

Flagship Report Paper Series

Paper 4: How to use revenues from extractive industries to improve health and education in Africa



AFRICAN DEVELOPMENT BANK GROUP

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Preface

History shows that an abundance of natural resources does not necessarily improve a country's human development. How can governments turn new discoveries of natural resources into outcomes that matter for their citizens – including better health, better education, and access to quality social services?

Most governments have expressed a commitment to turn revenues from new natural resource discoveries into outcomes that matter for their citizens: better health, better education, and access to quality social services. They also want to make sure the discovery of extractives translates into more and better jobs and business opportunities. Yet they are also aware that delivering on those commitments demands tough and sometimes complex policy choices, including balancing the need for social sector investments with the needs of other sectors across the economy, being transparent and carefully managing citizen expectations, and adequately distributing benefits both between extractives and non-extractives communities and between current and future generations.

In light of these challenges, the African Development Bank (AfDB) and the Bill and Melinda Gates Foundation (BMGF) came together to produce a joint Flagship Report: *'Delivering on the promise: Leveraging natural resources to accelerate human development in Africa'*.

This paper is one of a series of eight in-depth technical background papers which supported the development of the flagship publication. While each background paper can stand alone, they also build on each other. Paper 1 sets out a framework for understanding four key channels through which natural resources can translate into improved human development: 1# public spending on health, education, and social protection; 2# public spending aimed at fostering growth and economic diversification; 3# industry spending on infrastructure, procurement, skills, and employment; and 4# companies' spending on social investments. Paper 2 estimates the likely timing and magnitude of revenue from new discoveries of oil, gas or minerals in six African countries: Ghana, Liberia, Mozambique, Sierra Leone, Tanzania, and Uganda.

The next three papers examine the public spending channels described in the first paper. Paper 3 discusses the macroeconomic risks and policy choices associated with an influx of new revenues from natural resources. Paper 4 explores the potential of new revenues to improve health and education services, comparing the expected scale of revenues to financing needs in the six featured African countries and introducing a diagnostic framework for policy choices. Paper 5 looks at the case for using new revenues to fund basic social protection programs, including the potential to boost demand for health and education services.

The final three papers examine the industry activity channels described in Paper 1. Paper 6 looks at how policies on local content can leverage spending on extractives industry projects to create more broad-based economic growth. Relatedly, Paper 7 explores the policy choices involved in leveraging extractives projects to build skills and human capital. Finally, Paper 8 asks how governments and industry can maximize the human development impact of companies' social investment, a relatively small but potentially important part of company spending in extractives industry projects.

To access the Flagship Report and the other seven background papers presenting complementary in-depth discussions of the policy choices described in this paper, readers are encouraged to consult the dedicated website at: www.NaturalResourcesForHumanDev.org.

Paper 1 – A framework: Human development and the links to natural resources

Paper 2 – Timing and magnitude of new natural resource revenues in Africa

Paper 3 – Natural resource revenues and macroeconomic policy choices

Paper 4 – How to use natural resource revenues to improve health and education in Africa

Paper 5 – How to use natural resource revenues to enhance demand for public services through social protection

Paper 6 – Creating local content for human development in Africa's new natural resource-rich countries

Paper 7 – Leveraging extractive industries for skills development to maximize sustainable growth and employment

Paper 8 – Extractive industries and social investments: Principles for sustainability and options for support

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Disclaimer

This series of papers focuses on one part of the extractives debate and reflects research gaps identified by the contributors within their areas of expertise. The contributors are not held responsible for the views expressed in this report. This paper is based on research, analytics, and expert consultations completed during the writing of the eight background papers. However, this paper should not be considered as an alternative to in-depth technical expertise. Any mention of specific entities, individuals, source materials, trade names, or commercial processes in this publication does not constitute endorsement by the AfDB or the BMGF.

Key messages

- **The case for investing new natural resource revenues in health and education is strong.** It rests on evidence showing a high economic return on these investments, the human rights guaranteed by most constitutions, and the development plans of national governments.
- **Natural resources could meet a significant proportion of financing gaps in the sample countries to provide universal health care and education for all.** For example, if smoothed over the next 30 years (as a share of gross domestic product (GDP)) and devoted entirely to these sectors, Mozambique's projected natural resource revenues could fund either most of its education needs or around a third its health needs; in Ghana they could potentially meet about a third of the country's combined health and education funding needs over the next decade. Natural resources also look very promising compared both with aid flows and with innovative funding sources for health (such as taxes on remittances and mobile phone levies).
- **One of the risks of new natural resource revenue flows is their propensity to distract from results-driven questions ('what do we want to achieve?') and rather focus on expense-driven questions ('we have funds, what should we spend it on?').** Decisions regarding health and education expenditure should be based on a comprehensive diagnosis of the needs of the sector, which in turn is based on the development goals of the country. However, decisions regarding the use of natural resource revenue to invest in national priorities require an alignment of such investments against the scale, trends, and predictability of revenue flows. This paper introduces a diagnostics framework identifying the key questions that should inform such decisions.
- **There is a well-established body of evidence on delivering cost-effective strategies in health and, to a lesser extent, in education.** In both cases, there is a need to identify what makes sense in each country context. For example, in Ghana natural resources could be targeted to extend health coverage to poorer households or to improve education in the northern regions. In Sierra Leone, natural resource revenues could contribute to a general rebuilding of facilities and skills in the health sector, or to meeting the acknowledged funding gap in the government's stated goals on education.
- **There is a risk that natural resource wealth can be more easily captured by elites than funds that come from citizens.** In most ways, spending natural resource revenues on health and education is no different to spending money raised in other ways, such as taxation or aid. But to address political economy risks, additional measures may be needed to ensure that resources are used effectively, transparently, and accountably.
- **There are pros and cons to using social funds for funneling resource revenues to social sectors.** These funds can enable local communities to take the lead in identifying investments to reduce inequities, and their more autonomous nature can protect them from capture by political elites. However, they are still vulnerable to being used as patronage for politicians and administrators if beneficiaries are not organized to demand accountability. There is also a risk that social funds are not integrated with other government systems or that governments divert resources to other uses, producing no net funding gains.

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List of abbreviations

AfDB	African Development Bank
BRAC	Bangladesh Rural Advancement Committee
BMGF	Bill and Melinda Gates Foundation
CCT	Conditional Cash Transfer
DALY	Disability-Adjusted Life Year
EPDC	Education Policy and Data Center
EMIS	Management Information System for Education
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GSFP	Ghana School Feeding Programme
HIV/AIDS	Human immunodeficiency virus infection and acquired immune deficiency syndrome
IMF	International Monetary Fund
MDGs	Millennium Development Goals
NGO	Non-Governmental Organization
NHA	National Health Accounts
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OPHI	Oxford Poverty and Human Development Initiative
OPM	Oxford Policy Management
P4P	Pay-for-performance
PRMA	Petroleum Revenue Management Act (Ghana)
SACMEQ	Southern and Eastern African Consortium for Measuring Educational Quality
SADC	Southern Africa Development Community
SD	Sekolah Dasar (Indonesia)
SWF	Sovereign Wealth Fund
UHC	Universal Health Care

UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	US Agency for International Development
WHO	World Health Organization

1 Introduction

This is the fourth paper in the Flagship Report Paper Series, a joint project between the AfDB and the BMGF. It builds on and feeds into the other papers in the series, as outlined in the Preface above, by exploring the role that new extractive industries revenues could play in improving the supply of health and education services in countries with recent natural resource discoveries. It fills a gap in the literature in relation to experiences, mechanisms, and lessons on how funds from the extractive industries can be effectively spent to improve health and education outcomes in African contexts.

Building on papers 1 to 3, which provide estimates for the size and timing of extractive revenue flows and how they can be managed and allocated from a public finance perspective, this paper makes the assumption that there is a willingness to use some or all of these resources to invest in social development, and in particular in health and education. This paper assesses what governments in countries with new natural resource discoveries need to consider when spending natural resource revenues on health and education to expand and maintain services. In this sense, it complements Paper 5's focus on how to improve the demand side. The paper is based on an analysis of secondary data, the estimated projections of natural resource revenues in Paper 2, and a review of relevant literature.

Given the limited documented experiences in low- and middle-income country contexts in making a direct link between resource revenues and health and education sector development, the paper focuses on providing general guidance as to what seem promising strategies for the use of these funds, given what we know regarding the flows and the health and education sector context. This paper does not provide a comprehensive study of the costs and benefits of specific strategies, as these can be found elsewhere in the wider literature and are also very context-specific.

The Flagship Report Series defines human development as laid out in Box 1. This paper focuses on the dimension of human development related to *equitable* access to quality health and education services. The paper does not seek to identify how skills gaps can be funded through natural resource revenue in the interests of the extractive industries' labor force needs. Rather, the use of natural resource revenues to make progress toward universal health and education coverage is the focus.

Box 1: Defining human development

Many definitions of human development have been historically proposed and used by theorists and organizations to compare countries' progress across time and with each other. The Oxford Poverty and Human Development Initiative (OPHI) states that, 'Human development is a process of enlarging people's choices. The most critical ones are to lead a long and healthy life, to be educated and to enjoy a decent standard of living.' (OPHI, nd) Another commonly-cited measure is the United Nation's Human Development Index, which combines national income per capita with simple proxy measures for health (life expectancy) and education (years of schooling).

OPHI's Multidimensional Poverty Index combines a series of different human development metrics such as the proportion of households with a child of school age who is not in school, an under-five child who is lagging behind on weight-for-age, and access to electricity and improved sanitation and drinking water.

Despite their differences, what all of these definitions have in common is the recognition that monetary measurements – such as national income per capita or the number of people living on a dollar a day – alone do not capture all outcomes worth caring about for societies and individuals. Such is the premise of this series of papers. They ask how can extractives resources be leveraged to fast-track the human development agenda and thus enable broad-based, equitable, sustained growth?

Source: Paper 1 – A framework: Human development and the links to natural resources

The rest of the paper is structured as follows:

- Section 2 provides a summary of the evidence for the wider benefits of investing in health and education systems.
- Section 3 examines the scale of the natural resource revenues that have been modeled and how these compare with estimates of health and educational needs and financing gaps in the sample countries. This permits an estimate of their potential relative contribution.
- Section 4 continues by asking what the overall features of the fiscal space generated by revenues from natural resources are that are relevant from a health and education financing perspective, and what they imply for health and education investments.
- Section 5 analyzes health and education system constraints and the opportunities for scaling up key interventions. Lessons from existing case studies of countries which have used extractive industries' revenues (or other rapidly scaled-up funds) for health and education are presented.
- Section 6 presents a novel diagnostics framework to guide policy-makers willing to prioritize social sector investment.
- Section 7 presents policy implications.
- Annex A sets out the method applied to estimate the financing gaps in health and education in our sample countries. These are based on secondary sources – published and gray, including estimates from other OPM reports – which we analyzed and interpreted.
- Annex B supplements Section 5 and presents summary evidence on 'best buys' in health and education – in broad terms what is known in relation to priority needs and opportunities.

2 Why invest natural resource revenues in health and education?

This section presents two core arguments for investing some or all of the natural resource revenues in the social sectors, as a way of introduction to this paper.

First, all of the sample countries – Ghana, Liberia, Mozambique, Tanzania, Uganda, and Sierra Leone (identified in Paper 2) – have incorporated the ambition to move toward universal health coverage and universal basic education targets within national strategic documents, but still face many challenges in providing adequate resources to meet these goals in the face of high health and education needs (see below).

Second, investing in health and education can improve the growth prospects of a country and deliver very good returns. This can occur through a number of mechanisms:

- **Creating a better-educated and healthier workforce that tends to be more productive.** Health and skills are forms of human capital that determine the value of labor. Thus, raising health and education levels will lead to higher productivity. There are often positive externalities too. For example, treatment for communicable disease will have a greater impact than simply its effects on the productivity of one employee, as onward transmission is interrupted. A 2001 report by the World Health Organization's (WHO) Commission on Macroeconomics and Health estimated that focused health services costing US\$ 27 billion a year could yield increased economic output by some US\$ 186 billion a year by extending the productive life spans of millions of people in developing countries.
- **Developing domestic human capital to help sustain and improve growth through regional and global competition in industries besides natural resources.** If African nations are able to provide education and skills to their young people, the African workforce could account for a significant share of global consumption and production (McKinsey Global Institute, 2010). The correlation between schooling and individual earnings is high in African countries, and a recent study in South Africa using an industry-level dataset found a similarly strong effect for average worker schooling levels on productivity (Burger and Teal, 2014).
- **Capturing the 'demographic dividend'.** A fall in infant mortality in high-mortality populations initially boosts population growth, slowing economic growth. However, fertility then decreases as families choose to have fewer children when they realize that the mortality rate has changed. The reduced child mortality and reduced fertility leads to a short-term increase in the ratio of working-age people (15–64 years) to dependent people (children and people aged 65 years and older), facilitating a higher input of workers per person and an increased level of GDP per capita (Jamieson et al., 2013).
- **Generating knowledge for the future and creating healthier populations.** Educating the next generation on the importance of protecting the environment is an investment in a sustainable planet (UNESCO, 2014). However, education is closely linked to health, as healthier children are more likely to attend school and have greater cognitive capacity for learning. Conversely, improved education is a powerful mechanism of income growth, which in turn allows for greater spending on health care (Jamieson et al., 2013). Better-

educated children and adults are also more informed, and so in a better position to promote and protect their health, thus feeding into the virtuous circle (UNESCO, 2014)

- **Capturing potential temporary macroeconomic externalities.** Healthier and better-educated populations can generate, for example, higher savings rates and increased flows of foreign direct investments (FDI) temporarily. As health improves, life expectancies improve, and people start to save more for longer retirements. This leads to a temporary increase in the net national savings rate, which can improve investment and growth. A healthier workforce also requires less social expenditure and has the potential to attract FDI, bringing in new technology and thereby increasing trade and contributing to job creation (World Health Organization, nd).
- **Building social cohesion and politically stable societies.** This is particularly important in post-conflict and fragile states (such as Sierra Leone, Liberia, and Mozambique). There is a growing interest in the role of health systems as social institutions (Kruk et al., 2010). One line of this work focuses on how the design of a health system, and particularly its financing, conveys important social and political values of the state, such as inclusiveness and equity. Also, a review of the evidence (Eldon et al., 2008) found that health sector activities in fragile states could contribute to social cohesion by:
 - Building state capacity in stewardship, support systems, institutions, and policy;
 - Signaling an increased willingness on the part of the state to act positively on behalf of citizens;
 - Helping to strengthen the legitimacy of state institutions and improving citizen trust in the state;
 - Helping to clarify citizens' expectations of the state, and vice-versa; and
 - Making these expectations more realistic and manageable, thereby strengthening the social compact around health and improving resource management.
- **Contributing to increased economic growth.** For all low-income and middle-income countries from 2000 to 2011, the value of annual increases in life expectancy has been estimated at an equivalent of a 1.8 per cent increase in GDP per year. Also, reductions in mortality account for about 11 percentage points of recent economic growth in low-income and middle-income countries as measured in their national income accounts (Jamieson et al., 2013). This increase in GDP contributes to an expanded domestic revenue base, which allows for further increases in spending on education and health in future years.

In summary, there are strong economic as well as social arguments for investing in improving health and education services and outcomes in the sample countries. Furthermore, studies show that through aggressive scale-up of health services¹ low-income countries could converge with high-performing low-income countries' health outcomes by 2035 (Jamieson et al., 2013). Such convergence could prevent about 4.5 million deaths in low-income countries in 2035, at an annual incremental cost of around US\$ 23 billion per year in 2016 to 2025 and US\$ 27 billion per year in 2026 to 2035.² With use of full income approaches³ to estimate the economic benefits of

¹ This would include existing and new tools to tackle infections and improve reproductive, maternal, new-born and child health.

² Most of these incremental costs are to finance the crucial health systems components (e.g. skilled health workers) that would be needed for the delivery of interventions.

³ Incorporating life years gained and growth in GDP (Jamieson et al., 2013)

convergence, the authors estimate that for every dollar invested, the returns would be nine or more dollars.⁴

⁴ In addition to these effects, other papers in the series address the specific interests of extractives companies in local skills development and companies' social investments (see papers 6, 7, and 8).

3 The potential contribution of natural resource revenues toward current social sectors' needs

This section discusses the potential contribution that new natural resource revenue flows estimated in the six sample countries (see Paper 2 for full details) could make toward spending on education and health.

3.1 Our approach: A brief overview

A real challenge will be for countries to ensure a stable flow of revenue year after year. Sound macroeconomic management will have to address both the bell-shaped curve of the revenues (see Paper 2 for details on revenue projections) and short-term fluctuations in prices. Paper 3 discusses in detail the challenges of successfully using macroeconomic management to 'smooth' resource revenues over time using policy tools such as sovereign wealth funds (SWFs). We therefore use two rather extreme scenarios to simulate whether spending in the health and education sectors can be a feasible option for natural resource-rich governments in Africa. The two scenarios we construct are:

1. The projected revenues are left unmanaged and allocated directly into the budget available for health and education spending; and
2. Government manages revenues from natural resources to create a smooth stream of funds (as a share of GDP) over the next 30 years.

Neither scenario is likely to reflect the actual profile of revenues, for two reasons. Firstly, in reality revenues tend to be partly but imperfectly smoothed over time. Secondly, the mid-point estimates given here could easily be significantly higher or lower based on the direction of international commodity prices (see Paper 2 for more analysis on price sensitivity).

We then analyze the following:

- Resource revenues compared with (a) national health expenditures, based on national health accounts (NHA) data; (2) funding needs, using international recommendations, and estimated health funding gaps; and (3) other potential innovative health financing sources.⁵
- Resource revenues compared with funding gaps to reach the education goals of universal pre-primary, primary and lower secondary education.

This comparison is not intended to suggest that all resource revenues should be allocated to health and education spending – as explored in other papers in this series, there is also a strong case for spending on social protection and strategies to boost economic growth. It is, rather, intended to inform decisions by putting expected revenues in the context of health and education needs.

Our estimates of health and education financing gaps in the six sample countries are based on projections of resource needs and likely expenditure in the two sectors (for a full description of the methods used to estimate the funding gaps in the education and health sectors, see Annex A):

⁵ This information is available for Mozambique and Tanzania.

- **For health**, our estimates of financing gaps are based on systematic costings of health needs.⁶ In the absence of such information, we have drawn on the findings of a recent meta-analysis by McIntyre and Meheus (2014), which recommended that countries spend at least 5 per cent of GDP or US\$ 86 per capita (2012 prices) on public health care, whichever is higher. On the expenditure side, we constructed a financial programming framework for each country that allowed us to project key economic variables such as growth and domestic revenue, and used this to estimate resource availability for health.
- **For education**, our estimates of financing gaps are based on a paper commissioned by the 2010 Education for All Global Monitoring Report. The report calculates education financing needs based on projections of the number of school-age children, teacher salary and classroom construction costs, national targets for pupil–teacher and pupil–classroom ratios, and targets for the proportion of total recurrent costs to be devoted to non-salary spending. The cost of providing adult literacy programs was also accounted for. Resources available for education were estimated on the basis of GDP projections and the ratio of public education spending to GDP (EPDC and UNESCO, 2009).

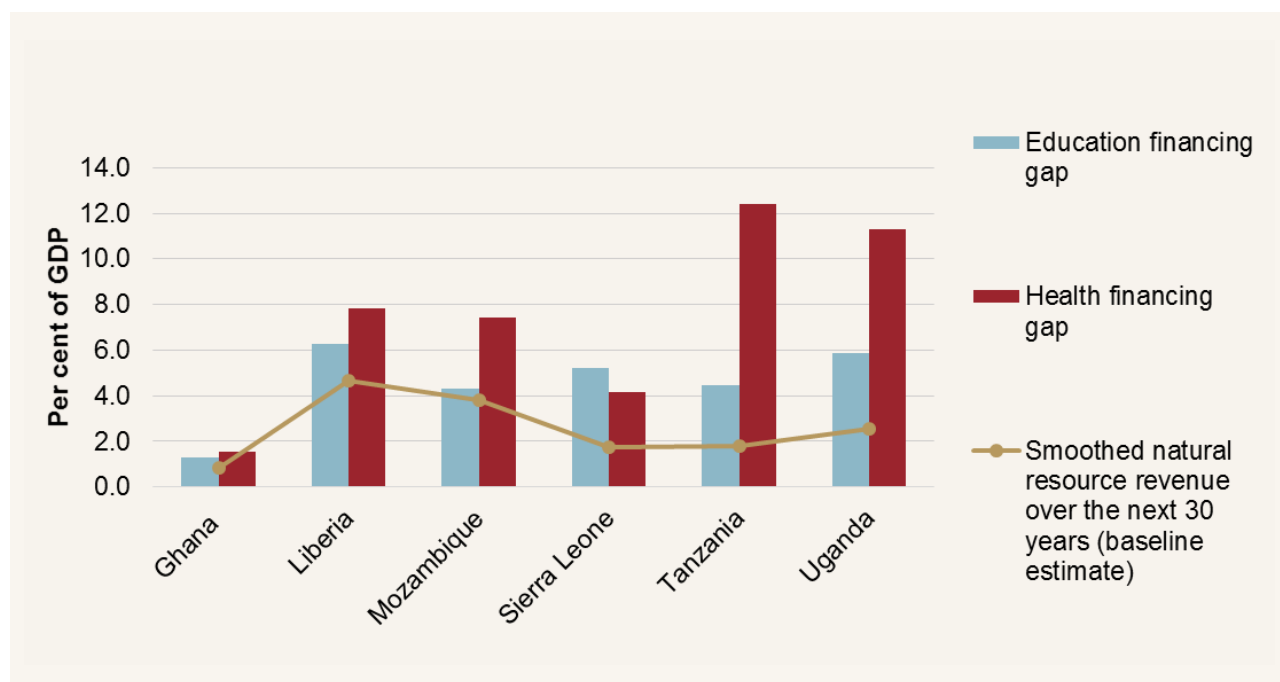
3.2 Comparing findings in health and education sectors

The two extreme revenue management scenarios provide evidence that the scale of income from natural resources across selected African countries in most cases is sufficient to cover some of the financing gaps in health and education (see Figure 1). However, they also show that the potential in each country is unique as both resource revenues and funding gaps differ.

If smoothed over the next 30 years, Mozambique's projected natural resource revenues could fund most of its education needs *or* around a third of the country's need for financing in health over the next decade. In Ghana, they could potentially meet about a third of the country's combined health and education funding needs over the next decade. In the same time period, Liberia could fill about a third of the combined health and education financing gap. Education and health financing gaps in Sierra Leone and Tanzania are large relative to projected revenues, but smoothed revenues could still cover part of the funding gaps in social sectors. In the case of Tanzania this is also due to low levels of projected natural resource revenues estimated to arrive later than in other countries.

⁶ The health financing gap estimates covers the additional costs needed for each sample country to achieve its health-related MDGs by addressing the most critical health system bottlenecks and scaling up a package of highly effective interventions proven to positively contribute to the health-related MDG goals. The relevant MDGs are: MDG No. 1 (Under-nutrition), MDG No. 4 (Maternal health); MDG No. 5 (Child health); MDG No. 6 (AIDS, TB and malaria); MDG No. 8e (the medicines needed for the above-mentioned areas); and interventions that address chronic diseases and essential drugs for chronic diseases, some cancers, neglected tropical diseases and mental health.

Figure 1: Health and education funding gaps compared to smoothed natural resource revenues in the sample countries, annual average 2016 to 2025



Source: Paper 1; authors' calculations (see details in Annex A)

Note: It appears that health funding gaps are larger than education funding gaps. This is partly due to the differing methodologies used to calculate gaps, which is related to available data on current spend and estimated needs for each sector and country.

Variations in oil, LNG and iron prices will most likely impact the baseline, or mid-point, estimates presented above. Table 1 presents an overview of the variations that could be expected if the baseline price is shifted by +/- 25 per cent (for details of this analysis, see Paper 2). In the low price scenario all sample countries could possibly have natural resource revenues available that amount to between a fifth and a tenth of their country's combined financing gaps in health and education – and this is assuming that all revenues are allocated to social sectors.

Table 1: Price variations in smoothed natural resource revenue projections compared to the combined health and education financing gaps

Sample country	New natural resource revenues as a share of total financing gaps in health and education	
	Low price scenario	High price scenario
Ghana	17.6	43.7
Liberia	18.1	65.5
Mozambique	15.6	49.4
Sierra Leone	0.0	36.7
Tanzania	5.4	17.4
Uganda	9.2	20.6

Source: Paper 2; authors' calculations

Importantly, even where revenue projections are of sufficient magnitude to cover many health and education financing needs, in practice it would take time to ramp up such spending due to constraints in institutional and absorptive capacities.

3.3 In-depth analysis of the opportunities in the health sector

Analysis of projected natural resource revenues by country for the next decade show different profiles (see Figure 2 below). Across our six sample countries, the timing, magnitude, and relative importance varies. In Ghana, Liberia, and Sierra Leone new resource revenues are already accruing to government, while in Mozambique, Uganda, and Tanzania revenues are not expected to flow for another four to six years.

These figures give a sense of the changing picture in each country and how much resource revenues could potentially contribute to improving health services:

- In Ghana and Liberia,⁷ natural resource revenues could substantially support health financing. The scale of revenues in Ghana is already very high in relation to the various measures of health needs and expenditures; however, if the revenues are smoothed over the next 30 years (as a share of GDP) then just over half of Ghana's health needs can be covered in the next decade.
- In Tanzania and Uganda the health financing gaps are significant and natural resource revenues are estimated to only contribute to parts of those needs and, most likely, not before the early 2020s; however, smoothing revenues over the next 30 years (as a share of GDP) show that both countries could potentially cover around one-fifth of their health financing needs.
- Mozambique shows a significant dependence on donor funds, which could only really be replaced or supplemented by resource revenues in the next five to ten years; however, looking at the scenario where revenues are smoothed over the next 30 years (as a share of GDP) reveals that there is the potential to cover around half of the funding gaps in health over the next decade.
- Sierra Leone already has revenues flowing today and, if smoothed over the next 30 years (as a share of GDP), this could potentially close almost half of the country's health financing gap.

It should be noted, however, that price variations could impact the baseline, or mid-point, estimates presented above and below in Figure 2. Table 2 presents an overview of the variations that could be expected if the baseline price is shifted by +/- 25 per cent (for details of this analysis, see Paper 2). In Tanzania, higher prices would result in the possibility that almost a quarter of the country's health gap could be closed, and a low price scenario in Sierra Leone could have devastating impact leading to the cancellation of projects: hence a zero contribution to health.

⁷ Projections for natural resource revenue have made an attempt to take account of the Ebola crisis in both countries.

Table 2: Price variations in revenue projections compared to the health financing gap

Sample country	New natural resource revenues as a share of the health financing gap	
	Low price scenario	High price scenario
Ghana	32.2	79.9
Liberia	32.6	117.8
Mozambique	24.6	78.2
Sierra Leone	0.0	82.7
Tanzania	7.3	23.6
Uganda	14.0	31.3

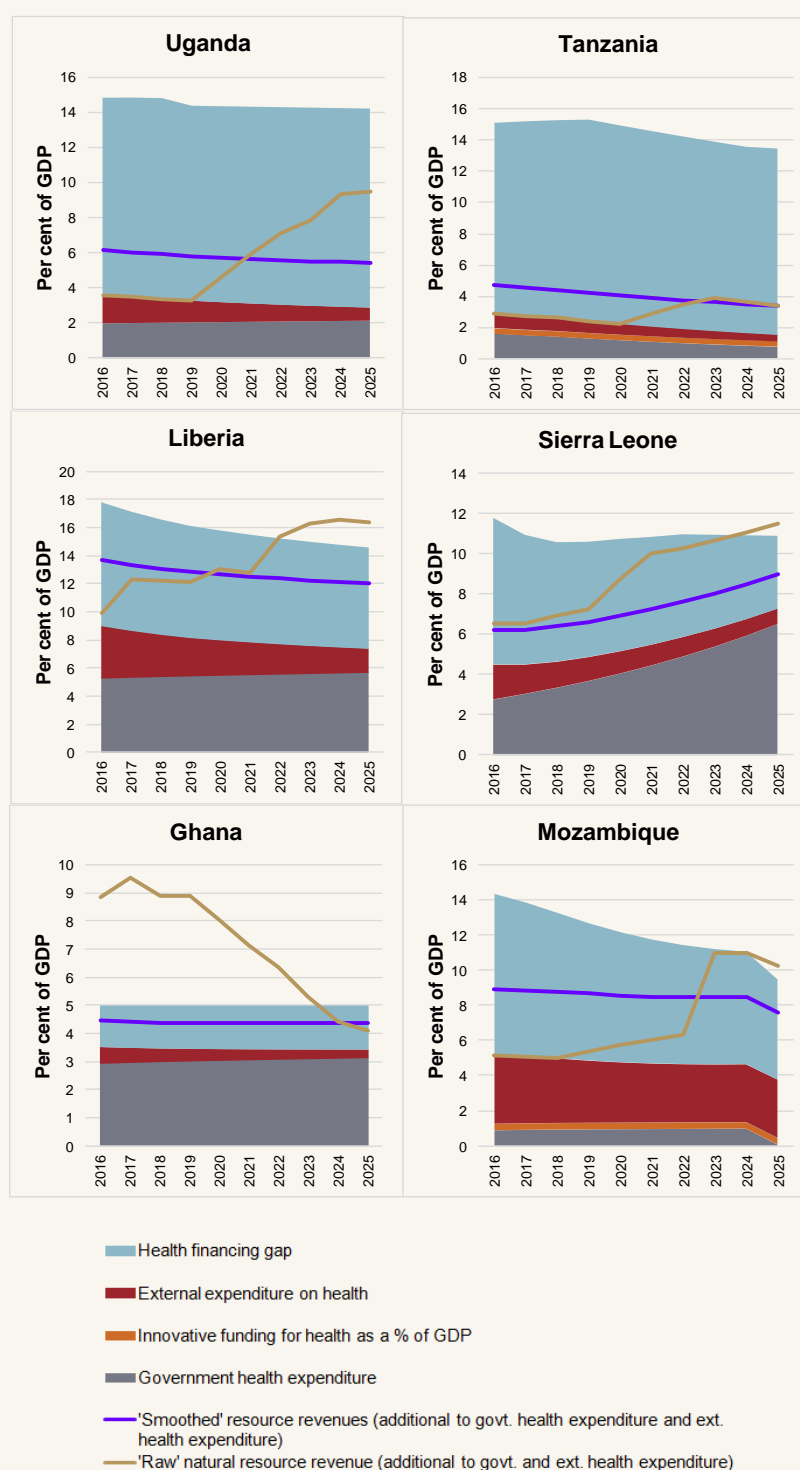
Source: Paper 1; authors' calculations

Overall, the relative importance of new natural resource revenues as a potential source of funding for health is potentially large. Other 'innovative' sources of funding for health (such as taxes on remittances, mobile phone levies, and borrowing using domestic bonds for health) would be much smaller than natural resource revenues – even in the low price scenario – in the two countries where we have estimates of such funding sources (see Figure 2).

It is also instructive to compare the projected funding from external donors for health (see Figure 2's depiction of external expenditure on health) with the estimated natural resource revenues. Several sample countries fund a substantial part of their health sector spend using external funding; however, this is expected to decline in the medium term, creating a gap that natural resource revenues could potentially close. The large scale of potential natural resource revenues compared to donor funding is striking for all sample countries – in particular we observe a cross-over pattern with falling donor support and rising resource revenues. That said, we need to add a cautionary note and emphasize that both data series are best guesses with considerable margins of error.

If we compare natural resource revenues with current government expenditure on the health sector, as opposed to the estimated health needs, which are much more ambitious, then their potential contribution to improvement in health services is even clearer.

Figure 2: Natural resource revenues compared with health sector financing gaps – profile over time by country⁸



Source: authors' calculations (see details in Annex A)

Note: these graphs do not show the price sensitivity of the revenues productions from Paper 1.

⁸ The decline in Liberia and Mozambique's estimated health financing gaps as a share of GDP reflects the fact that both countries are expected to experience very rapid GDP growth over the next decade. This means that although health financing needs in Liberia and Mozambique are expected to rise in absolute terms over this period, they are likely to fall as a share of GDP.

3.4 In-depth analysis of the opportunities in the education sector

Similarly to the analysis of the health sector, the projected natural resource revenues by country for the next decade show different levels of potential – in some country cases this is more significant than in others. Table 3 compares the projected natural resource revenues from 2016 to 2025 in the six sample countries with the estimated education financing gap to achieve Education for All goals (i.e. providing schooling to all pre-primary-, primary- and secondary-aged children).

Table 3: Price variations in revenue projections compared to the education financing gap

Sample country	New natural revenues as a share of the education financing gap	
	Low price scenario	High price scenario
Ghana	38.8	96.2
Liberia	40.8	147.3
Mozambique	42.3	134.3
Sierra Leone	0.0	65.9
Tanzania	20.3	65.6
Uganda	27.0	60.3

Source: Paper 1; authors' calculations

In Tanzania and Uganda, new natural resources revenues could cover part of the financing gap projected, and could be enough to achieve universal pre-primary and primary education in the high price scenario. In the low price scenario (with less available funding), revenues could cover either the financing gap in pre-primary education *or* about two-thirds of the financing gap to achieve universal primary education. The situation in Sierra Leone is similar, but here a low price scenario could mean cancellation of the extractives projects and thereby removal of any potential funding available for education.

In Ghana, Liberia, and Mozambique the situation looks different. Our mid-point estimates for the *total* projected new natural revenues in these three countries would be sufficient to ensure that between two-thirds and three-quarters of the financing gap could potentially be filled, moving close to achieving school attendance for all pre-primary, primary and lower-secondary aged-children. This would mean equipping them with sufficient classrooms, one teacher for every 44 pupils, and the funding to provide the regional standard of learning materials, as well as covering the costs of achieving universal pre-primary education, providing subsidies and supplies to target marginalized pupils, and offering adult literacy programs.

In the high price scenario for Ghana, Liberia, and Mozambique, the total estimated financing gap in education could be closed, and in Liberia and Mozambique there would also be an opportunity to allocate funding to other areas. If all new natural resource resources are allocated to education in this scenario there would also be funding available to introduce dramatic improvements to the quality of the education that pupils receive. However, the low price scenario also shows that in that situation less than half of the financing gap could be filled.

The current size of funds from private philanthropic organizations for education further highlights the potential contribution of new natural resource revenues toward improving education. Innovative

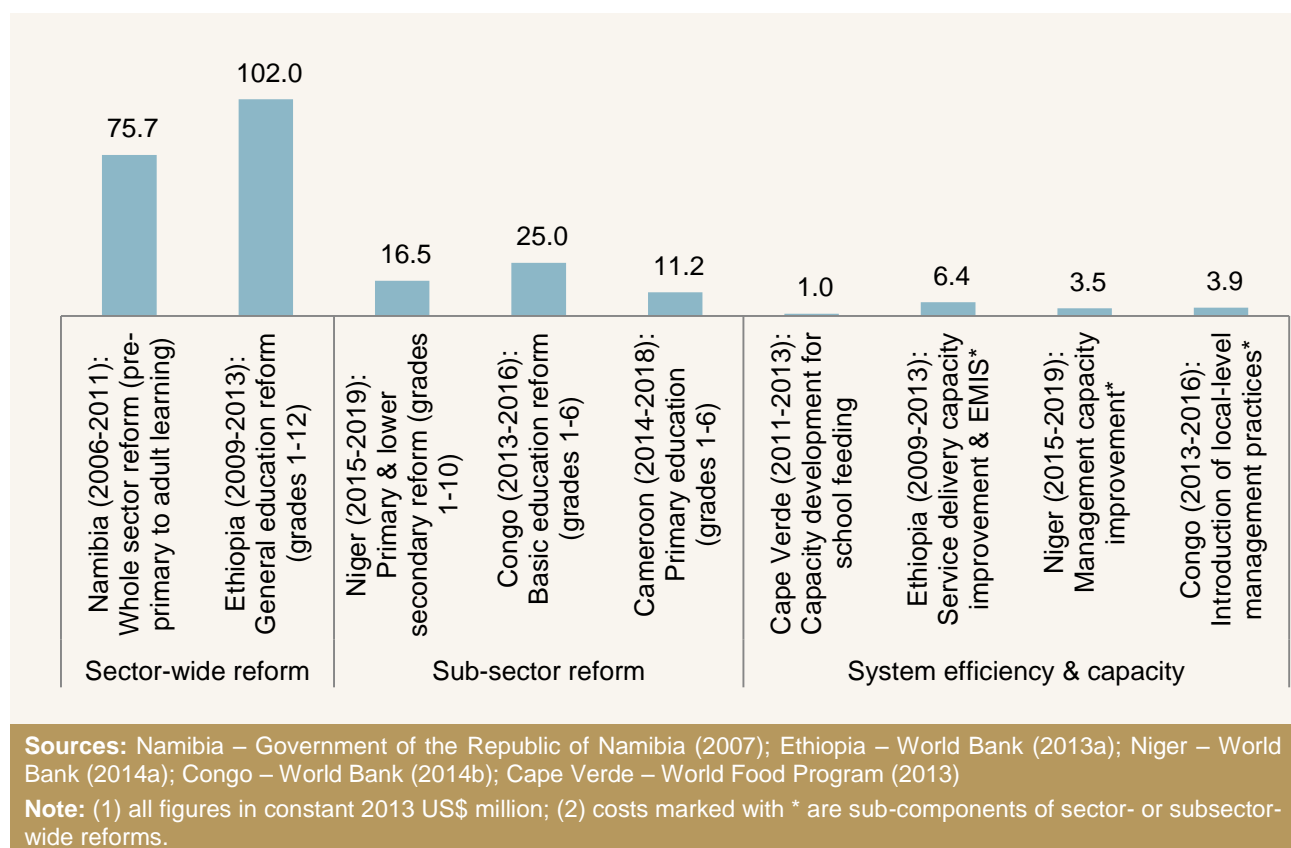
financing in the global education sector is still very limited, as education is still largely perceived to be a public good and, accordingly remains the responsibility of the public sector (Innovative Finance Foundation, 2013). Support provided by the largest private foundations and corporations to education in developing countries is estimated to be just 5 per cent of the size of official development assistance (ODA) to the education sector in these countries (*ibid*).

3.4.1 Costs of scaling up specific reforms in education

The potential for education sector improvements to be funded by new natural resource revenues can be further and more specifically illustrated by examining recent reforms in comparable African countries (see Figure 3). While the reforms were costed for a four- or five-year period, annual figures are presented for ease of comparison. With varying beneficiary populations, these comprehensive system-wide reforms aimed to target both access and quality outcomes. They included teacher training, textbook development and/or distribution, information and communications technology (ICT) strengthening, support for school management, and assessment reform.

The most costly reform considered here – a large-scale program to improve the quality of primary and secondary education in Ethiopia, with a population size larger than all of the sample countries – was just under US\$ 510 million over five years (World Bank, 2013a). Costing approximately 7 per cent of the budget for the entire sector plan, this intervention aimed to move from a focus on access toward improving quality (Federal Ministry of Education, 2008; Federal Ministry of Education, 2010). Its cost could comfortably be afforded from the projected natural resource revenues for all sample countries.

Figure 3: Examples of annual costs of education sector reforms (US\$ million)



4 Natural resource revenues' characteristics and modalities of use in the health and education sectors

Based on papers 2 and 3, this section highlights certain features of revenues from extractive industries that are relevant when making them a potential source of health and education financing. It discusses the characteristics of natural resource revenues, surveys the pros and cons of allocating these revenues to social sectors, and briefly reviews some country case studies of alternative ways of allocating natural resource funding to improve social sector performance.

This analysis shows that using resource revenues for health and education spending presents similar challenges to using funds from other sources, although the political economy risks may be more significant than for other funding sources. These risks are related to the lack of a 'fiscal-social' contract and enhanced expectations on the part of the population of a short-term natural resource dividend.

4.1 Characteristics of natural resource revenues

Table 4 presents the core characteristics of natural resource revenues that we have identified. We link each dimension to some *prima facie* principles for prioritization of available revenues within social spending. This analysis is developed further in Section 6, but first we compare each of the characteristics of natural resource revenues to other sources of funding available for social spending to improve the understanding of whether and how they differ.

Table 4: Revenue characteristics and their implications for social sector spending

#	Core and likely characteristics of 'raw' resource revenues	Implications for social spending prioritization
1	Of medium-term duration (20–30 years)	Investments should create major additional costs only if projected growth rates suggest they can be maintained over the longer term
2	Non-renewable	The investments should benefit future generations as well as current
3	Of varying scale and time profile, with rapid scale-up in some cases	They should be capable of rapid introduction, and acknowledge the risk of potential scale back
4	Volatile in amount and hard to predict, as extraction and world prices will vary over time and may be affected by shocks	Unless smoothing mechanisms can be found, the investments should focus on discrete interventions such as systems strengthening and improved value for money, rather than recurrent costs
5	Associated with weaker accountability to the local or host nation population	Some part should be focused on local communities, who have also had the dis-benefits of extraction. Attention should also be paid to creating transparency and accountability mechanisms

Source: authors

Characteristics #1 and #2. The first two characteristics are not specific to natural resource revenues – all health and education plans need to consider future sustainability, and all of their

investments have positive implications, at least potentially, for future generations, as healthier and more educated parents can pass down these and other benefits to their children.

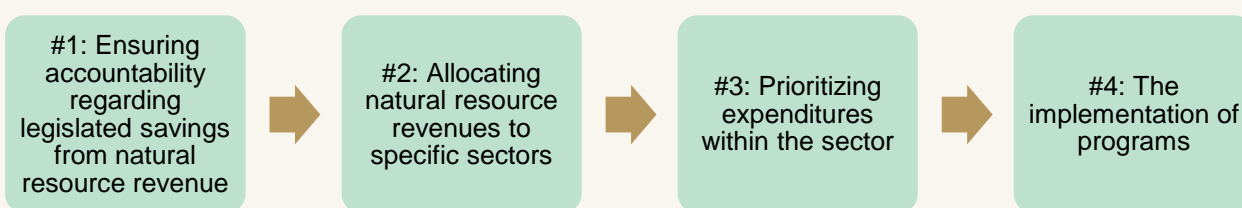
Characteristics #3 and #4. These two characteristics are related to the investment profile of the social sector spending decision, something that can be managed through fiscal and financial management tools before any natural resource revenue is spent. Macroeconomic management of natural resources is not necessarily straightforward (as discussed in more detail in Paper 3), but if course all public income needs to be managed.

Characteristic #5. The most distinctive feature of using revenues from extractives for health and education may therefore be related to its political economy features – a feature that is relevant irrespective of the spending choice. In short, natural resource revenues lack a fiscal-social contract. Natural resource revenues go straight into the national treasury, which makes the social contract that exists between people, as taxpayers, and governments, as providers of public services weak – indeed, it can even break it. One analyst, for example, argues that ‘taxation binds the state with interest groups and citizens [and] legitimacy comes in large part from government delivery of services that people want and need’ (Di John, 2009). This ‘fiscal-social’ contract requires the state to deliver health services to the population and citizens to pay taxes for these services. If this mechanism is absent, as in the case of natural resource revenues, additional measures may be needed to ensure that resources are used effectively, transparently and accountably. A weak or broken social contract is also the case when health and education is funded by external aid; however, donors are arguably able to demand accountability through their own direct mechanisms (using various conditionalities, for example).

Where can political economy risks arise?

Political economy risks exist at multiple points in the spending allocation process: (1) the allocation of natural resource revenue to the specific sector; (2) the allocation of these funds within the sector; (3) the actual implementation of specific programs; and (4) the day-to-day functioning of the sector. An example of the political economy risks is shown in Box 2 using Ghana as an example.

Box 2: Points along the spending allocation chain where political economy risks exist



#1 Ensuring accountability regarding legislated savings from natural resource revenue. In 2011 Ghana passed the Petroleum Revenue Management Act (PRMA), outlining how government oil revenues should be allocated: 50 to 70 per cent has to go into the annual budget, of which 70 per cent is required to go to 11 priority areas, and the remaining 30 to 50 per cent has to go into a SWF. While the PRMA in 2011 was considered innovative and a step toward the transparent management of Ghana’s natural resource revenues, weaknesses in the act resulted in an increase in the spending of oil revenues, previously earmarked for savings (i.e. via the SWF). In effect, the PRMA resulted in transparency without sufficient accountability to ensure savings for future generations (Adam, 2014).

#2 Allocating natural resource revenues to specific sectors. In 2013 citizen-led movements in Ghana protested against the lack of investment in education funded by extractives revenue. This resulted in the Finance Minister allocating US\$ 48 million to education in 2014. However, allocations have been earmarked

for education infrastructure spending, and there is little evidence to suggest that the focus on education infrastructure will adequately meet the needs of the education sector. The allocation of extractives revenue earmarked for specific expenditures within the sector risks inadequately meeting the needs of the sector and also involves a lack of coordination with the Education Sector Plan (Adam, 2014).

#3 Prioritizing expenditures within the sector. The political economy of educational systems in many developing countries lead to access being prioritized above quality in the education sector. Investing in buildings and hiring additional teachers involves increasing spending on political actors, whereas addressing inefficiencies reduces the resources allocated to underperforming political stakeholders (Kingdon et al., 2014). Decentralization often does not occur in practice, despite being a popular reform, as local elites tend to represent the wider community and participate in school affairs. Many programs seeking to increase the quality of education focus on increasing school autonomy and accountability to the local community. Several studies have found that such programs encounter interference from government officials due to their interruption of the established political equilibrium. In order for the programs to be implemented successfully, there will be a necessary shift in power away from the center. Examples include the capitation policy in Ghana and the Primary Education Development Program in Tanzania (Manara and Mwombela, 2012).

#4 The implementation of programs. Within the education sector in Ghana, significant regional inequalities exist. The three northern regions lag behind in terms of poverty and human development, and limited expenditure is targeted toward addressing regional inequalities, despite political rhetoric claiming the contrary. The Ghana School Feeding Program (GSFP) seeks to bridge regional inequalities in primary education but analyses shows that the distribution of power by ruling coalitions within Ghana shaped budgetary allocations to the extent that the actual implementation of the GSFP deviated from this targeted approach and rather reflected the regional distributions of power within the ruling coalition (Abdulai and Hickey, 2014).

Source: Kingdon et al. (2014); Abdulai and Hickey (2014); Adam (2014)

Similarly, the case study from Venezuela (see Box 3 below) shows that risks include rent seeking and elite capture, which could increase social inequalities. Thus, the political economy aspects of natural resource revenues need to be thought through more acutely for spending based on those revenues than for expenditure from general taxation revenues or donor aid.

Box 3: Venezuela: An example of state discretion in direct funding with resource revenues

Since 2003, the government in Venezuela has established a series of social programs, with diverse objectives, funded directly by the state oil company (PDVSA) and administered by the Ministry of Oil and Energy (not the Ministry of Education). As a result, part of the oil revenue has circumvented the normal budgetary process. As these programs did not diminish the government's discretion nor transfer resources to the private sector to improve accountability, they cannot be categorized as examples of direct distribution mechanisms.⁹ However, they serve as an example of using resource revenues outside of the budget – a characteristic of a direct distribution mechanism.

In education, the programs focus on basic adult education (*Misión Robinson*) and remedial high school classes for dropouts (*Misión Ribas*). The quality of the programs has received wide criticism – in contrast to official statements that illiteracy has reduced due to *Misión Robinson*, a household survey collected by the national statistical agency found little to no effect of the program on literacy rates (Ortega and Rodríguez, 2006). More broadly, Penfold (2006) argues that political considerations were behind these programs, and distributing oil revenue to the poor was not their prime objective. Furthermore, Rodríguez et al. (2012) contend that the programs have not suffered as much from rent-seeking and populist pressures as resource revenues channeled through the budget – which highlights that shifting spending off-budget is not a substitute for improving institutions.

Source: Penfold (2006); Rodríguez et al. (2012); Ortega and Rodríguez (2006)

⁹ Rodríguez et al. (2012, pp. 14) define a direct distribution mechanism as follows: 'oil rents would accrue to an autonomous agency, which would be in charge of distributing it as lump-sum cash transfers to all citizens. The government can then tax back a given percentage of each citizen's "oil income". Alternatively, the cash transfers can be distributed after the government has collected its tax share, a type of a priori tax or virtual tax. By broadly taxing citizens rather than an isolated and usually foreign group of oil companies, direct distribution schemes aim to replicate the beneficial effects of regular taxation'.

4.2 Social funds: A viable option to reduce political capture of natural resource revenues?

One mechanism for allocating natural resource revenues to social sectors is through social funds (see Box 4). Social funds exist in over 50 countries: in Latin America and the Caribbean, in at least 24 countries in sub-Saharan Africa, several in the Middle East and North Africa (the Egypt Social Fund is the world's largest), and about a dozen in Eastern Europe and Central Asia. Moreover, such funds are increasing in number (De Haan et al., 2002).

Box 4: Oil resources allocated to health and education in Brazil

In August 2013, following protests calling for better public services the Brazilian congress approved a bill to create a social fund from the drilling royalties that the Brazilian government receives from oilfields in the pre-salt layer. 75 per cent of drilling royalties from the pre-salt programs will be spent on education and 25 per cent on health. In June 2014, President Dilma Rousseff said that exploration of Brazil's pre-salt potential will raise the amount of royalties allocated to health and education to US\$ 271 billion.

Source: Youseff (2014)

Social funds generally balance multiple objectives under the umbrella of improving the living conditions of the poor, including improving social and economic infrastructure, community development, and improving social service delivery. Funds often have the following features: (1) they appraise, finance, and supervise small social projects that are implemented by other agencies, either public or private; (2) they are charged with establishing the procedures and targeting criteria to support pro-poor investments that respond to demands from local groups, within a set menu of eligible and ineligible projects; (3) they often have operational autonomy, and the managing staff are often employed on the basis of performance contracts; (4) they are dependent on external financing; and (5) they tend to be only partially accountable to the central government compared to SWFs, where revenues are allocated to centralized and fully autonomous public bodies (De Haan et al., 2002).

There are both potential advantages and risk factors associated with the decision to create a social fund. Below we list the most prominent reasons why governments could choose to establish a social fund together with the risks associated with such a decision, in particular in countries with weak public institutions – these are often two sides of the same coin and strongly linked (see Table 5).

Table 5: Advantages and risks of social funds to channel resource revenues into social sectors

	Advantages	Risk factors
Local ownership and needs assessments	Social funds can encourage communities and local institutions to take the lead in identifying and carrying out small-scale investments, such as social infrastructure (e.g. schools and health clinics), contributing to local capacity building and buy-in	Social funds can face the challenge of strengthening local capacity to assist weaker and more marginalized groups to be able to organize more effectively and challenge the dominance of elites
Improved health and education services	Social funds can contribute to state-building through improved access if managed properly, by increasing demand (e.g. relieving individuals and families of expenditure burdens for basic services) and improving supply (e.g. developing broader governmental capacity)	Lack of strong coordination between national strategy and social fund programs could challenge the successful improvement in social sectors. It is a concern that social funds work in parallel to conventional government structures but are not integrated into, nor do they influence, the direction of sector programs
More equal societies and commitment to social sector spending	Social funds could potentially reduce social inequities given the built-in pro-poor targeting mechanisms	Ministries often reduce national budgetary allocations to areas targeted and divert these resources to other uses, producing no net funding gains to addressing the problems in question. ¹⁰ Lack of political commitment could undermine longer-term financial sustainability of social programs as natural resource revenues run out
Less rent-seeking	Social funds could potentially reduce risk of fund capture by political elites due to their broadly autonomous nature	Continued risk of patronage by politicians and administrators in key positions in the social fund is still likely, thereby making funds at risk of personal capture before they reach the intended beneficiaries

Source: Hall and Midgley (2004); Springborg (2007)

An important characteristic of a social fund is the potential to reduce rent seeking; however, it is by no means certain that this benefit will materialize. Chad provides an example of the continued risk of rent-seeking by elites: the government of Chad adopted a petroleum management law earmarking 80 per cent of royalties and 85 per cent of dividends for 'priority poverty reduction sectors' – health and social affairs, education, infrastructure, rural development (agriculture and livestock), and environment and water resources. However, with problematic disbursement channels for public finance health centers in Chad received less than 1 per cent of the non-wage funds specifically set aside for them by the Ministry of Health (Wane, 2008). While there are no simple ways of avoiding this, it highlights the importance of putting in place governance systems that separate conflicts of interest between fund management and beneficiaries, clear rules and regulations for fund operations prior to disbursements, and mechanisms for the independent auditing of activities and procurement practices.

Although social funds could in principle increase local ownership of funds and their spending allocation, in the case of particularly vulnerable groups that have no political influence it is unlikely that the provision of safety nets can be left to a demand-driven approach. Proactive, supply-side interventions based on an external diagnosis of needs and a carefully targeted strategy may be

¹⁰ This has been documented in Egypt and Honduras.

more appropriate in such cases. However, this would require a strong political commitment on the part of government, non-governmental organizations (NGOs) and donors alike to allocate the resources necessary and to build in the accountability required.

For countries with newly acquired natural resource revenue, social funds with the lowest rates of external funding (e.g. Chile, Guatemala, and Colombia) have been among the most successful in terms of innovation as they have managed to build government ownership of the social fund set-up process and have also taken steps to build public financial management capacity in the health and education ministries to accompany the setting up of social funds.

Furthermore, we note that natural resources could also be allocated to existing social funds, e.g. funds like Kenya's HIV and Non-Communicable Diseases Trust Fund could be financed using a set percentage of government revenue accrued from natural resources. Allocating resource revenue to the Trust Fund, while encountering the common fiscal inefficiencies associated with earmarking government revenue, may have the advantage of increasing transparency in the use of oil revenue and as such holds the promise of increased accountability (see Box 5).

Box 5: Kenya's HIV and Non-Communicable Diseases Trust Fund

In an effort to tackle its HIV funding gap, Kenya has established a High Level Steering Committee for Sustainable HIV Financing, with the proposal to found an HIV and Non-Communicable Diseases Trust Fund that would pool public and private resources. The proposal aimed to allocate 0.5 per cent to 1 per cent of government revenues to the Fund. As other funding sources become available over time, the public money could be diverted to fund health-related priorities or to expand the National Health Insurance Fund. It has been estimated that the Trust Fund could fill 70 per cent of the HIV funding gap between 2010 and 2020 and 159 per cent of the gap between 2020 and 2030.

Source: UNAIDS (2013)

Alternative funding modalities

Experiences from Indonesia in education suggest that favorable treatment for the areas affected by extractives industries may not be needed if tangible benefits are felt across the country (see Box 6).

Box 6: School construction and access to primary education in Indonesia, 1973–1978

Indonesia lacked democratic and participatory institutions during its first oil boom in the second half of the 1970s. However, although corruption and governance issues were widespread, president Suharto's regime largely shielded the group of high-level technocrats responsible for economic policy from political pressures. Oil revenues were earmarked under direct presidential instructions (INPRES) to finance centrally administered development programs, making up 25 per cent of central government transfers to regional governments (Alisjahbana, 2005). These included the SD (*Sekolah Dasar*, basic education) program.

Between 1973 and 1979, the SD program built 61,807 primary schools – more than one per 500 children (Duflo, 2001). Due to a previous hiring freeze, there were no difficulties in recruiting qualified teachers for these schools. More schools were constructed in districts with a higher proportion of children not enrolled in school, and the central government gave clear guidelines on the allocation of funds and construction of facilities (Booth, 2002). Primary school enrolment rose from 60 per cent in 1973 to 99.6 per cent by 1988. Duflo (2001) estimated the returns to investment from this program, in terms of increased wages, as being between 6.8 and 10.6 percent.

The grant allocation system was highly centralized, with benefits spread across the country rather than concentrated in the oil-producing provinces. Booth (2002) noted that most of the oil came from only two provinces, both small and isolated and without strong regional identities, and that they saw enough benefits to satisfy most inhabitants.

Source: Duflo (2001); Booth (2002); Alisjahbana (2005)

One of the more unusual uses of national resources to support the health sector has been the 'oil for doctors' program established between Venezuela and Cuba (see Box 7). This has been successful in addressing human resources shortages in the former country, while also provoking opposition from Venezuelan doctors.

Box 7: International exchanges of oil revenue for health professionals: Cuba, Venezuela, and Barrio Adentro

Beginning with the adoption of Venezuela's new Constitution in 1999, enshrining access to health care as a human right and the investment of part of the oil rents in health, Hugo Chavez invested a large part of Venezuela's natural resource wealth in health care. The Barrio Adentro program was instituted under the Bolivarian Revolution as a means of providing social welfare and universal health care through sports training, doctors, and health infrastructure investments to the poorest regions of Venezuela. The program proceeded in four stages: Barrio Adentro I focused on assisting the most neglected areas through the reconstruction and staffing of local medical facilities; Barrio Adentro II was focused on building and staffing integrated diagnostic centers and integrated rehabilitation services; Barrio Adentro III, inaugurated in 2005, set out to reconstruct 42 of Venezuela's worst hospitals. The last phase of Barrio Adentro focuses on the construction and staffing of 14 new hospitals.

Barrio Adentro is based on an agreement between Cuba and Venezuela, according to which Cuba receives Venezuelan oil below market price, as well as oil refinery investments, and in exchange provides Venezuela with access to the country's medical services and medical professionals through Barrio Adentro. Under this bilateral effort, also known as the 'oil for doctors' program, Cuba provides Venezuela with 31,000 Cuban doctors and dentists and provides training for 40,000 Venezuelan medical personnel. In exchange, Venezuela provides Cuba with 100,000 barrels of oil per day. Based on February 2010 prices, the oil is worth US\$ 7.5 million per day, or nearly US\$ 3 billion per year.

Muntaner et al. (2006) present empirical evidence suggesting that the Barrio Adentro program has been successful on a range of dimensions. However, it has also faced opposition, including from the Venezuelan Medical Federation, which says that the program is causing unemployment among Venezuelan doctors.

Source: Muntaner et al. (2006); Pan American Health Organization (2006)

Lastly, there is also the investment in health and education funded directly by the extractive industries. Positive impacts can be generated from these efforts, but their ability to contribute to broader systems is generally more limited (Box 8). Please see Paper 8 for a full discussion of companies' social investments.

Box 8: Lessons from local investment experiences: Ghana Newmont Mines' contribution to health services

In 2013 Newmont's support to health at the Akyem mine was reviewed. The review found that the strengths of the support to health included strong and consistent community engagement, wide stakeholder consultation in the design of services, strong bi- and multilateral partnerships including with government at the district level, and a broad approach taken to health, integrating HIV/AIDS, water and sanitation and other medical services. The utilization of health services increased considerably and from 2009 to 2012 the number of outpatient department visits per capita more than doubled and from 2009 to 2011 the number of malaria cases decreased.

While this project was limited in scope it provides relevant lessons regarding the local investments into health service delivery. One of the key weaknesses of the intervention was the lack of health systems strengthening, which resulted in inadequate levels of joint planning and data sharing with the health sector and year-by-year planning, rather than employing longer-term strategies.

Source: Mining Health Initiative (2013)

5 Challenges of scaling up in health and education

Lack of finance is by no means the only constraint to scaling up health and education services. Constraints operate at a number of levels, from the community to service delivery, sector aspects, public policy, and wider institutional issues. There is a considerable body of literature on these constraints, and on strategies to address them, including through systems strengthening. This literature is briefly summarized in this section and explored in greater detail in Annex B.

Importantly, the different investment profiles of spending in health and education together with the need to ‘cascade’ new programs (instead of going to scale quickly) increase the risk of implementation failure. However, the needs can be fitted to the profile of natural resource revenues. First, many of our sample countries will see natural resource revenues grow gradually over the next five to ten years. Second, as discussed above, with sound macroeconomic management in place the actual shape of the resource revenues in the budget will be somewhere between ‘raw’ and (perfectly) smoothed revenues.

5.1 Costs are largely recurrent

Some systems-strengthening strategies involve new and considerable (largely recurrent) costs, such as the costs of supporting community health workers to deliver new integrated promotive and preventive programs. Others focus on changes to processes, which may not be very financially costly (some may be cost-saving eventually) but which will require time and enhanced capacity.

Current public expenditure in the health and education sectors in the sample countries is skewed toward recurrent costs (see Table 6). This indicates that natural resource revenues will need to primarily support recurrent expenditure, as this is the bulk of the sector needs, even if strategies are also used to increase the efficiency of the sector and to support diverse delivery systems. For education, the range is from 73 per cent in Mozambique to nearly 99 per cent in Sierra Leone, the bulk of which is absorbed by salaries (the only exception being Liberia, where non-salary recurrent costs are slightly higher as a percentage). For health, the breakdown is more limited and the range of recurrent costs wider, going from 37 per cent in Liberia¹¹ to 92 per cent in Ghana.

¹¹ It is possible that the post-conflict setting has generated the relatively higher investment costs in Liberia, but this does not hold true for its education sector, which should be equally affected.

Table 6: Education and health expenditure by type as per cent of total public expenditure (latest years)

Country	Recurrent expenditure			Capital expenditure
	Total	Salaries	Non-salaries	
Education				
Ghana (2010)	81 %	67.1 %	13.9 %	19 %
Liberia (2008)	88.8 %	41.4 %	47.4 %	11.2 %
Mozambique (2006)	73.2 %	.	.	26.8 %
Sierra Leone (2011)	98.7 %	74.3 %	24.5 %	1.3 %
Uganda (2009)	87.1 %	70.8 %	16.2 %	12.9 %
Tanzania (no data)
Health				
Ghana (2012)	92 %	.	.	8 %
Liberia (2013/14)	37 %	.	.	63 %
Mozambique (2011)	80 %	.	.	20 %
Sierra Leone (2009)	61 %	.	.	39 %
Uganda (2009/10)	48 %	.	.	52 %
Tanzania (2009/10)	77.7 %	.	.	22.2 %
Source: UNESCO (nd); Danida (2012); Magidu et al. (2010); Quist et al. (2010); Republic of Liberia Ministry of Finance and Development Planning (2014); Save the Children (2012); World Bank (2010)				

5.2 Scaling up health services: Moving beyond financing issues

As well as more financial resources, to scale up the access of the world's poor to essential health services also requires 'a bold process of health system strengthening' (WHO, 2001). This is particularly true where efforts are made to integrate services, rather than merely developing vertical programs for specific disease areas.

Fragmentation is a common constraint: programs may fail to build wider capacity or even undermine it through poor harmonization between donors and government, institutional divisions in the public sector, and inappropriate division or overlapping responsibilities between central and local levels of the health system. Some areas of weakness can only be addressed gradually over time, such as a need to train more doctors.

Addressing these structural challenges requires political will, strategic vision, and some room for maneuver, which funding can assist. As health systems are complex and adaptive organisms, the outcome of reforms is inherently somewhat unpredictable, and they should be undertaken iteratively, with constant adjustments over time (Paina and Peters, 2012). As summarized in Table 7, Hanson et al. (2003) have proposed that constraints to scaling up in the health sector operate at five levels: the community and household; health services delivery; health sector policy and

strategic management; public policies cutting across sectors; and environmental and contextual characteristics.

Table 7: Constraints to scaling up in the health sector and some possible strategies

Level	Common constraints in the health sector	Possible strategies
Community and household	Lack of demand for a health intervention or physical, financial, or social barriers that limit its utilization.	Health education and social marketing; Engaging community health workers and employing outreach strategies; Promoting community participation in health planning and implementation.
Service delivery	Lack of infrastructure and equipment; Inadequate drugs and medical supplies; Shortages and poor distribution of qualified staff; Weak management and technical knowledge; Inadequate supervision.	Additional funds; Reforming systems for managing resources and providers; Improving distribution, range of skills, motivation and individual performance of health workers; Addressing the weak capacity for planning and managing human resources in the health sector.
Health sector	Weak and overly centralized systems for planning and management; Weak incentive structures to use inputs efficiently and respond to user needs; Weak policies and systems for drug supply; Inadequate regulation of pharmaceuticals and private sector providers; Lack of coordination across sectors; Limited engagement with civil society; Reliance on donor funding that reduces flexibility and ownership.	These barriers are much less amenable to buy-out through the provision of additional funds and there is relatively little evidence on how to address them.
Public policy	Success in achieving improvements in health outcomes will also depend on efforts undertaken in other sectors. For example, ministries of economic planning and finance have a role in ensuring health is well reflected in poverty reduction strategies and medium-term expenditure frameworks. Ministries of labor, education, and the civil service can influence the pay and conditions, training, and retention of health workers, while ministries of trade and industry may affect access to drugs and other supplies.	
Wider context	Contextual factors, including the overall levels of education, housing, transport, water, and sanitation, can impact on health needs, health-seeking behavior and ultimately health outcomes.	

Source: adapted from Hanson et al. (2003)

Hanson et al. (2003) also highlight equity concerns: it may be most efficient to achieve higher levels of coverage by expanding access to 'easy-to-reach' groups, typically in the middle-to-upper socioeconomic groups and in urban areas. However, this risks overlooking the poorest and most vulnerable populations and widening inequalities in health outcomes.

One successful example of overcoming problems of absorptive capacity by using a 'cascade' approach comes from Tanzania. In a national scale-up program for adolescent reproductive health services, regional trainers supervised district trainers, who in turn trained teachers and health workers (Renju et al., 2010). The model succeeded in scaling up the intervention to at least three-quarters of intended schools and health facilities in four districts of the country.

5.3 Scaling up education services: Beyond financing issues

The literature on challenges to scaling up interventions in the education sector reveals that they are broadly comparable to those in the health sector. Sternberg et al. (2013) summarized these challenges in two categories:

(1) Difficulties associated with whether a particular intervention or program is suitable for up-scaling. Difficulties experienced by evaluators when seeking to evaluate whether a particular intervention is suitable for scale-up include contamination effects (see Kremer et al., 2002), ethical considerations regarding assigning schools to control groups, and ensuring external validity in education research and aligning evaluation design needs with implementation realities (Hutchison and Styles, 2010).

These difficulties are especially pronounced in education evaluations as ‘learning’ is a complex outcome to measure. Targets tend to be calculated by benchmarking basic skills and counting the number of pupils above and below the benchmark, which raises equity risks similar to those mentioned above in regard to health – the temptation is to make efficient improvements by focusing investments on pupils who are just under the benchmark, widening gaps to the most marginalized groups, where greater investments would be required.

(2) Difficulties associated with the geographic, economic, and social context of the up-scaling. It can be difficult to determine the extent to which the contexts of the programs being evaluated are representative of the contexts in which they are being considered for scale-up, for example in terms of characteristics of schools, pupils, or implementing agencies. Box 9 describes an example from Kenya in which the government ran into system-level challenges when attempting to scale up an NGO program that had been found to be highly cost-effective in one part of the country but that compromised its effectiveness.

Box 9: Government vs. NGO implementation of a contract teacher program in Kenya

The provision of contract teachers is the most extensively tested, successful intervention to raise student learning in primary schools. Exposure to an NGO-managed contract teacher program in government schools in Western Kenya was found to raise test scores by 0.21 standard deviations relative to being taught by civil service teachers. Similar positive results had been observed in urban India and also (though smaller in effect size) in a state-wide program in Andhra Pradesh. The experimental design of those studies could attribute the effect to the contract teachers themselves rather than a reduction in class size.

In 2009, the Kenyan government announced a nationwide contract teacher program that would eventually employ 18,000 teachers. As part of its pilot, 192 schools were chosen from all eight provinces: 64 to the control group, 64 to receive contract teachers as part of the government program, and 64 to receive a contract teacher under the coordination of the local affiliate of an international NGO. Bold et al. (2013) found positive and significant effects of the program only in schools that received a contract teacher from the NGO, with an increase in test scores of approximately 0.18 standard deviations. Treatment effects in schools that received contract teachers from the Ministry of Education were 'significantly smaller and indistinguishable from zero'.

The study's authors attributed the absence of an effect from the government-led intervention to two key factors. First, government-hired contract teachers experienced longer salary delays and these delays were significantly and negatively correlated with improvements in pupil test scores. Although not correlated with pupil test scores, schools in the government treatment arm also received fewer monitoring visits and hiring of contract teachers in government schools showed more evidence of nepotism and local capture. Second, there was evidence of general equilibrium effects through political economy channels. The prospect of a nationwide contract teacher program provoked organized resistance from the national teachers union. Government-contracted teachers were more likely to identify with the union – agreeing that it represents their interests – and this identification was also significantly and negatively correlated with pupil score improvements.

Source: Bold et al. (2013)

Based on a review of the experiences in countries that have taken over donor-originated school feeding programs, Bundy et al. (2009) identified three main preconditions of success that are relevant to scale-ups of education interventions – identifying financing, mainstreaming in national policies and plans, and expanding implementation capacity through investments (of both money and time) – in areas such as assessments, training, infrastructure, information management systems, and equipment. These conclusions closely reflect the requirements for up scaling discussed above, in relation to the health sector.

Strategies to strengthen the different institutions involved in delivering education programs should be planned in a systematic way, based on a capacity gaps assessment, be context-specific, and be properly monitored. Institutional capacity gaps are critical but more difficult to address than individual capacity gaps, as they are more socio-cultural than technical and take longer to achieve impact (Potter and Brough, 2004). Ultimately, improvements in education service delivery has to be come from those who are responsible for its delivery.

6 Prioritizing investments in health and education programs

In this section we present a novel diagnostic framework to help prioritize investments in health and education, using natural resource revenue and sector parameters. This addresses the important risk features of new revenue flows: the propensity to be distracted from results-driven questions ('what do we want to achieve?') and rather focus on expense-driven questions ('we have funds, what should we spend them on?'). This section also considers evidence around the constraints to scaling up spending in the health and education sectors. Specifically, we analyze how these may be overcome and how they relate to natural resource revenue characteristics.

The framework is then applied to two sample countries to illustrate how it could guide policy-makers' thinking in specific contexts.

6.1 A diagnostic framework for spending natural resource revenues on social sectors

The diagnostic framework brings together what we know about new natural resource revenues, the needs for funding, the systems constraints, and the existing experiences across the health and education sectors, to discuss what approaches are likely to yield good results in our sample countries (and by implication, in other low- and middle-income, often fragile, contexts).

Preconditions for the application of the framework are:

- A willingness to invest in health and education, without which the framework is redundant; and
- A situation in which health and education expenditure is based on a comprehensive diagnosis of the needs of the sector, based on the development goals of the country.

On such a basis, decisions regarding the use of natural resource revenues to invest in national priorities require an alignment of health and education investments against the scale, trends, and predictability of natural resource revenues. The scale of investments needed is quite straightforward and relies on matching the costs of investments against revenue flows. Predictability of revenues is less straightforward as volatility is a likely consequence of the uncertainty of future resource prices and demand (Stevens et al., 2013).

Future revenues are merely one dimension of the diagnostics framework. It also focuses on three additional dimensions: the national context in health and education, the health and educational financing context, and system diagnosis of social sectors. All four dimensions should be analyzed when making decisions around the allocation of funds to the health and education sectors. It is important to note that the diagnostics framework does not provide guidance as to how governments should allocate funding between sectors – only within each social sector. The full framework is shown in Table 8.

Table 8: Diagnostics framework – investing natural resource revenues in the health and education sectors

Core question	Range of answers	Implications
Natural resource revenue characteristics		
Scale of expected resources	High (more than 60 per cent of public health and education expenditure)	Can fund major new investments and/or restructuring, as well as core inputs
	Medium (20–60 per cent of public health and education expenditure)	Can fund core inputs and system strengthening
	Low (less than 20 per cent of public health and education expenditure)	Can fund marginal improvements
Volatility of resources	Government able to smooth out volatility	Can take on expenditures that are recurrent
	Government not able to remove volatility	Better suited to funding capital investment and discrete reforms or system strengthening
Duration of resources	Short term (5–10 years)	Cannot be used for recurrent expenditures, unless real GDP growth per capita is assumed to be strong at the end of the period
	Medium term (10–30 years)	Can commit to longer-term investments
	Long term (> 30 years)	
National context		
Coverage of health and education systems	Established, mature health system which can be accessed by all, within WHO norms; Established education system with universal access to early childhood and basic education	Focus on improving quality, efficiency, and equity
	Health and education infrastructure still rudimentary or in recovery from wars and/or shocks	Focus on getting full coverage of basic services – including infrastructure development, increased staffing, equipment, etc. During recovery focus on reconstruction and peace-building through inclusive health and education systems
Priorities established in a national plan	There is a medium-term expenditure framework, national health financing strategy, or education sector strategic plan	Fund priority areas within plan which are not yet supported by existing resources
	There is no medium-term expenditure framework, national health financing strategy, or education sector strategic plan.	Conduct assessment, using tools like OASIS (in health), Education Sector Review, etc. to establish priorities
Health and education financing context		
Financial protection	Financial protection for health care expenditures is adequate (e.g. less than 20 per cent of total health expenditure is paid out-of-pocket); Mechanisms are in place to offset household expenditure for the poor (e.g. household stipends or school grants).	Check for inequities (are all groups protected or does the average mask substantial differences?). Focus on improving quality of care, efficiency, and equity of access and utilization

Core question	Range of answers	Implications
	Financial protection is currently inadequate	Fund extension of universal health and education coverage, e.g. through increased public budget, funding to other risk pools such as social health insurance, and more effective public–private partnerships (e.g. franchising, social marketing, etc.)
Trends in other funding sources	The main other financial sources (government funding and external support, for example) are likely to be maintained and increased over the period	Natural resource revenues can be seen as supplementary, and can focus on currently neglected areas (e.g. unfunded areas within the sector plan)
	The main other funding sources are projected to decline over the period	Natural resource revenues will need to substitute for current sources and will fund some of the existing commitments
Earmarking	Within government, there is a willingness to earmark funds	Natural resource revenues could be put within a ‘national health fund’ or ‘national education fund’, to be used for priority areas, especially those which are harder to get external support for
	There is no willingness to earmark funds	Each year, the sector needs to present its case for additional funding
Bottlenecks in public finance	Health and education facilities receive adequate funding to cover essential salary and non-salary recurrent costs on a regular, reliable basis	Funds can be invested in existing system, which is able to channel resources to front-line providers.
	Funds at facility or school level are not adequate, regular, or reliable	Consider reforming funding of facilities (using capitation or a combination of input, output and quality measures)
System diagnosis of social sectors		
System preparedness to meet new needs	The system is resilient to shocks and able to adapt to new needs	Funds should go to improving and extending range of services, rather than systemic investments
	There is evidence of a lack of resilience and adaptability	Systemic investments are needed, including possibly re-organization, which can improve local stewardship (e.g. decentralization, increased autonomy), as well as developing supportive national systems
Areas of greatest need in terms of health and education system building blocks	Adequacy of indicators and performance of: <ul style="list-style-type: none"> - Human resources - Supplies and medicines - Infrastructure and equipment - Governance - Service delivery - Monitoring and evaluation 	Not all pillars can be supported simultaneously, so priorities need to be established using a systems diagnosis, if not already incorporated in sector plans, to establish reform and strengthening sequence

Core question	Range of answers	Implications
Community engagement and accountability	There are effective mechanisms for local communities to engage with the health and education systems and to ensure the system responds to their needs	These mechanisms do not need additional support but can be used to monitor the use of natural resource revenues
	These mechanisms do not exist or are not effective	Some part of the natural resource revenues should be earmarked to support local planning and monitoring mechanisms
Non-state engagement	Private for-profit, not-for-profit, and informal sectors contribute to public goods, including for poorer households	The natural resource revenues can be focused on funding or extending public provision
	The non-state sector is not well aligned with public health and education policies	The natural resource revenues can fund pilots in changing incentives for the non-state sector and testing new regulatory approaches
Source: authors		

Below we present an initial application of the diagnostics framework to the examples of Ghana and Sierra Leone. A full application of the framework would have to be more nuanced requiring further research. These are two countries where both the profiles of natural resource revenues and the health and education sectors are very different, meaning that the conclusions derived using the diagnostics framework are similarly different.

The example of Ghana

The resource revenues: In Ghana, natural resource revenues could potentially cover substantial investments in the health sector over the medium to longer term, and it is a possibility that the revenues could be smoothed to some degree. Ghana can therefore consider some transformative options, as well as gradually replacing the donor funding that is likely to fall over time and that has historically funded a number of the ‘high-impact’ interventions. Scale-up of natural resource revenues will be gradual, so absorptive capacity should not be a large concern.

In health: Ghana has a mature health system, with reasonable access in most areas. It has been extending financial protection through its National Health Insurance Fund, which is largely VAT (tax) funded (Witter and Garshong, 2009) but which faces a number of challenges to its sustainability, notably the need to control costs through reform of provider payments and to either constrain the benefits package or increase the resource base. Natural resources revenues could be used to extend coverage to poorer households – the current definition of indigents is very restrictive – and to strengthen the currently limited purchasing function in the Fund. As a middle-income country facing a growing burden of non-communicable diseases, Ghana might also choose to set aside a part of the natural resource revenues to boost promotive and preventive care, by increasing the capacity of community-based services like the country’s Community-Based Health Planning and Service to educate communities and stimulate behavior change, while also developing public–private partnerships, for example with employers to promote healthy lifestyles.

In education: While significant gains in enrolment, attendance, and completion have been made over the past two decades, the quality of education in Ghana is a key area of concern. In comparison to other African nations, Ghanaian pupils perform poorly on achievement tests, scoring

well below those from South Africa, Morocco, Algeria, Botswana, Egypt, and Tunisia (Etsey et al. 2009). Part of the reason for this may be the high incidence of untrained teachers, which stood at 36 per cent in 2007 according to Management Information System for Education (EMIS) data. A recent USAID study found the number of untrained teachers to have an adverse effect on pupils' English test scores in Ghana (Etsey et al. 2009). This is consistent with international studies, which indicate that what teachers know, what they do, and how much they care account for more variance in pupil achievement than any other policy-amenable variables. Ghana's Education Strategic Plan 2010–2020 prioritizes access, quality, and management as the policy drivers determining priority interventions. The strategy also targets science and technology as a priority area for improvement. In the first instance, natural resource revenues could be used to cost and implement the current plan, with a focus on inequality. With significant regional inequalities within the health and education sector, additional resources could be allocated to target the northern regions, for example, with the provision of allowances and training incentives for health workers and teachers in the area. Given the size of the projected natural resource revenues, a part could be allocated to test and implement teacher workforce reforms beyond those included in the plan, including high-quality teacher training.

The example of Sierra Leone

Resource revenues: The revenues are able to contribute significantly to the sector, but the government is less likely to be able to smooth expenditure and the country's absorptive capacity is lower compared to Ghana. Furthermore, extractives activities in Sierra Leone could be very sensitive to price fluctuations, leading mining companies to close down their operations temporarily or permanently.

In health: The health system was devastated in the civil war of 1991 to 2002, and was only just starting to recover when the Ebola epidemic struck in 2014. All health system pillars require reinforcement, and the natural resource funds could contribute to a 'national health sector recovery fund' to support the upgrading of facilities, upgrading of staff skills, packages to keep staff working in rural areas, and community programs to raise people's awareness of health risks and restore confidence in the health system. National and regional capacity needs to be built to be able to devolve some important functions, such as staff recruitment and management (Bertone et al., 2014). Financial protection also needs to be extended. At present, the Free Health Care Initiative provides some protection to pregnant and lactating women and children under five, but other groups are still carrying high health care costs. Facilities receive some flexible funding quarterly through the performance-based financing program, but the funds are not regular and reliable at present (Witter et al, 2015).

In education: Similar to the health system, the education system was badly affected by the civil war, and over 60 per cent of the country's education infrastructure was destroyed. Since then major strides have been made in rebuilding the education system. Most notably, the country has seen a huge increase in the number of children enrolled in primary education following the introduction of free primary education in 2003. Despite these improvements, there is still some distance to go in providing access to all students and in improving standards and learning outcomes. Demographic pressure on the education system is set to increase, with achievement of universal primary education by 2020 estimated to require increasing the system's capacity by 56 per cent (Government of Sierra Leone, 2013). The government has devoted a large share of education resources to the primary level, more so than other low-income countries. However, the government spends around 3.5 per cent of GDP on education, which is relatively low compared to other low-income countries and other sub-Saharan African countries. Successes at this level,

however, have created pressure on higher levels of schooling. The Education Sector Plan 2014–2018 acknowledges this and established goals and priorities in education subsectors beyond basic education. It also recognizes that with current levels of government resources and donor commitments there is a funding gap of about 15 per cent of total required expenditure, not accounting for returns expected from natural resources (Global Partnership for Education, 2013). Allocating natural resource revenues to meet some of this gap could signal government commitment in meeting its stated goals.

7 Policy implications

The following policy implications emerge from the wide range of issues discussed in this paper:

There is a strong case for investing natural resource revenues in social sectors

The case for investing natural resource revenues specifically to improve health and education services is strong. Such investments can: create a better educated and healthier workforce that will be more productive; help develop domestic human capital to sustain and improve growth, through regional and global competition in industries other than natural resources; lead to a 'demographic dividend', facilitating a higher input of workers per person and increased GDP per head; generate knowledge for the future, capture potential temporary macroeconomic externalities; build social cohesion and politically stable societies; and contribute to economic growth.

The arguments about the macroeconomic effects of health and educational spending are important in providing a response to concerns about the high recurrent cost burden that most social sector programs imply. Sustainability will be ensured only if the economic benefits of social sector investment are realized through effective and equitable allocation and expenditure that ultimately create and help to sustain broader economic development and progress.

Natural resource revenues could close part of the financing gap in health and education in the six sample countries

The scale of projected resources in the sample countries suggests that they could make a significant contribution in augmenting existing sources to close some of the considerable financing gaps to reach universal health care and education for all. They could also provide a safety buffer if donor resources, which currently play a significant role, dwindle as predicted. In the context of an aspiration to universal coverage for health and education, the natural resource revenues could be a critically important source of financing for core services and also for an extension of coverage, quality and equity – even if not all of the natural resource revenue is allocated to social sectors.

Many possible interventions are available to start closing the gaps in health and education services – full financing of health and education gaps is not a necessity and may cause scale-up problems

There is potential for education sector improvements to be funded by new resource revenues in all sample countries. For example, a large-scale program to improve the quality of primary and secondary education in Ethiopia, with a population size larger than any of our sample countries, cost just under US\$ 510 million over five years – a cost that could comfortably be met from the projected natural resource revenues for all sample countries.

But challenges in improvements to health and education are not all about closing the financing gaps. Non-financial constraints to the scale-up of service provision are at least as important. Programs need to build wider capacity, encourage harmonization between donors and government, bridge institutional divisions in the public sector, and improve collaboration between central and local levels of the health system. Some areas of these weaknesses can only be addressed gradually over time, such as a need to train more doctors.

Addressing these structural challenges requires political will, strategic vision, and some room for maneuver, which funding can assist. Health systems are complex, so the outcome of reforms is inherently largely unpredictable – the scale-up process should therefore be done iteratively, with constant adjustments over time.

Opportunities and challenges related to the use of natural resource revenues are not fundamentally dissimilar to those associated with other revenue sources, but the political economy risks may well be higher.

The lack of natural accountability to citizens, and the high expectations natural resources tend to generate, increase political economy risks and challenges. In order to manage these risks, we need to learn from the positive and negative lessons from social funds and other channeling mechanisms used to date, whose documentation also needs to be strengthened.

There is now quite a body of experience of using social funds, which can increase transparency of resource use, but still presents important challenges in relation to building capacity and avoiding elite capture. In countries struggling with issues of governance, transparency, and participation, there can be a case for new natural resource revenues being earmarked for specific purposes. However, evidence and opinions on the impact and efficiency of such instruments are mixed.

A starting point: a simple diagnostics framework can help guide social sector investments decisions in light of the new natural resource revenues

This paper presents a simple framework to help guide investment decisions in health and education in the context of resource revenues via structured questions about natural resource revenues, the socioeconomic context, and the sector constraints and priorities. While the framework can be applied to both sectors, as many of the challenges and issues are shared, there are also important differences. In particular, the range of conditions, interventions, and user groups in health presents a more complex landscape for priority-setting, compared to education, where services have a more clearly defined package and target group.

Further research, analysis, and policy debate is needed

There is a need for more evidence and more systematic documentation of lessons for spending natural resource revenues in the social sectors, especially in low- and middle-income (and fragile) states. In particular, further work is needed to adapt our diagnostics framework to the specific context of countries and to incorporate specific health and education system interventions.

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Annex A Methodology

This paper drew extensively on secondary sources – published and gray, including estimates from other OPM reports – which were analyzed and interpreted by the Flagship Report Paper Series team. The current annex presents the methodology and data used for the estimated financing gaps presented in this paper.

A.1 Educational data

Projected education financing gap data were obtained from a paper commissioned for the 2010 Education for All Global Monitoring Report, prepared by the Education Policy and Data Center (EPDC) and UNESCO (2009). The paper estimated the gap in financing that low-income countries face to achieve Education For All, based on a simulation model accounting for (1) projections of the number of school places needed based on the latest UN population estimates of school-aged children; multiplied by (2) teacher salary and classroom construction costs of providing required school places, based on national targets for pupil–teacher and pupil–classroom ratios as well as targets for the proportion of total recurrent costs devoted to non-salary spending. The authors also estimated costs for the provision of adult literacy programs, based on projected adult literacy rates, and programs to reach marginalized groups. These were then compared with (3) projections of government resources that are likely to be available based on the size of government revenues as a proportion of GDP and the proportion of the government budget spent on education.¹² The authors used this model to estimate country-level education financing gaps to 2015, with a longer-term projection between 2016 and 2025. The latter projections are converted to constant 2012 US\$ in this paper to compare against projections of new extractives industry revenues.

Drawing on previous studies with the same goal, this is the most up-to-date study of its type which includes a more comprehensive accounting of needs than earlier studies and has the benefit of including all of the sample countries for this paper. These projections provides a useful basis of comparison for this paper's estimates of the potential contribution of new extractive industries revenue flows in the sample countries. The projections chiefly focused on the targets to provide universal access to education, with some basic quality provisions, up to lower secondary level. The quality provisions accounted for the basic tenets of education provision – an adequate number of classrooms and teachers, as well as non-recurring unit costs such as textbooks and other learning materials. It is worth noting that these are not the only, or even the most important, drivers of learning outcomes. The quality of teaching – which, in turn, is influenced by various factors including teacher motivation, teacher accountability, school supervision, and the quality of in-service training – plays a vital role here. However, the relationship between these drivers of teaching quality and funding outlays is not straightforward, as indicated, for instance, by the fact that relatively low-paid contract teachers have been found to deliver better learning outcomes than regular public sector teachers in many countries. In light of this, the estimates presented in this

¹² (1) School age population projections and projections of population growth were obtained from the UN World Population Prospects database; (2) Enrolment, teachers, classrooms, and education financing data were obtained from the UNESCO Institute of Statistics, with targets for key quality parameters being based on previous studies, e.g. primary school teacher salaries at 4.5 times GDP per capita in sub-Saharan Africa and three times GDP per capita in other countries, US\$ 13,500 per classroom constructed with a maintenance cost of 2 per cent of construction cost included per classroom per year; (3) Overall government revenues and economic growth projections were obtained from the World Bank and the IMF, supplemented by available national education sector reports and plans and public expenditure reviews. More information on the projection methodology can be found in EPDC and UNESCO (2009).

paper serve as a useful starting point to gauge education financing gaps, although they do not provide a full picture of these gaps.

A.2 Health data

The health financing gap is the difference between health resource needs and health expenditure. These two components are calculated using a methodology from a recent OPM report (OPM, 2014). No systematic costing of health needs is available for most countries, and so we have used the estimate from a recent meta-analysis (McIntyre and Meheus, 2014) as a starting point to estimate the cost of universal access to a basic package of health services. McIntyre and Meheus suggest a double target: either public health funding of 5 per cent of GDP (arrived at by examining correlations between levels of health spending as percentage of GDP and the extent to which countries meet the minimum universal health care (UHC) requirements), or – but not less than – US\$ 86 (2012 dollars) per capita (arrived at by the High-level Taskforce on Innovative International Financing for Health systems through a comprehensive costing of key basic health services).

For the second component we construct a financial programming framework for each sample country that allows us to project forward key economic variables, such as GDP growth, government revenue, and expenditure, also for health and HIV. We take underlying macroeconomic data from the IMF's World Economic Outlook database (October 2013) and the most recent country-specific IMF Article IV publications. After 2018/19 the methodology for projecting longer term (up to 2024/25) utilizes the Southern Africa Development Community (SADC) convergence criterion of nominal growth graduating to 8 per cent by 2025. Even though from our sample countries only Mozambique and Tanzania are SADC members, we use the same criterion for all the other countries to ensure consistency but also for lack of better forecasts for the very long term. The health expenditure projections are then calculated using the following assumptions:

- The health expenditure is the sum of government health expenditure and donor health expenditure.
- The elasticity of government health spending to GDP is set at 1.1 (which implies that a 10 per cent increase in GDP is expected to lead to an 11 per cent increase in government health spending). The baseline spending figures are sourced from the World Health's Organization NHA estimates for general government expenditure on health.
- From 2015/16 onwards international funding is projected to remain stable, which represents a decline in nominal terms over the study period. International funding figures are sourced from NHA estimates for external funding.
- Medium-term growth rates (2012/13–2015/16) for international funding are sourced from the OECD (2013). The OECD projections estimate that growth in international aid will be 9 per cent in 2013 and remain at zero percent for the three years from 2014 to 2016. This refers to all ODA from all donors to all countries. OECD ODA projections are not available for health ODA in isolation, nor are they available disaggregated by region. However, comparing historic disbursements of Total ODA, Health ODA, Sub-Saharan African ODA, and Sub-Saharan African Health ODA it is clear that the trends are not divergent. Therefore it has been assumed that medium-term disbursements to health in our sample countries would not differ substantially from monies from donors to sub-Saharan Africa for health and HIV/AIDS. The total ODA annual growth rates were superimposed onto the 2012 actual data for each sample country.

For two of the sample countries (Tanzania and Mozambique), estimates of potential new funds from some ‘innovative’ sources are added, to illustrate how natural resource revenues compare with these other potential funding sources. These sources included estimated revenues from the most feasible local innovative sources, including taxes on remittances, mobile phone levies, alcohol levies, airline levies, and borrowing using domestic bonds for health. Estimations of potential levels of income from the first six new domestic sources are calculated by using data found from other countries that have harnessed these revenue sources. Their results have been summarized into an average return in terms of a percentage of GDP.¹³

A.3 Case studies

To further the discussion, this paper also sourced information on the opportunities for increased spending to achieve the greatest impact in health and education. The field of rigorous evaluation of education interventions in low- and middle-income countries is growing, but most completed assessments do not provide sufficient program costing information (McEwan, 2014). Cost-effectiveness analyses of educational interventions in the region are, therefore, still scarce. This paper relied on calculations based on existing randomized evaluation of interventions collected by the Abdul Jameel Poverty Action Lab (Dhaliwal et al., 2012), supplemented by the findings of recent reviews comparing the impact of these and other education interventions in lower- and middle-income countries (McEwan, 2014; Krishnaratne et al., 2013; Petrosino et al., 2012).

Fifteen countries in sub-Saharan Africa participate in the Southern and Eastern African Consortium for Measuring Educational Quality (SACMEQ), which has allowed for analysis of the enabling inputs to improve the quality of education within the region. These inputs include material resources, human resources, and enabling governance. Secondary sources from SACMEQ assessments have been used within this paper to review the costs and effectiveness of various education inputs seeking to increase the quality of education.

The case studies utilized a range of secondary sources, which were obtained through web searches on Google Scholar and targeted searches of relevant databases (e.g. Eldis), online repositories of international agencies (e.g. the World Bank and WHO repository of publications and UNESCO’s Planipolis database), online university databases, and national ministries. The searches were not meant to be comprehensive. Rather, they employed search terms and targeted manual searches that were meant to seek specific experiences introducing and implementing education and health interventions relevant to this paper. Examples of search terms included: successful scale-up health/HIV/education, combined with sample country terms, using/investing/earmarking oil/hydrocarbon/mining revenue for health & education, constraints to health & education scale-up, accountability in scaling-up health & education, human resource constraints in health & education scale-up.

A.4 Limitations

The limitations of our sources and methods should be made clear from the outset:

- In terms of educational data, the estimates of need are based on costing of basic inputs, with some basic allowances for quality improvements, which may be of equal or greater importance;

¹³ See OPM (2014) for further details.

- Health needs estimates are even more rough, using an international benchmark rather than precisely costed estimates, as these do not exist in comparable forms across countries;
- The health and education needs are applied from year 1, for illustrative purposes, although scaling up investment to meet these needs would be gradual in practice. Projections for expenditure on health and education are based on assumptions, which rely on best available evidence but which may prove more or less accurate in reality;
- Finally, while our initial hope was to draw lessons from existing material on how natural resource revenues have been used for human development in low- and middle-income settings, the scarcity of literature on this topic has meant that we have to draw from wider sources. These are not exhaustive but are illustrative.

Annex B How to invest in meeting health and education needs

This annex presents in broad terms what is known in relation to priority needs and opportunities. In particular, it explores the following questions:

- What are the ‘best buys’ identified for health and education in the sample countries or similar contexts?
- How are they bundled, in terms of delivery mechanisms, and what do we know about their cost?
- What are the constraints in scaling up programs?
- What approaches exist to addressing system-level constraints?

The focus here will be on investing in building capacity and systems, as well as improving quality, access and efficiency.

B.1 Best buys

Reasonable evidence exists for cost-effective health interventions which should be scaled up in general, and this is presented in the summary below. However, prioritizing within specific contexts requires this information to be linked to an understanding of local needs (not just of the burden of disease but also of the current constraints to delivery of these services, which includes not only service configuration but also demand-side barriers). Equally important are considerations of equity, of social priorities, and of feasibility and sustainability. For this reason, ‘best buy’ information on its own does not provide sufficient evidence for prioritizing investments.

Identifying best buys in the education sector is challenging due to two factors: (1) lack of costs data; and (2) a lack of agreement on the key outcome and objectives of certain interventions. Overall, the research suggests that a suite of demand-side interventions is effective in increasing access to education. However, the evidence on how these interventions improve the quality of education pupils receive is, at best, mixed. There is stronger evidence in support of the use of a number of different supply-side interventions in improving education quality. The interventions for which evidence exist on their effectiveness in achieving these goals are summarized below.

Health

The most common way of looking at cost-effectiveness across health interventions is to consider the cost per disability-adjusted life year (DALY) gained – a measure which combines information on deaths averted (at which age) with morbidity and disability averted. Based on these, there is a general understanding of what interventions should be given priority. However, it is important to note that both the effectiveness of interventions and their cost vary by context and program, so the figures given below are just indicative. Moreover, there are a number of important aspects which need to be considered alongside DALYs, including:

- the burden of disease (how significant is the problem which the intervention addresses, which is also very context-specific);
- the feasibility of implementation/scale-up (what system requirements need to be in place for the intervention to be rolled out);

- the financing source (some interventions are more easily financed than others, for example when targeted by global health initiatives), affordability, and sustainability; as well as
- broader social and political aspects of priority setting (for example, whether the groups affected have high social priority, whether the intervention benefits poor versus rich households typically, whether there are other externalities, etc.).

Using cost-effectiveness and burden of disease information from a range of studies, Table 9 lists some areas of cost-effective health interventions which are currently neglected in Africa, while Table 10 presents those which should receive less priority, based on these two domains.

Table 9: High priority health interventions in Africa

Low-cost interventions in Sub-Saharan Africa currently neglected	Cost per DALY averted (US\$)	Thousands of DALYs averted per 20 per cent increase in coverage	Burden of target diseases (millions of DALYs)
Childhood immunization Second opportunity measles Additional coverage of traditional Expanded Program on Immunization	1–5	n.e.	13.5–31.3
Traffic accidents prevention Increased speeding penalties, media, and law enforcement Speed bumps at the most dangerous traffic intersections	2–12	n.e.	6.4
Malaria prevention Insecticide-treated bed nets Residual household spraying Intermittent preventive treatment during pregnancy	2–24	20.8–37.6	35.4
Surgical services and emergency care Surgical ward in a district hospital, primarily for obstetrics, trauma, and injury Staffed community ambulance Training of lay first responders and volunteer paramedics	7–215	1.6–21.2	25–134.2
Childhood illnesses Integrated management of childhood illnesses. Case management of non-severe lower acute respiratory illnesses at the community or facility level. Case management package including community- or facility-based care for non-severe cases and hospital-based care for severe lower acute respiratory illnesses Breastfeeding support to prevent underweight children	9–218	At least 1.2	9.6–45.1
Cardiovascular disease Management of acute myocardial infarction with aspirin and beta-blockers Primary prevention of coronary artery disease with legislation substituting 2 per cent of trans fat with polyunsaturated fat, at US\$ 0.50 per adult Secondary prevention of congestive heart failure with angiotensin Secondary prevention of myocardial infarction and stroke with polypill	9–273	At least 0.04	4.6

HIV and AIDS Peer-based programs targeting at-risk groups (e.g. commercial sex workers) to disseminate information and teach specific skills Voluntary counseling and testing Diagnosis and treatment of sexually transmitted diseases Condom promotion and distribution Prevention and treatment of tuberculosis co-infection Blood and needle safety programs Prevention of mother-to-child transmission with antiretroviral therapy	6–377	n.e.	56.8
Maternal and neonatal care Increased primary care coverage Improved quality of comprehensive emergency obstetric care Improved overall quality and coverage of care Neonatal packages targeted to families, communities, and clinics	82–409	At least 2.8	29.8–37.7

Source: Musgrove and Fox-Rushby (2006)

Notes: 1. n.e. = not evaluated, 2. Ranges represent variation in point estimates in the Disease Control Priorities 2 Volume and from Mathers et al. (2006)

Table 10: Less cost-effective health interventions in Africa

High-cost interventions in Sub-Saharan Africa	Cost per DALY averted (US\$)	Thousands of DALYs averted per 20 per cent increase in coverage	Burden of target diseases
Diarrheal diseases Oral rehydration therapy if the cost per episode is greater than US\$ 2.80 per child Rotavirus or cholera immunization	500–1,658	0.1–4.6	22
HIV and AIDS Home care treatment Antiretroviral therapy in populations with low adherence	673–1,494	n.e.	56.8
Traffic accidents Random driver breath tests Enforcement of seatbelt laws Child restraint promotion	973–2,146	At least 0.05	6.2–6.4
High blood pressure and cholesterol Primary prevention of stroke and ischemic and hypertensive heart disease with aspirin, beta-blocker, and statin, incremental to policy-induced behavior change, at 15 percent risk of cardiovascular disease over 10 years	1,920	n.e.	10.6
Lifestyle diseases Primary prevention of diabetes, ischemic heart disease, and stroke through policy that replaces saturated fat with monounsaturated fat in manufactured foods, accompanied by a public education Primary prevention of diabetes, ischemic heart disease, and stroke through legislation that reduces salt content plus public education	1,766–2,356	1.4–1.8	9.6

Stroke (ischemic) Acute management with recombinant tissue plasminogen activator within 48 hours of onset Acute management with heparin within 48 hours of onset Secondary prevention with carotid endarterectomy	1,284–2,940	0.02–0.3	0.9–3.6
Tuberculosis Isoniazid treatment for latent endemic TB in patients uninfected with HIV	4,129–5,506	n.e	8.1
Cardiovascular disease Management of acute myocardial infarction with streptokinase or tissue plasminogen activator, incremental to aspirin and beta-blocker Secondary prevention of ischemic heart disease with statin, incremental to aspirin, beta-blocker, and angiotensin-converting enzyme inhibitor Secondary prevention of ischemic heart disease with coronary artery bypass graft	634–26,813	0.03–0.2	4.6
Source: Musgrove and Fox-Rushby (2006)			

Education

As noted above, in contrast with the health sector, identifying best buys in the education sector is challenging due to two factors: (1) lack of costs data; and (2) a lack of agreement on the key outcome and objectives of certain interventions. In the last two decades there have been rigorous impact evaluations in the education sector, but most of these do not provide data on the costs of the interventions they evaluated (Levin et al., 2001; McEwan, 2014). Cost-effectiveness analysis is further complicated by a lack of agreement over the key outcomes or objectives of different programs (an equivalent, for example, to the calculation of DALYs in the health sector).

Attempts to carry out cost-effectiveness analyses of education interventions have focused on student enrolment and attendance as measures of participation, and standardized assessment results – largely in mathematics and reading – as measures of education quality (Dhaliwal et al., 2012; McEwan, 2014). These two education outcomes – increasing access to and improving the quality of education – are the key goals of education interventions, and achieving a balance of both requires thoughtful planning backed by sound evidence. Recent reviews of the available evidence on different types of interventions are summarized in Table 11.

Overall, the research suggests that a suite of demand-side interventions is effective in increasing access to education. It also suggests, however, that the evidence on how these interventions improve the quality of education that pupils receive is, at best, mixed. Rather, there is stronger evidence in support of the use of a number of different supply-side interventions in improving education quality.

Purposeful, evidence-based policy needs to be pursued through planning and budgeting, in pursuit of both access and quality outcomes in education, through demand- and supply-side interventions.

Table 11: Examples of effective or potentially effective interventions to meet access and quality goals

To achieve goal of:	Demand-side interventions	Supply-side interventions
Increasing access	Conditional cash transfers (CCTs) Provision of information on returns to education to parents or to pupils * School-based health services: Deworming * School feeding Scholarships	School building^^ Adequate sanitation facilities, safety and security in and on the way to school***
Improving quality	Provision of information on returns to education to pupils (male youths) *^ Pupil performance incentives Girls scholarship programs awarded based on performance**	Teaching resources: Contract teachers * Teacher training ^^ Level of qualification of teacher ^^ Assign best teachers to the 1st grade Pay teachers regularly^^ Class size or composition: Streaming by achievement *^ Reduction in students per teacher^^ Enforce the length of the school year ^^ Support to school committees *^ Computer-assisted learning Improved learning materials ^^

Source: Dhaliwal et al. (2013); McEwan (2014); Krishnaratne et al. (2013); Petrosino et al. (2012)

Note: *Specific interventions of this type identified as cost-effective by Dhaliwal et al. (2013); ^ Specific interventions of this type identified as cost-effective by McEwan (2014). ^^ Specific interventions of this type identified as cost effective by Wolff and Nomura (2011) ** Kremer et al. (2009) *** Fawe (1998)

Demand-side interventions

- *CCT programs* (discussed in Paper 5) have been a popular and widely evaluated intervention in developing countries. Reviewing evidence from 23 studies on their impact on education, Krishnaratne et al. (2013) found strong evidence that CCTs increase enrolment and attendance, especially among the poorest sections of society. CCTs should be introduced after the abolition of primary school fees in order to target the most marginalized children, who may experience additional barriers to enrolling in and attending school.
- *Health and nutrition interventions* were largely found to have an impact on increasing access to education, chiefly through improving attendance and reducing drop-out rates, while having little to no impact on learning outcomes (Krishnaratne et al., 2013). Cost-effectiveness analyses have estimated that a deworming program in Kenyan primary schools produced 13.9 additional years of student participation, while an iron fortification and deworming program in Indian pre-schools returned 2.7 additional years, both per US\$ 100 spent (Dhaliwal et al., 2012).
- *The provision of information on education to parents or pupils* is a category that covers different forms of interventions and as a whole has produced mixed results. A widely cited evaluation of

an intervention that provided information on the returns to education to parents in Madagascar found it to be cost-effective relative to other robustly evaluated interventions, producing an estimated 20.7 additional years of student participation per US\$ 100 spent (Dhaliwal et al., 2012). Another similar intervention that provided information on returns to education to male pupils in the Dominican Republic was found to be cost-effective, increasing school enrolment at the same rate as a CCT program at a fraction of the cost (Krishnaratne et al., 2013). The impact of information programs on learning outcomes has been mixed, although positive impacts have been recorded in some cases (Krishnaratne et al., 2013). For instance, a school report card intervention in Pakistan that informed parents about learning outcomes at their child's school was found to have a positive impact on English test scores. Similarly, a study in the Gambia found that a program to raise awareness about schools' performance had a positive impact on learning outcomes, although more so in villages with high literacy compared to those with low literacy rates (Blimpo and Evans, 2011).

Studies that have investigated whether awareness-raising campaigns lead to significant changes in parental knowledge and behavior have also produced mixed findings. A methodologically strong 3ie evaluation of a program in India to raise awareness of schools' performance through village education committees found that the committees did not affect parental awareness of school, parental involvement with schools or parental knowledge of education (Banerjee et al., 2010). However, another similar study in India that evaluated a more intensive information campaign found that this did lead to greater awareness of the roles of village education committees and greater community oversight of schools through these bodies (Pandey et al., 2011).

Supply side-interventions

A number of supply-side interventions have been evaluated and shown to be effective in increasing pupil learning outcomes as measured by standardized assessment. The types of interventions cover a broad range, making it difficult to establish aggregated messages about specific intervention types.

Costing information is also rare, resulting in an evidence base biased toward contexts where such evidence has been generated. While not generalizable, McEwan (2014) undertook a meta-analysis of 77 experimental evaluations of the impact of school-based interventions on learning in primary schools in developing countries. He concluded that the largest effect sizes were found among treatments involving computer-assisted learning, teacher training, reduction in class size, increased ability grouping, introduction of contract or volunteer teachers, performance incentives, and improved instructional materials.

Among supply-side programs with available cost information, McEwan (2014) identified a program that linked school committees with village leadership in Indonesia and the introduction of ability tracking in Kenya as the most cost-effective. Calculations by the Abdul Jameel Poverty Action Lab (J-PAL, 2014) support this, estimating that those two interventions had a similar mean impact of a 34.6 standard deviation increase in test scores per US\$ 100 spent. Also based on experiences in Kenya, every US\$ 100 spent on teacher performance incentives was estimated to have an impact of 4.5 standard deviations in the second year of implementation, while providing textbooks to top performers had an impact of 3.6 standard deviations (*ibid*).

Again, it is important to note that these evaluations are small-scale randomized control trials and outcomes are likely to be context specific.

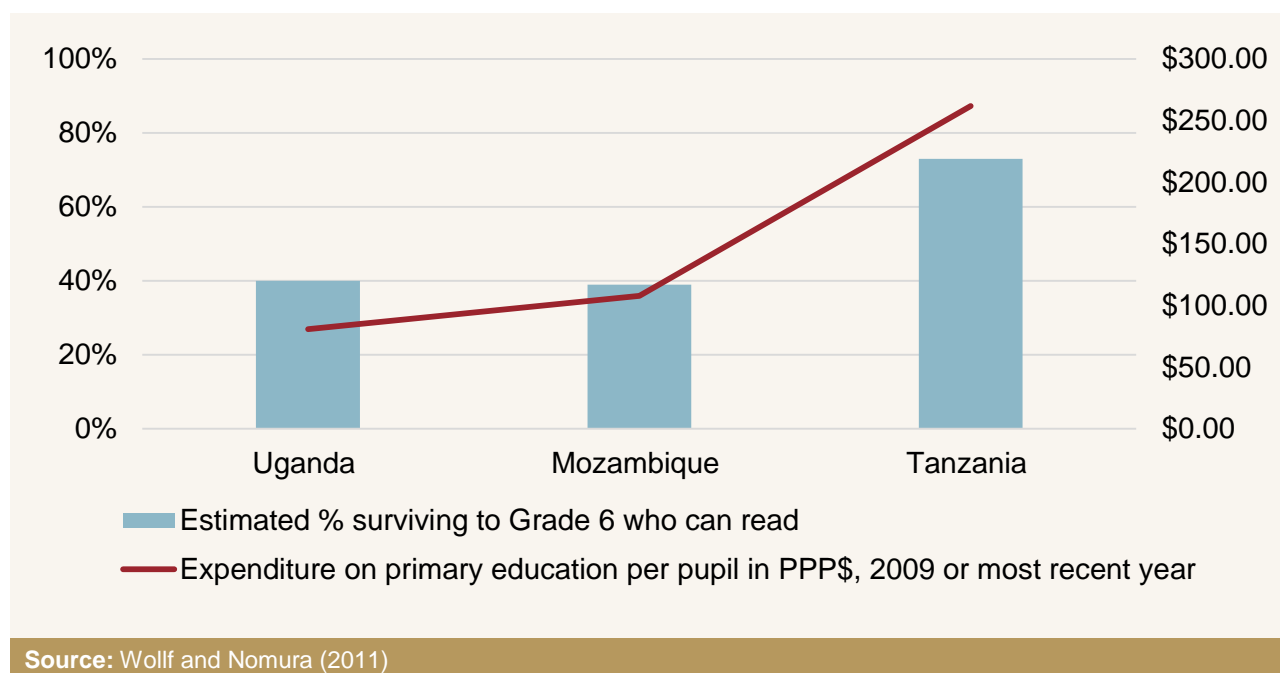
Education quality

Education quality is most commonly measured through student learning assessments. There are various factors that contribute to education quality:

1. *Literacy and numeracy* are considered the fundamental building blocks for future learning. Without literacy, children cannot continue to build their capacities (Wolff and Nomura, 2011). However, schooling is not the only contributing factor to student learning outcomes – learner characteristics account for the highest variance in pupil performance on tests (Outhred et al., 2012). These characteristics include health, cultural and religious background, access to social and economic resources, and innate pupil ability.
2. *Context* is also a determining factor in the variance of pupil performance on tests. The context dimension includes the values and attitudes dominant in society, economic and labor market conditions, and public and private sector education resource availability.
3. *Teaching and learning* is the third factor, usually referred to as enabling inputs, as they do not entirely account for increases in student performance. Examples include material resources, human resources and enabling governance of education (Wolff and Nomura, 2011).

Figure 4 provides examples of the estimated percentage of children surviving to Grade 6 who can read in Uganda, Mozambique, and Tanzania, with the corresponding expenditure on primary education per pupil. As can be seen, the percentage of children able to read by the end of Grade 6 is higher in Tanzania, as is the corresponding expenditure. However, the figure also shows that inputs alone are not enough to increase the quality of education, with Mozambique displaying a higher per pupil expenditure than Uganda, with no corresponding increases in quality. Combined learner characteristics (what learners bring with them to the classroom) and the broader social and political environment in which education takes place account for the greatest variance in pupil achievement. For this reason, costing improvements in education quality is highly contextual.

Figure 4: Percentage of children surviving to Grade 6 who can read and expenditure on primary education per pupil in PPP\$¹⁴ (2009 or most recent year)



B.2 Delivery mechanisms

Policy-makers in both sectors are, moreover, not typically faced with decisions over individual interventions but rather about how the overall system operates, how interventions are bundled, and how they are delivered within this system. Although this paper focuses on supply-side interventions, a combination of supply- and demand-side measures is generally required in both health and education, and some programs – such as school-based nutrition and health programs – can promote cross-sectoral goals for health and learning. In both sectors, there is increasing focus on ‘managing the market’ so as to make best use of the comparative strengths of public, private-for-profit, private-not-for-profit and community-based organizations for different services, as well as to reflect particular local population needs.

Health

Within the health sector, packages of different high-priority interventions have been developed for delivery at different levels – community, primary care level, secondary referral, and tertiary specialized care. Many countries have grouped them within ‘essential health care packages’ since the World Bank’s World Development Report of 1993 promoted this approach. The development of a package attempts to guarantee a minimum set of services that will be made available, commonly within public but sometimes also the private-not-for-profit sector. The concept now fits within the UHC movement, which guides countries toward expanding the range of services to the widest grouping of the population, with the highest degree of financial protection possible (World Health Organization, 2010). Since there are no limits to the potential expectations of UHC, each country has to establish priorities within its existing means, while working to expand those means over time, bearing in mind the objectives of making essential health care available and affordable to all.

¹⁴ Purchasing power parity.

Alongside work to strengthen the capacity of the public sector to deliver health interventions at scale, there is also recognition that increased coverage cannot be achieved by replicating existing models for service delivery or focusing only on the public sector (Mangham and Hanson, 2010). In the health sector there has been considerable interest in establishing the comparative advantages and relative quality of private, private-not-for-profit and public sector actors for delivering different services (and in different contexts – there has been more contracting out of services to non-governmental providers in fragile states and post-conflict settings, for example (Witter, 2012)). Private provision is extensive for many services, but very varied in type, size, and market role. There is an acknowledged need for better ways of regulating it and enabling it to play a constructive role in the provision of public goods, such as preventive and promotive care, and essential curative care for harder-to-reach population groups and poorer households.

Typically, private-not-for-profit providers have been more closely integrated with public policies and more likely to reach less well-off groups (Forsberg et al., 2011). Informal providers, such as drug vendors, traditional healers, and traditional birth attendants, also play an important role in many health markets and present a hard challenge from a regulation perspective. There is some evidence of success, especially for strategies which change market conditions for informal providers, by changing incentives and accountability (such as through social marketing and branding) (Shah et al., 2011).

Community-based organizations have played less of a role in service delivery. The literature on community participation focuses on their role in monitoring and enforcing accountability, although some see a more transformative role for community participation, in the spirit of the Alma Ata Declaration of 1978. In recent years, there has been renewed attention paid to the potential of community health workers to expand access to essential health care services, especially in light of critical shortages in the health workforce.

Early discussions on how to deliver health interventions at scale reinvigorated debate on vertical approaches (disease-specific programs) and integrated approaches (interventions that cut across health systems) to delivering health services. Where there are capacity constraints in existing services, an expansion of access to priority interventions that can be delivered independently of the health service infrastructure may initially need to rely on vertical programs. Many early attempts to scale up HIV prevention and care have taken this approach and used non-governmental organizations to deliver program activities. There is now a discussion of a ‘diagonal’ approach (Ooms et al., 2008), whereby vertical program investments can also be used to drive longer-term system strengthening.

Education

Even within the relatively small education evidence base, several reviews have identified that delivering a package of complementary interventions may be the most cost-effective approach. In considering how teachers’ salaries (which comprise the bulk of education budgets in most developing countries) and incentives can be designed to influence education quality, Riddell (2008) concluded that a package of incentives would be the approach to make a difference. Monetary incentives should be complemented with interventions that address teacher status, support and supervision, and welfare. A similar line of evidence exists for health workers (Willis-Shattuck et al., 2008). As McEwan (2014, p. 34) noted in his meta-analysis of educational interventions, almost all of the effective instructional interventions in the review included ‘at least a minimal attempt to develop teachers’ capacity to deliver effective classroom instruction’. The reduction of class sizes also has considerable overlap with other interventions.

Combining demand- and supply-side interventions in an intervention package may prove more cost-effective and increase the impact of each component. From a meta-analysis of CCT evaluations, for example, Saavedra and Garcia (2013) concluded that CCT programs that are complemented with supply-side interventions – such as school infrastructure improvement, additional teachers, grants, or textbooks – have greater impact and are more cost-effective than those that are not. They suggest that the increased impact outweighs the additional costs of delivery of the supply-side complementary intervention. More broadly, the delivery of education through the private sector is a key focus of the discussion in many education systems serving rapidly growing populations. As free and compulsory education policies have been introduced, governments have not always been able to provide enough public schools for rapidly expanding populations (Heyneman and Stern, 2014). For example, in Lagos, Nigeria there are around 18,000 private schools, with this figure expected to rise to 22,000 by 2017. By comparison, there are approximately 1,600 public schools. In such a context, it is obvious that ‘Credible efforts to improve ... human capital ... clearly need to include private education’ (Crawford et al., 2014).

Many argue that the privatization of basic education delivery in developing countries improves quality and efficiency in service delivery through the mechanisms of choice and competition. Others argue that private schools are only accessible to those who can pay, and competition is only effective if households can access more than one schooling option (Akaguri, 2011). Another issue within the public/private schooling debate is the issue of quality. There is strong evidence that teaching is better in private schools than in state schools, in terms of higher levels of teacher presence and activities that are likely to lead to improved learning outcomes, but only moderate evidence that private school pupils achieve better learning outcomes (Day et al., 2014). The cost of education delivery is lower in private schools, often due to lower salaries for private schoolteachers. Nevertheless, private school fees remain prohibitive for many poor families. In many instances, the outcomes of private schooling are highly contextual. In Ghana, for example, the extent to which private schools offer a better quality education is derived mainly from the location of the school. In urban or peri-urban settings private schools provided better education outcomes, but private schools in rural areas did not appear to perform any better than public schools in terms of learning outcomes (Akaguri, 2011). Therefore, while the private sector can play a role in easing the strains of education service delivery in locations with rapidly growing populations, the extent to which private education provides better learning outcomes is highly contextual, relies on particular market conditions (choice and competition), and may not be relevant for the most marginalized children.

One caveat when interpreting the evidence on education interventions is that the majority of interventions that make up the evidence base around impact and cost-effectiveness were implemented by NGOs or university researchers (McEwan, 2014). Experimentation in collaboration with governments is rare. This has relevance for the scale-up of interventions. As three out of four primary and secondary school pupils in sub-Saharan Africa are enrolled in public institutions (Wodon, 2014), if scale-ups of education interventions are intended on a regional or national scale, they require at least some cooperation with or involvement by the government.

While NGOs may become incubators for designing and introducing initiatives that respond to the needs of communities they work in, they often have limited capacity in delivering scaled-up programs. This was a lesson from the experiences of even two of the largest education NGOs in the world, Bangladesh Rural Advancement Committee (BRAC) in Bangladesh and Pratham in India, when scaling-up their education programs. On the back of positive evidence from rigorous impact evaluations of two programs that provided remedial education delivered by tutors from the community (Banerjee et al., 2006), Pratham received a great deal of funding and support, including in the form of a US\$ 9.1 million grant from the William and Flora Hewlett Foundation and the

BMGF, to scale-up its programs. When trying to scale up the program, Pratham was unable to find enough local volunteers, compared to the number of pupils who needed supplemental help, so it introduced an alternative model which also works with teachers in government schools using similar teaching methods and materials (Poverty Action LaB, nd). However, most of the interventions that relied only on government teachers showed little to no impact compared to the control group (Banerji and Walton, 2011). The evaluators posited that this could be related to a broad range of system-wide factors, including low teacher and pupil attendance and a rigid curriculum. This reflects similar challenges in implementation through the existing government system faced during the scale-up of the contract teacher program in Kenya (see Section 5).

On the other hand, BRAC's non-formal primary schools in Bangladesh were explicitly designed to address the shortcomings of the government-provided options. They were based on the NGO's own research into why children do not attend or drop out of government schools (some of the issues it identified included large classes, long school days, and an emphasis on homework that discouraged poor children who often lacked support outside of school) and the program's budget was restricted to not exceed the equivalent government budget of US\$ 15 per child in order to be useful as a model for reform of government schools (Ahmed and French, 2006). One key factor to which BRAC attributes its successful scale-up of the model to over 31,000 primary schools in Bangladesh is its advocacy work, which has led to 'an excellent working relationship with government education programs' (*ibid*, p. 39). When it found that most of its graduates continue on in their education at government schools, BRAC incorporated the government curriculum into its schools and the government has since also allowed their pupils to sit the national examinations.

B.3 Addressing constraints

A number of potentially effective strategies are highlighted by Wagstaff et al. (2006) to accelerate progress in health toward the Millennium Development Goals (MDGs) (see Table 12), which also apply in the post-MDG era. The authors point out that increased spending alone cannot provide progress, unless there is better targeting of the resources, alongside stronger policies and institutions.

Table 12: Summary of strategies to accelerate health progress

Improvements to allocation and targeting	
Geographic targeting	<p>Improved resource allocation to ensure that funds are distributed in a needs-based way. These formulas have been used, for example, as part of Bolivia's decentralization efforts since 1994 and have been associated with some large—and pro-poor—improvements in maternal and child health indicators.</p> <p>Targeting resources to poor regions and provinces may be most effectively implemented through non-traditional mechanisms for priority setting and implementation, such as social investment funds. In Bolivia, an impact evaluation concluded that such funds were responsible for a decline in under-five mortality from 88.5 to 65.6 per 1,000 live births over a five-year period.</p>
Changing the allocation of spending across care levels	<p>Another important allocative reform may be to improve the distribution of resources between hospitals and primary care.</p>
Targeting specific programs	<p>Programs such as those delivering directly observed treatment short courses for tuberculosis or integrated management of infant and childhood illness for child health are good examples of programs that may yield high returns to government spending at the margin.</p>
Targeting specific population groups	<p>There are many proven ways to target the poor, for example by delivering essential services in clinics or health posts that only poor families attend or by promoting and delivering services in a way that segments the market and appeals to those in low-income households.</p>
Targeting spending to remove bottlenecks	<p>Using tools, like the Marginal budgeting for Bottlenecks, can help to assess the health sector impediments to faster progress, to identify ways of removing them, and to estimate their costs and effects</p>

Improving policies toward households as producers and demanders of care

Lowering financial barriers	<p>Low income is a barrier to the use of most health interventions, and economic growth is an important weapon in the war against malnutrition and mortality. However, social protection programs are also important.</p> <p>One part of the affordability equation is price. User charges for MDG interventions are to be discouraged. Subsidies should be targeted to services with spillover effects and at the poor.</p> <p>Some recent programs, especially in Latin America, have not only made health care affordable for the poor but have also made it profitable. Rather than simply reducing the cost of using specific interventions, these programs provide users with cash payments, which are linked to specific interventions and restricted to certain groups—often poor mothers and their children. The experience with these programs in targeting and achieving results is encouraging.</p> <p>Risk aversion coupled with the unpredictability of illness provides a motivation for pooling risks through an insurance scheme, in some contexts.</p>
Providing information and enhancing knowledge	<p>Lack of knowledge is a major factor behind poor health. It results in people not seeking care when needed, despite the absence of price barriers, and it also results in people—especially poor people—wasting limited resources on inappropriate care. Ignorance may also result in people not getting the maximum health gain out of the inputs they do have available to them and that they use.</p> <p>Better-educated girls will mean healthier women and healthier children in years to come. A shorter and more direct route to increasing health-specific knowledge and skills is through information dissemination, health promotion, and counseling in the health sector. Social marketing and media campaigns (e.g. on malaria and the social marketing of insecticide-treated nets) have also proved effective in some circumstances.</p>
Reducing time costs	<p>Transportation systems, road infrastructure, and geography influence the demand for care delivered by formal providers through their effect on time costs, which can be substantial, especially for rural communities. Road rehabilitation and other transportation projects are important here, but so are subsidies linked to the use of health services.</p> <p>Other options for tackling inaccessibility include using outreach and establishing partnerships between government and NGOs, private providers, or community organizations.</p>
Providing access to water and sanitation	<p>The availability of adequate supplies of water and improved sanitation is associated with better maternal and child health outcomes, at least among the better educated, even after controlling for other influences. Poor households tend to be particularly disadvantaged in terms of access to and costs of water and sanitation.</p>

Improving health service delivery	
Improved management of providers	Management styles in government-funded and government-implemented health schemes have recently begun to change, focusing on performance—that is, on outputs and outcomes—rather than on inputs and processes. Good performance is rewarded, financially or in some other way. The focus is on clients and on the belief that an organization is ultimately accountable to its clients. A client-oriented strategy emphasizes customer choice and satisfaction. Business techniques enhance performance and are a standard part of strategic planning.
Increased accountability to communities	Having community representatives participate in the governance and oversight of providers can improve the productivity and quality of public sector providers. The approach probably works best for primary care and in situations in which strong technical and advisory support is provided to community representatives who are close to the service being delivered.
Contracting	<p>Evidence on the effect of contracting within the public sector is mixed, and the experiences are mainly based on lessons learned from middle-income countries. Key influences on the success of contracts within the public sector include whether the provider has the ability to respond, whether service commitments are congruent with funding levels, whether outputs and key components of performance expectations are easily measurable, and how far capacity strengthening of the payer or funder is addressed.</p> <p>Contracting with non-profit organizations is most common in low-income countries. Most cases have had positive effects on target outcome or output variables. Only a few cases assess efficiency. Contracting with non-profits works best when the contractors have well-functioning accountability arrangements and strong intrinsic motivation and when the government makes timely payments to the NGOs. The government needs to be capable of assessing, selecting, and managing the ongoing relationship with contractors.</p> <p>Results on contracting with for-profit private service providers are also mixed. Experience from the hospital sector warns that weak government contracting capacity often allows the provider to capture efficiency gains or to expand volume—not necessarily of cost-effective services—to generate more income.</p>
Strengthening core public health functions	
Government-led monitoring and evaluation	<p>Governments in developing countries generally recognize that public health functions are important, but they often lack the capacity and financial resources to implement them. Few low-income countries invest in these public health functions. By employing public health professionals with core public health competencies, the government can develop and enforce standards, monitor the health of communities and populations, and emphasize health education, public information, health promotion, and disease prevention.</p> <p>Integrated disease surveillance, program assessment, and collection and analysis of demographic and vital registration data are essential if governments and donors are to ascertain whether policies and programs are positively affecting health goals. Greater investments are also needed in systems to monitor the intermediate indicators and to track expenditures on public health.</p>

Intersectoral actions	<p>Roads and transport are vital for health services, especially for reducing maternal mortality, but so is working with the transportation sector to ensure the availability and affordability of transportation, and to reduce HIV transmission in many settings.</p> <p>Improved hygiene (use of hand washing) and sanitation (use of latrines and safe disposal of children's stools) are at least as important as drinking water quality in shaping health outcomes, specifically in reducing diarrhea and associated child mortality. Constructing water supply and sanitation facilities is not enough to improve health outcomes: sustained human behavior change must accompany the infrastructure investment.</p> <p>Indoor air pollution is a major risk factor for pneumonia and associated deaths in children and for lung cancer in women who risk exposure during cooking. Studies are under way to improve access to efficient and affordable energy sources through local design, manufacturing, and dissemination of low-cost technologies, modern fuel alternatives, and renewable energy solutions.</p> <p>Agricultural policies and practices influence food prices, farm incomes, diet diversity and quality, and household food security. Policies that focus on women's access to land, training, and agricultural inputs, on their roles in production, and on their income from agriculture are more likely to have a positive effect on nutrition than interventions without a focus on women, particularly if combined with other strategies, such as women's education and behavior change.</p>
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Source: summarized from Wagstaff et al. (2006)

Looking at the factors that facilitate scaling-up of health interventions in general, Yamey (2011) highlights some generic facilitators, such as: choosing a simple intervention which is widely agreed to be valuable; strong leadership and governance; active engagement of a range of implementers and of the target community; tailoring the scale-up approach to the local situation; and incorporating research into implementation.

All of the strategies in Table 12 can potentially be applied in a situation where additional resources become available to the health sector. Costing data for these programs are patchily available and have not been assembled here as the packages vary widely and their costs are contextually determined. However, one of the best known recent approaches aiming to increase coverage and quality has been paying providers for performance – using marginal increments in resources for facilities and staff to incentivize a change in behavior. The Rwanda experience has been documented (Gertler and Vermeersch, 2013) and has shown promising results, although cost-effectiveness data are yet to be released. A recent evidence synthesis paper concluded that, 'it is clear that pay-for-performance (P4P) can have a positive influence on health outputs, at least in some contexts, and in the short term. However, there are a number of important areas which remain to be better understood. These include the long-term impact of P4P, assuming it is intended as a long-term financing mechanism as opposed to a short-term behaviour modifier' (Witter, 2013). This concern is particularly relevant for programs funded from natural resource revenues, which will be of limited duration.

Another approach to expanding the coverage of high-priority services, in addition to the CCTs discussed in Paper 5, is the use of vouchers, which are given to potential clients to entitle them to free or subsidized services but also function as an output-based financing mechanism for providers (Janisch et al., 2010; Bellows et al., 2011; KfW, 2012). They have been shown to increase utilization of services, although, once again, their cost-effectiveness is not well documented, and overhead costs tend to be high (Witter and Somanthan, 2011).

Experiments with increasing the direct funding to facilities have also been undertaken in countries like Kenya, aiming to address the public finance bottlenecks that reduce the functioning of primary care providers. Early results indicate that even without performance targets, an increase in funding at peripheral level may have a positive impact on utilization and quality (Consortium for Research on Equitable Health Systems, 2009).

Another approach to increasing uptake of services is fee exemption, where most commonly facilities are funded retrospectively per service provided, to replace lost user fees. These have shown some effectiveness in raising utilization, though there is less evidence of impact on health outcomes.