SOCIAL AND ECONOMIC POLICY
WORKING PAPER

RIGHT IN PRINCIPLE AND IN PRACTICE: A REVIEW OF THE SOCIAL AND ECONOMIC RETURNS TO INVESTING IN CHILDREN

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This is a working document. It has been prepared to facilitate the exchange of knowledge and to stimulate discussion.

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A REVIEW OF THE SOCIAL AND ECONOMIC
RETURNS TO INVESTING IN CHILDREN

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Abstract

At the most fundamental level, providing adequate investments that enable children to thrive is a moral imperative, and investing in a child is to invest in society's future. Most would agree that there could be no more compelling argument than that. The international community has recognized that investing in children is not only essential, but an obligation as outlined under the United Nations Convention on the Rights of the Child (CRC). Still, other arguments related to economic and social issues have also been made in search of an answer to the broad question: To what extent do investments in children's survival and well-being also contribute to poverty reduction, income equality and economic growth? This paper provides a review of the literature on these relationships. It finds that investing in children can be extremely effective, and that the social and economic returns are potentially very large. Some of the evidence is based on investments that target the poorest and most vulnerable children and families. The paper also notes, however, that there are still considerable gaps in the literature, and that more needs to be done to effectively analyse the returns and the impact of investments within different contexts and environments.

Executive Summary

The principle of investing in children rarely evokes controversy. The 1989 UN Convention on the Rights of the Child, the most rapidly and widely ratified human rights treaty in history, sets out the legal obligations of national governments to realise children's economic, social, civil, political and cultural rights to the maximum extent of their available resources (Article 4). However we look at it, to invest in a child is to invest in our common future: The world of tomorrow will inherit the children of today. Whether nations will grow and prosper depends highly on whether their citizenry is healthy and educated.

The science of child development tells us that even temporary deprivations experienced by young children can have irreversible effects on their future capabilities and, in turn, a nation's future prospects (Victora et al., 2008). Interventions and policy choices made today will determine whether millions of children and youth are able to reach their full potential, or are left to face a future of worsening inequity and marginalization. Most would agree that there could be no more compelling argument than that.

Repeated studies find that investments at relatively low financial costs during childhood can yield a lifetime of gains, not only for individuals, but also for societies and economies. For example, in 2012 the Copenhagen Consensus, a panel of some of the world's leading economists, was asked to identify the priorities for policymakers and philanthropists over the coming four-year period to address some of the most pressing global issues. After considerable research, including the presentation of challenge papers and perspectives, the panel concluded that the top five priorities for policymakers and philanthropists were: bundled interventions to reduce under nutrition in pre-schoolers; a subsidy for malaria combination treatment; expanded childhood immunization coverage; deworming of schoolchildren; and expanding tuberculosis treatment. All of the top five are highly relevant for children.

Even where returns accrue to the individual, the poorest and most vulnerable groups in society might be unable to make the optimal investments on their own. Consequently, there is a strong rationale for public investments – especially when aimed at those most in need. Over the years, as cost-effective interventions to address childhood deprivations have emerged, the investment case for investing in children has steadily strengthened. Below are some examples from the literature.[1]

Early Childhood Development
Early childhood represents a unique window of opportunity for investing in children's cognitive and physical development. When a baby is born, the brain is organized into networks that require trillions of connections (synapses). While it is known that the human brain is malleable and that its capacity for reorganization continues throughout life and can be enhanced by interventions, it is widely accepted that there are periods in life when the developing brain is particularly open to new experiences and especially able to take advantage of them (UNICEF 2001). These critical or sensitive periods vary according to

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[1] For a full list of examples and references, please see the full paper.

different functions, such as vision, hearing, and cognitive skills. Since such critical brain development occurs during the first few years of a child's life, even temporary deprivations experienced during that crucial time period can have irreversible negative effects on children's future capabilities (UNICEF 2001).

Various studies on early childhood development programmes have found long-term private gains in terms of higher earnings. A simulation on increasing pre-school enrolment in 73 countries found benefits in terms of higher future wages of $6.4-$17.6 per dollar invested (Engle et al. 2011). The simulation indicated potential long-term benefits which range from $11 to $34 billion. Benefits also, however, accrue to wider society, such as enhanced welfare, crime savings and tax revenues. One assessment of four U.S.-based programmes found public benefits to be, on average, over half of the total benefits. An evaluation of the High/Scope Perry Preschool project (Schweinhart et al., 2005), one of the most well-known in the U.S., found up to $16 in benefits for every dollar invested, with public benefits estimated to be around $12.90 per dollar invested. Across the studies considered in this paper, benefits are often found to be highest when programmes are aimed at the low income and disadvantaged group or geographic locations.

Health
Health services and interventions throughout children's lives are critical for maintaining progress and building further momentum. Better health status has been shown to be associated with lower disease burden, improved individual-level productivity and skill-sets, access to higher wages, as well as positive externalities on the whole society and economy. Scaling up cost effective health services and interventions can be essential to realizing these benefits.

Childhood health interventions are found to be among the most cost-effective. For example, expanding an immunization programme in Sub-Saharan Africa can be between $1 and $5 per Disability Adjusted Life Year (DALY) averted, and $8 per DALY averted in South Asia (Laxminarayan et al., 2006). DALYs measure overall disease burden expressed as the number of years lost due to ill-health, disability or early death. By comparison, interventions to treat diseases such as high blood pressure and cholesterol in Sub-Saharan Africa can reach up to $1,920 per DALY averted; interventions to treat stroke (Ischemic) in Sub-Saharan Africa can cost between $1,284 and $2,940 per DALY averted (Laxminarayan et al., 2006).

Better health can improve individual productivity. Healthy individuals are more likely to be efficient at assimilating knowledge, have stronger mental and physical capabilities and, in consequence, obtain higher productivity levels, and hence higher incomes. Better health can also enhance educational outcomes, both through school attendance and performance. In terms of macroeconomic benefits, life expectancy (a proxy for the health status of a country) is found to be significantly associated with GDP per capita growth. One notable study finds that a one-year improvement in a population's life expectancy could be associated with a 4% increase in output (Bloom et al., 2004).

Improving equity in health outcomes has also been found to directly contribute to economic growth. Grimm (2010) evaluated 62 low and middle income countries over the period 1985 to 2007, and found that reducing child deaths by 4.25 per thousand children born (i.e. by

about 5% of the sample studied) to mothers with low levels of education is associated with an almost 8% increase in GDP per capita ten years later. Putting it another way: reducing health inequality by 1% per year could increase the country's annual rate of growth by 0.15%. This suggests that reducing health inequity by targeting the poorest children can make a substantial contribution towards economic growth.

Water and Sanitation
Almost fifty per cent of the developing world's population – 2.5 billion people – lack improved sanitation facilities, and over 780 million people still use unsafe drinking water sources. Better water and sanitation is very closely linked to good health: it can significantly help reduce illness and improve productivity. Furthermore, it has been shown to improve school attendance, and prevent unnecessary deaths, particularly through a reduction in diarrheal cases. Good water and sanitation systems are also very important in agricultural development and food production.

Aside from better health outcomes, achieving the MDG targets on water and sanitation has many additional benefits, including reduced patient expenses due to avoided illnesses, value of time savings due to better access to water and sanitation, productive time due to less time spent ill, days of school attendance gained, value of child days gained to those with avoided illness, health sector costs saved, and prevented deaths. Quantifying these, the benefits of achieving the MDG target on water and sanitation have been estimated to be between $3 and $34 per dollar invested (Hutton and Haller, 2004), the main driver being time-savings associated with better access to water supply and sanitation services. These estimates are larger than other studies which focus on specific interventions[2], where more conservative, yet still significant benefit-cost ratios ranging from $1.8-$2.9 per dollar invested, have been found (see Whittington et al., 2008).

Hutton and Haller (2004) estimate that achieving the MDG targets on water and sanitation could yield a total annual economic benefit of $84 billion. The estimated global savings to the health sector could be around $7 billion per year for meeting the MDG water and sanitation targets. Time saved due to closer location of facilities, however, such as the relocation of a well or borehole to a site closer, the installation of piped water and closer access to toilets, was the greatest benefit, at $64 billion globally. The Economics of Sanitation Initiative (ESI), a multi-country initiative of the Water and Sanitation Program at the World Bank, also produced a study which estimated the economic impact of poor sanitation. They find it can be in the region of 1-2.5% of GDP for 18 African economies.

Nutrition
Adequate nutrition is an essential component of overall health, and studies have shown very strong linkages between nutrition and cognitive, physical and emotional development. The impact of poor cognitive development on schooling outcomes could also have an impact on future wages. One study estimated that the loss in adult income from being stunted could be up to 22% (Grantham-McGregor et al., 2007).

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[2] These included rural water supply programme for constructing deep boreholes with hand pumps in Africa, a sanitation programme designed to halt open defecation in South Asia, water disinfection technology installed at the household level (point-of-use), and large multipurpose dams in Africa.

Studies have also found that stunting and anaemia could affect productivity. For example, one study found stunting which results in a 1% loss in adult height is associated with a 1.4% loss in productivity (Hunt, 2005). Another study found that eliminating anaemia results in a 5 to 17 per cent increase in adult productivity (see Horton and Ross, 2003).

The Copenhagen Consensus 2012 identified treating undernutrition as the key global priority for policymakers and philanthropists. For about $100 per child, a bundle of interventions could reduce chronic undernutrition by 36% in developing countries (Hoddinott et al., 2012). In very poor countries, the authors find that each dollar spent has at least a $30 payoff.

Through reduced productivity, poor nutrition could also have macroeconomic effects. Analysing 122 countries over three decades, one study found that inadequate nutrition is responsible for a shortfall of between 0.23 and 4.7 percentage points in the annual growth rate of GDP per caput worldwide (Arcand, 2001).

Education
Better education status has been shown to be associated with lower disease burden, improved individual-level productivity and skill-sets, access to higher wages, as well as positive externalities on the whole society and economy. The average rate of return to an additional year of education is estimated to be around 10% (Psacharopoulos and Patrinos, 2002). The rate of return varies, however, depending on whether it is primary, secondary or tertiary, as well as the wealth of the country.

Education adds skill to labour. While labour has been traditionally used in growth frameworks as a factor of production, adding skill to labour enhances the productivity of labour. A 1-year increase in the average years of schooling of the labour force has been shown to raise output per worker by 5-15% (Topel, 1999). An educated workforce can also help societies absorb and develop new technology.

There are significant spill-over effects from education. People learn from each other; and a better educated society can help propel further sharing of ideas and skills. This can ultimately impact productivity and economic growth. A comprehensive review of the literature concluded that a one-year increase in the average years of schooling has been shown to be conservatively associated with a rise in per-capita income of 3-6%, or a higher growth rate of 1 percentage point (Sianesi and Van Reenen, 2003).

Social protection
Social protection has emerged as an effective approach to assisting poor and disadvantaged children and families in building resilience, escaping poverty, and gaining better access to key social services by addressing demand-side bottlenecks and barriers. While policies to promote broad based economic growth are fundamental to overall social development, the benefits of growth do not always automatically reach the poorest and most marginalized. Social protection protects vulnerable populations from shocks, and helps to level the playing field so that marginalized and excluded families can more effectively participate in the

economy. It also helps to build resilience, strengthening capacity of households and families to care for their children.

Studies have shown that well-designed and judiciously applied social protection programmes can decrease inequality. In Brazil (*Bolsa Familia*) and Mexico (*Oportunidades*), conditional cash transfer programmes were found to reduce the GINI coefficient by around 21%, and in Chile (*Chile Solidario*) by 15% (Soares et al., 2009). Furthermore, in Brazil the poverty gap was reduced by 12% and in Mexico by 19% (See Dercon, 2011). In South Africa, a simulation on up-scaling the Child Support Grant estimated the poverty gap could decline by up to 28% (EPRI 2004), depending on how it was up-scaled. In Mexico (*Oportunidades*), child outcomes also improved: infant mortality decreased by 8% on average and 17% in rural areas (Barham, 2011). A conditional cash transfer programme targeted at the poorest has found school enrolment to increase in Turkey by around 10% (Ahmed et al., 2006). In Ecuador, a programme (*Bono de Desarrollo Humano*) resulted in school enrolment among poor children to increase by around 10% (Schady and Araujo, 2006); and a scholarship programme awarded to poor girls in Cambodia increased enrolment by up to 33% (Filmer and Schady, 2006). While the social protection programmes listed above differ in nature and in scope, significant positive results have been found.

Caveats and conclusions

Although growing, the literature linking social-sector investment in particular to wider societal and economic gains is still at a nascent stage. The findings presented here are indicative rather than conclusive. For early childhood development, most analyses focus on individual and community-level benefits. With few exceptions, rarely do evaluations of early childhood development programmes systematically consider the implications on the macro-economy. For health, there are difficulties in comparing studies due to methodological differences. There are a variety of indicators that measure better health, from reduced DALYs to higher life expectancy to reduced frequency of illness, for example. Moreover, while there tends to be more evidence on the effect of health interventions on better health, some studies have found little or no relationship between better health outcomes (i.e. higher life expectancy) and growth. Indeed, other studies found that the direction of causality is reversed – higher levels of economic growth lead to better health. Modalities in delivering health interventions can also make a difference; innovative approaches which ensure quality services at low costs reach the most marginalized populations could help improve cost-effectiveness and returns on investments.

Studies on investing in education also suffer from similar limitations. The quality of education and the degree to which there is a well-functioning labour market appears to be associated with future earnings. Again, modalities in the delivery of education services also matter – ultimately cost-effectiveness ratios depend on appropriate programming for specific contexts. Other methodological limitations include the ways in which human capital is defined, issues of reverse-causality (do better health and education outcomes lead to higher growth, or vice versa?), and the variety of types of investments and contexts, making comparisons very difficult. The degree to which there are supporting institutional and policy environments appears to have a strong effect on the extent to which investments have positive impacts.

Notwithstanding the caveats, the available evidence demonstrates that the investment case for children is compelling. To be clear, investing in children is fundamental to protecting their human rights. Even if no additional reasons existed to invest in children, we would still be mandated to do so. However, the literature demonstrates that there are many additional arguments and benefits to investing in children, which complement wider societal and broader economic goals. If governments are serious about reducing poverty, achieving greater equity and social stability, and increasing economic growth, investing in children is imperative. Redoubling our efforts for child survival and development, particularly for the most disadvantaged children, will be essential to regain any lost ground as a result of the recent global economic crisis, and build a foundation for more sustainable and equitable development in the future.

I. Introduction

As much as it is true that children will inherit tomorrow the world we leave for them today, it is also important to remember that the world tomorrow will inherit the children of today. Whether nations will grow and prosper depends highly on whether their citizenry is healthy and educated. Today, even as the world continues to be confronted with economic turmoil, unstable job markets, and escalating commodity prices, the case for investing in children is compelling. In these difficult times, children face heightened risks of experiencing deprivations such as food insecurity and malnutrition, or dropping out of school to work and help out at home. Providing adequate social protection and ensuring access to essential services for children and their families have the potential of delivering even greater long-term benefits than in good times by preventing the otherwise long-term adverse effects caused by shocks. Policy choices made today will determine whether millions of children and youth are able to reach their full potential, or left to face a future of worsening inequity and marginalization. Consequently, they can determine the world we will see tomorrow.

This paper aims to add to the call for investing in children by providing advocates, policymakers and the general public with evidence and arguments on private and social benefits. It does so by identifying key findings from the literature on the returns to investments in children. It examines *individual outcomes*, such increased future wages, as well as *social and macroeconomic outcomes* from better health and education outcomes. Given the growing imperative to find development solutions that are equitable, whenever possible the paper also looks at the returns generated by investments targeted at the poorest and most vulnerable children and families.

The following section presents the methodology for this literature review. The paper then reviews the private, social and economic returns to investments in early childhood development (ECD), health, water and sanitation, nutrition, education, social protection and child labour. The final section draws some conclusions from the review and offers suggestions for further analysis and research.

II. Methodology

To identify the key findings on the returns to investments in children, the authors examined commonly cited studies, many of which are referenced publications, across a broad range of countries or regions. The review is based on internet and journal database searches. As such, the review is not strictly systematic, and its findings are not meant to be comprehensive or exhaustive. Nevertheless, we hope the paper provides a useful guide to understanding how investing in children is not only morally right, but also highly practical. We hope that it also helps identify the gaps in the literature and areas for future research.

The paper analyses three types of investments: early childhood programmes; interventions in health and education; and social protection programmes that often have multi-sectoral benefits, primarily by addressing access to services. There are other types of investments which we would have liked to cover, but are beyond the scope of this paper. For example, it could be useful to draw evidence which modalities of the health service delivery or

education programmes give the best value of the money. In addition, there are many types of investments that may benefit children indirectly through trickle-down effects on job creation or aggregate demand, which this paper has not examined.

The literature contains a number of methods to quantify the returns to investments in children, with different types of benefits measured (private, social or macroeconomic). We group the findings on returns according the types/ sectors of investments, and types/ levels of returns measured, including a) private, and b) social and economic (See *Table 1*).

- **Private returns –** these accrue to the individual. Returns measured include future wages, averted, cognitive scores, and schooling and performance outcomes. Also considered as a measure of efficacy is the cost of Disability Adjusted Life Years (DALYs) averted. DALYs measure overall disease burden expressed as the number of years lost due to ill-health, disability or early death.
- **Social and economic returns –** these accrue to the community and wider society. crime, grade repetition, dropout rates, government revenue/savings, DALYs averted, poverty reduction, inequality, stunting, enrolment in school, health service access, and economic growth (as measured in terms of GDP growth or GDP per capita growth).

Table 1: Returns Analysed in this Literature Review

Type/ Sector of Investment	Categorization of returns	Returns measured
Early Childhood Development	Private	Future income, cognitive scores, and schooling and performance outcomes
	Social and economic	Reduced crime, grade repetition, dropout rates, and future government revenue and savings
Health	Private	DALY averted
	Social and economic	Future economic growth
Water and Sanitation	Private	Time saved, productivity, health costs saved, reduced illness, mortality and morbidity
	Social and economic	Value of health sector costs saved
Nutrition	Private	Cognitive development, physical development, child survival, productivity, future income
	Social and economic	Future economic growth
Education	Private	Future income
	Social and economic	Future economic growth
Social Protection	Private	Physical development, school enrolment, health service access
	Social and economic	Poverty reduction, improved GINI, and economic growth
Child Labour	Private	Productivity, earning capacity, reduced illnesses and injury

PANEL 1: Analysing returns to investments in children

For development practitioners and policymakers, assessing the returns to investing in children may be an important part of any advocacy strategy. There are however, many factors that influence returns. Below are some initial guidelines that may be worth considering:

- *Consider* the **type of investment**: In which sectors are investments made? How large are the investments? Who is the targeted recipient and how will they be affected?
- *Assess* the **investment context:** Are there institutions and policies which are accountable for the investments and can ensure they are successfully delivered to the necessary recipients? Are there barriers to delivering investments (i.e., logistical, rural/urban)? Are there enabling factors, such as complementary investments, that can help increase the potential for returns?
- *Identify* the **type of returns** and measure the **impact of investment**: To what degree do returns accrue to beneficiaries, and to what degree do they accrue to non-beneficiaries? To what extent does the wider community or society benefit? How do they accrue – to individual, society or the whole economy?

Investment types can range from whether they are directed towards health, education, or other areas such as agriculture or infrastructure (which also could have positive implications for children, depending on the exact nature of the investment). The different types of investments can also vary by size – larger investments not only are more likely to benefit more children, but are also likely to have greater returns to scale, thus improving the marginal benefit-cost ratio. Furthermore, *where* the investments are targeted can influence the degree of returns: a 2010 UNICEF study on 15 developing countries has demonstrated that additional investments in child survival, health and nutrition targeted at the most vulnerable and deprived populations are up to 60% more cost effective (UNICEF, 2010).

Investment context also matters. As the literature shows, sound policy environments, governance and institutions can make a big difference in ensuring interventions are delivered efficiently, equitably, and contribute towards economic and social development. Geography has also long had an impact on the return to investments. Demography, including the size, structure and distribution of the population, may influence the types of returns, depending on the type of investment. The initial wealth of a country can also influence returns. The exact nature of the interaction between initial wealth and investment returns depends largely on the type of the investment and other contextual factors.

Further, where data permits, analysis of the returns should take into account the synergic and cascading benefits through multiple channels, feedback loops, and inter-generational effects. For example, at individual level, early child development programs may enhance participants' education outcomes later on. At social and macroeconomic level, social protection programmes that reduce poverty and improve equity allow economic growth to generate greater impact on poverty reduction – for example, Hanmer and Naschold (2000) found that GDP growth is three times more effective in reducing the incidence of poverty in low-inequality countries than in high-inequality countries. This, in turn, contributes to subsequent growth, forming a virtuous cycle (Waddington, 2004).

III.   Early Childhood Development

Early childhood represents a small, unique window of opportunity for investing in children. Critical brain development occurs in all domains during the first few years of a child's life, making this period particularly important. During the first years, the brain develops rapidly through brain cell formation and maturation, formation of synapses amongst brain cells that create neuronal pathways, as well as through cell death and synaptic pruning. These events take place at different times and build on one another. Brain development is influenced by the quality of the environment, and even small perturbations in the development process can have long-term impacts on the structure and functional capacity of the brain (Grantham-McGregor et al., 2007).

Interventions during this period therefore have great potential to improve the ability of children to reach their full potential later in life. Studies have shown that benefits for children include higher graduation rates, schooling attainment, improved nutrition and health, higher employment, higher incomes as adults, less dependency on welfare, lower rates of alcohol and other drugs use, fewer criminal acts, lower incarceration rates, among others.

Similarly, deficiency during the first few years of a child's life can have life-long implications. Vitamin A deficiency, anaemia, malnourishment and diarrhoea can inhibit both physical and cognitive development,

Figure 1: Returns across the Lifecycle

Source: Carneiro and Heckman, 2003

significantly affecting children's future ability to grow, learn, develop useful skills, and participate as productive members of society (Shonkoff and Phillips, 2000). Early childhood, therefore, is not only a moment of immense opportunity, but also a time of great vulnerability for children.

The positive effects of early childhood development programmes support higher levels of cognitive development, better health outcomes, and improved performance in school. These gains, in turn, have a strong effect on employment and earnings in the future. According to Heckman and Masterov (2007), this is partly because of the technology of skill formation – 'skill begets skill', and early-learning of skill makes future acquisition of skill much easier.

Figure 2: Major Findings: HighScope Perry Preschool
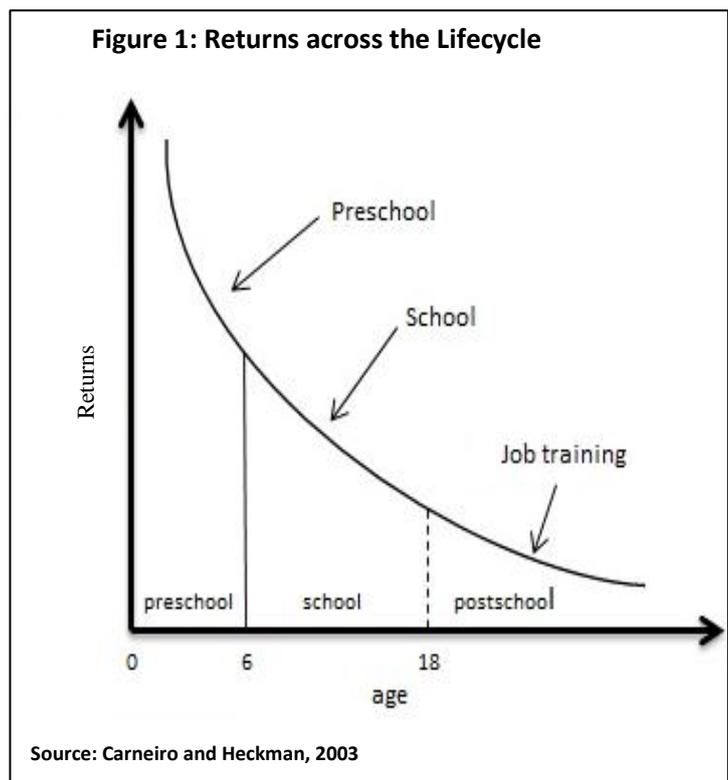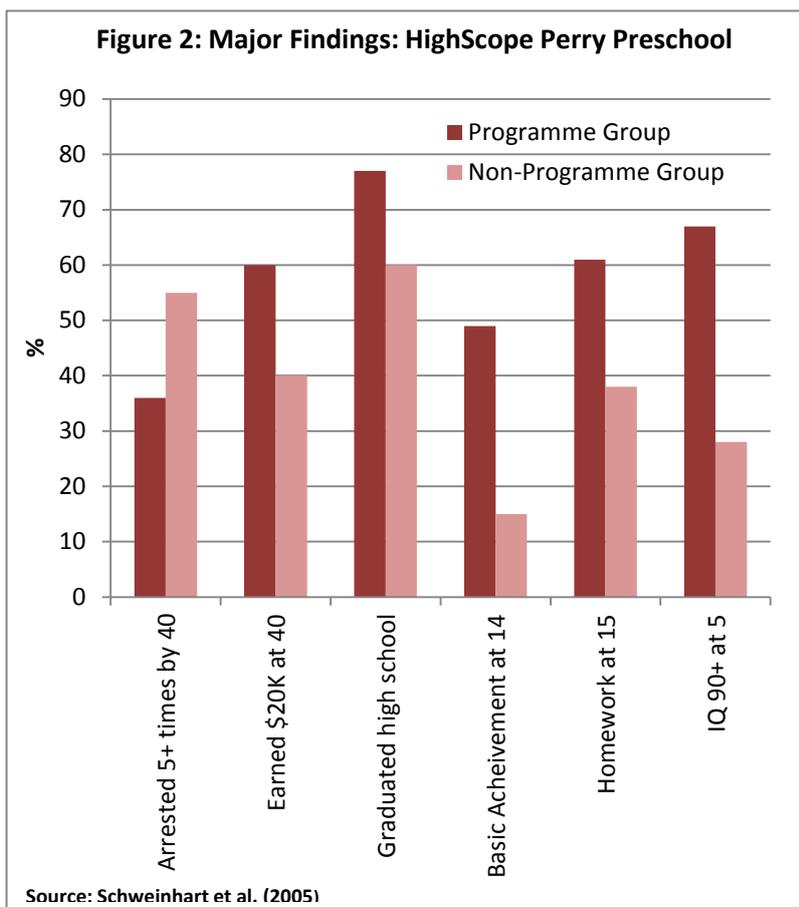
Much of the literature on ECD programmes originates from the United States, and positive results have been found, especially for low income families. *Figure 2* presents some of the key findings of the HighScope Perry Preschool study, a one- or two-year ECD model programme provided to children from low-income families in Ypsilanti, Michigan. In this study, researchers tracked the impact of the programme on three and four year-olds for the following 50 years of the children's lives (both programme and control/ non-program participants). By age 5, the proportion who had IQ scores greater than 90 was over twice as high for programme participants. By age 15, basic achievement scores for programme participants were substantially higher. By age 40, studies have shown that programme participants could be expected to earn significantly more than non-participants. The Perry Preschool program yielded a benefit-cost ratio of 16.14 to 1 (Schweinhart et al., 2005).[3] The benefits accrued largely in terms of crime savings, education savings, increased taxes due to high earnings, and welfare savings.

The Chicago Child-Parent Center, a half-day programme for low-income children, has also demonstrated high private returns. Using data from a cohort of 1,539 programme and comparison group children, studies show that school achievement and rates of high school completion were greater for programme participants, and lower rates of remedial education services, juvenile delinquency and child maltreatment were observed for this group. The benefit-cost ratio was approximately 7.14 to 1 (Reynolds et al., 2002).[4] The benefits were largely generated by increasing economic well-being and tax revenues, and by reducing public expenditures for remedial education, criminal justice treatment, and crime victims.

Other studies include the *Nurse Family Partnership*, and the *Carolina Abecedarian* project in Chapel Hill, North Carolina. The Nurse Family Partnership is based in Elmira, New York, and provides health and parenting information to mothers with children. Researchers assessed

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[3] In constant 2000 dollars discounted at 3%. This includes public and private benefits.
[4] This includes public and private benefits.

children up until the age of 15, and found fewer instances of running away, fewer convictions and violations of probation, fewer lifetime sex partners, fewer cigarettes smoked per day, and fewer days having consumed alcohol in the last 6 months for children in the treatment group. Parents also reported that their children had fewer behavioural problems related to use of alcohol and other drugs (Olds et al., 1998). The Carolina Abecedarian project is a centre-based full-day preschool focusing on children aged three months through four years old. Studies have found the programme to result in higher reading and math achievements, lower rates of drug use, lower rates of grade retention, and higher likelihood of enrolling in university (Campbell et al., 2002).

Heckman et al. (2006) present the internal rate of return for a series of early childhood development programmes, which measures the point at which the net present value of costs equals the net present value of benefits, for the US programmes: The High/Scope Perry Preschool project has an estimated internal rate of return of 18%[5]; The Child Parent Center Programme has an estimated internal rate of return of 22%[7]; The Nurse Family Partnership has an estimated internal rate of return of 23%[6]; the Carolina Abecedarian project has an estimated internal rate of return of 7%[7]. They compare these rates of return with the dissimilar public and private investments. For example, Heckman et al. (2006) claim that early education studies compare favourably with the US stock market, which on average earned between 5% and 7% in real terms over the past few decades.

Early childhood programmes in developing countries have also shown high returns.[8] An ex-ante study conducted in Turkey showed that benefit-cost ratios for preschool programs ranged from 1.12-3.43 to 1, as a result of increased lifetime productivity for wage earners in the private sector (Kaytaz, 2004). Because only one quantifiable benefit was assessed, namely increased productivity and hence increased income, the benefit-cost ratio is assumed to be only a conservative initial approximation. These are broadly similar to the results of a UNICEF-commissioned study on early childhood development in Azerbaijan, which found benefit-cost ratios of up to 2.31 to 1 (Bagriansky and Engle, 2009).

In Bolivia, a study by Van der Gaag and Tan (1998) found that an early childhood development programme was even more effective when targeted to the poorest and most marginalized children, emphasizing the point that an equity-based approach can yield returns that are on an order of magnitude larger. The authors used different scenarios (targeted and not targeted to the poor) to evaluate PIDI (Programa de Desarrollo Infantil Integrado), and found that while benefit-cost ratios for the better-off were between 1.38

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[5] Heckman et al. (2006) states a rate of return of 18%. In another highly cited paper, Rolnick and Grunewald (2003) report a rate of return of 16% to the Perry program. Belfield et al. (2006) report a 17% rate of return. More recent analysis by Heckman et al. (2010) found slightly lower annual social rates of return of between 7 and 10%.

[6] Calculated by Grunewald. Presented in Heckman et al. (2006). Internal rates of return for Nurse Family Partnership and Chicago are higher than Perry while their benefit–cost ratios are lower due to the timing of when benefits occurred.

[7] Original analyses by Masse, L.N., Barnett, W.S (2002). A Benefit-Cost Analysis of the Abecedarian Early Childhood Intervention. New Brunswick, N.J.: National Institute for Early Education Research

[8] Unfortunately, however, most of the studies presented here do not distinguish between public and private returns.

and 2.38 to 1, benefit-cost ratios for the poorest children were between 2.07 and 3.06 to 1. The authors focus exclusively on the benefits of life time earnings which can be increased by higher cognitive skills, physical stature, number of grades completed and decreasing the age of school completion (without changing the number of grades completed). Another more recent study of the same programme found gains in lifetime earnings that are between 1.7 and 3.7 times the initial investment (Behrman et al., 2004a).

Another publication by Engle et al. (2011) in *The Lancet* has shown that data from 73 countries suggest that increasing preschool attendance – one type of ECD programmes – in all low- and middle-income countries could lead to substantial gains in schooling and potentially help reduce inequalities perpetuated by poverty, poor nutrition, and restricted learning opportunities. The authors calculated the loss in dollars from the schooling gap, simulated reductions in schooling gaps due to increasing preschool enrolment rates, and then calculated the economic benefits of reducing the schooling gap. The simulation indicated potential long-term benefits which range from $11 to $34 billion. The benefit-cost ratio ranged from 6.4-17.6 to 1, depending on the percentage of children attending preschool (25% or 50%) and the discount rate. These are conservative estimates that do not account for other early child development interventions or for advantages of increasing childhood development, such as reduced crime or improved parenting.

Disparities between the rich and the poor in terms of cognitive development become ever starker in the early stages of life. For example, Paxson and Schady (2005) examine 3,000 poor children in Ecuador and find that household socio-economic characteristics (including wealth quartiles, place of residency, maternal and paternal education) create dispersion in vocabulary test scores as children get older. Children from wealthier households and with more educated parents have higher scores. If early childhood development programmes can improve learning ability, they could potentially have a strong impact on promoting equity.

Social and Economic Returns
While early childhood development programmes have been shown to benefit recipients, they have also been shown to benefit wider society. Firstly, where children are given a good start in life, and better prospects for employment, they are less likely to need to resort to public services, such as welfare, later in life. Second, where employment rates are high, crime rates tend to be lower. This is not only a public benefit in itself but it also reduces government and local spending on crime prevention and incarceration. Third, where more people are working and paying taxes, government revenues increase. Furthermore, governments can save money where welfare, remedial education and out-of-work programmes are not needed. (see Karoly et al., 1998; Reynolds et al., 2002; Heckman et al., 2006; Schweinhart et al., 2005)

While most studies that evaluate the returns of early childhood development projects combine the private and public benefits into a single benefit-cost ratio, some studies consider the public returns separately. Schweinhart et al. (2005) estimated that High/Scope Perry Preschool Programme to have an estimated public benefit of $12.90 per dollar invested, the majority of which accrues in terms of crime savings, but also significant amounts in terms of taxes on earnings, education savings, and welfare savings. This is a significant portion of the total benefits of $16.14 per dollar invested.

A study by Reynolds et al. (2002) estimated the Chicago Child-Parent Center to have a public return of $3.85 per dollar invested. The benefits accrued in terms of higher tax revenues, reducing public expenditures for remedial education, criminal justice treatment, and crime victims, among others. The authors evaluated three categories of interventions, however, and the returns differed. 'Extended intervention' (which includes 4 to 6 years of participation) provided a return to society of $3.6 per dollar invested; and the 'school-age programme' yielded a return of $1.42 per dollar invested.

Karoly and Bigelow (2005) examined ex-ante the provision of a high-quality universal preschool programme in California in terms of reduced remedial education, child welfare, savings to governments and victims from crime reduction, future earnings, among others. The authors found it could generate about $7,000 in net present value benefits per child for California society (using a 3% discount rate). This equals $2.62 per dollar invested, or an annual rate of return of about 10% over 60 years. Furthermore, each annual cohort of children generates $2.7 billion in net present value benefits (assuming a 70% participation rate). The analysis does not include other public benefits due to data limitations, such as child maltreatment and crime, improved health and well-being of preschool participants, and the potential intergenerational transmission of favourable benefits.

In Egypt, a study by Janssens et al. (2001) assessed the provision of kindergartens schools across the country as a whole, as well as for certain governorates. The benefits include increased lifetime productivity, while the costs included the costs of schooling and the opportunity costs of delayed entrance in the labour market. The study found benefit-cost ratios of 1.20-5.81 to 1. Where governorates are poorer, the authors estimate larger effects of early childhood development programmes.

The case for investing in early childhood remains a strong one. Although variations in the type, context and quality of programme can have a strong effect on the final result, the argument for investing in young children is a rare public policy choice where, Heckman and Masterov (2007) argue, there is no equity-efficiency trade-off – 'investing in children reduces inequality associated with accident of birth and at the same time raises the productivity of society at large.'

IV. Health

Good health has intrinsic value – well-being and reduction in suffering and illness are key goals for human existence. Furthermore, health is a fundamental human right, recognized in regional and international covenants as vital to all aspects of a person's life and well-being, and as crucial for realizing many other human rights and freedoms. In many ways, one's health is his or her most basic and essential asset. There are, therefore, several benefits that stem from good health. Good health can enhance educational outcomes, both through school attendance and performance (see Bloom and Canning, 2000; Schultz, 1999; Baldacci et al., 2004; Suhrcke and de Paz Nieves, 2011; Basch, 2010). It can improve mental and physical capabilities and, in consequence, productivity and future incomes (Savedoff and Schultz, 2000b; Liu et al., 2008; Davis et al., 2005; Tompa, 2002; Bloom and Canning, 2000;

McNamara et al., 2010; Strauss and Thomas, 1998; Mitchell and Bates, 2011; Savedoff and Schultz, 2000a; Schultz and Tansel, 1992). As such, there is a good rationale for investments, using public resources where justified, in adequate health services and systems, as well as in safety nets such as social health insurance in order to provide cost-effective prevention and treatment of health problems and build resilience.

There are, however, difficulties in evaluating the returns to investments in health. Two in particular stand out: Firstly, there is no obvious metric that captures all dimensions of poor health; and second, there are difficulties in measuring health due to data availability. Life expectancy is often used as an indicator of overall health in a country; however it does not capture the complexity behind poor health, particularly when it doesn't necessarily lead to a shorter life. Many health inflictions and illnesses do not result in death, but can significantly affect one's life and productivity.

One commonly used measure in the literature is Disability Adjusted Life Years (DALYs), which is a quantifiable measure of the disease burden, expressed as the number of cumulative years lost due to ill-health, disability or early death. It combines the traditional measure of years of life lost due to premature death to an additional measure of years of 'healthy' life lost due to poor health or disability. DALY then combines mortality and morbidity into a single metric; one DALY, then, is equal to one year of healthy life lost. DALYs are frequently used as an outcome measure of the cost-effectiveness of health programmes.

There remain, however, limitations to the use of DALYs. Anand and Hanson (1997) argue that not only are the age-weighting and discounting (the value of each year of life depends on age, with years lived as a young adult valued more highly than years spent as a young child or older adult) unacceptable, but allocation of resources by aggregate DALY-minimization is potentially inequitable. Mont and Loeb (2008) argue that DALYs are potentially biased because they only reflect medical conditions with certain functional limitations.

Despite the difficulties and limitations in measuring health outcomes, many evaluations have been conducted. *Figure 3* presents some of the main findings of a study by Laxminarayan et al. (2006) covering 319 evaluations of health interventions across South Asia and Sub Saharan Africa. All of the interventions presented cost under $409 per DALY saved. Childhood interventions are among the most cost-effective in terms of DALYs saved, with immunizations at the top (between $1-5 per DALY saved in Sub-Saharan Africa and $8 per DALY saved in South Asia). Other studies have found similar results for immunizations. Miller and McCann (2000) find hepatitis B immunization in low income high prevalence countries in Africa to cost just $8-11 per DALY gained. They further find that routine scheduled use of hepatitis B (HB), Haemophilus influenzae type b (Hib) vaccines could prevent up to 1.7 million deaths annually. Claeson et al. (2000) find very similar levels of cost effectiveness for an expanded programme on immunization. Hamoudi and Sachs (1999) also find that increasing immunization coverage by 1% would improve an infant's chances of surviving to the first birthday by almost 2%.

Treating childhood illnesses (through integrated management of childhood illnesses; case management of non-severe lower acute respiratory illnesses at the community or facility level; case management package including community or facility-based care for non-severe

Figure 3: Neglected low-cost opportunities in South Asia and Sub-Saharan Africa

Neglected Low-Cost Opportunities		Cost per DALY averted[*] ($)	Burden of Target Diseases[*] (Millions of DALYs)
South Asia	Childhood immunization [a]	8	28.4
	HIV/AIDS [b]	9-126	7.4
	Surgical services and emergency care [c]	6-212	48.0-146.3
	Tuberculosis [d]	8-263	13.9
	Lower acute respiratory illnesses of children under five [e]	28-264	9.7-26.4
	Cardiovascular diseases [f]	9-304	25.9-39.1
	Tobacco use and addiction [g]	14-374	15.7
	Maternal and neonatal care [h]	127-394	37.7-47.8
Sub-Saharan Africa	Childhood immunization [i]	1-5	13.5-31.3
	Traffic accidents [j]	2-12	6.4
	Malaria [k]	2-24	35.4
	Surgical services and emergency care [l]	7-215	25-134.2
	Childhood illnesses [m]	9-218	9.6-45.1
	Cardiovascular disease [n]	9-273	4.6
	HIV and AIDS [o]	6-377	56.8
	Maternal and neonatal care [p]	82-409	29.8-37.7

Source: Laxminarayan et al. (2006), Table 2.2. Based on chapters in DCP2 (Jamison et al. 2006).

* Laxminarayan et al. (2006) note that: ranges represent variation in point estimates of cost-effectiveness, DALYs averted or burden of disease among the different interventions listed in each group. Point estimates of cost-effectiveness and DALYs averted were obtained directly from the relevant chapters or calculated as the midpoint of range estimates reported in the chapters. Burden of disease were obtained from the relevant chapters and from Mathers et al., 2006.

[a] Increased coverage of traditional EPI programme

[b] Voluntary counseling and testing; peer-based programmes for at-risk groups to disseminate information, services and teach specific skills; school-based interventions to disseminate information; prevention of mother-to-child transmission with antiretroviral therapy)

[c] Surgical ward in district hospital, primarily for obstetrics, trauma and injury; staffed community ambulance; training of lay first-responders and volunteer paramedics)

[d] Childhood vaccination against endemic disease; directly observed short-course chemotherapy; isoniazid treatment of epidemic disease; management of drug resistance)

[e] Community-based or facility-based case management of non-severe cases; case management package, including community based and facility-based care for non-severe cases and hospital-based care for severe cases)

[f] Management of acute myocardial infarction with aspirin and beta-blocker; primary prevention of coronary artery disease with legislation, substituting 2% of trans fat with polyunsaturated fat, at $0.50 per adult; secondary prevention of congestive heart failure with ACE inhibitors and B blockers incremental to diuretics; secondary prevention of myocardial infarction and stroke with polypill, containing aspirin, beta-blocker, thiazide diuretic, ACE inhibitor and statin

[g] Tax policy to increase price of cigarettes by 33%; advertising bans, health information dissemination; tobacco supply reductions and smoking restrictions; nicotine replacement therapy

[h] Increased primary care coverage; improved quality of comprehensive emergency obstetric care; improved overall quality and coverage of care; neonatal packages targeted at families, communities, and clinics

[i] Second opportunity measles vaccination; additional coverage of traditional EPI programme

[j] Increased speeding penalties, media and law enforcement; speed bumps at most dangerous traffic intersections

[k] Insecticide-treated bed nets; residual household spraining; intermittent preventive treatment during pregnancy

[l] Surgical ward in district hospital, primarily for obstetrics, trauma and injury; staffed community ambulance; training of lay first-responders and volunteer paramedics

[m] Integrated management of childhood illnesses; case management of non-severe lower acute respiratory illnesses at the community or facility level; case management package including community or facility-based care for non-severe cases and hospital-based care for severe lower acute respiratory illnesses; breastfeeding support to prevent underweight children

[n] Management of acute myocardial infarction with aspirin and beta-blocker; primary prevention of coronary artery disease with legislation substituting 2% of trans fat with polyunsaturated fat, at $0.50 per adult; secondary prevention of congestive heart failure with angiotensin-converting enzyme inhibitors and beta-blockers incremental to diuretics; secondary prevention of myocardial infarction and stroke with polypill containing aspirin, beta-b locker, thiazide diuretic, angiotensin-converting enzyme inhibitor, and statin

[o] Peer-based programmes targeting at-risk groups (e/g/, commercial sex workers) to disseminate information and teach specific skills; voluntary counseling and testing; diagnosis and treatment of sexually-transmitted diseases; condom promotion and distribution; prevention and treatment of tuberculosis co-infection; blood and needle safety programmes; prevention of mother-to-child transmission with antiretroviral therapy

[p] Increased primary care coverage; improved quality of comprehensive emergency obstetric care; improved overall quality and coverage of care; neonatal packages targeted to families, communities, and clinics

cases and hospital-based care for severe lower acute respiratory illnesses; breastfeeding support to prevent underweight children) can cost between $9 and $218 per DALY saved (As illustrated in *Figure 3*). Many of the other interventions also presented benefit children directly and/or indirectly. In addition to being low cost, *Figure 3* presents the burden of target diseases.

By comparison, health interventions that treat other diseases have been shown to be much more costly. For example, interventions to treat stroke (Ischemic)[9] in Sub-Saharan Africa has been found to cost between $1,284 and $2,940 per DALY averted, and interventions to treat depression[10] in South Asia can cost between $1,003 and $1,449, interventions to treat schizophrenia and bipolar disorder[11] in South Asia can cost between $1,743 and $17,702 (Laxminarayan et al., 2006). In the US costs are likely to be even higher.

Box 1: Copenhagen Consensus 2012:

In 2012, the Copenhagen Consensus, a panel of expert economists, met to determine the key priorities for policymakers and philanthropists in terms of cost-effectively addressing some of the most pressing global issues. In a paper submitted to the conference, Jamison et al. (2012) determine that the critical priorities for controlling infectious diseases are malaria treatment, control of tuberculosis, addressing the spread of HIV, immunizations, and deworming. They estimate every million dollars spent on the so-called 'Affordable Medicines Facility-malaria' would mean 300,000 more children are treated. Benefits put in economic terms are 35 times higher than the costs. Controlling tuberculosis, while less effective than 2008, remains a highly valuable investment. Spending an additional $1.5 billion on controlling tuberculosis would save 1 million adult deaths annually. In terms of immunization, Jamison et al. estimate an additionally $1 billion annually on expanded immunization coverage would save 1 million child deaths annually. Addressing issues such as de-worming have proven to be highly effective not just for health reasons, but also in terms of education outcomes. Nevertheless, deworming remains a neglected infection. The authors estimate an additional $300 million could treat 300 million children. In economic terms, the benefits would be about ten times the costs.

Source: Jamison et al. (2012)

Social and Economic Returns
While it is clear that investing in health can greatly improve individual outcomes, to what extent might it contribute to economic growth? This is often a more difficult area of analysis, most principally because there are many competing factors that affect economic growth. In addition, like when assessing the private returns to health, there are also measurement

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[9] This includes acute management with recombinant tissue plasminogen activator within 48 hours of onset; acute management with heparin within 48 hours of onset; and secondary prevention with carotid endarterectomy

[10] This includes episodic treatment with newer antidepressant drug (selective serotonin reuptake inhibitors); episodic or maintenance psychosocial treatment plus treatment with newer antidepressant drug (selective serotonin reuptake inhibitors)

[11] This includes antipsychotic medication and psychosocial treatment for schizophrenia; valproate and psychosocial treatment for bipolar disorder

difficulties. Life expectancy is only a proxy for health. Nevertheless, a review of the literature indicates that there are potentially a variety of theoretical channels through which connections between health and economic growth could occur, much of which is similar to the returns from private investments in health.

First, healthy individuals are more likely to be efficient at assimilating knowledge, have stronger cognitive and physical capabilities and, in consequence, obtain higher productivity levels (Suhrcke et al., 2005; Tompa, 2002; Bloom and Canning, 2000; McNamara et al., 2010; Strauss and Thomas, 1998). Where time is spent treating disease, productivity may also suffer. For example, where malaria is endemic, workers can expect to suffer from two bouts of fever per year, losing 5-10 working days each time (see Bloom et al., 2008).

Second, better health has been shown to increase incentives to invest in education and skills. Better health can affect the returns to education through improved cognitive ability and higher levels of school attendance. Studies have shown that unhealthy children are less likely to attend school (see Bloom and Canning, 2000; Schultz, 1999; Blackwell and Tonthat, 2002; Freudenberg et al., 2007). Furthermore, where life expectancy is longer, the present value of human capital is higher and the returns to investing in it become even greater (see Bloom and Canning, 2000; Jayachandran and Lleras-Muney, 2009; Kalemli-Ozcan et al., 2000; King et al., 2010).

Third, studies have claimed that better health can propel the 'demographic dividend'. Better health can facilitate the demographic transition: as children become healthier and more likely to live longer, fertility rates decline; and as the proportion of the population that is of working age increases, incomes per capita can rise (provided the broader policy environment permits the new workers to be absorbed into productive employment) (see Bloom and Canning, 2000; Bloom et al., 2003; Jorgensen, 2010; Ross, 2004). Bloom and others in a report for the Asian Development Bank speculate that this transition may be responsible for as much as 0.5-1.3% in accelerated annual growth in Asia over the period 1965-1990, or 15-40% of the region's total growth performance (Asian Development Bank 1997)

Finally, studies have shown that better health environments can help propel investment and development. Economic activity is often deterred by health issues (see Hamoudi and Sachs, 1999; WHO, 2001; Azemar and Desbordes, 2009; Alsan et al., 2006; as well as early seminal works such as Sorkin, 1977 and Bryant, 1969). Linkages have also been found between the expected lengths of retirement and savings (see Bloom, Canning and Graham, 2002; Tan and Folk, 2011). In addition, where health environments are favourable, foreign direct investment has been shown to increase (see Sachs and Malaney, 2002).

The theoretical underpinnings and association between health and growth have also been empirically evaluated in many studies. Using microeconomic estimates of the effect of health on individual outcomes to construct macroeconomic estimates of the proximate effect of health on GDP per capita, Weil, 2005 found that eliminating health differences among countries would reduce the variance of log GDP per worker by 9.9 per cent, and reduce the ratio of GDP per worker at the 90th percentile to GDP per worker at the 10th percentile from 20.5 to 17.9. Another study by Sala-I-Martin (1997) included a meta-analysis that evaluated about 32,000 regressions involving 59 different variables, and found that 'initial life

expectancy in 1960' is significantly correlated with economic growth in more than 96% of the specifications. This, he claims, makes initial health one of the most robust predictors of subsequent economic growth.

Another study by Grimm (2010) revealed the profound effect of health equity for children on economic growth. Covering 62 low and middle income countries over the period 1985 to 2007, Grimm found that reducing child deaths by 4.25 per thousand children born (i.e. by about 5% of the total sample studied) to mothers with low levels of education (i.e. a highly disadvantaged group), can result in an almost 8% increase in GDP per capita 10 years later. Put another way, the coefficient implies that reducing health inequality by 1% per year could increase the country's annual rate of growth by 0.15%. This makes reducing health inequity by targeting the poorest children a very strong policy alternative for improving economic growth.

Figure 4 presents a series of studies conducted over the past two decades which illustrate the strong relationship between life expectancy at birth and economic growth. Because life expectancy is highly influenced by child mortality, low-cost interventions can be important instruments towards raising life expectancy (Bhargava, 2001). In fact, Hamoudi and Sachs (1999) find that improving a child's chances of survival to the fifth birthday by 1% improves life expectancy by 1%.

Figure 4: Estimated growth effect of increasing life expectancy by five years

Source: Calculations on growth effect of increasing life expectancy by 5 years conducted by Bloom, Canning, and Sevilla (2004).
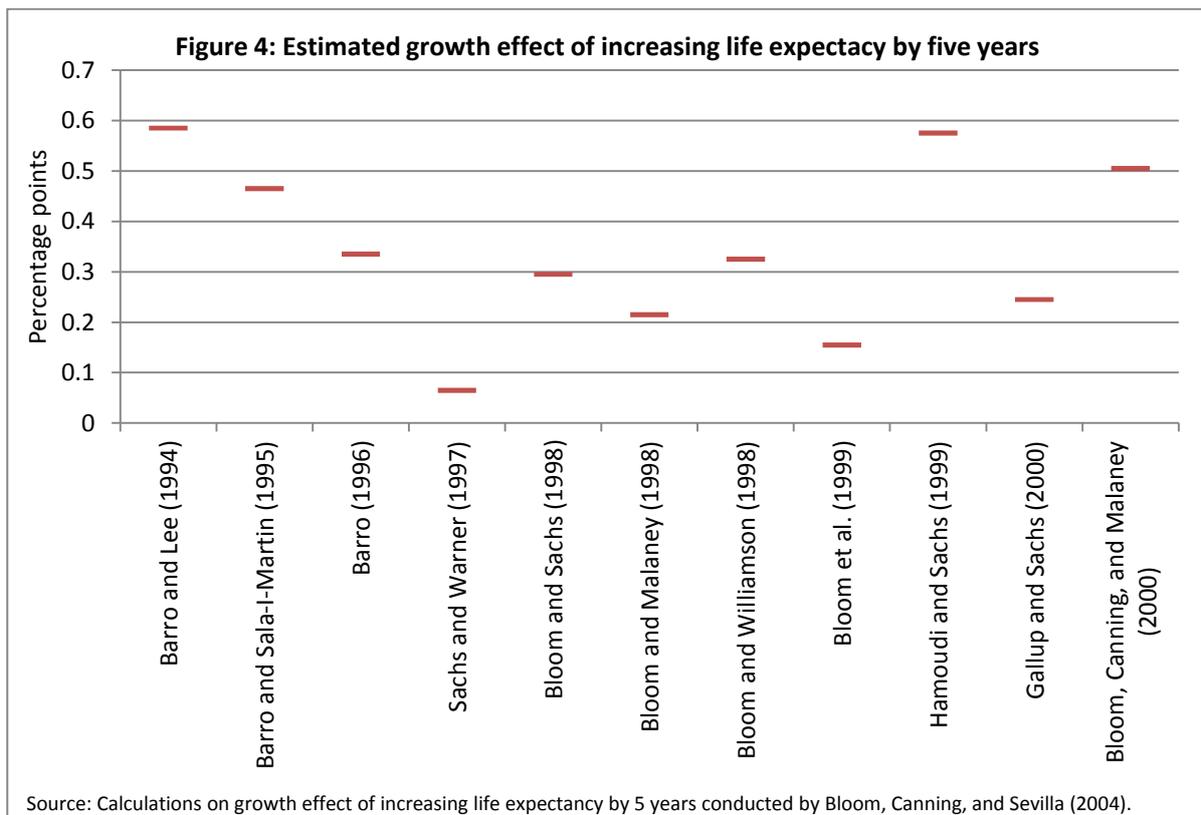
The studies presented in *Figure 4* are based on calculations and extrapolations conducted by Bloom et al. (2004). Each study covers panel or cross-sectional data in a variety of different periods and intervals between 1965 to 2007, and examines several other covariates such as education levels, fertility, trade openness, institutional quality, population dynamics,

government expenditures, among others. Bloom et al. (2004) empirically examine the relationship between health and growth using a production function model of aggregate economic growth including two variables of human capital – work experience and health. They conclude that health has a positive effect on labour productivity – a one-year improvement in a population's life expectancy contributes to a 4% increase in output. This is a relatively large effect, and indicates the importance of investments in health.

One of the major drawbacks to the studies presented in *Figure 4* is that life expectancy is used as a proxy of health. The life expectancy measure, however, does not include all the dimensions of good health, such as morbidity or disability; nor are they child-specific. Bhargava (2001) claims, for example that life expectancy says nothing about how active and healthy working age people are – a critical element in productivity. In order to adjust for this, Aguayo-Rico et al. (2005) examined the four determinants of health defined by the European Commission of Public Health: health services, socioeconomic conditions, lifestyles, and environment. The authors find a highly statistically significant relationship between broader determinants of health and economic growth, further supporting the relationship between investing in health as a policy tool to spur economic growth.

Another drawback from the studies presented in *Figure 4* is that they focus on the relationship between health outcomes and economic growth, rather than investments such as government spending (which would be more pertinent to policymakers). Addressing this issue, Baldacci et al. (2004) use a dataset covering 120 developing countries from 1975 to 2000 to examine the effect of social spending on growth (see *Table 2*). They find that increasing health spending by 1% of GDP is associated with a reduction in child mortality rate of 0.6%, as well as a rise of 0.5% in annual per capita GDP growth. The authors also find that health spending affects education spending – a 1% of GDP increase in health spending can result in an increase in net enrolment rate by about 2%. This is consistent with the theory that children who are healthy are better able to attend school and be active in the classroom. Interestingly, the authors also find that improvement in child outcome variables, such as under five mortality, composite enrolment, and net primary enrolment come sooner rather than later. This lends support for investments in children during acute shocks, such as the recent economic crisis and in humanitarian crises, as the returns could be realised in the short run. Improvements in GDP growth, however, are realized in the short term as well as the long term.

Baldacci et al. (2004) also incorporate governance into their model, and found that it has a significant direct effect on whether social spending has a positive impact on social indicators. Improvements in the governance index from lower- to higher-than-average is associated with an immediate reduction of 0.5 percentage point in the child mortality rate, an increase of 6 percentage points in the composite enrolment rate, and a rise of 1.6 percentage points in per capita GDP growth. Countries where there is poor governance exhibit investment to GDP rates that are 2 percentage points lower than other countries. The important role of governance, therefore, could explain why some studies may have found weaker relationships between health spending and health indicators.

Several studies have, however, found little or no causal relationship between investment in health and economic growth (see, for example, Benhabib and Spiegal, 1994). Although Topel

(1999) and Krueger and Lindahl (2001) suggest specifications in which human capital can improve productivity, they also claim there are challenges in estimating the returns. Acemoglu and Johnson (2007) find that while life expectancy is associated with a very minor improvement in aggregate GDP, when GDP *per capita* is used, the relationship doesn't hold and can even be negative. The authors find that improved expected life expectancy results in higher levels of population growth, which diminished the effect of higher GDP per capita.

Other authors also posit that the direction of causality is the other way around – that is, economic growth leads to healthier societies (see Pritchett and Summers, 1996; Subramanian et al., 2002). In an attempt to isolate endogenous effects, Pritchett and Summers use instrumental variables that are exogenously defined to estimate the effect of income growth on health status. They find that differences in income growth can explain up to 40% of the cross-country difference in mortality improvements, and that, if income were 1% higher in developing countries, up to 53,000 child deaths could be averted every year.

Much of the debate on the relationship between health and economic growth is not about whether there is a relationship, but rather what are the key causal factors and the direction of causality. Many authors find that good policy and the choice of institutions is what matters (See Acemoglu et al., 2002; Easterly and Levine, 2003; Rodrik et al., 2002). It may be, therefore, that when health spending occurs in a sound policy environment, it has the greatest impact on economic growth. The way a health system is managed could also be a crucial factor influencing returns to social spending (Mauro, 1998; Abed and Gupta, 2002; Gupta et al., 2002; Rajkumar and Swaroop, 2002). Inefficiencies in a health system are likely to diminish the effectiveness and value of the investment. Finally, modalities of health delivery can make a big difference – and effectiveness varies greatly depending on types and innovations in health interventions.

Table 2: Estimated Impact of Macroeconomic Policy Options over 15 years

	Baseline	T+5yrs	T+10yrs	T+15yrs	T+5yrs	T+10yrs	T+15yrs
		End of period value			Absolute change		
Increase Health Spending by 1 % of GDP over 15 years							
Under 5 child mortality (per 1000 live births)	76	73.6	69.9	69.9	-2.4	-3.7	0
Composite enrollment	154	154.4	157.7	157.7	0.4	3.3	0
Implied net primary enrollment	89.7	90	91.8	91.9	0.3	1.9	0
Per capita GDP growth (in %)	1.3	1.7	1.7	1.7	0.4	0	0.1
Implied headcount ratio	100	95.6	91.2	86.7	-4.4	-4.4	-4.5
Increase Education Spending by 1 % of GDP over 15 years							
Composite enrollment	154	160	167.2	172.5	6	7.2	5.4
Implied net primary enrollment	89.7	93.2	97.5	100	3.5	4.3	1
Per capita GDP growth (in %)	1.3	1.8	2	2.7	0.5	0.2	0.7
Implied headcount ratio	100	95.2	89.9	82.9	4.8	-5.3	-7
Under-5 child mortality (per 1000 live births)	76	76	70.9	64.7	0	-5.1	-6.2
Reduce Inflation (marginal change from high inflation to below 20 %) over 15 years							
Per capita GDP growth (in %)	1.3	1.4	1.4	1.4	0.1	0	0
Implied headcount ratio	100	96.4	92.9	89.3	-3.6	-3.6	-3.6
Reduce fiscal deficit by 1 % of GDP on Growth over 15 years							
Per capita GDP growth (in %)	100	1.8	*1.8*	1.8	0.5	0	0
Implied headcount ratio	100	95.4	90.6	86.0	-4.7	-4.7	-4.7

Source: Baldacci and others (2004). Panel data across 120 developing countries from *World Development Indicators* database 2003, *World Economic Outlook* database 2003, country authorities and Baldacci and other's (2004) calculations.

V.   Water and Sanitation

Almost fifty per cent of the developing world's population – 2.5 billion people – lack improved sanitation facilities, and over 780 million people still use unsafe drinking water sources.[12] Hutton and Haller (2004) at the World Health Organisation evaluated the costs and benefits of improved sanitation at the global level, and considered interventions in a variety of areas that relate to the MDGs and that help improve access, disinfection, and piped water supply and sewage. The costs included full investment and the annual running costs, while the benefits included reduced patient expenses due to avoided illnesses, value of time savings due to better access to water and sanitation, value of productive time due to less time spent ill, value of days of school attendance gained, value of child days gained to those with avoided illness, health sector costs saved, and the value of prevented deaths. Using a variety of methods to quantify these benefits in monetary terms, the authors found that the benefits of achieving the MDG target on water and sanitation would be between $3 and $34 per dollar invested. The main driver being time-savings associated with better access to water supply and sanitation services. Time-savings for children and families could make it easier for children to attend school.

Other studies, however, have found more conservative estimates. Whittington et al. (2008) found that a municipal water and sanitation network infrastructure to have a benefit-cost ratio of 0.65-0.75 to 1, depending on certain assumptions. The authors point out, however, that the ratios are most sensitive to per capita consumption, diarrheal incidence, the value of a statistical life, and assumptions about the value of time spent collecting water. Furthermore, the authors claim that the benefits are likely to improve over time due to economic growth and rising incomes. They also state that water investments could in theory influence the returns to investments in other sectors.

Whittington et al. (2008) proceed, however to assess several non-network water and sanitation interventions that might have higher economic returns for many developing country situations, including a rural water supply programme for constructing deep boreholes with hand pumps in Africa, a sanitation programme designed to halt open defecation in South Asia, water disinfection technology installed at the household level (point-of-use), and large multipurpose dams in Africa. They find that the borehole programme to have significant benefits in terms of time savings, reduced mortality and morbidity, with a benefit-cost ratio of 2.9 to 1. The community-led total sanitation campaign to achieve open defecation-free communities in South Asia had a benefit-cost ratio of 2.7 to 1, and the biosand filter to disinfect water had a benefit-cost ratio of 2.8 to 1. The construction of a large dam in Africa was estimated to have a lower benefit-cost ratio of 1.8 to 1. Each of the ratios are based on discount rates of 6%.

Aggregating the benefits, Hutton and Haller (2004) estimate that achieving the MDG targets on water and sanitation would yield a total annual economic benefit of $84 billion. Cost savings to the health sector are mainly due to the reduced number of treatments of diarrhoeal cases, which Hutton and Haller (2004) estimate would reduce by 10% on average

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[12] UNICEF and WHO 2012. Progress on Drinking Water 2012 [Update]

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(ranging from 0 to 14% depending on the region). The estimated global savings to the health sector could be around $7 billion per year for meeting the MDG water and sanitation targets. Furthermore, the authors estimate that the value of adult working days gained as a result of less illness would be approximately $750 million, valuing the cost of time spent ill at a rate linked to regional minimum wages. They estimate the value of time saved to be even higher due to closer location of facilities. Time saved due to closer location of facilities (such as the relocation of a well or borehole to a site closer, the installation of piped water and closer access to toilets), is estimated to be worth $64 billion globally for meeting the MDG water and sanitation targets.

The Economics of Sanitation Initiative (ESI), a multi-country initiative of the Water and Sanitation Program at the World Bank, also produced a study which estimated the economic impact of poor sanitation. They find it can be in the region of 1-2.5% of GDP for 18 African economies.[13] This number, however, is a conservative estimate because it doesn't account for the many spill-overs or non-monetized benefits of improved sanitation, such as improved tourism, trade, etc. It only covers healthcare costs, losses due to premature deaths, losses in productivity, and time-saved due to prevention of open defecation. Meanwhile, the survey finds that the 18 economies only invest between 0.1 and 0.5% of GDP in improved sanitation.[14]

In a similar study by the ESI on several countries in Southeast Asia, they find an estimated 2% of combined GDP is lost due to poor sanitation (World Bank 2007). This varies from 1.3% in Vietnam, to 1.5% in the Philippines, to 2.3% in Indonesia, to 5.6% in Lao, to 7.2% in Cambodia. An ESI study on South Asia[15] also found that the losses as a result of poor sanitation faced by Bangladesh are equivalent to approximately 6.3% of GDP; the losses faced by India are equivalent to 6.4% of GDP; and the losses faced by Pakistan are equivalent to 3.9% of GDP.

VI.   Nutrition

Access to good nutrition is an essential component of overall health. Still, under nutrition contributes to more than a third of under-five deaths globally. Studies have shown very strong linkages between nutrition and cognitive, physical and emotional development (See Pollitt et al., 1995; Grantham-McGregor et al., 2007; Martorell, 1995, 1999). A meta-analysis of 18 studies[16] found that people who had experienced some iodine deficiency had, on average, 13.5 points lower IQs than control groups. Nutrition has also been shown to impact survival - an increase of 1% in protein availability per capita improves a child's chances of survival to the fifth birthday by over 4% (Hamoudi and Sachs, 1999). Poor nutrition reduces

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[13] The study covered Benin, Burkina Faso, Chad, Central African Republic, Democratic Republic of Congo, Ghana, Kenya, Republic of Congo, Liberia, Madagascar, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Tanzania, Uganda, and Zambia

[14] http://www.wsp.org/wsp/content/africa-economic-impacts-sanitation

[15] http://www.wsp.org/wsp/content/south-asia-economic-impacts-sanitation

[16] Cited in Grantham-McGregor, Fernald and Sethuraman 1999, original studies by Bleichrodt, N. and Resing, W., 1994

the effectiveness of immune responses, making the chances that infectious illnesses will be more severe, and result in long-term disability or death (Farmer 1999).

A study by Behrman et al. (2004b) evaluated the costs and benefits of various nutrition interventions, using discount rates of 3-5%. All the nutrition programmes demonstrated significant returns per dollar invested. The results of some of this analysis are presented in *Table 3*. A subsequent study by Alderman and Berhman (2006) combine the implications of several studies and some explicit assumptions to examine economic benefits of reducing low birth weight in low income countries. They find benefits to be approximately $510 per infant moved from a low-birth-weight status (at present discounted value of 5 per cent). Most of the benefits come from increased productivity from reducing stunting and improving cognitive ability (partially through more education). Thus there may be many interventions that are warranted purely on the grounds of saving resources or increasing productivity.

Table 3: Benefit-Cost Ratios for Specific Nutrition Programmes[17]

Intervention programmes (in populations where deficiencies are prevalent)	Benefit-Cost ratio
Breastfeeding promotion in hospitals[18]	5-7 to 1
Integrated child care programmes	9-16 to 1
Iodine supplementation (per woman of child bearing age)	15-520 to 1
Vitamin A supplementation (children <6)	4-43 to 1
Iron fortification (per capita)	176-200 to 1
Iron supplementation (per pregnant woman)	6-14 to 1

Source: Behrman et al. (2004b)

In rural Zimbabwe, Alderman Hoddinott and Kinsey (2003) find that improved pre-schooler nutritional status is associated with increased schooling and an earlier age at which the child starts school. Glewwe et al. (2001) examine the effect of early childhood nutrition in the Philippines and find that children not only learn more because of more time spent in school, but also because of higher levels of productivity per year of schooling. They estimate that every $1 invested in similar nutrition programmes in a developing country like the Philippines could yield a return of at least $3 and possibly much higher if the programmes is targeted at malnourished children.

The links between nutrition, cognitive development and schooling could ultimately affect future incomes, fertility and the wellbeing of future generations – and hence the intergenerational transmission of poverty (Grantham-McGregor et al., 2007). Arcand (2001) cite a long history of literature which points to the theoretical relationship between improvements in nutrition status and labour productivity (Barlow, 1979; Martorell and Arrayave, 1984; Strauss, 1985; Srinivasan, 1992; Behrman and Deolalikar, 1988).

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[17] As stated by Behrman et al. (2004): "These estimates are based on extensive assumptions that are discussed in the text and in the underlying studies, are subject to considerable uncertainties, and cannot be understood without reference to those discussions. The estimates are all of total (private plus social) benefits relative to total (private plus social) costs -- and therefore do not provide information about the differences between social and private benefit-to-cost ratios (or rates of returns) that would be necessary to assess the efficiency case for public subsidies."

[18] In which norm has been promotion of use of infant formula.

Grantham-McGregor et al. (2007) estimate that the loss in adult income from being stunted could be 22%. The combined effect of being stunted and living in poverty could lead to a 30% loss of adult income. Hoddinott et al. (2008) examined the effect of a nutritious supplement (atole) among Guatamalan adults, and found that it was associated with higher hourly wages of US$0.67 where children were exposed to atole under the age of 2, which translated to a 46% increase in average wages. The effect, however, was only significant for men. Croppenstedt and Muller (2000) found that in rural Ethiopia a one-standard deviation in the Body Mass Index increased male wages by 26%, and a one standard deviation in Weight for Height increased wages by 29%. These, the authors claim, compare well with Lee (1982) and Thomas and Strauss (1997), but not Deolalikar (1988) or Behrman and Deolalikar (1991).

Social and Economic Returns

The highly cost-effective nature of nutrition interventions, and the degree to which it influences productivity, could make nutrition a very strong factor in terms of improving economic growth. While many studies have examined the effects of nutrition on productivity, some have gone further to analyse the extent to which it might influence growth. Broca and Stamoulis (2003) point to several mechanisms through which poor nutrition can influence growth, including: by reducing the productivity of labour; increasing susceptibility to illness; perpetuating intergenerational transmission of poor nutritional status; it's association with poor school performance of children; it's causing people who live on the edge of starvation to be risk-averse when it comes to making investments. These all have cumulative effects on the macro-economy.

Studies point to a direct link between nutrition and productivity. Hunt (2005) found stunting which results in a 1% loss in adult height is associated with a 1.4 per cent loss in productivity. Anaemia could be even worse – Horton and Ross (2003) review results of earlier studies and conclude that a conservative estimate of the labour productivity gains of eliminating anaemia could be 5% in blue collar work, and up to 17% for heavy manual labour. In a corrigendum, Horton and Ross (2003) find that, across ten developing countries, the median value of annual physical productivity losses due to iron deficiency is around 0.57% of GDP. Combining this with cognitive losses, it could be up to 0.81% of GDP. Horton and Ross (2007) also find that, for every dollar invested, the median value of benefits is $6 and can be up to $8.7 when including cognitive improvements.

Arcand (2001) cite a long history of literature which points to the theoretical relationship between improvements in nutrition status and economic growth (see Leibenstein, 1957; Mazumdar, 1959; Mirlees, 1975; Stiglitz, 1976; Bliss and Stern, 1978; Dasgupta and Ray, 1984). Arcand (2001) goes on to examine the impact of the prevalence of food inadequacy (PFI), and the dietary energy supply (DES) on economic growth. The impact of nutrition on economic growth would appear to operate directly, through nutrition's effect on labour productivity, as well as indirectly, through improvements in life expectancy. Depending upon the empirical specification that is chosen, the point estimates imply that inadequate nutrition is responsible for a shortfall of between 0.23 and 4.7 percentage points in the annual growth rate of GDP per caput worldwide. Seen from another angle, countries with above-median PFI would have seen their annual growth rate of GDP per caput increase by 1.6 percentage points if they had raised their DES per caput to 2,770 kcal / day.

Stemming from Arcand (2001), Wang and Taniguchi (2003) also examine the relationship between nutrition and economic growth. They find that, while the short-run affect is rather ambiguous, better nutrition is associated with faster growth in the long run. They estimate the magnitude of this effect at the sample mean to be about 0.5 percentage points for a 500-kcal/day increase in DES. The authors recommend that, because of the long-term effects, any countries should commit to long-run provision of adequate nutrition.

Studies have also examined the reverse effect – the extent economic growth and higher incomes might improve nutrition. For example Easterly (1999) found that an increase in per capita GDP was associated with an increase in dietary energy supply. Ravallion (1990) also found that nutrient intake is responsive to the prices of food staples. Other studies, however, conclude that while there is a relationship in both directions, the effect of nutrition on economic growth is much stronger (See World Bank, 2006). In other words, it would take considerably longer for growth to achieve the nutrition MDG if we relied on it alone. Countries cannot depend on economic growth alone to address malnutrition, and this is especially true given the human costs.

As Gillespie and Haddad (2003) put it, investing in nutrition is critical to achieving elements within many of the MDGs. Malnutrition erodes human capital through irreversible and intergenerational effects on cognitive and physical development; it reduces chances children will go to school, stay in school and perform well; addressing malnutrition empowers women more than men; it is directly or indirectly associated with most child deaths; it is a major risk factor for maternal mortality; and it may increase risk of HIV transmission and compromise therapy.

Finally, in 2012, the Copenhagen Consensus, comprising a panel of the world's leading economists, identified a series of interventions to solve the world's greatest challenges. The top priority was tackling undernutrition. In a paper presented at the conference, Hoddinott et al. (2012) find that it would cost less than $700 million annually to eliminate vitamin A deficiencies in pre-school children, eliminate iodine deficiency globally and dramatically reduce maternal anaemia during pregnancy. For about $100 per child, a bundle of interventions including micronutrients, improvements in diet quality and better care behaviours, could reduce chronic undernutrition by 36% in developing countries. They estimate that each dollar spent could have a payoff of about $30. Hoddinott et al. also propose other sets of solutions, including increasing food production, improving market functioning through better communications and competition in fertilizer markets. While it could be argued that food production may already be in excess of food needs, prices are not affordable given the recent food price crisis. Furthermore, the negative consequences of impending issues like climate change could pose additional challenges, making the case for improving production and distribution even more important.

VII.   Education

Like health, education is a basic human right. There are, however, related benefits that stem from it. The private returns to education are primarily in the form of higher wages. This could come as a result of higher productivity, or because employers might use level of education as a signal of capability and skills (Psacharopoulos, 2006).[19] Other private benefits also include improved cognitive development, particularly when education is provided to children early in life (See section on early childhood development).

The literature on the returns to investments in education, however, largely focuses on an individual's future earnings. The studies we reviewed found significant rates of returns from education, particularly primary education. But one of the most notable studies was conducted by Psacharopoulos and Patrinos (2002), who employ an elaborate method across 78 countries which allows for the identification of rates of return according to different educational stages. They calculated the annual stream of benefits based on earnings advantage of graduates at higher educational level compared to graduates at lower educational levels (control group). A private rate of return is then calculated by equating the stream of costs with forgone earnings while being at school. Their analysis indicated that every additional year of schooling improves average earnings by approximately 10% globally. This is consistent with another rigorous single-country study by Duflo (2001), which found that each year of schooling in Indonesia increased wages by 7-11%. A more recent study by Barro and Lee (2010) also examined panel data on educational attainment for 146 countries from 1950 to 2010 to investigate how output relates to the stock of human capital, and found similar rates of return, of between 5% and 12%.

While most studies use enrolment rates and average years of schooling to evaluate returns, some studies consider other variables, such as literacy rates and test scores, to test for quality of education.   For example, Coulombe et al. (2004) examine 14 OECD countries and find that, a country with literacy scores 1% higher than the average exhibit labour productivity that is 2.5% higher. Several country-specific studies have evaluated test scores and found that higher scores can increase wages. Moll (1998), for example, found computational scores in particular to be strongly associated with wages. Joliffe (1998) have assessed the effect of cognitive skills on different types of income, and found a positive effect on total and off-farm income, but not on farm income.

Social and Economic Returns
While the returns to investing in education accrue largely in terms of increased wages, many individual-level benefits are felt by the wider society. The method for evaluating social returns to education which Psacharopoulos and Patrinos (2002) employ encompasses not only forgone earnings but the true resource costs. These include, for example, public subsidies. However, it does not take into account the externalities that might come from investments in education. Non-market externalities might include reduced crime, more social cohesion, among others (Psacharopoulos, 2006). Others might include better social

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[19] While the latter may not directly have implications for the wider society, implications for the individual remain.

outcomes. For example, as stated in Schultz (1999), studies (Cochrane et al., 1980; Schultz, 1981) have found that a year of additional schooling for the mother is often associated in a low-income country with a 5 to 10 percent reduction in her child's likelihood of dying in the first five years of life. These benefits have monetary value which could potentially increase the overall value of the returns to investing in education.

There are three main theoretical channels through which education could potentially contribute to economic growth: Firstly, labour has been traditionally used in growth frameworks as a factor of production. Adding skill to labour, however, enhances the productivity of labour. Improvements to labour productivity through human capital can help ensure transition to a higher equilibrium level of output. (See Barro, 1991, 1997; Mankiw et al., 1992; Bernanke and Gurkaynak, 2001; Boucekkine et al., 2002; Pyo, 1995)

Second, education facilitates the capacity to absorb and develop new technologies. The Solow growth model included technological change as an independent variable in an aggregate production function, along with physical capital and labour, in order to explain economic growth (Solow, 1956, 1957). In 1992, Mankiw et al. extended the Solow model of growth by adding human capital, specifying that it had a significant impact on economic growth through its ability to endogenously generate it as well as attract investment. (See also Griffith et al., 2000; Cameron et al., 1998; Benhabib and Spiegel, 1994).

Third, education has been shown to stimulate the accumulation of other productive inputs. The theoretical implication of this is that knowledge becomes a public good, and the externalities allow output to grow even further. First instigated by Schultz (1961) and Becker (1964), the basic idea of people being able to invest in their own capabilities was expanded into new growth theories, postulating that education can affect other processes and dynamics within society, further spurring national output. The idea that education has spill-over effects, and that an educated person has not only a positive benefit to her/his self but also others not directly receiving education, is founded in this philosophy. As a result, most new growth theories directly incorporate human capital as a factor input into their models, thus departing from the constant returns to scale argument.

There is an important methodological difference, however, between new growth theories and the neo-classical tradition: under the augmented Solow growth model, a one-off increase in the stock of human capital (such as the average level of school enrolment) is associated with a one-off increase in growth. However, under the new growth theory tradition, a one-off increase in the stock of human capital is associated with a permanent increase in the growth rate of productivity. The new growth theory approach is therefore considered endogenous, and growth can thus be affected by government policy rather than purely by exogenous impacts of technological change. It both uses resources as well as increases the productivity of other factors of production. Rather than having constant returns to scale, knowledge becomes a public good or externality that spills over the economy, allowing output to grow beyond the measurable inputs (Psacharopoulos, 2006). Furthermore, the concept of economic development has changed over the past few decades. While it initially was tied to income per capita, development now encompasses notions of greater equity, rights, poverty reduction, liberty, democracy, health, and a better

environment. The value of education could potentially also contribute to these variables, in addition to monetary benefits (Psacharopoulos, 2006).

Another method of examining the social impacts of education is to consider the welfare loss of not educating a population. Using a newly constructed data set on education and national accounts from 1950 to 2010, Patrinos and Psacharopoulos (2011) estimate the loss of income associated with not having a higher rate of educational investments. They also estimate forward (2010 to 2050). The authors claim that every country that has sustained high growth for long periods of time made significant investments in schooling and deepened its human capital. They find that, on average, welfare losses in terms of per capita income as a result of a one-year deficiency in schooling conservatively range from about 7 to 10 per cent of per capita income, and the loss from illiteracy range from about 4 to 12 per cent of per capita income. Furthermore, the authors find a strong relationship between educational attainment and income inequality – improved education performance is related to a reduction in the GINI index of 1.4 points (out of 100).

Other studies have also considered the effect of education public policy on income inequality. A study by Keller (2010) found that expenditures per student in primary education have a significant effect on inequality: one standard deviation increase experiences a decrease in the GINI coefficient by 1.2 percentage points. Enrolment rates in secondary education have a similar effect. This makes education policy an important tool in promoting equity.

Sianesi and Van Reenen (2003) conducted a thorough review of the literature on the macroeconomic returns to education. They concluded that a one-year increase in the mean years of schooling has been shown to raise the level of output per capita by between 3-6%, or a higher growth rate of 1 percentage point. These, they claim, are conservative estimates. There are, however, more conservative estimates. Anderson and Hague (2007) estimate that an increase of 20 percentage points in primary school enrolment rates would raise growth by 0.3 percentage points per year, with an equivalent increase in secondary school enrolment raising growth by 0.2 percentage points per year. Sala-I-Martin et al. (2004) evaluated 67 explanatory variables for growth in a sample of eighty-eight countries and found that a 10 percentage point increase in primary school enrolment rates is associated with a 0.27 percentage point increase in the growth rate.

Studies on the United States also have found significant impacts from education. Goldin and Katz (2008) studied the United States labor force from 1915 to 1999 and estimated that gains in educational attainment directly resulted in at least 23 percent of the overall growth in productivity in the country, or around 10 percent of GDP growth. They found that the major factor was the move to universal high school education from 1910 to 1940, which expanded work force education more rapidly than at any other time in the country's history. This created economic benefits that lasted into the rest of the 20th century, and put the United States ahead of other countries in education.

> **Box 2: Macro Evidence on the Effect of Education on Growth:**
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> - An extra year of male secondary or higher education is estimated to raise the growth rate by 1.2 percentage points per year (Barro, 1997)
> - Hanushek and Woessmann (2008) find macroeconomic returns to schooling can be as high as 36.9% in total, or associated with a long-run growth rate that is 0.58 percentage points higher.
> - Primary and secondary school enrolment is significantly associated with per-capita growth (McMahon, 1998).
> - A one-year increase in the average years of schooling for a country's workforce raises output per worker by 5-15% (Topel, 1999).
> - Increasing the mean educational attainment of the population by 1 year raises output per worker by 6% (Bassanini and Scarpetta, 2001).
> - High rates of investment (in particular private investment) explains a large part of the growth rate between 1960 and 1990 (World Bank, 1993)

Nevertheless, like health and economic growth, the relationship between education and economic growth is not without critique. Benhabib and Spiegel (1994) find no significant impact of years of schooling on economic growth. Bils and Klenow (2000) assert that there is an issue of causality, and that it is in fact higher growth that leads to better education. Pritchett (2001, 2006) finds that there is no evidence of wide social returns based on cross country regressions, and stresses that other factors are important to facilitate the relationship between education and economic growth, in particular the institutional/ governance environment of the country, the quality of education, and the demand for education. Hanushek and Woessmann (2008) also assert that it is the quality of education that affects growth. Focusing only on school enrollment, for example, can be misleading, especially when classes are too large and there is not enough focus on teaching children.

There are also methodological limitations and issues.[20] Data quality as well as data sources in the measurement of human capital remain a persistent problem. Authors use a variety of proxies to measure human capital, including school enrollment ratios, average years of schooling, which or not immediately comparable nor do they reflect the quality of schooling. They also don't reflect the type of education received – whether that be formal or informal on-the-job training or learning-by-doing.

The effect of education on economic growth can also depend on the type of education as well as on the wealth of the country – for example, coefficients on the effect of primary education tend to be more pronounced for lower-income countries, while coefficients on the effect of higher education tend to be more pronounced for high-income countries. The heterogeneous effects of various types and contexts of educational investments make it very difficult to evaluate the impact of education on economic growth.

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[20] These are summarized in the following paragraphs – for a full explanation and review of limitations, see Sianesi and Van Reenen (2003)

Furthermore, the degree to which there could be reverse causality remains a problem – does investing in education lead to growth, or does faster growth lead to more investments in education? The effect of education on productivity may be as much a function of the demand for education as it is of the supply. These considerations make an endogenous relationship between education and economic growth highly plausible. These problems are consistent through much of the literature, and although many efforts have attempted to solve them, they remain key aspects of the debate which often make assessing the exact level of returns difficult to determine.

VIII. Social Protection

Social protection is seen as a crucial tool for strengthening the capacity of families to care for their children and remove barriers to access services and thus contribute to equitable human development outcomes. Families face both economic and social vulnerabilities[21], and social protection is often designed to address these. There are broadly two mechanisms through which social protection could do this:

Social protection helps to reduce barriers and/or bottlenecks to accessing social services (UNICEF, 2012). Education and health services may be in abundance; however the constraint in increasing use and/or coverage is often a demand-side factor. For example, families might not have the money or resources to access education or health services, even where they do exist. Individuals might also be discriminated against, causing utilization rates to be lower than they could be. Social protection has the potential to increase use of education and health services by covering expenses, reducing fees, addressing legal barriers, or providing monetary incentives with programmes are conditional, for example.

Social protection also helps to build resilience, strengthening capacity of households and families to care for their children, while also their ability to respond and cope with shocks. Effective social protection systems help build the resilience amongst the poor, to help them cope when shocks do occur. During times of crisis, social protection has proven to be an effective rapid-response mechanism to ensure households have access to essential services, including food, healthcare, and education. A review of 23 DFID supported social transfer schemes found that food security was improved in around half of the programmes (Devereux and Coll-Black, 2007).

Social protection can also enhance labour market participation, which has direct implications for household purchasing power. Studies have shown that transfers, particularly to the poorest families, are spent on basic goods such as food expenditures (see Devereux and Coll-Black, 2007; Fiszbein and Schady, 2009; Rawlings, 2004; McCord, 2004). The benefits of public works programmes can also include training, skill-generation and exposure to future contract work (Kabeer, 2009), improving opportunities for income generation in the future.

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[21] Vulnerability defined here as exposure to risk as well as ability to respond and cope (resilience)

The literature on the impact of social protection systems on the health and wellbeing of families and children continues to grow. For example, an evaluation of three cash transfer programmes (Hoddinott and Wiesmann, 2008) found significant improvements in calorie intake, particularly for the poorest third of eligible households. In Mexico's *Oportunidades*, intake per person increased by 5.6%. In Honduras, an evaluation of Programa de Asignación Familiar found a 12.7% increase in calorie intake; and in Nicaragua, an evaluation of *Red de Protección* Social found intake to increase by 6.9%. Maluccio and Flores (2005) also found that *Red de Protección Social* led to a 16% increase in the probability of health check-ups for children under three, a 5.5 percentage point reduction in stunting, a 13 percentage point increase in school enrolment and a 20 percentage point increase in current attendance for the target population. In addition, the percentage of children aged 7-13 working declined by 5.6 percentage points.

In Mexico, a study by Barham (2011) of *Oportunidades*[22] found significant improvements in infant mortality – up to 17% reduction in rural areas and 8% on average. Benefits are not limited to health, however. A study by IFPRI found that the programme resulted in increased primary school enrolment rates of 1.07% for boys and 1.45% for girls, and increased secondary school enrolment of between 3.5 to 5.8% for boys and 7.2 to 9.3% for girls (See IFPRI, 2002).

Evaluations of other social protection programmes have also shown improvements in maternal and newborn health. In Bangladesh, vouchers for maternal health services among the poor, pregnant women have found to increase institutional deliveries from 2% to 18%, utilization of antenatal care by trained providers increased from 42% to 89%; and utilization of post-natal care by trained providers increased from 10% to 60% (Rob et al., 2010). In Brazil, children from families exposed to the *Bolsa Familia* were 26% more likely to have normal height for age than those from non-exposed families. This difference also applied to weight for age (Paes-Sousa et al., 2011).

In Malawi, an unconditional cash transfer pilot called *Mchinji* witnessed ilnesses drop by 23% among children participating in the programme compared to 12.5% for non-participants from 2007 to 2008 (Miller et al., 2008). Miller et al. (2008) also found positive impacts on schooling - the percentage of children newly enrolled in school was 8.3% compared to 3.4% in comparison households. Dropout rates were also lower in comparison households. Another cash transfer programme in Malawi called *Zomba* which provides transfers to adolescent girls piloted both conditional and unconditional grants. The likelihood that recipients of unconditional grants suffer from psychological distress was 38% lower than the control group. The likelihood that recipients of grants made conditional on regular school attendance suffer from psychological distress was 17% lower (Baird et al. 2011).

The impact of social protection on education has been found in several other evaluations as well. A conditional cash transfer programme in Turkey increased secondary school enrolment for girls by 10.7 percentage points, with higher results in rural areas (Ahmed et al., 2006). As a result of the *Bono de Desarrollo* programme in Ecuador, primary school

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[22] Formerly known as *Progresa*.

enrolment increased by about 10 percentage points (Schady and Araujo, 2006). Better results were also found through a scholarship programme in Cambodia for girls making the transition from primary to secondary school. Secondary school enrolment increased by 22–33 percentage points, and the results were particularly significant amongst the poorest children (Filmer and Schady, 2006).

Social and Economic Returns
While policies to promote broad based economic growth are fundamental to overall social development, the benefits of growth do not always automatically reach the poorest and most marginalized. Among the different mediums through which direct interventions can be made, social protection has become increasingly recognized as a critical tool to help smooth consumption patterns and improve access to social services. Social protection has proven to level the playing field as it has been an effective tool that helps address these multiple and compounding vulnerabilities children and families face (UNICEF, 2012).

Social protection protects vulnerable populations from shocks, and helps to level the playing field so that marginalized and excluded families can more effectively participate in the economy. As such, while growth is necessary for poverty and inequality reduction, it alone is not sufficient; social protection is one of the tools for making growth more pro-poor and equitable. This argument can be exemplified by the experience of Brazil, a country that has over the past decade, been able to experience economic growth accompanied by social progress. During Brazil's "economic miracle" decade (1960s), the country experienced economic growth and poverty reduction, but inequality rose. In the past decade, however, the economy grew, poverty has been reduced, but so did inequality, with the income of the poorest in society increasing much more rapidly than that of the richest. Large scale, national social protection programmes have been partly responsible for this.

Social protection programmes are key policy instruments for addressing overall poverty and inequity. *Bolsa Familia*, a conditional cash transfer programme for poor households in Brazil, covers approximately 13 million households. It is conditional on school enrolment and attendance, and on essential vaccinations. Studies have shown that the poverty gap of those reached went down by 12% between 2001 and 2005 (Dercon, 2011). Another study by Soares et al. (2009) found that income inequality, as measured by the GINI coefficient, declined by 21%. When analysing other government cash transfers (in addition to *Bolsa Familia*), Hoffmann (2006) found that between 2002 and 2004 government cash transfers contributed to 31% of the reduction of inequality in the country, as measured per the GINI index. The author also notes that in the Northeast, the poorest region in the country, these transfers are the main determinant in the reduction of inequality, accounting for 87% of the reduction from 2002 to 2004. Cash transfers have also been fundamental in reducing poverty in the country. From 2002 to 2004, transfers were responsible for 86% of poverty reduction.

In Mexico, *Oportunidades* has also had significant effects on poverty and inequality. *Oportunidades* is a cash transfer programme which reaches around 5 million poor households. It is conditional on regular school attendance, health clinic visits, and nutritional support. Studies have shown that the programme has contributed to a 19% decline in poverty gap in rural areas between 1996 and 2006 (Dercon, 2011). Like with *Bolsa Familia*, income inequality has also declined. Soares et al. (2009) found that the Gini coefficient

declined by 21%, and claimed that CCTs in Mexico and Brazil have been so well targeted that they were the second most important determinant of the fall in inequality between 1996 and 2004.

In South Africa, a study by the Economic Policy Research Institute (EPRI 2004) found that the greatest poverty reduction lies with the progressive extension of the country's *Child Support Grant*. Extending the eligibility age to 14 reduces the poverty gap by 16.6%, and a further extension to age 18 reduces the gap by 21.4%. The results are even higher when combined with an increase in real grant payment (as the government did in 2003) – the extension to age 14 yields a 22% poverty gap reduction, while the extension to age 18 reduces the poverty gap by 28.3%. While these are impressive results, the report cautions that the magnitude depends on the poverty line by which the impacts of reforms are measured.

Not investing in social protection can also have considerable costs for society and hence the economy. UNICEF research with the Financial and Fiscal Commission of South Africa found that in South Africa, the percentage increase in poverty headcount as a result of the crisis would have been double, without the presence of the Child Support Grants (the increase would have been as high as 7.2% when compared to its initial level in 2007, as opposed to the actual 3.6% in the presence of grants) (UNICEF and FFC South Africa, 2010). In Armenia, social expenditures also allowed the poverty rate to increase by only three percentage points, rather than the eight that were expected – demonstrating that such measures can be a crucial anti-poverty tool (UNICEF and York, 2011). Another study on a programme in Argentina, *Jefe y Jefas* – a direct income support in Argentina for families with dependents for whom the head had become unemployed due to the crisis – has also been found to have positive impacts. Counterfactual poverty is 53% rather than 67% among recipients, mainly stopping people falling into poverty during crises (Dercon, 2011). Dercon (2011) also assessed how high poverty would have been if social protection had removed losses linked to shocks in Ethiopia. Starting with headcount poverty of 47%, if social protection removed losses linked to shocks, headcount poverty would be 29%. In other words, it would have removed a third of the poor from poverty.

Moreover, to what extent might social protection also contribute to the channels which influence economic growth? Although the direct relationship between social protection and growth remains under-examined, there are potential linkages through which the former could influence the latter. Firstly, social protection interventions can improve the human development of children by increasing access to and financing investment in health, nutrition, food security and education services. Supporting public and family investments in children's needs is particularly important because of the irreversibility of deprivation in areas such as education and health. This is especially the case for very young children (Dercon 2011). This in turn can improve society's future productivity and workforce participation, and ultimately economic growth and prosperity (Kabeer, 2009; DFID, 2006). A recent study on the Mexican cash transfer programme, *Progresa* (currently called *Oportunidades*), found that future earnings of participating children were 8% higher due to more schooling[23] (Schultz, 2000).

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[23] Internal rate of return, adjusted for inflation, taking into account the costs of the grants.

Second, social protection can contribute to enhancing households' resilience and capacity to take care of their children, and thus are better able to manage shocks which might have otherwise pushed them into poverty and forced them to sell off productive assets (Kabeer, 2009). Protecting assets that help people earn income is critical to their future. This is likely to make social protection particularly relevant for addressing short-term needs, such as the risk of increased material deprivation for poor and vulnerable households during a crisis. It therefore has an important role in easing the pain of economic transition (DFID, 2006).

Third, social protection can also protect the current productivity of adults (See Kabeer 2009, Barrientos et al., 2008; DFID, 2006). This occurs through several channels, including through better access to health and education services. Labour participation has also been found to increase. For example, a study of the pensions programme in South Africa found that labour force participation was 13-17% higher among participating households (EPRI, 2004). These not only provide families with incomes necessary to support their children, they also can help provide relevant public goods and infrastructure, which can contribute to growth. Social protection that supports labour participation in economic transformation helps cities grow in an inclusive and sustainable way. Also, since adolescents are not only becoming a burgeoning workforce, and because they have difficulty transitioning to the labour market, social protection which helps incorporate them into the labour market will be important (Dercon, 2011). While labour participation of adults has been shown to improve, labour participation of children has been shown to decrease as a result of social protection programmes (Skoufias and Parker, 2001).

Fourth, social protection can help stimulate market demand for goods and services. Often, the binding constraint towards production of goods and services is inadequate demand for those services; and inadequate demand is mainly a result of lack of income. Where families have access to more disposable income, they can purchase required goods and services. It has been found that channelling transfers to mothers can shift consumption to more efficient resource allocation, as well as towards children-related goods and services (Barrientos et al., 2008).

The multiplier effects of cash transfers on the local economy have also been documented: a multiplier effect of 2.02 to 2.45 was found as a result of the Dowa emergency cash transfer programme in Malawi (Davies and Davey, 2008). The authors use the Social Accounting Matrix to identify and follow changes in income and expenditure following the injection of cash around the local economy, as well as identify the secondary beneficiaries of the programme. Cash transfers have been shown to help stimulate local production and smooth consumption has aggregate effects beyond the household (Yablonski and O'Donnell, 2009). Sadoulet et al. (2001) also found that a programme in Mexico had a multiplier effect of between 1.5 and 2.6 time the amount transferred. Of the potential adverse impacts of cash injections and increased multiplier effects is the risk of inflation in the local economy; however the literature indicates that this is often a rare side-effect (Harvey, 2005).

The extent to which social protection could have positive spillover effects on the local economy depends on a variety of circumstances. For example, markets which respond to increased demand can help preventing negative effects such as inflationary pressures.

Positive spillover effects include the stimulation of local economy effects. Studies have shown that public works programmes which connect isolated communities to markets and services could help stimulating local economy effects (Kabeer, 2009).

Fifth, social protection can contribute to efficiency by encouraging the risk-taking and innovation essential for economic growth (Ravallion, 2006; Dercon, 2011; Hoddinot, 2009; Kabeer, 2009). Poor families often find themselves stuck in low-level equilibrium traps. But access to cash that can help them escape these traps and lift credit constraints, propel them beyond a critical point where steady-state progress is possible and investments yield greater returns (DFID, 2006; Barrientos and Scott, 2008; Barrientos, 2011). Uncertainty can make investments very risky, and where transfers can ameliorate this, they could create a more favourable environment for productive investment (Barrientos, 2011). In South Africa, the pensions programme has been found to provide South Africans that receive the grants with the resources and economic security necessary to invest in high-risk/high-reward job search, as well as improve their productivity and wage earning capacity (EPRI, 2004).

While social protection can help address market failures and support equity objectives, it is rarely in itself a sole driver of growth. Still, as Dercon (2011) put it, social protection can 'provide the oil to make the growth engine work more smoothly'. Furthermore, macro-level econometric analysis is unlikely to pick up the impacts of social protection due to its relatively small contribution to GDP; the poorest families account for a very small proportion of GDP (Barrientos and Scott, 2008).

Social protection has also been shown to improve productive investment. This could occur, for example, through direct investment of part of cash transfers, to smoothing access to credit, to the acquisition of productive inputs or assets (Kabeer, 2009). For example, Devereux found a direct link between income earned in a public works programme in Zambia and the proportion of income invested. In the short term, income was spent on consumption; while in the longer term, it was spent on purchasing fertiliser and starting/expanding small businesses. In Malawi and Nepal, public works income was invested in purchasing small animals (cited in Devereux and Coll-Black, 2007). By contrast, some studies have found that where transfers are small, the proportion spent on investment is likely to be smaller than if the transfers were larger (see Devereux and Coll-Black, 2007; Kabeer, 2009). Kabeer (2009) states that, ultimately, the size, reliability and regularity of the transfers will greatly influence the capacity of households to save or invest.

While research is needed to assess the effects of social protection directly on economic growth, there appear to be indications that social protection could affect some of the channels that affect growth. However, as Kabeer (2009) states, social protection which improves the wellbeing of children and their families cannot be separated from wider social policy. An increase in access or utilization needs to be supported with corresponding increase in supply, otherwise the quality and efficacy of services risk being eroded. Furthermore, the variety of contexts, the design of the transfer and the initial condition of households matter a great deal. Where food security is not assured, for example, the productive investment is likely to be low. Where positive spillover effects to the wider community are maximized, the impact of social protection on growth is likely to be greater.

> **Box 2: Benefits of Eliminating Child Labour**
>
> Approximately one in every six children aged 5 to 14 is exploited by child labour, many of whom are working in hazardous conditions. Boys and girls are equally as likely to be engaged in child labour across all regions.[24] Just a childhood represents a unique window of opportunity for growth and development that has implications throughout adulthood, deprivations and exposure to hazardous environments could have negative implications for the rest of a child's life. Children are often forced to do the most dangerous work where they are exposed to potential injury.
>
> Children who are forced to work not only suffer from hazardous conditions, but also lose the opportunity of education, which as we have analysed in this paper, is significantly associated with future incomes and wellbeing. Benefit-cost analysis on the effects of child labour that consider the value of improved productivity and earning capacity associated with greater education, and the value of reduced illnesses and injuries versus the cost of administering an income transfer programme. Globally, the benefit-cost ratio is estimated by the International labour Organisation (2004) to be 6.7 to 1. The ratios are also considerable focussing on specific regions: in the Middle East and North Africa region, the ratio is estimated to be 8.4 to 1; in Asia, the ratio is estimated to be 7.2 to 1; in Latin America, the ratio is estimated to be 5.3 to 1; in Sub-Saharan Africa the ratio is estimated to be 5.2 to 1.
>
> The issue and scale of child labour is an urgent issue for the Millennium agenda, especially in the area of education. Achieving universal primary education and gender parity in primary and secondary education will require stepping up efforts to eliminate the worst forms of child labour. One key way of doing this will be to supply education that is safe, accessible and high quality (UNICEF 2006).

IX.   Conclusion

The literature points to considerable returns to investing in children. The high returns in part reflect the fact that these programs generate not only short term positive benefits but also cumulative long term effects, accrued not only to the individuals benefiting but also to the society and the economy. In addition, mounting evidence suggests that demand side interventions, through social protection programs and systems are effectively in reducing poverty incidences and child outcomes. While the various measurements of the returns presented in this paper are not used to infer ranking of public investments, they may be compared with returns of other types of investments when similar methods and measurements are used.

Some difficulties encountered in our review are worth mentioning, warranting cautions in interpreting the findings presented here. These include:

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[24] UNICEF 2012. ChildInfo.org

- Different methods were used for analysing the returns for different types investments and country contexts could vary considerably, rendering comparison of returns across studies difficult.
- The current literature on investing in children has different degrees of methodological rigour. Few studies provide confidence intervals, there is usually little discussion of confounding variables, and few have strong sensitivity tests, among other limitations.
- Monetizing impacts can be very difficult, even controversial, and different measurements of returns were used in different studies, again making comparisons of the literature on investing in children, across countries and across sectors, very difficult.

One noteworthy takeaway from our review is that considerable gaps exist in the evidence base, calling for continued efforts to build investment cases. Efforts to fill the gap on data most relevant for children are critical. UNICEF's Multiple Indicators Cluster Surveys are among the few efforts to collect such data at cross-country level. Similarly, there is a need to undertaking in-depth country studies in order to better understand the implications of the contexts particular those related to the role and quality of the institutions and social norm.

To summarize, despite the aforementioned difficulties in analysing the returns to investing in children, the literature illustrates that there could be significant social and economic benefits to investing in children. Investing in children is a key component of human development, helping to reduce inequity and the inter-generational transmission of poverty. It also has considerable economic benefits, both towards the individual, society, and nationally. Moreover, the costs of financing are found significantly less than the economic benefits of the investment, making the impetus for investing in children even stronger. If governments are serious about improving growth rates, reducing poverty, and achieving greater equity and social stability, investing in children will be a crucial way forward. Redoubling our efforts will be essential to regain any lost ground and build a foundation for more sustainable and equitable development in the future.

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