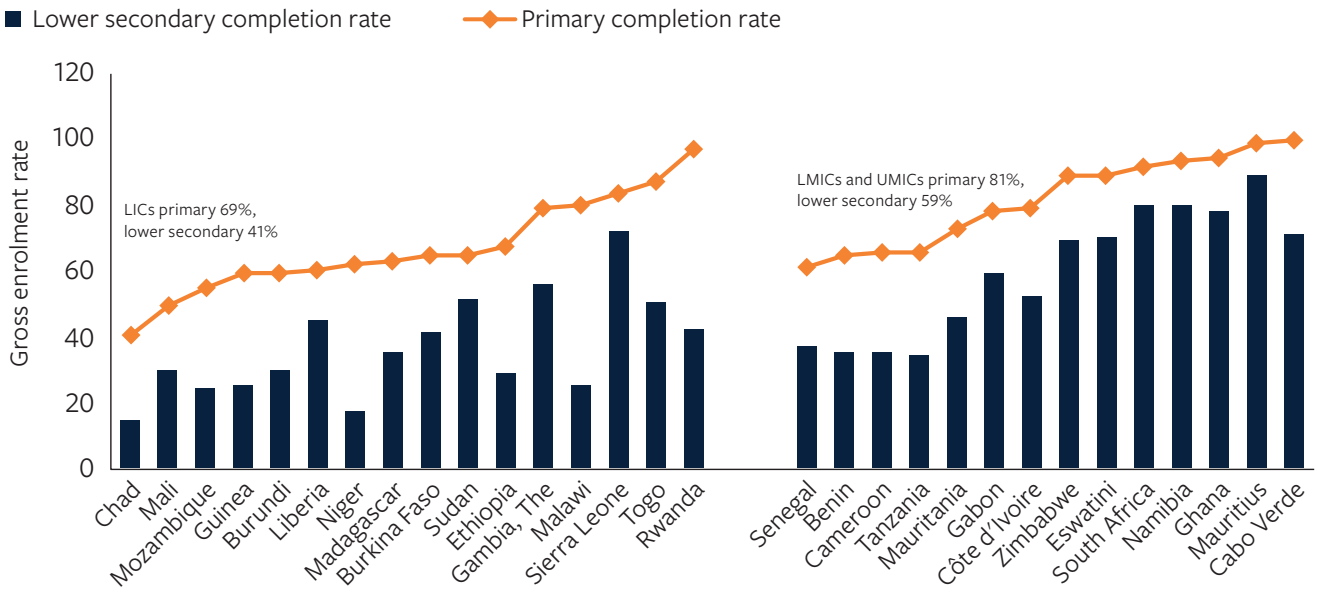
Primary completion rates – the number entering the last grade of primary for the first time divided by the age cohort for the last year of primary – show that only 67% achieve this in LICs and 78% in LMICs (Figure 4). Completion rates are typically much lower than GERs. They give an indication of the on-schedule graduation rate. Completion rates vary widely between countries; lower secondary rates are much less than primary completion rates, and LMICs and UMICs have much better rates than LICs. This is a further indication that there is still a distance to travel to ensure that all children complete on schedule as anticipated by national curricula.

Table 4 Enrolment rates at secondary and tertiary level

	Secondary GER %	Secondary NER %	Lower secondary completion %	Tertiary GER %
LIC	38.1	30.3	38.5	6.9
LMIC	54.4	45.0	58.2	12.5
UMIC	99.8	78.7	80.7	27.7

Source: World Bank dataset

Figure 4 Completion rates at primary and secondary level



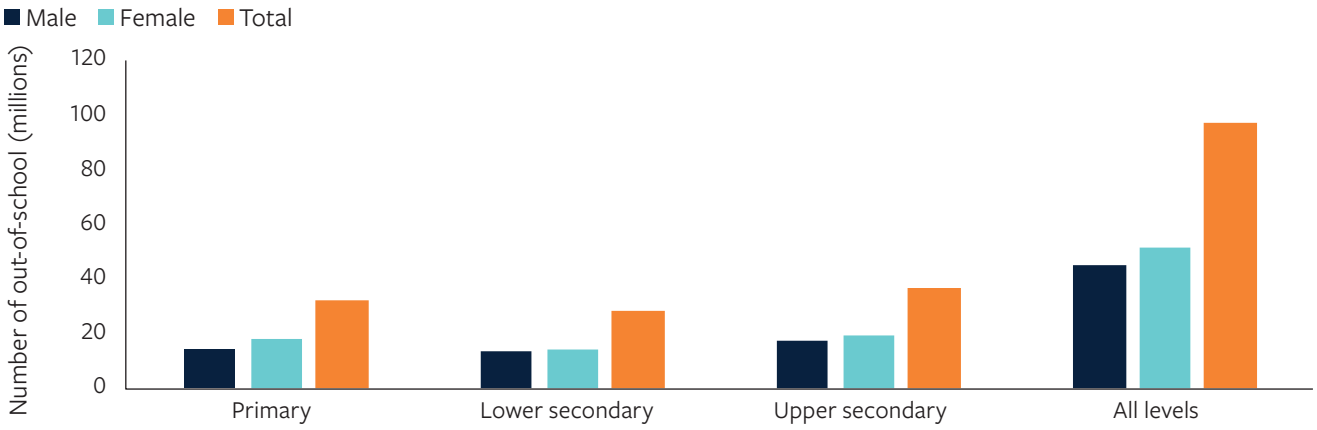
Source: UIS/World Bank, 2019 or latest year available

2.4 Out-of-school children

The numbers of children and young people out-of-school (OOSC) are considerable. Some recent estimates (UIS, 2019; UNESCO, 2018) suggest that about 32 million primary age children of school age, equivalent to 19% of the age group, are not enrolled. At lower secondary level the number is 28 million and at upper secondary 37 million.

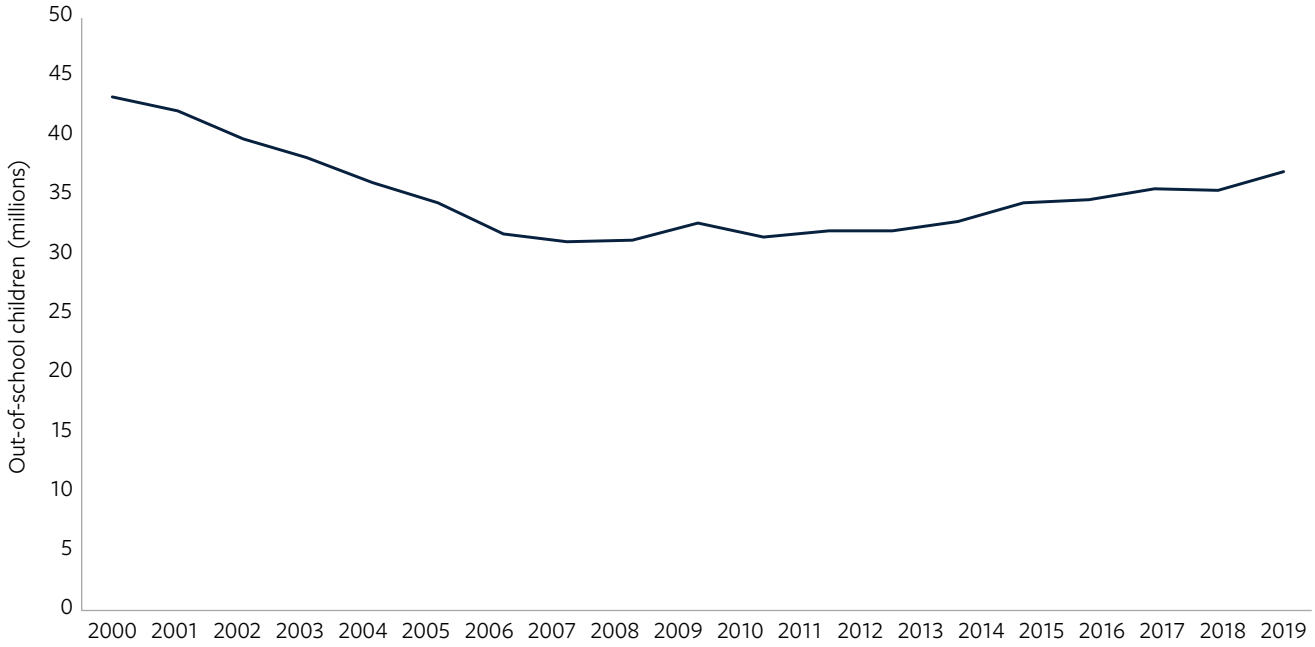
Strikingly, 29% of all OOSC are of secondary age and 38% are of upper secondary age. The great majority of OOSC are now of secondary school age (12 to 18 years) where costs per learner are highest (Figure 5). Differences in out-of-school numbers between boys and girls in SSA are largest at primary level. Out-of-school children are predominantly those who have entered primary school but failed to enter or complete secondary school.

Figure 5 Out-of-school children in SSA



Source: UIS/World Bank, 2019 or latest year available

Figure 6 Out-of-school children of primary age in SSA



Source: UIS/World Bank, 2019 or latest year available

The number of out-of-school children in SSA was falling in the early 2000s. The best estimates suggest that the number of primary age out-of-school children in LICs and LMICs in SSA was around 45 million in 2000, and fell to about 30 million by 2008 (Figure 6).

Since 2008 progress has stalled and, after 2012, the numbers of OOSC have been rising. The latest data suggests they may now exceed 35 million. The medium-term impact of Covid-19 is yet to be established but it is likely to increase the number of OOSC in the short term (Lewin, 2020b). Out-of-school numbers now include children of lower and upper secondary age. This greatly increases the numbers and increases the challenge of financing education for all children up to grade 12, especially where levels of finance for education in LICs and LMICs have been static, as evident from Chapter 4.

2.5 Gender Parity Index

The Gender Parity Index compares enrolment rates of boys and girls and generates a ratio where values less than 1.0 indicate more boys than girls and more than 1.0 more girls than boys. The average ratio at different levels in SSA is shown in Table 5. Gender parity is apparent on average in LMICs with an overall GPI of 0.99. LICs lag a little behind with a GPI of 0.96 (Table 5).

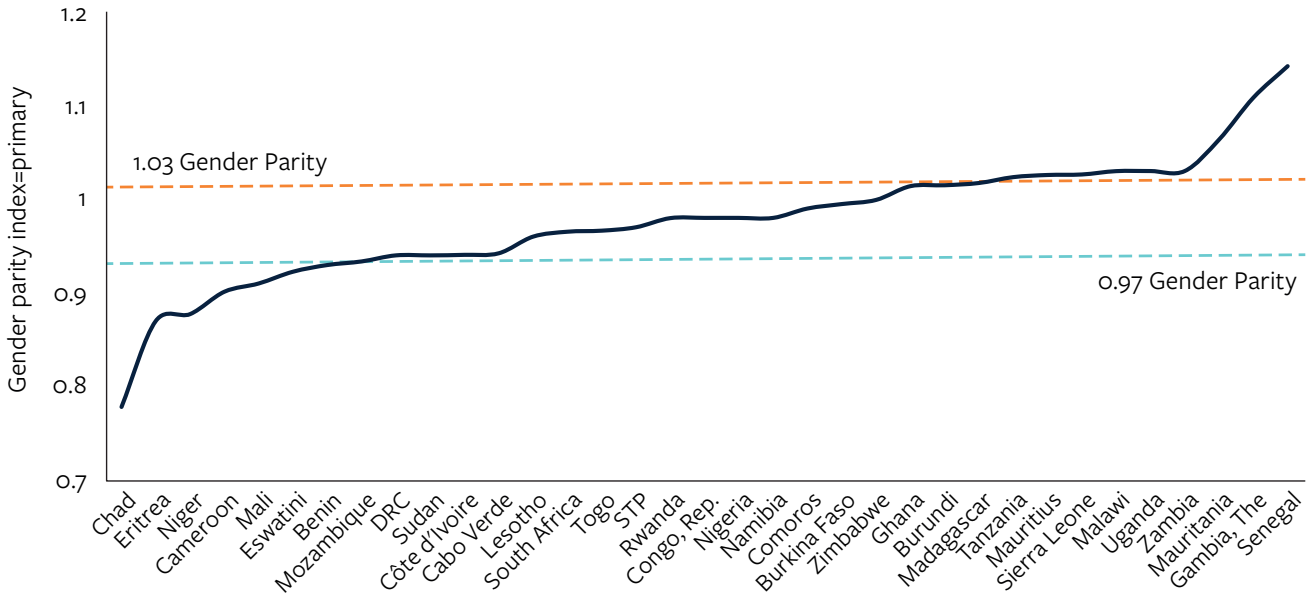
Table 5 Gender Parity Index

	GPI Primary	GPI Secondary	GPI Tertiary
LIC	0.96	0.94	0.64
LMIC	0.99	1.06	0.72
UMIC	0.99	1.04	1.36

Source: World Bank dataset

More than 20 countries (45%) in SSA have GPIs at primary greater than 0.97 and less than 1.03, the band of values widely accepted as indicating parity (UNICEF, 2020). Altogether, 33 countries have GPIs at primary greater than 0.90 (Figure 7). At secondary level LICs average GPIs of 0.94 and LMICs average GPIs of 1.06, indicating richer countries are more likely to have GPIs at parity or better. About 12 countries have GPIs over 1.0 at primary and secondary, indicating that more girls than boys are enrolled at both levels. At tertiary level GPIs favour boys in LICs and LMICs but favour girls in UMICs, as they do in almost all high-income countries.

Figure 7 Gender Parity Index – primary



Source: UIS/World Bank, 2019 or latest year available

2.6 Teacher demand

The learner teacher ratio (LTR) determines how many teachers need to be employed and financed. The LTR is not the same thing as class size, which is determined by how teaching groups are organised. The available data indicates that LTRs in SSA at primary level average 45:6, 34:1 and 24:3 in LICs, LMICs and UMICs respectively. At lower secondary the ratios fall to 31:1, 21:4 and 17:3 and reduce at upper secondary level to 22:5, 17:1 and 5.5 (Table 6).

These ratios fall as countries get richer. They also reduce at higher levels of school systems as conventionally teaching groups become smaller at higher grades. LTRs and how they are translated into learning opportunities depend on the level of teachers' salaries, the proportion of children enrolled, and the organisation of teaching and the deployment of teachers. Tertiary institutions may or may not be more efficiently organised than schools and can have many different patterns of learning and teaching, which have an impact of learner teacher ratios.

Table 6 Learner teacher ratios

	LTR Primary	LTR Lower Secondary	LTR Upper Secondary	LTR Tertiary
LIC	45.6	31.1	22.5	22.8
LMIC	34.1	21.4	17.1	23.3
UMIC	24.3	17.3	5.5	21.6

Source: World Bank dataset

Poorer countries have more learners per teacher than richer countries. This is a result of demographic differences, not simply because they have lower GDP per capita. Lower LTRs imply greater financial commitment to salaries. This is easier to achieve where demographic transition to low population growth has taken place and where tax to GDP ratios are high.

2.7 Costs per learner

A final observation is that costs per learner (unit costs) follow well-established patterns across SSA countries. Costs per learner in primary schools in LICs, LMICs and UMICs average 10% to 15% of GDP per capita, with higher costs in UMICs. At secondary the range of averages is 15% to 25% of GDP per capita for lower secondary, and 20% to 50% at upper secondary. Tertiary education tends to be much more expensive, averaging over 250% of GDP per capita in LICs and 85% of GDP per capita in LMICs (Table 7). Looked at another way, tertiary places in education are financed with over 25 times as much as a primary school place on average in LICs. In LMICs the average is about eight times as much.

The higher costs per learner at higher levels are a central issue for planning universal access to grades 1–12. LICs may become more like LMICs as they develop. If they do, then cost ratios between levels will fall. If they do not, high levels of participation will remain difficult to finance and most funding will flow to support enrolments at higher grade levels where learners are more likely to be from richer households.

These costs only relate to public costs. The costs to households can be substantial and may be comparable to public costs. However, data on these costs is very patchy and unreliable. There may have been a drift to increase costs to households in some countries where privatisation has taken place, but there are clear limits to growth (Lewin, 2021). Austerity in public spending is likely to increase pressure on schools to generate revenue from fees and contributions within the limits of what household expenditure will bear. The most recent global review of non-state and private education providers is in the 2021 Global Education Monitoring Report (GEMR). This provides an evidence base to explore policy issues that are beyond the scope of this research project.

Table 7 Costs per learner

	Unit cost as % GDP	Unit cost as % GDP	Unit cost as % GDP
	Primary	Secondary	Tertiary
LIC	10.0	23.8	263.4
LMIC	11.9	17.3	85.3
UMIC	15.5	24.9	42.4

Source: World Bank dataset

2.8 Overview

This section has summarised data which provides an introductory profile of educational development levels in SSA. This captures insights into differences between LICs, LMICs and UMICs in the resources available for education, the population of school-age children, participation rates at school and tertiary levels, numbers of out-of-school children, gender parity indices, learner teacher ratios, and cost per learner at different levels.

To understand the nature of the challenges presented for financing educational development in LICs and LMICs in SSA, it is now necessary to explore how patterns of educational participation have been changing and develop insight into what has and has not happened in relation to global goals to ensure every learner has access to education.

3 Changing patterns of access to education

This chapter addresses the first research question, 'How have education systems developed over recent decades and what are the changing patterns of access and participation since the commitments made at the World Education Forum in Dakar and in the Millennium Development Goals in 2000?'.

The chapter is in several parts following this introduction. The first substantive part makes the case for using a dynamic approach to understand how patterns of access to education evolve. The second explores country data on how enrolments by grade changed in line with global goals and targets set at conferences in Jomtien (World Conference on Education for All (WCEFA), UNESCO, 1990) and in Dakar (World Education Forum (WEF), GEMR, 2017). These catalysed many Education for All initiatives and resulted in unprecedented enrolment growth and demand for education services and financing. This leads in the third section to some synthetic insights into system reform and identifies some sources of inefficiency and ineffectiveness. The fourth part focuses on the use of flow charts to help understand issues that will have financial implications as systems transition to universal participation up to grade 12 in line with current global goals. Data from six countries is used to illustrate the issues arising from interrogating patterns of participation. Section 5 draws attention to some of the limitations of cross-sectional analysis based on indicators at a point in time. Section 6 presents a generic chart that can be used to profile specific systems and identify priorities going forward, and to explore financial implications. The last part notes that dynamic planning is needed that manages flows and recognises the sequencing needed to generate higher levels of participation that are sustainable and financially viable.

3.1 Approaches to planning Education for All

Planning for the future depends on understanding the past. To make efficient allocative decisions about resources and financing it is critically important to appreciate how children flow through education systems – especially during periods of reform (Lewin, 2023a). Public finance indicators often have a blind spot between inputs and outputs that overlooks the processes that convert finance into outcomes (Buffardi, et al., 2021). Promises like those made at the World Education Forum in 2000 that 'no country that has a credible plan for universalising access will fail to educate all its children for lack of resources' have to be translated into priorities based on a diagnosis of needs and bottlenecks. The experience of previous development initiatives is a valuable reminder about what has worked in the past and what may work in the future.

All planning makes assumptions about what should happen that do not necessarily affect what actually does happen as reforms are implemented **(Lewin, 1985)**. The failure of many large-scale innovations may be the result of assuming that implementation follows a planned pathway when in fact it does not. If policy and practice are not iterated and adjusted to reflect empirical realities, the result will be poor resource allocation and an unreliable evidence base for decision-making. How systems actually develop determines their costs and the impact of any shortfalls in financing. Scaling programmes, especially in complex systems, is very challenging (Piper et al., 2018).

The experience of Education for All is instructive, and foreshadows some of the things that will

unfold in relation to the implementation of aspects of SDG4. Commitments have been made to sequentially universalise primary, lower secondary and upper secondary schooling. Each wave depends on the successful implementation of the previous wave since lower secondary cannot be universalised until primary completion rates are near to 100%, and ambitions to universalise upper secondary depend on flows from lower secondary. Nor is it likely that gender equity, expressed in terms of the GPI, is a sufficient goal unless it is linked to universal participation. Achieving GPI 1.0 with a primary or secondary completion rate of 50% is not much of an achievement.

There is another reason why the dynamics of system change have to be considered as an integral part of policy dialogue. Systems have to be financed, and teachers, buildings, equipment and learning materials all have to be in the right place at the right time. Demand for resources depends on how growth and inclusion are managed, and how the rate of progress towards sustainable endpoints is phased. Aspirational policy commitments driven by political ambition delinked from historical experience, current systems, capacity at different levels and the absorptive capacity of the labour market for school leavers risks mismatches between goals, time-bound targets and learning outcomes. If these are not aligned, many things may end up in the wrong place at the wrong time.

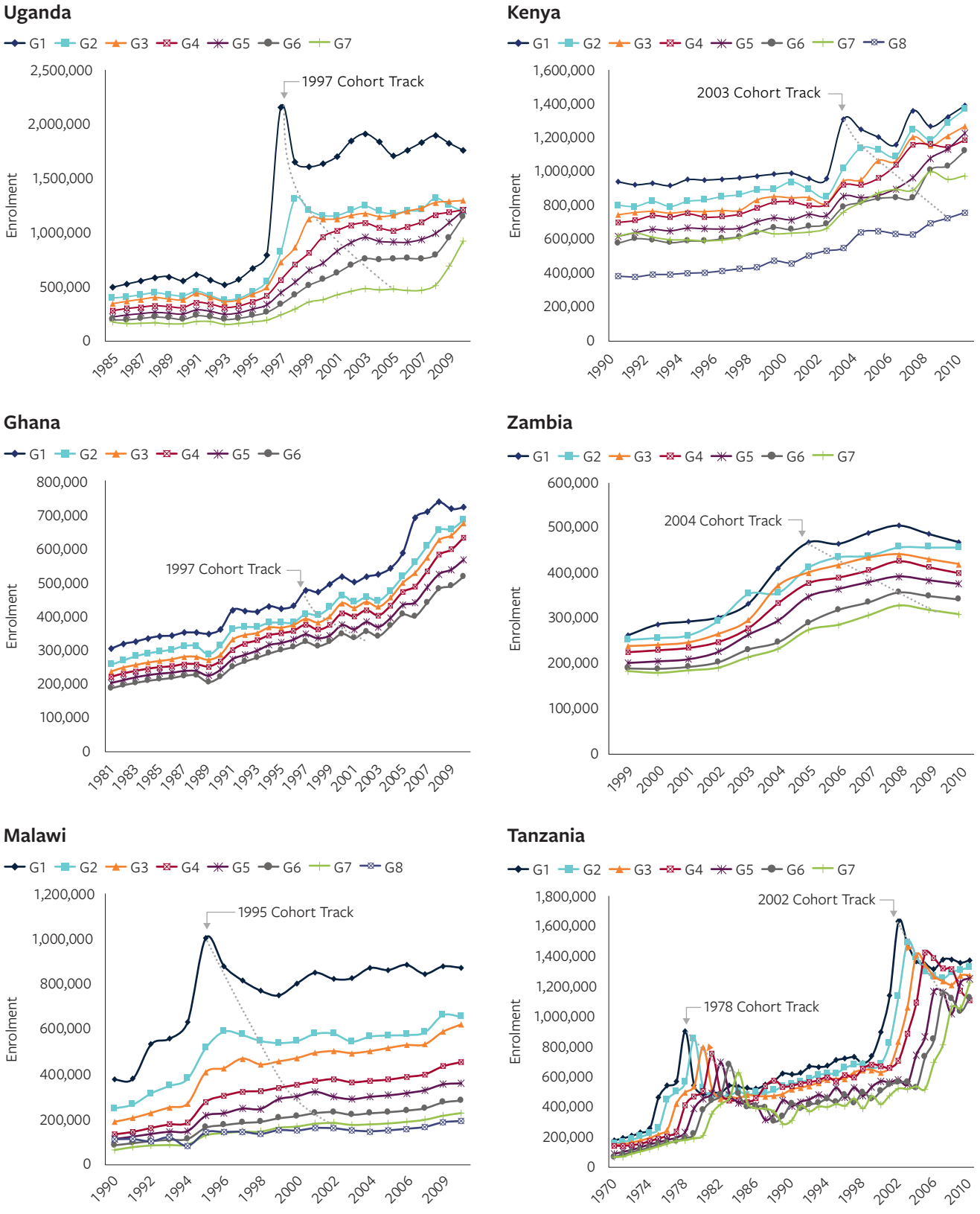
3.2 System expansion in six countries

The experience of Education for All (EFA) of six countries in SSA is illustrative of some of the patterns that occur in the wake of large-scale attempts at system reform. These are likely to resonate with current SDG ambitions to universalise access to grade 9 and grade 12. There may also be lessons for reforms in Technical and Vocational Education and Training (TVET) for upper secondary age children and expanded access to higher education to qualified school graduates from grade 12. They also suggest that exogenously driven goals and targets need to be carefully balanced with endogenously determined priorities and system realities if the two perspectives are to reinforce each other consistently. The priorities of development partners are not always shared by recipients of aid (Schiefelbein et al., 1999; Crawfurd et al., 2021). Modelling systems as static formal bureaucracies may often be less useful than seeing them as complex dynamically inter-related sets of transactions (Faul and Savage, 2023).

The charts in Figure 8 display 25-year sequences of enrolments by grade for six countries. The cases chosen are all anglophone, and are derived from the UNESCO Institute of Statistics and additional information from educational management systems. The patterns are different in francophone and lusophone countries and a separate study is needed to explore patterns in these systems, which have a different history and structural commonalities. In each case the impact of the announcement of universal primary education (UPE) or in some cases universal basic education (UBE) is clearly shown by large increases in grade 1 enrolments. These knock though to higher grades in very different ways in different countries.

Uganda announced universal primary education in 1997, when the President promised that every household could send up to four children to primary school and the government would meet the costs. Shortly afterwards this arrangement was extended to all children. The result was that, in a single year, the number of children enrolled increased from 3.1 million in 1996 to 5.3 million in 1997 (ODI, 2005). The total enrolled continued to expand rapidly to reach 7.6 million five years later, in 2003.

Figure 8 Six countries' implementation of Education for All



Source: UIS data supplemented with EMIS

This massive increase in enrolments was concentrated in grade 1, which exploded from 800,000 to 2,100,000 in just a year. As can be seen from Figure 8, enrolments in grade 1 were not translated into a similar increase in enrolments in grade 2 the following year as might be expected. In fact, the number enrolled increased by about half as much as in grade 1, suggesting many did not proceed from grade 1 to grade 2. The dotted line shows the track of an age cohort through the grades assuming they were automatically promoted each year. Of the 2.1 million in grade 1 only about 500,000 arrived in grade 7 seven years later.

Ten years after UPE was announced, the Government of Uganda introduced new policy on secondary schooling which greatly increased access but fell sort of universal access. The decision was to make places available to all those who successfully reached the end of primary school and who achieved minimum grade levels in the primary school leaving examination. Public schools were to be expanded and private schools were offered capitation grants that could be supplemented by fees from students who could not enrol in public schools (Lewin, 2004).

The enrolment curves by grade and year show how long it took for the enrolment bulge starting from 1997 to ripple through the system. At first there was massive over-enrolment without a concomitant increase in the supply of teachers. Though teacher numbers were gradually increased, there was no clear mechanism to ensure they would be posted to teach grade 1 classes. Thus, not only was there massive over-enrolment in grade 1, there was also massive inflation of class sizes to the point where some schools might have over 200 children in grade 1 taught by one teacher. If the government had anticipated this, it had no mechanisms to manage it. Nor was there a coherent response from donors to find ways of directing sufficient resources to increase the supply of teachers for the early grades.

The numbers enrolled in grade 7 consistently lagged behind those in grade 1. Moreover, the gaps in enrolments between grades 1 and 2 and between grades 6 and 7 were systematically greater than the gaps between enrolments in other years in sequence. The reasons are different.

Many grade 1 children did not transit to grade 2 for a variety of reasons, including being over-age on entry, costs to the household of attendance (even though there were nominally no fees), low learning, failing to adjust to school climate, and being withdrawn by parents. Some who were under-age may have spent more than one year in grade 1, thus inflating grade 1 enrolments.

The gap between grade 6 and grade 7 enrolments is best explained by queuing in grade 6 to achieve higher grades in the primary school leaving examination. Schools are known to discourage those likely to fail from taking the examinations since this will lower the school level average pass rates. Demand, especially in private schools, is very sensitive to pass rates, which are published. Individual candidates and their households may also reason that they are not ready to take the examination and defer enrolment in grade 7 in favour of private tuition.

Lastly, it is noticeable that enrolments in grade 1 remained very high from 1997–2009. In fact, these enrolments were considerably more than the size of a single age cohort, which was about 900,000 at secondary entrance level. Many over-age children therefore remained in the system. More particularly over-enrolment in grade 1 is persistent and does not fall back over the 12 years from 1997–2009.

This means that it is not simply a problem of a bulge in enrolments created by a surge after the announcement of UPE. It is a systemic feature which persists and is a source of considerable inefficiency. Simply put, it significantly inflates the number of years of school that have to be provided to generate a successful school graduate.

The enrolment curves in other countries in SSA have features that resonate with the case of Uganda. The following discussion highlights some points of similarity and difference.

Kenya has an 8:4 system of primary and secondary schooling. Its first post-independence commitment to UPE was in 1974, the second in 1979 and the third in 2003. These are discussed in more detail in Somerset (2009). The evolution of the third reform programme resulted in the patterns of enrolment shown in Figure 8. From 1990 to 2002, enrolments in grade 1 grew slowly and drifted up to 1,000,000 by 2000. Between 2000 and 2002 there was a small decline in enrolments. This may have been related to the widely telegraphed expectation that school levies, which had reappeared in the aftermath of previous attempts to provide free primary education, would be abolished, along with the obligation to buy uniforms and meet other costs.

Enrolments in primary schools ballooned from 2 million in 1973 to over 6 million by 2003. The increases were spread across grades, though the largest increase was in grade 1, of over 38% (Oketch and Rolleston, 2007). As in Uganda, these enrolments were not translated into pro-rata increases in enrolments in subsequent grades. There was a lot of attrition such that, by grade 8, the 1,300,000 in grade 1 had become only 750,000. These were not actually the same children as the number includes repeaters from other cohorts. Nevertheless, the crude number is a simple indicator of attrition.

There is a large gap in enrolments between grade 7 and grade 8. The main reasons are the same as in Uganda. Schools discourage progression of those likely to fail the primary leaving certificate examination. In Kenya there is evidence that, after 2003, children re-entered schools in high grades having previously dropped out, as well as entered in greater numbers in grade 1. This is indicated by the steeper gradient of increase in higher grades in 2003 and 2004.

Ghana has a different pattern for flows of learners. Free compulsory and universal basic education (FCUBE) can be traced back to the new constitution of 1992, which mandated that it should be achieved by 2005. Progress was slow but steady and punctuated by policy initiatives and periodic efforts to accelerate implementation. These correlate with spikes in enrolment, which are reflected in peaks and troughs in the graph. These are generally not lagged and seem to occur in every grade in the same year. They are not therefore flow characteristics so much as system-level perturbations that affect all grade levels at the same time.

Thus in 2005/6 there was a surge in enrolment related to the introduction of a school capitation allowance system that was coupled with another initiative to ensure that fee-free schooling was a reality as well as a policy. This resulted in an increase in enrolments in all grades except grade 1 as a result of the lowered costs of participation. As grade 1 entry was already close to universal the inflection did not appear in the entry cohort.

In **Zambia** there was no major discontinuity in enrolments when free basic education was announced in 2002. Enrolments increased from 1.7 million to 2.9 million over a six-year period. Enrolment growth was greatest in grade 1 but was not much slower in higher grades. Up until 2010

attrition rates remained at similar levels, so the enrolment curves remained essentially parallel. The 2005 cohort of those entering grade 1 of 470,000 became about 300,000 seven years later. By 2008 enrolment growth had slowed and GERs were over 115%, suggesting that effective demand for primary schooling might be saturating (DFID, 2011). This, coupled with the impact of the global economic crisis, may have adversely affected progress towards universal enrolment.

Malawi has a generic enrolment flow pattern like that in Uganda, though with steeper attrition that persists over a long period. Malawi announced UPE in 1994 after its first free and fair elections. Total enrolments moved from 1.9 million to 2.9 million in one year, and the number in grade 1 exploded from 630,000 to over 1,000,000. This was followed by the evolution of a new equilibrium where total enrolments averaged about 3 million for the next five years, and settled to grow at about the rate of the child population growth rate.

As in Uganda there was a huge drop in the numbers transiting to grade 2, which was consistently about 25% smaller than grade 1 for reasons similar to Uganda. Overall, the 1 million who entered in 1994/5 translated into somewhat less than 200,000 enrolled in grade 8 eight years later. Grade-on-grade enrolments shrank by 15%–20%, which was at least five times the rate of child population growth – if all were enrolled and promoted each grade would differ in size by an amount determined by the child population growth rate.

From 1994 to 2009 the patterns established persisted year on year without much realignment. This is a signal that the system has switched to a new equilibrium. From low enrolment rates and substantial attrition the system now has high enrolment rates accompanied by high attrition, with the result that the ratio of grade 1 to grade 8 students has only changed slowly as the system has developed. By 2009, enrolments in grade 8 were still less than a quarter of those in grade 1 eight years before. System inefficiencies therefore remained high, with implications for costs and sustainable financing of higher participation and completion rates.

Tanzania has strikingly different patterns of participation over time. Here, there are very clearly two periods where universal primary education policy was implemented effectively.

In 1978 the first of these created a massive spike in enrolments. The gains appear to have been lost in the 1980s and 1990s until 2001, when the policy was reintroduced. In the first case enrolments in grade 1 quadrupled in four years. In the second they doubled over the same period.

Most significantly, the Tanzanian education system suffered setbacks after virtually achieving UPE by 1980 as economic recession, lack of political will, changed priorities and structural adjustment not designed to protect educational gains combined to result in declines in enrolment rates.

When recovery came after 2002 the enrolment curves suggest that drop-out rates fell very rapidly so that most of the enrolment growth in the lower grades was reflected in enrolment growth at higher levels as age cohorts progressed. There is evidence that the system dramatically reduced over-age enrolment. Unlike in Malawi, which switched from a low- enrolment, high drop-out equilibrium to a high-enrolment, high drop-out state, Tanzania appears to have switched to a high-enrolment and low-attrition system. This clearly has implications for sustainable financing that reflect success in retaining more children in school, which itself increases effective demand for enrolment at secondary level.

3.3 Lessons about reforms to enhance participation

This analysis leads to several conclusions for future efficiency and effectiveness at system level. These will determine how financing is translated into learning.

First, plotting enrolment charts provides an empirical insight into the actual behaviour of systems that can be compared to the aspirations of plans for system development. It is therefore a fundamental base for iterating implementation of well-conceived plans that respond to changes in system status. This can shape inputs to enhance access and achievement to meet needs as they arise, and respond to uneven patterns of development that require different interventions to achieve desired outcomes.

Second, unanticipated outcomes are not uncommon. None of the countries in the data set had plans that anticipated that enrolments would not knock through sequentially to higher grades, nor that levels of attrition would remain high despite increased enrolments. Neither did they systematically anticipate queuing around high-stakes selection examinations, which distorted enrolment patterns. Analysing the past can highlight risks that reforms will unfold in ways that are not planned.

Third, the analysis presented here is based on total enrolments. With access to detailed country-level data, it can be repeated for many different sub-populations that may be of interest, e.g. girls and boys, urban and rural enrolments, high- and low-achieving students, and children from different household income bands. This can show the differential impact of development on different groups and profile those who are more and less marginalised. Innovations designed to enhance access and participation may succeed in the aggregate, but can at the same time disadvantage the most marginalised.

Fourth, this kind of flow analysis is critical to attempts to increase participation at secondary level since increasingly the limitation on expansion of secondary schooling, especially at upper secondary level, is the supply of qualified and willing primary school leavers and the supply of vacant school places that are affordable. Yesterday's achievements provide the baseline for tomorrow's development, so it is essential to monitor flows at system level.

Fifth, to be used in planning, the enrolment patterns revealed by analysis of data available on global databases has to be validated by in-country verification and secondary analysis. This is because aggregation can depend on different assumptions about how to combine data. Definitions used in EMIS systems and household surveys often vary between data collection systems and the same definitions may be applied differently. The treatment of missing data can also have an impact on the reliability of data.

Sixth, the education systems represented by the flow charts are complex organisations with many interacting parts. They respond to policy, as is evident from the spikes in enrolment after major interventions for EFA. But they also appear to have dynamic characteristics that shape their evolution largely independently of specific policy. Enrolments by grade evolve as a result of the interplay of various factors, including changes in the number of children in the population, over-age enrolment and repetition, selection examinations that limit access to the next level, school location and identity, labour market demand for educational qualifications, and the costs of attendance and private tuition. How these factors interact is system-specific. They

include long-term drivers of participation and costs. Short-term perturbations resulting from policy interventions have to be seen in the context of longer-term trends that are central to medium-term questions of education financing.

3.4 Education system learner flow analysis by grade

The demand for education financing is determined by the number of children (and adults) who have rights to participate in public systems funded by states. In practice, this demand is moderated by the numbers able to participate and those who are willing and able to enrol. In principle this will be the whole of an age cohort when education is compulsory below a school leaving age, which is typically 15 years old but varies from country to country. Beyond this level, access to education may be more or less mandated and may or may not be seen as a right. SDG4 assumes that all citizens have a right to education up to grade 12, but this is not reflected in domestic legislation in many countries.

Actual expenditure depends on costs per student at different levels, and crucially how the students flow through school systems. Gross and net enrolment rates at primary level are high in most LICs and LMICs, suggesting there are enough school places for all children in these countries. This could be true if learner teacher ratios and class sizes were at acceptable levels, but might conceal significant distributional problems and inefficiencies in uneven allocation (of teachers, classroom space, equipment etc.). Gross and net enrolment rates at lower and upper secondary level tell a different story and provide clear indications that enrolment is falling short of universal levels. Data on primary completion rates confirms that, in LICs and LMICs in SSA, these average 67% and 78%, and at lower secondary only 38% and 58%. This suggests that there are issues with the flow of students that need to be addressed, and that internal inefficiencies arising from late entry, over-age enrolment and progression, and premature drop-out remain substantial problems.

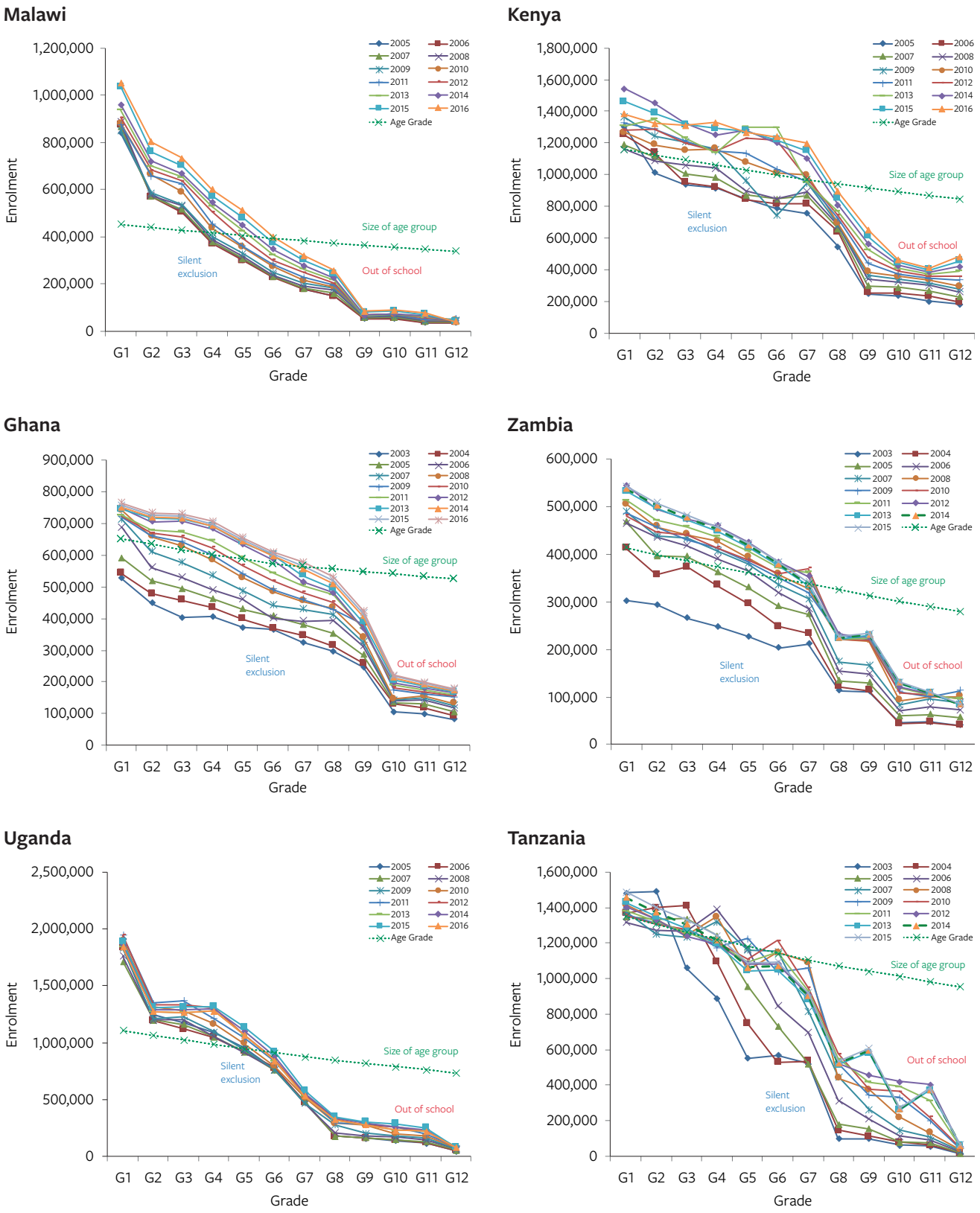
One way of understanding challenges of achieving high levels of participation is to construct flow charts by grade and year for national systems to gain a deeper system-level understanding of the dynamics of progression though education systems (Figure 9). The patterns are invisible to aggregate measures of participation, which usually only provide cross-sectional snapshots of the value of key indicators at a single point in time.

The charts in Figure 9 indicate enrolments by grade from 2005 to 2016 for six countries – Malawi, Kenya, Ghana, Zambia, Uganda and Tanzania. These charts show many different country-specific features relevant to public financing of educational development consistent with the global targets of SDG4. They provide a starting point for more detailed interpretation at country level. Figure 9 uses the UIS database to present data differently to Figure 8 (as well as a different time period).

In every case there is a serial decline in numbers as grade level increases. The green dotted line is an approximation of the number of children in a single age group who might be expected to be enrolled in that grade. Where this line slopes downwards to the right, as it does in all these cases, it means the population of children is growing year on year and demographic transition has not taken place.

It is clear that there is a tipping point in the relationship between the enrolment curve and the age group curve. This occurs when the enrolment line for a given year crosses the age cohort line. Above this tipping point there are fewer children enrolled than in the age group, and thus there are increasing numbers that are likely to be out of school as grade levels increase.

Figure 9 Enrolment patterns grades 1–12 in six countries



Source: UIS data supplemented with EMIS

The UNESCO Institute of Statistics data set typically identifies children in three age groups – primary (6–12 years), lower secondary (13–15 years) and upper secondary (16–18 years), and counts whether children are registered at a school and are nominally attending. The actual computation of the numbers of out-of-school children is complex and needs to be undertaken on a country-by-country basis. Flow charts help indicate where capacity may fall short of demand at a macro level with implications for both recurrent and capital costs. If full enrolment to grade 12 is targeted, then enrolment curves have to follow the size of the relevant age cohort with adjustments for age in grade slippage.

It is important to recognise that those who appear to be enrolled may not be learning and may be 'silently excluded'. Children may appear to be enrolled but may not be physically or mentally present all the time, and may not be learning at a level appropriate for their capabilities (Lewin, 2015). Data on achievement levels repeatedly confirms that there have been serious problems with learning levels in many systems since independence (UNESCO, 2017). These have been recognised and documented but remain unresolved. Low learning levels may also have been exacerbated by over-rapid expansion of systems at rates so high that learning infrastructure has been stretched beyond its ability to maintain learning levels.

Malawi is typical of a cluster of low-enrolment SSA countries. Enrolments in grade 1 are a multiple of the number of children in the age group, in this case nearly double. This arises because children in grade 1 include many who enter late, above the age of six years. There may also be some who are below school age who enter under-age who main remain in grade 1 for more than a year and who may be enrolled early because of parents' work commitments.

Enrolments in each grade have increased year on year as programmes to universalise primary education have had an effect on school entry rates and on the capacity of schools to enrol more children. These rises appear to be faster in the middle grades, suggesting drop-out may be slowly reducing and progression rates improving until the end of primary school at grade 8.

In Malawi the gradient of attrition which reflects drop-out has remained substantially unchanged over time. The number enrolled in grade 9 was about 7% of those in grade 1 in 2005. In 2016 it was about 8%. There is an inflexion in the enrolment curves between grades 8 and 9, which is the transition to lower secondary. In Malawi the flow of students is linked to the results of the primary school leaving certificate. Enrolments at secondary level have remained low despite the expansion in numbers reaching the end of the primary cycle. Costs to households at secondary can be several multiples of those at primary. Those who are over-age will reach secondary school at or above the age of 15 years, and may choose work in preference to school if it is available.

Kenya has different patterns. Here primary school lasts eight years. The numbers entering grade 1 have increased year on year and most have reached grade 7. Though there is some over-enrolment in grade 1 it is much less than in Malawi, suggesting on-schedule school entry rates are high. Grade 8 enrolments fall substantially when compared to grade 7 in Kenya. The primary school leaving certificate is in grade 8. Enrolments in grade 8 fall because some schools discourage students who are likely to fail from continuing. Those with low academic performance will not achieve the grades needed for selection for desirable secondary schools. Schools seek to maximise their pass rates by pre-selecting those who are likely to score well.

Kenya announced a free secondary school policy in 2008. Enrolments in grade 9 grew at about 14% per year for two years before falling back to consistently expand at between 5% and 10% a year. There was no large discontinuity, but there was a surge in grade 9. It remained the case that many Kenyans were unable to enrol, and the numbers in grade 9 remained about 70% of those in grade 8.

Ghana's educational expansion continued from 2005 to 2016 in a consistent progression, with most grades growing at between 4% and 6% a year up to grade 9 and the Basic Education Certificate of Education. After grade 9, enrolments fall at senior secondary level as a result of selection according to examination performance, costs and availability of places.

Zambian enrolments have been increasing grade on grade at about the same rate as in Ghana. There is a steep decline at the transition of lower secondary school from grade 7 to grade 8 and another from grade 9 to grade 10 as further selection takes place. By grade 10 the number enrolled is about 20% of the total enrolled in grade 1, which includes those who are over-age.

Uganda's profile of enrolments resembles Malawi's, with high levels of over-enrolment in grade 1 and high attrition through to grade 8. Retention has improved in the lower grades of primary but accelerates above grade 4 such that, by grade 8, enrolments are about 40% of those in the age group. Uganda's profile has not changed much over the last decade. The profile of enrolment has not changed in ways that indicate rapid increases in efficiency or reductions in drop-out. Secondary-level enrolments post-grade 8 have increased but remain well below universal levels.

Tanzania has seen a rapid transition to higher enrolment rates as the number enrolling in grade 1 has been regularised with more and more enrolling at the appropriate age. Most who enrol now complete grade 7, at which point there is a transition to lower secondary. The patterns displayed are characteristic of a system which has made rapid progress eliminating repetition and enacting automatic promotion, unlike other countries such as Malawi and Uganda. Participation at grade 8 has also risen rapidly, to the point where more than half the age group appear to be enrolled at this level.

3.5 Limitations of cross-sectional data

Table 8 shows completion rates for the same six countries as the flow charts of learners. These statistics give one picture of levels of participation based on aggregate data at a point in time. Average completion rates are 62.5%, 39.5% and 24% at primary, lower and upper secondary. If these numbers are compared to the country charts above in Figure 9, it is immediately clear that different stories lie behind the completion rate numbers, and that the incidence of over-enrolment and drop-out is different and occurs at different grade levels.

This cross-sectional and aggregate data may not be consistent in some cases with the flow data. The reasons for inconsistencies are likely to be complex. Exploring these is beyond the scope of this paper since it requires detailed analysis of the original data and its collection and collation. The main point is that flow analysis adds a dimension to tabular data that generates new insights into where problems are located and how they are changing. The flow data reveals patterns invisible in cross-sectional data so should be adopted as a standard planning tool.

Table 8 Completion rates

	Primary			Lower secondary			Upper secondary		
	Male	Female	Average	Male	Female	Average	Male	Female	Average
Ghana	73	69	71	50	44	47	9	12	10.5
Kenya	82	77	79.5	68	61	64.5	38	44	41
Malawi	52	43	47.5	21	23	22	13	15	14
Tanzania	84	75	79.5	26	30	28	27	32	29.5
Uganda	43	39	41	23	26	24.5	15	18	16.5
Zambia	43	71	57	46	54	50	27	33	30
Average	63	62	62.5	39	40	39.5	22	26	24

Source: UNICEF global online database, April 2021

The out-of-school rates collated in Table 9 for each country also give a partial picture of the nature and magnitude of the problem of OOSC. There are surprising differences in the rates between countries that are not reflected in consistent patterns in the flow data. OOSC data is difficult to collect and often depends on self-reporting from samples of respondents that may or may not be representative. There may also be incentives to under- or over-report OOSC if the numbers out of school are linked to intervention programmes. Both the numerator and denominator of OOSC rates contain uncertainties that are not usually indicated in data sets.

Table 9 Out-of-school rates

	Primary			Lower secondary			Upper secondary		
	Male	Female	Average	Male	Female	Average	Male	Female	Average
Ghana	6	7	6.5	6	8	7	29	21	25
Kenya	5	5	5	3	3	3	11	9	10
Malawi	5	6	5.5	8	8	8	36	23	29.5
Tanzania	14	18	16	58	56	57	81	74	77.5
Uganda	8	9	8.5	23	22	22.5	68	53	60.5
Zambia	13	18	15.5	27	20	23.5	61	44	52.5
Average	9	11	10	21	20	20.5	48	37	42.5

UNICEF global online database April 2021

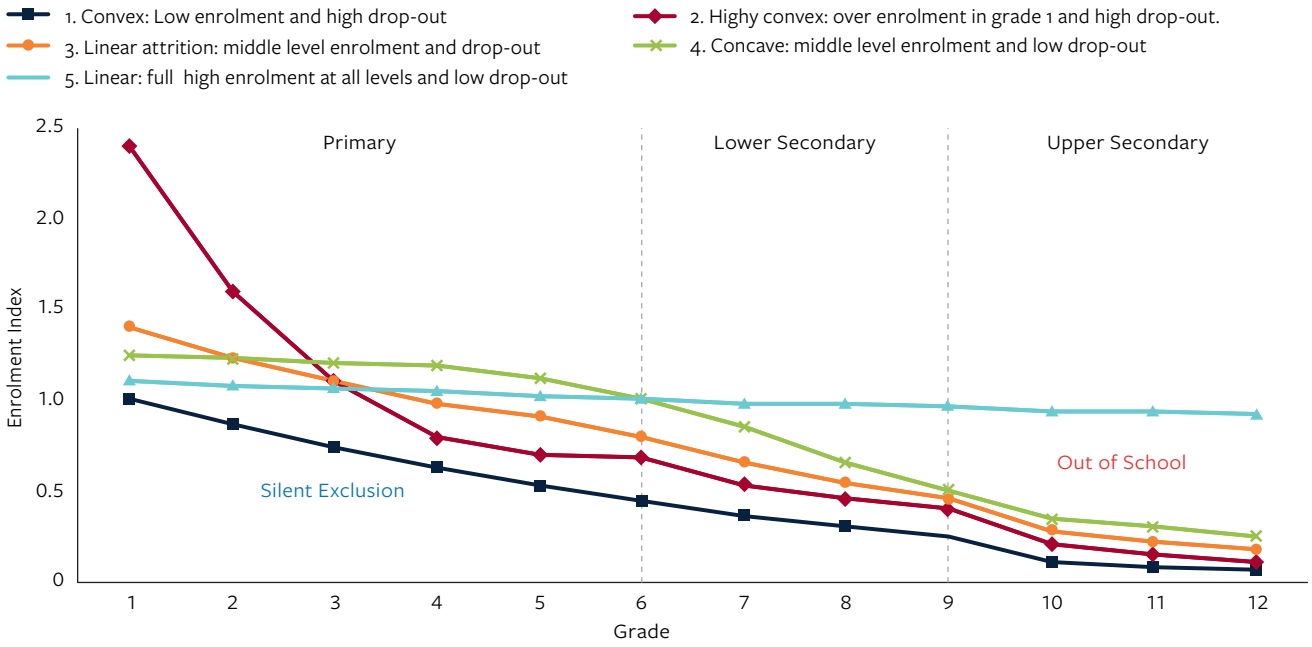
An understanding of the reasons for anomalies and validation of the national data that lies behind the tables and charts is needed to develop detailed plans to address low completion rates and meet the needs of OOSC. The flow data is a more reliable measure of the direction of travel of systems in improving the progression of learners. It allows various consistency checks that can identify data anomalies since time sequenced flows are visible and inter-related.

3.6 Synthesising flow patterns and some implications

Across SSA, patterns of enrolment fall into five different types distinguished by the shape of the participation-by-grade curve and overall rates of participation and drop-out (Lewin, 2008). This is shown in Figure 10. Type 1 countries have low enrolments and primary entry rates well below 100%. Drop-out occurs from grade 1 and primary completion rates are below 50%, with less than 30% reaching grade 9. Type 2 have substantial over-enrolment in grade 1 with many over-age entrants and rapid subsequent attrition. Often, there is an inflexion at the transition between primary and lower secondary, and increasingly at the end of lower secondary as participation rates increase and competition to enter senior secondary becomes intense. Type 3 patterns have less over-enrolment and more regular attrition with middling levels of drop-out. Type 4 countries have middle-level enrolment and low drop-out that increases up to upper secondary. Type 5 countries have high levels of enrolment and little drop-out up to at least grade 10. A list of countries by type can be found in Lewin (2015). The patterns in Figure 10 use an enrolment index that compares enrolment with the number in the age group for the grade level.

These generic patterns are important for several reasons and provide signals about levels of efficiency and effectiveness. First, the patterns are a reminder that each country has different starting conditions for the journey from the present to the kinds of outcomes anticipated by SDG4. The distance systems have to travel to similar destinations immediately suggests a need to differentiate goals and targets based on diagnosis of patterns of exclusion and inclusion that are specific to each system. Priorities for governments and for development agencies wishing to accelerate development have to reflect the current disposition of educational assets and patterns of access and learning.

Figure 10 A typology of learner flow patterns



Source: Author

There are practical consequences of varied patterns of access. Thus, for example, in Type 1 countries it is likely to be a priority to ensure every child enters school, and as many as possible complete a full cycle of basic education. In Type 2 countries over-enrolment in grade 1 is a sign of inefficiency and also a predictor of high rates of subsequent drop-out. Type 3 countries succeed in enrolling most children of school age initially, but numbers reduce grade by grade. In contrast, Type 4 countries retain almost all children through to the end of primary and are more likely to prioritise expanded secondary schooling.

Second, a common presumption is that Type 1 patterns will evolve into Type 3 and Type 4. The evidence suggests that, at least in some cases, the transition has been to Type 2 with difficulties shifting Type 2 to Type 3. Thus, countries such as Malawi and Uganda have had similar profiles involving substantial over-enrolment in lower grades for 20 years. Progression though the types is therefore not guaranteed. One reason may be that the patterns are not generally recognised as a key indicator for managing system development and there is too much dependence on cross-sectional indicators aggregated across grades. This can focus attention on gross enrolment and away from repetition and drop-out, which become the main sources of lost learning and incomplete educational investment by households and schools.

Third, the typology has implications for financing. Whenever there are more enrolled than there are in the appropriate age group, school places are being occupied by repeaters and over-age students who could have progressed on schedule at less cost per school completer. There may be good reasons for some repetition if it is pedagogically managed to support students to complete an educational cycle. But if repetition and over-age participation is high, it is an indicator that learning is not being managed effectively, and that curriculum issues need addressing so that the majority can progress on schedule.

Fourth, notwithstanding repetition the curves which fall below the values for the school age population for each grade are *prime facie* indicators that more capacity is likely to be needed, both in terms of physical space and in terms of teachers and other staffing. Type 5 systems enrol almost all children in the appropriate grade for their age. Other types of system need to provide more places at higher levels to match capacity with the number of children who need to be enrolled. Some of the costs and some of the space might be generated from efficiency gains arising from smoothing flows through the systems. But almost certainly additional resources will be needed and these will have to be provided on a recurrent basis.

3.7 Concluding remarks

Learner flow analysis is not sufficient to understand the nuances of the development of different systems or the sensitivity and feasibility of steps that may be taken to enhance efficiency and effectiveness. It is an advance on tabulated data that simply shows indicator values at a point in time. It can provide signals of where there are bottlenecks, grade levels where sequencing of interventions will be critical to better flows through the education systems, and baselines to manage forward projections of future costs at different levels of participation.

The key point is that cross-sectional aggregated indicators are a poor source of insight into how participation is evolving. Completion rates, gross and net enrolment rates, entry rates and other similar indicators are often difficult to interpret, especially if they are compound indicators where

several things can vary at the same time. At the very least they need to be complemented by flow analysis which allows the consideration of possible flows independent of aspirational goal setting, and can allow this to be linked with financial demands. Such charts can be iterated to include flows for learners with different characteristics – over-age, gender, household wealth, location, cultural affinity group, learning levels. This can highlight inequalities. It is essential to projections of financing needs.

To be directly useful in planning, current and projected patterns of participation need to be linked to policy goals, timeframes and costs to establish the likely fiscal demand needed to support different trajectories towards agreed goals. Too often, aspirational plans are developed without adequate attention to historical experience, existing patterns of expenditure and outcomes, and realistic resource envelopes that can be sustained.

The next chapter explores how educational financing has been changing in order to contextualise analysis of financial shortfalls and pave the way for analysis of policy options.

4 The evolution of public spending on education

This chapter explores how public expenditure on education has evolved to address the concerns of the second research question, 'How have patterns of public spending on education evolved and are some countries stagnating in a low-financing trap?'.

The first section charts the long history of investment in education since the start of modern development assistance in the 1960s. Newly independent states mostly adopted education as a high priority and began to increase levels of public investment in education systems. By the 1980s, amounts of investment had stabilised. The second section brings the story up to date with data from 2000 onwards. This shows that the proportion of GDP states in SSA allocate to education oscillated around 3.7% in LICs and 4.2% in LMICs. This is significantly less than in Organisation for Economic Co-operation and Development (OECD) countries, which average about 5%. The third section explores how the proportion of government expenditure allocated to education has varied. It averages about 14.5% in LICs and 15.4% in LMICs. Strikingly, in the case of both indicators the median levels of investment have not changed over two decades, despite powerful advocacy around the need to spend more than 6% of GDP and 20% of public expenditure. The fourth section collates data for 2016–2019 from national accounts collected by the Global Partnership for Education (GPE), and develops a taxonomy of expenditure on education. This confirms the trends identified in the previous sections and tabulates country-by-country estimates. The last section summarises the prognosis and leads into methods of estimating public expenditure on education needed in SSA.

4.1 History

The allocation of resources towards education in SSA countries has grown from a low base during the 1960s, when many countries were becoming independent. Newly emerging states replaced colonial administrations, and many adopted the recommendations of the UNESCO- sponsored conferences in 1961 that advocated universal primary education (Watson, 1991), both as a human right and as a vector to encourage economic development. Human capital theory was gaining traction as a theory of change for development that promoted investment in knowledge and skills as a pathway to economic independence. This was underpinned by beliefs that import substitution could lead to industrialisation and export-led growth and reduce dependence on aid. The benefits of investing in education were initially seen as being concentrated at higher education levels, but over time the case was made more frequently that there were gains from investment in primary education in agriculture and in the informal sector.

The preference to expand educational access and, by design or default, increase public spending on education is easy to locate in post-independence political rhetoric – e.g., Nkrumah's Accelerated Development Plan in Ghana in 1951, FCUBE (Akyeampong, 2009), the Arusha Declaration in Tanzania in1967, and the Education for Ujamaa movement in Kenya in the 1970s. The political economy of popularism was reinforced by an emerging consensus that human capital complemented and could substitute for physical capital when the latter was in short supply. Social rates of return were argued to be positive and

a justification for public investment that could accelerate economic growth and contribute to greater equity.

There are no reliable data sets on public expenditure on education in low-income countries that reach back to the 1960s and include a consistent set of countries. There are several reasons for this. These include: i) the dislocations of independence disrupted data collection institutions and activities; ii) common national accounting conventions were lacking; iii) national accounts were entangled with those of former colonial powers and their currencies and exchange rates; and iv) demographic data and education management information systems were paper-based and often incomplete and difficult to access.

Most colonial governments sought to limit expenditure on education and to fund it without external subsidies, though there was considerable variation in practices. In parallel, many embryonic systems did benefit from the support that missionaries and other religious and charitable non-government organisations provided. The history is important and is located in different national time and space. It continues to leave a legacy in where schools were built, how schools are organised, how communities relate to local schools and the extent to which revenue is raised from the communities schools serve.

National administrations in the colonial period were more likely to see spending on education as consumption rather than investment. This was especially so if enrolment was raised beyond the level needed to supply educated school leavers to small modern sectors and to provide mid-level officials and clerical staff for public services. Starting in the 1960s, newly independent states mostly committed themselves to universalising primary education and, by design or default, to greater levels of participation above primary level. This began to have consequences for public expenditure. The convention was developed that to assess educational effort the key parameters were the proportion of GDP allocated to educational expenditure and the proportion of government expenditure allocated to education, though these are not independent of each other.

What data there is suggests that, across about 80 low-income countries in the 1960s, education expenditure averaged between 2% and 3% of gross national product (GNP) compared to 4% to 5% in the richer developing countries. In 1968, although data is incomplete, developing countries were spending about $10 billion a year on education (Coombs, 1968), of which as much as 10% was being externally financed. This would have been around 4% of GNP at the time. This may have been an over-estimate given the number of missing cases in the data and the selective focus on countries receiving aid from OECD states.

By the mid-1970s, education as a percentage of GNP had risen to on average between 3.5% and 4% in less-developed countries (Table 10).

Table 10 Education as % of GNP and as % of government expenditure, 1960–1974

	Education as % GNP				Education as % govt expenditure			
	1960	1965	1970	1974	1960	1965	1970	1974
More developed	4.0	5.2	5.7	5.7	11.3	15.2	16.1	15.6
Less developed	2.3	3.0	3.4	3.9	11.7	13.1	13.8	15.1

World Bank (1980: 67)

The proportion of government expenditure on education over the same period also rose, from around 11% to 15% over the same period (Coombs, 1985; UNESCO, 1982). Underfunding of education was a persistent theme (Lewin et al., 1982).

A decade later, the definitive World Bank report on *Education in Sub-Saharan Africa* (World Bank, 1988) reviewed the previous three decades' progress and noted that, through the 1970s and 1980s, average allocations to education as a proportion of GDP in SSA had plateaued at about 3.5%, and that the share of government budgets was averaging only 15% at the end of the period (Table 11). In 1990, at the time of the Jomtien World Conference on Education for All (WCEFA), spending in SSA countries averaged 3.9% of GNP, with an average allocation of about 16% of government expenditure (EFA, 2002: 284). Spending was heavily biased towards post-primary education, as was aid (Lockheed and Verspoor, 1990).

Patterns of investment during the 1990s suggest that, across SSA, levels of spending as a proportion of GDP and of government budgets were settling around long-term trend levels (Table 12).

The historical record indicates that levels of spending as a proportion of GDP in the 1960s were much lower than in the recent past, and seem to have averaged between 2% and 3% of GDP. Conversely, the proportion of government revenue allocated to education seems to have been higher in the earliest period, with an average of around 18% up until the 1970s, after which it fell to closer to 15%. Since the 1970s, education as a percentage of GDP in LICs has fluctuated between 3% and 4%, and as a proportion of government expenditure between 14% and 17%. It is important to remember that the data sets used by different studies include different countries, so the averages over time are not necessarily comparable. Until 2000, many LICs had incomplete data sets and variable quality control over data validity and reliability.

The stagnation of primary education in SSA between 1980 and 2000 was associated with a GDP per capita decline of about a third between 1970 and 1997 (weighted average for SSA minus South Africa). The SSA GER (weighted average) declined from around 80% in 1980 to 72% in 1992, and only regained its 1980 value in 1999. The annual growth in education budgets between 1980 and 2000 was very modest and appears to have been no more

Table 11 Education as % of GNP and % of government expenditure, 1970–1983

	Education as % GNP				Education as % govt expenditure			
	1970	1975	1980	1983	1970	1975	1980	1983
Sub-Saharan Africa	3.8	3.5	3.7	3.3	17.6	17.8	18.8	15.3

Source: World Bank (1988: 139)

Table 12 Education as % of GNP and % of government expenditure, 1990–2000

	Education as % GNP		Education as % govt expenditure	
	1990	2000	1990	2000
Sub-Saharan Africa	3.6	3.9	17.6	15.6

Source: EFA Global Monitoring Report (2002)

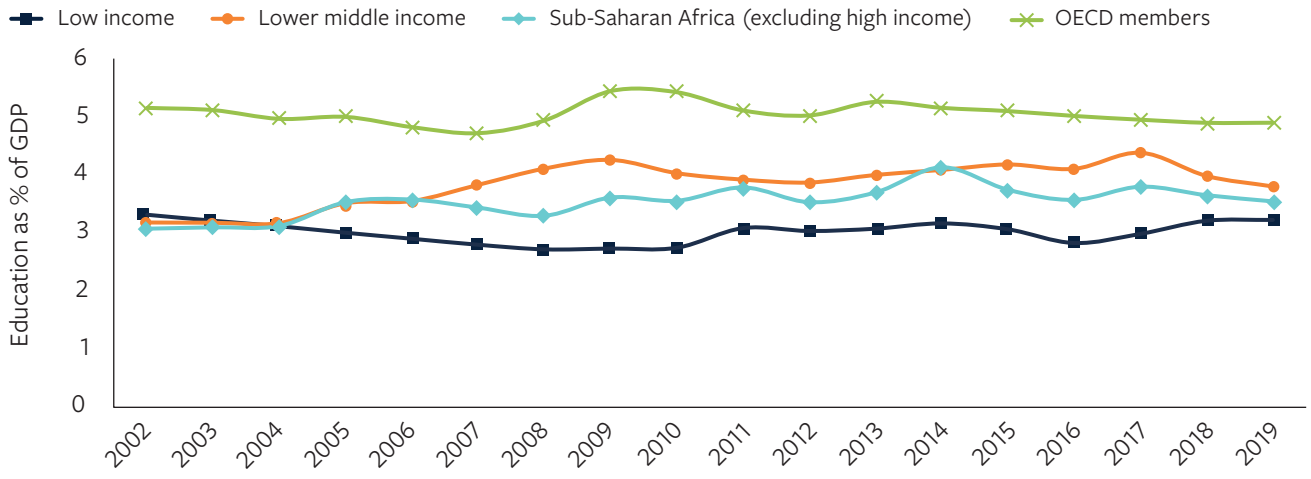
than 1% per year: hence a 20-year decline in funding per learner. This can be contrasted with increases in the SSA GER between 2000 and about 2014, which were associated with steady growth in GDP per capita. Most of the estimated increase in education financing during this period can be plausibly attributed to economic growth. Since then, GERs have stagnated at the same time as GDP growth (Frederiksen, 2022 pers. comm.). According to the April 2020 and 2022 IMF Economic Outlooks, SSA's GDP per capita grew annually on average by 2.7% between 2001 and 2014, but declined on average by 1.8% between 2015 and 2021. This provides a backdrop to look more closely at recent trends.

4.2 Education as a proportion of GDP in the twenty-first century

Two indicators are commonly used to assess educational investment levels. The first is spending on education as a proportion of GDP, and the second is the proportion of public expenditure allocated to education. These both have indicative levels specified in the SDGs – 4%–6% of GDP and 15%–20% of the government budget. In this chapter, we focus on these two indicators. Section 6.5 extends the analysis to include consideration of the overall size of public expenditure relative to GDP, which is necessary to understand how the key parameters interact. The proportion of the budget spent on education multiplied by the size of government spending as a percentage of GDP generates the proportion of GDP spent on education.

Since 2000, the data sets have improved and are more comprehensive. There is now convincing evidence that patterns of resource allocation to education in LICs and LMICs have stabilised. What is striking in the evolution of these averages across more than 70 LICs and LMICs, including all countries in SSA with data series, is that the level of commitment to spending on education as a proportion of GDP has been fairly static over the last decade (Figure 11). This is especially so in the poorest countries, despite much advocacy and repeated global pledging events intended to increase levels of commitment.

Figure 11 Education as % of GDP in LICs, LMICs, SSA and OECD countries, 1999–2019



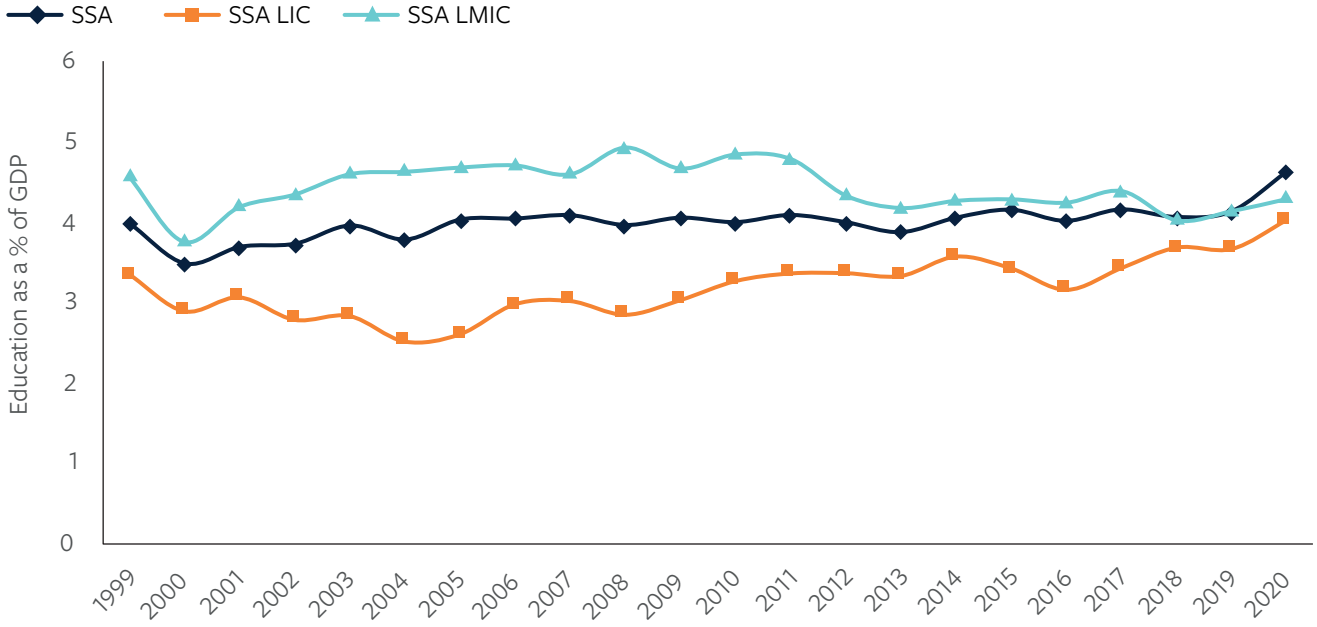
Source: World Bank/UIS data

The patterns are clear:

- The allocation of GDP to education in LICs (about 3%) is typically less than LMICs (over 4%) and OECD countries (5%); SSA has averaged about 3.8% over the last decade.
- There is no consistent long-term trend to increase allocations, though there is some upward drift in spending in LMICs up to 2010, after which values plateau.
- There are fluctuations in the allocation in 1999–2002, the years around the WEF in Dakar where pledges to increased spending were made.
- There is volatility around the time of the WEF in Incheon and the second GPE replenishment in 2018, which generated many country commitments to SDG4.
- The allocations made in SSA countries generally fall between the averages for all LIC and LMICs.
- Between 2000 and 2009 LMICs increased their allocation to education as a percentage of GDP from about 3% to 4%, but then ceased to increase their average allocation.
- There does not seem to be a long-term impact from the global financial crisis from 2008–2011, either upwards or downwards.
- OECD countries consistently allocate about 5% of GDP to education, and are able to do this because they generally have a much larger stream of revenues as proportion of GDP.
- SSA allocation to education has been static since about 2010 with no consistent upward trend.

A closer look at data for SSA countries shows how the poorest LICs have lagged behind those that are or have become LMICs (Figure 12).

Figure 12 Education as % of GDP in SSA countries, 1999–2019



Source: World Bank/UIS data

In this data set the average allocation of LICs trends around 3% ending the decade slightly higher than it began. LMICs have a higher commitment, averaging around 4.5% if UMICs are included. This peaks in 2008–2009 at the time of the global financial crisis, and then falls back. Overall, across SSA the medium-term trend is to allocate 4% of GDP to education.

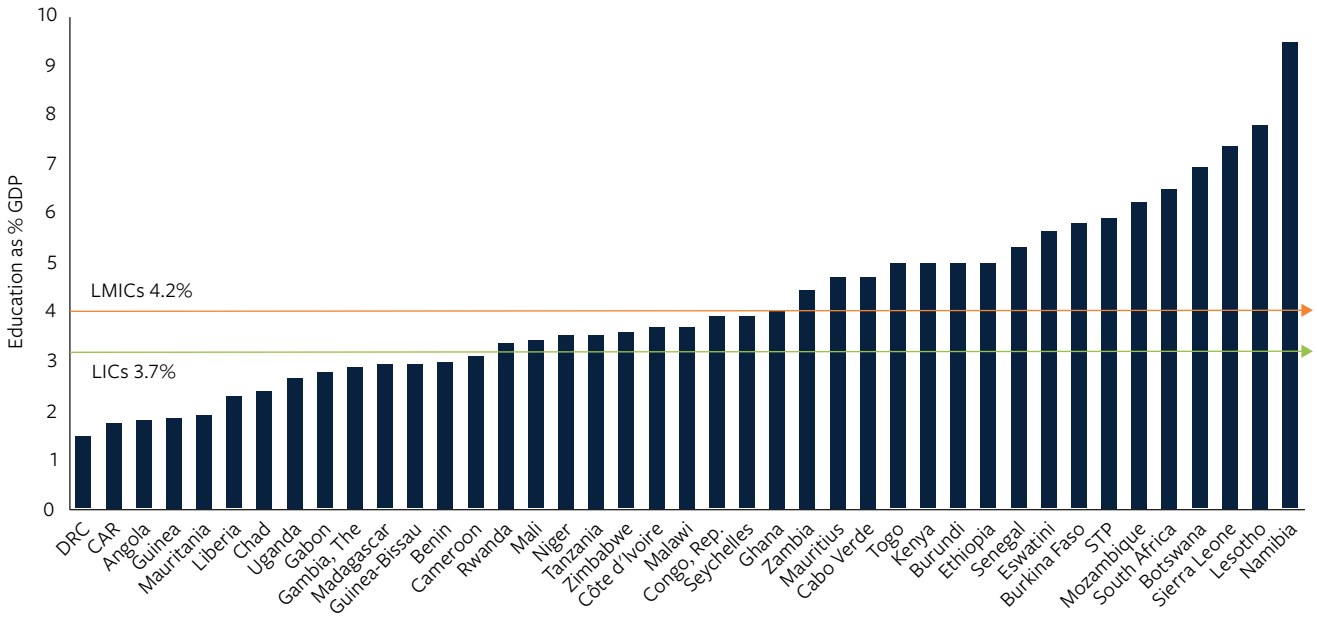
In the latest year for which data is available, LICs allocated about 3.7% of GDP to education and LMICs 4.2%. DRC, Central African Republic (CAR), Angola, Guinea and Mauritania all appear to be spending less than 2% of GDP. Botswana, Sierra Leone, Lesotho and Namibia allocate 7% or more of GDP (Figure 13).

In general, allocations to education vary widely. Most countries fall in the range of 3% to 5%. LICs generally have lower allocations than LMICs. Less than 10% of these countries exceed expenditure of 6% of GDP on education.

4.3 Education as a proportion of government spending

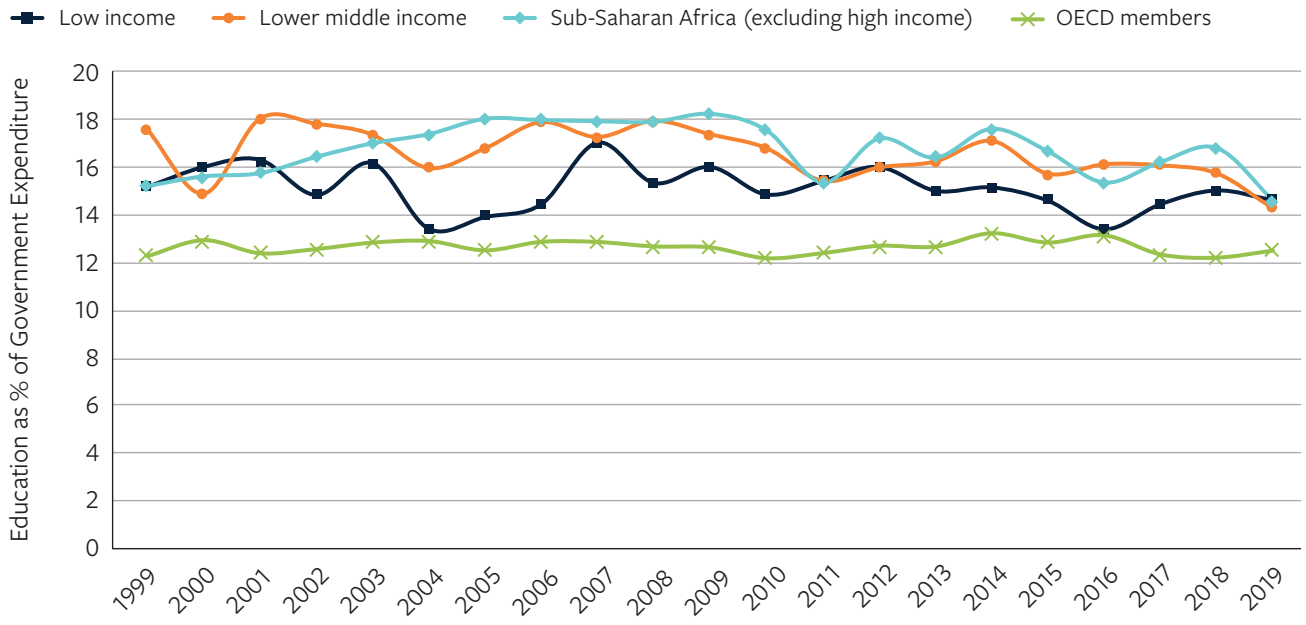
The value of educational finance provided by governments depends not only on the proportion of government expenditure allocated to education, but also the size of government expenditure relative to GDP. The second key indicator used to assess financing effort and target improvements is the proportion of government expenditure allocated to education. This can also be charted over the last two decades, and the results are as shown in Figure 14. Several things are evident:

Figure 13 Education as % of GDP in LICs, LMICs and UMICs in SSA by country



Source: World Bank/UIS latest year

Figure 14 Education as % of government expenditure in LICs and LMICs, 1999–2019

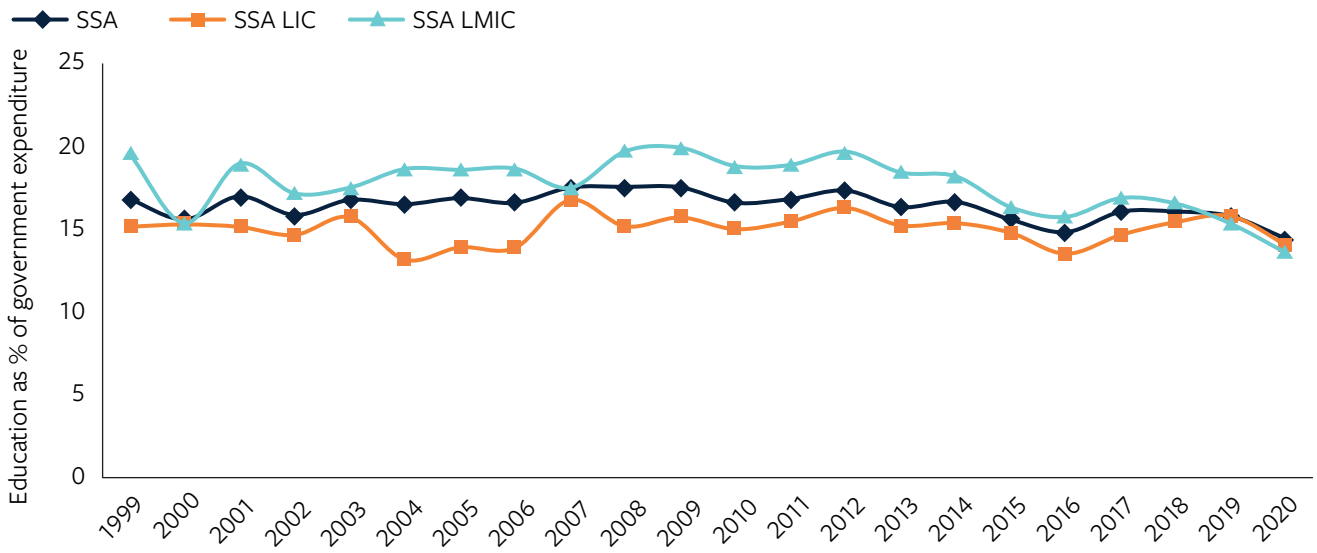


Source: World Bank/UIS data

- LICs average between 14% and 16% of government budgets for education.
- LMICs were spending an average of 17% between 2000 and 2010 and this fell to around 16% from then until 2020.
- Though there are some inflection points in the averages these are not easily mapped onto pledging events, e.g. the GPE replenishment, the WEFs.
- OECD countries consistently spend less on education as a proportion of public expenditure than LICs and LMICs, and average about 12% of total government expenditure.
- The proportion of GDP spent on education indicates that there are tendencies to converge on 16% of public expenditure.
- OECD countries tend to allocate less than LICs and LMICs, not least because they have many fewer children per working adult so can invest relatively more per child.
- On average LICs and LMICs spend the same proportion of government expenditure on education as they did in 2000.
- SSA has had a flat profile since about 2010.

A closer look at SSA distinguishes between LICs and LMICs. LICs consistently allocated about 15% of public expenditure to education over the 20-year period. LMICs averaged more, peaking at close to 20% around 2010 but falling back later in the last decade to less than 16% (Figure 15). The peak coincided with the global financial crisis and may be a result of the stickiness of education expenditure in downturns because most of it is in salaries that cannot quickly be reduced.

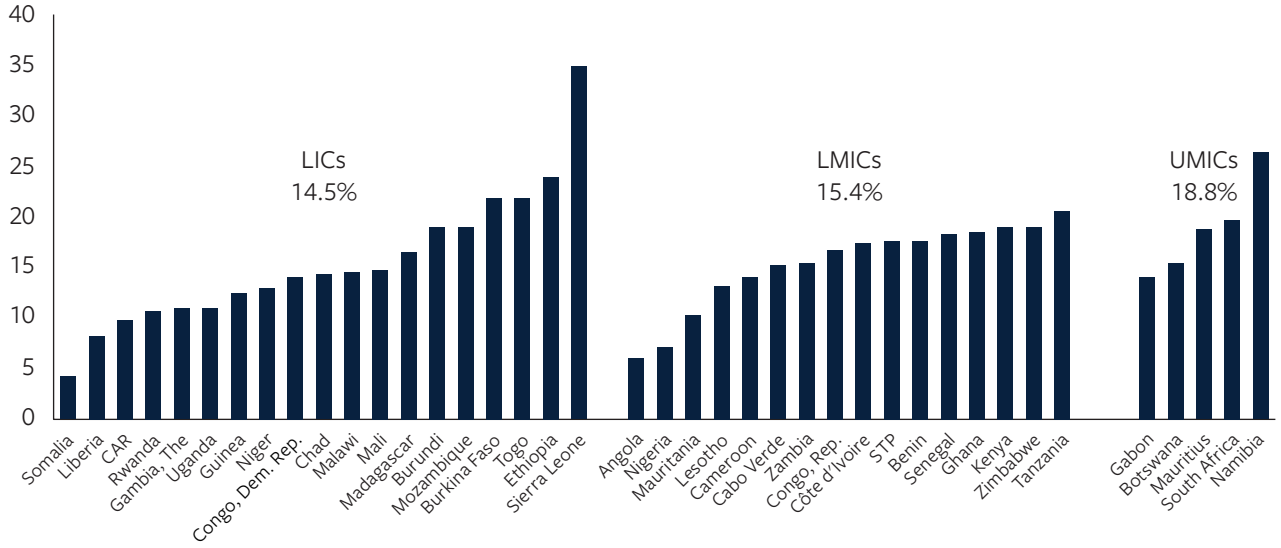
Figure 15 Education as % of government expenditure in SSA countries, 1999–2019



Source: World Bank/UIS data

As with the more global data, it is clear that the medium term trend of this data on allocation is for the proportion allocated to education to fluctuate at levels between 15% and 17% (Figure 15). There does not appear to be a long-term trend. The range of values have a larger variation than for education as a percentage of GDP. There is no systematic difference in the distribution between LICs and LMICs.

Figure 16 Education as % of government spending in LICs, LMICs and UMICs by country



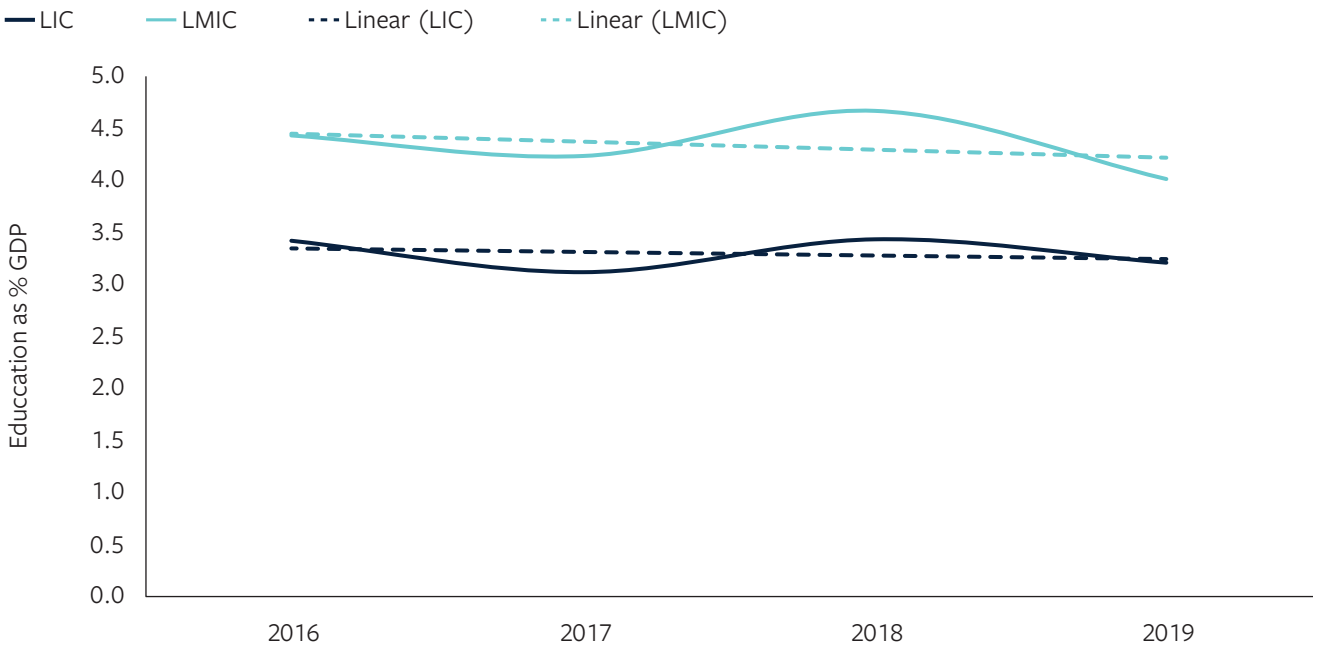
Source: World Bank/UIS data

Education spending by governments varies from below 5% to 35%, though most countries allocate between 10% and 20% (Figure 16). The averages for LICs, LMICs and UMICs are 14.5%, 15.4% and 18.8%. The ambition of SDG4 has been that governments should allocate 20% or more if they are to finance much higher levels of participation.

4.4 A taxonomy of countries

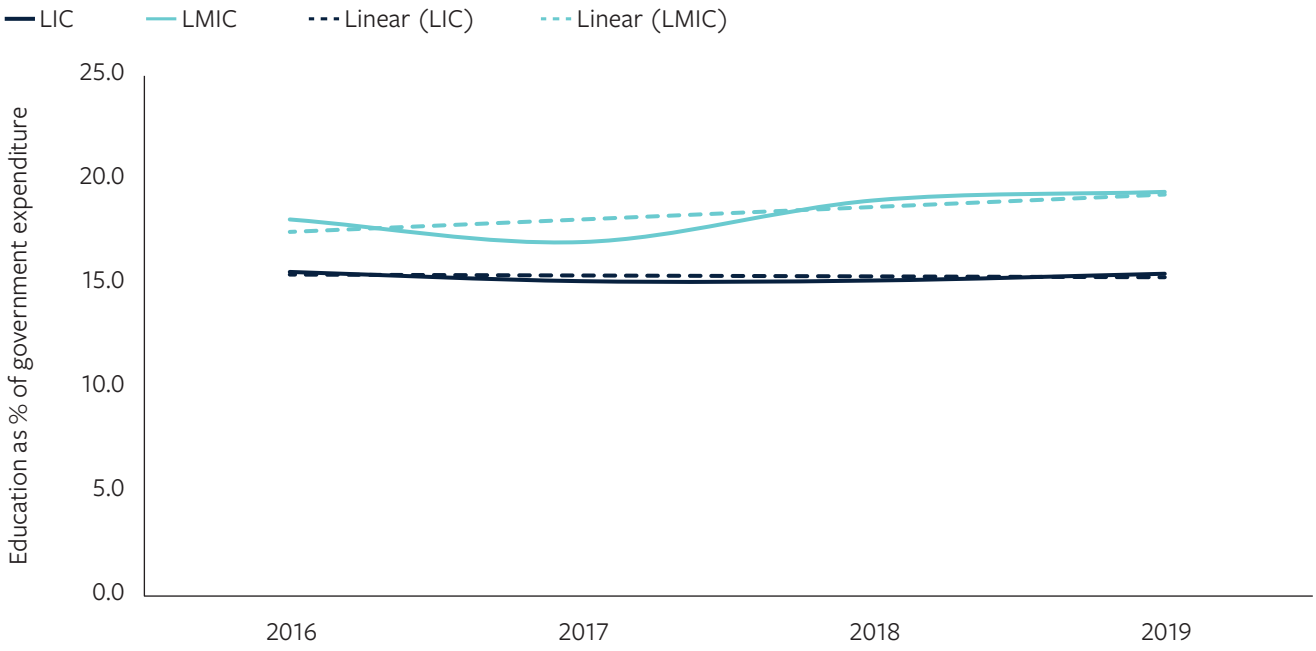
Confirmation of the trends identified above can be found in analysis of a recent data set relating to countries eligible for GPE grants based on nationally validated data collated by the GPE. This confirms that trends over the last four years are consistent with those identified above for education as a percentage of GDP and of government expenditure (Figures 17 and 18). This data from national accounts is in local currencies and calculates expenditure taking into account debt servicing. The results are for 2016–2019. This period covers the activities that followed Incheon WEF that endorsed SDG4 in 2015 and brackets the time around the GPE replenishment meeting in 2018 in Dakar. At the Dakar meeting countries made pledges to raise their allocations to education to the value of $110 billion, and donors collectively pledged to complement this with about $1 billion a year. At both meetings targets of 6% of GDP and 20% of national budgets were widely discussed. There is as yet little evidence that this has had a large effect on governments' decisions to invest in education.

Figure 17 Education spending as % of GDP for GPE-eligible LICs and LMICs



Source: GPE (2021)

Figure 18 Education expenditure as % of government expenditure, GPE-eligible countries



Source: GPE (2021)

Figures 17 and 18 show a weak tendency for a decline in the share of GDP to education and a weak increase in the proportion of government budgets for education. Neither trend is strong over the last four years. The central message is that there is little evidence that budgetary allocations to education are shifting to higher levels. There may be some shifts in particular countries related to specific events and political commitments. However, the medium-term evidence is that allocation levels tend to equilibrate around particular levels.

When the data is tabulated by country, patterns emerge indicating that, for most countries, there is relative stability in allocations over the four-year period of the GPE national data (Table 13). In terms of education as a percentage of GDP there are three bands of countries: those that tend to allocate below 3% of GDP, those between 3% and 5%, and those above 5% of GDP. About 40% of SSA countries remained in the low band from 2016, and 40% remained in the middle band. Countries have very different starting points and distances to travel if they plan to reach more than 6% of GDP for education. It also suggests that there may be structural features and historical patterns that condition countries into relatively low or relatively high levels of expenditure.

There is a similar pattern that can be used to group countries into clusters based on their allocation to education as a proportion of the national budget. The low allocation group allocates less than 15%. Mid-level countries allocate between 15% and 19% and high-allocation countries exceed 19% (Table 14).

Table 13 Education expenditure as % of GDP, 2016–2019

	2016	2017	2018	2019	Average
Low					
South Sudan	0.4	0.4	0.5	0.4	0.4
Congo	2.1	1.5	1.5	1.5	1.6
CAR	1.5	1.5	1.6	2.0	1.6
Uganda	1.9	2.0	2.0	1.8	1.9
Guinea	2.1	2.4	2.4	1.8	2.2
Ethiopia	2.3	2.5	2.5	1.6	2.2
Mauritania	2.7	3.0	3.2	0.2	2.3
Gambia	2.0	2.5	2.4	2.9	2.4
Chad	2.4	2.4	2.4	2.5	2.4
Liberia	2.5	2.7	2.3	2.6	2.5
Madagascar	2.7	2.6	3.1	2.5	2.7
Sierra Leone	3.1	2.2	3.1	2.5	2.7
Rwanda	3.0	2.8	3.1	2.8	2.9
Average	2.2	2.2	2.3	1.9	2.2
Medium					
Cameroon	2.7	3.1	3.3	3.2	3.1
Niger	3.5	3.3	3.1	3.4	3.3
Benin	3.1	3.5	3.7	3.4	3.4
Côte d'Ivoire	4.0	3.8	3.2	3.7	3.7
Mali	3.7	3.7	4.1	3.8	3.8
Tanzania (Mainland)	4.1	4.4	3.7	3.5	3.9
Djibouti	3.9	3.7	4.0	4.2	3.9
Togo	3.7	3.8	4.3	4.1	4.0
DRC	5.2	4.4	3.0	3.9	4.1
Ghana	4.8	3.9	4.5	3.9	4.3
Zimbabwe	6.1	4.7	5.1	1.4	4.3
Malawi	4.6	3.5	5.1	5.1	4.5
Zambia	4.4	4.6	5.3	4.8	4.7
Average	4.1	3.9	4.0	3.7	3.9
High					
Kenya	4.8	4.6	5.3	5.1	5.0
Senegal	5.0	4.6	5.7	5.0	5.1
Burundi	5.0	5.0	5.3	5.4	5.2
STP	5.2	5.0	5.2	5.9	5.3
Mozambique	5.9	5.5	5.8	5.6	5.7
Burkina Faso	5.5	5.6	5.9	6.1	5.8
Lesotho	7.8	8.3	8.7	8.1	8.2
Average	5.6	5.5	6.0	5.9	5.7

Source: World Bank dataset

Table 14 Education as % of government expenditure including debt servicing, 2016–2019

	2016	2017	2018	2019	Average
Low					
South Sudan	6.4	3.7	4.7	2.3	4.3
CAR	10.0	10.0	9.6	12.5	10.5
Rwanda	11.8	11.0	11.2	9.9	11.0
Uganda	12.1	13.0	11.5	10.2	11.7
Togo	13.2	10.5	12.1	11.9	11.9
Ethiopia	12.0	12.0	14.6	12.5	12.8
Guinea	13.2	14.0	10.9	14.2	13.1
Mauritania	12.4	14.8	14.3	12.0	13.4
Gambia	9.0	12.0	15.1	17.6	13.4
Sierra Leone	15.8	12.0	15.3	13.8	14.2
Cameroon	11.5	14.3	16.0	15.7	14.4
Congo	11.8	13.6	17.4	15.8	14.7
Chad	19.1	14.8	10.5	14.5	14.7
Djibouti	14.5	13.9	14.6	16.3	14.9
Average	12.3	12.1	12.7	12.8	12.5
Medium					
Niger	16.2	15.7	13.7	16.0	15.4
Tanzania (Mainland)	17.4	16.3	14.7	14.4	15.7
Liberia	14.6	16.3	15.9	16.3	15.8
Lesotho	15.9	18.1	17.9	17.2	17.2
STP	15.7	15.3	19.7	20.3	17.7
Malawi	20.1	13.9	17.9	20.0	18.0
DRC	19.3	18.5	16.8	17.5	18.0
Senegal	17.9	17.1	19.6	17.6	18.0
Côte d'Ivoire	19.5	15.0	18.9	20.5	18.4
Madagascar	19.3	17.9	19.7	17.1	18.5
Zambia	17.7	18.2	19.6	19.0	18.6
Mali	15.3	20.5	20.5	19.4	18.9
Average	17.4	16.9	17.9	17.9	17.5
High					
Benin	19.6	15.5	19.1	22.3	19.1
Kenya	18.9	17.9	20.2	20.7	19.4
Ghana	23.8	18.2	19.3	19.3	20.2
Burundi	19.4	20.8	20.9	21.4	20.6
Mozambique	20.0	22.9	21.1	19.2	20.8
Burkina Faso	23.0	21.8	22.3	26.1	23.3
Zimbabwe	26.1	18.2	25.0	28.1	24.3
Average	21.6	19.3	21.1	22.5	21.1

Source: World Bank dataset

Policy dialogue is needed to understand the reasons why countries occupy different positions on the indicators. In some cases high levels of debt repayment may be an underlying cause of low allocations (OECD, 2020b). Within the averages cited the variation in levels of commitment is wide. At the same time, there is evidence of stability over time in the majority of countries so that equilibrium levels are different in different countries. About 50% of LICs and LMICs did not change their allocations to education by more than 10% over the period 2000–2019, suggesting that fluctuations were often short term around a central tendency which had a different value in different countries (Lewin, 2019). The values and group averages suggest benchmarks related to the clustering of values of relative effort. These kinds of benchmarks are only of use if they are mapped onto specific systems and their political economy of choices (Miller et al., 2021: 32). This can uncover how external assistance can complement domestic prioritisation and can indicate the need for changed priorities where allocation levels are low.

4.5 Prognosis for financing

Systems that allocate less than low and middle levels of GDP and government expenditure on education will not be able to finance high levels of participation in grades K-12. Those most committed with higher levels of allocation will still need 6%+ of GDP and more than 20% of public expenditure. The value of these allocations is dependent on levels of GDP per capita and the rate of growth of total government expenditure as a proportion of GDP. A large proportion of a low level of total public expenditure may be less than a small proportion of a higher level of government expenditure.

Data on clusters of countries shows how large government spending is relative to GDP. Low spending countries in the range of 10%–15% of government expenditure cannot finance universal access to education services. Those spending 15%–20% will find it difficult to sustain high level of access to education, especially if they seek to simultaneously enhance quality. Countries spending more than 20% of government expenditure may be able to finance universal access to core services if they also make budget allocative decisions with this in mind. Chapter 7 identifies countries within each group.

The next chapter considers how the global goals and targets of SDG4 are now generating financing gaps much larger than those anticipated by Education for All and the WEF in 2000. Financing shortfalls are always conditioned by expectations and the political will to raise the revenues necessary to provide sustainable financing largely from domestic resources.

5 Sustainable Development Goal 4 for education: is it mission impossible?

5.1 Introduction

This chapter explores how the global goals for education have developed since 2000 and identifies how expectations have changed, leading to more and more demanding calls on financial resources. It responds to the third research question, 'What additional demands do the Sustainable Development Goals create for financing education and to what extent can these be met from existing revenue?'.

Central to financing shortfalls are levels of ambition for educational development and the timescale over which goals are to be achieved. The previous section has established the recent history of education financing and the extent to which average allocations to education budgets by governments in LICs and LMICs have plateaued, despite repeat advocacy around the need to commit more resources if goals are to be achieved. It is central to planning for sustainable educational development that we understand how the goals that are set determine the financial challenge that faces governments and agencies in realising global goals. Such goals should change over time and be adapted for different country contexts if they are to remain relevant. If they are to have utility they must also be sustainable.

Much analysis is focused on the proposition that it is the implementation of SDG4 that is problematic. It is much less frequently recognised that it is the identification of unrealistic goals, and the ease with which their scope has been expanded and extended, that is the driver of financing deficits. Development is goal-driven but also time-bound, and targets have to be linked to plausible patterns of expenditure growth.

The first part of this chapter considers the development of global goals since 2000. The second section compares and contrasts the agenda in place in 2000 with that agreed at the WEF in Incheon in 2015 (UNESCO, 2015). This includes at least nine calls which have substantial implications. The third section highlights five omissions which are likely to become issues as time passes.

5.2 Global goals circa 2000

For the purpose of this discussion we take the goals and targets set in 2000 as the point of departure. The Millennium Development Goals (MDGs) specifically linked to education are listed below. These were complemented by commitments made in Dakar in April 2000: the Dakar Targets (DTs) for Education, which are also presented below (Boxes 1 and 2).

The MDGs and the Dakar Targets (DTs) became the basis for common international commitments to achieve these targets by 2015.

Several things are notable. First, universal access to primary school (MDG2, DT2) appears in both lists. Conventionally this covers six years of school typically from six years old. If national definitions of primary school are used, the length can be as short as three years and as long as eight. This matters because costs per student are often several times greater at secondary level than at primary. Transition points are also typically associated with higher levels of drop-out than grade-by-grade progression within the same school. Longer primary cycles can be associated with smaller secondary enrolment rates.

Box 1 Millennium Development Goals, directly education related

UN General Assembly, September 2000

MDG Goal 2: Achieve universal primary education with the target that by 2015 all children complete a full course of primary education, indicated by primary enrolment and completion rates for boys and girls

MDG Goal 3: Promote gender equality and empower women with the target of eliminating gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015 as indicated inter alia by ratios of girls to boys in primary, secondary and tertiary education

Box 2 The Dakar Targets for Education, UNESCO, April 2000

DT1	Expanding and improving early childhood care and education, for the most vulnerable and disadvantaged
DT2	Ensuring that by 2015 all children have access to and complete free and compulsory primary education
DT3	Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life skills programmes
DT4	Achieving a 50% improvement in levels of adult literacy by 2015, especially for women
DT5	Eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015
DT6	Improving all aspects of the quality of education so that measurable learning outcomes are achieved by all

Second, there are no targets for participation rates at levels above primary. There is an unquantified expectation that secondary and higher education participation will grow, as will access to TVET since this is implicit in meeting learning needs of young adults (DT3). This formulation had the virtue of allowing countries to adapt to targets that suit national circumstance. It had the disadvantage that it might encourage neglect since no time-bound commitments to levels of goal achievement are suggested.

Third, early childhood care (ECC) and pre-school (DT1) are gazetted for expansion especially for the most vulnerable and disadvantaged populations. The length, intensity, location and staffing levels are not elaborated but these clearly have implications

for financing. Much pre-school and ECD is provided privately and is fee-paying in LICs and LMICs, so access is rationed by price. Universalising access will increase costs both directly, as more provision will have to be publicly financed, and indirectly, if regulation and minimum standards for physical provision and qualified teachers are enforced.

Fourth, quantitative commitments to gender equity infuse both the MDGs and the DTs (MDG3, DT5). These commitments have substantial costs in some LICs and LMICs but not in others where quantitative equity has already been achieved. Inequalities vary by educational level. Gender parity indexes for education typically but not always indicate: i) greater differences between boys and girls at secondary than primary; ii) larger disparities in poorer countries; iii) increased probability of GPIs in favour of girls in secondary school where enrolment rates are over 50%; and iv) greater enrolments of girls in higher education in middle-income and rich countries. Between 1990 and 2015, there was rapid progress in many LICs and LMICs in reducing gender disparities illustrated by quantitative indices, but the ambition to achieve equality at all levels including tertiary was far from being met. The costs of quantitative equity can be identified; qualitative equity is difficult to assess since there are no standard definitions.

Fifth, adult literacy levels are difficult to establish with precision because of varying measurement methods, unreliable reporting, language of literacy issues and difficult-to-reach populations. This indicator can only be understood on a country-by-country basis and with some validated estimation of the baseline from which a 50% improvement is being targeted.

Sixth, quality learning (DT6) is a target so the costs of achieving the unspecified 'improvements' in learning levels should have been part of any planning exercises linked to the commitments of the DTs. It is evident from a rapidly growing volume of achievement data across and within LICs and LMCs that levels of achievement may have been much lower than was assumed in 2000, and remain low currently. The task of improving learning levels in low-performing systems is massive. This goal cannot easily be quantified, not least because to do so requires agreement on benchmark levels of performance, as well as operational definitions of quality that extend beyond test results. If spending per child as a proportion of GDP is used as a proxy for possible school quality, some indication of the magnitude of the task may be gleaned from comparative data.

Seventh, and perhaps most significantly, the MDGs and DTs are goals and targets agreed at international conferences that governments are asked to commit to, and take the necessary steps to ensure their achievement. They are not goals and targets for development partners related to levels of support or technical assistance. Historically global goals were set by the UN system at its foundation and framed in terms of universal human rights. By 2000, global goals had transcended rights-based commitments to include many aspirational targets that could not be accurately described as fundamental human rights. This transition is at least in part responsible for the gaps that are now very apparent between goals agreed and targets met.

5.3 Sustainable Development Goal 4 for education

The 2000 goals and targets were replaced in 2015 by a new framework. On 22 May 2015, SDG4 was agreed at the WEF at Incheon and adopted by 184 member states and the global education community during a high-level meeting at UNESCO in Paris on 4 November 2015. The SDG4 targets

provide a baseline and benchmark indicators for achievement by 2030. These were more ambitious and broader in scope than the MDGs and DTs. It is these goals and these targets that set the scene for the location and magnitude of funding gaps between what is available and what is needed in LICs and LMICs (UNESCO, 2018; Mundy, 2019).

The WEF at Incheon was designed to shift the global gaze from the MDGs and their limited view of education investment to a more nuanced emphasis on: i) e*ducation for sustainable development* (*ESD*) – the content and process of curricula that determine if education systems are fit for purpose in the Anthropocene; and ii) *sustainable educational development* (*SED*) – the mechanisms that are needed to ensure all have access to education services of quality that are affordable and available equitably.

This analysis is most interested in SED and the implications of the aspirations of SDG4 for public financing. SED is concerned with whether what is proposed is environmentally, financially and socially sustainable. Criteria include whether goals are achievable, proven methods of service delivery exist, levels of inequality are reduced, class and school size are appropriate, achievement levels can be increased and indicate meaningful learning, calls on expenditure from low-income households are affordable, and the levels of public expenditure can be supported from likely revenue streams. The analysis is critical because education systems are responsible for large parts of public expenditure, and because they are the primary vehicle through which states can shape the future behaviour of citizens to make rational choices that lead to more or less sustainable outcomes, not least in relation to planetary well-being and climate change.

Box 3 UNESCO – Sustainable Development Goal 4

Goal: Ensure inclusive and quality education for all and promote lifelong learning

List of SDG4 targets

Target 4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

Target 4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

Target 4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

Target 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations

Target 4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

Target 4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

Target 4.b By 2030, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing states and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries

Target 4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing states

UNESCO established a Technical Cooperation Group on the indicators for SDG4 and this oversees the development of indicators and benchmarks for SDG4.

5.4 Ten new calls for education from SDG4

There are many differences in the scope and level of ambition reflected in the global goals and targets between those of 2000 and those in 2015. A comparison between the two sets of goals and targets reveals many financing issues. SDG4 is far more ambitious and far more expensive than were the MDGs and the DTs for education. The latest UNESCO global education monitoring (GEM) indicator list now has over 60 specific education indicators for SDG4 if the indicators are counted by distinct data points (e.g. counting primary and lower secondary completion rates as two indicators). This is becoming of limited use in policy dialogue. It requires a massively different level of financing and consequentially a step change in the level of political will and fiscal effort. If the need for additional financing is to be met from domestic revenues, the implication is that fiscal reform would have to deliver greatly increased financing of public expenditure.

At the same time, especially in LICs and LMICs, the demand for financing driven by commitments to new goals and targets is set to grow substantially if SDG4 is to be implemented over the next decade. The most recent documentation from UIS includes as indicators the proportion of GDP spent on education (4%–6%) and the proportion of government budgets allocated to education (15%–20%). The lower limits are coincident with the averages for LICs and LMICs but are insufficient to finance SDG4.

There are at least 10 'calls' that SDG4 makes that imply substantial additional financial commitments. Understanding how 'gaps' in

financing are coming about is essential to understanding which kinds of gaps should be closed over what time period, which can and cannot be financed from domestic revenue and thus require grant aid or lending with the attendant risks and time limits, and which could be addressed but involve allocative choices and trade-offs, e.g. greater access of the most marginalised or investment in strategic higher education, pre-schools or public TVET in secondary schools.

5.4.1 Call 1 Expanded access

SDG4.1 anticipates that all children and young adults will experience 12 years of quality education. The related indicator 4.1.2 implies the target is 100% completion rates at all school levels. The macro simulation in this report (Chapter 6) has estimated the costs of achieving this in SSA by 2030. These amount to at least $37 billion a year in excess of current levels of recurrent spending in LICs and LMICs in SSA. This specification of SDG4 substantially increases the grade range for universal access, and includes expectations of learning levels that have additional costs in terms of investment in improved levels of learning achievement and the elimination of gendered differences in performance. SDG 4.2, 4.3, 4.4 all include expectations of substantially greater enrolments at all levels of education systems and especially in pre-school, TVET and tertiary education. These are massive commitments and extend far beyond the MDG and DT agendas.

The analysis of enrolment flows by grade has drawn attention to the challenge created by persistent drop-out from grade to grade and related age in grade slippage, which can result from and be exacerbated by learning that is not age grade appropriate for individual learners. Systems which delay entry, include much repetition and do not succeed in automatically promoting learners have inefficiencies that result in more years of schooling having to be financed than would be necessary if the flow of learners was regular and in line with the learning expectations of curricula. It is not possible to cost all the interventions that might be needed to regularise enrolment and grade progression since the nature of the problems is different in different systems. It is certain that there will be substantial costs that are additional to the expectation of the MDGs and DTs. These include new expectations that over-age progression will be reduced and largely eliminated, and that out-of-school children will be enrolled in schools or in training programmes.

5.4.2 Call 2 Out-of-school children

The pathway to universal access to education from primary through secondary school has to have measures that include those currently OOSC and to enrol them in education institutions. Addressing the needs of OOSC is part of SDG4. In principle it is a transient cost since, if full educational participation is achieved, there will be no more OOSC. But on the time scale of SDG4 up to 2030 actions are needed to reduce the number of OOSC.

Disaggregating the figures for OOSC in SSA produces the results shown in Table 15 using the latest data available. The GEMR estimates that about 98 million children of school age are OOSC in SSA. This does not account for many more who may be attending irregularly, who are missing from birth records, and who are attending but experiencing little or no effective teaching. More than 65% of OOSC in SSA are of lower and upper secondary age, most (53%) are female, and rates for OOSC are twice as high in lower secondary than at primary and more than three times as high at upper secondary.

Table 15 Out-of-school children (millions) in SSA

	Male OOSC	Female OOSC	Total OOSC	Rate %	Enrolled
	Million	Million	Million		Million
SSA					
Primary	14.1	18.1	32.2	18.8	168.0
Lower secondary	13.7	14.5	28.2	36.7	70.5
Upper secondary	17.7	19.3	37.0	57.5	65.5
Total SSA	45.5	51.9	97.4		304.0

Source: GEMR, 2018

The scale of the problem is evident. The numbers of OOSC can be compared to those currently enrolled. In SSA at primary level, there are 32 million OOSC, which is 19% of the total. At lower secondary the number is 28 million (37% of the total) and at upper secondary 37 million (56% of the total). Aggregate numbers conceal the fact that OOSC include those who never attended school and much larger numbers who entered grade 1 and who drop out or were pushed out before finishing secondary school. The patterns of enrolment analysed in Chapter 3 provide a clear indication that many are excluded after enrolling, and that the numbers of OOSC increase grade by grade in most countries. For those who do not enter grade 1 solutions are needed that address the causes of initial exclusion. For those who drop out the causes have to be addressed and will include a complex array of system-specific factors. These can generally only be managed at school and community level. If they are not addressed, one generation of drop-outs becoming OOSC will be followed by another and another.

We should note that:

- Most but not all OOSC are likely to be from households close to the poverty line and unable to afford fee-paying schooling if the costs to the household are a significant proportion of household income.
- In countries that have yet to experience demographic transition the number of school-age children is growing at 3% per annum or more. The number of OOSC may be expected to grow at least at this rate and faster if recession and the effects of Covid-19 reduces the level of economic activity.
- Costs to households can be a significant proportion of the total costs of attending school. Direct costs can act as a disincentive to enrol and attend school. They are additional to the opportunity costs that fall on OOSC children if they have to forego income and employment to attend school.

5.4.3 Call 3 Early childhood and pre-school

Under SDG4.2 early childhood care (ECD) and pre-primary education (PPE) there is a commitment to universal access. The only indicator currently specified measures outcomes and participation in the year prior to enrolment in primary. The expectation is that all children will have access to ECD support and that one or two years of PPE will be provided. The costs of ECD may fall under Ministries of Health and not be a charge against the SDG. PPE is often privately provided in LICs and LMICs. It is an educational cost so should be considered as part of SDG financing.

SDG4.2 moves from a commitment to 'expand access' to pre-school under the DTs, which was unquantified, to assessments of the proportion of children achieving milestone levels of development and readiness. The clear implication is that ECD and PPE should be available to all. For these services to be universal they would have to be publicly financed in the majority or they would exclude the poor.

PPE cannot be easily costed because of its many different forms and because uncertain proportions are provided privately. In some countries community provision is common and financed locally and makes use of voluntary contributions of labour and community fundraising. For some purposes the simplest approach is to cost PPE at primary school levels of cost for one or two years and inflate education system costs *pro rata*. In most LICs and LMICs PPE will be a substantial additional cost adding 5%–10% to the education budget, especially if it is formalised with qualified teachers and standards of provision that have to be met.

5.4.4 Call 4 TVET and tertiary education

The third and fourth SDG4 targets overlap. SDG4.3 commits to equal access to TVET and tertiary education. SDG4.4 targets increases in TVET-based skills related to employment. Indicators are specified for participation rates in TVET and tertiary education up to the age of 24 years, extending the range of education commitments to young adults in the labour market. Both targets for tertiary enrolment rates and for TVET for 15–24-year-olds add to the financial implications of SDG4 and are new. Indicators also include digital literacy and ICT skills, but identify no other employment-related skills. This seems an oversight and understates the ambition if these are to be the 'engine drivers' (Lee et al., 2008) of quality education and higher levels of skill in labour markets.

It is unclear how TVET is defined in SDG4.3 and 4.4. It is important to understand how TVET is essentially different to other forms of post-school education and training. Without this, any targeting has a high level of ambiguity and open-ended costs. In addition, TVET has to be related to labour markets if it is to be demand-led rather than supply-driven. There has to be interaction with any private sector initiatives to provide employable skills to employees, and this should involve contributions to costs. The vagueness of SDG4.3 and 4.4 impedes any well-founded costing. They do add to the ambition level of the DTs, which anticipated meeting the learning needs of all young adults through appropriate learning and life skill programmes.

SDG4.3 explicitly endorses expansion of tertiary education including universities. No targets are set and no indicators are identified. However, the implication is that SDG4 encourages expansion of post-school education and increasing enrolment rates. There is no indication as to how this may be financed or at what cost levels it might be provided. Post-primary education costs are highly variable and can be many multiples of school costs. Choices have to be made which limit access when cost per learner is very high. Cost recovery from the learners who benefit from more education may or may not be associated with additional earnings, and these will lag expenditure by many years. Country-specific circumstances and strategies for economic growth and employment have to be considered in managing increased participation post-school.

Whether global targets are needed for post-basic education (PBE) is an open question. Unlike rights-based commitments to universalise access to basic education, PBE meets needs of learners who are above the legal minimum age of work in most countries and not subject to compulsory attendance legislation. National investment strategies for PBE

are subject to the political economies of choice and trade-offs resulting from competition for resources within the education sector. They are also desirably linked to human capital investment to accelerate economic development and meet changing labour market needs. Looked at this way, global targets for PBE seem of limited utility given the wide variations between countries in levels of educational development, economic opportunities, labour market characteristics and national development priorities.

5.4.5 Call 5 Equity

The fifth SDG4 identifies equal access to education opportunities by gender and disability, indigenous person status, and vulnerability status at all levels. This extends the gender equality commitment to higher education so is an additional commitment. So also is the extension of equal access to nominated groups that were not explicitly identified previously.

The indicators identified for SDG4.5 are parity indices which compare access and participation of different groups. Target levels are not linked to time frames and the implication is that all indices are targeted on parity between identified groups. The financial implications of seeking parity on key indicators could be anything from modest to overwhelming depending on starting points and distance to travel, and underlying causality of inequalities.

There are many issues. For example, reducing or eliminating disparity in performance of children from the top and bottom wealth quintiles has to be interpreted in the context of its likely causality and the ability of stakeholders to act to reduce such inequality. Some kinds of inequality may be less important than others. A new aspiration is to increase the proportion of learners taught in their first language, which could be expensive in very linguistically diverse systems. Reallocation of resources to disadvantaged areas as a form of positive discrimination could be both necessary and costly.

5.4.6 Call 6 Literacy and numeracy

SDG4.6 seeks universal child and adult literacy and numeracy. Previously the 2000 DTs committed states to reduce by 50% levels of adult illiteracy. SDG4.6 therefore extends this commitment to target universal literacy by 2030 for whole populations. This must have extra financial costs depending on starting points and demography. It may also have opportunity costs if literacy educators are in short supply.

5.4.7 Call 7 Sustainable development

SDG4.7 targets the knowledge and skills needed to promote sustainable development. In this respect it introduces a curriculum element into the global goals that was not previously present. In so doing it seems to overlap with commitments in SDG4.1, 4.3 and 4.4 to quality education at all levels including TVET related to employment and entrepreneurship. Quality education presumably includes the curricula ambitions of SDG4.7.

The indicator chosen seeks to assess the extent to which global citizenship and education for sustainable development are 'mainstreamed' in curricula, assessment and teacher education. The ambition is also to target and assess the availability and levels of achievement in relation to global citizenship, geoscience, life skills and HIV, human rights and other topics. These are not quantified or interrelated to any specific national curriculum and represent a step change in global ambition to determine educational content. They are an additional commitment to what would be

needed to improve educational quality that the DTs identified. They imply large-scale curriculum development, examination reform and teacher education and in-service training.

5.4.8 Call 8 Buildings, infrastructure and safe learning spaces

SDG4.a is concerned with building adequate physical capacity to provide appropriate learning spaces. This was not mentioned in the DTs and MDGs, though it was clearly an implication of the Education for All programme. New buildings, and presumably older ones, were to be disability- and gender-sensitive and provide effective learning environments. Expanded participation generates need for capital investment and more efficient use of educational facilities. The indicators for this SDG include measures to address bullying and violence, in addition to the proportion of schools with basic services. Our estimations suggest the cost of buildings for expanded access could be comparable to the costs of additional teachers, depending on how capital costs are financed and translated into annual budgets.

5.4.9 Call 9 Scholarships

SDG4.b seeks to substantially expand the number of scholarships to learners from the South in developed countries, as indicated by the volume of development assistance allocated for this purpose. This clearly has costs if it were enacted. Several bilateral donors already allocate large shares of their funding to scholarships to higher education institutions.

SDG4.b does not distinguish between types of scholarships in different fields relevant to national development, nor does it indicate what incentives may be needed to encourage recipients to return to sending countries. The impact of such programmes on the flow of students and resources into domestic institutions is also not noted.

5.4.10 Call 10 Trained and qualified teachers

SDG4.c generates targets to ensure all learners are taught by a trained teacher. This is a massive task given that, in some systems at some levels, the majority of teachers have not been trained or have experienced incomplete training for the level they teach. This has implications in relation to the costs of training and the cost of employment. Full-time residential training can be similar in cost to university degrees and can be many multiples of a primary school place. If training involves taking untrained teachers out of the classroom, there is an opportunity cost. Trained teachers are essential but are more expensive to employ. The DTs and MDGs were not explicit about commitments to employ more qualified and trained teachers so this is another additional commitment of SDG4.

5.5 Realities and tall orders

Financing gaps are created by imbalances between income and expenditure. They are also generated by mismatches between aspirations and revenues. The former is well understood; the latter is often overlooked in policy dialogue. It is not as simple as saying that financial shortfalls can be resolved by reducing aspirations since some of these hopes are at the heart of development. However, there is a sense in which some aspirations are 'mission impossible' and therefore should be redefined to generate achievable targets.

Development is a time-bound process. The pace of movement towards achieving developmental goals is directly related to the magnitude of resources that need to be mobilised within any particular accounting period. Accelerated development is not as simple as just slowing things

down if the books do not balance. That would be like improving learning achievement by lowering the threshold test scores that count as mastery.

Goal achievement is always related to both the choice of goal and the timeframe for success. If goals cannot be achieved, there is always a case to vary one or the other. There are many precedents. Notably, the goal of gender equity in primary and secondary school by 2005 set in 2000 at the Dakar World Conference on Education for All was unachievable the day it was announced since it implied unrealistic re-enrolment of the large numbers of girls in higher primary grades who had already dropped out. The goal was appropriate but the lead time for implementation was implausible. The target was quietly replaced with one with a different time scale.

Sometimes goals remain the same but are allowed to lapse by default. At the Jomtien World Conference on Education for All, (WCEFA) one clause of the Education for All Goals was to improve learning achievement 'such that an agreed percentage of an age cohort (e.g. 80% of 14 year olds) attains or surpasses a defined level of necessary learning', which sounds like it anticipated the 'crisis in learning' that is now identified. Learning was central to the 1990 WCEFA and to the debates leading up to it, and many studies identified correlates of achievement (e.g. Heyneman and Loxley, 1983; Fuller, 1987), but it may well have been placed in the background as development partners sought quicker 'wins' with expanded access.

This review of SDG4 ambitions makes it clear that they have a much more extensive set of targets and indicators than the previous global architecture defined by the DTs and MDGs. There was and is no matrix that attempts to cost how much all the expectations would cost to implement, not least because many are unquantified aspirations. Costing in any case would have to take into account current levels of achievement and the data for that is incomplete or missing for many countries.

It seems likely that the costs of achieving SDG4 could be many times the costs of the DT and MDGs for education. A mission that was clearly difficult to finance and enact in 2000 has become a vast agenda of developments that may be desirable in themselves, but are so extensive in their demand for resources that many things simply will not happen. They are well beyond the reach of likely flows of multilateral and bilateral aid. In any case, it makes little sense to majority-finance public services like education with aid to cover core recurrent costs if the underlying fiscal base is unsustainable (Lewin, 2020a).

SDG4 has to be adapted to reflect both the preferences of governments and their people and the resources that can be committed to defined outcomes. The current set of global goals is not evidently suited to many country circumstances, has limited developmental logic grounded in real economies, labour markets and social well-being, and is not evidently nationally located (Lewin, 2021b). The mission creep that has occurred increasingly means that SDG4 cannot easily be used as the scaffolding for national or international development without revisiting its premises and its public financing. The agenda will falter both because it is ambiguously specified and because it is dislocated from country contexts. It is also unfinanceable without much greater alignment of aspirations with the resources likely to be available.

The next chapter moves the discussion on to explore the basic arithmetic of educational financing to develop an algorithm to project costs and base the planning of expanded access and quality improvements to enhance learning in fiscal realities.

6 The basic arithmetic of public financing of education

This chapter develops the core algorithm – the steps to determine demand for education financing. In response to the fourth research question – 'What is the basic arithmetic of educational financing, how does this translate into demand for financing, and what does it reveal about benchmarks for necessary levels of investment?' – this discussion identifies the cost drivers and demand for educational finance and locates benchmark levels necessary for defined outcomes.

The proportion of GDP needed to finance an education system is determined by the level of participation desired, the number of learners in education cohorts and the cost per learner at different levels. The second section uses this equation and populates it with data derived from a data set on SSA. This is then used to project current spending though to 2030, using assumptions on participation based on global goals and targets. The third section projects capital costs linked to the expected increases in enrolment. The fourth part takes a focused look at the demand for teachers and flags the importance of planning how demand could be met and financed. The fifth section interrogates the financing nexus that inter-relates demand for finance to levels of revenue collection that would be needed to finance education systems from domestic resources. The last section profiles the prospects for aid to education and concludes that it had already plateaued before Covid-19 became a pandemic in 2020. Aid is unlikely to grow in the foreseeable future. Useful though grant aid is, it is small compared to need and thus has to be highly catalytic (Fredriksen, 2010).

Public financing of mass education systems is driven by a number of factors. A simple algorithm determines the proportion of GDP needed to achieve and sustain given levels of enrolment in SSA from pre-school to grade 12. The relevant parameters are; i) the desired level of enrolment at any given level; ii) the proportion of children in the age group relevant to that level; and iii) the public cost per student per year. Each of these parameters need to be estimated for existing systems, and each can be projected into the future to establish the additional cost of any particular mix of policies that changes levels of participation.

Policy dialogue has to have a foundation based on the basic arithmetic of sustainable financing, otherwise it is likely to stray into fantasies of aspiration that cannot be realised (Little, 2013). The risk is that, if goals and targets that cannot be achieved are generated, this undermines trust in the planning system and the appetite to finance desirable developments that are achievable. It can lead to poor decision-making based on false premises. It makes it difficult to iterate plans as they are implemented to take into account actual rather than intended progress. It can have opportunity costs that distort decision-making, over-value short-term goal-seeking, and misprice the costs and benefits for development understood more broadly than as a narrow set of outputs.

Fundamentally, the overall wealth of a country underpins its ability to provide public services. This is mediated by: i) the level of political will to raise revenue and allocate this to public services; ii) the demographics of service delivery to sub-populations

which for education systems are predominantly children; iii) the cost per recipient of delivering services at different levels, e.g. primary, secondary and tertiary education; and iv) the willingness and ability of citizens to make private contributions to the costs of education. Data on all these issues is patchy and not very reliable. In the case of LICs and LMICs, grant aid and concessionary lending may also make significant contributions to financing public services but are often unsuited to meeting recurrent costs in a sustainable way. The volume of these flows is unlikely to be sufficient to eliminate shortfalls in funding in all but the short term.

6.1 The core algorithm

The financing challenges in LICs and LMICs depend on an appreciation of the core algorithm that determines how much investment is needed to achieve the goals for mass public education systems. The amounts needed to finance public education are determined by a simple linear equation which computes the product of the desired rate of enrolment, the proportion of the population that is in the relevant age group, and the public recurrent cost of providing an appropriate educational service to learners.

Formally this can be expressed as:

X = GER *A *C where:

X = Public expenditure on primary/secondary education as a percentage of GDP

GER = Gross enrolment rate

A = The proportion of the population of primary/secondary school age

C = Public recurrent expenditure on primary/secondary schooling per student as a percentage of GDP per capita

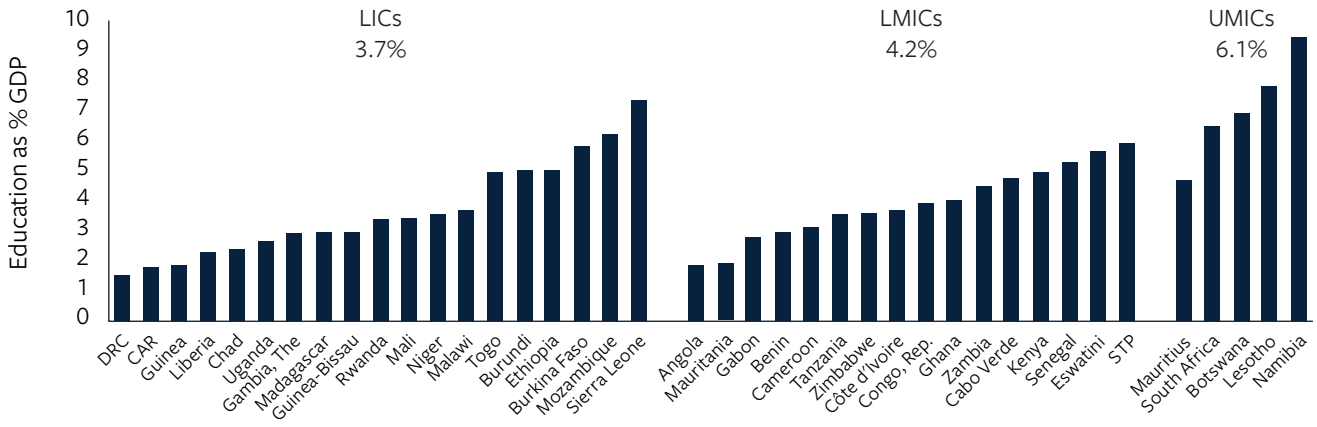
This equation can be populated with data from countries in SSA and used to profile current patterns of spending and to identify the additional spending that would be necessary to reach goals set by national governments and by the global goals encapsulated in SDG4. This provides insights into the magnitude of the resources that may be needed, where shortfalls are likely to be greatest, and what proportion of the demand for financing can be generated by likely flows of domestic revenue. This is sufficient for a first-order analysis of the global educational financing problems in LICs and LMICs. It needs to be complemented by country-level sector analysis that can capture the nuances of different national systems and their political economies of resource allocation.

6.1.1 Education spending as a proportion of GDP

The first term in the financing equation is the proportion of GDP (X) that countries allocate to public education. The average expenditure on public education in LICs, LMICs and UMICs in SSA is 3.7%, 4.2% and 6.1% respectively, as discussed in Chapters 2 and 4. Across SSA countries public education absorbs from below 2% to over 9% of GDP. The spread is very wide (Figure 19).

Figure 19 shows that only 30% of LICs and LMICs spend 5% of GDP or more on education. This is almost certainly an underestimate of the numbers below 5% of GDP as missing cases are likely to make below-average allocations. UMICs average over 6% of GDP though the number of cases is small. This expenditure as a percentage of GDP includes all levels of education and training financed from education budgets, not just basic education.

Figure 19 Education expenditure as % of GDP by country

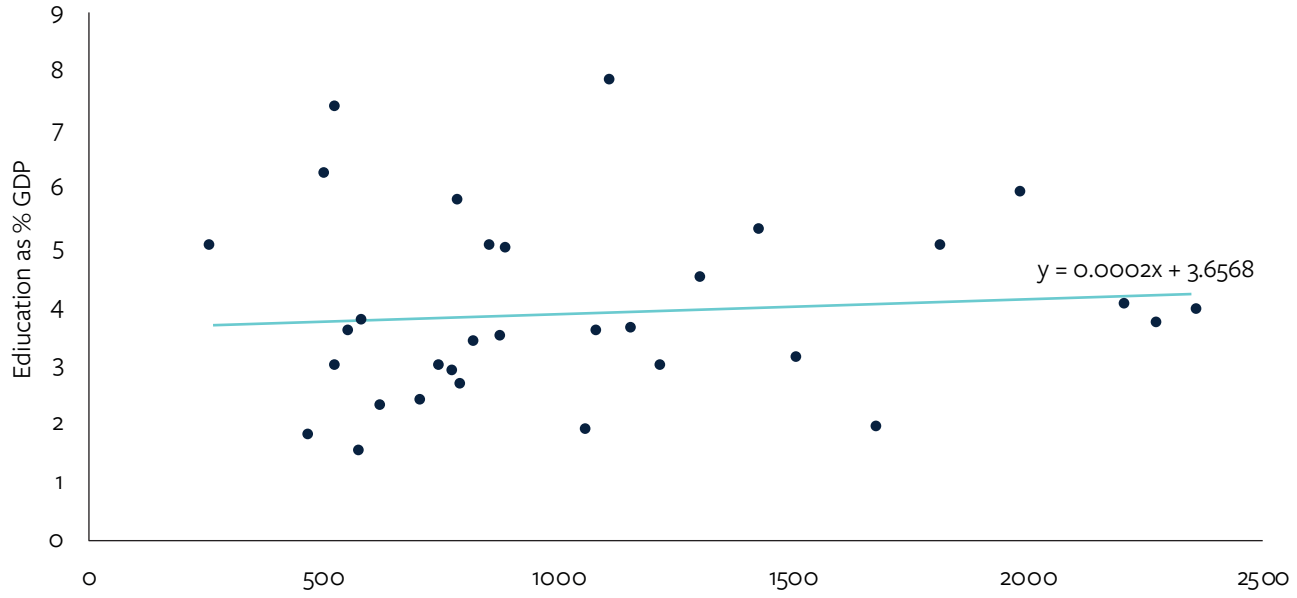


Source: : World Bank database 2021

In both LICs and LMICs average levels are well below the expectations created by SDG4 that countries would aspire to spend between 4% and 6% of GDP on education. More than 60% of countries allocate less than 4% of GDP to all education spending. These estimates include aid, which makes a significant contribution to education spending especially in LICs.

There is very little correlation with the level of GDP per capita across LICs and LMICs in SSA, suggesting that this measure of commitment to education is determined more by the political economies of resource allocation than the relative wealth of countries within this band of national income (Figure 20).

Figure 20 Educational expenditure as % of GDP by GDP per capita



Source: World Bank database 2021

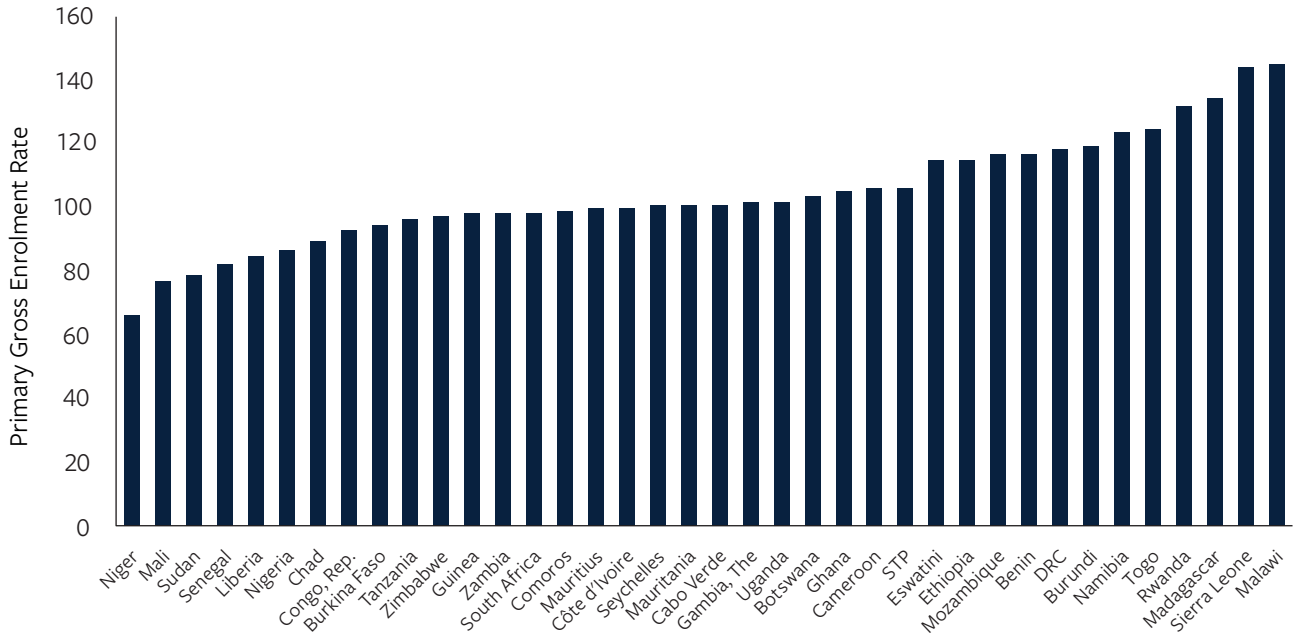
6.1.2 Gross enrolment rate (GER)

The second element in the financing equation is the GER. This is defined as the number of children enrolled in education at a given level independent of age divided by the number in the appropriate age group for that level of education. Where there are over-age or under-age children enrolled, the value of GER can be greater than 100%. GERs at primary and secondary level are shown in Figures 21 and 22.

The financing equation uses GER rather than other measures of participation, e.g. net enrolment rates (the net enrolment rate is the number enrolled who are from the appropriate age cohort as a proportion of all those in that age cohort), or completion rates (a proxy for the proportion of an age cohort completing a cycle on schedule for their age) because these are less widely available and more difficult to measure. GERs do indicate the total numbers enrolled relative to the number who need to be enrolled for full participation. With this understanding, GER is the appropriate indicator to use in calculating demand for financing at levels of participation targeted by governments or development partners. It is not the best indicator to use to plan and manage systems (Lewin, 2007).

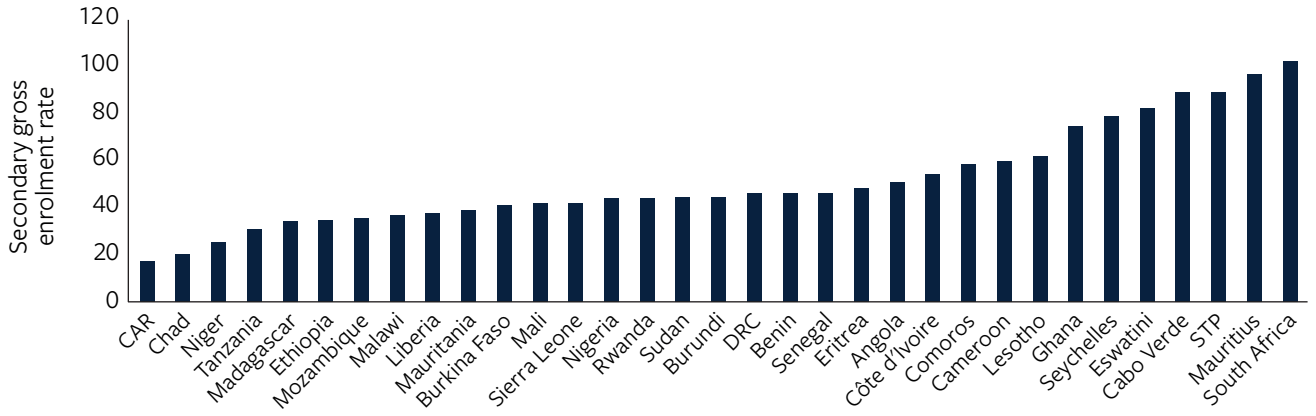
GERs at primary level average between 108% in LICs and 100% in LMICs, which have fewer over-age learners (Figure 21; and see Chapters 2 and 3). Where GER is 100% the total numbers enrolled are similar to those in the relevant age group. However, since many are over age, it does not mean that all children are enrolled in primary school. Table 3 reports net enrolment rates and suggests that enrolments in about 60% of SSA countries are at levels comparable to the number of children in the relevant age group, indicating that problems are centred on the uneven flows of learners through systems and not necessarily the total volume enrolled.

Figure 21 Primary gross enrolment Rates in SSA



Source: World Bank database 2021

Figure 22 Secondary gross enrolment rates in SSA



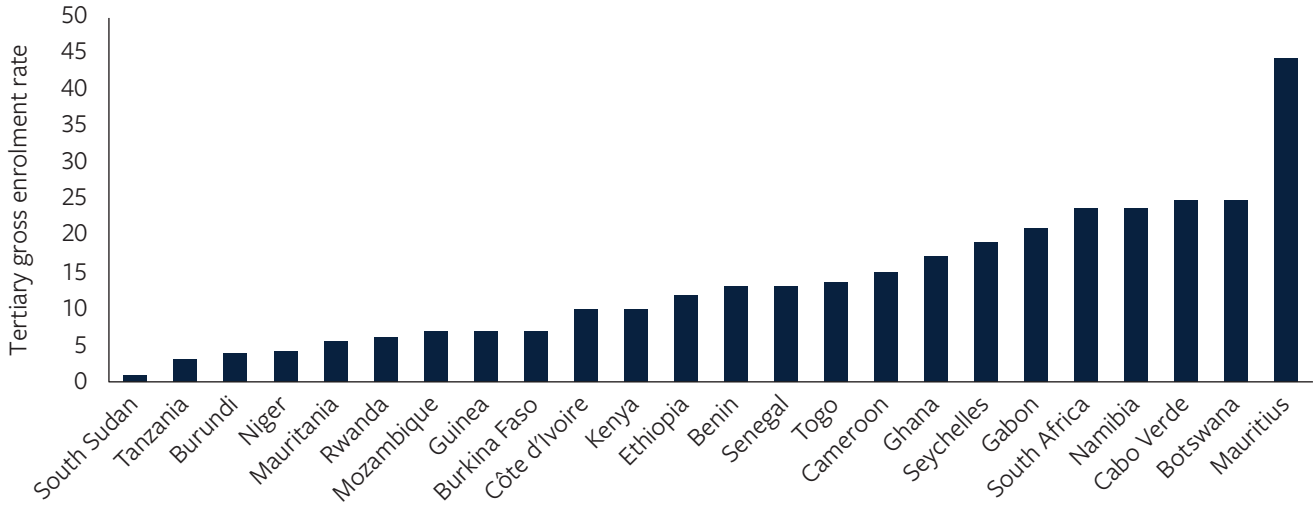
Source: World Bank database 2021

At secondary level enrolment rates are lower and average GER 38% in LICs and GER 54% in LMICs (Figure 22). This means that, in LICs, less than a third of children complete secondary schooling and in LMICs, less than a half. Because systems differ in the length of lower and upper secondary, and because data is missing on some countries, averages are a general indication of differences between groups of countries rather than a precise measure. Secondary enrolment rates depend on primary completion rates, which limit the demand for places and financing at secondary level.

GERs at tertiary level are more difficult to collate because of missing data and the heterogeneity of systems between countries. What data there is indicates that in SSA, LICs GERs average about 7% and in LMICs about 13%. The range is from less than 1% to over 45% and there is a correlation with GDP per capita, with the highest rates tending to be in the richest countries (Figure 23).

Strategy for financing and development may or may not be coordinated in a systematic way across ministries. Matching outputs from school systems

Figure 23 Tertiary gross enrolment rates in SSA



Source: World Bank database 2021

with opportunities for further education and training and with job opportunities is at the heart of efficient system development and policy trade-offs in financing different levels of education. Post-school education is often split across several ministries and may therefore fall under several largely unrelated budgets.

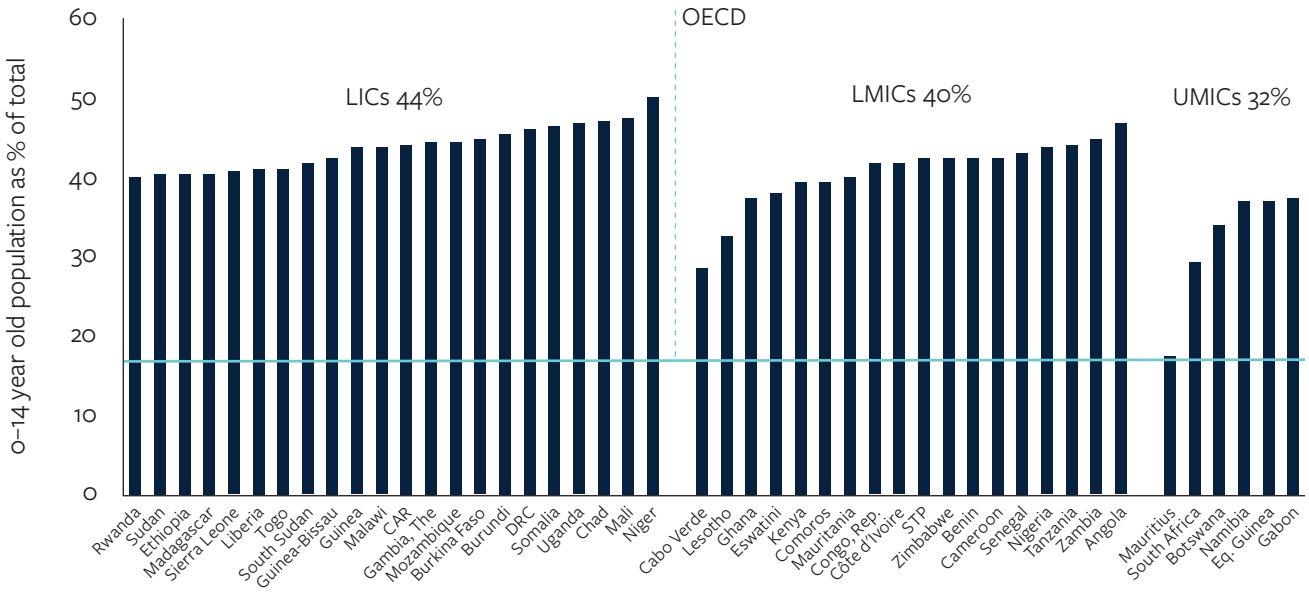
6.1.3 Population of learners

The third element in the financing equation is demographic and includes the child population and its growth rate as noted in Chapter 2. SDG4 assumes that early childhood care and pre-school are to be made available to all children. The minimum age of work in terms of International Labour Organization (ILO) conventions is 15 years. An estimate of the costs of public education can then be made.

One simple proxy for the total number of school-age children is the number in the age range 0–14 years. It also provides a signal of the dependency ratio in the population if the number of 0–14-year-olds is compared to those in the total population, as noted in Chapter 2.

Figure 24 shows that, in LICs in SSA, the dependency ratio is 44% on average, in LMICs 40% and in UMICs 32%. These are high rates suggesting that in LICs and LMICs demographic transition has not taken place and that fertility rates are high, as noted in Chapter 2. UMICs are beginning demographic transition to lower growth. OECD countries average 0–14-year dependence rates of only 18%. The ratio of children needing educational services to tax-paying adults is a critical parameter for educational financing. This means that, as countries experience demographic transition to low growth, they are likely to experience much lower levels of dependency with rates that fall by more than 50%. This makes financing universal participation much easier.

Figure 24 Dependency ratio of 0–14-year-olds in SSA



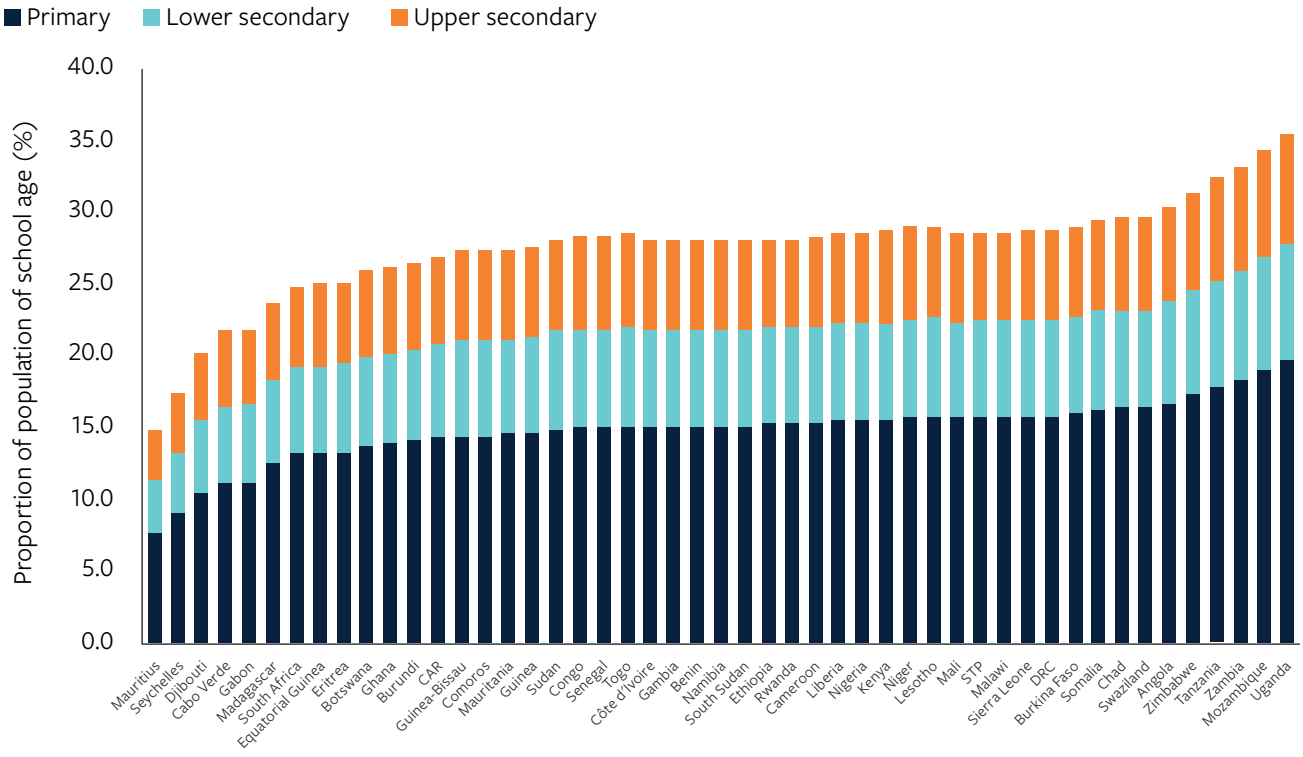
Source: World Bank database 2021

More refined estimates of the demand for financing are based on the number of children of primary, lower secondary, upper secondary and tertiary education age. If the target is universal enrolment then enough places have to be provided for all children. The size of the child population can be derived from single age population estimates (UN Population). If the target is less than universal access, say at upper secondary, a GER less than 100% can be identified as a goal and linked to a proportion of the number of children of upper secondary age.

The financing equation requires estimates of the number of children of school age for each cycle. On average in LICs about 15.5% are of primary school age and in LMICs 14.5%. In LICs and LMICs on average about 6.5% of the population is of lower secondary age and 6% of upper secondary age (Figure 25). Child population growth rates are higher in LICs than LMICs (2.1% vs. 1.5%), meaning that the ratio of primary age children to secondary age is slightly less as the population pyramid is wider at the base in LICs.

Countries with a primary age population below 12% of the total population are likely to be in demographic transition to low growth. Most high enrolment rate countries have primary age populations below 10% of total population. Only 12% of SSA countries have a primary age cohort that is less than 12% of the total population. Simply put, OECD countries have about half the proportion of their populations of school age than the median SSA country. Consequently, the financial demand to fund school systems relative to their economies is much lower where demographic transition has occurred.

Figure 25 Proportion of the population of school age by educational level in SSA



Source: World Bank database 2021

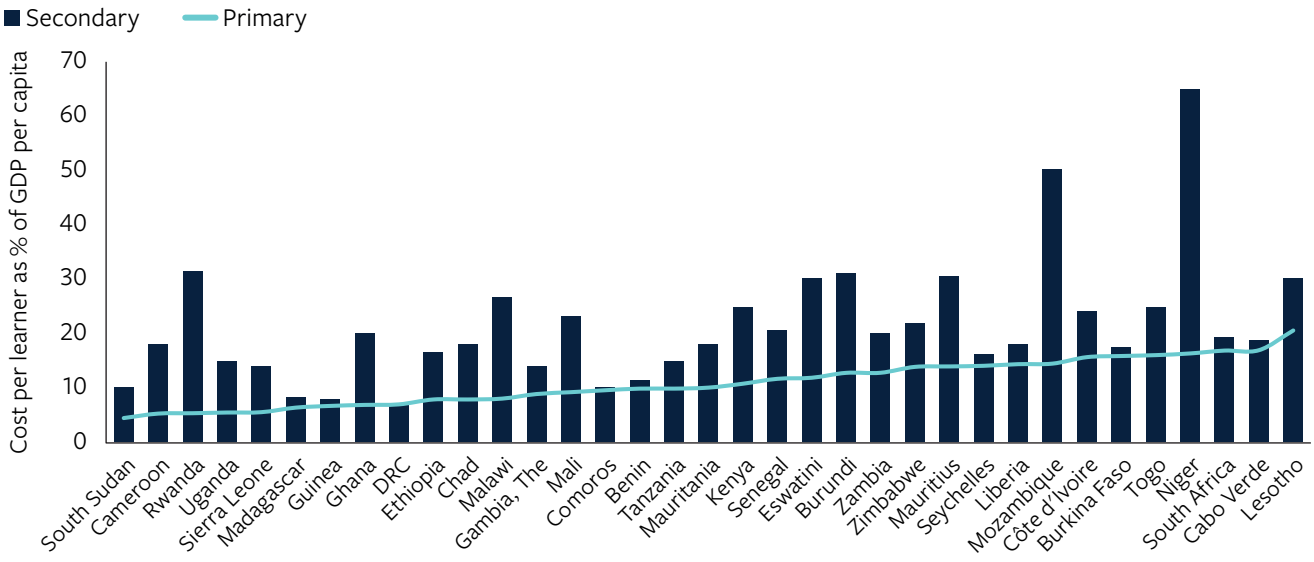
6.1.4 Public cost per learner

The fourth element for the estimation of cost gaps at macro-level relates to costs per child, as noted in Chapter 2. The unit costs are very variable between institutions, especially where staff student ratios vary considerably by level and type of school. Combining data on educational expenditure by level with enrolment makes it possible to arrive at some general estimations of costs per child at different levels. In SSA the average cost of a primary school place is about 11% of GDP per capita. At secondary it is 21% and at tertiary level over 170% of GDP per capita (Figure 26).

In the poorest countries costs per student at tertiary level tend to be very high relative to school level costs. As systems develop costs per student at tertiary level fall as a ratio of GDP per capita. Secondary schooling also tends to fall in cost to no more than twice the costs of a primary school place. These dynamics are key drivers of costs since the demand for finance depends on both the cost of a place and the numbers enrolled at that level. As systems expand it becomes impossible to maintain high cost differentials between levels. The implication is clear. Expanded access has to be accompanied by reforms that reduce differences in cost per student between levels.

Primary costs per student vary from little more than 5% of GDP per capita to as much as 18% with an average across all countries of 11%. At secondary level the range is from about 10% to as much as 50%, with an average of 21%. These proportions of GDP per capita translate into very wide variations in the dollar value of cost per student. The lowest spending countries like Burundi and Madagascar spend less than $50 a year and the richest like South Africa as much as $1,000. At secondary level the range is also very wide, from less than $100 to over $1,200. There is a high correlation (R squared over 0.8) between costs per student at primary and at secondary level in different countries. These differences have real consequences, especially where inputs are priced in global markets, e.g. for internet services, equipment and textbooks.

Figure 26 Cost per student at primary and secondary level as % of GDP per capita

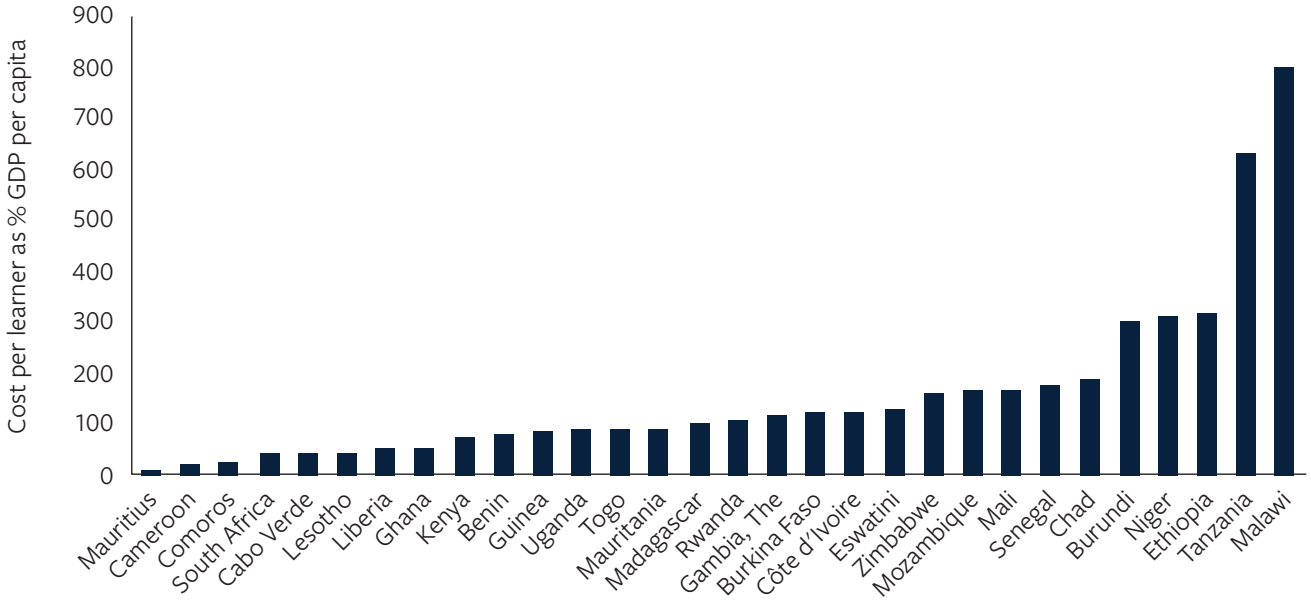


Source: World Bank database 2021

Tertiary costs are much higher than those for school learners. They range from as little as 20% to over 800% of GDP per capita (Figure 27). The average across all SSA countries is about 170% of GDP per capita. If this is translated into dollar values the average is over $2,000 across all SSA countries, with a range from $500 to over $5,000 per student. Even if the outliers are removed from the data set, typically tertiary education costs are at least 10 times those at primary level. In the OECD tertiary costs per learner are about 25% of GDP per capita and are less than twice the cost of a primary school place. High costs create a massive financial challenge for expansion of access to higher education and other post-school institutions with tertiary-type cost structures. Without cost saving reforms, much greater participation rates will be unattainable.

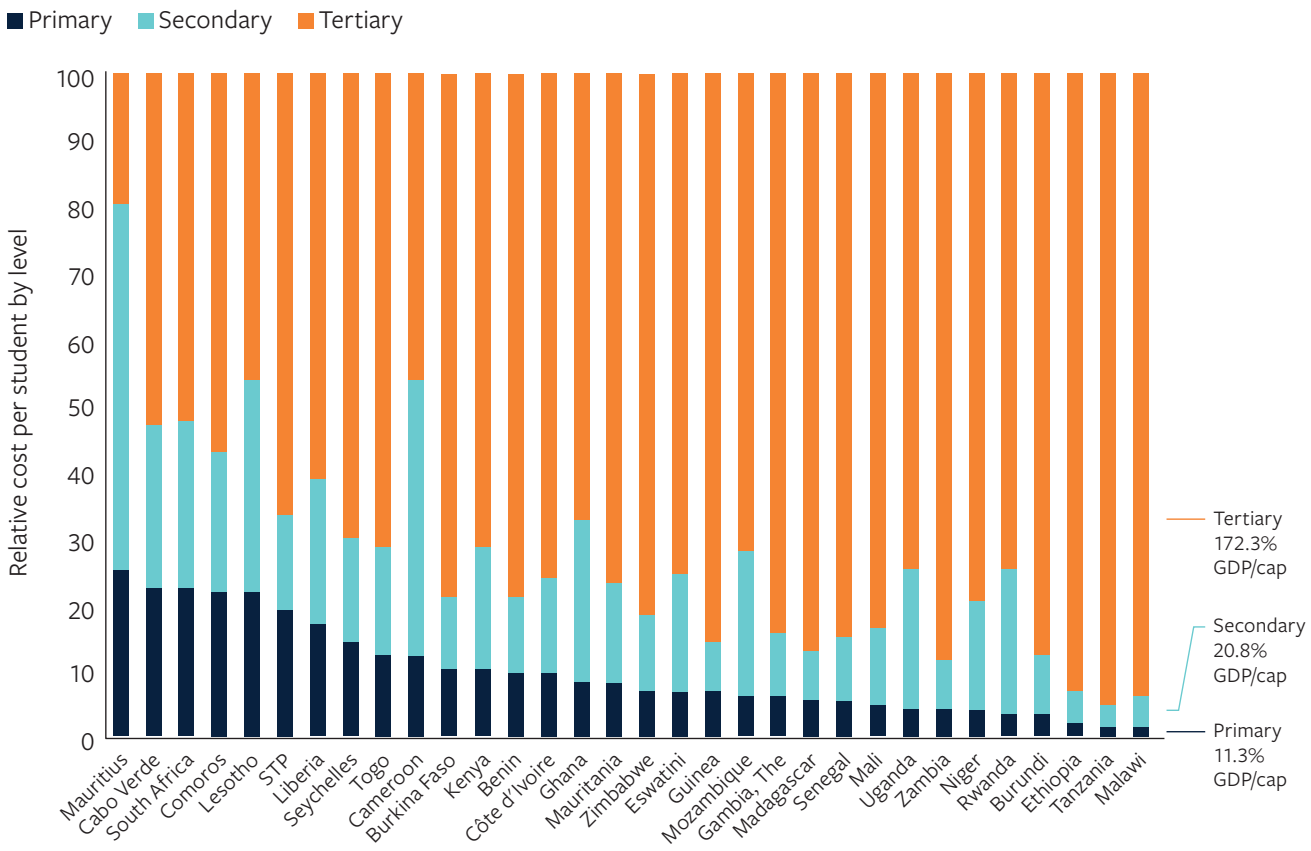
If the relative cost of places at different educational levels within countries is compared, then the extent of the imbalances in investment costs per child can be clearly seen. Figure 28 shows relative spending by level per student in each country on which there is data. From this it is clear that higher education students are much more expensive to educate. The poorer the country the more likely that higher education costs per student are a higher percentage of GDP per capita (Figure 28). This reflects the fact that, in dollar terms, on average secondary school places are usually more than twice the cost of primary school places, and higher education places more than 10 times as much.

Figure 27 Cost per learner at tertiary level



Source: World Bank database 2021

Figure 28 Relative cost per student by level in SSA



Source: World Bank database 2021

6.2 Estimating the demand for financing education

The financing equation can now be populated using plausible values derived from the analysis presented of each main parameter. First, we create a baseline model which reflects the current disposition of the key parameters. This is shown in Table 16. Estimates of costs are made for LICs, LMICs and UMICs for each level from pre-school to tertiary. This modelling simulates groups of countries that have different levels of educational participation represented by the GERs, varied demography associated with the school age population, and a range of costs per child. The values chosen are illustrative and plausible but not necessarily the same as averages. The table thus identifies values for GER, A and C in the financing equation, enabling total expenditure as a proportion of GDP to be calculated since X = GER*A*C.

6.2.1 The baseline variant

The results are as shown (Table 16). Currently, LICs in SSA need to spend about 3.8% of GDP if they have the profile represented by the simulation. LMICs need to allocate 4.2% of GDP and UMICs 4.9%. Translated into dollar values this amounts to about $14 billion, $40 billion and $21 billion for LICs, LMICs and UMICs. The total of $75 billion is the approximate expenditure on education by governments in SSA as of 2020. This represents an unweighted average of about 4.3% of GDP across the three groups or 4.1% as a simple average across all countries.

Table 16 Recurrent costs of education in SSA

Variant
Baseline

	GER	% School-age children	Cost per child % GDP/cap	% GDP needed	Total expenditure
	GER	**A**	**C**	**X**	**US$ billions**
LICs					
Pre-school	24	5.2	10	0.12	0.45
Primary	100	15.5	10	1.55	5.63
Lower secondary	60	7	24	1.01	3.66
Upper secondary	15	6	40	0.36	1.31
Higher	7	4	260	0.73	2.64
Total				3.77	13.69
LMICs	**GER**	**A**	**C**	**X**	
Pre-school	50	5	12	0.30	2.90
Primary	100	15	14	2.10	20.33
Lower secondary	80	6.5	16	0.83	8.05
Upper secondary	30	5.5	30	0.50	4.79
Higher	13	4	85	0.44	4.28
Total				4.17	40.36
UMICs	**GER**	**A**	**C**	**X**	
Pre-school	75	4.5	12	0.41	1.72
Primary	100	12.5	12	1.50	6.36
Lower secondary	100	6	20	1.20	5.09
Upper secondary	75	5	35	1.31	5.57
Higher	30	3.5	42	0.44	1.87
Total				4.86	20.60
Grand total					**74.64**
Average				**4.27**	

Source: World Bank database 2021

Several things are striking about this estimation.

First, most expenditure is in LMICs since they have much higher GDP per capita and costs than LICs. UMICs are more expensive than LICs and LMICs but there are only six countries in the data set; they represent 24% of the GDP of SSA compared to 55% for LICs.

Second, most spending in LICs and LMICs is on primary education, which accounts for 40% to 50% of the total. This falls to 30% in UMICs.

Third, secondary schooling accounts for between 35% and 40% of total spending in LICs and LMICs.

Fourth, higher education absorbs 20% or more of total spending in LICs, and 10% in LMICs and UMICs.

The proportion of children in the age group for different educational levels does not vary in the short term. If demographic transition occurs then it will change and could have very substantial effects on the flow of students. The flow of children is known six years before they enter primary school. For practical purposes 10-year projections can assume that the age group is a fixed proportion of the population and will not change substantially.

Cost per student is the variable that can be transformed to increase affordability. As systems develop costs per student as a percentage of GDP per capita tend to rise slowly at primary level as learner teacher ratios fall. At higher levels costs per student have to fall where these have been historically high, otherwise expanded access is stalled by inability to recruit and pay enough additional teachers, resulting in a more even distribution of costs per learner between levels. This is inevitable if expanded access to post-primary education is not to pre-empt most of the education budget.

The simulation assumes a fall in the cost of post-primary education per student as a percentage of GDP. This does not mean a diminution in quality if it is achieved through gains in efficiency and increased productivity. All high participation systems have costs at secondary and above that are a small multiple of costs per primary child.

Reducing the ratio of costs per learner primary to secondary and secondary to tertiary should have the additional virtue that is also likely to reduce the extent to which public financing of education is regressive with household income. Participation at higher educational levels is typically correlated with high household income. Richer households may benefit disproportionately from public subsidy. As access increases, this uneven distribution should improve.

6.2.2 High participation variant

The simulation can be iterated to indicate what magnitude of new resources would be needed to meet the first order goals of SDG4 to ensure that all children had access to education from pre-school to grade 12, with options to enter higher education for those qualified and willing. The target GER for primary is set at 105%. This assumes minimal over- and under-age enrolment and high levels of efficiency though grade levels with some headroom for slippage in progression through grades. Pre-school is costed at levels similar to primary school on the assumption that it will be arranged over two years and will engage qualified teachers similar to primary teachers. Secondary education is assumed to be universalised with a GER at lower and upper secondary of 105%. Higher education is projected to expand to GER 20% in LICs, 40% in LMICs and 80% in UMICs with costs per student that fall as participation increases. Higher levels of participation would not seem feasible in the medium term.

The results of the macro simulation for a high participation variant are such that much higher levels of participation could be financed if cost per student could be contained at levels indicated in Table 17. This would however require a considerable increase in the allocation of funds to education to increase the average to 6.9% of GDP in LICs, 6.8% in LMICs and 6.8% in UMICs. This would be an 80% increase on the current average in LICs, 60% in LMICs and 40% in UMICs. Though conceivable this is not within the range of historical precedent.

Table 17 Recurrent cost of education in SSA with high participation

Variant
High participation

	GER	% School-age children	Cost per child % GDP/ cap	% GDP needed	Total expenditures	Shortfall
	GER	**A**	**C**	**X**	**US$ billions**	**US$ billions**
LICs						
Pre-school	105	5.2	14	0.76	2.77	2.32
Primary	105	15.5	14	2.28	8.27	2.64
Lower secondary	105	7.0	20	1.47	5.34	1.68
Upper secondary	105	6.0	25	1.58	5.72	4.41
Higher	20	4.0	100	0.80	2.90	0.26
Total				6.89	25.00	11.32
LMICs	**GER**	**A**	**C**	**X**		
Pre-school	105	5.0	14	0.74	7.11	4.20
Primary	105	15.0	14	2.21	21.32	0.99
Lower secondary	105	6.0	20	1.26	12.18	4.13
Upper secondary	105	5.5	25	1.44	13.96	9.17
Higher	40	5.0	60	1.20	11.60	7.33
Total				6.84	66.18	25.82
UMICs	**GER**	**A**	**C**	**X**		
Pre-school	105	4.0	14	0.59	2.49	0.78
Primary	105	12.5	14	1.84	7.79	1.43
Lower secondary	105	6.0	20	1.26	5.34	0.25
Upper secondary	105	5.0	25	1.31	5.57	0.00
Higher	80	3.5	60	1.68	7.12	5.25
Total				6.68	28.31	7.71
Grand total					**119.50**	**44.86**
Average				**6.80**		

Source: Author's computation

6.2.3 Shortfalls in financing

The high participation scenario (Table 18) shows the need to find ways of financing expanded access and how challenging this will be.

First, the model shows that there would be a shortfall between current levels of expenditure and those needed to support the new scenario of higher participation as indicated in Table 17.

The shortfall would be about $11 billion in LICs, $26 billion in LMICs and $8 billion in UMICs excluding capital costs. The total of $45 billion is more than 20 times current aid to basic education in SSA. The shortfall is recurrent and would be repeated every year, building a cumulative deficit if it was not financed from domestic revenue. Capacity constraints on building and training teachers have to be considered since they place limits on the rate of expansion that can be sustained and the sequencing necessary. The cost of addressing the needs of OOSC has also to be factored in.

Second, nearly 60% of the shortfall is in LMICs in SSA, not the LICs which account for 25%. On current projections UMICs would account for less than 20% of the gap and should be able to finance short-term deficits. This raises questions as to whether LMICs should be prioritised for grants and concessional loans since most of the finance shortfall is in those countries. Conversely, it might be argued LICs should be prioritised because any resources allocated will buy more goods and services than in LMICs. GDP per capita in LMICs averages nearly three times that in LICs.

Third, it is clear that most of the shortfall is attributable to the expansion of upper secondary (30%) and higher (29%) education. This is because current levels of enrolment at these levels are low in LICs and LMICs, and costs per student tend to be much higher than at primary and are embedded in historic pedagogic practices and curricula requirements. SDG4 anticipates much higher spending on upper secondary education, TVET and higher education without consideration of how it could be financed. This raises the question as to what developmental goal such costs are supporting aside from increasing the average number of years of education completed. Without consideration of labour force absorption capacity, there is a risk of educated unemployment and qualification escalation on the one hand, and large-scale student debt on the other. The relationships between investments in human capital and economic returns to enhanced knowledge and skills are different in different economic sectors and at different levels of capability. They are also subject to prices determined by supply and demand in labour markets, the distribution of value added by different employees, and the impact of new technologies of production.

Fourth, pre-school contributes about 16% of the projected shortfall. If early childhood care is also included in the education budget, this would inflate costs further. The model assumes two years of pre-school at primary school cost levels. If this educational experience could be delivered at least partly at community level, making use of para-professionals and concerned adults, savings could be made. If pre-school is privately provided and financed with fees, then this would be an additional cost to households if not to the public purse. It might also be exclusive since fees would likely exclude many households at or near the poverty line.

Table 18 Projections of the shortfall in recurrent expenditure for high participation

Recurrent	Shortfall	Proportion of shortfall
	US$ billions	%
LICs	11.32	25.2%
LMICs	25.82	57.6%
UMICs	7.71	17.2%
	44.86	100.0%
Pre-school	7.30	16.3%
Primary	5.07	11.3%
Lower secondary	6.06	13.5%
Upper secondary	13.58	30.3%
Higher	12.84	28.6%
Total	44.86	100.0%

Source: Author's computation

Table 18 shows that there is a shortfall of about $45 billion a year in recurrent expenditure for the high participation scenario. This can be compared to the current level of spending of about $75 billion a year on education in SSA. About $8 billion of this is in UMICs, which could be expected to finance their own education systems.

Strikingly, most of the demand for new expenditure is for secondary and tertiary education. This carries risks that include mismatching enrolment growth with labour market ability to absorb more secondary and tertiary graduates and allowing powerful lobby groups to crowd out spending on basic education, and skews in investment that may not be equitable and are at worse regressive with household income. The question of how to phase growth in participation at higher levels, and how to finance it, needs revisiting in every country.

To close the gap LICs and LMICs would have to increase expenditure by about $37 billion annually. This would be a 69% increase on current levels and would require about 6.8% of GDP. Currently total aid to basic education in SSA appears to be less than $2 billion per year, or about one-twentieth of the shortfall in the high participation model.

6.3 Capital costs

The basic equation for education financing for expanded access is focused on recurrent costs and omits capital costs. These are predominantly located in building additional physical capacity to accommodate additional students and boarding hostels where these are essential in areas of low population density. The core variables are the number of classrooms needed and the cost per classroom. The number of new classrooms needed is driven by the additional number of children enrolled and the student/classroom ratio. This ratio is not the same as the learner teacher ratio since in most systems teachers do not teach every teaching period available and the teacher per teaching group ratio is greater than 1:1. The average class size at primary, lower secondary and upper secondary can be used to estimate the number of new classrooms needed over a defined period.

Costs per classroom vary, especially when linked to the cost of land that may be located anywhere from very high-cost city environments to low-cost land in rural areas. Using assumptions guided by historic experience in LICs and LMICs, costs per classroom have been configured at plausible levels. It is assumed that the classroom unit cost includes the cost of other necessary buildings, e.g. latrines, offices and communal space. They have been modelled such that costs are greater in LMICs and in UMICs to reflect the greater costs of labour and building materials. The current assumptions may underestimate the cost differences between LICs and LMICs. If the variation in GDP per capita is taken as a proxy for building costs, then construction costs in LMICs may be more than three times as expensive than LICs. This simulation does not model higher education building costs, which are very variable and have to be considered on a system-by-system basis.

The purpose of these projections is not to provide an accurate estimate that could be used for advocacy, but to draw attention to the need to understand the order of magnitude of likely capital costs associated with expansion at different levels, and compare these costs with financing shortfalls that relate to recurrent costs. This also provides an opportunity to consider what options may exist to amortise building costs over a substantial period of time and finance them differently to recurrent costs.

Table 19 shows projections of the number of classrooms needed to deliver the levels of participation modelled for recurrent costs. The values used have been chosen for plausibility as well as reference to average values, since this is the only way to generate consistent modelling from databases that have different missing cases and sample sizes. The assumption has been made that class sizes will fall in order to meet SDG4's ambitions to improve learning with greater engagement between learners and teachers. The direction of travel is towards class sizes of 25, 20 and 15:1 at primary, lower and upper secondary. These would still be above OECD levels but would represent a considerable improvement on current levels.

The results of this new projection over the 10-year period from 2020 to 2030 are as shown in Table 19. Achieving the higher levels of participation identified in the model generates a demand for about 1.1 million classrooms at primary level in LICs and 870,000 in LMICs. The numbers for lower secondary are 910,000 and 710,000 respectively. Upper secondary has the lowest enrolment rates and thus the greatest demand for additional space if it is to be universalised. Here, over 2 million classrooms are needed in LICs and over 2.5 million in LMICs. The number of additional classrooms needed at all levels is 8.5 million.

Table 19 Cost of additional classrooms for expanded access

	Class size	Class size	Total classrooms	Total classrooms	New classrooms needed	Cost per classroom	Cost
	2020	2030	2020	2030	Millions		US$ billions
LICs							
Primary	50	40	1.68	2.82	1.14	10,000	11.4
Lower secondary	40	35	0.44	1.35	0.91	10,000	9.1
Upper secondary	30	20	0.16	2.20	2.03	15,000	30.5
Total			2.28	6.37	4.09		51.0
LMICs							
Primary	45	35	1.71	2.58	0.87	15,000	13.1
Lower secondary	35	30	0.74	1.45	0.71	15,000	10.6
Upper secondary	25	15	0.24	2.69	2.45	20,000	48.9
Total			2.69	6.72	4.03		72.7
UMICs							
Primary	30	25	0.24	0.39	0.15	20,000	3.0
Lower secondary	25	20	0.12	0.21	0.08	20,000	1.7
Upper secondary	15	15	0.13	0.25	0.12	25,000	3.0
Total			0.50	0.85	0.35		7.7
Total			**5.5**	**13.9**	**8.5**		**131.4**

Source: Author's computation

These school classroom building estimates do not include whatever may be allocated and spent on pre-school, where there may be opportunities to mobilise community resources and multi-purpose space in existing buildings. Costs of expanding pre-school are very uncertain, as is the proportion of pre-school that is privately financed by households. If it is delivered and financed institutionally, e.g. through adding facilities to primary schools, a *pro rata* assumption using the cost per child of primary schools could be applied. This could inflate total capital costs by one-sixth of those for primary, or even more if pre-school lasts more than one year.

The estimates also do not include any calculation for the construction needs of post-school higher and further education and TVET. Cost of plant and equipment, especially if specified at international price levels, can be very expensive relative to GDP per capita. Modelling the costs of the growth of higher education is very speculative in LICs and LMICs. School expansion is linked closely to demography and the partly predictable politics of access to basic education. Higher education is funded in many different ways and is not usually part of a commitment to universalise access. The methods of funding are complex, may involve loans, and can include substantial private sector investments seeking a return on capital. Detailed analysis of this is beyond the scope of this report, not least because of the great variability of systems across SSA. If funding was on the public budget it would add considerably to total costs.

In sum this projection of capital costs for expanded schooling identifies costs over $130 billion (Table 20). If building costs in LMICs are much greater than in LICs, this estimate could be significantly increased. Over a 10- year period the stock of classroom space would need to increase by 250%. This could be achieved by financing and building a little over 1 million new classrooms a year. This may be unrealistic. It implies a rate of growth in classroom stock of about 15% annually, and this is before an allowance is made for rehabilitation and maintenance of existing classrooms.

Demand is heavily skewed upward. Half of the total costs are for expanded upper secondary and about 75% for upper and lower secondary school construction. This signals cause for concern that a disproportionate demand for resources may skew investment towards expanded upper secondary schooling without a clear rationale of the developmental pathway that benefits from prioritisation of this level, or balances it against needs at other levels. About 5% of total costs are in UMICs, which in normal circumstance should

Table 20 New classrooms needed

	New classrooms needed	Cost		New classrooms needed	Cost
	Millions	US$ billions		Millions	US$ billions
LICs	4.1	51.0	Primary	2.2	27.5
LMICs	4.0	72.7	Lower secondary	1.7	21.4
UMICs	0.4	7.7	Upper secondary	4.6	82.5
Total	8.5	131.4	Total	8.5	131.4

Source: Author's computation

be expected to finance educational development from domestic resources. If the costs in UMICs are excluded from these estimations, it would reduce the total by about 5%.

There is an assumption that procurement systems could support such high rates of expansion year on year, and that financing could keep pace. It is also assumed that the new classrooms could be staffed at appropriate rates of growth with additional teachers, and that funds would be available to pay salaries. Over a 10-year period 1 million classrooms would cost about $15 billion a year in LICs and LMICs. This is a little less than half the recurrent deficit in the SDG4 variant of the model, and is therefore a substantial additional call on financial resources.

6.4 Teacher demand and costs

The ambitions of SDG4 make a clear commitment to universalising access to schooling up to grade 12. This implies a considerable increase in the number of learners, enrolments and teachers, which needs to be understood in order to convert aspirations into viable plans. If public sector budgets do not expand at a rate sufficient to employ additional teachers, then one of two things will happen. Either more learners will be enrolled and will be taught in larger and larger teaching groups, or the planned expansion simply will not take place as schools limit the number of learners they enrol.

Balancing the supply of and demand for teachers is central to efficiently managed education systems. So also is effective deployment and utilisation. The ability to achieve these things is contingent on sustainable financing that can support the cumulative increase in capacity needed to realise SDG4 ambitions. Financial and non-financial constraints on growth have to be managed consistently to support system development.

Estimating the demand for additional teachers arising from SDG4 commitments as an order of magnitude across SSA countries is straightforward. If target GERs are set at 105% in 2030 for primary through to upper secondary, the number of learners for whom school places need to be provided can be estimated from the size of the school age cohort. Target learner teacher ratios for 2030 also need to be set, and in this projection the intention is to achieve an average learner teacher ratio of 30, 25 and 15:1 for primary, lower and upper secondary in LICs and LMICs by 2030.

The first order estimate of teachers needed is the difference between those currently employed and those that would be needed in 2030 to achieve the targeted learner teacher ratios. Table 21 shows the number of teachers needed as being 7.1 million with 2020 levels of enrolment and 17.5 million if all learners are to have a school place in 2030, amounting to a total of about 10.4 million additional teachers. Most of the costs are in teachers' salaries with other salary costs in non-teaching support staff and central costs.

A necessary refinement is to include estimates of teacher attrition. Every year a proportion of the teacher workforce retires, resigns, occupies a non-teaching post, or suffers ill-health and takes extended leave. In the projections annual attrition rates of 3%, 4% and 5% for primary, lower and upper secondary. This creates demand for more teachers that is additional to that arising from the increase in the number of learners. Though patterns vary, teacher attrition tends to be greater at higher levels of school systems and especially in subject areas with strong demand in the labour market, e.g. maths and science. Attrition therefore adds to demand arising from increasing participation rates, as shown in Table 22.

This projection uses the same participation rates as used in the projection of recurrent costs and targets universal access to 12 years of schooling. If lower target rates for participation are used, especially at upper secondary, the estimates will shrink. Conversely, if lower numbers of learners per teacher are assumed, then the number of new teachers needed is inflated.

Table 21 Projections of learners, enrolments and teachers, 2020–2030

	2020	2020	2020	2030	2030	2030	2020	2030
	Learners	Enrolled	Teachers	Learners	Additional learners	Total teachers	PTR	PTR
LICs	**Millions**	**Millions**	**Millions**	**Millions**	**Millions**	**Millions**		
Primary	83.8	83.8	1.8	112.7	28.8	3.8	46	30
Lower secondary	35.2	17.6	0.6	47.3	29.7	1.9	31	25
Upper secondary	32.7	4.9	0.2	43.9	39.0	2.9	23	15
Total	151.7	106.3	2.6	203.9	97.6	8.6		
LMICs								
Primary	76.9	76.9	2.3	103.3	26.5	3.4	34	30
Lower secondary	32.3	25.8	1.2	43.4	17.6	1.7	21	25
Upper secondary	30.0	6.0	0.4	40.3	34.3	2.7	17	15
Total	139.1	108.7	3.8	187.0	78.3	7.9		
UMICs								
Primary	7.3	7.3	0.3	9.8	2.5	0.5	24	20
Lower secondary	3.1	3.1	0.2	4.1	1.1	0.3	17	15
Upper secondary	2.8	2.0	0.2	3.8	1.8	0.3	10	12
Total	13.2	12.3	0.7	17.7	5.4	1.1		
Total	**304.0**	**227.3**	**7.1**	**408.6**	**181.3**	**17.5**		

Source: Author's computation

Table 22 Total teachers needed for expanded participation

	2030	2020-2030	2030
	Teachers 2030 minus 2020	Teacher attrition	Total new teachers needed
LICs	**Millions**	**Millions**	**Millions**
Primary	1.93	0.63	2.56
Lower secondary	1.32	0.27	1.60
Upper secondary	2.72	0.13	2.85
Total	5.97	1.03	7.01
LMICs			
Primary	1.18	0.78	1.96
Lower secondary	0.51	0.59	1.10
Upper secondary	2.33	0.22	2.56
Total	4.02	1.59	5.61
UMICs			
Primary	0.19	0.10	0.29
Lower secondary	0.09	0.09	0.18
Upper secondary	0.12	0.12	0.24
Total	0.40	0.32	0.71
Total	**10.4**	**2.9**	**13.3**

Source: Author's computation

The number of teachers needed across SSA in 2030 (17.5 million) is more than twice those needed in 2020. If they were to be employed, this would more than double the wage bill if the 2020 conditions of service and pay were maintained with a *pro rata* effect on the necessary education budget.

LICs have the greatest need for additional teachers but the least capacity to support a flow of qualified graduates from secondary schools and from teacher training systems. There are real risks that it will prove difficult to maintain the supply of new entrants to the teaching profession, especially if entry qualifications are raised. This is likely to prove most problematic at upper secondary level, where historically and pedagogically university graduates have been preferred.

The projections highlight how the majority of teachers needed are to support expanded access to secondary schools. Over 8 million of the additional teachers needed (64%) are at secondary level, which is also where the greatest additional budgetary demand will arise if access is expanded up to universal levels to grade 12 (Table 23). The projection highlights how important it is to understand the cost implications of SDG4 and the extent to which it would redirect investment to levels above basic education.

Table 23 Teachers needed in SSA for expanded access

	Teachers needed		Teachers needed
	Millions		Millions
LICs	7.0	Primary	4.8
LMICs	5.6	Lower secondary	2.9
UMICs	0.7	Upper secondary	5.6
Total	13.3	Total	13.3

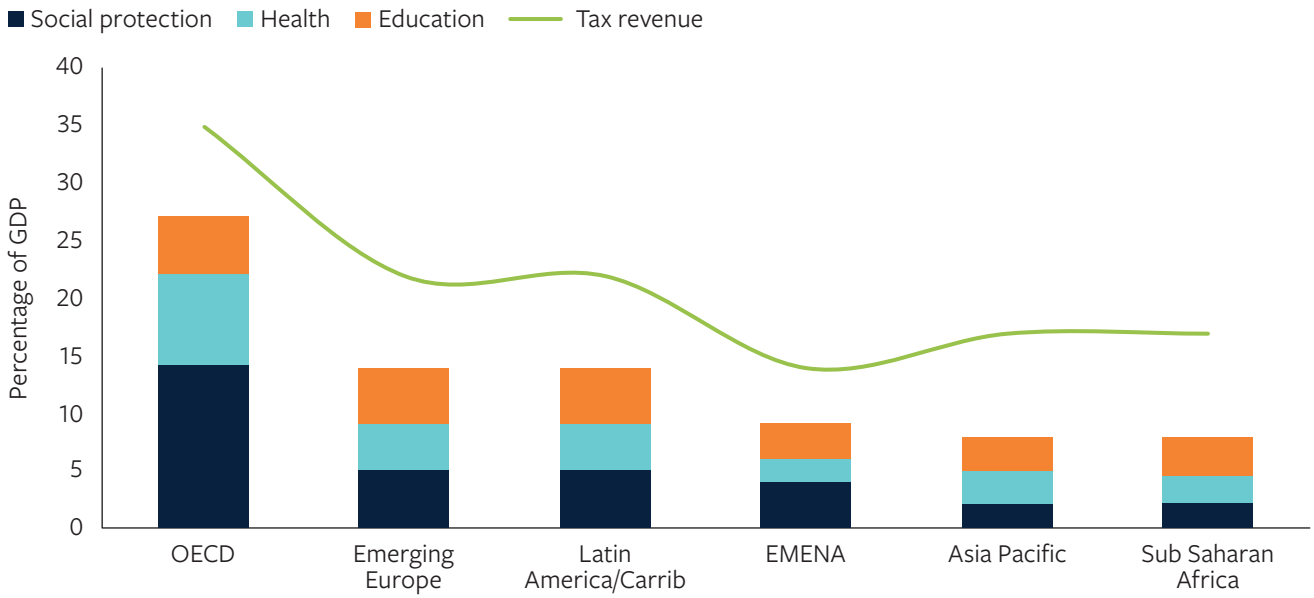
Source: Author's computation

6.5 The public expenditure nexus

At the heart of educational financing lies the commitment of governments to allocate resources to education in competition with other sub-sectors from a pool of resources determined by domestic revenue which may or may not be complemented by grant aid and borrowing. Government expenditure as a proportion of GDP is much higher in OECD countries than it is in LICs and LMICs. Within the total the balance between social protection, health and education and other expenditure (e.g. infrastructure, defence, debt servicing) is characteristically different. Typically, in high-income OECD countries 35% of GDP raised in revenue finances public expenditure. Education accounts for about 5% of GDP and is much smaller than social protection or health spending. In other poorer regions of the world, governments raise and spend less as a proportion of GDP (Figure 29). Debt slows growth as it pre-empts domestic revenue gains (OECD, 2020a). Demographic transition also explains some of the differences between OECD and low-income countries.

In SSA total public expenditure is only about 16% of GDP and education expenditure averages less than 4% of GDP. It is usually more than health spending and much more than social protection. However, because total government expenditure is much smaller this translates into persistent under-funding of education (and other sub-sectors). This makes it difficult to achieve the 6% of GDP needed to meet the expectations of SDG4.

Figure 29 Government expenditure by sub-sector by region



Source: Derived from World Bank 2018

The allocation of funds to education is determined by the size of public expenditure and the proportion of it that is allocated to education. Mathematically if:

X = the proportion of GDP spent on education
E = public expenditure as a proportion of GDP
S = the proportion of public expenditure allocated to education

Then

$X = E * S$

The value of X depends on both E and S. Any given increase in X can be the result of an increase in E or S, or an increase in both. Targeting changes in X requires targeting of both E and S with known interactions between the two. Considering them separately can mislead. Thus, total UK GDP in 2010 was 27% less than in 2007 according to World Bank data, Nigeria's GDP fell by 14% and Malaysia's GDP decreased by 15%. Education spending as a share of GDP increased, but not because of an increase in its value. The proximate cause was the global financial crisis. In all these countries publicly funded teachers continued to be employed and there were no mass redundancies. Salary spending remained at historic levels, but GDP fell. Consequentially the value of X increased as expenditure represented a larger share of a diminished GDP and smaller total government spending.

The value of E is subject to all the difficulties of aggregating what is spent on education by governments, especially where several ministries are involved, expenditure is by local as well as national government and external flows may or may not be off budget. Compounding these problems, what is allocated is not what is disbursed and what is disbursed is not necessarily what is spent on the activities for which it was allocated. Moreover, no account is often taken of private expenditure by households, which may be equivalent in value to public spending or even greater. These difficulties are compounded by the need to take account of exchange rates in any cross-national comparisons, the appropriate inflators to apply to time series, and the appropriate use of purchasing power parities.

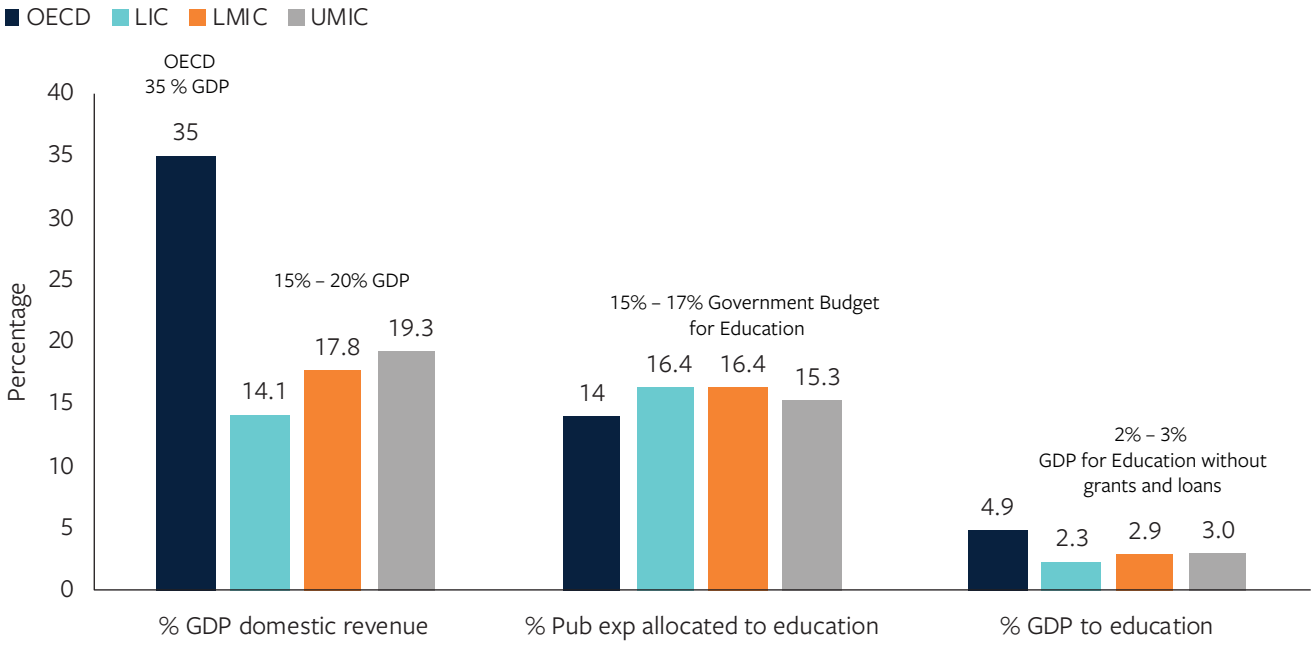
The value of S may or may not reflect the amount of domestic revenue generated by governments net of borrowing and any grants and loans that are relevant. Debt repayments may greatly diminish S if they take a substantial share of revenue (IMF, 2018; Carneiro and Kouame, 2020). Revenue that depends on fluctuations in the prices of global goods will create volatility where national economies are dependent on a few sources of income, which precludes risk management and diversification.

Accepting all these limitations, it is possible to chart the options for public financing of education systems. Figure 30 shows that typical values for OECD countries for government spending as a share of GDP and education spending as a share of government spending result in about 5% of GDP being allocated to education. The values are much lower for LICs, LMICs and UMICs in SSA. LICs average about 14% of GDP on public expenditure and 16% of public expenditure on education. This is equivalent to only 2.2% of GDP for education (i.e. 14% of 16%). Averages for education as a percentage of GDP cited in UIS data sets are higher and for LICs appear to be around 3.7%. This inconsistency suggests that grant aid and concessional lending are included in some methods of calculating flows to education but not others.

The key financing issue is revealed when Figure 30 is compared to Figure 31. This shows the changes that would be necessary to raise the percentage of GDP spent on education to more than 6%. This is the level indicated by modelling the first order costs of SDG4. Government expenditure would have to rise from about 14% of GDP to 20% and allocations to education from the national budget would also have to increase from about 16% to 30% in LICs. To get an equivalent result in LMICs the proportions would have to rise to 25% and 24% respectively. UMICs could achieve 6% of GDP by raising government expenditure to 30% of GDP and allocating 20% of that to education.

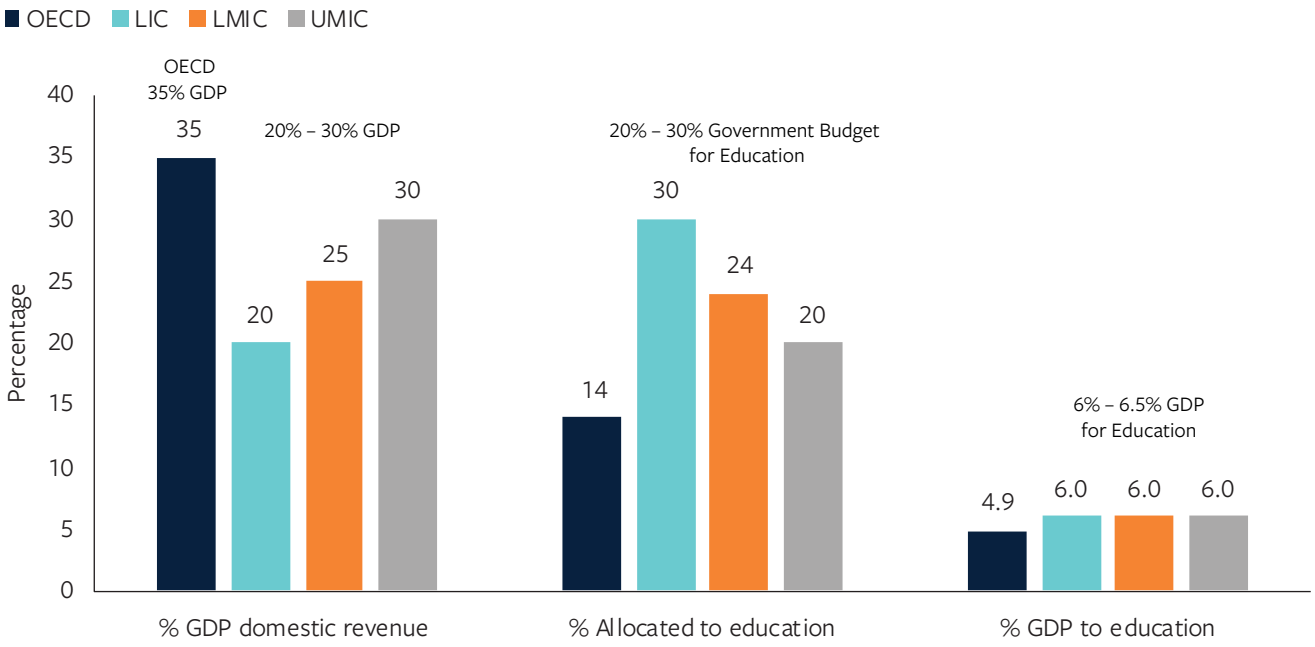
Other combinations of increases are possible. In every case a smaller increase in total government expenditure would have to be compensated by a larger increase in the proportion allocated to education. In this model the simulation assumes that it will be more difficult to raise total government spending than to increase the proportion allocated to education in LICs because of the limits to domestic revenue-raising in the poorest countries. LMICs should be able to raise a greater share of GDP in revenue and thus finance education with a smaller share of GDP. Other outcomes are of course possible in different countries with different priorities and political economies of choice. Figures 30 and 31 show how government expenditure could vary from typical values in SSA in 2020 to what would be needed to universalise enrolment up to grade 12, which could only be sustained with more than 6% of GDP for education.

Figure 30 Pattern of public expenditure on education in 2020 – the status quo



Source: Author

Figure 31 Expenditure patterns to achieve 6% GDP for education



Source: Author

We should note that households already meet substantial proportions of the costs of basic education through contributions to both direct and indirect costs. Households below the second quintile of income are unlikely to be able to afford privately financed primary schooling and private secondary schools are mostly attended by those in the first quintile (Lewin, 2008). Households close to poverty lines are likely to be excluded from fee-paying systems and may contract unsustainable debt through high interest rate borrowing for school fees etc.

The limitations imposed by income distribution and limited disposable income set boundaries on the extent to which private contributions can be mobilised though financial mechanisms that transfer costs to individuals, households and businesses (Lewin, 2021). Private flows that benefit individuals, e.g. fees for private schools, are generally exclusive at some margin of household income and thus are inequitable. Private for-profit investment in educational institutions is limited by the rates of return that motivate investors, and these in turn are limited by what markets will bear and what disposable household income will support.

The amounts needed to greatly increase participation and make sustained inputs to quality enhancements that can improve very low learning levels are much greater than the sums currently allocated from national budgets. LICs and LMICs need to target an average of more than 6% of GDP with variations between countries. Very few countries have sustained 6% of GDP for education and none has allocated more than 30% of public expenditure to education consistently and sustained it for three years or more. The amounts needed are many times larger than the volume of grant aid and concessional financing for basic education in SSA, which has been averaging less than 3% of current spending.

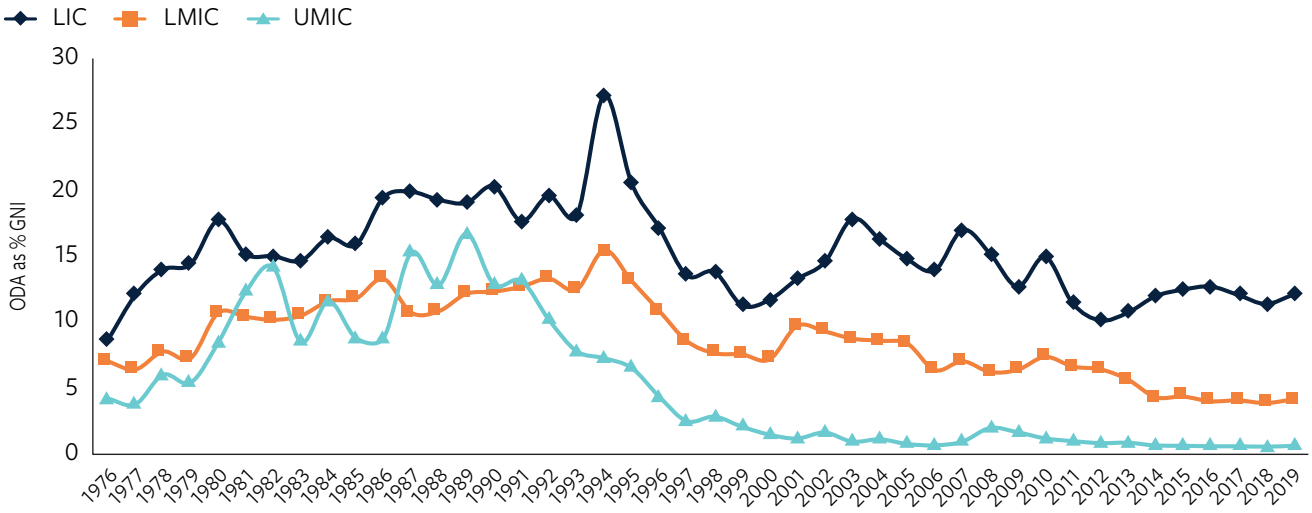
Most disturbingly, UIS and GEMR predict that education as a proportion of GDP will remain static at around 4% until 2030 (UIS/GEMR). At the same time their projections show education as a proportion of government spending increasing from around 15.5% to over 19.5%. The basic arithmetic of X = E * S outlined above is that if X (education as a percentage of GDP) remains constant and S (the proportion of government expenditure allocated to education) goes up, then E (the total size of government expenditure) must decline. This would happen if the tax GDP ratios were to fall. These projections cannot be reconciled with a policy agenda that clearly implies significant increases in X are needed and that states need more revenue not less.

6.6 Peak aid to education

Aid to education has been important in the poorest countries. If it is grant aid it does inflate education budgets. Lending, even if concessional, has to be repaid and is therefore borrowing from the future, albeit sometimes at low interest rates. Long-term trends for aid to education are difficult to evidence since older databases are incomplete and use different definitions of aid. In addition, aid to education may be located across several ministries and budget heads, making tracking difficult. Data on overall flows of aid is more readily available and this suggests that, from the mid-1970s, total aid as a percentage of GNI rose in SSA from around 9% in LICs and 7% in LMICs in 1976 to a peak of over 25% and 15% respectively in 1994. Data on the small number of UMICs shows an increase from 4% to 17% between 1976 and 1989. Since then there has been a fairly consistent decline, with LICs stabilising around 12%, LMICs 4% and UMICs less than 1% (Figure 32).

The best estimates suggest aid to education has typically been about 10% of all aid with the exception of a period in the 1970s after independence from colonialism, when it reached higher levels (Coombs, 1968; 1985). In 1989 aid to education was 11% of the total and valued at about $5 billion (Coombs, 1985: 295; World Bank, 1991). It is a reasonable assumption that aid to education has tracked overall volumes of aid over the long term. If so, then the total value of aid to education is falling as the total volume of aid shrinks. If the percentage allocated to education also falls this will exacerbate the contraction.

Figure 32 Official Development Assistance (ODA) as a percentage of gross national income (GNI)



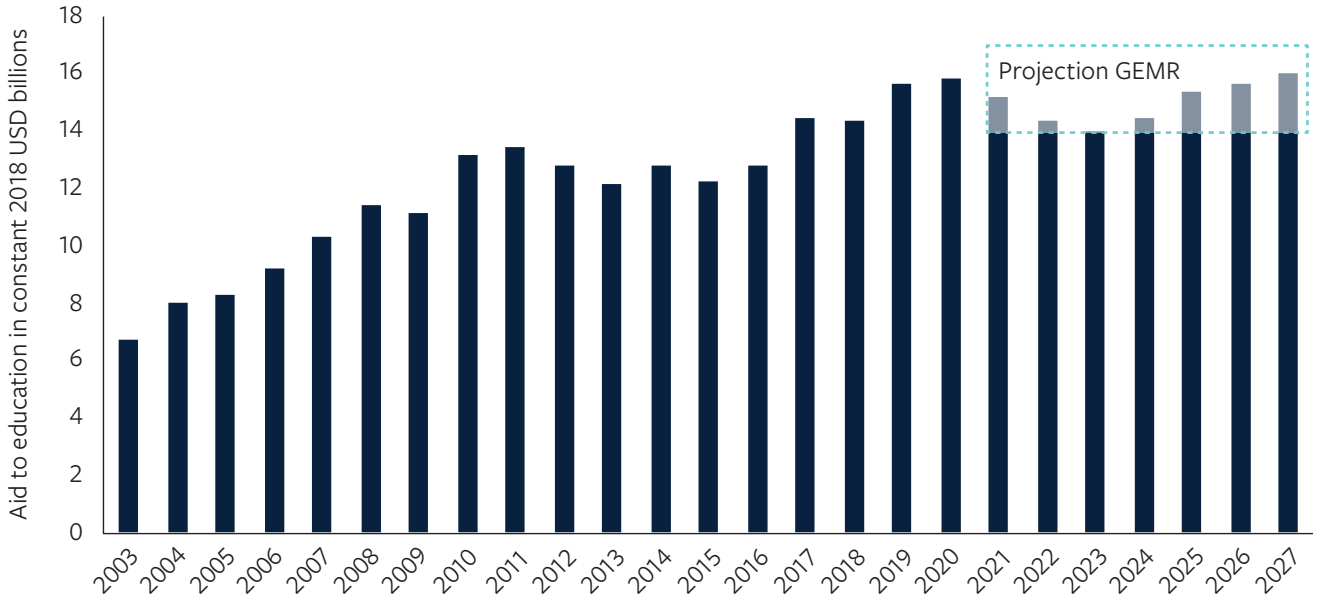
Source: World Bank/UIS data 2021

Data sets are more reliable since 2000. Globally aid to education from OECD countries increased from about $6 billion in 2000 to peak at around $14 billion in 2010. Subsequently, after a short rally from 2016 to 2020 to about $16 billion, the volume fell back again, not least because of the impact of Covid-19 and of economic recession (Figure 33). The early evidence for the 2020s is that the appetite for aid to education is softening. Aid to education as a proportion of all aid fell from a peak of about 15% to little more than 10% of allocatable aid (Figure 34) and has since fallen further. At the same time aid unallocated to sub-sector and specific countries appears to have grown (OECD, 2020a). Most recently the proportion of aid allocated to basic education has been falling in real terms and so also has the share directed towards sub-Saharan Africa, which declined from nearly 50% in 2002 to under 30% by 2018 (not shown). Peak aid to education almost certainly has occurred (Lewin, 2018; GEMR, 2017).

Projections made before Covid-19 disrupted economic activity and had an impact on priorities for aid projections suggested that aid to education would flatline in value through to 2025. There were indications that the appetite for aid to education was softening. One major donor, the UK Foreign, Commonwealth and Development Office (FCDO), dramatically cut its aid budget by more than 40% in 2021 and realigned its priorities. The result was that UK aid to education fell from over £800 million to not much over £500 million in two years (UK Parliament, 2021). The cut resulting from abandoning a commitment to maintain aid at 0.7% of GDP in favour of 0.5% was compounded by a fall in UK GDP as a result of the pandemic. Education was cut more than many other sectors (Packer, 2021).

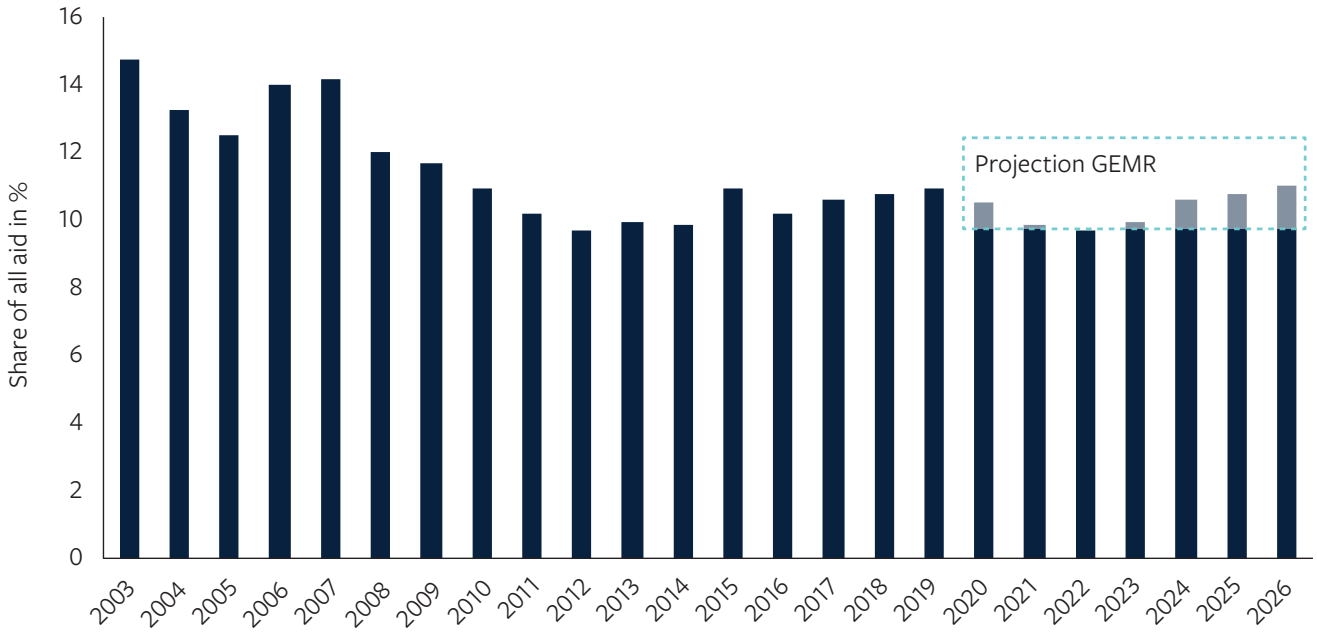
Figures 33 and 34 show how aid to education was projected to evolve based on GEMR data analysis before the pandemic. It is too early to have much certainty about the medium-term impact of Covid-19, but few are anticipating increases in aid to education (Lewin, 2020a; GEMR, 2020). Early evidence (Development Initiatives, 2021) is that bilateral aid commitments fell by 26% and the proportion of loans relative to grants increased substantially.

Figure 33 Aid education at all levels in US$ billions (2018 constant prices)



Source: GEMR, 2018

Figure 34 Aid to education as % of all aid – Development Assistance Committee (DAC) countries



Source: GEMR, 2018

UNESCO (GEMR, 2021: 468) estimates that globally total aid to education fell to about $15 billion in 2020, of which $5.8 billion was for basic education, $3 billion for secondary and $5.9 billion for post-secondary education. SSA received a total of about $3.6 billion, of which $1.6 billion was for basic education, $0.9 billion for secondary and $1.1 billion for post-secondary. Aid to education represented about 12% of education spending in LICs and less than 4% in LMICs in SSA in 2020. If expenditure on education averaged 6% of GDP, these proportions would fall to 8% and 3% unless aid was increased by at least 60% over current levels. Looked at another way, if public expenditure backed by revenue was increased by one percentage point from an average of 15% to 16% of GDP, this gives a gain worth more than three times all the aid to education in SSA. Increasing revenue is more likely than increasing aid by large amounts.

Aid to basic education is now concentrated in a relatively small number of countries. The Global Partnership for Education is the largest single source of grant aid to education in LICs. Over the last decade about 24% of countries receiving this aid account for 68% of all its grant aid by value. Some large countries like Ethiopia and DRC are the major beneficiaries. On the other hand, 42% of aid recipients receive less than 5% of all aid so there is a long tail of commitments (Lewin, 2017: 45). Most of these countries are either smaller or richer or both than the average LIC, and they include many small island states.

Aid is becoming less important. The amount the GPE can disburse is less than 2% of the *additional* amounts needed for recurrent financing for the education 2030 agenda. Significantly, at the GPE replenishment conference in Dakar (GPE, 2018) countries likely to be in receipt of GPE grants pledged to increase spending on education to at least 20% of their public budget and 4%–6% of GDP. These

pledges amounted to $110 billion, dwarfing the $2.3 billion pledged by the donors to the GPE. However, to date these pledges made in 2018 have not been reflected in actual government expenditure. The 2021 replenishment of the GPE raised less than $5 billion for a five-year period, suggesting that at best it would disburse $1 billion a year before costs, fees and other charges, or about 1% of the recurrent costs of education systems in SSA (GPE, 2021). Clearly, most of the financial challenge for education is now for domestic financing. The message may be that, if educational inequalities in access persist, the heart of the problem signals a need for more domestic commitment backed by political will to change historic patterns of resource generation and allocation. Grant aid can help as a catalyst to accelerate the transformation.

6.7 Overview of basic arithmetic of demand for educational financing

This chapter has developed the basic equation that determines the demand for education financing and populated it with plausible values derived from cross-national data sets. This leads to a profile of the financing needed to universalise access to basic education and pre-school and expanded opportunities at tertiary level. The shortfall in recurrent spending is as much as $37 billion per year in LICs and LMICs. This excludes costs in the UMICs, which should be able to self-finance. Most of the additional cost is located in LMICs.

The projections of recurrent costs should be sufficient to pay salaries of teachers, but this in itself does not guarantee that the demand for new school teachers, estimated at about 13 million, can be met. Twice as many teachers will be needed in 2030 as in 2020. There are real constraints on the supply of qualified entrants to training and capacity limitation in training. Public sector austerity may also hamper recruitment and deployment.

Capital costs are in addition to the recurrent cost burden. Their magnitude depends on building costs and how these are financed. The total demand is estimated at over $130 billion to create enough teaching space to universalise access. This sum could be spread over 10 years and would then amount to about a third of the additional recurrent costs projected.

In summary, the projections show that enrolments would have to increase in SSA in LICs from 106 million to 204 million and in LMICs from 108 million to 187 million by 2030. Most of these additional enrolments would be at secondary level and fully 40% are at upper secondary level in LICs and LMICs. These new places will have to be financed if expanded access is to be realised and sustained and ways need to be identified to reduce the likely costs of higher levels of participation. The largest demand for new places is from LICs because they have the lowest baseline enrolment rates at secondary level. Since their costs are lower, the gap in financing is less in LICs than LMICs.

The financing nexus arises because, in LICs and LMICs, government expenditure supported by revenue generation averages only 15% of GDP. To support the SDG4 targets most countries would need more than 6% of GDP. This implies much higher rates of revenue generation are needed of 20% of GDP or more, and large increases in the proportion of public expenditure allocated to education. Volumes of aid appear to have been shrinking and are small relative to domestic financing except in the most heavily aided countries (OECD, 2020).

We now turn to consider some of the key challenges for public finance over the next decade.

7 Seven key challenges for public education financing

The preceding chapters have profiled how education systems are being financed, have identified the level of ambition generated by global goals, and explored the basic arithmetic that underpins the political economy of national resource allocation. The fifth research question is, 'What challenges and policy options exist to address the low-financing trap, enhance educational efficiency and effectiveness, increase domestic revenues and accelerate progress towards sustainable educational development goals?'. This provides a consolidation of policy options to enhance efficiency and effectiveness and to accelerate educational development that can be financed sustainably.

There are many challenges if SDG4 is to be financed sustainably. These are primarily domestic but also have many implications for international support (Heyneman and Lee, 2016; Burnett, 2019; Lewin, 2020a; Beharry, 2021). Seven challenges stand out for the next decade. The first is to understand in each country how low-financing traps are to be avoided. The second identifies countries which have low and high indicators of educational investment level and profiles their needs. The third explores how flows of learners through systems have to improve to achieve higher levels of efficiency and effectiveness. The fourth suggests that the conceptualisation of out-of-school children may need to be revisited, since the current definition would direct most new resources to older children of upper secondary age with no clear development rationale. The fifth explains how managing the cost of teachers is critical to sustained educational development. The sixth section explores structural issues and identifies areas for efficiency gains related to school cycle length, school location, size and deployment of teaching staff. The last section draws attention to the central importance of the development of fiscal states.

7.1 How to address the education financing trap?

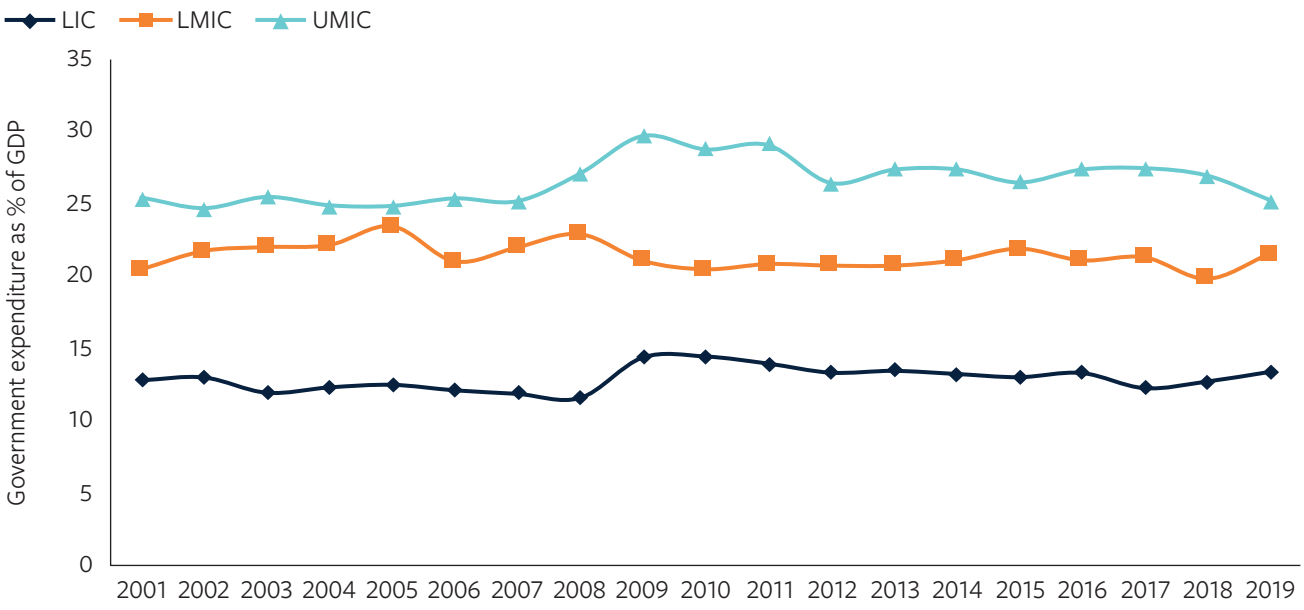
The first question is to understand why there is an education financing trap and how it can be addressed. The literature on stages of development has a long history drawing attention to stalled growth (e.g. Rostow, 1960; Gerschenkron, 1962). More recently, low growth traps have been highlighted in which a combination of factors interact to make it difficult for low-income countries to generate sustained growth (Agénor and Canuto, 2015; Glawe and Wagner, 2016). Clearly, some countries have managed to move from high levels of poverty and progress towards becoming fiscal states able to finance public goods like education from their own resources, not least because they collect more in revenue than they receive in aid (Moore et al., 2018). But others have failed to do so and have remained dependent on concessional financing and development grants to provide educational public goods to the mass of their populations. The low growth trap reasoning suggests that there is a combination of circumstances that leads to economic stasis, despite efforts to 'shift the dial' to rates of growth that lift countries out of poverty. Aid dependence can persist and occurs when a significant proportion of government expenditure is externally financed (Lensink and White, 1999). Van der Waale (2005) noted that 27 countries failed to grow in the 1990s and that high levels of aid may have been a contributing factor. Aid dependence is widely criticised (Easterly, 2013) as leading to slow growth.

The most recent SDG4 projections and commitments anticipate no growth in the proportion of GDP allocated to education through to 2030 based on benchmarks agreed with national authorities, with an average value remaining at around 4% of GDP (UIS/GEMR, 2022a: 136). Moreover, the benchmark for the proportion of government spending is set at 15%. If both figures were realised, this would require the government budget to reach 26% of GDP, which is not true of any LICs and LMICs in SSA. If the benchmark is 6% of GDP, then government spending would have to be 40% of GDP, which is very unlikely. SDG4 will simply not be realised because it will not be financed at a level sufficient to achieve its targets unless the underlying arithmetic of resource allocation is understood.

Whether or not there is a low growth trap, there does seem to be a low educational financing trap. This mirrors the 'vicious circle in which a low skill base constrains economic growth and, in turn, low growth severely limits their fiscal potential to improve skill levels and create the political space necessary to introduce difficult education reforms' (Fredriksen and Tan, 2008). The analysis of educational expenditure in Chapter 4 has shown that, over the last two decades in SSA, investment in education has remained remarkably stable as a proportion of GDP and as a proportion of government expenditure. It is important to pause to establish if this stasis is mirrored more generally in indicators of public financing. If educational funding follows national trends for public spending overall, then it is clear that what to some appear to be educational financing problems are in fact much more generally public sector finance problems.

This section now considers how public expenditure and revenue have evolved in SSA using long-term data sets. The best available are those of the World Bank, but they are not always complete and contain missing data and missing cases. Total government expenditure has been broadly stable over the last two decades. In LICs in SSA it has averaged around 14% of GDP, in LMICs nearly 20% and in UMICs over 25%. The years 2008 to 2010 saw some volatility, but in the medium term the trend was clear and essentially flat (Figure 35).

Figure 35 Total government expenditure as % of GDP in SSA

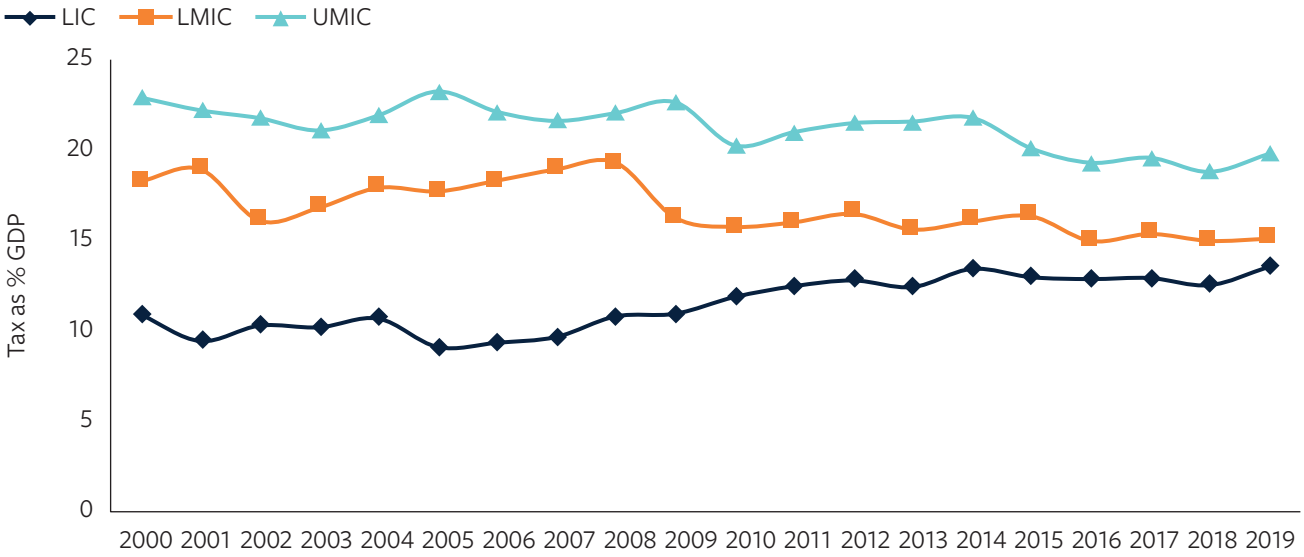


Source: World Bank/UIS data 2021

Government expenditure is supported by domestic revenue raised predominantly from taxes. This also seems to have flatlined in the recent past. LICs collect about 14% of GDP, up from about 10% in 2000. LMICs collect between 15% and 17% and UMICs nearly 20% of GDP. LICs have increased their revenue collection (Figure 36).

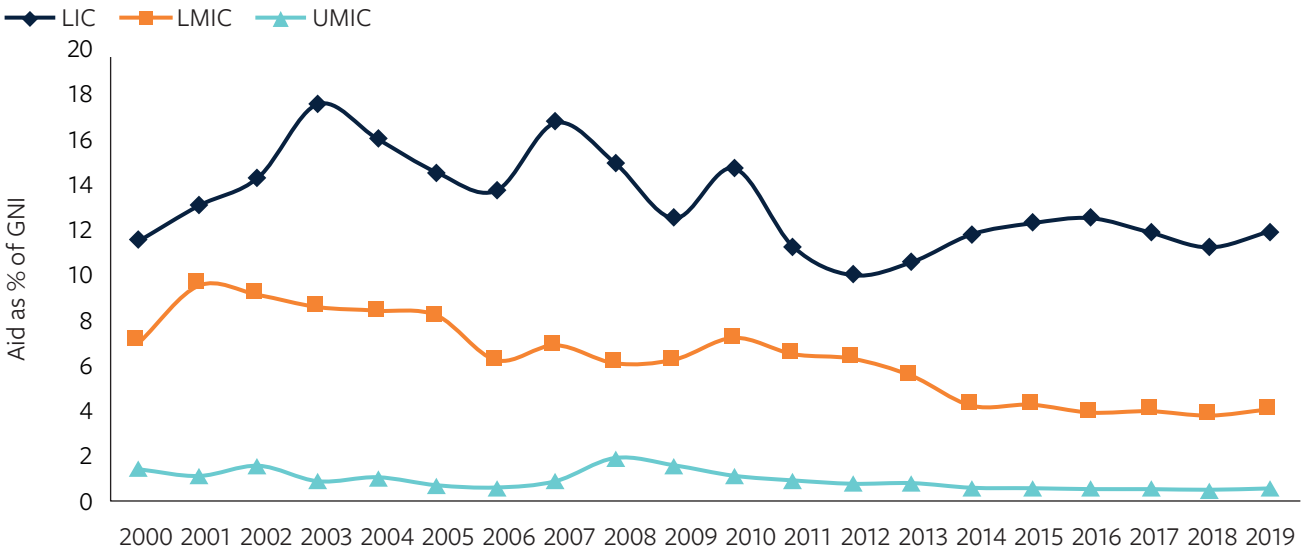
Total aid has fluctuated and averaged about 12% of GNI in LICs, 4% in LMICs and less than 1% in UMICs (Figure 37). Broadly, this suggests that the average LIC in SSA is substantially aid dependent for government expenditure.

Figure 36 Tax revenue as % of GDP in SSA



Source: World Bank/UIS data 2021

Figure 37 Aid as % of GNI for SSA



Source: World Bank/UIS data 2021

A central concept to some systems theory has to do with equilibrium states. Without conditions of equilibrium, systems decay, sometimes catastrophically and sometimes decrementally. When equilibration occurs it indicates that there are some elements within a system that respond to feedback that indicates disequilibium, and that causes events that return the system to equilibrium. There does not have to be divine intervention for this to happen – it is simply an essential aspect of stable systems which contain within them mechanisms that equilibrate, i.e. when a stable state is disturbed they are actuated to return the system to an equilibrium. Feedback loops provide negative feedback that corrects deviation from a central tendency. In public finance and politics there is often an assumption that taxation can be increased up to the point where feedback from those who pay taxes creates pressure to either improve and extend services or reduce taxes. This leads some to a kind of 'political settlement analysis', which balances pressures from different interest groups and leads to a degree of stability in resource allocation. Fiscal states depend on the prior development of stable political systems that have predictable decision-making, the rule of law, public accountability, and economic stability. These conditions may be difficult to establish in fragile states and LICs but are essential to the development of viable methods for financing education.

The equilibration in the share of education as a proportion of GDP, resulting from static levels of allocation to education and the share of government spending and little growth in public spending as a whole, signifies a financing trap. This has meant that LICs and LMICs as a whole have failed to increase spending on education substantially, despite much advocacy and many commitments. The reasons why this is so are very complex, with many interacting parts, and are likely to be country-specific. However, the data is unambiguous – most countries have not responded to calls to increase budget allocations to 6% of GDP and 20% of government expenditure or more over the last two decades. Major pledging conferences have promised a 'new dawn' with higher levels of financial commitment by states that have not materialised. Development partners are now allocating less not more to educational assistance.

Policy dialogue based on the presumption that any pattern of allocation is possible given enough political will is not a good basis for strategies that can be implemented in sustainable ways. Unlocking financing traps and seeking to catalyse shifts to new equilibria that consistently allocate more resources to education will be central to sustained educational development in low-income countries. This appears to be what has happened in countries that have transited from LMICs to middle- and higher-income groups, where education investment in most is consistently at a high level. The most powerful driver has been increased revenue collection coupled with real economic growth and commitment to expenditure to finance public goods (Al-Samarrai et al., 2019).

The importance of economic growth is often underestimated. The preference has been for policy dialogue around target levels for the proportion of GDP and government budgets allocated to education. These have been foregrounded in conferences pledging replenishment of global funds. These rarely discuss the importance of increasing domestic revenue, though this is fundamental to the translation into real resources of specific levels of the percentage of GDP and of government expenditure allocated to education. In addition, where the political economy of resource allocation creates a financing trap that limits growth in the share of the budget for education, then general economic growth may become the most important factor in financing the expanded value of education budgets.

7.2 Which countries need to increase public spending on education?

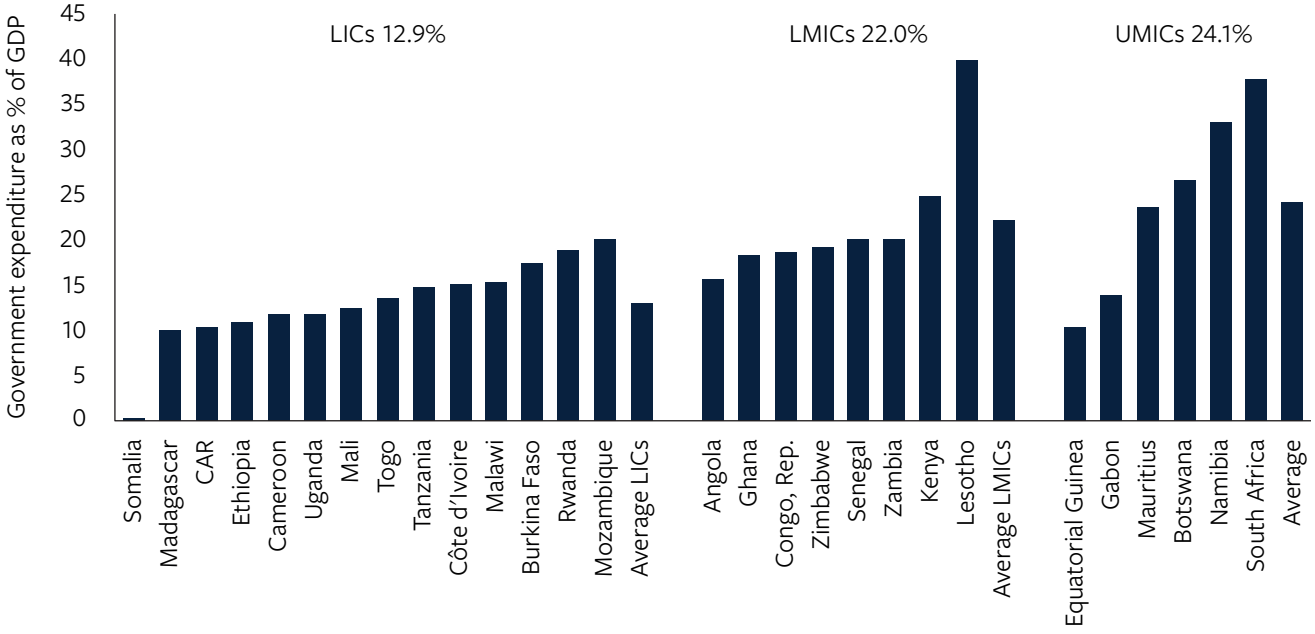
The second question seeks to identify where needs for financing reforms are greatest. Countries with the lowest levels of expenditure on government services, lowest revenue collection rates and highest dependence on aid are likely to be places in which education is most underfunded. They include Somalia, Madagascar, CAR, Cameroon, Uganda and Ethiopia, which all allocate less than 12% of GDP to all public spending. Surprisingly, some LMICs and UMICs (Angola, Equatorial Guinea and Gabon) allocate 15% or less of GDP to government expenditure, contrary to the trend for richer countries to allocate proportionately more to public services including education (Figure 38).

In general government expenditure runs at about 14% of GDP in LICs in this data set, 22% in LMICs and 24% in UMICs. If a deficit is not to accumulate, revenue has to exceed government expenses taking into account any grants and loans.

Rates of revenue collection as a percentage of GDP vary from 14% in LICs to 15% in LMICs and by country 19% in UMICs. DRC, CAR, Eritrea, Liberia and Ethiopia collect less than 12% of GDP in tax revenue, as do Cameroon, Angola, Kenya and Congo (Figure 39). Low rates of revenue collection are widely recognised as a key issue for educational financing (Fredriksen and Tan, 2008; Archer, 2016; RonBalsera et al., 2018; Lewin, 2021a).

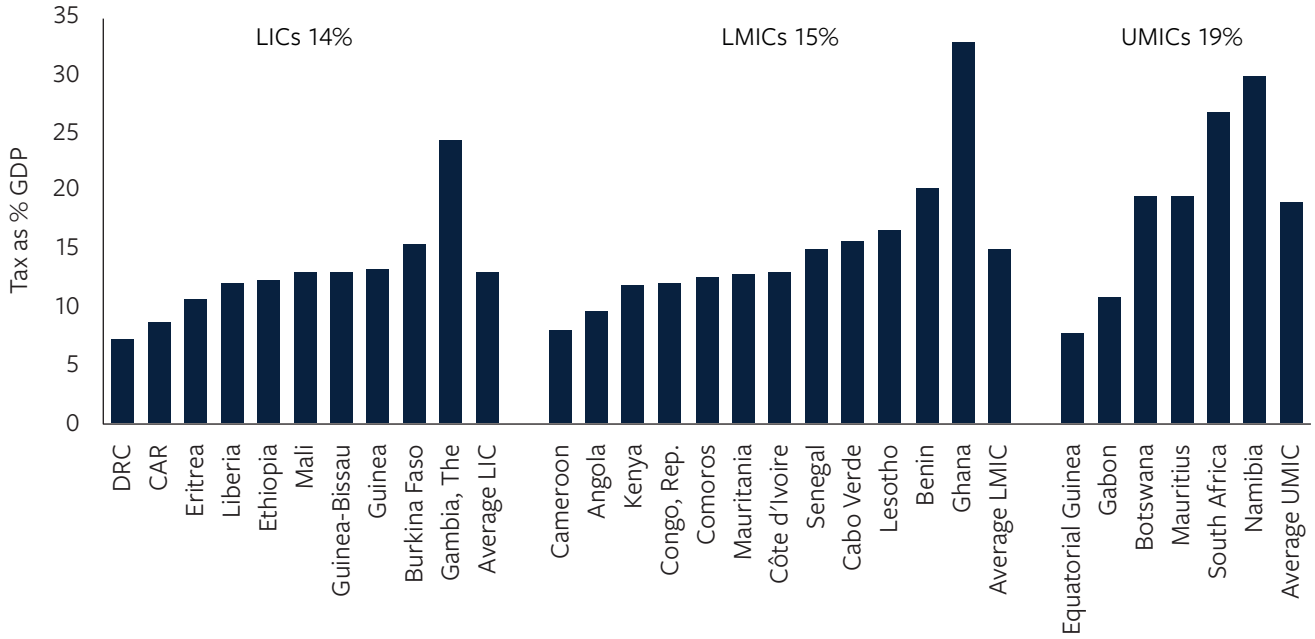
The most heavily aided countries are now receiving more than 10% of GNI in ODA. Country data is incomplete but illuminating. Figure 40 shows that, in LICs in SSA, aid accounts for about 12% of GNI on average. In LMICs this falls to about 4%. At least a dozen countries receive more than 10% of GNI in aid, and almost all LICs receive more than 5% including several not in the data set as data is unavailable. UMICs receive less than 1% and are not recorded in the chart (Figure 40).

Figure 38 Total government expenditure as % of GDP, 2018 by country



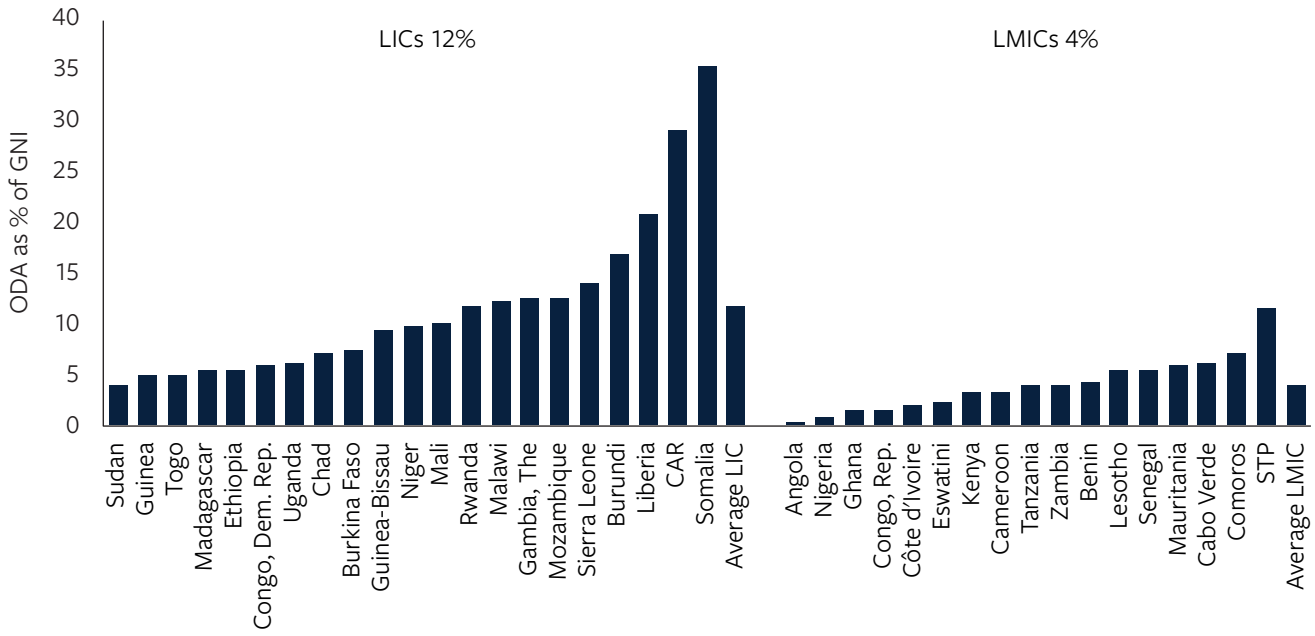
Source: World Bank, 2021

Figure 39 Tax as % of GDP, 2018



Source: World Bank, 2021

Figure 40 ODA as % of GNI, 2018 by country



Source: World Bank, 2021

If public expenditure averages 12% of GDP and aid is more than 5% of GNI, it is likely that between a third and a half of all government spending is financed by aid. This then generates policy dependence and undermines the financial sustainability of publicly funded educational development that

is endogenously owned and driven. It also may confuse public accountabilities and create ambiguous principal-agent relationships.

Countries vary in the resources they invest in education. How much they need depends on their levels of ambition in terms of participation rates, the costs of participation per learner, and the number of learners that need educating. The demand for financing this creates is determined by the equations discussed in Chapters 6 and 7. A simple taxonomy identifies countries with different levels of commitment to financing their education systems (shown in Table 24). This builds on the discussion in Chapters 4 and 6 and provides an invitation to populate the matrix with country cases. Other combinations of values for S and E can be included in the matrix to profile real cases and shape policy dialogue. Expenditure as a proportion of GDP is a product of the proportion of public spending allocated to education and the value of government spending as a proportion of GDP.

Fundamentally, policy dialogue needs to evaluate whether government allocations to education are high or low, and whether public spending as a whole is high or low. If funding is insufficient to finance the achievement of system goals, then this should lead to discussion as to whether under-funding is a result of low domestic prioritisation of education or low domestic revenue collection and consequentially low public expenditure. These are the key parameters for policy dialogue.

Table 24 Taxonomy of effort to invest in education

Expenditure on education as % of government expenditure	Total public expenditure as % of GDP	Public expenditure on education as % of GDP	Comment
S	**E**	**X = S * E**	
Low <13%	Low <14%	Low <3%	Low spending on education (S) and low public expenditure (E) signals need to increase level of public spending on education and raise more domestic revenue through fiscal reforms
Low <13%	High >20%	Middle 3%–5%	Establish reasons for low government spending on education, e.g. low level of political commitment, priority of other sub-sectors, high debt servicing, and act accordingly
Middle 13%–18%	Middle 14%–20%	Middle 3%–5%	Identify opportunities to increase allocation to education and to government expenditure related to revenue towards 6% of GDP
High >18%	Low <14%	Middle 3%–5%	Explore fiscal reforms to increase domestic revenue that can be used to support public goods like education
High >18%	High >20%	High >5%	Maintain high level of allocation of public expenditure to education and seek increased efficiency and effectiveness

Source: Author

Table 25 classifies countries by level of financial commitment to education. This is based on aggregate spending that does not differentiate between educational levels. More detailed analysis would yield insight into how expenditure was balanced between primary, secondary and tertiary level and between types of provision, e.g. general schools, TVET, professional further education and conventional degree courses.

From this matrix those countries that fall into the low- spending category allocate on average 2.4% of GDP and 9.8% of government expenditure to education. Total government expenditure averages only 10.4% of GDP. These countries are a long way from becoming fiscal states with levels of commitment that could conceivably support mass education systems with full enrolment up to grade 12, as SDG4 envisages. They would have to increase the resources available by at least 250% to approach the kind of levels identified in Chapter 6 as necessary.

Countries with middle levels of commitment average 3.8% of GDP and 15.5% of government spending, and at the same time mobilise 17.2% of GDP for all government spending. This can generate considerably more resources for education. However, it still falls far short of what would be needed, leaving a substantial financing shortfall. These countries fall close to the median case in SSA, indicating that the financing problems are not marginal but central to the ambitions of SDG4.

The highest-spending countries allocate on average 6.2% of GDP and 21.5% of government expenditure and have total government expenditure representing 28% of GDP. These countries have some chance of financing high levels of educational access from grades 1 to 12, providing mass pre-schooling and investing extensively in enhanced quality.

The essential message is that each country has to be considered in terms of education as a percentage of government expenditure and in relation to total government spending as a percentage of GDP. Together these determine the proportion of GDP spent on education.

Critically the two headline indicators for SDG4 – education as a share of public expenditure and education as a percentage of GDP – are not independent of each other, as is clear from X = E * S (See Section 6.5). X cannot be targeted independently of targets for E and for S. There is no target currently for E, government expenditure as a percentage of total government spending (UIS/GEMRb, 2022).

Table 25 highlights which countries under-invest in terms of share of government expenditure and in terms of the size of public spending as a whole. Angola, Nigeria, Liberia and CAR all have low levels of allocation to education as a share of government spending. Madagascar, CAR, Sudan and Ethiopia have very low levels of total government expenditure. In contrast Kenya, Botswana and Namibia have consistently high levels of allocation and of government spending. Policy priorities will therefore differ.

Table 25 Taxonomy of low-, medium- and high-spending countries (2018 data)

	Ed as % of GDP		Ed as % of govt exp		Govt exp % of GDP
Low		**Low**		**Low**	
DRC	1.5	Somalia	4.3	Madagascar	9.9
CAR	1.8	Angola	6.0	CAR	10.1
Angola	1.8	Nigeria	7.0	Sudan	10.3
Guinea	1.8	Liberia	8.2	Ethiopia	10.8
Mauritania	1.9	CAR	9.8	Cameroon	11.7
Liberia	2.3	Mauritania	10.2	Uganda	11.8
Chad	2.4	Rwanda	10.8	Mali	12.4
Uganda	2.6	Gambia	11.0	Togo	13.5
Gabon	2.8	Uganda	11.0	Gabon	13.7
Gambia	2.9	Seychelles	11.1		
Madagascar	2.9	Guinea	12.4		
Guinea-Bissau	2.9	Niger	13.0		
Benin	3.0	Lesotho	13.1		
Average	**2.4**		**9.8**		**10.4**
Middle		**Middle**		**Middle**	
Cameroon	3.1	DRC	14.0	Tanzania	14.6
Rwanda	3.4	Cameroon	14.1	Guinea-Bissau	14.6
Mali	3.4	Gabon	14.2	Côte d'Ivoire	14.9
Niger	3.5	Chad	14.2	Malawi	15.2
Tanzania	3.5	Malawi	14.6	Angola	15.6
Zimbabwe	3.6	Mali	14.6	Burkina Faso	17.2'
Côte d'Ivoire	3.7	Cabo Verde	15.2	Ghana	18.1
Malawi	3.7	Zambia	15.3	Congo, Rep.	18.4
Congo, Rep.	3.9	Botswana	15.4	Rwanda	18.7
Seychelles	3.9	Madagascar	16.4	Zimbabwe	19.2
Ghana	4.0	Congo, Rep.	16.7	Senegal	19.8
Zambia	4.5	Côte d'Ivoire	17.4	Mozambique	19.9
Mauritius	4.7	STP	17.6		
Cabo Verde	4.7	Benin	17.7		
Average	**3.8**		**15.5**		**17.2**
High		**High**		**High**	
Togo	5.0	Senegal	18.3	Zambia	20.1
Kenya	5.0	Ghana	18.6	Mauritius	23.5
Burundi	5.0	Mauritius	18.7	Zambia	20.1
Ethiopia	5.0	Burundi	18.9	Mauritius	23.5
Senegal	5.3	Kenya	19.0	Kenya	24.8
Eswatini	5.6	Zimbabwe	19.0	Botswana	26.5
Burkina Faso	5.8	Mozambique	19.0	Cabo Verde	28.4
STP	5.9	South Africa	19.6	Seychelles	32.0
Mozambique	6.2	Tanzania	20.5	Namibia	33.1
South Africa	6.5	Burkina Faso	22.0	South Africa	37.7
Botswana	6.9	Togo	22.0	Lesotho	39.9
Sierra Leone	7.4	Ethiopia	24.0		
Lesotho	7.8	Namibia	26.4		
Namibia	9.5	Sierra Leone	35.0		
Average	**6.2**		**21.5**		**28.1**

Source: World Bank, 2021 or latest year

The analysis highlights the financial challenge of SDG4. Countries that fall into the low and medium expenditure groups have to address the question of how to increase either the proportion of government expenditure allocated to education or the size of government spending in relation to GDP. In the short term these are the only options that increase the resources available as a proportion of GDP. Grant aid will never fill the gaps and capacity to service loans is already highly constrained in most low- and middle-spending countries.

7.3 What improvements are needed in managing flows of learners?

The third question is how can the flow of learners be improved to increase internal efficiency? Chapter 3 has shown that understanding flows of learners through systems is central to gains in participation, completion rates and learning levels. It has highlighted how systems may take a long time to internalise changes in established patterns of entry and progression through grade levels. Increased and smoother flows allow more learning opportunities to be provided for a given amount of public financing. The CREATE research programme identified 'zones of exclusion and inclusion' that can be detailed for different systems (Lewin, 2011). This is a necessary precursor to medium-term planning that can identify and address the causes of exclusion and the mechanisms to encourage inclusion. The challenge is to chart a pathway from existing patterns of participation to ones that resemble those in countries with full enrolment, as envisaged by the core objectives of SDG4.

A graphical illustration of the task is shown in Figure 41. This shows participation by grade in a low-enrolment system similar to many LICs in SSA, and simulates countries which have Type 1 enrolment patterns as described in Chapter 4, Figure 10. In this model enrolments in grade 1 are about the same as the number of children in the six-year-old age group. They include many over-age children who are late entrants, so the entry rate is substantially less than 100%. Drop-out and push-out occurs in every subsequent grade to the extent that, by grade 9, only 25% of the number of learners in the relevant age group remain enrolled. There are inflexions around selection points at the end of primary and lower secondary, where repetition rates increase and there is some queuing to retake high-stakes selection examinations. Participation in upper secondary is less than 15% of the age group.

The extent of the challenge is evident. The gap between the line of participation and the age grade cohort would need to be filled if all learners were to attend from grades 1 to 12. The arrows indicate the direction and distance there is to travel. In this case this would mean:

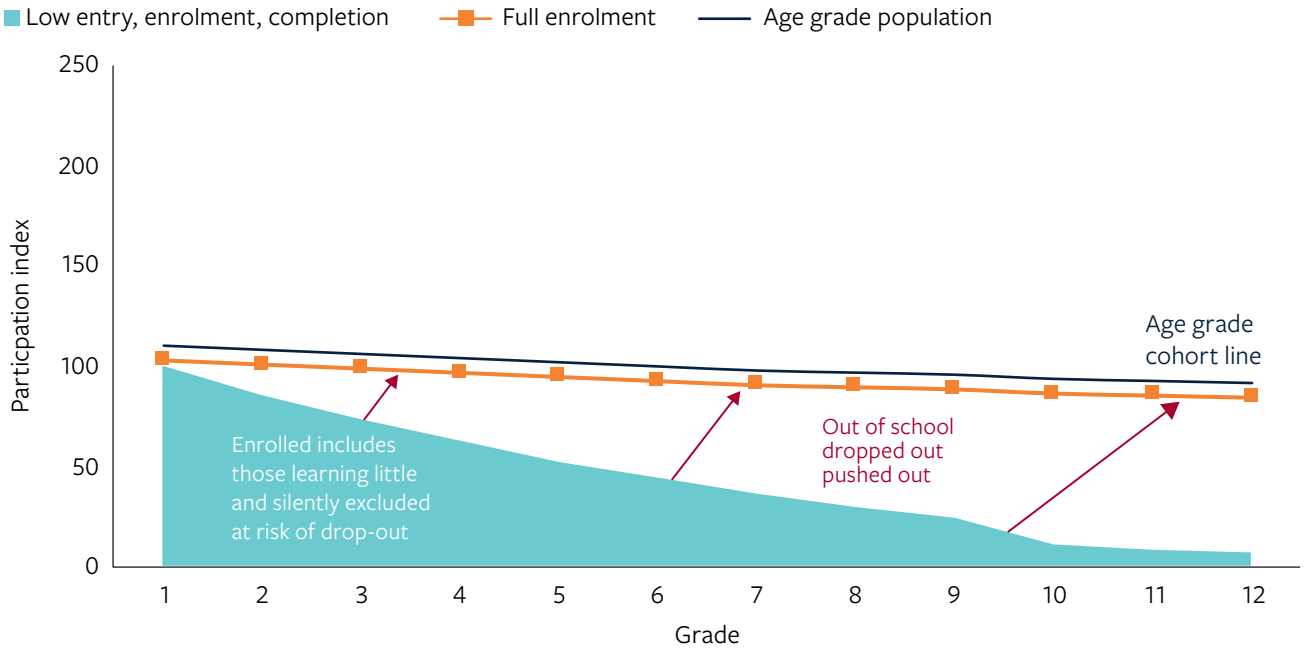
1. Doubling the total number of learners enrolled.
2. Smoothing out the inflection points so that the flow was more even and tracked the number of children in the age grade groups.
3. Reducing and eliminating repetition so that all children progress through school on schedule with the benefit of age grade capability-appropriate curricula.
4. Retaining learners in school so that the number out of school shrank and were eliminated year on year.
5. Realising that the rate at which the gap can be closed depends on the flow of learners from lower grades. In this model grade 7 cannot grow faster than the supply of learners from grade 5, grade 4, grade 3, grade 2 and grade 1.
6. Universal enrolment to grade 12 is not available until the grade 1 cohort all progress and complete every grade of schooling; improving access is a sequencing problem that cannot be removed from the timescale of flows.

7. More rapid progress, e.g. by 2030, supposes methods of re-enrolling drop-outs, ensuring that those who are over-age are somehow supported to get back on track, and learners manage to keep up with curriculum content and expectations of levels of achievement well above current levels.
8. The number of teachers would also have to double or increase more rapidly if high learner teacher ratios were to be reduced.
9. Costs would more than double because the costs per learner at secondary level are much greater than at primary.

Figure 42 models the participation profile of many countries that have increased gross enrolment rates rapidly but have yet to manage the flow of learners to approach universal participation. These are Type 2 countries (Chapter 3, Figure 10). Many of these countries have benefitted from 'Education for All' programmes. Characteristically, enrolments in grade 1 have exceeded the number in the age group of six-year-olds by a wide margin. By grade 3 or 4 there is a tipping point such that there are fewer enrolled than in the relevant age group. From that point on the numbers out of school grow rapidly as a result of drop-out and push-out, often accelerated by transition points between education levels. By grade 9 or 10 only 25% or fewer remain enrolled.

In these types of systems the task is different. Massive over-enrolment in lower grades needs to be resolved so that all learners enter at the appropriate age and progress grade by grade without substantial repetition. Above the tipping point the challenge is similar to very low enrolment countries, and is focused on retaining learners in school and managing their progression with appropriate pedagogy and curriculum matched to realistic expectations of achievement levels across the age cohort. As in the first case, the number of learners may have to double at least above grade 3 if all are to have a school place.

Figure 41 Increasing participation in very low enrolment countries



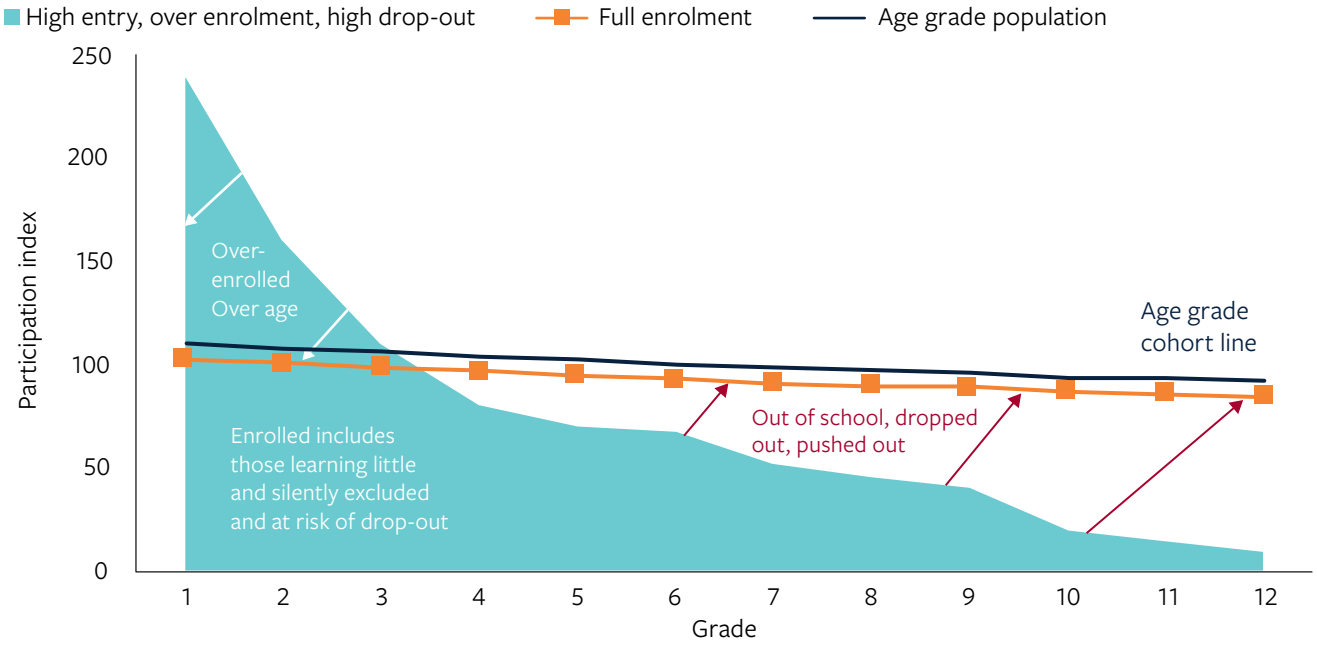
Source: Author

Progress towards universal participation means raising the participation level so that it coincides with the age grade cohort line. This means:

1. Phasing out over-age and late entry to grade 1 and redeploying any resources released to higher grades.
2. Realising that those already over age cannot be brought back on track without special measures that are likely to have costs.
3. Reducing repetition, which in some systems generates high learner teacher ratios, increases the chance of drop-out, mismatches learners and teaching levels, and produces large direct and indirect costs with scant evidence that it is an effective remedial strategy.
4. Recognising that multi-grade pedagogies and curricula could ease the transition to a more regular flow through education systems.
5. Smoothing the flow across transitions between education levels and institutions to reduce costs per successful completer.

Enrolments in grade 1 are often over-estimated and that they persist over implausible lengths of time, suggesting the data is flawed. Some countries have had gross intake rates (GIRs) of more than 150% for more than a decade and three (Rwanda, Malawi and Uganda) had rates exceeding 200% for most of the period 2000–2010 (Bashir et al., 2018: 147). This is not possible without retaining many over-age children year on year, and even then implausible. As Frederiksen (1991) points out, two factors may cause GIRs to exceed 100%: repetition and over/under-aged pupils. But the latter only causes GIRs>100% if there is a change in the age distribution of new entrants, caused by an increasing number of children starting at the official school age rather than older. This happens in many countries. However since, if correctly recorded, a student can only enter school once as a 'new entrant', this effect will decline over time and more rapidly the faster the movement towards entering school at the official entry age (since there are fewer older children to

Figure 42 Increasing participation in very low enrolment countries



Source: Author

enter as a 'new entrant'). But, frequently, an important cause of this 'grade 1 bulge' is data error, as documented in many studies in Asia, Latin America and Africa over the last several decades (Frederiksen, 1991). Often there are incentives to exaggerate enrolment, especially of new entrants where school finance and teacher employment depend on the number of learners.

Flow management needs to be developed at country level and iterated to lower planning levels so that pathways towards achievable goals become visible. This can help identify the financial implications of where external assistance could be catalytic (Frederiksen, 2011). It will illuminate how important sequencing will be to manage enhanced flows of learners in ways that are sustainable.

Flow management resolves the problem of OOSC over time. Retaining learners who enter school in school until they complete an appropriate level is consistent with agreed goals for universal levels of completion. It is likely to be the most cost-effective way of meeting currently unmet needs. It is the only strategy consistent with most SSA national educational development plans, and the only one likely to be financed from recurrent revenue streams.

The key issues for financing are then:

- What is the cost of transition from systems with substantial numbers of out-of-school learners to systems with few learners unenrolled?
- What specific investment is needed to ensure all learners enter school at the appropriate age?
- What specific investment is needed to reduce and eliminate repetition and drop-out at different levels?
- What interim measures need to be financed to meet the needs of those currently out of school until they reach school leaving age?
- How can interventions related to OOSC above compulsory school leaving age be profiled in relation to labour market opportunities?

These questions can only be costed on a system-by-system basis.

7.4 Out-of-school children and phasing enrolment targets

The fourth question is should the way we conceptualise out-of-school children be revisited?

The ambition of SDG4 is that all OOSC should be in school and that all children of school age should be enrolled. To do so would increase the number of children in grades 1–12 by about 30% or about 100 million in SSA. The great majority – over 50% – would be enrolments at upper secondary level, which is much more expensive than primary school per place. This is especially so in the poorest countries, where successful participation above primary level is still below 50% of an age cohort and at upper secondary can be less than 10%. Costs per student in the poorest LICs at any level are typically a greater share of GDP per capita than in LMICs, though much less in dollar terms.

The cost implications of enrolling all out-of-school children as currently defined are considerable. A first order estimate can be made based on several plausible assumptions if OOSC are costed as additional entrants to the school system at average costs per child. This ignores the short-term costs of re-enrolling OOSC but does capture additional recurrent costs of being enrolled without increased learner teacher ratios.

Costs per student in SSA at primary level average about 10% of GDP per capita, at lower secondary 25% and at upper secondary 40% of GDP per capita adjusting for missing data.

LICs average GDP per capita of about $700, LICs about $2,000 and UMICs over $7,800. This translates into about $70 per child at primary level, $210 at lower secondary and $280 at upper secondary in LICs and *pro rata* for LMICs and UMICs.

Using appropriate weighting estimates, the additional recurrent costs of enrolling OOSC in LICs appear to be about $10 billion and in LMICs $23 billion. UMICs should be able to finance additional costs from domestic revenue. The total estimate of the recurrent cost of absorbing all OOSC is about $33 billion and this estimation compares well with other recent estimates of the additional costs of universalising access to education. It is a reminder that such costs are at least 15 times greater than current volumes of aid to education in SSA.

It is likely that this is an underestimate of the costs of enrolling and retaining OOSC. Costs are likely to be greater than estimated because:

- OOSC are more likely to be drawn from marginalised groups
- location, compromised cultural capital, language issues and lack of discretionary household income may increase costs of schooling relative to the median
- OOSC may need additional counselling and support, mental health interventions and extra tuition to re-enrol and complete a cycle of schooling
- many OOSC are over-age, leading to pedagogic needs that are specific to helping learners catch up with their peer group
- OOSC may have dropped out because of economic hardship and family labour needs and if so, may have to be supported with cash transfers to return to school.

Costs may be less where:

- additional children can be accommodated in schools that are under-enrolled, space is available and learner teacher ratios are below whatever norms are set
- communities can be mobilised to meet some of the costs
- accelerated learning programmes replace lost learning efficiently
- donations and philanthropic contributions are made on scale
- expanded enrolment leads to lower costs per student as a result of efficiencies of scale
- school mapping and other planning methods reduce costs per child
- more efficient pedagogies are adopted and low-cost learning materials and delivery systems are adopted.

How out-of-school children are engaged and re-engaged with education systems is clearly a financing issue in both the short term and in terms of the long-term recurrent costs. What the costs are depends on how interventions are configured and whether they are short-term interventions (e.g. accelerated school projects with intensive support for catch-up) or long- term reforms (e.g. interventions that seek to promote child-friendly schools that retain children by encouraging demand for participation). If and when all children are in school, no additional financing for OOSC should be necessary.

There is a key issue with more general implications. Costs are related to levels of expectation and the phasing of demand for financing related to the timing of outcomes. An example makes the point. In a 6:3:3 year primary, lower secondary and upper secondary system with cost ratios of 1:2:4 between levels, nearly 50% of all costs are for upper secondary if there is full enrolment. If enrolments

at upper secondary fall to 50% participation, then the overall cost of the system would be reduced by about 25%. This clearly signals that, if progress towards universal enrolment is phased over a longer period, the demand for finance, and hence the magnitude of financing gaps, can be managed to more affordable levels while waiting for the real value of education budgets to increase over time.

7.5 Financing teachers

The fifth question is concerned with the costs of employing teachers. This is the main expense in any system and plans for massive increases in enrolments have to answer the question as to how teachers' salaries will be financed. In LICs and LMICs with many households below the poverty line, it is inevitable that most of the resources to fund teachers' salaries have to be derived from domestic revenue collected by states if learners are not to be excluded from school by inability to pay the costs.

Teachers' salaries and the costs associated with managing learning are the main cost drivers of the financing needs of SDG4. However, despite massive investment in developing indicators for learning and a very diverse range of investments in interventions linked to SDG4 priorities, much advocacy continues to treat financing implications as a residual to be resolved during implementation of national development plans. This working paper has already demonstrated that the financial challenges of SDG4 lead to the conclusion that at least 6% of GDP, and more than 20% of public expenditure, is needed to provide sustainable financing that is sufficient to ensure goals are achieved, not only by 2030 but for the indefinite future. And these levels have to be achieved at the same time fiscal reforms ensure that revenue as a proportion of GDP rises to 20% or more, so that the allocations that states make have sufficient value to meet the costs of expanded and higher-quality access.

Chapter 6 used a fundamental algorithm to derive the necessary levels of commitment in LICs and LMICs to achieve universal access for grades 1–12, one year of pre-school, and expanded access to higher education and TVET. The algorithm can be applied to validated country-level data as part of national planning to see if the politics of resource allocation match demonstrated needs. The centre of gravity of the costs that underly the basic arithmetic of educational financing is teachers' salaries. Salaries are unlike capital costs that generally can be deferred without immediate consequences. So too can non-urgent expenditure on maintenance and infrastructure. Salary costs have to be paid if system integrity is to be preserved. They have to be budgeted forward if sufficient teachers are to be employed to meet system demand for new teachers and the replacement of those who resign or retire.

It is therefore timely to explore the constraints on costs associated with teachers' salaries.

X is Teacher's salary as a proportion of GDP. It can be expressed in terms of the product of the number of teachers that have to be employed (T) times the average gross salary cost (S) per teacher including benefits (e.g. pensions and other on-costs). Then:

$$X = T * S$$

T can be estimated by dividing the number of learners in the age group for a given educational cycle by the expected learner teacher ratio. This is likely to be different to the class size unless teachers teach every period available, which can be the case at primary level but is often not the case in secondary schools. We thus have:

$$T = (A * N)/L$$

where

A = proportion of school-age children for an educational cycle
N = the total population
L = the learner teacher ratio

If S = M * GDP/N

where M is the average teacher's salary divided by GDP per capita

then by substitution:

X = (A * N)/L * M * GDP/N

X/GDP = (A * M)/L

This is not quite sufficient for a rough and ready model because teachers' salaries are not the only costs. If teachers' salaries are 85% of total recurrent costs, then actual costs will increase *pro rata*. Similarly, we should recognise that there will be some inefficiencies in the flow of learners and posting of teachers equivalent to over-staffing by adding 5% to costs. Our corrected estimate is then:

X = ((A * M)*(1.20))/ L

This basic equation can then be applied to some plausible scenarios. It captures the inescapable metric that the level of educational investment as a percentage of GDP is dependent on the number of learners to be enrolled as a proportion of the age group, teachers' salaries as a percentage of GDP, and the learner teacher ratio.

The first estimation below uses values typical of LICs and LMICs in SSA with low enrolments. Here the primary age group is about 15.5% of the total population and is virtually all enrolled. At lower secondary enrolments are about 6% of the population and at upper secondary about 4%, reflecting the fact that many have dropped out. Learner teacher ratios are 45, 30 and 25:1, reflecting average values for LICs in SSA. With this configuration education needs about 3.8% of GDP to support its costs. This is close to the current average including aid and concessional loans. Note that, when the model is adjusted to include non-salary costs (X + 20% = Y) and amortised capital costs (Y + 10% = Z), as much as 5% of GDP would be needed. This is already well above current average levels of expenditure, suggesting that salary levels are below the level that is modelled, and that salaries may be more than 85% of total recurrent expenditure.

The model indicates that this level of participation can be supported with primary- and secondary-level teachers whose salaries are between two and six times GDP per capita depending on the educational level. High salaries for tertiary teachers can be sustained if the enrolments are small. This translates in a country with a GDP per capita of $1,000 into salaries of $2,000 to $6,000 for primary and secondary school teachers. Clearly there is not much scope for increases in teachers' salaries unless there are real increases in GDP per capita, increases in the revenue used to support public expenditure, or increases in learner teacher ratios. Only 3.8% of GDP is not enough (Table 26).

Table 26 Cost of teachers in LICs and LMICs

Scenario 1 Current data
LIC/LMIC

	% GDP needed	Salary as multiple of GDP/cap	Learners as % population	Learner teacher ratio	Adjusted for non sals	Capital amortised
	X	M	A	L	X+20% = Y	Y+10% = Z
	% GDP	Multiple	%	Ratio	% GDP	% GDP
Pre-school	0.1%	2	1.0%	30	0.1%	0.1%
Primary	1.2%	3.5	15.5%	45	1.4%	1.6%
Lower secondary	0.9%	4.5	6.0%	30	1.1%	1.2%
Upper secondary	1.0%	6	4.0%	25	1.2%	1.3%
University	0.7%	10	1.0%	15	0.8%	0.9%
	3.8%				4.6%	5.0%

Value of teachers' salaries

	GDP per capita US$ 1,000	Nominal salary US$ per year
Pre-school		2,000
Primary		3,500
Lower secondary		4,500
Upper secondary		6,000
University		10,000

Source: Author's computations

If the simulation is used to predict what is needed for higher rates of participation with universal enrolment to grade 12, the result is as shown in Table 27. Here the number of learners has been increased to universal levels up to grade 12 and salaries have been elevated by a modest 10% on average, and learner teacher ratios reduced at school level to 35, 25 and 20:1 at primary, lower and upper secondary respectively. This is less ambitious than the ratios used in Chapter 6 and thus less expensive.

The overall effect is to generate a model that requires nearly 8% of GDP (or over 10% after non-salary additions) to finance (Table 27). This is unlikely. It would require as much as a doubling in tax revenue or reductions in salaries below levels that are already regarded as often too low to motivate teachers.

Table 27 Cost of teachers – high enrolment

	% GDP needed	Salary as multiple of GDP/cap	Learners as % population	Learner teacher ratio	Adjusted for non sals	Capital amortised
	X	M	A	L	X+20% = Y	Y+10% = Z
	% GDP	Multiple	%	Ratio	% GDP	% GDP
Pre-school	0.2%	3	2.0%	30	0.2%	0.3%
Primary	1.8%	4	15.5%	35	2.1%	2.3%
Lower secondary	1.4%	5	7.0%	25	1.7%	1.8%
Upper secondary	2.1%	7	6.0%	20	2.5%	2.8%
University	2.4%	12	3.0%	15	2.9%	3.2%
	7.9%				9.4%	10.4%

Value of teachers' salaries

	GDP per capita US$ 1,000	Nominal salary US$ per year
Pre-school		3,000
Primary		4,000
Lower secondary		5,000
Upper secondary		7,000
University		12,000

Source: Author's computations

Teachers' salaries are not determined by simulation models but by the political economy of pay bargaining, the historic and cultural expectations of different systems, and the real limits of the basic arithmetic of salaries and revenue raising. Iterations of the model lead to the conclusion that, in LICs and LMICs, if there are ceilings of around 6% of GDP to finance education then schoolteachers' salaries will not be sustainable if they exceed between 3.5 and 5 times GDP per capita. All high-enrolment countries fall below these thresholds. OECD countries have much lower ratios of salaries to GDP per capita but much higher pay in dollars because their GDP per capita is much greater. Arithmetic and demography determine the range of teachers' salaries that can be supported at any given level of revenue collection and expenditure.

SDG4 plans have to be developed within a resource envelop that recognises these constraints. Simply put, if goals are to be achieved they must be financeable with available resources or they will lead to 'blind alleys' which risk the achievements of the past and result in poor allocative decisions in the future. This discussion seems long-overdue and is essential to any consideration of the use of grants and loans to subsidise salaries of teachers. It is more

particularly central to any evaluation of national development plans in terms of whether they can and should be financed.

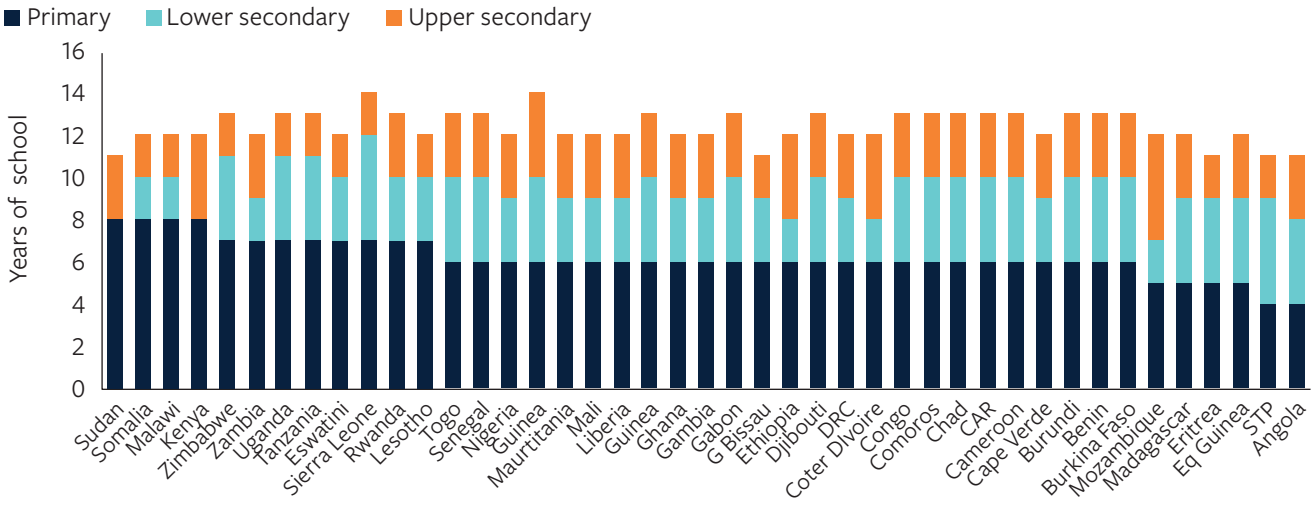
7.6 Structure and operation of school systems

The sixth set of questions relates to the structure of school systems and how their assets are deployed. How schools are organised by grade levels and by specialisations, where schools are, how big they are, and how they timetable and operate staff are all directly related to financing and cost per learner.

Taking these in turn, school systems are structured in terms of cycles of different lengths. The reasons for the structures can have to do with historical tradition and mimicry of patterns in colonial metropoles. They also may be influenced by population density, curricula assumptions, presumptions about learning capabilities at different ages, pedagogic preference, and social and cultural preferences, especially those around adolescence and gender. The total length of school systems is a determinant of costs, as is the distribution of grades by level.

The longest systems last 14 years excluding pre-school and higher education (Figure 43). The shortest last 11 years in SSA. The great majority of systems (85%) extend over 12 or 13 years. Within this there is variation in the distribution between primary, with a median length of six years (60%), lower secondary four years (50%) and upper secondary three years (65%). Most systems anticipate entry at the age of six. As noted in relation to flows, many children progress through grades more slowly than they would if automatic promotion was applied. Most systems have selection examinations that shape access to different types of schools and most separate primary and secondary schools in physically separate institutions, though many have mixed systems with a range of types of institution making it difficult to generalise. The predictive validity of selection examinations is often unknown and can be a source of inefficiency. Systems with longer primary school systems tend to be cheaper than those with long secondary school systems. This is especially the case where secondary schools are separate institutions with higher operating costs. National patterns are shown in Figure 43.

Figure 43 Length of primary and secondary school systems in SSA

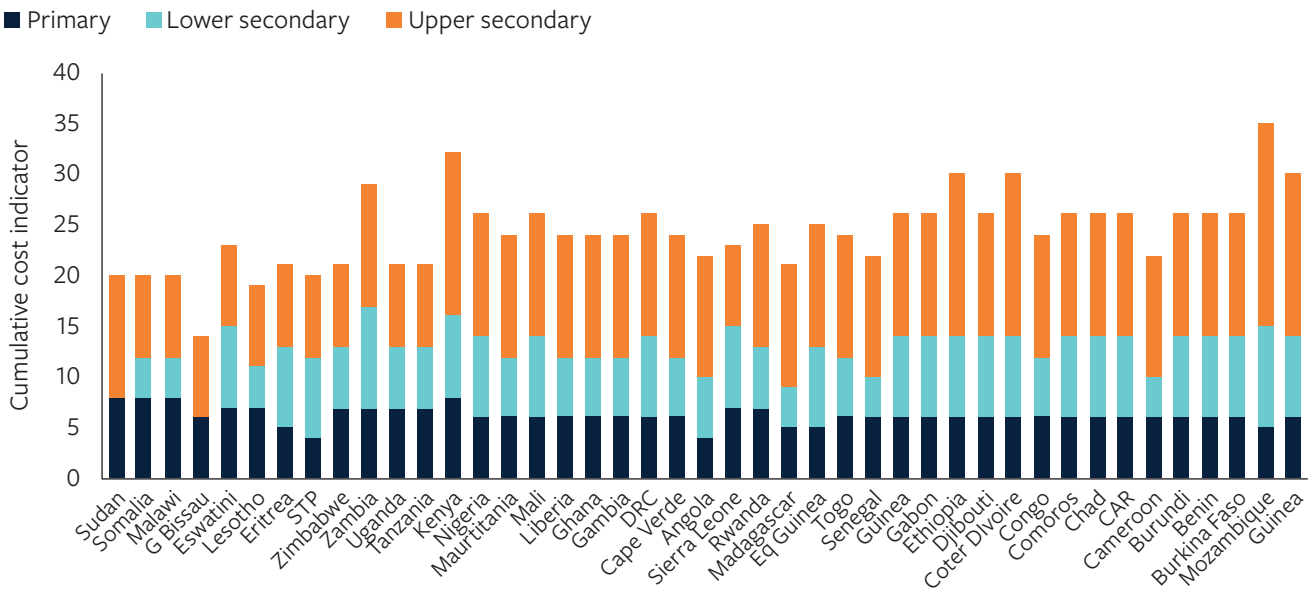


Source: GEMR database, 2021

Some indication of the impact of school cycle structure on cost is provided by combining data on cycle length with cost per student. If unit costs stand in the ratio 1:2:4 for primary, lower secondary and upper secondary and these are aggregated to simulate full enrolment grades 1–12 in line with SDG4, the result is as shown in Figure 44. The most expensive systems have longer upper secondary systems and the least expensive have longer primary education systems. Hypothetically, short primary systems could be extended upwards to create long primary cycles e.g. in Kenya. This reduces costs, assuming that years added to the primary cycle are costed at primary levels. Though lengthening primary cycles is an option, most countries have not adopted this kind of radical shift. The costs of transition can be considerable and the ramifications for building stock, teacher employment and costs, and for curriculum make changing cycle lengths potentially expensive with ambiguous cost benefits. Convergence around median-length systems is possible but would not create major cost savings, except at the extremes of the distribution. Shorter systems provide fewer school days in aggregate unless the number of days in the school year is increased.

Cost per student by level escalates in ways that make it very challenging to universalise participation. This is clear from Chapters 2 and 6. Simply put, all high-enrolment countries have ratios of primary to secondary costs per child less than 2:1. This is inevitable. In countries with six years of primary and three years of lower and upper secondary with a school age population growth rate of about 3%, the ratio of school-age children is about 55:25:20. If costs by level are in the ratio of 1:2:4 with full enrolment, expenditure by level would be in the ratio of 30:27:43. Using these ratios, lower and upper secondary would take 70% of the total budget. As participation increases cost ratios diminish in order to make possible higher participation at higher levels, without unrealistic calls on education spending as a proportion of total government expenditure. Gains from increased efficiency are needed,

Figure 44 Cumulative cost indicator for different educational cycle lengths



Source: World Bank data

especially at higher grade levels so that expanded access is affordable.

Three areas in which efficiency gains are available are in relation to school location, size and timetabling. Programmes to achieve efficiency gains are system-specific and invite detailed country case studies. The general case is easy to make.

In relation to location, school mapping can be used to link decisions on school location and development to GPS coordinates and relevant demographic and topological data. This can link data on school-age children, travel times and costs, and school size and teacher utilisation. It can be linked to staffing norms and assumptions about teachers' working practices and workloads and learning time on task to generate more efficient deployment of education assets.

In some areas in SSA population density is low and conventional schools lack viability or can only be staffed at unsustainably high costs per learner. Boarding may be an option but is likely to be an additional expense that has to be subsidised. Where boarding is elective and a matter of choice, the costs and benefits need careful consideration since they may more than double cost per learner. Communities support schools and often have preferences for very local pre-schools and primary schools, with good reason. Young learners are vulnerable and need safe learning environments locally, while community resources can be mobilised and locally resident teachers provide continuity and stability.

Small schools generally have higher costs, especially if they are staffed with mono-grade assumptions (one teacher for each grade) and there are not enough learners to fill each grade group. This can lead to low learner teacher ratios and hence high costs. Thresholds of efficiency are system-specific, but systems with many small schools with learner teacher ratios much below 20:1 are likely to be expensive to operate unless multi-grade pedagogies are used (Little, 2006). If grade groups are not combined, then time with teachers will be reduced and teaching groups will be small.

Schools have fixed and variable costs. Both need to be considered in relation to school size. Larger schools have lower fixed costs per child. Overall costs per learner fall as size increases. A primary school with 60 students and six teachers (one for each grade) is four times the cost per learner of a school with 240 learners and six teachers in terms of variable costs. If the school has 480 learners and 12 teachers, the variable costs per learner remain the same and twice as many teachers are employed. Simply put, economies of scale in most primary school systems taper off when schools have enough learners to fill teaching groups. This means economies of scale are marginal above about 240 learners at primary level. Because of subject-based curricula, specialised teacher qualification requirements and lower class sizes, secondary schools may reach diminishing returns on scale at higher enrolment levels of around 700 learners. Reducing the variation in school size, and increasing the average size where this is low, could create considerable cost savings. This has to be balanced against any increase in travel costs, whether subsidised or not, if distances to school increase.

Some systems have permitted the development of mega-schools, and primary schools with enrolments of between 5,000 and 10,000 can now be found. These schools can be efficient depending on the level of their learner teacher ratios, which are often high. Their fixed costs per learner are likely to be low. Such large institutions create logistic and pedagogic issues and require

sophisticated management of learning resources. It is often not clear why such large institutions have evolved, though pressure to access schools with well-known brands may be part of the reason.

Timetabling determines time on task for learners and workload in terms of teaching periods per day. Most systems do not have systematically applied mechanisms to make the best possible use of the resources available through optimising the use of staff time. Workloads often vary considerably across teachers and by specialisation. Primary teachers generally have higher workloads in periods per week than secondary teachers, and class sizes are typically much larger in lower grades than higher up the school. Class groups may be doubled up and, if so, reduce teacher workloads. There are often few incentives to deploy teachers efficiently. Absenteeism is at high levels in many systems, which lack consistent methods of covering for absence.

The scope for efficiency gains is very wide. If the least efficient systems performed as well as the most efficient systems, and the least efficient schools matched the most efficient ones, many more learners could be educated at the same cost. Mass participation from K-12 depends on reductions in cost ratios per learner to below 2:1 secondary to primary. High-performing systems deliver as much as twice as much teaching time each day than low-performing ones. Oversize teaching groups of more than 100 persist (sometimes in the same schools) at the same time as classes of fewer than 15 in higher grades as a result of drop-out and mono-grade curricula organisation. Many secondary school systems have teacher:class ratios over 2:1, meaning that, whenever a teacher is teaching another teacher is on other tasks. System-specific checklists are needed along with mechanisms and incentives to make better use of teachers and increase time on task where it is low. Learner teacher ratios have to be considered along with teacher to class and learner to class ratios.

There are many possible reforms linked to evidence that could reduce costs per learner and make more use of the financing that is available (Coombs, 1985; Colclough and Lewin, 1990; Schiefelbein et al., 1999). Updated lists continue to emerge with varying degrees of utility (e.g. GEEAP, 2021; Lewin, 2021c). It seems unlikely that really radical reforms that are viable have been overlooked. The task is to connect context-specific diagnosis and match to interventions that can be financed and which are sustainable.

7.7 The development of fiscal states and increased revenue generation

The final question relates to developments exogenous to education systems. Gains in efficiency and effectiveness are central to any strategy that seeks to identify ways of financing education and development in LICs and LMICs. But they are not enough. Sustainable educational development also needs fiscal reforms that can lead to more LICs and LMICs becoming fiscal states that can finance their own educational development from domestic revenues. The literature on education financing rarely addresses the fundamental reality that aspiration and ambition have to be tempered by the need to fit financial demands into the envelop created by domestic revenue. Prudent mobilisation of additional external resources that can accelerate development with benefits that outweigh costs is a welcome complement to the efforts of governments to self-finance, but it is never a substitute. Most of the costs of education systems are, and will remain, domestically financed, as illustrated in discussion of the basic arithmetic of financing education in Chapter 6.

Fiscal states are increasing in number (Moore et al., 2018). One proxy signal of this is that 15 countries have changed status from LICs to LMICs since 2000, and two LMICs have become UMICs in SSA (Table 28). This means that these countries have been getting richer in real terms, have reduced the number of households below the poverty line, and have increased the number of potential taypayers who can contribute to public finances. LMICs have more capacity to generate revenue, allocate a larger share of GDP to public finance (Figure 35) and collect more tax as a proportion of GDP (Figure 36) than LICs.

This research has identified how much finance different countries have to generate if they are to deliver on the promises of global and national goals. The ability to finance sustainable educational development, using revenue complemented by loans, is inescapably linked to fiscal realities and levels of ambition. A broader definition of a fiscal state is needed. This could be states which not only balance tax revenue and prudent borrowing and are credit-worthy, but which also seek to finance public goods including mass education systems largely from domestic revenue with a sustainable complement of borrowing serviced with revenue from taxation. Further elaboration of the nature of fiscal states is beyond the scope of this report and is well covered in the United Nations University World Institute for Development Economics Research (WIDER-UNU) (2022) special collection on this subject. Most states in SSA have yet to become fiscal states, but many have this as a goal.

Table 28 Countries in SSA becoming LMICs, 2001–2019

	GNI 2019	GNI 2001
Angola	3,370	220
Ghana	2,130	390
Nigeria	1,960	310
São Tomé and Príncipe	1,890	270
Zimbabwe	1,790	520
Congo, Rep.	1,640	670
Kenya	1,620	360
Côte d'Ivoire	1,610	710
Sudan	1,560	330
Cameroon	1,440	580
Zambia	1,430	320
Senegal	1,410	510
Lesotho	1,380	550
Comoros	1,320	350
Mauritania	1,190	380

Source: Steinbach, 2019

The analysis shows that countries are located differently in terms of key indicators of education investment effort and fall into different groups with different needs. Simple typologies like those of Table 25 are a useful heuristic but need translating into different country contexts to arrive at policy options that are fit for purpose. In some countries, political will to invest in education has remained low. In others low or negative rates of economic growth have stalled educational development. The 'financing trap' has resulted in persistent underfunding of education systems, despite many high-level rhetorical commitments to address the underlying causes. Progress depends on viable states with levels of revenue collection adequate to support public social sector investment. Increased efficiency and effectiveness in delivery systems are crucial. So also is real economic growth coupled to fiscal reform that addresses imbalances between educational ambition and resource allocation.

Though economic growth has been stalled by the Covid-19 pandemic, the expectation is still that

it will return to the average of 4.5% it sustained between 2001 and 2019. If so, GDP will double in size in not much more than 15 years with a *pro rata* impact on educational funding if government expenditure remains the same proportion of GDP. This may be over-optimistic given the cost of recovery after Covid and the challenges to the world economy and security posed by geopolitical realignments. A return to economic growth would figure dramatically in ameliorating the financing trap that restricts educational development at rates that can be sustained.

Where demographic transition occurs, as is predicted in some parts of SSA, this will further benefit education spending as the number of school-age children will decline as a proportion of the total population. This means that the ratio of taxpayers to dependent young learners should improve, allowing more per child to be spent. Both of these developments should increase further the number of fiscal states which can support mass education systems from domestic revenues.

Fiscal reform will be needed to increase domestic revenues. This has to complement efforts to enhance effectiveness and efficiency and elevate levels of financial commitment to education by governments. Simply put, currently LICs and LMICs in SSA generate about 15% of GDP in revenue from all regular sources. This is equivalent to about $280 billion. The total recurrent public cost of SSA's education systems is about $53 billion and the projected shortfall for financing SDG4 is about $37 billion. This shortfall is equivalent to around 13% of total domestic revenues. It is about the same value as increasing the revenue stream from an average of 15% to 17% of GDP in LICs and LMICs. Economic growth is likely to be much more important in meeting shortfalls in financing in the medium term than increases in the proportion of resources allocated to education that are not sustained.

Increases in domestic revenue are conceivable. There are good reasons to be optimistic that amounts will rise over and above the benefits bestowed by real economic growth and demographic transition. There are several vectors that will increase the yield of revenue collection systems. These include:

- Growth of formal sector employment, and thus wage and salaried taxpayers, from an average of about 15% of total employment to include the majority of the workforce, as is the case in richer SSA countries.
- Widespread adoption of biometric identity systems and Tax Identification Numbers (TINs) that become a requirement for opening and operating bank accounts, doing public business, receiving salaries, and paying down contracts (e.g. Ghana card).
- Withholding tax systems, which collect revenue from the employer rather than the employee, becoming more widely adopted in formal sector employment. These are likely to greatly enhance collection rates and reduce costs.
- Collection of income taxes where yields are low and where 10% or less of the labour force pay any income tax, including higher earners.
- Fiscal drag, whereby progressive tax thresholds rise more slowly than taxable income generating a higher tax yield.
- Elevated levels of general sales tax, value added taxes and excise duties, provided these are targeted away from the poorest.
- Reductions in energy subsidies where these primarily benefit the rich with measures to protect public benefit services, e.g., public transport.

- Fair corporate taxation of income streams with sanctions for transfer pricing and avoidance strategies.
- Natural resource taxes and licence payments that reflect present and future costs and ensure extractive industries contribute fairly to national accounts.
- Property taxes linked to remote sensing with ownership tracked through payment systems, so that progressive taxes can be levied efficiently.
- Money transaction taxations levied on electronic transfers of monies transacted through banks and mobile phones.
- Use of Unexplained Wealth Orders and adoption of money laundering protocols to reduce illicit flows of assets and revenue to reduce the estimated annual $50 billion lost to fraudulent activity.

As more fiscal states develop the financing dilemmas in SSA will change. Planning will have to sequence development to resonate with the likely pace of growth in the economy and domestic revenue. More LICs will become LMICs. Fragile states with little capacity to generate revenue that are externally dependent for large-scale public spending on grants and concessionary flows will diminish in number. Fiscal states with the capacity to finance public services sustainably will increase in number. This is what will happen as development takes place.

The historic record shows that it is more likely that revenues will rise with economic growth and greater fiscal yields than it is that states will dramatically increase their levels of investment in education relative to other sectors. This should produce real increases in public expenditure on education.

As states develop their fiscal base, national policy dialogue will centre on the allocative choices that will decide at what level to support education services and which services to provide with which kinds of financing. The role of development partners will change from financiers of last resort to financiers of choice, where their special characteristics create mutual benefit, avoid conflicts of interest and manage opportunity costs. As complementary agents, rather than principals, the opportunity is to reconfigure assistance increasingly to catalytic support for systems evolution that can accelerate development towards outcomes that are sustainable.

The final chapter draws together the findings from this research, reviews the research questions, identifies areas for further research, highlights 10 policy conversations that are now needed within countries, and between countries and development partners, and finally draws attention to possible catalytic interventions.

8 Conclusions and recommendations

8.1 The core narrative

This report identifies and addresses the financing challenge for education systems in LICs and LMICs in SSA. In summary, the core narrative is:

- There is a low-financing trap which has meant that many countries, especially in SSA, have had static levels of public investment in education as a proportion of government budgets and of GDP over the last two decades.
- A taxonomy of countries identifies three bands of financial effort for investment in education. These are less than 3%, between 3% and 5%, and over 5% of GDP. Individual countries tend to remain in the same band of expenditure on education over time and only those in the highest band are likely to be able to finance the ambitions of SDG4 with domestic revenue.
- Mission creep has meant that SDG4 for education now commits countries to universal enrolment K-12, much higher participation in TVET and expanded higher education that would require massive increases in funding.
- The 'learning crisis' is in large part a financing crisis. The expenditure needed to achieve global goals (SDG4) cannot be financed from domestic revenue in countries that collect less than 15% of GDP in revenue, and substantial fiscal reforms are needed.
- No conceivable amount of external assistance would be sufficient to support the recurrent costs of SDG4 and the appetite for aid to education is softening.
- Most finance will come from domestic resources, not aid, in all but the poorest countries.
- Substantial gains in access, participation and learning are possible from enhanced efficiency and effectiveness.
- Improving access and learning can happen if global and national goals are reset to reflect achievable outcomes suited to different country circumstances and a differentiated approach is taken to supporting countries at different levels of development.
- Grant aid can play a significant role in catalysing such gains, but only if it changes its purposes and moves beyond filling gaps and delivering services directly to the most marginalised; it needs to shift towards catalytic support for system-level change that can be sustained from domestic resources.
- Strategically targeted budget support is becoming more attractive.
- External assistance has to be demand-led, co-owned (which probably means co-financed except in the poorest countries), and contracted with the expectation of viable exit routes.
- A new commitment is needed to the Paris aid effectiveness principles of ownership, alignment, harmonisation, managing for results and mutual accountability.
- The Sustainable Development Goals for education have to be reconfigured to resonate with diverse national priorities and identify achievable targets that can be financed.
- Plans have to be matched to realistic appraisals of resources available and the basic arithmetic of school leavers and labour markets.
- Accelerating the development of fiscal states is central to sustainable educational development since this is the only way to generate reliable revenue streams that can fund public goods including education systems.

A new policy dialogue is needed to catalyse escape from low-financing traps for education and reduce the need for aid in future. This means investment

in enhanced efficiency and effectiveness, new goals and targets tailored to realistic capacities and resources, and financing that accelerates progress towards becoming fiscal states.

8.2 Chapter essentials

The essential arguments that run through the chapters of this research report are as summarised below.

Chapter 2 Status report

- Education systems, especially in low-income SSA, have been persistently underfunded for decades with consequential crises for access and for learning that have not been resolved. On average, less than 4% of GDP and 15% of government spending has been allocated to education, which is well short of the levels needed to finance SDG4.
- There are 23 LICs, 18 LMICs and 6 UMICs in SSA with GDP per capita ranging from below $500 to over $10,000 and populations from 100,000 to over 200 million. A few countries have experienced demographic transition with the 0–14-year-old dependency ratio below 15%, but most have high fertility and ratios over 40% meaning there are many more children per taxpaying adult; countries in SSA are therefore at very different levels of development.
- Gross participation rates in education are approaching 100% at primary level, though substantial drop-out takes place alongside repetition and over-age enrolment. Primary net entry rates average about 60% and completion rates around 70%. This can be compared with secondary gross enrolment rates of 38% and 55% in LICs and LMICs, with about 40% completing lower secondary in LICs and 60% in LMICs. Higher education has been growing rapidly. Post-primary provision has become a high domestic policy priority in many countries.
- There were about 30 million children of primary age out of school in 2008. Since then, the number has increased to 35 million. Most out-of-school children as defined by UNESCO are now of lower secondary (28 million) and upper secondary (37 million) age. About 45% of countries in SSA have reached gender parity in enrolments at primary level. Most countries with enrolment rates of over 50% at secondary have achieved gender parity at secondary level. Costs per learner are about 10% of GDP per capita at primary and 20% at secondary, and may be over 200% at tertiary level.

Chapter 3 Changing patterns of access

- Planning greater participation, and estimating the financing this requires, depends on analysis of the flows of learners through school systems. Grade-by-grade enrolments are the simplest indicator of flows, but are not often tracked.
- Historical patterns of changing enrolments give indications of how systems can evolve and how rapidly they can be transformed. Flow data highlights the sequential nature of expanded access, e.g. universalising secondary participation is not possible without full completion of primary.
- National-level initiatives to rapidly increase educational participation have often succeeded in raising entry rates into grade 1. Time series data show that higher rates of entry to school have often been accompanied by higher rates of drop-out and by increasing numbers of 'silently excluded' children who are enrolled but not learning at an appropriate level.
- Many systems have transition points (primary/lower secondary, lower secondary/upper secondary) where there are inflection points in the flow of enrolments associated with high-stakes selection tests and subsequent push-out. Disaggregated analysis can show how these bottlenecks may be associated with inequalities.

- Conventional completion rates captured by cross-sectional single data points are a poor indicator of participation and flow and are an unreliable basis for policy dialogue.
- Profiling of flows of learners through grades of education systems highlights what is needed to ensure they remain on track to complete education phases on schedule. This understanding is fundamental to target setting and to costing the resources needed.

Chapter 4 The evolution of spending on education

- Financial commitments to public education systems in LICs and LMICs in SSA have settled on around 15% of government spending and 4% of GDP since the 1990s, despite much advocacy that more was needed to achieve global goals first set in the 1960s and reiterated in 1990 and 2000 at world conferences.
- LICs and LMICs characteristically spend less than OECD countries as a proportion of GDP (less than 4% compared to over 5% of GDP), but have much larger numbers of children to educate relative to working-age adults.
- LICs and LMICs spend more on education than OECD countries as a proportion of government expenditure – about 15% compared to 12%.
- This translates into much less investment in real terms because government expenditure in LICs and LMICs may be below 15% of GDP, compared to over 35% of GDP in OECD countries.
- There is evidence that a 'low-financing trap' exists. Over the last two decades public investment in education, as measured by the proportion of GDP allocated and by education as a proportion of government spending, has not increased despite extensive lobbying by development partners. Systems are equilibrating around historic levels with limited signs of an appetite to increase financial effort.

Chapter 5 Sustainable Development Goal 4 for education

- SDG4 has greatly extended the global level of aspiration for educational participation and learning compared to the 2000 agenda of global goals provided by the MDGs and Dakar Targets.
- SDG4 now assumes universal access K-12 with expanded opportunities in TVET and higher education and extensive investments in enhanced learning, and by implication buildings and infrastructure.
- Though much attention has been given to the difficulties of implementing some parts of the SDG4 agenda, it is now clear that some of the financial difficulties and learning crises are the result of over-ambitious goal and target setting, not least retaining all learners in education and training to grade 12.
- The new SDG4 architecture is undifferentiated in scope or sequencing and does not recognise the many different starting conditions, historic rates of progress, varied national prioritisation and different growth projections and capacity to support reforms.
- Critically, if SDG4 is retained, the basic arithmetic of employment and investment in different levels of education has to be central to strategic development plans that can be financed from revenues and future growth linked to evidence and plausible projections of the utilisation of human resources in real economies.
- SDG4 as currently conceived cannot be achieved in most LICs and many LMICs by 2030 and the SDG framework is in urgent need of revision so that it is fit for purpose.

Chapter 6 Basic arithmetic of educational financing

- The core algorithm of educational financing is **X = GER * A * C** where X is public expenditure on education as a percentage of GDP, GER is the gross enrolment rate, A is the proportion of the population of school age and C is public recurrent expenditure on schooling per learner as a percentage of GDP per capita.
- To approach the targets set by SDG4 would need resources sufficient to enrol an additional 180 million learners, employ 13 million new teachers and build about 9 million new classrooms.
- Using the core algorithm, the financial implications of SDG4 for public expenditure are very large and imply the need for an additional expenditure of at least $37 billion annually up to 2030 for recurrent expenditure split between LICs ($11 billion) and LMICs ($26 billion) in SSA.
- Capital investment would need to be at least another $13 billion a year and nearly twice as many teachers as currently employed would need to be recruited and paid.
- Meeting this level of demand would require more than 6% of GDP to be spent on education, which can be compared to a current average of about 4% of GDP. It also implies that education would need to be more than 25% of public expenditure with much-enhanced government spending.
- Aid to education has peaked and is diminishing as a proportion of all aid. It may also be exacerbating financing traps that have led to static levels of domestic educational financing in some heavily aided countries.
- Grant aid is unsuited to supporting recurrent costs; borrowing to support recurrent costs is unwise and difficult for countries with poor credit ratings and high debt service ratios.
- Most educational financing, except in the most heavily aid-dependent countries, will continue to be sourced from domestic revenue.
- The total volume of aid to education in SSA is less than 5% of education expenditure in LICs and LMICs. It can therefore only be catalytic and cannot support core recurrent expenditure, except for short periods in extreme circumstances.

Chapter 7 Seven key challenges for public education financing

- The first challenge is to escape from low-financing traps. This requires more commitment to higher levels of allocation to education by governments to more than 6% of GDP and more than 25% of government expenditure. It also requires fiscal reforms that can increase the yield and the rates of revenue collection to levels that can sustain public expenditure of 20% of GDP or more to be consistent with goals governments set themselves.
- The second challenge is to review actual patterns of expenditure in terms of the allocation of public budgets, the overall size of public expenditure, and the consequent level of commitment of GDP to public educational investment. Charting these parameters produces a taxonomy that highlights where current levels of expenditure are much lower or higher than in similar countries. It provides the basis for policy dialogue to increase public financing within the political economies of choice of public expenditure.
- The third challenge is to systematically review and analyse flows of learners through education systems, link this to data on achievement, and determine where internal efficiency can be improved and learning effectiveness enhanced. All systems need to make best use of financial resources and understand how the dynamics of flows of learners determine costs.
- The fourth challenge is to reconsider targets to reduce the number of out-of-school children and phase in greater participation, especially at

higher educational levels. Most out-of-school children are now young adolescents and half are above the legal minimum age for work if UNESCO definitions are used. The cost of enrolling all learners from K-12 is unfinanceable without dramatic reductions in cost per learner at higher levels. Nor is it clear how greatly increased flows of upper secondary graduates will be absorbed into small formal sector labour markets without radical curriculum reform. Phasing is needed to manage increased participation to levels that can be financially sustained.

- The fifth challenge relates to the employment of teachers, which is the main driver of costs in all education systems. The main policy variable that can influence financing is the cost per learner, and this is largely determined by how many teachers are employed and their salary levels. Policy options have to present the choices that link numbers employed, teaching group sizes, salaries and levels of productivity to result in fair and sustainable employment that can be financed sustainably.
- The sixth challenge is to consider the structure of delivery systems and the opportunities that exist to reform organisational practices that drive costs. This can point the way to greater impact on access, learning and outcomes through changes in the structure of school systems, cycle length, location, size and utilisation of assets including teachers.
- The seventh challenge is the most significant for overcoming chronic underfunding of education systems. It is to accelerate the development of fiscal states which generate sufficient domestic revenue to finance their own systems without substantial and indefinite external assistance; a major purpose of aid is to accelerate development that can be self-financing.

8.3 The research questions revisited

This research had five main research questions. They are:

1. How have education systems developed over recent decades and how patterns of access and participation have changed since the commitments made at the World Education Forum in Dakar and in the MDGs in 2000?
2. How have patterns of public spending on education evolved and are some countries stagnating in a low-financing trap?
3. What additional demands do the SDGs create for financing education and to what extent can this be met from existing revenue?
4. What is the basic arithmetic of education financing, how does this translate into demand for financing, and what does it reveal about benchmarks for necessary levels of investment?
5. What challenges and policy options exist to address the low-financing trap, enhance educational efficiency and effectiveness, increase domestic revenues and accelerate progress towards sustainable educational development goals?

The first question was explored in Chapters 2 and 3. Education indicators across SSA paint a picture of a very diverse continent of over 50 countries with a wide variation in size, wealth and education system development. Access to education is near-universal in some systems and far from being achieved in others. Demographic transition, a critical issue for future demand for public services, has yet to take place in most countries but is happening in some. There has been progress on gender parity in enrolments, but many inequalities remain to be addressed. How to train and employ enough qualified teachers is critical to questions of how to reduce costs per learner to levels that allow universal participation at secondary

level and above. The analysis in Chapter 3 offers unique insights into how participation has been changing over time in particular systems, and draws attention to the dynamic aspects of system transitions to higher levels of participation and their financial implications. It also highlights how important the specificities of different systems are, and the need to place diagnoses of the demand for finance in system context. A definitive typology locates countries in five different profiles of participation that should shape investment strategies, but often do not.

The second research question was addressed in Chapter 4. Over the last two decades the proportion of GDP allocated to education has averaged about 4%, and about 16% of public expenditure. Government expenditure has fluctuated around 15% of GDP. Tax revenues have improved but remain at low levels, limiting government expenditure on education. There is evidence of a low-financing trap that has constrained countries from responding to sustained advocacy for more than 6% of GDP and 20% of government budgets to be allocated to education. The MDGs and Dakar Targets cannot be financed for less than these levels of commitment. A taxonomy of education investment levels indicates most countries are not on track to achieve these targets for financing.

The third question was addressed in Chapter 5. The SDGs promulgated in 2015 have replaced the MDGs and Dakar Targets of 2000. They propose a demanding set of outcomes by 2030, including universal enrolment over 13 years kindergarten to grade 12, with financial implications much larger than the global goals agreed in 2000. This includes expanded technical and vocational education, greater and more equitable access to higher education, universal literacy, investment in buildings and infrastructure, international scholarship programmes and a qualified teacher for every child. The new agenda requires governments to increase education spending dramatically in ways which can be sustainable but are likely to be beyond reach.

The fourth question was the concern of Chapter 6. This presents the fundamental algorithm that determines the finance needed to support different levels of participation at different educational levels. Using typical country data on enrolment rates, numbers of school-age children and costs per learner at different levels, the amount of GDP needed for education recurrent spending can be estimated for different groups of countries. The result is to demonstrate that between 6% and 7% of GDP is required. This can only be achieved if government expenditure (and hence domestic revenue) is more than 20% of GDP and the allocation of public funds to education is of the order of 30% (20% of 30% = 6%). The rest of the chapter identifies capital costs, notes the constraints on teacher costs, and charts the challenge for public budgets supported by domestic revenue. Aid will be part of the story, but aid as a percentage of GNI has fallen since 2000 and aid to education is now shrinking. Aid, in the form of grants and concessionary loans, is an order of magnitude or more too small to close the gaps between what would be needed and what is plausibly available to achieve SDG4. Thus, most financing will continue to come from domestic revenue. Aid may accelerate this process if it is reconceived to catalyse accelerated development as its main purpose, rather than to fill gaps that require recurrent expenditure to be provided repeatedly.

The fifth question framed Chapters 7. This identifies seven challenges for future educational financing. The low levels of allocation of public expenditure have to be addressed. A taxonomy of

education investment identifies the countries that need to invest more. Efficient systems manage the flow of learners so that all learners enrol on schedule for their age and graduate without significant repetition or drop-out. Effective systems ensure learning at levels determined by national curricula and imply higher levels of investment in pedagogy, learning resources and infrastructure necessary to manage progression and realise educational goals for all learners. Out-of-school children's needs have to be addressed and clarity is needed as to whether children above the legal age of work should be regarded as out of school. Financing teachers is a central issue for sustainable systems and has to be tailored within plausible resource envelopes linked to teacher supply, deployment and emoluments. Structural issues that determine system effectiveness and efficiency (e.g. school cycle length, size and time on task) need review. Fiscal states are central to sustainable development. Grant aid and concessional lending should promote their development as a priority. This is a challenge for the transforming education agenda of the UN and for the proposed International Finance Facility for Education (IFFEd, 2019) for LMICs.

This analysis identified many opportunities for future investment in research too numerous to list. Among these, five stand out.

First, studies of francophone and lusophone education systems are needed to complement those in this report. They have a different history, structural characteristics and developmental profiles to anglophone countries. Some of this analysis warrants replication building on the template created by this report. In particular, flow analysis could illuminate key issues and translate them into insights and opportunities for gains in efficiency and effectiveness and policy dialogue.

Second, the report highlights many issues that indicate that institutional capacity remains lacking. Though many of the solutions to problems are known, it has proved difficult to translate these into sustained resolutions of unmet needs, e.g. the provision of learning materials to every child, low time on task, low levels of learning achievement, and exclusion from school associated with poverty and costs. Research grounded in specific systems could reveal why institutional capacity remains so hard to build and embed in education systems.

Third, investment is needed to improve the quality of education statistics. These vary from good to non-existent. Many data sets are of poor and inconsistent quality with uneven validity and uncertain access. Without data that can be addressed cross-sectionally and longitudinally, the quality of decision-making and of resource allocation is severely compromised. The needs for internationally comparable data sets are already being met to the point where there may be diminishing returns. The priority is investment in national systems shaped by national monitoring and decision-making needs and financed at least in part domestically to ensure ownership, validity and likely usage of data by stakeholders.

Fourth, grade repetition and over-age progression remains a source of considerable inefficiency, though in many countries there are no systematic studies that attest to its efficacy or to its costs. This, coupled to age in grade slippage, creates large internal inefficiencies and sits uneasily with the widespread use of mono-grade curricula. The country-specific evidence base for decision-making in this area is thin and it is critical to enhance it. Addressing this alone could generate more than 20% of additional access at no extra cost in some cases.

Fifth, not enough is known about the relative impact of economic growth on enhanced participation in comparison to the level of commitment of government spending on education. If there is a financing trap that limits government allocation of resources, then growth in GDP may be the most important determinant of the growth in education resources. This, along with methods of increasing fiscal effort where this is low, is poorly evidenced and rarely discussed in education financing fora. Fiscal states depend on sufficient economic growth to generate enough domestic revenue for sustainable public goods. More studies are needed that revisit the links between educational development and economic growth.

8.4 Recommendations

The analysis in this research report yields a set of 10 recommendations. These need to be considered collectively as there are many possible synergies across the recommendations. Recommendations 1–5 and 9 and 10 derive directly from this analysis. Recommendations 6–8 are necessary complements of needs to increase efficiency and effectiveness.

Recommendation 1. Educational investment effort
Review indicators of educational investment by country (education as proportion of public expenditure, education as a proportion of GDP, public expenditure as a proportion of GDP, shortfalls relative to national goals and SDG targets); locate countries on the taxonomy of effort and profile financing needs; match planned outcomes to level of effort over plausible timescales.

Recommendation 2. Unlock the low-financing trap with social contracts between governments and those they govern, with support from coalitions of the willing including development partners, to increase domestic revenue and spend more on education to ensure at least 6% of GDP is available to finance public systems with equitable and gender-balanced access, adequate staffing and learning infrastructure, and cost-effective composition of education expenditure.

Recommendation 3. Revise SDG4
Revisit SDG4 and develop nationally determined priorities and targets costed to be financed predominantly from domestic revenue with precedence given to contextually located priorities; scale and phase targets into goals that are achievable, especially in relation to out- of-school children; adopt targets that are domestically owned, not exogenously driven.

Recommendation 4. Review the cost per learner
Review costs of learning, especially at secondary and higher education levels, to facilitate more participation at affordable costs; pedagogic and organisational reforms are needed that generate costs per learner below 15% of GDP per capita at primary, 20% at lower secondary and 25% at upper secondary levels. Adequate numbers of qualified teachers need to be financed within a viable public sector budget envelope. This is a fundamental test of a plan's viability but is often omitted.

Recommendation 5. Manage flows of learners
Analyse and monitor flows of learners through systems and into labour markets to identify bottlenecks, zones of exclusion and indicators of inefficiency and exclusion to smooth flows, reduce push-out, manage learning more efficiently, and lower costs per completing learner.

Recommendation 6. Invest in curriculum development and formative assessment
Develop curricula differentiated for different learners and grounded in learning capabilities

and educational outcomes that have utility for development; embed formative assessment into pedagogy and systems for managing learning on schedule, and thus increase the efficiency of flows.

Recommendation 7. Reform high-stakes examination systems
High-stakes examination systems need to be reformed to reduce their adverse effects on narrowing curricula, generating shadow school systems, increasing costs of education to households, and triggering drop-out and push-out related to low performance; managing the under-performance of learners is as important as managing examination success.

Recommendation 8. Generate decision-oriented information systems
Revitalise information systems that link data collection and analysis to decision-making and allow iterative development planning that includes frequent feedback and adjustment linked to agreed indicators of progress and judgements of that which cannot be measured quantitatively.

Recommendation 9. Promote fiscal reform
Promote fiscal effort to invest more in public education systems and enhance domestic revenue arising from economic growth, greater yields from existing taxation, fiscal drag, growth in modern sector employment and withholding taxes , more revenue from value-added tax (VAT) and general sales tax (GST), modernisation of property taxes, expanded natural resources and extractive industry levies, more efficient corporate tax collection, and anti-corruption measures including Tax Identification Numbers (TIN) and a General Programme for Money Laundering (GPML). The ambition is to encourage development strategies that reduce financial dependence and accelerate progress towards fiscal state status.

Recommendation 10. Develop new and more catalytic modes of external assistance
Develop modes for external assistance that promote catalytic aid that accelerates educational development within a framework of sustainable financing from domestic revenue. This would focus on system-level changes that are resilient with an enduring impact on efficiency and effectiveness and outlast grants and concessional financing. New modalities have to recognise that grants cannot finance recurrent expenditure safely or sustainably, and that lending is limited by indebtedness and prudent borrowing against future revenues.

Throughout these recommendations runs a concern to identify and adopt catalytic approaches to educational development that seek to identify opportunities to accelerate progress towards more efficient and effective systems that can be financed largely from domestic revenues. The analysis highlights many opportunities to nudge system-level changes that would generate large gains in performance at modest cost – what can be called low-cost levers for sustainable change. Chapter 7 provides a preliminary list of possible avenues for catalytic intervention. More are listed in Lewin (2020a). They are relevant to both domestic and international educational financing. They fall into two main clusters of interventions.

Sections 7.1 and 7.2 identify countries that fall into financing traps, and unpack whether this is a result of lack of political will to allocate public expenditure to education, or whether it is because overall government spending is too low. Small increases in budget allocation and increments in the total volume of government expenditure are likely to have much more effect, and more likely to be sustainable, than interventions that are not catalytic and which do not result in sustained changes. Increases in revenue generation from more efficient collection, progressive taxation

of income and other fiscal measures can be very cost- effective. Positive economic growth will also be fundamental to medium-term prospects for adequate education financing and can dwarf other sources of additional resources where it is sustained. Section 7.7 elaborates on the importance of developing mechanisms that increase the number of fiscal states able to self-finance most of their own recurrent costs for public services. Pathways forward are different for different countries and have to be configured with this in mind.

Sections 7.3 to 7.6 identify four arenas that have an impact on efficiency and effectiveness that can be the subject of catalytic approaches to transitions that support more equitable learning and its translation into sustainable development outcomes. Section 7.3 illustrates how critical managing the flows of learners is to financial demand. Many systems could enrol as many as twice the number of children at little additional cost; smoother flows would reduce the number of years of schooling needed to produce a successful school leaver. Some of the necessary changes have low costs relative to the benefits – e.g. automatic promotion, reform of high-stakes examination-linked bottlenecks, learning materials development.

Section 7.4 suggests that the targets for OOSC are revisited since the rationale for enrolling all children from pre-school to grade 12 has unsustainable costs, is practically unattainable in the near future, and has no basis in economic development theory. A more measured set of targets phased to reflect real-world costs and constraints and tailored to resolve OOSC issues in a single generation by ensuring appropriate completion rates at different levels is attractive. It is likely to be cheaper to act through the school system than to develop parallel programmes for those who have dropped out. Gap-fixing approaches fail because they repeatedly treat the outcome of poor-quality schooling, i.e. being out of school, rather than address the causes of that drop-out once and for all.

Section 7.5 focuses on the financing of teachers. The variation between countries in how teachers are financed and deployed is so wide that it prevents simple synthesis. The analysis shows how the cost of salaries is linked arithmetically to key cost drivers, and locates where some inefficiencies may arise. Within systems there is scope for many catalytic interventions including attention to deployment, timetabling and time on task, management strategies to deliver quality learning consistently, and incentives to manage teachers more efficiently. All could generate large gains in performance.

Section 7.6 reviews the structure of school systems and draws attention to differences between countries which have cost implications. Changing structures needs investment but should have benefits that outweigh costs. It also has implications for the balance of public investment in education, especially where tertiary-level programmes are many times more expensive than at lower levels. All high-enrolment countries have found ways of limiting costs per student at higher levels to a small multiple of those at lower levels.

8.5 In conclusion

Education financing in SSA is at a watershed. If the next decade is like the last two, the SDG4 targets for 2030 will not be met and financing will remain stagnant at levels far short of what is necessary. UNESCO is projecting that benchmark spending will remain at about 4% of GDP and 15% of the government budget in SSA (UIS/GEMR, 2022b: 136). This is far below the minimum needed for SDG4 of 6% of GDP and 20% of the government budget. Precious domestic revenue needs to be complemented by aid focused on catalysing development that can be sustained with the resources available. A return to consistent economic growth is likely to be central to sustainable gains in access and learning along with appropriate fiscal policy. Aid effectiveness principles need to be revitalised to reflect growing sentiments that ownership, alignment, harmonisation, managing for results, and mutual accountability are central to durable outputs and outcomes as enshrined in the Paris accords on aid effectiveness.

The basic arithmetic of education financing makes a compelling case to use domestic resources, grant aid and concessional financing to enhance efficiency and effectiveness, and facilitate the development of fiscal states that can mobilise sufficient domestic finance for education. The challenge to the Bretton Woods institutions, and to bilateral development partners, is to provide more aid of a different kind than in the past to catalyse system-level changes that accelerate progress and reduce future dependence on aid. The Transforming Education Summit of the UN in September 2022 has to rise to the challenge posed by the lessons from past initiatives. Financing 'gaps' need durable solutions so that they cease to persist. More resources should be directed towards catalytic reforms that lead to educational development that is financially sustainable. This really would be a game changer to escape the low-financing trap, match aspirations to achievable goals, and promote endogenous development strategies that can translate educational development promises into development realities.

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