



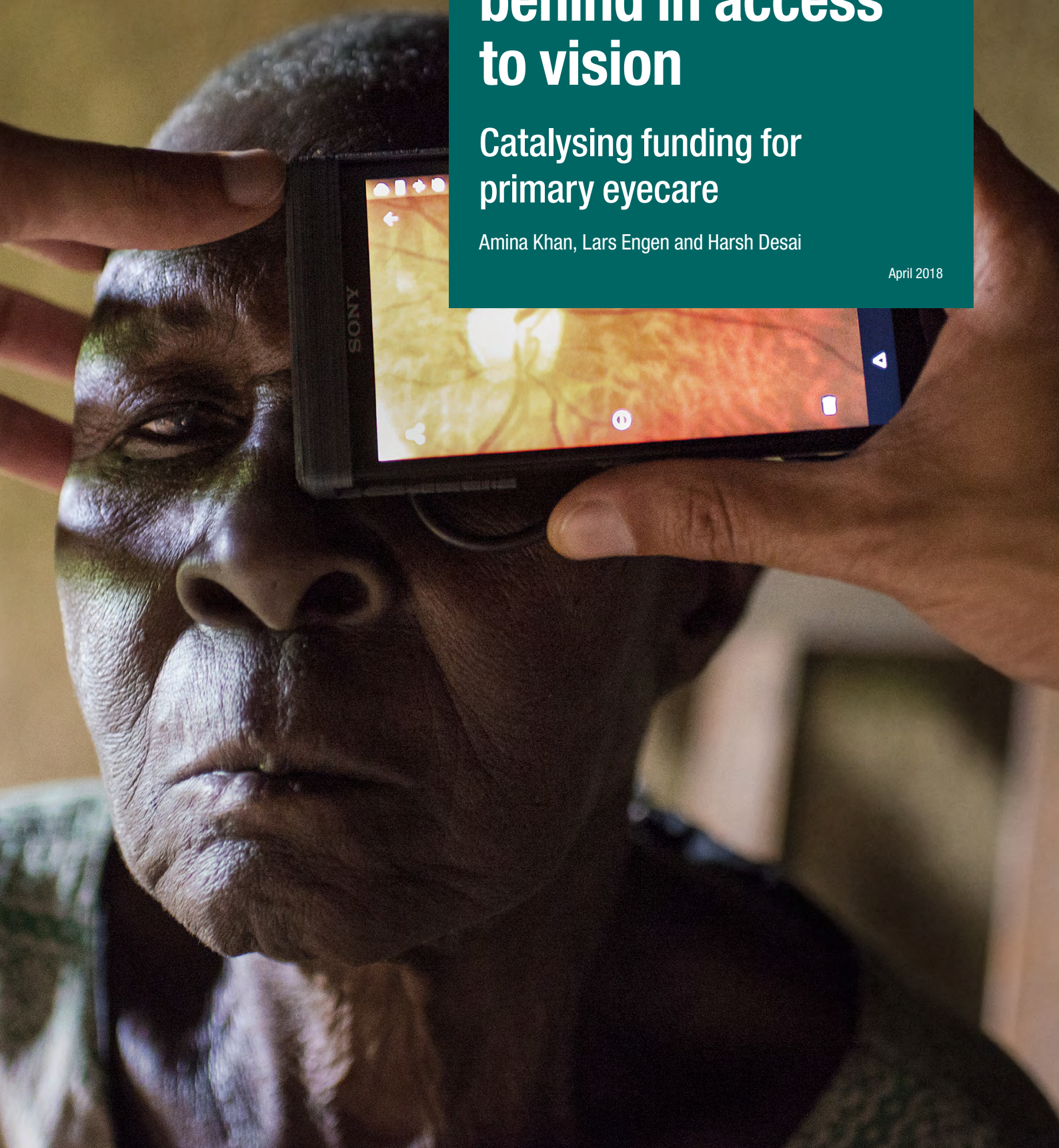
Report

Leaving no one behind in access to vision

Catalysing funding for primary eyecare

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Contents

Acknowledgements	3
List of boxes, figures and tables	6
Acronyms and abbreviations	7
Executive summary	9
1. Introduction	11
2. Why invest in primary eyecare?	13
2.1. Poor eyesight: a '2.5 billion people' problem	14
2.2. Impacts of poor eyesight on global prosperity	14
2.3. Impacts of clear eyesight on global prosperity	14
2.4. Financial gains from investment	15
3. What makes an effective primary eyecare programme?	16
3.1. Promising solutions exist	16
3.2. Solutions can be scaled up or replicated	18
3.3. Solutions are cost-effective	19
4. What is the potential to scale up official donor funding?	21
4.1. Marginal ODA for primary eyecare	21
4.2. Principles likely to mobilise future donor funding	22
5. Using innovative finance models to increase donor funding	24
5.1. Leveraging private-sector capital through catalytic financing	24
5.2. Leveraging private-sector expertise by financing social enterprises	25
5.3. Maximising spending by paying for results	25
5.4. Innovative finance for primary eyecare in practice	27
6. Conclusion and recommendations	29
References	31
Annex 1: Data sources on donor projects for primary eyecare (2010–2017)	34
Annex 2: Cost-effectiveness of interventions including annual screening of school children	35

List of boxes, figures and tables

Boxes

Box 1. Understanding funding is not the only issue or solution	22
Box 2. Alina Vision	24

Figures

Figure 1. Top 20 countries with the highest unmet need for vision correction	13
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Tables

Table 1. Key aspects of the programmes in Rwanda, Cambodia and Bangladesh	17
Table 2. Situations where innovative financial instruments would work	27

Acronyms and abbreviations

BRAC	Building Resources Across Communities (Bangladesh)
DAC	Development Assistance Committee
DALY	Disability-adjusted life year
DFI	Development finance institution
DFID	UK Department for International Development
DIBs	Development impact bonds
DIV	Development Innovation Ventures, USAID
FAE	Foreign Aid Explorer (US)
GDP	Gross domestic product
GPE	Global Partnership for Education
HAART	Highly active antiretroviral therapy
IAPB	International Agency for the Prevention of Blindness
IDA	International Development Association, World Bank Group
IFC	International Finance Corporation, World Bank Group
INGO	International non-governmental organisation
MICs	Middle-income countries
MSI	Multi-stakeholder initiative
NGO	Non-governmental organisation
NPI	Nonprofit Investor
NTDs	Neglected tropical diseases
ODA	Official development assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
PCD	Partnership for Child Development, Imperial College London
PwC	PricewaterhouseCoopers
RBF	Results-based financing
ROI	Return on investment
SDGs	Sustainable Development Goals
SHIP	School Health Integrated Programme
URE	Uncorrected refractive error
USAID	United States Agency for International Development
VAO	Vision Aid Overseas
VFAN	Vision for a Nation
WHO	World Health Organization

Executive summary

Key messages

- Two and a half billion people in the world today need but lack access to glasses, 80% of whom live in just 20 developing countries.
- Effective delivery models for primary eyecare do exist: case studies in Rwanda, Bangladesh and Cambodia show that eyecare services that are integrated with existing health and education systems are fit for the future.
- Donors can play an important role in addressing the unmet need for glasses, and in drawing attention to amplifying the impact of clear eyesight on people's health, education and economic outcomes. But it is unlikely that official development assistance will be available to fund efforts in this area for now.
- Instead, innovative financing mechanisms can be used to leverage and multiply available funding from sources such as the private sector and philanthropies.

Two and a half billion people in the world today need but lack access to a pair of glasses, and 80% of this group live in just 20 developing countries (Mackenzie, 2017). Being able to access primary eyecare services, including basic eye tests to determine how well people can see and whether glasses can help them see clearly, is a necessary first step in acquiring glasses.

This study analyses primary eyecare provision in developing countries from the perspective of global development rather than health alone. Poor sight is not only a health issue, but one that, left untreated, can exclude people from numerous life-changing opportunities. Starting from an early age, visual impairment can waste human potential (Chen, 2017), affect people's education and health outcomes (Krumholtz, 2000; Atkinson et al., 2002; Williams et al., 2005; Roch-Leveq, 2008), and shorten their most productive working years (Frick et al., 2015).

Commitments from the international development community to deliver on the Sustainable Development Goals (SDGs), which focus on poverty, health, education, gender equality and productive employment, have at their core the pledge to leave no one behind. Meeting primary eyecare needs in developing countries, especially those of people furthest from accessing care, is central to leaving no one behind. The poorest and most marginalised groups are less likely to receive primary eyecare, and, as sight conditions deteriorate over time without care, this means further marginalisation.

Without additional investment in primary eyecare the cycle of poor sight and low development outcomes could continue. In a bid to reverse this, we ask why additional

investment should be made in primary eyecare in developing countries, and consider the potential to scale up investments from official donors and from other sources. The study focuses on development finance for primary eyecare provided by the United States, the United Kingdom and the World Bank Group, and on the additional private finance that such donors can catalyse for primary eyecare using innovative finance.

The study explores three service delivery models in depth that have design features and institutional arrangements likely to capture the interest of donors: that of Vision for a Nation (VFAN in Rwanda), VisionSpring in Bangladesh and the Global Partnership for Education's (GPE) work in Cambodia. Using evidence from the programmes, the study finds that effective service delivery models tend to:

- work with the right in-country partners
- train first-time service providers: shifting vision screening and delivery of glasses to general nurses, teachers and community health workers is necessary as developing-country health systems continue to underinvest in human resources
- be integrated with existing health and education systems
- engage with communities to raise awareness of the benefits of primary eyecare; be fit for the future; and be cost-effective.

While the global productivity-based financial returns on investment (ROI) in primary eyecare in developing countries are relatively modest (4:1), there is growing evidence that suggests VFAN and VisionSpring

productivity-based returns could be significantly higher. One independent study assessed rate of returns as high as 30.5:1 (Chao, 2012).^{1 2} As a ratio of more than 30:1 represents a strong business case relative to a wide range of development interventions (beyond health), it is good to note that a major independent detailed assessment of these rates of return is already planned and underway.³

A small amount of official development assistance (ODA) has been directed at primary eyecare from bilateral donor agencies like the UK Department for International Development (DFID) and the United States Agency for International Development (USAID) in recent years. Official donors committed US\$3.7 million in 2015 – just 10% of the total resources dedicated to meeting the need for eyeglasses (WEF, 2016). Considering that many of the countries with the highest unmet need for vision correction are middle-income, and the fact that the donors considered in this study have hitherto not focused investments in this area (to date the main emphasis of eye-health spending has been, and may continue to be, on combating neglected tropical diseases (NTDs) that affect sight, like trachoma and river blindness), it seems unlikely that donors will scale up ODA independently in terms of absolute sums for eyeglass provision.

Remedies for the lack of attention from official donors on eyeglass provision could include aligning strategically with donor priorities (geographical as well as thematic), highlighting proven delivery models, and building strong coalitions to crowd in additional finance and competencies. One such alignment could link the issue to that of disability, which is currently a high priority for DFID, for instance, as witnessed by the fact that it is co-hosting a

high-profile disability summit with the Government of Kenya in 2018.

Another option would be to link provision of eyeglasses to the growing interest in cash transfers targeted at the poorest.⁴ As the focus of such programmes is on reducing poverty and inequality, lower economic rates of return are accepted. Furthermore, some programmes have specific provision for transfers to those with disabilities, which would both increase people's ability to purchase glasses, as well as offer opportunities for linking to provision of eyecare treatment. As some cash transfer programmes also focus on increasing agricultural productivity, and include targeted livelihood training and support packages, there may also be options for including the provision of eyeglasses, given the demonstrated impact of glasses on increased productivity. As cash transfers are scaled up globally, there may be an opportunity to re-assess the potential to also scale up supply of glasses to the poorest at least.

A second angle is to explore how official donors can catalyse the provision of primary eyecare through innovative finance and by crowding in additional private finance. By using innovative financing instruments, donor funding can leverage other flows to multiply available funding, including from the private sector and philanthropies. This paper examines alternative funding models of blended finance, volume guarantees, funding social enterprise and results-based financing.

Finally, while primary eyecare suffers from a lack of funding, it is worth noting that the financial aspect is not the only concern, nor is it the only solution. Developing countries themselves need to take the issue seriously, and implement policies on delivering universal eyecare.

1 Nonprofit Investor (NPI) report on VisionSpring, estimated for 2009 (<https://www.slideshare.net/kentchao/npi-evaluation-of-vision-spring>). VisionSpring itself cites rates of return as high as 23:1 (<http://visionspring.org/why-eyeglasses/>). As noted in chapter 3, however, there is some uncertainty around the basis of these estimates.

2 Variations in ROI are a result of methodological differences. Such differences include the range of investments considered (i.e. just glasses or all investments in primary and secondary eyecare) and the range of costs included (i.e. workforce, infrastructure, training and operational costs; recurrent and one-off costs). As a separate major independent review has been commissioned and is underway, this paper has not sought to independently validate estimates made to date but has sought to identify the current uncertainties and flag the importance of eyecare relative to other development interventions.

3 This ratio emerged from the most cost-effective intervention that was identified by the Copenhagen Consensus Panel in 2012. See Hoddinott et al. (2012).

4 E.g. Financing the future ODI (2015) <http://www.odi.org/publications/9462-financing-future-international-public-finance-should-fund-global-social-compact-eradicate-poverty>

1. Introduction

In 2017, James Chen, founder of the UK-based charity VFAN, published the book *Clearly: how a 700-year old invention can change the world forever*. In it, he stated that ‘global prosperity cannot be achieved without clear vision for all’ (Chen, 2017: 15), and showed how simple primary eyecare interventions are some of the most useful ways for people in developing countries to access a pair of glasses if needed in order to restore their sight.

Eyeglasses allow people to seize numerous life-changing educational, health and livelihood opportunities – priorities that lie at the heart of the SDGs (Kumah et al., 2017) and the commitment to leave no one behind. The SDGs paint an inspiring picture of what the world could look like in 2030. They consist of 17 goals and 169 targets intended to spur action in areas of critical importance to humanity – people, planet, prosperity, peace and partnership (Nicolai et al., 2015). Crucially, the commitment to leave no one behind is aimed explicitly at accelerating progress for people with the worst development outcomes (Stuart et al., 2016).

The SDGs also build on the Global Action Plan on Universal Eye Health (2014-19), adopted by all World Health Organization (WHO) member states, which sets out plans for universal access to comprehensive eyecare services.⁵

Chen (2017) argues that the global development community must act decisively to remove the barriers to the provision of primary eyecare in developing countries through policy changes in the ‘four Ds’:

1. **Diagnosis:** allowing health workers, nurses or teachers to take on simple, straightforward tasks of vision screening, normally the responsibility of trained ophthalmologists and optometrists.
2. **Distribution:** subsidising provision of glasses to the poorest people in developing countries to help gradually create a market, removing inappropriate regulations on selling glasses, and creating simpler, cheaper supply chains.
3. **Dollars:** removing import duties and taxes on basic glasses to make them affordable.
4. **Demand:** eliminating social and cultural barriers to wearing glasses.

Without additional investment in primary eyecare, there is a risk that the resulting cycle of poor eyesight and concomitant low development outcomes will continue. In a bid to reverse this, we consider the potential to leverage

official donor and other funding for primary eyecare, with a focus on development finance provided by official donors in the US, UK, and the World Bank Group (both its International Development Association (IDA) and its International Finance Corporation (IFC)), and on the additional private finance that such donors can catalyse for under innovative finance.

To date, official donors have directed significant attention and funding to the health sector and the fight against life-threatening diseases like malaria, tuberculosis and HIV/AIDS; to NTDs in the eyecare arena, like trachoma and river blindness; as well as to cataract surgeries. Primary eyecare programmes under which people can access glasses to correct conditions such as uncorrected refractive error (URE) and presbyopia – the normal loss of near-focusing sight that occurs with age – have not been high priorities for donors. In other words, donors demonstrate a preference for funding life-saving rather than life-changing interventions like primary eyecare (key informant interviews, 2017).

Throughout, the study uses a narrow definition of primary eyecare to include vision screenings or basic eye tests and the prescription and delivery of glasses for correcting URE and presbyopia. This is only one of many existing definitions of primary eyecare, but it highlights the minimum and most relevant set of services needed in developing countries that have less integrated health systems than developed countries.

The study uses a range of methods: literature reviews, secondary data analysis and in-depth key informant interviews with prominent international eyecare non-governmental organisations (NGOs) and alliances, including VFAN, VisionSpring, Eyelliance, Sightsavers, Fred Hollows Foundation, the Brien Holden Vision Institute, BRAC Bangladesh, the International Agency for the Prevention of Blindness (IAPB), WHO and DFID’s Human Development Department. The data on funding for primary eyecare programmes in recent years (2010-2017) are from donor-maintained databases, such as the UK’s Development Tracker (DevTracker), the US’s Foreign Aid Explorer (FAE) and the World Bank’s database (see Annex 1).

Chapter 2 sets out the case for investment in primary eyecare in developing countries, analysing the scale of the need for glasses and the lack of access, as well as the impacts of both poor and clear eyesight on global prosperity. Chapter 3 considers options to scale up or replicate effective primary eyecare models based on a

5 http://www.who.int/blindness/AP2014_19_English.pdf?ua=1

review of programmes operational in Rwanda (led by VFAN), Bangladesh (led by VisionSpring and Building Resources Across Communities, BRAC), and Cambodia (led by partners of GPE). Chapter 4 discusses the potential for scaling up financial support in the current context of global, health and primary eyecare ODA, analysing funding for primary eyecare from the largest bilateral donors in the

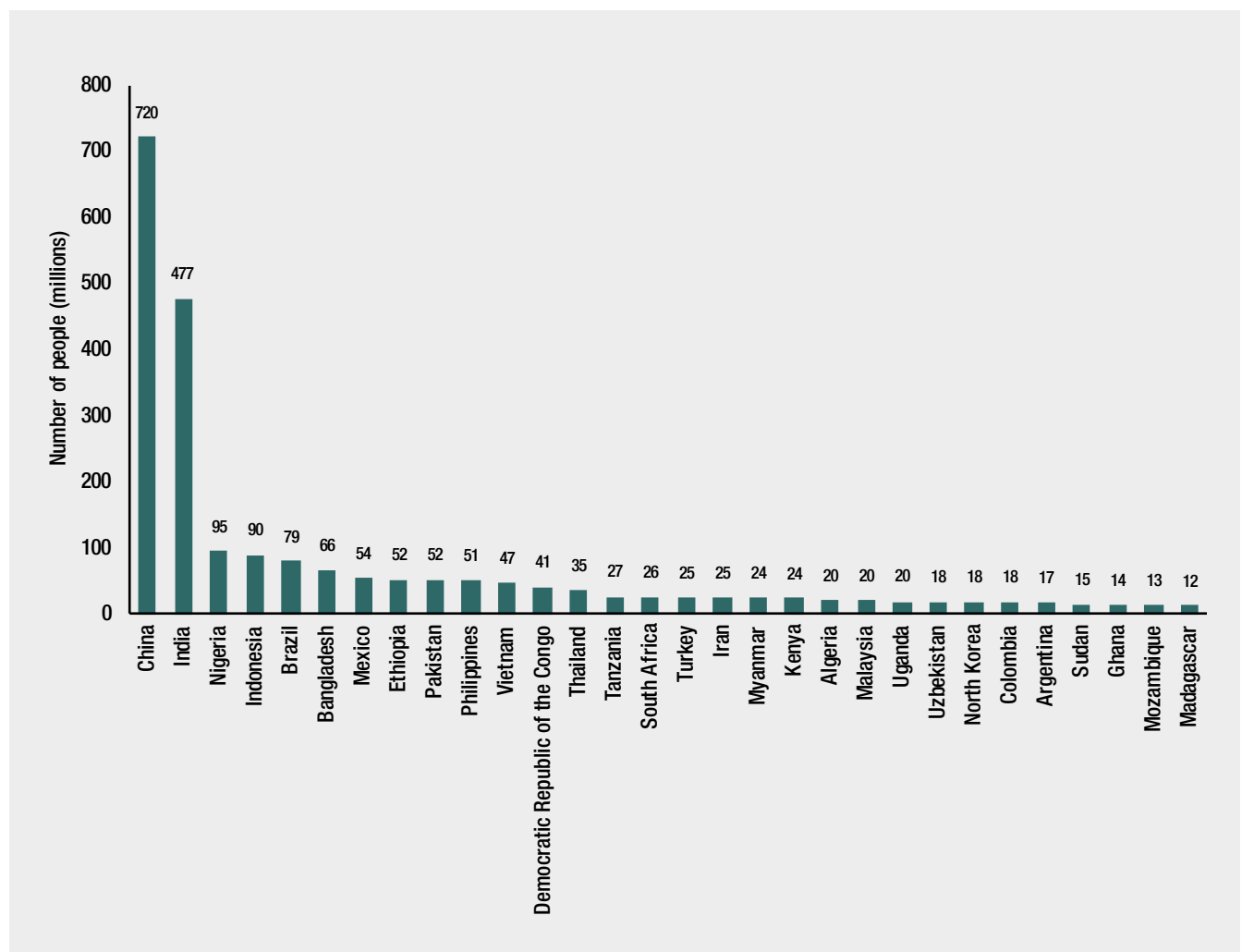
healthcare arena (the US and UK governments, via USAID and DFID) and the largest multilateral provider (the World Bank). Chapter 4 also presents a set of principles that need to be applied in order to secure future funding for primary eyecare from official donors. Chapter 5 examines the potential for scaling up donor support through innovative finance, and Chapter 6 concludes with recommendations.

2. Why invest in primary eyecare?

This chapter analyses why investing in primary eyecare should be important for official donors today. Firstly, too many people in the world suffer from poor eyesight caused by URE and presbyopia, even though a simple solution exists for treating these conditions: glasses. Secondly, living with such conditions negatively affects a wide range of development outcomes, not only in health but also in education, productive employment and many other areas relating to

the SDGs. Thirdly, treating such conditions can easily turn these negative outcomes into positive ones, particularly in the case of children's education and adult productivity. Finally – from a narrow, utilitarian perspective – financial returns on investment can be derived, in terms of both economic benefits relative to the costs of investment, as well as the cost-effectiveness of screening interventions expressed as costs per disability-adjusted life year (DALY) averted.

Figure 1. Top 20 countries with the highest unmet need for vision correction



Source: Mackenzie (2017).

2.1. Poor eyesight: a '2.5 billion people' problem

Around 2.5 billion people, one third of the world's population today, need but cannot access a pair of glasses to see clearly (Mackenzie, 2017).⁶ The primary causes of loss of eyesight that glasses can address include URE and presbyopia, found in people aged 35 or older (Bourne et al., 2017). Both URE and presbyopia affect people's distance and/or near vision (ibid.). Reading glasses can help restore sight in people with presbyopia, and glasses with adjustable lenses in people with URE.

Where do these people live? Eighty percent of them, about 2 billion people, live in just 20 developing countries (see Figure 1). Many of these countries are highly populated middle-income countries (MICs) that donors increasingly view as being able to fund programmes themselves. For instance, in India, DFID transitioned from a focus on service delivery to economic development. It has ended ODA, but continues to provide development capital investment and technical assistance, focused both on domestic challenges and on helping India build its capacity as a donor country (ICAI, 2016).

2.2. Impacts of poor eyesight on global prosperity

Poor eyesight stops people from realising their full potential (Chen, 2017): it hampers their education and health outcomes (Krumholtz, 2000; Atkinson et al., 2002; Williams et al., 2005; Roch-Leveq, 2008), and cuts short their productive working lives (Frick et al., 2015).

Impact on children's education and adult reading

Vision problems from an early age can lock children into a life of disadvantages. Relative to peers with better eyesight, they can underperform academically. With 80% of all learning occurring visually, preschool children from as young as four or five years old who have uncorrected hyperopia (or far-sightedness) can perform badly on early literacy tests (Kulp et al., 2016). In China, students with uncorrected vision are often diverted to a slow academic track, which causes them to attend less academically challenging vocational secondary schools (WEF, 2016).

Living with near-vision loss due to presbyopia prevents adults from reading or learning to read. Without access to reading glasses, ageing populations have difficulty seeing the screens of their mobile devices clearly and accessing the digital economy, resulting in a 'visual divide' as well as a technological one (ibid.).

Impact on adults' productivity and earning

Presbyopia also reduces people's productivity and personal income. In the prime of their working lives, adults with this condition who work in agriculture and food production, such as coffee- and cocoa-bean sorting, or in garment and textile work, are unable to perform a wide range of tasks (WEF, 2016). A BRAC study found that 90% of individuals experiencing near-vision loss faced problems in their daily work and, on average, 23% reported their income as compromised (ibid.).

Lost productivity among adults who need glasses is estimated to be US\$227 billion annually (Fricke et al., 2012; Frick et al., 2015). Frick et al. (2015) arrive at this figure by adding the value lost per year due to presbyopia (US\$25.4 billion), to the value that Smith et al. (2008) suggest is lost per year due to URE (US\$202 billion).⁷ According to our calculations, derived from Smith et al.'s (2008) productivity loss by sub-region, US\$166 billion of this US\$202 billion loss occurs in developing countries. Frick states that this is still a conservative estimate: 'the US\$227 billion annual loss is derived from a narrowly defined age group and does not account for loss associated with missed educational opportunities, nor is it measuring the full impact on quality of life' (WEF, 2016: 11).

Impact on road safety

Drivers with poor vision compromise road safety: they have an up to 30 percentage point higher incidence of road accidents than those with clear vision (Verma et al., 2016). Studies in West Africa show that large numbers of commercial drivers on the road have vision that fails to meet the minimum standards required by law. In Ghana, Ovenseri-Ogomo (2011) found that over 12% of commercial drivers were on the road with vision below the minimum standards required by law, and 7% were visually impaired. And while 98% of commercial drivers possessed a licence in northern Nigeria, less than 28% received an eye test before obtaining their licence (WEF, 2016).

2.3. Impacts of clear eyesight on global prosperity

Impact on children's education

Vision corrected through glasses can improve children's academic performance and education outcomes, which in turn can raise personal income and GDP per capita. Ma et al. (2014) found that providing primary students with glasses boosted their test scores, and their academic performance improved to the same degree as it would

⁶ Mackenzie (2017) arrives at the 2.5 billion figure based on: (1) how URE and presbyopia are distributed globally; (2) the subset of people who would use corrective eyewear if the barriers to its uptake were low, as they are in many developed countries (estimated from the prescribing habits of eye specialists in developed countries); and (3) the extent to which corrective eyewear is available in a country or region (calculated based on market penetration for lenses in a country or region).

⁷ This figure adjusts for labour-force participation and employment rate, after assuming a productivity loss of 10% of gross domestic product (GDP) for blindness and 5% of GDP for URE.

with four to six months of additional schooling. If one extra year of schooling increases earnings by as much as 10% (according to UNESCO (2010), cited in WEF, 2016), then correcting vision in primary school students through glasses can increase personal earnings by as much as 5% (ibid.). Similarly, improvements of at least 0.1 standard deviation seen in test scores due to glasses being worn (Ma et al., 2014) can be associated with a 0.2% increase in annual growth of GDP per capita (WEF, 2016).

Early detection and the effective management of eye health conditions in children and youth – especially myopia (or near-sightedness), commonly diagnosed at 8 to 12 years of age – with properly prescribed glasses can also contribute to achieving some of the education targets in SDG 4 by reducing dropout rates and improving academic performance (ibid.; Kumah, 2017).

Further, the impact that wearing glasses can have on children's mathematics test scores can be 10 times higher than from deworming, and three times higher than from nutrition, based on data analysed from 60 trials of health interventions in primary schools (WEF, 2016). This outcome is particularly powerful given that interventions for deworming and nutrition have been demonstrated to improve learning (ibid.) and have attracted significant donor attention.

Impact on adults' productivity and movement

Vision correction boosts adults' productivity and eases their movement and travel. For instance, providing affordable glasses to rural agricultural workers can boost their productivity by up to 34% (ibid.). A study by Dalberg Global Development Advisors (2015) of adults in India who had their vision corrected with glasses found that 65% reported an increase in independence in movement and travel, and 59% reported an increase in work productivity. Ensuring that drivers can see clearly can also contribute to achieving the SDG 3 health and wellbeing target of halving the number of global deaths and injuries from road traffic accidents by 2020 (WEF, 2016).

2.4. Financial gains from investment

There can be sizeable financial gains for donors by investing in primary eyecare. This can be measured in terms of productivity benefits, expressed either as a financial value of economic benefits relative to costs; or in terms of costs per DALY averted. WHO has classified interventions as cost-effective based on the cost per DALY averted: if it is less than three times the national

annual GDP per capita, the intervention is considered cost-effective; if it is less than the national annual GDP per capita, the intervention is considered very cost-effective.⁸

In terms of productivity benefits expressed as a financial value of economic benefits relative to costs, PricewaterhouseCoopers (PwC) (2013) has estimated returns on investment in the Vision 2020 goals,⁹ which seek to eliminate cases of avoidable or treatable blindness by 2020. PwC has recommended that US\$57 billion be spent on primary eyecare between 2011 and 2020 in developing countries, and estimate a productivity benefit of US\$228 billion over the same period. This amounts to a cost-benefit ratio of 4:1, which is a relatively modest return on investment compared to other development interventions. However, specific case studies reviewed in Chapter 3 of the present report suggest higher rates of financial return.

A primary eyecare intervention such as screening school-age children is considered very cost-effective when measured in terms of costs per DALY averted. Using WHO's method for cost-effectiveness analysis, Baltussen et al. (2008) estimate that the cost-effectiveness of screening school children annually (combined with the provision of glasses for eligible school children) is a financially viable intervention for reducing rates of URE (see Annex 2). Other factors not included in the study's estimates, like savings outside the health system, can further improve cost-effectiveness.

However, screenings are not necessarily as cost-effective as other eyecare interventions or other health interventions. Annex 2 shows that interventions for trachoma control and cataract surgery are more cost-effective; only in Southeast Asia is eyecare screening more cost-effective than the treatment of trachoma control in children via tetracycline. Further, relative to other health interventions for malaria, TB, and HIV/AIDs, the costs per DALY averted for annual eyecare screening for school children can be much higher. The only exception is treating HIV in some regions, like Southeast Asia and Africa, through the standard form of highly active antiretroviral therapy (HAART) where the service can be provided in primary healthcare facilities. The costs of such standard HAART are much higher than the costs of eyecare screening in the two regions respectively.

Eyecare screening for school children is less cost-effective than other common – but still underfunded – health interventions (such as malaria, for instance). But when cost-benefit ratios from case studies are taken into consideration, the purely financial case for treating URE is stronger. These studies are the focus of the next chapter.

8 The WHO threshold is commonly accepted for measuring and comparing the cost-effectiveness of health interventions, even though it has many limitations (See Marseille et al., 2015).

9 A predecessor to the current Global Action Plan on Universal Eye Health (2014-19).

3. What makes an effective primary eyecare programme?

This chapter analyses the design features and institutional arrangements of effective primary eyecare programmes that have been launched in recent years in three developing countries. This includes the VFAN programme on universal primary eyecare in Rwanda; VisionSpring's project with BRAC in Bangladesh on community health worker-based provision of primary eyecare; and the school eye health pilot project led by partners of GPE in Cambodia. We draw on their experiences to suggest the specific design features donors should look for when making their decisions regarding investment. As stated before, cost-effectiveness estimates for two of the programmes are derived to highlight the purely financial gains from investment. Cost-effectiveness studies for the project in Cambodia are currently being led by the implementing partners so estimates of that particular project have been excluded from our analysis.

3.1. Promising solutions exist

In recent years, primary eyecare programmes have been designed by international- and national-level eyecare non-governmental organisations (NGOs), philanthropists and social enterprises in partnership with developing-country governments and other key stakeholders to address poor eyesight problems with some financial support from official and other donors. This section provides a general overview of the three programmes reviewed in this study, with Table 2 summarising some key aspects.

Vision for a Nation programme in Rwanda

The VFN Rwanda programme was set up as a partnership between the UK-based charity Vision for a Nation and Rwanda's Ministry of Health. Between 2012 and 2017, the partnership designed a universal primary eyecare programme that has made services available to the country's entire population.

An innovative approach to training enabled 2,700 general nurses in Rwanda to conduct basic vision tests and dispense affordable glasses (free for the poorest 20% of people, with the rest capped at US\$1.5 per pair) (VFAN,

2017). Over a five-year period, the general nurses screened 2 million people (around 18% of the country's population), prescribed medicines (e.g. eyedrops for conjunctivitis) for 1.1 million people (9% of the population) and eyeglasses for 160,000 people (1.35% of the population), and referred 214,000 people (1.8% of the population) for specialist treatment.

The programme was financed by: the founder of VFAN, James Chen, through the Chen Yet-Sen Family Foundation (Chen, 2017); UBS Optimus, a foundation of the global private bank dedicated to helping children (US\$1,400,000); other private donors (US\$550,000); DFID (US\$379,000); and USAID (US\$225,000).

Vision Spring and BRAC's programme in Bangladesh

VisionSpring, a non-profit organisation founded in 2001 and based in the US, uses a social enterprise model to provide basic screening services and sell affordable, ready-made reading glasses to people living in rural areas in developing countries (Karnani et al., 2010). It typically sources the glasses at about US\$1 per pair from Asia, mainly from China (ibid.), and trains local women to become 'vision entrepreneurs', i.e. independent commissioned sales representatives who visit villages and sell the reading glasses at or under US\$4 per pair (key informant interview, 2017).

In Bangladesh, VisionSpring uses a franchise model on a fee-for-service basis. This involves disseminating its sales kits to BRAC, the largest NGO in Bangladesh (Karnani et al., 2010). The partnership helps equip nearly 120,000 community health workers (known locally as *Shasthya Shebikas*) who have already received training from BRAC in basic healthcare services with the skills to conduct vision screenings and sell reading glasses in poor rural communities.

Since the programme's inception in 2006, over 1 million people living in 61 of 64 districts in Bangladesh have accessed reading glasses.

The grant for VisionSpring in Bangladesh, and for its subsequent engagement with BRAC, was provided by the Skoll Foundation and Grand Challenges Canada. Though detailed financial reporting is unavailable, it is estimated

that the Skoll Foundation allocated US\$850,000 to this programme, and Grand Challenges Canada an additional US\$500,000 (USAID, 2014).

The Global Partnership for Education's school eye health pilot project in Cambodia

GPE, established in 2002, is a multi-stakeholder partnership and funding platform that aims to strengthen education systems in developing countries to increase the number of children learning and in school. GPE launched a school eye health pilot in 2012 in partnership with Cambodia's

Ministry of Education, the World Bank, Sightsavers, Imperial College London's Partnership for Child Development (PCD), and the Fred Hollows Foundation (WEF, 2016).

During the pilot, 88 teachers were trained to conduct vision screenings in 56 schools (Heath, 2018). Thirteen thousand students and out-of-school children aged 11–15 years were screened and those requiring glasses received them (WEF, 2016).

The World Bank acted as a grant agent, administering the funds of GPE. Though, it is unclear from available project documents how much was allocated for the pilot.

Table 1. Key aspects of the programmes in Rwanda, Cambodia and Bangladesh

	Rwanda	Cambodia	Bangladesh
Key aspects			
Lead stakeholders	VFAN in Rwanda; Rwandan Ministry of Health	GPE; Sightsavers; Fred Hollows Foundation; Cambodia's Ministry of Health and Ministry of Education	VisionSpring; BRAC
Duration	2012-2017 (five years)	2012	2006-present
Stakeholder category	International non-governmental organisation (INGO); government	GPE (multi-stakeholder partnership); INGOs; government	INGO; Bangladeshi NGO
Service provider	General nurses	School teachers	Community health workers
Conditions detected and treated	Refractive error status based on vision test; conjunctivitis	Refractive error status among children corrected through glasses	Presbyopia in adults corrected through reading glasses
Number of people trained	2,700	88	N/A
Number of people served	2 million people screened; 1.1 million prescribed eyedrops; 160,000 provided with glasses; 214,000 referred further	13,000 children aged 11-15 screened	Over 1 million people provided with glasses, in 61 out of 64 districts in Bangladesh
Integrated with other systems or programmes?	Yes, with Rwanda's healthcare system	Yes, with Cambodia's school health interventions	Yes, with BRAC's nationwide network of community health workers
Limitations		Only school-age children are a target group; most likely in-school children will be screened more easily than out-of-school children	Adults are target group; addresses only one eye condition (presbyopia); not integrated with Bangladesh's national healthcare system although BRAC community health workers are used by the government's health departments for their own programmes
Financial aspects			
Main funders	Chen Yet-Sen Family Foundation; UBS Optimus Foundation; DFID; USAID	GPE	Skoll Foundation; Grand Challenges Canada
Funder category	Philanthropy; corporate philanthropy; US and UK bilateral donor agencies	Vertical fund (the World Bank acts as grant agent)	Philanthropy; innovative fund
Cost of the programmes	US\$11.28 million (2015-2017 window) (including both VFAN and Government of Rwanda)	Not available	US\$1.25 million (US\$850,000 from Skoll Foundation; US\$500,000 from Grand Challenges Canada)

Sources: Authors' analysis.

3.2. Solutions can be scaled up or replicated

In this section, we focus on the design features and institutional arrangements that make the programmes effective and worth scaling up or replicating elsewhere.

The right in-country partnerships are in place

The programmes under review show the benefits of working with the right in-country partners. Cooperation between different actors, within and outside of government, helps leverage the comparative advantage of each of the stakeholders. VFAN worked with Rwanda's Ministry of Health to deliver primary eyecare services throughout the country, while GPE's project partners in Cambodia worked with the country's Ministry of Education on the school eye health pilot. VisionSpring works with an NGO stakeholder outside of government, BRAC.

These partnerships have helped to remove major stumbling blocks in 'distribution' and 'dollars', two of the four Ds identified by Chen (2017). He describes 'distribution' in terms of removing inappropriate regulations on selling glasses, and creating simpler, cheaper supply chains; and 'dollars' in terms of removing import duties and taxes on basic glasses to make them affordable. For instance, the Rwandan health ministry waived all taxes and duties on eyewear used in the VFAN programme, which, under normal conditions, would have amounted to a quarter of the total product, insurance and freight costs. Its Medical Procurement and Production Division sources the glasses from Asia, and ensures regular supply to the country's local health centres. It has also deregulated the sale of eyewear by allowing nurses to sell glasses to people who need them, rather than limiting this to optometrists and ophthalmologists alone. Furthermore, Rwanda is using its health insurance scheme to cover the costs of eye tests and referrals, and is administering a central fund where revenues from the sales of glasses will be used exclusively to sustain the programme. Similarly, the Cambodian education ministry ran the school eye health pilot in 56 schools in urban and rural areas in Siam Reap Province where it already operated other school health interventions, and then helped to roll out the programme in three other provinces the year after the initial pilot. BRAC's massive network of community health workers (the *Shasthya Shebikas*), spread across Bangladesh supplied VisionSpring with an organised, skilled and entrepreneurial workforce.

First-time service providers are trained

All three interventions reviewed have had a training component targeted at first-time service providers. This has helped address another of Chen's Ds – 'diagnosis' – allowing health workers, nurses or teachers to take on the simple task of vision screening, normally the remit of trained ophthalmologists, optometrists and refractionists (Chen, 2017). The Rwandan Ministry of Health and VFAN

operated a three-day training programme for general nurses focusing on the essentials of eyecare, compared to the traditional one- to five-year programmes employed elsewhere. The nurses learn to conduct basic vision tests, to detect and treat minor eye allergies or infections, and to refer patients for specialist treatment at their nearest hospital (VFAN, 2017). Based on the vision test results, the nurses also dispense affordable reading glasses or ones with adjustable lenses. The training curriculum has been developed by Rwandan ophthalmologists and is now part of the curriculum of all eight of the country's nursing schools (ibid.). Subsequently, all nursing school graduates will be certified to provide the same level of primary eyecare in the future.

VisionSpring's trainings in Bangladesh have helped BRAC's *Shasthya Shebikas* become 'vision entrepreneurs'. The three-day trainings cover basic eyecare and business management (Karnani et al., 2010; WEF, 2016), and enable the women to provide basic screenings using distance and near eye charts. The women then carry a sales kit containing reading glasses, screening tools and marketing materials (ibid.). This training adds to the *Shasthya Shebikas*' existing skill set, as they are already trained by BRAC to diagnose, treat and provide health education on conditions like diarrhoea, anaemia and worm infections to women living in rural communities.

GPE's work in Cambodia provided teachers with one day of training on conducting basic vision screenings. An evaluation six months after the pilot found that teacher screenings were fully aligned with those of trained eye health workers, demonstrating the method's effectiveness and safety (WEF, 2016).

Task-shifting is an innovative element in all three training programmes. In Rwanda there is one ophthalmologist for every 1 million people (ibid.), whereas in the UK there is one for every 8,000 residents (Karnani et al., 2010). Training general nurses in the Rwandan context helps meet the primary eyecare needs of the general population; previously, services like eye examinations and glasses were provided only by a very small number of ophthalmic specialists in district and national hospitals (VFAN, 2017). Task-shifting to *Shasthya Shebikas* in Bangladesh offers a valuable, first-time health service to underserved communities. It also increases the workers' earnings, as eyeglasses have the highest profit margin of all the products they currently sell (including clean birthing kits, aspirin and oral rehydration salts) (WEF, 2016).

Interventions are integrated with existing health and education systems

Integrating primary eyecare services into existing systems has helped ensure the continuity of the programmes. The VFAN programme is woven into Rwanda's universal healthcare plan. All 42 of the district-level hospitals in the country are linked to all 502 of Rwanda's local health centres, which now deliver primary eyecare services and provide people with eyeglasses and medicines on the spot. Where needed, the local health centres also refer

people with moderate and severe vision loss to the linked hospitals. Similarly, GPE's school eye health pilot has led to the integration of eyecare into the Ministry of Education's plan and budget for a comprehensive school-based child health programme and a scaling-up of the pilot model (WEF, 2016). The year after the pilot ended, the Ministry incorporated the model into its new five-year National Education Strategic Plan and hired the Fred Hollows Foundation to provide technical assistance in implementing vision screening in three other provinces. It also integrated vision screening with different school health interventions like deworming. In addition, in 2016, the Ministry of Education launched national operational guidelines for school vision screenings in collaboration with the Ministry of Health, the National Programme for Eye Health, the Brien Holden Vision Institute and the Fred Hollows Foundation (ibid.).

Communities are made aware of the benefits of primary eyecare

Community awareness of the primary eyecare programmes is vital for greater uptake of services and forms a component of each of the programmes. This has helped with Chen's (2017) fourth D, 'demand' (eliminating social and cultural barriers to wearing glasses). In 2015, the Rwandan Ministry of Health and VFAN launched a one-off nationwide outreach programme to raise awareness about the benefits of regular eye tests and corrective eyeglasses. Communities in all 15,000 villages in Rwanda now know that eyecare services are available at their local health centres. In Bangladesh, *Shasthya Shebikas* also led information campaigns in their communities about eyecare and the benefits of wearing glasses. Interestingly, because the school eye health pilot in Cambodia made teachers more aware of the benefits of wearing glasses, they themselves asked to be screened alongside the children. The teachers were also made aware that, by wearing glasses themselves, they could serve as role models and encourage children to wear glasses too.

Interventions are fit for the future

All three interventions reviewed here have evolved beyond a single project in a specific context, having been designed to be scaled up or replicated elsewhere. VFAN will apply its programmatic approach in Ghana (key informant interview, 2017). By 2020, it is expected that another 38,000 *Shasthya Shebikas* will be trained to screen for presbyopia and dispense reading glasses, reaching 150 million people in Bangladesh who would otherwise not have access to glasses to correct near-vision loss (WEF,

2016). After the pilot project ended in Cambodia in 2012, GPE scaled up its efforts there, and throughout 2016 it replicated the project under the School Health Integrated Programme (SHIP) in Ethiopia, Ghana and Senegal (ibid.).

3.3. Solutions are cost-effective

In addition to the features outlined in the previous section, cost-effectiveness plays a vital role in making investment decisions, and in making primary eyecare programmes work. We analyse the three programmes and estimate cost-effectiveness ratios for two, to reinforce the case for scaling up innovative service delivery models like those of VFAN in Rwanda, and of VisionSpring and BRAC in Bangladesh.

VFAN in Rwanda

A 2015 evaluation by Crook Associates commissioned by VFAN estimates that US\$60 million – or 0.7% of Rwanda's GDP – in economic productivity is lost annually due to URE.¹⁰ This figure was ascertained after adjusting for WHO disability weights (0.19 for severe vision loss and 0.003 for moderate vision loss) and assuming a 12% prevalence rate, which is a conservative estimate.¹¹ The annual cost of VFAN's programme between 2015 and 2017 was US\$3.76 million (including both VFAN and Government of Rwanda costs), which implies a 16:1 rate of return.¹² However, a full assessment of the rate of return is more complicated.

The VFAN programme is estimated to have reached a third of the population over this three-year period, implying that full coverage would be possible over ten years. But to achieve the full productivity benefits, it may be necessary to repeat testing more frequently than every ten years. If testing were needed every five years the rate of return would be only 8:1. At the same time, a VFAN programme at the 2015-2017 scale may not be needed indefinitely, as these initial years included certain startup costs and one-off catchup costs to treat a population that has been without eyecare for many years. Moreover, the productivity loss is likely to rise sharply over time, probably as fast as GDP and possibly even more as industry and services become a larger part of the economy, while costs are expected to rise more slowly. These issues will hopefully be captured in the separate independent assessment of rates of return that has already been commissioned and is underway.

It is difficult to project rates of return for an equivalent programme in Ghana due to the limited data on prevalence rates and the lack of past precedent in this country for primary eyecare services at a national scale. Kumah et

10 The full basis for this estimate is not set out in the paper but will presumably be fully assessed by the planned major independent review that is already underway.

11 URE associated with moderate and severe distance vision loss is much lower than the real prevalence of URE (which also includes marginal and mild vision loss). Presbyopia that affects near vision and would affect almost all adults above 35 years is not included in this estimate.

12 The estimates span the 2015-2017 time-frame in line with the Crook Associates study (2015); this is the period for which we could calculate costs relative to the productivity loss due to the projections provided in their study. Some of the high one-off costs were incurred in the earlier start up period from 2012-2015.

al. (2017), in an IAPB-commissioned study, indicate a 1.07% rate of severe visual impairment in Ghana, with URE contributing to 44% of such incidences. Based on these figures, given a population of 28.21 million people,¹³ approximately 479,570 people have severe vision impairment in Ghana, with URE contributing to 211,011 of such cases within that subset. As this population is spread out across a country twice as large as Rwanda, it will be harder to achieve similar financial returns on investment. Additional research is needed to assess URE rates in Ghana and similar countries within which VFAN is considering expanding, as well as to determine whether similar or most cost-effective rates can be achieved given these prevalence rates.

VisionSpring and BRAC programme in Bangladesh

The VisionSpring and BRAC programme is an example of a low-cost, high-yield intervention for treating poor vision and avoidable blindness. Its social entrepreneurship model (BRAC, 2017) focuses on providing cheap eyeglasses to ‘the base of the pyramid’ via community health workers; free eyesight screenings and referrals for eye diseases are built into the programme.

The William Davidson Institute’s (unpublished) evaluation of VisionSpring’s activities in India suggests a high return on investment for work in Bangladesh. Based on their sample of individuals earning an average of US\$2 per day, the authors estimate that every pair of eyeglasses purchased yielded an increased monthly productivity of 35% – later revised to 20% following scrutiny by Nonprofit

Investor (NPI),¹⁴ an independent assessor of non-profit organisations (Chao, 2012). Assuming 275 working days and that the glasses last for two years, NPI estimates the gross potential increase in income-earning potential for each pair of glasses provided under the scheme is US\$220, with a net increase of US\$216 after allowing for the US\$4 purchase cost. As NPI estimated that the average cost of VisionSpring providing glasses in 2009 was US\$7.09, this translates into an NPI-cited rate of return of 30.5:1. VisionSpring has estimated that the average cost of eyeglasses fell to \$4.7 by 2013, but for reasons that are not clear they also reduced the estimated productivity benefit to the annual amount rather than the two years (the lifetime of the glasses). As a result, VisionSpring estimates the rate of return to be 23:1. Had it maintained the full two-year benefit, the implied rate of return would be 46:1. Unfortunately it is not clear in either the NPI or the VisionSpring estimates whether the full cost of providing the glasses by all partners involved has been factored in, e.g. whether there is any degree of cross-subsidisation by BRAC or any activity that is funded by the Government of Bangladesh. These issues will hopefully be resolved in the separate independent assessment of rates of return that has already been commissioned and is underway.

The three programmes analysed in this chapter highlight that there are multiple solutions on offer to correct URE and presbyopia and a variety of effective service delivery models in resource-poor settings to provide primary eyecare services to people who need them most. Despite this, there is a lack of donor interest in funding primary eyecare – an issue that the next chapter focuses on.

13 Derived from World Development Indicators 2016 population estimates.

14 Chao (2012) indicates that VisionSpring should be basing its productivity estimate on “income growth” rather than ‘increased productivity’, which includes non-income-generating activities. Doing so leads to a more conservative estimate but does not invalidate the rest of the assumptions in the model.

4. What is the potential to scale up official donor funding?

The first part of this chapter examines recent funding for primary eyecare, and explores the potential to scale up ODA, given the likely direction of future aid flows. Based on insights distilled from the INGO and donor interviews conducted for this study, the second part of the chapter provides a key set of principles that will likely help mobilise future donor funding.

4.1. Marginal ODA for primary eyecare

The data on ODA for primary eyecare is not available in disaggregated datasets, and information is limited to case studies. However, one of the few existing estimates shows that around US\$3.7 million was committed by official donors in 2015 to finance access to glasses in developing countries (WEF, 2016).

To get a rough overview of the scale of aid disbursed for primary eyecare in recent years (for the purpose of this study we selected 2010-2017), we examine primary eyecare funding from three donors: the US, the UK, and the World Bank (see Annex 1 on how we constructed our database).

DFID funding: DFID spent approximately US\$1 million – on average about 0.01% of its health ODA budget – on primary eyecare programmes in three developing countries between 2010 and 2017: Zambia, Rwanda and Ethiopia.¹⁵ These were earmarked aid flows channelled through three INGOs that implemented the eyecare programmes: Orbis International (an INGO with a mission to treat causes of blindness and poor eyesight) for the ‘Vision for Zambia’ programme, VFAN in Rwanda (discussed in Chapter 3), and Vision Aid Overseas (VAO) in Ethiopia.

Of the total amount, roughly 50% was given to the Vision for Zambia programme in 2016,¹⁶ 40% to VFAN’s primary eyecare programme in Rwanda for 2015-2017, and 10% to VAO’s programme in Ethiopia in 2013.

USAID funding: Over the same period, USAID disbursed approximately US\$3.1 million for three primary eyecare programmes: one in the Palestinian territories of West Bank and Gaza, one in India and one in Rwanda. This is only, on average, 0.02% of USAID’s health ODA budget.

The programme in West Bank and Gaza, run by St. John Eye Hospital,¹⁷ received 84% of the overall funding; VisionSpring received 9% for its work in India; and VFAN in Rwanda received 7%.

World Bank funding: Despite the World Bank being a prominent member of the EYelliance (a coalition of multi-sector public, private and NGO partners, as well as other stakeholders, collaborating to find solutions to the world’s unmet need for eyeglasses), IDA – the concessional arm and primary provider of ODA from the World Bank Group – did not fund primary eyecare programmes between 2010 and 2017. However, the IFC (its non-concessional lending window) funded two private-sector programmes between 2009 and 2017 on correcting refractive error.

As stated earlier, most donor funding related to eye health goes towards treating two NTDs – trachoma and river blindness – and donors’ commitments for the future seem to reinforce this approach. While funding for these NTDs in relation to primary eyecare is not zero-sum, since donors invest in other health interventions, it is useful to compare the two to illustrate how funding for the former vastly dwarfs that for the latter and the degree of prioritisation among the donors. DFID programmes

15 At the time of writing, overall financing data from the Organisation for Economic Cooperation and Development’s (OECD) Development Assistance Committee Creditor Reporting System (DAC-CRS) was not available for recent years. Thus, we cannot determine the proportion of primary eyecare relative to health ODA; however, given the steady under-investment in previous years, we would not expect the proportion to be higher on average.

16 Vision for Zambia’s log frame proposes four types of activities that fall under primary eyecare. All four are represented in the financing amount stated here. However, it is important to note that two of its outcome indicators – surgeries and post-surgery follow-up, as well as training health professionals at the tertiary level – do not fall under our definition of primary eyecare services. Information on financing for each outcome indicator was not available.

17 In addition to primary eyecare services, this project funds cataract surgeries after detection and the establishment of a national management information system. Information on financing by activity was not available, so the estimate presented above includes financing for all activities.

addressing the two NTDs received US\$94 million between 2010 and 2017, while only US\$1 million was spent on primary eyecare; and USAID programmes addressing these NTDs received US\$61 million, while only US\$3.1 million was spent on primary eyecare.

4.2. Principles likely to mobilise future donor funding

At a global level, there are already signs that programmable ODA has flattened out, while new increases in ODA have gone towards either humanitarian assistance or in-donor refugee costs. The situation is especially uncertain in the US, which is the largest bilateral donor in terms of dollars. Within the health arena, donor funding has been increasing slowly; however, there is little reason to believe that these trends have any positive effects on funding for primary eyecare. In addition, the UK is unlikely to scale up ODA to middle-income countries.

This paper suggests two sets of solutions to this problem. On the one hand, the small sums of existing donor funding should be used catalytically to help crowd in private-sector finance (discussed in chapter 5). On the other hand, advocates could present eyeglass provision in such a way as to align with priorities of the major donors rather than as a separate issue. This should consider the following areas:

Aligning strategically with donors' thematic focus

Access to primary eyecare can be framed under the 'leave no one behind' agenda, both because marginalised groups are less likely to receive care, and because the lack of primary eyecare might lead to further marginalisation as eye conditions deteriorate. As primary eyecare is about more than just healthcare, the issue needs to be situated in a wider development context and pitched to donors as such.

For instance, DFID is prioritising disability under the rubric of leave no one behind – and this explicitly includes eyecare. Indeed, DFID has said it aims to become a world leader on disability (Sightsavers, 2016; DFID, 2016). In December 2016, the former Secretary of State for International Development Priti Patel highlighted both NTDs and disability as priority areas for the Commonwealth Heads of Government Meeting in 2018 (*The Guardian*, 2016). In November 2017 the recently appointed Secretary, Penny Mordaunt, reaffirmed the UK's commitment to spending for disability, pledging to host the Global Disability Summit in 2018 (DFID, 2017). This opens an avenue for promoting primary eyecare through disability funding.

USAID focuses on addressing childhood blindness since this relates to its priority sector of children's education (key informant interview, 2017). Recently, advocacy in the US has helped to relate the READ Act to school eye health and children's learning (ONE, 2017). The READ Act's emphasis on vision health may open an avenue for funding at USAID, and would involve INGOs working with its Office of Education (key informant interviews, 2017).

Box 1. Understanding funding is not the only issue or solution

While primary eyecare suffers from a lack of funding, the financial aspect of underprovision is neither the only issue, nor the only solution.

One policy-related issue is the requirement for particular qualifications for eyecare personnel, which makes it harder and more expensive to provide basic eyecare (WEF, 2016). Another issue is import duties on eyecare equipment, including glasses, which, by increasing prices, makes the financing problem greater than it should be. Many countries incorrectly classify glasses as cosmetic commodities rather than health-related products, and do not have appropriate classifications for non-branded, essential eyewear. For example, customs duties on eyeglasses in the US are levied at 2.5%, whereas in Bangladesh they can be levied at up to 90%, making them much more expensive (ibid.). These duties often also lead to consignments of glasses being held by Customs for days (Chen, 2017).

While policy-related issues can be harder to solve than financing issues, there are avenues for pushing donor governments to support changes in these areas. For example, EYelliance is currently collaborating

with the WHO's Department of Essential Medicines and Health Products on policy-level work aimed at eliminating duties on non-branded glasses (key informant interviews, 2017). Multilateral meetings where both donor and recipient countries are present – i.e. the Commonwealth Heads of Government Meeting in 2018 – can be another avenue for promoting policy changes in favour of primary eyecare. Chen (2017) argues this can be a platform to start a discussion and possibly lay the foundations for a new commitment, and can be used as a springboard for further progress in other institutions. He explains that governments should understand that making it easier for their populations to buy glasses would have massive economic and health benefits.

Successful donor programmes require government interest and ownership, and policies can only be changed by these governments. Thus, it is paramount that the case for primary eyecare also be made to developing-country governments (ibid.), so that universal eyecare (including universal primary eyecare) can be embedded within their health systems.

Highlighting proven delivery models

Interviewees suggested that programmes would be more likely to secure donor funding if they used proven models for delivering primary eyecare (key informant interview, 2017). This corroborates our analysis in Chapter 3. The interviewees stated that donors were interested in funding cost-effective models that would be sustainable after the donor has withdrawn, either because of local country ownership or because of a revenue-generating financial model. They also stated that they find donors to be increasingly interested in projects where progress is visible and measured on the basis of outcomes and impacts, where solutions are pragmatic, and where there is scope for scaling up or replicating such projects. VFAN's work in Rwanda demonstrated all these points, and it is mainly because 'there is a successful story to tell' (key informant interview, 2017) that donors like DFID are interested in funding similar work by VFAN in other countries such as Ghana (*ibid.*).

Building coalitions to crowd in additional finance and competencies

In terms of campaigning for primary eyecare funding, interviews with stakeholders suggested that funding will likely come through when multiple stakeholders from government, the NGO community, donor agencies and the private sector agree to collaborate. In Bangladesh, for example, EYElliance, VisionSpring and others, including Essilor, Lexotica, BRAC and Sightsavers, launched the Clear Vision Collective in a workshop in May 2017, which also included Ministry of Health officials and those from district-level health departments in Bangladesh. The different stakeholders discussed how to leverage their respective competencies and jointly scale up their work in the country. With the government only able to spend US\$10 million over the next five years on eyecare overall, these stakeholders are aware that they would need to pool their financial resources and expertise (key informant interview, 2017).

5. Using innovative finance models to increase donor funding

While traditional funding avenues are unlikely to meet the financing gaps for primary eyecare, innovative finance models could be used to increase the impact of scarce donor resources. Two aspects of innovative finance are pertinent:

- Using official funding to mobilise additional private finance
- Spending more effectively to maximise impact for every dollar spent.

5.1. Leveraging private-sector capital through catalytic financing

Blended finance

A core part of innovative finance is the use of official finance to mobilise private-sector investments. This is often referred to as blended finance. According to OECD estimates, DAC members mobilised an additional US\$81.1 billion of private development finance between 2012 and 2015, although only 2.5% of this was in the health sector (Benn et al., 2017).

At the core of blended finance is the notion that private investors do not invest in some markets because the perceived rewards are insufficient considering the perceived risks. To alter the risk-adjusted rewards, donors can use risk-transfer instruments to transfer some of the risks to themselves.

One such instrument is a guarantee. For instance, by providing guarantees to a bank, a donor can commit a relatively small amount of funding, which will only be drawn down if the bank is not repaid by its lenders; this unlocks a large amount of affordable funding for the bank's clients, since the bank's risk calculations are sufficiently favourable with the new donor assurance. In Uganda, the private health sector – like the rest of the private sector – is struggling to access financing to fund and scale their operations because the local banks consider the risk of lending to small operators too high. To alleviate the financing gap for private healthcare providers, USAID's Development Credit Authority provided US\$315,000 in loan portfolio guarantees to local banks over three years

between 2011 and 2014. Rather than lending directly to the private healthcare providers, issuing guarantees to the banks (at very little cost to USAID) allowed the banks to lend a total of US\$10 million to those across the spectrum of health service providers, from small drug shops to hospitals, with a focus on rural areas, resulting in a multiplication of the total funding available (Martyris, 2014).

Most blended finance comes from donor governments' separate development finance institutions (DFIs), which provide equity, debt and other types of finance to the private sector. However, they very rarely invest in the health sector (except through financing general-purpose funds); a study by the Global Impact Investment Network (2015) found that less than 1% of DFI funding in western Africa went to the health sector between 2005 and 2015.

In 2017, the World Bank's IFC, the biggest DFI, invested 6% of its portfolio in health and education combined (IFC, 2017). While IFC investments are usually in the financial sector and in infrastructure, it also invests in private-sector healthcare providers. One example of this is its US\$25 million equity investment in Lenskart, an Indian eyecare company, for a minority stake. This occurred during

Box 2. Alina Vision

Alina Vision (formerly GlobalVision) is a network of eyecare subsidiaries financed by an innovative blended finance mechanism. It acts as a holding company that attracts a mix of financing from grants, equity and loans. Grants from public donors and philanthropies are used to support initial start-up expenses, while equity supports early operations and capital expenditure. Finally, loans are used to scale up successful branches once they are off the ground. Alina Vision won a grant from Convergence in 2017 to set up its financing facility, and is partly funded by the Fred Hollows Foundation. The delivery model targeting poor clients is based on successful models used by the Aravind Eye System (Convergence, 2017).

an investment round that included private-sector investors. Delhi-based Lenskart works in assembly, wholesale distribution and supply of affordable eyewear products, and have pioneered a delivery model using handheld autorefractors for use by eye health workers visiting customers' homes (Lenskart, 2016; IFC, 2016; WEF, 2016).

Volume guarantees

Another catalytic instrument that official donors can use to mobilise the private sector is a volume guarantee. This is a contract between the funder and a private-sector provider, in which the funder commits to purchasing a set volume of goods or services for a fixed price. Volume guarantees are useful in situations where market barriers prevent access to beneficial goods – because, for example, low volumes make a product expensive – while the high prices keep demand and thus volumes low (CHAI, 2015). The Jadelle Access Program is a public-private partnership between the Gates Foundation, a group of smaller donors (including the Clinton Health Access Initiative, the United Nations Population Fund and bilateral donors), and the pharmaceutical company Bayer. Through a contract, the donors commit to purchasing a total of 27 million units of the contraceptive product Jadelle. This volume guarantee reduces the price of each unit by more than 50%, from US\$18 to US\$8.50, saving hundreds of millions in procurement over the course of the programme. In addition to the guarantee, the programme also includes trainings for healthcare personnel in using the contraceptive (Velleuer, 2013; CHAI, 2015). Advance purchase commitments work in a similar way to volume guarantees, but for goods that are not yet developed. They are used in particular for the development of vaccines (WHO, 2006).

5.2. Leveraging private-sector expertise by financing social enterprises

Another model for leveraging private-sector expertise is to use the private sector as a provider of goods or services. In the health sector, this often takes the form of using social enterprises for service delivery. The definition of social enterprises varies, but it usually involves a combination of 'key features of private-sector enterprises (notably financial viability) with a primary focus on achieving positive social and/or environmental impacts' (Rogerson et al., 2014: 8). In a review of donor funding of social enterprises, Rogerson et al. (2014) find that funding social enterprises to cost-effectively contract out public services is most common in the health and education sectors, and that justifications for using social enterprises for service delivery include cost-effectiveness, lack of service provision by the government, and direct accountability to patients/customers.

Smart Focus is an eyecare provider in rural China. As a social enterprise, it works through primary schools and

vision centres based in county hospitals, at the intersection between the public and private sectors. The model works by training teachers to act as screeners of children, referring children to vision centres, where they are given a first pair of glasses for free. This builds access to an untapped rural market, since customers come back for more glasses once they realise the benefits of owning a pair. Smart Focus is financially sustainable, as successive glasses are sold for profit, and the vision centres pay the hospitals for housing them. Smart Focus received seed funding from a mix of official and private funders, including Stanford University, the UBS Optimus Foundation and Essilor.

Another rationale used for supporting social enterprises is their capacity for innovation and experimentation (ibid.). Private-sector service providers have been successful in catering to the 'bottom of the pyramid', i.e. poor consumers in developing countries, using innovative approaches particularly targeted at serving the poor (WEF, 2016). Bhattacharyya et al. (2010) have reviewed innovative private-sector health service delivery models in developing countries. They find that the core innovations of most of the organisations in the present study are in business rather than medical processes, demonstrating that it is possible to have large-scale impact by implementing existing care processes using innovative marketing, finance and operating strategies. Examples include:¹⁸

- Lower operating costs through simplified medical services: the social enterprise VisionSpring provides training and equipment for rural community members, allowing them to become vision entrepreneurs. They provide only very basic eyecare, but keep barriers to entry and operating costs low, which improves outreach in the rural population.
- High volume and low unit costs: high volume helps keep unit costs – and, therefore, prices – low.
- Process and product reengineering: one successful innovation VisionSpring has employed is offering ready-made and adjustable-lens glasses. These glasses can be produced at a large scale, which reduces costs.
- Cross-subsidisation: Aravind Eye System in India is the largest eyecare provider in the world. It offers cheap or free eyecare for poorer patients by cross-subsidising treatment with higher prices for financially better-off patients. In fact, all patients receive the same medical care, but more expensive amenities, such as private rooms, are targeted at wealthier individuals (Jahani and West, 2015).

5.3. Maximising spending by paying for results

A core element of using finance more effectively is ensuring that the money put in is well spent. This is reflected in the recent push from donors for value for money and a focus on measuring results. An emerging strand within this

18 More examples can be found in Bhattacharyya et al. (2010), as well as the Center for Health Market Innovations (CHMI) database on innovations in eyecare to the poor (see <http://healthmarketinnovations.org/blog/database-glance-how-innovators-deliver-quality-eye-care-poor>).

field is paying for outcomes or outputs rather than inputs (Savedoff et al., 2016; USAID, 2017).¹⁹ The overarching objective of this type of approach is to limit donor risk and wasteful spending. Another benefit is that the increased focus on results promotes evaluations (Gelb et al., 2016). Finally, various instruments contain elements that make them effective at promoting flexibility and innovation.

Results-based financing

Although structures vary, results-based financing (RBF) projects all include agreed measurable targets, and set payment rates for completion of these targets. The donor and implementer set a target or a price, and pay for the attainment of the agreed outputs or (preferably) outcomes. In healthcare, the implementer can be a public or private healthcare provider, and RBF projects have been used for small-scale rural health centres as well as urban hospitals (Fritsche, 2014). In eyecare, the VFAN project was funded partly through USAID's Development Innovation Ventures (DIV), an open innovation fund that funds the scaling up of innovative solutions to development problems through a competition. DIV supported VFAN through an RBF grant covering outreach activities to 5,000 villages, contingent on the programme providing 500,000 eye screenings and the dispensing of 250,000 eye drops, 120,000 glasses, and 100,000 referrals.

RBF has many possible advantages over traditional funding (Meessen et al., 2010; DFID, 2014; Savedoff et al., 2016), including:

- increased accountability of the service provider towards the donor, incentivising the implementer to perform
- promoting innovation and flexibility, since the implementer is free to choose how to achieve results and can adapt the approach accordingly; increased autonomy also allows the service provider to adapt to local contexts
- increased transparency, as the approach builds on measured results and reporting, and the objectives are clear and transparent for the implementer
- creating a focus on performance in service providers, since it incentivises them to identify what is working and what is not in terms of achieving results.

Development impact bonds

Development impact bonds (DIBs) are one of the newest instruments in development financing, and are based on the social impact bond model introduced to provide financing to tackle social problems in developed countries (CGD, 2013). In basic terms, a DIB is a financial instrument through which the investor only gets repaid if the associated project meets certain objectives. DIBs are similar to RBF in that an outcome funder is willing to pay

for the attainment of certain outcomes, and only pays if the objectives are met, as monitored by an independent verifier. But they differ from RBF in that a third-party investor, rather than the implementer or outcome funder, provides the upfront investment. The outcome funder repays the upfront investment (plus a return) to the third-party investor only if the objectives are met. While RBF moves project risks from the donor to the implementer, DIBs shift risks from the implementer to the third-party investor. Of the small number of existing DIBs in low- and middle-income countries, most (11 DIBs) are in the health sector (Gustafsson-Wright et al., 2017).

DIBs have only emerged in the last few years, and sufficient evidence of their impact is not yet available. However, implemented pilots and ongoing projects can provide some lessons learned:

- Because of their complex structure, transaction costs for DIBs can be high. They are therefore better used to support organisations that can be scaled up, rather than early stage implementers (Constanza, 2016).
- One of the benefits of DIBs is that the focus on measurement and results brings with it a performance-oriented culture that investors are attracted to, and that can benefit implementers' results (CGD, 2013; Constanza, 2016).
- As the risks for investors are high, DIBs are well suited to target the impact-investor subset of funders, which is the case in the few existing examples currently in operation (Gustafsson-Wright et al., 2017).

In October 2017, the first DIB in eyecare was launched. The Cameroon Cataract DIB provides financing for the Magrabi International Council of Ophthalmology (ICO) Cameroon Eye Institute to perform up to 18,000 cataract surgeries over the next five years. The outcome funders are a consortium of philanthropic organisations and NGOs, including the Conrad N. Hilton Foundation, the Fred Hollows Foundation and Sightsavers, while the upfront investment comes from the Overseas Private Investment Corporation (OPIC, the US DFI) and the impact investor, the Netri Foundation.

Challenge funds

Challenge funds are competitions set up to solve a specific problem in development; in these competitions, one or a small number of winners are rewarded for their solution (Pompa, 2013). Challenge funds target either innovations or small-scale solutions that need financing to scale up, and the recipients can include private-sector companies, research institutes and NGOs, among others. Often, challenge funds end up functioning as a type of blended finance instrument, since, by the end of the competition, much of the risk in identifying a successful model has already been taken on

19 The nomenclature in this area is not rigid, and there are as many names for this approach as there are development agencies. In this study, we will use RBF, but at DFID the general concept is referred to as Payment by Results (PbR), with RBF referring only to projects where the payee is the service provider, as opposed to Results Based Aid (RBA) where the payee is the government. At the World Bank, the general concept is referred to sometimes as RBF, sometimes as Performance Based Financing (PBF), and at USAID as RBF or pay-for-success. Some authors use the terms Output/Outcome Based Funding (OBF).

by the donor. In many cases, challenge funds are explicitly financed by a pool of donor funds and private investments.

The Clearly Vision Prize, a challenge fund initiated by the campaigning organisation Clearly, seeks to fund solutions to three problems surrounding access to affordable vision correction: 1) diagnosis and training for basic vision screening, 2) supply and distribution and 3) analytics and insights. The total value of the fund amounted to US\$250,000, with prizes for the top five contestants, and 10 additional category prizes. Vula Mobile – a phone app for rural healthcare referrals, detecting eye problems and sending real-time data to doctors for diagnosis and treatment – was the winner of the first and only round, held in 2016.

5.4. Innovative finance for primary eyecare in practice

In practice, there is no universal solution for financing primary eyecare; different contexts require different models. Table 3 presents the situations for which the various financial instruments discussed in this chapter would be effective, and the challenges that can render them unsuitable.

Given the meagre interest of donors in the eyecare sector, it is especially important to mobilise private finance and use available funding more effectively. Based on the evidence in this chapter, a number of considerations should be made by eyecare NGOs and advocacy groups seeking funding:

1. **The importance of non-donor private-sector actors needs to be emphasised.** Using blended finance to mobilise private investments could potentially unlock a huge source of investments, although existing examples are rarely found in the health sector, let alone in primary eyecare. The role of impact investors, in addition to that of purely profit-seeking commercial investors, could also be expanded by targeting such companies or organisations directly and informing them about the challenges and opportunities of investing in primary eyecare. On the non-financial side, private-sector service providers are already being used to provide low cost, high quality health services for the poorest. Leveraging this type of existing expertise should be promoted to the greatest extent.
2. **Multi-stakeholder initiatives (MSIs) are a promising model for incorporating funding and expertise from different types of actors.** Some MSIs already exist in

Table 2. Situations where innovative financial instruments would work

	Effect on supply-side issues (low availability, high cost, low quality)	Effect on demand-side issues (cultural stigmas, lack of interest/knowledge)	When to use (how can it solve primary eyecare provision issues?)	Limits/challenges
Blended finance	Supplies finance to private-sector service providers, expanding supply		Supplies finance to private-sector primary eyecare providers that would otherwise not have access to finance; lowers the risk of financing primary eyecare; can multiply available finance	Lack of interest/unfamiliarity with the sector from private investors (for the health sector in general and primary eyecare in particular)
Results-based financing	Supplies finance to service providers; can improve quality of service delivery; good value for money as it decreases risk for the donor	Has been found to incentivise providers to reach out to customers, increasing consumer interest/knowledge	Supplies cost-effective finance to primary eyecare providers as only results are paid for; can also be used to improve the quality of service providers	Only suitable for measurable outputs/outcomes; financial sustainability not guaranteed, as it requires donor funding
Development impact bonds	Supplies finance to service providers; can improve quality of service delivery; decreases risk for implementer		Finances scale-up of existing primary eyecare providers' models	Only suitable for measurable outputs/outcomes; lack of interest from private investors; high transaction costs
Social enterprises	Good value for money in providing services; can often be scaled up		Finances existing primary eyecare providers	Requires the existence of suitable providers
Challenge funds	Supplies finance to entrepreneurs; can promote innovation and unlock new technological or business-model solutions to problems		Unlocks technological and business-model solutions for issues of primary eyecare provision	Only suitable for early-phase businesses; potential challenges to scaling up

Source: Authors' analysis.

- eyecare but have not yet reached a sufficient scale to tackle the problem globally. A recent proposal for a US\$1 billion Vision Catalyst Fund by Andrew Bastawrous, the CEO of Peek, involves raising money from various sources, including philanthropists, NGOs and international development funds. This will help finance RBF projects to improve eyecare. While the goals are ambitious, and the fund still in a planning phase, it has the potential to be a prominent example of innovative finance for primary eyecare in the future. Primary eyecare could also be included as a topic in related MSIs, such as those in education or disability, for example.
3. **There can be problems on both the supply and demand side when it comes to primary eyecare.** On the supply side, issues can relate to low availability in rural areas, prohibitively high costs of care, or low quality of care; on the demand side, cultural stigmas or lack of interest in seeking eyecare can cause under-utilisation of available care (WEF, 2016). Blended finance strategies to improve financing for private-sector healthcare providers target the supply side. Case studies of RBF show that paying large enough sums for results in maternal healthcare can incentivise service providers to reach out to clients, having an indirect effect on the demand side as well as the supply side.
 4. **Some of the financial instruments are very specialised and would only be suitable to tackle specific problems.** Volume guarantees are designed to counter the under-supply of affordable goods or services caused by a cycle of low demand, low supply and high prices. Challenge funds and other seed funding for private-sector innovations and solutions to problems can be good at overcoming technological challenges or discovering new business-model solutions. If outcomes are easily measurable, as they might be for many eyecare interventions (e.g. number of glasses sold or handed out, number of children screened, number of referrals), RBF and DIBs can be a good fit.
 5. **The many successful examples of social enterprises in the eyecare sector is promising and suggests that further donor involvement should be focused in this area.** Many technological and business-model solutions have already been pioneered, sometimes thanks to seed funding from donors. What remains is for these to be scaled up and/or adapted to various local contexts. Blended finance and DIBs are especially suitable for scaling up existing solutions.
 6. **Financial sustainability is a core concern for any donor intervention.** This is especially true in primary eyecare, considering the difficulty in attracting external financing to this sector. To solve issues on the supply side, any intervention that results in a primary eyecare provider becoming financially sustainable is preferable. Some of the financing tools target this more explicitly, especially where private investors are involved and donor support is required only temporarily. Interventions on the demand side may also seek to improve the financial sustainability of eyecare providers, as they are instrumental in creating a market for eyecare where one does not already exist.
 7. **Many innovative finance instruments involve private-sector healthcare providers, but the increasing donor reliance on the private sector can be controversial** (Das, 2017). Most of the outcome-based instruments above could be used to support public as well as private healthcare, and there are many examples of government-initiated RBF-style projects, where the service provider is a local public health clinic or such like. At the same time, even when donors support private-sector programmes, the lessons learned can be picked up by government programmes and employed for publicly provided healthcare.

6. Conclusion and recommendations

Without scaled-up investments, the cycle of poor eyesight and low education, health and productivity outcomes in developing countries may continue. **Investments in addressing poor eyesight will positively impact people's lives and enable them to realise their potential.** Investing in clear vision can also help achieve targets related to some SDGs and the commitment to leave no one behind. Children can improve their academic performance; adults can boost productivity and ease their movement and travel, can read clearly, can drive safely, and can access the digital economy. All of which will contribute to global prosperity.

Donor investment can help scale up or replicate simple and effective service-delivery models in developing countries, as evidenced by the three programmes studied here: VFAN, VisionSpring and GPE. The design features and institutional arrangements that will likely capture donors' interests include: working with the right partners in countries, training first-time service providers, integrating eyecare with existing health and education systems, raising community awareness of the benefits of primary eyecare, being fit for the future, and being cost-effective. We urge donors to assess the viability of funding such programmes in other developing countries.

Though the **global productivity-based financial returns** on investment are relatively modest (4:1) according to the PwC studies (2013), the initial VFAN and VisionSpring productivity-based returns suggest rates could be significantly higher. A ratio of more than 30:1 would represent a strong business case relative to a wide range of development interventions (not just health interventions) (Hoddinott et al. 2012),²⁰ and one independent assessment estimated returns as high as 30.5:1 for VisionSpring (Chao, 2012).²¹ The more detailed cost-effectiveness and impact evaluations of VFAN that have been planned are most timely in validating any returns. We urge service providers to continue to invest in their evidence base, especially the productivity impact and cost-effectiveness of their delivery models.

Moreover, the **global productivity benefits represented in terms of costs per DALY averted** of annual screenings of school children appear to be less cost-effective than many health interventions, including those dealing with malaria. However, the recent VFAN and VisionSpring approaches are low cost, and it will be worth drawing

on these experiences to update previous global health calculations presented here. If costs can be shown to be as low, or lower, than some of the highly effective malaria interventions, then this would transform the case for funding primary eyecare. If not yet planned, it would be good to include such comparisons in the forthcoming evaluations of VFAN.

One set of remedies for the lack of attention from official donors could be promoting eyeglass provision through **aligning strategically with donor priorities (geographical as well as thematic), highlighting proven delivery models, and building strong coalitions** to crowd in additional finance and competencies. One such alignment could be by linking the issue to that of disability, which is currently a high priority for DFID, for instance, as witnessed by the fact that they are co-hosting a high profile disability summit with the Government of Kenya in 2018.

Another option would be to **link provision of eyeglasses to the growing interest in cash transfers targeted at the poorest** (Greenhill et al., 2015). As the focus of such programmes is on reducing poverty and inequality, lower economic rates of return are accepted. Some programmes have specific provision for transfers to those with disabilities, which would both increase their ability to purchase glasses as well offer opportunities for linking to provision of eyecare treatment. As some cash transfer programmes also focus on increasing agricultural productivity, and include targeted livelihood training and support packages, there may also be options for expanding the package to include eyeglasses given the demonstrated potential for glasses to increase productivity. As cash transfers are scaled up globally, there may be an opportunity to re-assess the potential to scale up supply of glasses to the poorest at least. The successful scaling up of malaria bednets relied on a dynamic partnership of private-sector innovation, increased long-term funding through the Global Health Fund, and experiments into the most cost-effective methods of distribution to the poorest (Chandy et al., 2013). Lessons can be learned from this for scaling up eyecare provision.

Navigating the funding landscape in the next few years may prove to be an uphill struggle for many organisations working in this area (key informant interviews, 2017), so

20 This ratio emerged from the most cost-effective intervention that was identified by the Copenhagen Consensus Panel in 2012.

21 As noted earlier the basis of these estimates is not fully clear.

eyecare NGOs should expect little future ODA (although some very limited provision might be possible). **The focus should be less on ODA and more on building strong coalitions** to crowd in additional finance and explore the innovative financing domain with official donors. Using innovative financing instruments, donor funding can leverage other flows, including from the private sector and philanthropies, to multiply available funding. This could be by funding MSIs, supporting private-sector healthcare providers indirectly, providing funds for scaling up successful social-enterprise models, and financing experimental approaches to identify good models. If donors want to finance eyecare directly, outcome-based financing mechanisms should be considered for possible efficiency gains.

Donors should fund **research into the potential benefits as well as the potential for reducing costs of screening and of providing glasses**. Stakeholders need to better understand why take up of glasses is slow in developing countries, and how to encourage change by drawing on lessons from previous public behavioural-change campaigns.

Crucially, however, while this paper has provided a number of potential options for financing eyecare, **for solutions to be sustainable they must be seen in a local context**. Solutions should be adapted to the specific problems holding back provision in an area, which would likely involve cooperation and coordination between domestic government, commercial and philanthropic private investors, official donors, and the local and global eyecare civil society.

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Annex 1: Data sources on donor projects for primary eyecare (2010–2017)

We constructed our database by triangulating information on eyecare projects from donor-reported data to the International Aid Transparency Initiative (IATI) registry, the OECD-DAC's Creditor Reporting System (CRS), and donor-maintained databases, such as the UK Government's Development Tracker (DevTracker), the US Government's Foreign Aid Explorer (FAE), and the World Bank's records database. We capture projects and programmes for which there were funds disbursed between 2010 and 2017. Each data source varied in coverage and detail, but donor-maintained databases generally contain the most up-to-date and complete project information, including details that allowed us to narrow the scope of our database. Because there is not a universal definition for eyecare, we filter project records based on whether their titles or short/long descriptions contained idiosyncratic words such as 'blind', 'sight', 'eyecare', 'eyesight', 'vision', 'trachoma' or 'cataract', or other associated synonyms. From this subset, we eliminated records that did not fall under a narrow definition of primary eyecare services, such as visual acuity screening and detection, referral, and provision of eyeglasses. Often, donors will fund projects in which many, but not all, activities are primary eyecare services. Other activities include secondary or tertiary eyecare services, such as surgeries after cataract detection or the training of health professionals at a tertiary level. Due to the lack of sufficiently granular information, we could not disaggregate project financing by each individual activity. Thus, the estimates should be treated as an upper-bound, wherein we captured programmes that fell under our definition of primary eyecare services, even if not all its activities were primary eyecare services. We ensured the completeness of our database by cross-referencing information from implementer databases, donor press releases and reports, and secondary literature on donors' activities in service provision for this sector.

Annex 2: Cost-effectiveness of interventions including annual screening of school children

Intervention (base year 2000) (95% coverage)	Africa D (International dollars, I\$) ²²	Africa E (International dollars, I\$) ²³	Sear D (International dollars, I\$) ²⁴	Amr B (International dollars, I\$) ²⁵	Cost- effectiveness according to WHO-CHOICE classification
Eyecare					
Screening of school children (11-15 years)	165	N/A	67	178	Very cost-effective
Cataract surgery, Intraocular lens	89	109	57	135	Very cost-effective
Trachoma control in children – Mass Tetracycline	21	50	196	113	Very cost-effective
Trachoma control in children – Mass Azythromycin	9	23	41	36	Very cost-effective
Malaria					
Insecticide-treated bed nets plus case management with artemisinin-based combination therapy plus intermittent presumptive treatment in pregnancy	24	41	N/A	N/A	Very cost-effective
Indoor residual spraying plus the above	32	41	N/A	N/A	Very cost-effective
Tuberculosis (TB)					
Minimal DOTS	N/A	8	7	N/A	Very cost-effective
Full DOTS	N/A	13	11	N/A	Very cost-effective
HIV/AIDS					
Voluntary counselling and testing ²⁶	N/A	82	40	N/A	Very cost-effective
Treatment of sexually transmitted infections (general population) ²⁷	N/A	32	20	N/A	Very cost-effective
Highly active antiretroviral therapy (HAART)—Standard HAART ²⁸	N/A	556	542	N/A	Cost-effective

- 22 Africa D – Countries include: Algeria, Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Comoros, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone and Togo. D = High adult mortality and high child mortality.
- 23 Africa E – Countries include: Botswana, Burundi, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe, E = Very high adult mortality and high child mortality.
- 24 Sear D – Countries include: Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Maldives, Myanmar, Nepal. D = High adult mortality and high child mortality.
- 25 Amr B – Countries include: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.
- 26 Performed in primary care clinics for anyone requesting the services; includes training of health workers; based on rapid test; number of tests over five-year period assumed to be twice average annual prevalence.
- 27 Provided in primary care facilities, available to anyone who requests it; includes visits, drugs, counselling, advice on protection, and condom distribution if requested. Effectiveness scaled by access and likelihood of using the services.
- 28 No intensive monitoring, first line drugs only (can be provided in primary health care facilities).



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