Development of an Investment Case for EARLY CHILDHOOD DEVELOPMENT in South Africa: Prioritizing Investments in Early Childhood Development

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Development of an Investment Case for Early Childhood Development in South Africa: Prioritizing Investments in Early Childhood Development


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# UNEDITED REPORT

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DESTINATIONS AND PATHWAYS

The South African Government has committed to investing in early childhood development (ECD). Much has already been done to create an environment which supports children’s development: free access to primary health care for pregnant women and young children, access to adequate housing and basic services have been expanded, birth registration is the norm, extreme poverty has been reduced through the Child Support Grant (CSG) and other transfers, crèches have been subsidized and Grade R rolled out. Moreover, there is now a stated intent to consolidate these gains through early childhood development specific programmes. Interventions to improve early childhood development are included in the National Development Plan and were promised in the 2014 election manifesto of the ANC. In December 2015 the Cabinet approved The National Integrated Early Childhood Development Policy (ECD Policy).

The ECD Policy outlines a range of services which would support the development of young children in South Africa, with a particular focus on the poorest children, to improve their life chances and reduce inequality. The Policy provides a description of what we aim for, i.e. the destination, but remains silent on the relative merits of alternative pathways to this destination. The services outlined in the Policy cannot be rolled out all at once. Decisions will have to be made on what to prioritize. It is to this sequencing question that this document is addressed.

We limit our analysis to the four largest components of the ECD Policy: interventions to improve pregnancy outcomes; home visits for at-risk mothers of children under 2 years of age; community-based playgroups for mothers and children; and centre-based services. For each component we estimate the costs and benefits and how these vary depending on the quality of the service. This analysis is designed to help address two central priority setting questions:

1. Should the components be rolled out simultaneously or should they be sequenced?
2. Should the roll-out of services focus on high-quality high-benefit services at the expense of coverage? Or should coverage come first and quality improvements follow?

Certain components and sequences are better at generating certain benefits. As a result, the answers to the above questions vary depending on the importance attached to different benefits. Indeed the answers to the above questions can be derived from the answer to the following:

1. What weight should be attached to each of the multiple benefits which arise from investing in early childhood development and from the manner (coverage/quality) in which the investment is made?

We outline the multiple benefits and present them alongside the costs. We do not say what the relative importance of each type of benefit should be – this is a value judgement. Value judgements are best made by policy makers, rather than analysts. However, to facilitate debate, we outline what common value sets would imply for priority setting. This approach to investment analysis is not traditional. In traditional investment analysis the benefits are all converted into financial values and directly compared to the cost. The strategy which generates the highest rate of return is presented as the optimal strategy. Such approaches are not used here as they incorporate the value judgement into the analysis, rather than making them explicit and allowing them to be part of the policy making process. For a detailed discussion on this topic, see Annex A.
The results presented are intended to inform the planning process, specifically the setting of priorities in the short to medium term. To do this we estimate the costs of alternative approaches. This is necessary to provide a comparator to the benefits estimated. This should not be confused with a budgeting exercise. Once priorities are set, detailed planning for the roll-out of these priorities, including establishing budgets for specific departments, will still be necessary.

**WHAT ARE THE BENEFITS TO WHICH COSTS MUST BE COMPARED?**

Investments in early childhood development have the potential to generate benefits for children across their lifespan, their caregivers and for broader society (Karoly, Kilburn & Cannon 2005). All of these benefits are potentially relevant for priority setting discussions. We interviewed a number of policy makers and they agreed that a range of benefits should be considered when determining which interventions to prioritize – for a summary of those interviews, see Annex B.

There are numerous short- and long-term benefits for children (Britto, Hirokazu & Boller, 2011; Lynch, 2004; Trefler, 2009). In the short term children may benefit from improved care and protection, better health and nutrition outcomes and reduced stress associated with living in adverse conditions (Lynch, 2004; Young, 1996). As a result, they will be more likely to survive, enjoy a happy childhood and thrive. Because pregnancy and the early years of life are a period of rapid brain development, experiences during this time can have lifelong implications. As a result, early childhood development interventions which meaningfully improve children’s early experiences can lead to better cognitive and emotional development over the life course. These improvements can lead to better emotional and social adjustment, education outcomes and higher earnings. Early childhood development interventions have similarly been linked to improved health, including improved mental health outcomes and reduced risk of metabolic disorders in adulthood (Gertler et al., 2014; Trefler, 2009; Young, 1996).

Caring for young children can be demanding, especially under conditions of disadvantage and adversity. Interventions to promote early childhood development can help reduce some of those demands or at least the consequences of those demands. For example, home visiting has been shown to improve the mental health of participating mothers; similarly, centre-based care frees up the time of caregivers, which can facilitate labour force participation (Lynch, 2004; Young, 1996).

Interventions in early childhood can help meet a number of social goals. Many of these social goals are reflected in government's existing commitments – as a result, early childhood development interventions can help realize policy goals in other sectors. For example, interventions in the early years can assist with realizing the rights outlined in the Constitution and meeting commitments made through signing the Convention on the Rights of the Child (CRC), the African Charter on the Rights and Welfare of the Child (ACRWC), and the Convention on the Rights of Persons with Disabilities (CRPD) (Martin-Weisner, 2016).

The impact of early childhood development interventions on education, earnings and health means that they would help realize a range of goals prioritized in the National Development Plan 2030. The South African Government’s current Medium Term Strategic Framework (MTSF) provides an action plan for implementing and achieving the NDP goals, emphasizing the reduction of inequality, poverty and other social and economic challenges that hinder human development. Some of these challenges include violence against women and children, absent parenting, access to health and education related services and malnutrition. This requires strengthening service delivery such as early childhood...
development services (Martin-Weisner, 2016). Achievement of the NDP goals through the delivery of good quality and equitable early childhood development services would in turn assist South Africa in reaching some of the Sustainable Development Goals (SDGs) including reducing poverty, improved health and wellbeing, quality education, gender equality and of course reducing inequality (Martin-Weisner, 2016; UNDP, n.d.).

The way in which early childhood development interventions are rolled out also needs to be considered in terms of their potential contribution to the realization of social goals. For example, in South Africa we often place an emphasis on equity of access. This goal is sometimes pursued even if it means that dose or quality might suffer. Then there is the value we place on inclusion. Ensuring access to services which meet the needs of children with disabilities and their carers increases cost. These costs need to be compared not only to the benefits which accrue to these children and their caregivers, but also to the value placed on being a more inclusive society. Unfortunately there is a scarcity of data on the benefits of early childhood development interventions for children with disability and on the cost of making them accessible and appropriate. This leaves a large and highly unfortunate gap in our analysis, as we can only speculate on how inclusion would alter costs and benefits.

WHAT YOU SEE IS NOT WHAT YOU GET

The benefits of early childhood development investments are well documented and are discussed in detail below in relation to each of the four components. However, it is important to acknowledge a problem. The problem is that many of the benefits are counter-intuitive and this can lead to investment cases being resisted by sceptical policy makers. For example, many people find it hard to reconcile what they observe with the argument that early childhood development investments have a higher rate of return than any other investments later in life. It is critical that we understand why it is hard to reconcile everyday observations with research findings and find ways to explain our results in ways which avoid resistance to the findings. Moreover, appreciating why the rates of return to early childhood development investments are so much larger than the immediately obvious observed benefits is important when considering which aspects of the ECD Policy to prioritize. Prioritization focused on the immediately obvious benefits could lead to inappropriate sequencing and possible underinvestment.

Children attend a playgroup or an early childhood development centre, are seen to learn some basic skills, such as holding a pencil, learning the alphabet or interacting well with other children. Young adults attend university and go from being a high-school graduate to a doctor or engineer. It is not immediately obvious to many that the returns on the early childhood development investment are greater than the returns on university investment. One must first remember that early childhood development interventions are far less costly than university, which influences the rate of return. Secondly one must keep in mind that the benefits which arise from early childhood development investments accrue because children get more out of subsequent investments. This is where the conflict with observation arises. Benefits which arise as a result of early childhood development interventions but only occur later in life once children receive subsequent investments can easily be wrongly attributed to having resulted only because of those subsequent investments and not because of early childhood development interventions.

To illustrate the way in which early childhood development investments operate we developed a simple model. In this model we ignore the complexity of child development and assume a simple world governed by a simple set of rules. Such simplification allows for a clearer explanation of how early childhood development returns operate.
In our simple model there are four inputs into a child’s development: those which occur before school (early childhood development), in primary school, in secondary school and at university. The full cost of each input is assumed to be double the cost of the input before. So if early childhood development costs 10, primary costs 20, secondary 40 and university 80. The percentage improvement in child development resulting from each input is the same. This means that the absolute size of the improvement of later inputs is larger because their baseline is higher. Finally, we assume that a child’s level of development affects how much they benefit from subsequent investments. That is to say, a child who has good early childhood development will do better in primary school than a child who does not have good early childhood development. Similarly, a child who does well at primary school will benefit more from secondary school, and so on. These assumptions, while simplistic, are not unrealistic.

Figure 1a shows the level of child development at each stage assuming maximum investment at each stage. The steep gradient reflects what we observe in day-to-day life. The investment in early childhood development leads to a small increase in development; subsequent investments are associated with ever larger increases in development. What is obscured in the figure (and in everyday observations) is the role of the early childhood development investment in increasing the returns of all subsequent investments. Because of the early childhood development investment, the child does better in primary school, which leads them to do better in secondary school and finally, at university. This impact can be seen in Figure 1b. Here the bottom line shows the level of development which occurs when no investment is made in early childhood development, but full investment is made at all other levels. Because children do not get a good start, they don’t get nearly as much out of subsequent investments and fall further and further behind, despite receiving the same inputs from primary school onward. For comparison, Figure 1b also shows the impact of reducing investment in university by an amount equivalent to the cost of early childhood development. This leads to slightly lower returns to university, but the impact is minimal, with the line only slightly below that associated with full investment.

It is the obscured benefits of early childhood development which make returns on investment so high. The fact that they are obscured (and occur only over the long term) is one of the reasons that early childhood development interventions have been underprovided. If this dynamic can be clearly explained in investment analysis, it may increase political will to invest in early childhood development.
EVALUATION FRAMEWORK

The ECD Policy covers a range of interventions. We focus here on the four largest components. This is not intended to imply that the other components of the Policy are not important. Rather it is to draw attention to the most significant trade-offs.

The four components considered in the analysis are:

- Interventions to improve pregnancy outcomes, with a focus on nutrition;
- Home visits for at-risk mothers of children under 2 years of age;
- Community-based playgroups for mothers and children, with a focus on children 0-3; and
- Centre-based services, with a focus on children aged 3 until entry into the formal schooling system.

A notable exclusion from the analysis is the development of a supervisory structure for child-minders. Such supervision would likely improve the quality of child-minding services and possibly improve child development outcomes and women’s participation in the labour force as a result. It would be a significant intervention but was excluded because of a lack of data on the current conditions of such services and how effective supervision would be in improving quality.

We include pre-registration for the Child Support Grant during pregnancy as part of our discussion of interventions during pregnancy. We estimate the costs, but only describe the benefits in broad terms. There was insufficient data to estimate the benefits. The intervention was included because the provision of the grant from birth has long been in the Policy and is likely to have benefits for mothers and children.

For each of the four components we present our analysis of the following:

- The evidence in favour of such interventions
- An estimate of the benefits to children (short- and long-term) and caregivers
- The potential contribution to broader society (social values including those embodied in policy goals)
- The cost of implementing the interventions
- Constraints and enabling factors

For each of the above we discuss differences associated with intervention quality, which we assume is determined by design, financial inputs and level of supervision and monitoring.

The estimated costs and benefits are obviously central to the evaluation. It must however be kept in mind that accurately predicting child outcomes in a changing environment, based on historic data, often from different contexts, is near impossible. The estimates presented here should be considered illustrative.

SUMMARY OF EVALUATION RESULTS BY COMPONENT

Below we present a summary of the findings by component. Annexes C-G provide the full analyses, including the methods and assumptions used to estimate costs and benefits. Two assumptions are worth noting at this stage: we assume services are targeted towards children who are eligible for the Child Support Grant, i.e. the poorest 65%, and when we discuss the total cost it is based on reaching 80% of the 65% target population, i.e. 52% of all children.
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NUTRITION INTERVENTIONS IN PREGNANCY

The ECD Policy mentions the provision of micronutrient supplements to pregnant women, food provision or supplementation for pregnant women by Community Health Workers (CHWs), as well as a “food and nutrition communication and education campaign with a focus on the prevention of hunger, malnutrition and stunting in pregnant women and infants and young children”. We focus here on these specifically mentioned interventions during pregnancy. It is worth noting that the Policy calls more generally for improved care during pregnancy – given the importance of this period for maternal wellbeing and long-term child development outcomes. Nutrition is a necessary, but not sufficient, component of the package of service necessary to improve outcomes significantly. Moreover, it is worth noting that the nutrition interventions called for are intended to echo those outlined in the Maternal and Child Health Policy.

Evidence: Multiple-micronutrient (MMN) supplementation during pregnancy: there is good evidence that multiple-micronutrient supplementation increases average birthweight (including from low- and middle-income countries). There is also good evidence that birthweight is linked to later life outcomes (Haider and Bhutta, 2015). But there is as yet only minimal evidence that improvements in birthweight which have occurred because of multiple-micronutrient supplementation can lead to improved later life outcomes (Tanner et al., 2015).

Food (balanced protein-energy) supplementation: randomised controlled trials of energy and protein supplementation during pregnancy have found that balanced protein-energy supplementation (i.e. supplements containing below 25% of the total energy content as protein) can significantly increase birthweight. They have also been found to reduce the relative risk of babies being small for gestational age (SGA) and the risk of stillbirth (Ota et al., 2015). Both SGA and birthweight affect subsequent child development.

Food and nutrition communication and education campaigns are reported to be successful, based on the 5 trials which have been conducted (Ota et al., 2015).

Intervention evaluated: A package of nutrition interventions in pregnancy – multiple micronutrients targeted at 65% of pregnant women, food (balanced protein-energy) supplementation for undernourished pregnant women (we assume 10%), and a mass media and antenatal care-based education campaign targeted at 65% of women to encourage optimum nutrition during pregnancy.

Short-term benefits for children: If multiple-micronutrient supplements were supplied to 80% of the targeted 65% of pregnant women (i.e. 52% of pregnant women) and the prevalence of low birthweight (LBW) was reduced by 12% (as in Haider and Bhutta, 2015) among this target population of 520,000, this would mean 9,422 fewer babies per year being born with low birthweight, and a drop in the prevalence of low birthweight (among all births) from 15.1% to 14.2%.

Long-term benefits for children: There is substantial evidence that birthweight is related to outcomes in adulthood, such as height, educational attainment and earnings. LBW babies are more likely to die in infancy and are more likely to be stunted in childhood. Stunted children enrol in school later and attain, on average, a lower level of schooling. Birthweight is also related to cognitive achievement. Once they reach adulthood, children born of low birthweight are likely to be less productive and have lower earnings due to reduced schooling and cognitive ability. Moving a baby from a low birthweight status to a normal birthweight increases their earnings in adulthood by an estimated 5-10% a year. Costs associated with chronic diseases will also be reduced. Finally, the next generation may also
benefit because stunted mothers may be more likely to have LBW children (Alderman and Behrman, 2006), who themselves will accrue similar disadvantages.

**Potential contribution to broader society:** LBW children are more likely to have health-related problems, leading to higher average healthcare costs (Russell et al., 2007; Sicuri et al., 2011). Reducing the incidence of LBW, therefore, reduces pressure on healthcare resources. Moreover, improving pregnancy outcomes would assist in breaking the intergenerational transfer of poverty and help to reduce inequality through the resultant benefits for child development.

**Cost:** R83 million per year
- Providing multiple-micronutrient supplements for 80% of the targeted 65% of pregnant women would cost R25.5 million per year.
- It would cost R51 million per year to provide balanced protein-energy supplements for the 10% of pregnant women we assume are undernourished.
- A mass media campaign to promote maternal nutrition during pregnancy would cost R6.6 million (a rough estimate as such campaigns vary in cost according to the desired intensity).

**Constraints and enabling factors:** Interventions during pregnancy build on the existing health care system, which already has high levels of coverage.

We focus on nutrition interventions during pregnancy. There is, however, also a call for pre-registration for the Child Support Grant during pregnancy to ensure that children receive the grant early, exposing them to the benefits of the grant for a longer proportion of the crucial first two years of their lives. There is encouraging evidence that an earlier and longer exposure to the grant may have beneficial effects on children’s height-for-age and grade progression (See Annex C). The additional expenditure on the Child Support Grant associated with improving access would be significant, over R2 billion. The Child Support Grant itself is, however, not part of the ECD Policy and so is not considered in detail here.

**HOME VISITS FOR AT-RISK MOTHERS OF CHILDREN UNDER 2 YEARS OF AGE**

**Intervention:** The Policy calls for home visiting programmes which it defines as the “delivery of services at the household level to parents/primary caregivers and young children for the purposes of providing information, supporting early learning and development, and promoting referrals and linkages to support services”. The Policy suggests that this service be provided to at-risk children, “those who experience compromised caregiving and/or compromised access to quality early childhood development services because of one or more structural, social, familial or any other risk factor associated with poor access to services, and/or poor early childhood outcomes”.

**Evidence:** Compelling evidence from various developing countries suggests that home visiting programmes to support caregivers in the early years of a child’s life are effective at improving both short- and long-term outcomes for children. They have been found to be particularly successful when targeted to vulnerable children – as is suggested in the ECD Policy. For a more detailed discussion of the literature, see Annex D.

**Intervention evaluated:** A psychosocial stimulation intervention involving weekly one-hour home visits in which community health workers conduct sessions with the infant and caregiver whilst demonstrating how to engage in play and communication, and how to recognise and respond to the infant’s needs. The intervention is based on a highly successful Jamaican intervention (Gertler et al., 2014; Walker, Grantham-McGregor, Powell & Chang, 2000) and the UNICEF/WHO Care for Child Development intervention.
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Short-term benefits for children: Improved care resulting in improved development outcomes.

Long-term benefits for children:
- **Improved mental health in later life:** In a follow-up of the Jamaican study when children were 18 years of age, depression rates were nearly 40% lower in the stimulation group, anxiety 15% lower, and attention deficit disorder 36% lower. Mental health challenges can affect an individual’s ability to function and excel in life as the individual experiences negative symptoms such as fatigue, loss of appetite, lack of concentration or a loss of motivation, all of which would affect health, schooling and labour market outcomes (Walker et al., 2006).
- **Improved cognition and school performance:** Follow-up of the children exposed to the Jamaican intervention found sustained improvements in cognitive ability and school performance (Walker et al., 2000). Using Spaull and Kotzé’s (2015) analysis to provide a baseline, we estimate what this improvement would mean if repeated in South Africa. The original analysis by Spaull and Kotzé suggests that children in the lower four quintiles are way behind where they should be. For example, they estimate that Quintile 1 learners from Grade 4 are performing as if they had received less than one year of schooling. The difference expected to arise from a stimulation intervention targeting at-risk children from the lower three quintiles is substantial, as seen in Figure 2. It is, however, small relative to the overall shortfall in learning.
- **Higher rates of employment and earnings:** Long-term follow-up of the beneficiaries of the Jamaican intervention found that they were more likely to be employed, and to earn more. Given the differences between the labour markets of South Africa and Jamaica it is difficult to say if such benefits would be repeated here, but given the likely cognitive and schooling benefits, it is likely that they would.

**Figure 2: Potential reduction in learning deficits of Grade 4 learners with home visiting programme**

Benefits for caregivers: Home visiting, particularly for vulnerable populations, can help reduce isolation and may improve the mental health of caregivers.

Potential contribution to broader society: As an intervention with proven long-term benefits which is targeted at vulnerable populations, it has the potential to contribute to efforts to reduce inequality. It is also an inclusive intervention as the costs of visiting children with disabilities are not likely to be significantly different. Moreover, as it draws on personnel who do not need to have high levels of
education, it provides employment opportunities to a portion of the population facing high unemployment – more immediately addressing inequality.

**Cost:** The cost per mother-child pair is estimated to be R2,600 per annum. The high-risk population was estimated to be 30% of the target population to be covered by state services. To reach 80% coverage of this population, i.e. 16% of all children, would cost R810 million per annum.

**Constraints and enabling factors:** The intervention would require approximately 20,000 personnel (mainly community health workers, but to ensure quality delivery roughly 700 supervisors and managers would also be required). Existing CHWs could be trained to undertake this task, but the extra workload would have to be balanced by a reduction in the number of households covered. Estimates of the size of the community health workers workforce vary widely (17,000-70,000), but irrespective of the current size of the workforce, 20,000 additional personnel would require a significant increase in investment in training and salaries. The costing is based on the assumption that the intervention would be managed by the Department of Health as it is the only department with the necessary infrastructure to support this programme. If another Department were to assume responsibility for this intervention, costs estimates would need to be revised upward substantially. Again, regardless of which Department implements this intervention, there would need to be a significant investment in supervision so as to ensure a quality service is delivered. Such supervisors would also be required to refer families to other services, when needed.

**COMMUNITY-BASED PLAYGROUPS FOR MOTHERS AND CHILDREN**

**Intervention:** The Integrated Early Childhood Development Policy defines a playgroup as: “A group of young children organised for play or play activities for early learning and development (cognitive, language, motor, emotional, social). A playgroup is attended by children from birth until the year before they enter formal school, usually accompanied by their mothers and/or fathers or primary caregivers, and supervised by a voluntary or paid playgroup facilitator”. Playgroups are further categorized in the Policy according to age group whereby the older the age group, the more formalized the structure.

**Evidence:** There is a wealth of evidence on the importance of early stimulation for child development. There is also strong evidence that interventions can help promote a stimulating environment and thereby influence child outcomes by improving caregiver knowledge of child development, home practices and maternal mental health. Although playgroups have been evaluated as part of a package of services, there is no high quality evaluation in a developing country context of a standalone playgroup – see Annex E for further details.

**Intervention evaluated:** The intervention evaluated is based loosely on the playgroup component of the Pakistan Early Child Development Scale Up (PEDS). Playgroups in the PEDS study were run by community health workers for 1h20m once a month (Petrovic & Yousafzai, 2013). As these playgroups were supplemented by home visits, we considered a more intensive intervention appropriate for a standalone playgroup. As such we based our analysis on biweekly 2 hour sessions. We consider an intervention targeted at 0-3 year olds.

**Short-term and long-term benefits for children:** Given the strong data on the impact of early stimulation interventions it is reasonable to expect that playgroups would have a similar impact. They could be expected to lead to improved caregiving and associated improvements in child development, including cognition. Home visiting interventions designed with the same end in mind have seen sustained improvements in development leading to better school performance, higher rates of retention
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in school and eventually, higher earnings. We did not estimate these outcomes for playgroups because we might expect them to generate similar outcomes to home visits, but we have no way of knowing if they would be of a similar magnitude.

**Benefits for caregivers:** Community-based playgroups are relatively easy to access for caregivers, possibly being associated with lower travel cost. Moreover, participating in a playgroup has been shown to increase social support to caregivers as they provide them with the opportunity to intermingle and increase their social networks which can raise the caregiver's self-esteem and confidence (Grealy et al., 2012; Hancock et al., 2015; Strange et al., 2012). Increased social support has also been linked to reduced anxiety (Boyd, 2002; Scrandis, 2005), and decreased stress response and depression (Heinrichs et al., 2003; Tripathy et al., 2010).

**Potential contribution to broader society:** If playgroups do yield similar returns to home visiting interventions they have the potential to generate substantial social benefits. They can be used to reach large numbers of children during the critical first few years, leading to better education outcomes, helping to address both poverty and inequality. Moreover, playgroups can be relatively easily adapted to allow for the inclusion of children with disabilities, and therefore promote inclusion. Similar to home visiting, this intervention can help provide employment to a sector of the population facing high levels of unemployment – directly addressing inequality and poverty.

**Cost:** We estimate a cost of R1,500 per child per annum. This implies an annual cost of R2.3 billion to reach 52% of children 0-3 years of age (80% coverage of the poorest 65%). This includes the cost of supervision, which is critical to ensure quality.

**Constraints and enabling factors:** An intervention of this scale would require over 30,000 staff, presenting a substantial training and quality control (supervision and monitoring) challenge. Another challenge will be its placement within the departmental structure. The Department of Health has the national delivery infrastructure necessary to support such an intervention, but the Department of Health is likely to see playgroups as outside of their mandate. The Department of Social Development may see it as part of their mandate, but does not have a delivery infrastructure. It would be costly to set up such an infrastructure. It may be that a subsidy model to non-governmental providers could be possible, as done in Chile, but this would require further investigation.

**CENTRE-BASED SERVICES**

**Intervention:** The ECD Policy mentions centre-based early learning programmes as part of a continuum of care and early learning services from birth until school. It emphasises the need to provide safe care in the absence of parents or caregivers, as well as the need to provide high quality opportunities for early learning and development. Programmes should promote emotional and social development and prepare children for school through play-based learning.

It is important to emphasize that there are two aspects of the service: the provision of care (day care) and the provision of early earning (early stimulation). It is possible to have each without the other – i.e. to have a centre which provides safe care but does little or nothing for early learning; or a centre which provides early learning opportunities, which require little time per day, and is closed at other times. Further, various combinations of the two are possible, with centres providing full care and intensive early learning being the most expensive option.

**Evidence:** Centre-based services have been shown to improve children’s cognitive ability and help prepare them for school. Moreover, they can provide a safe place for children to be cared for, thereby
freeing up the time of caregivers for other tasks, including work or job search. Much of the evidence is from the developed world. The Perry Preschool Project, for example, was conducted in the 1960s and has benefitted from long-term follow-up. A wide range of benefits have been observed, including improved chances of employment and higher earnings once children reach adulthood, suggesting a sustained impact (Reynolds and Temple, 2008; Currie, 2001). Such programs are, however, costly and reliant on highly skilled staff. To replicate the Perry Preschool Project in South Africa would cost close to 6 times more per child than we currently spend on centre subsidies. Moreover, it would provide only early stimulation and not day care (the Perry design requires only 2.5 hours a day). There are, however, examples from middle-income settings which have been rigorously evaluated and found to be beneficial. In Chile there are the state-funded organisations, JUNJI and Integra, which run public centre-based ECCE programmes for children aged up to 5 years, operating for 9 hours daily. The programmes are targeted at the poorest 60 percent of children and have been found to improve subsequent school performance.

**Intervention evaluated:** We evaluate an intervention based on the Chilean example. We assume the same staff to child ratios and the same level of training for staff (which has a major impact on staff costs). We then examine two scenarios. Both scenarios include state funded early stimulation, but differ in their state funding of day care. The first scenario includes subsidized day care and the other includes fully funded day care. Given that the early stimulation is common to both scenarios, they do not differ in terms of child development outcomes.

**Short-term benefits for children:** Centre-based services have been found to improve both cognitive and non-cognitive skills, if they are of a high enough quality. It is interesting to note that even when the cognitive advantages faded in the Perry Preschool Project, long-term benefits were maintained as the non-cognitive skills acquired help children perform better in school.

**Long-term benefits for children:** Children who attended JUNJI or Integra centres scored between 0.17 and 0.21 standard deviations higher on Grade 4 mathematics, reading and social science tests than comparable children who did not attend (Cortázar Valdés, 2011). Again, using Spaull and Kotzé (2015) as a baseline, we estimate what this improvement would look like in the South African context – see Figure 3. As with home visits, there is a meaningful improvement, but the inequalities are such that it does little to close the gap between the bottom four quintiles and quintile 5.

**Figure 3: Potential reduction in learning deficits of Grade 4 learners**
Benefits for caregivers: Centres can provide a safe environment for caregivers to leave their children, freeing them to spend the time on other activities, including employment. This benefit can make a significant difference in the lives of caregivers, who are typically women. This benefit was a major driving force behind the expansion of centre-based services in Chile, among other places. In the scenario based on subsidized day care, the costs of this benefit are divided between the state and caregivers. In the scenario in which day care is fully funded, these costs are met entirely by the state.

Potential contribution to broader society: Early stimulation targeted at poor children through centre-based services leading to improvements in cognitive and non-cognitive skills has the potential to reduce poverty and inequality in the long term. Day care has the potential to reduce poverty and inequality in the short term by freeing up women’s time and in so doing facilitate their access to the labour market. There are, however, two potential concerns both relating to possible increases in inequality related to the manner in which the service is rolled out. Currently centre-based services are primarily implemented by non-government providers, some for profit. If this model is continued, then it may amplify existing inequalities within the target population. Less poor areas are more likely to have providers who are able to get registered with the state to receive funding. These slightly better off areas will then likely receive services earlier and benefit from them for longer. Secondly, making centres accessible to children with disabilities can be expensive and therefore often lags behind, leaving these children at an added disadvantage.

Cost: To allow for comparison to the current subsidy we estimated a daily cost per child at the level of the centre (i.e. excluding the supervision and administrative overheads). The estimated cost of a programme similar to the Chilean preschool programmes would be R34 per child per day, based on a full early stimulation intervention and subsidized day care. To cover the full cost of day care in addition to the early stimulation would cost double, i.e. R68. The total costs for centre-based ECD programmes of similar quality to those in Chile at a coverage level of 80% of the targeted 65% of children between the ages of 3 and 4.5 years, assuming subsidized day care, would be R6.5 billion per year. A supervision structure would add R200 million per year. Further research is needed to determine the best approaches and associated costs of ensuring centres are accessible to children with disabilities.

Constraints and enabling factors: The provision of centre-based services at this scale would require a major investment in training. The Chilean model requires early childhood development facilitators with two years of training and centre managers (for larger centres) with four year degrees. This would require, first, a considerable investment in creating the capacity to train large numbers of people to these levels. The Department of Higher Education would need to consider ways in which this training of trainers and then training of early childhood development facilitators at such a large scale will be managed. There is also a challenge with infrastructure. Space would need to be found and adapted or built new; both options have cost implications. Finally, consideration must be given to provision in areas where there are no private providers to subsidize. The possibility of state provision will have to be considered.
ESTIMATING LONGER-TERM OUTCOMES

Much is made in the literature of the impacts of early childhood development interventions on later life outcomes. While we expect that these impacts would be repeated in South Africa, it is impossible to accurately predict that far into the future – there are too many unknowns. We can, however, provide a rough indication of what they may look like, given what we know about the current situation. We focus in this section on estimating the long-term impacts on education outcomes.

Van der Berg (2015) shows that the pattern of relative performance across quintiles in Grade 4 closely resembles matric performance patterns (Figure 4). This implies that most children who are behind in Grade 4 are likely to stay behind. On the other hand, the relatively flat learning trajectory implies that an improvement in Grade 4 outcomes may persist to Grade 12 at least to some extent.

Figure 4: School performance patterns

(Source: Van der Berg, 2015)

For the purposes of illustration, we assume that a reduction in the achievement deficit in Grade 4 mathematics scores between quintiles 1-3 and quintile 5 will lead to the same reduction in the differential rates of Grade 12 bachelors passes between quintiles 1-3 and quintile 5. Figures 5 overleaf show the potential improvement in Grade 12 bachelors pass rates by quintile as a result of centre-based early childhood development programmes and home visiting.
Figure 5: Improvement in Grade 12 bachelors pass rates by quintile

The early childhood development centre intervention would lead to 17,564 extra learners in quintile 1-3 schools achieving a bachelors pass in Grade 12. This equates to a 2.9 percentage point improvement in the bachelors pass rate, from 25% to 27.9% (in 2015 figures; Department of Basic Education, 2015). The home visiting intervention would lead to 34,652 extra learners in quintile 1-3 schools achieving a bachelors pass and therefore being eligible to attend university. This equates to a 5.6 percentage point improvement in the bachelors pass rate, from 25% to 30.6%.

To get a rough idea of the relative sizes of the impacts of the interventions, we can compare those interventions for which we have outcomes in terms of years of schooling or years of learning. Home visiting programmes lead to between 0.74 and 0.8 years improvement in effective grade. Centre-based early childhood development programmes lead to 0.27-0.6 years improvement in effective grade. Multiple-micronutrient supplementation during pregnancy increases schooling by 0.03-0.06 years. In other words, home visiting programmes have the largest impact, followed by centre-based early childhood development programmes and then multiple-micronutrient supplementation. Furthermore, the effect of centre-based programmes and home visiting is measured in terms of the improvement in effective grade (in other words, in learning that actually takes place), while the effect of multiple-micronutrient supplementation is measured in terms of years spent in school. If children spend more time in school it does not imply that they are actually learning anything. Time spent in school is thus probably an overestimate of the amount of learning that takes place – the amount of effective learning as a result of multiple-micronutrient supplementation is likely to be smaller than the estimated impact on years of schooling, which is already smaller than the estimated learning impacts of home visiting and early childhood development programmes.

COMPONENT COMPARISON

The following four components have been examined in terms of their costs and benefits:
- Interventions to improve pregnancy outcomes, with a focus on nutrition;
- Home visits for at-risk mothers of children under 2 years of age;
- Community-based playgroups for mothers and children, with a focus on children 0-3; and
- Centre-based services, with a focus on children aged 3 until entry into the formal schooling system.
Development of an Investment Case for Early Childhood Development in South Africa

As we work to reach the goal of full implementation of all components, trade-offs will have to be made. We need to decide what to prioritize and what can wait. The choice of which component to prioritize is not simple as no component is better than all of the others in every way – i.e. there is not one which is both cheaper and better at producing all of the benefits of interest. To support the discussion of which to prioritize, this section summarizes the costs and benefits of each component, side-by-side.

Figure 6 below shows the costs of each of the components: per child and total cost. The nutrition interventions during pregnancy have both the lowest cost per mother/child and the lowest total cost. It is a relatively straightforward set of interventions and makes use of an established infrastructure. The home visits are more costly per child than the playgroups, which would be expected as they are more intensive. However, given that the home visits are targeted at high-risk mother-child pairs only, the total cost is lower than that of playgroups. Centre-based services, particularly when they include the full cost of day care, are by far the most expensive per child and have the highest total cost. In fact, for the cost of moving from subsidized day care to full day care, you could fully implement the other three components.

**Figure 6: Cost per child and total cost of interventions**

Given the differences in cost, the level of coverage you are able to achieve with a given budget increase varies considerably. The text box overleaf provides some examples.

Table 1 provides a summary of the costs and benefits predicted for each of the components. There are significant differences in benefits. All of these differences are relevant, but is helpful to highlight some of the most striking:

- Home visits for at-risk mothers are associated with a wide range of large benefits for children, caregivers and broader society. The evidence for these benefits is stronger than that associated with playgroups. The benefits are likely to be significantly larger than those which arise from centre-based services for older children, yet home visiting is far cheaper.
- The two advantages of playgroups over home visiting are their lower cost and potential to reach a greater number of children.
- Centre-based services are expensive and generate smaller returns for the child. However, they could provide a safe place to care for children which frees up mothers’ time to engage in other activities, including economic activity.
Prioritizing investments in early childhood development in South Africa

- Home visiting and playgroups are more easily adapted to facilitate the involvement of children with disabilities than are centres.
- All of the components have the potential to reduce poverty and inequality in the long run. However, the larger impact of home visiting and the low cost of playgroups suggests that these two have the greatest potential to contribute to this goal.
- All of the benefits are estimated based on the assumption that the services will be of appropriate quality. Low-quality services are unlikely to generate any benefits.

**With R1 billion, you could provide...**

- Multiple micronutrient supplements for 20.4 million pregnant women (i.e. all pregnant women for 20 years), or
- Home visits for 384,615 children, or
- Playgroups for 666,667 children, or
- Centres (early stimulation and subsidized day care) for 120,019 children, or
- Centres (early stimulation and full day care) for 60,013 children

**Combinations:**

With R1 billion, you could provide...

- Full target coverage of pregnancy interventions plus full target coverage of home visits to at-risk mothers and children plus playgroups for 71,968 children
## Table 1: Summary of costs and benefits

<table>
<thead>
<tr>
<th>PREGNANCY INTERVENTIONS (nutrition)</th>
<th>HOME VISITS</th>
<th>PLAYGROUPS</th>
<th>CENTRE-BASED SERVICES (early stimulation and subsidized day care)</th>
<th>CENTRE-BASED SERVICES (early stimulation + childcare)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COST</strong></td>
<td>(0-2 years)</td>
<td>(0-3 years)</td>
<td>(3-4.5 years)</td>
<td>(3-4.5 years)</td>
</tr>
<tr>
<td>Total cost</td>
<td>R83 million</td>
<td>R809 million</td>
<td>R2.3 billion</td>
<td>R6.5 billion</td>
</tr>
<tr>
<td>Cost per child</td>
<td>R2,600</td>
<td>R1,500</td>
<td>R8,332</td>
<td>R16,663</td>
</tr>
<tr>
<td><strong>POPULATION COVERED PER YEAR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy interventions</td>
<td>Multiple-micronutrient supplements: R49</td>
<td>R2,600</td>
<td>R8,332</td>
<td>R16,663</td>
</tr>
<tr>
<td></td>
<td>Protein-energy supplements: R509</td>
<td>R1,500</td>
<td>R16,663</td>
<td>R13 billion</td>
</tr>
<tr>
<td></td>
<td>Mass media campaign: R13</td>
<td>R8,332</td>
<td>R13 billion</td>
<td></td>
</tr>
<tr>
<td>New system infrastructure</td>
<td>312,000 mother-child pairs</td>
<td>1,560,000 children</td>
<td>780,000 children</td>
<td>780,000 children</td>
</tr>
<tr>
<td><strong>REQUIREMENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New system infrastructure</td>
<td>No: Can build on existing health care infrastructure</td>
<td>Yes: Possible: Depends on which department assumes responsibility for implementation</td>
<td>Yes: Investment in infrastructure or adaptation of existing infrastructure needed</td>
<td>Yes: Investment in infrastructure or adaptation of existing infrastructure needed</td>
</tr>
<tr>
<td>Cost per child</td>
<td>R2,600</td>
<td>R1,500</td>
<td>R8,332</td>
<td>R16,663</td>
</tr>
<tr>
<td><strong>BENEFITS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child: short-term</td>
<td>Reduction in the prevalence of low birthweight</td>
<td>Improved care &amp; development</td>
<td>Uncertain, but expected improvements in caregiving and child development</td>
<td>Improved cognitive &amp; non-cognitive skills</td>
</tr>
<tr>
<td>Child: education</td>
<td>0.05 years increase in schooling</td>
<td>0.77 years improvement in effective grade</td>
<td>Uncertain benefits given lack of evidence</td>
<td>0.44 years improvement in effective grade</td>
</tr>
<tr>
<td>Child: long-term</td>
<td>Possible benefits: • Lower stunting • Higher cognitive ability • More schooling • Higher earnings in adulthood • Lower susceptibility to chronic diseases • Reduced prevalence of low birthweight in the next generation</td>
<td>Possible benefits: • Improved mental health • Improved cognition &amp; school performance • Better labour market outcomes</td>
<td>Uncertain, but expected improvements in: • School performance • Earnings</td>
<td>Possible benefits: • Improved mental health • Improved cognition &amp; school performance • Better labour market outcomes</td>
</tr>
<tr>
<td><strong>REQUIREMENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional workforce</td>
<td>No</td>
<td>Yes: Community Health Workers</td>
<td>Yes: Community Health Workers</td>
<td>Yes: Playgroup facilitators</td>
</tr>
<tr>
<td><strong>BENEFITS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiver: gender equality</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Caregiver: other</td>
<td>Improve maternal nutrition</td>
<td>Possibly improved mental health</td>
<td>Increased social support, which can improve self-esteem &amp; mental health</td>
<td>Caregivers are able to participate in the labour market &amp; other activities</td>
</tr>
<tr>
<td>Society</td>
<td>• Contribution in the long term to the reduction of poverty &amp; inequality • Reduced use of health care resources associated with caring for LBW children</td>
<td>• Contribution in the long term to the reduction of poverty &amp; inequality • Inclusive of children with disabilities • Generates employment</td>
<td>• Contribution in the long term to the reduction of poverty &amp; inequality • Inclusive of children with disabilities • Generates employment</td>
<td>• Contribution in the long term to the reduction of poverty &amp; inequality • Generates employment</td>
</tr>
</tbody>
</table>
LIMITATIONS

An analysis such as the above suffers from a number of limitations. Most notable among these is that the costs and benefits are estimates only. It is not possible to predict the future. That said, it is worth noting that the evidence base of some components is stronger than others – leading to the team having more confidence in some estimates. Figure 7 highlights the differences. The solid line represents evidence from a developing country linking the intervention evaluated to the outcome estimated. The dotted lines represent where we had to draw in additional data or make additional assumptions to make the estimate. In addition to the uncertainty related to the estimated benefits, the analysis was limited by there being insufficient data to estimate all of the quantifiable benefits, many of which are only described.

Figure 7: Confidence in estimates of benefits over the life course

IMPROVEMENTS IN EARLY CHILDHOOD DEVELOPMENT OUTCOMES NEED NOT COME ONLY FROM ECD INTERVENTIONS

As discussed previously, South Africa has a range of polices and interventions which support early childhood development, including free healthcare and the Child Support Grant. Furthermore, any effort to address poverty is likely to have an impact on early childhood development outcomes.

There are, however, a number of polices which could be improved to support better early childhood development outcomes. An example is maternity and paternity leave. Women are eligible for a total of four months paid maternity leave, providing them the time to develop a quality bond with their infant, and establish breastfeeding which has been proven to be invaluable for the child’s development. Unfortunately, although advantageous, four months is too short for the full benefits to accrue (Martin-Wiesner, 2016) and WHO policy is that infants should be breastfed until at least six months of age (WHO, 2003). Forcing mothers to go back to work before this recommended time period may hinder their capacity to continue breastfeeding, as well as limit the available time to form a quality bond with their infant, impacting on child outcomes. In relation to paternal leave, men are allowed to take three
Development of an Investment Case for Early Childhood Development in South Africa

consecutive days, which limits their time to bond with the child at this critical stage. Another example of a policy that assists with the realization of early childhood development is birth registration, which is a necessity for a child to have an identity and gain access to subsidies and services such as the Child Support Grant, education, healthcare and future employment (Martin-Wiesner, 2016). Many disadvantaged groups face obstacles in registering their child’s birth and improvements here could help their children do better.

DEMONSTRATION MODELS

To illustrate the impact of investing in interventions targeting different ages and at the same time emphasize the point that what you see is not what you get, we constructed another simple model. This model is a little more complicated than the one discussed previously, but is still a highly simplified representation of reality. The assumptions of the model are detailed in Annex G.

In this model we examine the impact of early adversity and access to services on children’s developmental potential. The model does not consider variations in potential at conception\(^1\), rather we index this level at 100. This represents the highest level of development that they can reach by age 18. The model assumes a significant reduction in potential following poor pregnancy outcomes. This reduction is compounded if the child does not find themselves in a stimulating environment after birth. This stimulation could come from the family (more common in families with higher levels of education) or from the family supplemented by a home visiting intervention and/or playgroup. Attending a centre mitigates further loss of potential – again, children in stimulating home environments are already protected. Finally, children who have had a poor quality early childhood development experience are less likely to do well at school, although high quality schools protect against further loss of potential (children living in higher socio-economic status households are more likely to attend better schools).

To be clear, we do not have data to calibrate this model to the South African context. The model is based on a series of assumptions which are intended to reflect the patterns seen in the literature. Given the number of assumptions it is best to focus on the pattern of the results, rather than specific numeric values.

Figure 8 presents the results for children living in poverty in the absence of additional early childhood development interventions. The line represents average development potential and the dots are individual results for a random sample of the 10,000 individuals in the model. The figure is intended to visually depict a number of conclusions which are well established in the literature:

- The developmental ceiling of children is largely set during pregnancy and the early years
- Subsequent adversity can pull that ceiling lower, but the impacts are not usually as dramatic
- Not all children will do badly. Family actions and individual resilience can lead to children’s potential being unaffected by adversity
- Some children do very badly. Clustering of adverse experiences can lead to some children suffering very significant decreases in their potential

\(^1\) Children’s potential, even at conception, is varied as a result of prior adversity. This drives the intergenerational transfer of advantage and disadvantage, but is beyond the scope of this discussion.
The focus on potential is intended to draw attention to the critical nature of the early years in shaping lifetime outcomes. It should not be interpreted as suggesting that early childhood development is all that matters, or that once children's potential is cut, there is nothing we can do for them.

- Investments in early childhood development can protect children's potential and help them to start to realize this potential. Realizing their full potential will, however, require numerous subsequent investments.
- Children who lose potential in the early years require support to ensure that they can realize as much of their potential as possible. Adverse experiences tend to continue through the life of disadvantaged children and those who suffer loss of potential are also likely to be those who have fewer opportunities to realize potential. The worst outcomes occur when the chance to protect children's developmental potential during early childhood is coupled with the denial of opportunity to realize developmental potential later in childhood.

**Figure 8: Average and individual loss of potential, simple demonstration model**

Interventions during pregnancy and the early years, such as those envisaged in the ECD Policy, can protect against the loss of potential which can occur when children experience adversity. Figure 9 shows the modelled results of five scenarios: poverty and no additional interventions; poverty and centre-based services for 3-4 year olds; poverty and interventions during pregnancy and the first 2 years of life; poverty and both early interventions and centre-based services; and finally a comparison to a non-poor population. The top set of lines represents the average developmental potential of the population. The bottom set represents the realized development.
The figure is intended to highlight three points implied by the results (all established in the literature):

- Interventions earlier in children’s lives do better at protecting children’s potential
- The period of a child’s life when differences in potential arise is a period when differences in realized development are hard to see
- Interventions targeting early childhood development can help, but for children living in poverty to do as well as the non-poor would require large-scale structural changes

PROTECTING WHAT WE HAVE

Discussions on investing in early childhood development can be taken to suggest that parents are somehow deficient, particularly poor parents, who are mostly African. This is a highly negative frame and ignores the hard work and devotion of the many parents whose children do well despite adversity. The implication is also untrue. Many parenting practices which are common in African families are highly beneficial to children, particularly in the first few years. Difficulties occur later as a result of environmental factors, including lack of good quality services, lack of information and demands on caregivers’ time.

African children develop faster than Western children in the first year of life. This observation was first made in the 1950s in Uganda (Geber & Dean, 1957) and has been confirmed over the past 60 years in several east African countries (Warren, 1972), southern Africa (Hsiao et al., 2016) and Jamaica (Grantham-McGregor and Back, 1971), amongst others. Initially this precocity was thought to be limited to motor skills, but Richter et al. (1992) and others (Hsiao et al., 2016 in press) have reported generally advanced development in year one. Both biological and environmental factors are posited to account
for this advanced development. Suggested biological factors include selection effects resulting from high infant mortality rates and subsequent robustness of surviving infants, as well as potentially longer gestation. However, strong consensus exists on the influence of environmental factors, including the value placed on and interest in infants expressed in high levels of social interaction with infants, infant carrying, responsive feeding, immediate attention to infant crying, co-sleeping, and deliberate teaching of developmental skills such as sitting, standing, singing and toileting. This advanced development starts to fall off soon after the first year, often dropping to below Western norms on developmental tests, thought to result from increased exposure to infections from independent mobility, inadequate complementary feeding and less intense adult-infant interaction when toddlers are placed in the care of siblings.

**IMPLICATIONS**

The investment analysis presented has outlined the cost and multiple benefits of the four largest components of the ECD Policy:

- Interventions to improve pregnancy outcomes, with a focus on nutrition;
- Home visits for at-risk mothers of children under 2 years of age;
- Community-based playgroups for mothers and children, with a focus on children 0-3; and
- Centre-based services, with a focus on children aged 3 years to entry into the formal schooling system.

This was done to help policy makers address two critical questions:

1. Should each of the components be rolled out simultaneously or should they be sequenced?
2. Should the roll-out of services focus on high-quality high-benefit services at the expense of coverage? Or should coverage come first and quality improvements follow?

Rolling out all of the interventions simultaneously will lead to some children from each age group benefiting simultaneously. Sequencing will lead to a focus on a particular sub-population, defined either by age (pregnancy, playgroups and centres) or age and risk (home visits). Moreover, sequencing will lead to a focus on certain benefits. Starting with home visiting, and then moving on to playgroups, pregnancy interventions and finally centres, would lead to the largest child development benefits. Starting with centres and moving on from there would lead to the smallest child development benefits, but would more quickly provide benefits to women in terms of improved access to the labour market.

Focusing on quality or coverage involves a trade-off between child development outcomes and equity of access to services. Early childhood development interventions do not lead to improvements in child development outcomes unless they are of sufficient quality. This includes having the necessary supervision and oversight systems. Pushing ahead with high rates of coverage to the detriment of quality will mean that children access services, but do not benefit from them. For example, improving access to centre-based services based on the current subsidy would help with day care, but would do little if anything for child development, as the quality is too low. Focusing on quality will lead to slower roll-out, which in the short term will lead to inequitable access to services. As mentioned previously, equitable access to services has been highly valued in decisions related to programme implementation in South Africa.

The answers to the questions relating to sequencing and quality/coverage can be derived from the answer to the following question: What weight should be attached to each of the multiple benefits which arise from investing in early childhood development?
Armed with the analysis presented above we can outline what should be prioritized, depending on the values held. We outline some extreme positions where one benefit is valued ahead of all others. The reader can then consider how much they agree with each valuation and develop their own view of prioritization accordingly, which will likely lie somewhere in-between these extremes.

**Table 2: What you value determines what you should prioritize**

<table>
<thead>
<tr>
<th>IF YOU BELIEVE THAT</th>
<th>THEN PRIORITIZE ACCORDINGLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions outlined in the ECD Policy should be prioritized in order to maximize the impact on child development, particularly for the most vulnerable.</td>
<td>Priority should be given to the development and roll-out of home visiting interventions for at-risk children. This can be done simultaneously with the roll-out of nutrition interventions for pregnant women, given that this latter intervention is relatively low cost. As a secondary priority, playgroup models should be developed and assessed for effectiveness. If successful these should be rolled out, primarily targeting the youngest children. Only once the above are well underway, attention should be paid to improving the quality of centre-based services and gradually improving access.</td>
</tr>
<tr>
<td>To address gender inequality, interventions which reduce time demands on women should be prioritized, with a view to facilitating their engagement in the labour force.</td>
<td>Expand access to early childhood development centres, supporting day care and maintaining the current standard until coverage is greatly increased.</td>
</tr>
<tr>
<td>Gender inequality must be addressed, but without missing an opportunity to improve child development outcomes.</td>
<td>Increase the subsidy for centres to ensure adequate resources are available for full day care. This would require a 5-fold increase in the current subsidy and the development of an appropriate supervisory system to ensure quality.</td>
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In addition to the value placed on different benefits, the feasibility of rolling out each component must be considered. Nutrition interventions during pregnancy are relatively simple and make use of an existing infrastructure and could be rolled out rapidly. Home visiting interventions could build on the existing health infrastructure. They make use of community health workers who could be relatively easily trained. Moreover, the intervention is backed by a wealth of evidence. Playgroups may be slightly harder to roll out as how exactly they would operate and evidence that they would lead to the hoped-for outcomes is not yet clear. The expansion of access to centres presents the biggest logistical challenges. The high skill level required to run the centres which would improve child development outcomes would require a massive investment in training. This would need to be accompanied by investments in physical infrastructure and a monitoring and supervisory system. All of this would take time to put in place. Expanding access before these complementary investments are made will lead to the expansion of day care, with only a slim chance that child development outcomes will be improved.

The above conclusions are based on current intervention models. Given the importance of early childhood development and the costs involved, efforts to innovate and evaluate more effective and cost-effective models must be prioritized. We need to examine whether more affordable models of centre-based services can be implemented without losing the impact on child development. Innovative non–centre-based approaches may prove to be cost-effective ways of improving child outcomes throughout early childhood. Efforts to innovate need not be separate from efforts to expand access. Flexibility in funding combined with rigorous monitoring and evaluation would facilitate the combination of expansion and innovation.
The investment analysis presented here is intended to be an input into a priority setting process. We have not drawn conclusions on what should be done regarding the roll-out of components of the ECD Policy. Rather, we have outlined what should be done depending on what benefits are most highly valued and what logistical constraints are most binding. What is required now is a discussion on these issues, i.e. the relative importance of different benefits and the logistical barriers.

The process to discuss these issues would benefit from additional inputs:

- Research determining the costs and effectiveness of playgroups. Playgroups and other non-centre-based models of delivery have the potential to reach large numbers of children at relatively low cost, including very young children and children with disabilities. The lack of evidence on the effectiveness of such interventions is a profound hindrance to planning for their roll-out.
- Research examining the situation of children cared for in child minder/day mother settings, and on ways in which supervision and support could improve outcomes for these children. Investment analyses of interventions in this component of the Policy were not conducted because of the scarcity of data on both the current situation and the possibility that interventions could improve outcomes.
- Research determining whether lower cost centres could still lead to significant improvements in child development. We are currently subsidizing centres which are not proven to improve child development outcomes. It is clear greater investments are needed to improve quality, but it is unclear how much greater that investment needs to be. We estimated that to implement the lowest cost centre-based intervention which has been shown to be effective in a similar context would require a more than doubling of the current subsidy plus a large investment in training and supervision. There may, however, be lower cost options which have, as yet, not been tested.
- Further research is needed on the importance of training duration and alternative models of training. Training backlogs present a major challenge to the roll-out of services, particularly centre-based services. Developing cost-effective ways to address these backlogs would greatly reduce the importance of this barrier in the priority setting process.
- Further research is needed to determine cost-effective ways of including children with disabilities. This would need to include measures of the benefits for these children, as we know little about the returns on investments during the early years for this population. It may be that investments lead to large savings by avoiding the need for interventions later in life, which may be more costly.
- The investment analysis has focused on the different components. This, however, leaves unanswered the systems questions relating to how best to coordinate across components and whether there are ways to reduce costs and improve efficiency by integrating delivery. Further work in this area could be highly informative.

CONCLUSION

The approval by Cabinet in December 2015 of the South African National Integrated Early Childhood Development Policy was a great achievement for the sector. It will, however, take many years for the Policy to be fully implemented. The investment analysis reported on in this report is intended to inform the discussion of how best to go about rolling out the Policy. There are different components which have different cost implications and lead to different benefits. All of the components are in the Policy because they are highly likely to be socially beneficial and we should not lose sight of the importance of the eventual implementation in full of all of them. But in the short term trade-offs will have to be
made. Given how beneficial each of the components is, these trade-offs are significant. For this reason, the priority setting process must be undertaken carefully, to ensure that budget increases are put to best use.

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ANNEX A: OVERVIEW OF THE ECONOMIC EVALUATION OF EARLY INTERVENTION LITERATURE

INTRODUCTION

Early childhood development programs have the potential to generate large individual, social and macroeconomic benefits (Karoly, Kilburn, & Cannon, 2005). These benefits can accrue over both the short and long term and include the healthy development of children, increased opportunities for women to participate in the labour market and improved later life education outcomes and earning potential (Britto, Hirokazu, & Boller; Karoly et al., 2005; Lynch, 2004; Myers, 2008; Trifler, 2009; van der Gaag, n.d.).

The extent to which benefits of early childhood development programs are realized is associated with the quality of the programme (Barnett, 2012). Low quality programs have little if any impact, whilst high quality programs can generate significant benefits. For example, a Brazilian study found that children who attended high-quality programs had a higher developmental age then those attending low-quality programs (Grunewald, 2014). Similarly the National Institute of Child Health and Human Development (2002) found that the higher the quality of programme, the more the child developed in terms of cognitive and language skills (NICHD, 2002).

Focusing on the importance of quality can raise concerns regarding whether the costs associated with ensuring appropriate quality could outweigh the benefits. Attempts have been made to evaluate this concern and a long tradition of cost benefit analyses has consistently shown that the costs are typically small relative to the benefits (Barnett, 2012; Grunewald & Rolnick, 2007; Heckman, n.d.; Karoly et al., 2005; Rees, Chai, & Anthony, 2012; Van der Gaag & Tan, n.d.).

Recently spending on early childhood development programs has been increasingly framed in investment language. This claim is based on a wealth of evidence which indicates that investing in young children is a low risk investment with substantial returns. A prominent advocate of this frame is Nobel laureate James Heckman who has demonstrated that the earlier investments are made, the longer the period of time it has to accumulate into economic and social gains, whereas not investing in early childhood development can lead to huge losses due to deficits during early childhood (Carneiro & Heckman, 2003; Girdwood, 2012; Rees et al., 2012). Framing early childhood development as an investment case is an attempt to shift the thinking about early childhood development from something that is nice to have, to something which is seen as a critical item on any government development plan.

Economic evaluations of spending on early childhood development programs – cost-benefit analyses or investment cases – are all essentially asking if such spending is warranted. Although all are designed with the same question in mind, approaches to evaluation differ in a variety of ways. It is useful to examine the nature of these methodological differences as they reveal underlying differences in the value system used to evaluate costs and benefits/returns. Of particular interest is which outcomes are considered in the evaluation and how they are estimated – both of which are discussed below.
WHAT IS INCLUDED IN THE EVALUATION SPACE OF INVESTMENT CASES?

In theory, every possible consequence of implementing an intervention should be included in an evaluation, including the costs of not doing something else useful with the resources used in implementation (opportunity costs). Benefits from early childhood development interventions can arise immediately or over a long period of time and can accrue to various sectors of society. Some of the immediate effects that involve the child include: improved birth-outcomes due to prenatal health; better health and nutrition of the child; cognitive, socioemotional and motor skill development; psychosocial development in terms of self-esteem, autonomy, social integration and adaptability; school-readiness; enhanced numeracy and literacy skills; and the protection of children’s rights (Grunewald & Rolnick, 2007; Grunewald, 2014; Rees et al., 2012; Lynch, 2004; Woodhead & Oates., 2009; Young, 2002; Petrovic & Yousafzai, 2013; Powell & McGregor, 1989). Not only do early childhood development interventions affect the development of the child, but can also have positive outcomes for and via the family. Women are able to participate in the labour market and earn an income while their infants are cared for; the parents can gain knowledge about the developmental stages of early childhood development and needs of their subsequent infants; the interventions can improve parenting skills and increase family involvement in a positive manner; as well as foster a healthier home environment for the infant to be raised in (Lynch, 2004; Britto et al., 2012; Woodhead et al., 2009; Young, 2002; Biersteker, Dawes, & Hendricks, 2012; Petrovic & Yousafzai, 2013; Cooper et al, 2002; Rahman, Iqbal, Roberts, & Husain, 2008).

Long-term gains for the child include decreased health risks, as good early childhood development programs have been shown to lessen the chances of developing a chronic illness, starting smoking or initiating substance use; higher academic achievement during the formal schooling years; increased graduation rates with higher enrolment in tertiary institutions; higher income earning potential; and heightened self-sufficiency in adulthood (Young, 2000; Lynch, 2004; Trifler, 2009; Grunewald, 2014; Britto et al., 2012; Barnett, 2012; Woodhead et al., 2009; Chang-Lopez et al., 2014). Increased enrolment in secondary school and beyond has cost implications for the government but these tend to be offset by the significant returns of the investment. Moreover, there are savings associated with reduced rates of grade repetition, demand for remedial education; dependency on social welfare, and from decreased pressure on the criminal justice and health systems (Lynch, 2004; Trifler, 2009; Barnett, 2012; Woodhead et al., 2009; Young, 2002).

In addition to long-term benefits to the child, there is evidence of a range of benefits accruing to others. For example, a society that has a higher concentration of prosocial and productive members; reduced crime and delinquency rates; increased tax revenue; and improved equity (Young, 2002; Rees et al., 2012; Trifler, 2009; Grunewald, 2014; Barnett, 2012; Britto et al., 2012; Van Der Gaag & Tan, n.d).

Although in theory all of the benefits listed above should be included in an evaluation, in practice, not everything can be, due to data limitations and the difficulty in measuring certain intangible outcomes in a manner which suits the evaluation method. In response many evaluators opt to narrow the evaluation space, permitting only outcomes of a particular type. For example, when the evaluator opts to include only the costs and benefits which impact on government expenditure. The literature then can be divided according to how much the evaluator has narrowed the frame. Two broad categories of investment cases emerge, those which take the provider/government perspective, and those which take the social perspective. The latter can be further sub-divided according to which social outcomes are considered.

Taking the provider/government perspective leads to an evaluation which is largely financial. It typically involves evaluating the impacts of early childhood development in terms of government expenditure
and monetary returns. On the cost side, studies from this perspective may include the costs of implementing the early childhood development programme plus perhaps the cost of delayed entry into the workforce due to the children staying in school longer which effects government expenditure (Janssens, Van Der Gaag, & Tanaka, 2001). On the benefit side they may include reduced expenditure on remedial programs implemented to overcome the accumulation of early disadvantage, welfare payments and the costs of law enforcement (Heckman & Masterov, 2007). This is not implying that government disregards the social perspective, but rather that measuring social returns in data scarce contexts is problematic, therefore it is more feasible to use the impact on the budget as a markers. An example of an evaluation adopting this perspective from within a developing country context was a cost benefit analysis in Turkey which found that by investing in early childhood development the government benefited through increased tax revenues. The study predicted an estimated cost-benefit ratio of between 4.35 to 6.37, which meant that for every 1 unit invested, the returns would be between 4.35 and 6.37 (Kaytaz, 2005).

The social perspective aims not to limit the evaluation space and in addition to government costs and benefits it includes those outcomes that benefit the individual, community or society as a whole. This approach is particularly challenging when the evaluation method calls for all costs and benefits to be converted into monetary terms – as is generally the case with traditional cost benefit analyses. Benefits are often of a kind that do not lend themselves to the attachment of a money value (e.g. improved equity), others are intangible (e.g. social cohesion). Given such challenges it is often the case that although a social perspective is taken, not all social benefits are included. To avoid excluding important benefits, evaluators have found a variety of ways to attach a money value to non-monetary benefits. This often involves limiting what is considered valuable about a particular outcome. For example, cognitive benefits are valued in money terms by way of their impact on earnings – even if this is only part of the reason why they are valuable. Although limiting the analysis to costs and benefits measured in money terms leads to exclusions, including a range of outcomes beyond government finances can strengthen the case for investment. For example, a cost analysis of 10 developing countries concluded that malnutrition and poor cognitive development in childhood could annually cost the economy between 0.57 to 4.05 percent of its gross domestic product due to productivity losses and reduced income levels, suggesting the potential for high-returns on early childhood development interventions which reduced either or both (Hunt, 2000).

Limiting the analysis to monetary outcomes is not necessary. Indeed, a societal perspective can be used to shift the discussion to explicitly focus on non-monetary outcomes. For example, framing early childhood development as a social responsibility to ensure that every child has an equitable chance of developing to their full potential (Vegas-Baron et al., 2009). Such an approach has been used with some force to demonstrate the potential of early childhood development investments to reduce gender inequality. Early childhood development has been shown to level the playing field in a variety of ways: mothers are provided with the opportunity to earn an income while their infant is well cared for; older female siblings get the opportunity to attend secondary school rather than staying at home to look after their younger siblings. Furthermore, keeping girls in school has been linked to reduced teenage pregnancy and more gender equality (Vegas-Baron et al., 2009; Britto et al., 2012). The argument for investment in early childhood development services because of equity improvements can extend to inequalities associated with poverty. Children who come from disadvantaged backgrounds experience deficits early on (e.g. congenital anomalies, poor health and cognitive delay), that hinders their opportunity to excel. Early childhood development programs can bridge this gap as they prevent, or help overcome these deficits (e.g. better health and nutrition, school-readiness), giving all children a more equal opportunity to succeed in life. Moreover, such interventions can also break the
intergenerational cycle of poverty and health inequalities as children with a healthier start in life are shown to have better life outcome (Britto et al., 2012; Van Der Gaag & Tan, n.d.). Early childhood development has been identified as a social determinant of both health and poverty, and the causal relationship between poverty and health is well documented in the literature (Leon, Walt, & Gilson, 2001; Wagstaff, 2002). Therefore, early childhood development interventions are also an investment in alleviating poverty and improving the health of the population. This in time will transfer back into early childhood development with a future child population characterised by more equality of opportunity.

The perspective taken can influence the conclusions drawn. For example, a narrow perspective may lead to the exclusion of large benefits (because they are external to government or because they are not readily measured in money terms). As a result the returns on investment are estimated to be much lower than they actually are.

**ESTIMATION METHODS AND DATA**

When estimating an investment case you have to predict future returns. This is typically achieved by drawing on past experiences. Using past experience to estimate future outcomes is done implicitly when using a favourable cost benefit results from a past programme to justify future expenditure. The argument that returns will be repeated is the same in investment cases, the only difference being that it is explicitly made. Once the assumption is explicit, it must be justified. How difficult it is to justify, and how much adjustment to past data is required, is determined by how different the situation is now compared to when and where the intervention was previously implemented. If an intervention was previously implemented in the same context in recent times, it is generally safe to assume that the outcomes of implementing it again are likely to be similar. However, if the intervention is somewhat different, or a great deal of time has passed since it was previously implemented, or if the context in which it will now be implemented is markedly different, then the assumption that the results will repeat requires greater justification, and the estimated outcomes may have to be adjusted.

Lynch (2004) developed an investment case by assuming that the outcomes from a small town intervention (The Perry Preschool Project) would be repeated (but not exactly) if the programme was expanded on a national scale in an urban city environment. An objective of the analysis was to determine what the implications would be for returns on investment of changes in population dynamics since the 1960s. The authors modelled the costs and benefits based on those calculated from the Perry Preschool Project including both tangible and intangible returns. The costs were adjusted for inflation and real earnings up to the year 2050. The prospective investment case demonstrated both the replicability and expandability of the programme as the model estimated high social returns and net budget savings for government (Lynch, 2004). Belfield (2008) applied data from the Perry Preschool Project and Child-Parent Center Programme in order to estimate the likely returns of implementing a similar project in Hawaii. The analysis suggested that it was a worthy investment as the benefits outweighed the costs (Belfield, 2008).

Assuming that programme benefits can be replicated in different time periods and different contexts is often not unrealistic. Consider the example of the Chicago Child-Parent Centre Program which has been operating since 1967. The intervention targets children from disadvantaged backgrounds from preschool up to grade 3. Due to the programme’s high success rate, the Midwest CPD expansion was funded, with the purpose of not only expanding the programme to different social contexts, but also to evaluate and validate the generalizability of the intervention. The outcomes were favourable and consistent with previous findings (e.g. decreased drop-out rates, fewer crimes, higher income) (HCRC,
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n.d.; Erickson, 2012). Similarly, a successful early childhood development intervention in Jamaica was replicated in Cambodia. The intervention maintained the basic structure of the Jamaican intervention whilst adapting certain activities to be culturally appropriate. Both studies, although situated in different contexts, were observed to lead to similar outcomes (improved cognitive, economic, social, emotional outcomes) (Ottanasio et al., 2012). Cuba implemented a home visiting programme called ‘Educate Your Child’ which was piloted between 1983 and 1992, and scaled up between 1992 and 1998. The programme was so successful that the methodology has been replicated in several different contexts in South America (Bernard van Leer Foundation, 2011). The Prenatal and Home Visiting Program in United States was evaluated with two large-scale random control trials, testing the effectiveness of the programme in two different contexts, with two different populations. Both trials led to similar outcomes, including improved prenatal care, reduced fertility levels, increased female participation in the labour market, and reduced reliance on social welfare. Since 1996 permission has been granted for this programme to be implemented elsewhere on the condition that the replication stringently follows the original methodological design (Olds, 2002).

Historical data can be used directly – i.e. it is assumed that what happened before will happen again. Or it can be adjusted, such as in the above example when it was adjusted for inflation and changes in earning levels. It can also be used to develop models which allow for a more dynamic evaluation of alternative interventions. For example, Heckman and colleagues have postulated a model based on a child development production function. The axioms on which the model is developed are informed by the literature and historic data has been used to estimate its parameters (Heckman and Masterov, 2007). What this work has done is demonstrate how much greater the returns are to early investments when compared to later life investments. Given the complexity of child development such models require a considerable degree of abstraction and numerous assumptions. As a result, such models are not particularly useful way of evaluating a specific intervention (such as home visits to promote early stimulation), but they are useful for when evaluating classes of intervention (such as interventions during pregnancy vs preschool interventions).

KEY POINTS

Reviewing the literature on economic evaluation, including investment cases, has highlighted a number of key issues which must be considered when undertaking such work or using the results to inform policy.

Perspective matters: economic evaluations can be undertaken from a variety of perspectives. These can be loosely grouped into provider (typically government) or social. Social perspectives can then be divided into those which include only returns which can be measured in money terms and those which include as wide a variety of social returns as possible. A narrow perspective facilitates easier analysis and clear conclusions. These benefits must be weighed against the risk that the conclusions (however clear) may be incorrect. Excluding broader benefits leads to an underestimate of the returns on investment, possibly leading to an erroneous decision not to invest.

Assumptions have to be made: a past intervention can be evaluated based on observed consequences. However, to make the argument that these consequences justify further investment requires a number of assumptions. These assumptions revolve around the question of to what extent past consequences are likely to repeat, if the intervention is repeated. The need for these assumptions cannot be avoided, but this does not mean that their justifiability should not be interrogated. Assuming that the consequences of an intervention implemented last year will be the same if repeated again in the same place this year, should be easily defended. Assuming that an intervention implemented 20
years ago in a different country will lead to the same outcomes today in a markedly different environment, not so easy to defend.

The need to consider perspective and the magnitude of required assumptions is particularly acute when attempting to develop investment cases in developing countries. Social returns may play a more important role where government services are limited. If you evaluate an early childhood development intervention only in terms of its impact on government revenue in a developing context the returns are not likely to be high. This is because government returns require there to be social services, the cost of which is reduced by avoiding the need for them through early intervention. Developing country governments are not likely to pay for remedial education, not likely to apprehend and prosecute criminals or collect much tax from the future earnings, many of which are likely to be earned in the informal sector. Therefore, in such a context it is critical to include the social benefits of early intervention which accrue to both individuals and to broader society.

The lack of data on the impacts of early interventions in different developing country contexts is a hindrance. Investment cases may have to be built using data on interventions conducted in very different settings – requiring the use of numerous assumptions.

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ANNEX B: SUMMARY OF INTERVIEWS WITH POLICY MAKERS REGARDING ECD POLICY PRIORITIES

WHY SHOULD EARLY CHILDHOOD DEVELOPMENT MATTER TO THE SOUTH AFRICAN GOVERNMENT?

a. What should motivate State investment in early childhood development interventions? What should be the goals?

The interviewees identify early childhood development (ECD) as a phase of immense opportunity for developing human capital, and in the long term reducing the growing burden on state-funded social assistance programmes. State investments in early childhood development interventions should be motivated by the proven potential of such interventions to improve the human condition by increasing chances of success in education and employability of children in the future. The future of the South African society largely depends on effective and universal early childhood development interventions.

Poor matric examination results for the majority of learners are a clear indication that many children’s early childhood development needs are not adequately met and the state does not optimally benefit from investments made in basic education as there is inconsistency in quality of services during this foundation phase. Children need to be capacitated to develop physically, intellectually and emotionally so that they attain holistic development and their decision-making abilities are enhanced.

The goals of state-funded early childhood development interventions should be to give children a good start by meeting their needs taking into account their different biographic and socioeconomic circumstances. The goal should be to ensure that children achieve at their optimal level including children with disabilities, those affected by parental death due to HIV and AIDS and those born to teenage parents. That entails investing in early childhood to improve education outcomes, enhance skills acquisition and employment opportunities and ensure a healthy and long life for the nation. Early childhood development interventions should aim to influence the choices and behaviour of children during adolescence and adulthood.

Investments should address children’s situations at various levels: individual, caregiver-child and community levels. For example, programmes which focus on healthy growth of a child; parenting programmes and safety measures that improve living environments in the homes and communities. The concern is that children are growing up in social environments that are not supportive to childhood. They do not support safe play, especially before children start attending early childhood development centres.

Communities that are resourceful support families to raise children; they are crucial support systems even in the context of poverty.

Early childhood development is a good investment for the child and the future of the country. Early education provides a good foundation for the child physically, emotionally and intellectually. At this phase of development, the child can be moulded in various ways to prepare them to learn important values of society. Failure to address early childhood development has far-reaching consequences.

The National Development Plan 2030 states that there should be universal access to early childhood development services - and the government is acting in accordance with this vision.

Investments will support skills development for early childhood development practitioners.
WHAT BENEFITS OF EARLY CHILDHOOD DEVELOPMENT ARE MOST IMPORTANT FROM YOUR DEPARTMENT’S POINT OF VIEW?

The interviewees identified the benefits of early childhood development for their respective departments and mandates but emphasised the need to see the benefits through a multi-sectoral lens. The multi-sectoral lens allows actors within each sector, namely health, education and social development to recognise the significance of their interventions across the value chain of human development. From the Department of Health’s perspective, the most important benefits of early childhood development are opportunities to prevent communicable diseases and reduce under-5 mortality, detect disability, malnutrition and stunting and intervene early in the life of a child. There are also opportunities for disseminating health promotion messages to children at an early age. For example, through the Integrated School Health Programme (ISHP), school children are taught about basic health protection practices such as handwashing, nutrition and dental care. These lessons lay a foundation for capacitating children to receive age-appropriate health messages as they grow up and their needs change, for example family planning.

Understanding the importance of attending antenatal care (ANC) services by community members in general and attendance of the services by pregnant women is another benefit of early childhood development for the Department of Health.

From the Department of Social Development’s point of view, the most important benefits of early childhood development are opportunities for advocacy and provision of prevention and early intervention (PEI) services for at-risk children and their parents and caregivers. Increasing investments in early childhood development has a direct bearing on strengthening PEI, taking into account that this requires a broad approach that cuts across government departments, the life course of a child and their environments (family and support to new mothers). The significance of the first 1000 days and effective management of conception and pregnancy is emphasised by interviewees in both sub-sectors.

However, implementing an integrated system of services that facilitates early identification of risk and effective referrals remains a key challenge that negatively affects access to early childhood development interventions.

There is recognition among the government and expert interviewees alike that early childhood development extends to a period when child bearing activities are not visible in the public domain. This period includes pre-conception, conception, pregnancy and the first three years of a child’s life. During this period maternal health status and lifestyles can have serious consequences for early childhood development. Families and parents make decisions about how to meet young children’s needs and some of these decisions do not enhance early childhood development. The concern of government actors is that many families do not have access to information and knowledge that would help them support behaviours that are consistent with early childhood development during this period. Currently, government interventions target pregnancy, the child’s and mother’s health and wellbeing from birth until the child is aged 6 years.

The interviewed experts emphasise the need to recognise that early childhood development goes beyond concerns with child survival that preoccupy policy makers and the public during this phase and tend to be expressed in terms of children’s health (immunisation and health care) and nutritional needs. Other equally important domains are their need to feel safe and secure – the need to develop secure attachments with someone.
IF YOU HAD TO PRIORITISE BETWEEN THE FOLLOWING 5 COMPONENTS OF THE ECD POLICY, WHAT WOULD YOU PRIORITISE AND WHY?

b. Home visiting for at-risk pregnant women and new mothers;
c. Group-based care and opportunities for learning for children under-2 years;
d. Centre-based care for children over 3 years;
e. Community based (mobile care) for children over 3 years and
f. Supervision of child minders.

There is consensus regarding how the components of the current ECD policy should be prioritised with home visiting for at-risk pregnant women and new mothers generally viewed as deserving high priority. The reasons for prioritising home visiting for at-risk pregnant women and new mothers include the potential to realise prevention and early intervention including effective referrals. The view is that the policy on the re-engineering of primary health care, community health workers and ward-based outreach teams provide an environment conducive for implementing home visitations.

Other components of the ECD policy such as community based (mobile) care for children over 3 years and centre-based care for children over 3 years are generally preferred because they have the potential to reach many children as they are cost-effective. These components are necessary for providing children with stimulation and opportunities for play. They should also be prioritised because of their benefits for mothers and caregivers. They provide primary caregivers with respite and enable them to pursue other activities, including employment without feeling severely constricted by child rearing responsibilities. Children also benefit when their caregivers’ mental wellbeing is protected as the risk for abuse is reduced.

Experts differ from government actors in their views on interventions that may be interpreted as intrusive and discounting the inherent competencies of parents and caregivers to nurture and support the development of their children. Policy makers identify parenting programmes and supervision of child-minders that includes their skilling as interventions that can promote early childhood development in the home. Experts warn against inadvertently sending negative research and policy messages to the public suggesting that the expertise of raising competent children lies with external actors and not with families. Sometimes messages intended to protect children undermine parents with they have undertones of blame; yet the majority of parents want to care well for their children and desire the best for them. There is a need for messages that acknowledge the challenges associated with caring for young children, especially in conditions of deprivation, and the value of social support for mothers and parents.
SHOULD SOUTH AFRICAN GOVERNMENT ROLL-OUT LARGE SCALE PROGRAMMES FOR ALL CHILDREN AND IMPROVE THE QUALITY AS WE GO? OR FOCUS ON HIGH QUALITY PROGRAMMES FOR A FEW AND IMPROVE COVERAGE AS WE GO? WHY?

The interviewees were cognisant of the current low quality of most early childhood development programmes and disparities between rural and urban facilities, and affluent and disadvantaged communities. However, in their view South African government should focus on providing access to all children under the age of 6 years by improving coverage, and large scale programmes should be implemented for all children while quality improvement is incrementally introduced.

This approach is viewed as in line with two national policy pronouncements: compulsory basic education and the National Development Plan goal of universal early childhood development by 2030. It will mean that by the age of 6 years most children will have had contact with early childhood development services and when they start school, they will be ready and have a stronger foundation than if they were excluded from early childhood development opportunities.

High quality programmes are associated with complex services which are resource-intensive and currently unaffordable for many South African families. The widespread problem of poverty renders many families dependent on government to provide even the most basic form of structured early childhood development programme. Prioritising the roll-out of large scale programmes that address early childhood development needs from conception and are phased according to the developmental stages of children will ensure that every child has the opportunity to access basic programmes such as those that focus on stimulation and play.

WHAT INFORMATION WOULD HELP POLICY MAKERS DECIDE HOW BEST TO INVEST AN INCREASE IN early childhood development FUNDING?

Information on early childhood development remains fragmented and it is necessary to compile available research findings, communicate findings in simple terms and identify information gaps. As a result there is a concern that the current policy is not based on a comprehensive understanding of children's demographics, the practice of early childhood development and the impact of early childhood development programmes on participating children. In order for universal access to be realised, children’s biographic information (including the forms of disabilities affecting them, geographic distribution, age cohorts, forms of services that children access at all the levels of early childhood development and their living circumstances) is needed for proper planning of resources – financial and human. There have not been efforts to generate baseline information and monitor the impact of early childhood development on educational outcomes. There is no reliable information about the registration status of early childhood development facilities. Unlike with basic education, where government has information about private schools, the Department of Social Development does not have a database of private early childhood development programmes. This situation is considered a barrier that impacts on planning for children as they make transition through the education system. In the early childhood development sector, services have historically been provided by the NGO community and they are the repository of the expertise in the sector. The necessary transition that would allow the democratic government to become the public provider of a service that is considered a right and entitlement for everybody has not yet occurred, thus contributing to an environment that hampers collaboration between the government and NGOs. Recognising these expertise and the capacity built by the NGO community as well as the government duty to provide early childhood development should motivate the two sectors to work together.
HOW DO YOU BALANCE THE ROLE OF THE FAMILY AND THE ROLE OF THE STATE IN early childhood development INVESTMENTS – NORMATIVELY (IDEALLY)? WHO IS RESPONSIBLE FOR WHAT?

From policy experts’ perspective the main challenges in realising a balance between the role of the family and the role of the state in early childhood development investments are the country’s history and a poor alignment between family policies and institutionalised practices in relation to reproductive responsibilities. In South Africa it is imperative for government to provide immense support for families that are raising children but there is no consistency and integration in the way the state supports early childhood development across all the services in which families with young children are visible. State assistance to families on a large-scale is one of the imperatives of transformation and requires extensive public resource investments. At the same time, there is a weak state-private sector partnership to support families in meeting the early childhood development needs of their children. For example, although the role of maternity and paternity leave in supporting early childhood development is acknowledged, it is mostly privileged families that can fully benefit from this employment benefit without risking loss of income. Lack of supportive policy in this area negatively affects other early childhood development goals such as exclusive breastfeeding in the first 6 months and reduction of infant mortality. The interviewed experts underscore the need for the general public to understand that as individuals and families they have a responsibility to support children’s development. But parents need society to provide social support and it is equally important for parents to know that society has the responsibility to support parenting responsibilities. Families with young children need a society that has a culture of support in early childhood, also referred to as a social order that supports parents with time, money and resources, and support that makes it possible for parents to fulfil their responsibilities.

There is a concern among early childhood development experts that there is limited understanding about the first three years of life, including the capacity of infants to interact with their caregivers and respond to their immediate environments (“infants as social beings”), and the important role of family environments in supporting early childhood development. In this situation policy makers might opt for investing in the pre-school phase and construction of facilities might be prioritised over supporting what is known to be developing during this phase. Traditionally, early childhood development has been understood in terms of pre-school child care. There is consensus among experts that research has not yet articulated the process of child development in a manner that policy makers and the general public understand, hence the Frameworks initiative.
WHAT DO YOU THINK WOULD BE THE CONSEQUENCES OF NOT INVESTING IN EARLY CHILDHOOD DEVELOPMENT FOR THE SOUTH AFRICAN SOCIETY?

A divided society will be one of the major consequences of not investing in quality early childhood development. Both government policy actors and early childhood development experts note that poor education outcomes for a high number of learners who do not complete Matric, those who fail Matric examinations annually and a lack of second-chance interventions for children who do not pass matric examinations create a pool of young people who leave school without the necessary education to participate in the South African economy. The economy is technologically advanced and youth who are not educated have low chances of obtaining employment. Early childhood development will contribute towards developing the workforce.

A working early childhood development system is necessary to reduce inequalities and create an environment where members of society will feel safe and happy. There are several social problems in society that negatively affect citizens’ wellbeing and erode public resources such as high levels of crime, violence and HIV and AIDS, the roots of which are in poor investments in early childhood development.

HOW DO YOU THINK INVESTING IN EARLY CHILDHOOD DEVELOPMENT WOULD IMPACT ON THE FUTURE GENERATIONS OF SOUTH AFRICA?

Children will have a better chance of developing to their full potential. The current social inequalities generate anger and feelings of deprivation and loss of hope. Investing in early childhood development will improve the sense of citizenship because early childhood development helps instil core values at a very early age. This can reduce negative tendencies such as a sense of entitlement among beneficiaries of various social interventions and instead bolster a sense of responsibility.

Suggested additions:

- Skilling of practitioners and professionalization of early childhood development so that practitioners may have a professional home, improve remuneration and provide career paths to support individuals who are motivated. Early childhood development must also attract young people who can develop careers in the profession.
- Since the variation across early childhood development programmes provided by the NGO community, the main public providers at present, are minimal, and the government does not have the same wealth of expertise and institutional capacity in early childhood development provision, cooperation among the NGO providers and between them and government is necessary for developing an integrated early childhood development programme that is implemented at population level.
- Research should also establish the extent to which the general public consider it relevant to know more about how early childhood development works and how they may influence its direction in children.
ANNEX C: INTERVENTIONS TO IMPROVE PREGNANCY OUTCOMES

The ECD Policy (Republic of South Africa, 2015) mentions the provision of micronutrient supplements to pregnant women, food provision or supplementation for pregnant women by community health workers, as well as a “food and nutrition communication and education campaign with a focus on the prevention of hunger, malnutrition and stunting in pregnant women and infants and young children”.

MULTIPLE-MICRONUTRIENT SUPPLEMENTATION

There is good evidence that multiple-micronutrient (MMN) supplementation during pregnancy improves neonatal outcomes. A Cochrane review of 17 randomised controlled trials (mainly from low- and middle-income countries) on the effect of multiple-micronutrient supplementation compared with supplementation with iron only (with or without folic acid) found that multiple-micronutrient supplementation led to a significant reduction in low birthweight (LBW) (by 12%) and small for gestational age babies (by 9%), as well as in the rate of stillbirths (by 8%) (Haider and Bhutta, 2015).

In spite of the evidence that multiple-micronutrient supplementation increases birthweight, the few existing follow-up studies of prenatal multiple-micronutrient supplementation have generally failed to find any impact on later outcomes (Tanner, Candland and Odden, 2015). Vaidya et al. (2008) provide evidence that birthweight gains persist in early childhood to some extent: Nepalese children whose mothers received multiple-micronutrient supplements were 204g (2%) heavier than the control group at 2.5 years. However, a follow-up study found that these gains had disappeared by 8.5 years (Devakumar et al., 2014). Nonetheless, given that there are very few studies of the long-term effects of multiple-micronutrient supplementation, there is currently insufficient evidence to draw any firm conclusions on the long-term effects of multiple-micronutrient supplementation. There is, however, substantial evidence that multiple-micronutrient supplementation improves birthweight and that birthweight is linked to later life outcomes.

The prevalence of low birthweight (less than 2.5 kgs) in SA is approximately 15.1% (Lee et al., 2013). Approximately a million babies are born in SA every year, which means that around 151 000 babies are born with low birthweight every year. If multiple-micronutrient supplements were supplied to 80% of the targeted 65% of pregnant women and the prevalence of low birthweight was reduced by 12% (as in Haider and Bhutta, 2015) among this target population of 520 000, this would mean 9 422 fewer babies per year being born with low birthweight, and a drop in the prevalence of low birthweight (in the whole cohort) from 15.1% to 14.2%.

FOOD (BALANCED PROTEIN-ENERGY) SUPPLEMENTATION

A Cochrane review of 12 randomised controlled trials on energy and protein supplementation during pregnancy found that balanced protein energy supplementation (i.e. supplements containing below 25% of the total energy content as protein) significantly increased birthweight by 41g on average. It also reduced the relative risk of babies being small for gestational age by 21% and the risk of stillbirth by 40% (Ota et al., 2015). A small number of studies have investigated the effect of prenatal protein-energy supplementation on body composition, cognitive development and educational attainment and
did not find any impact, but there is still insufficient evidence to draw any firm conclusions on the effect of protein-energy supplementation on long-term outcomes (Tanner, Candland and Odden, 2015)².

What sort of effect would balanced protein-energy supplementation during pregnancy have in South Africa? A relatively small percentage of South African women are underweight (an estimated 6%), while obesity affects a much larger percentage of women. The National Income Dynamics Study (NIDS) in SA includes data on birthweight that can be used to illustrate the impact of an average increase in birthweight of 41g (from Ota et al., 2015)³ on the number of low birthweight babies. The 2014/15 NIDS data (Southern Africa Labour and Development Research Unit, 2016) has birthweight data for 3402 children under 5, with a mean of 3.09kg and a standard deviation of 565g. In this dataset, 393 of the 3402 children under 5 in the sample have a birthweight below 2.5kg (i.e. 11.55%). Even if all mothers received the supplement and the birthweight of all children in the sample increased by 41g, this would only move 15 of the 393 children from being low birthweight to normal birthweight (i.e. a 3.8% decrease in the number of low birthweight children), and a decrease in the prevalence of low birthweight in this particular sample of children under 5 from 11.55% to 11.11%. If the poorest 10% of mothers in the sample received the supplement, this would change the birthweight status of only 1 child in the sample.⁴

Despite the small effect of balanced protein-energy supplementation on birthweight, we assume that some form of food supplementation is necessary among underweight pregnant women in order for them to reap the full benefit of multiple-micronutrient supplementation and that balanced protein-energy supplementation should therefore be provided to undernourished pregnant women (we assume 10%), but include only the impact of multiple-micronutrient supplementation.

**FOOD AND NUTRITION COMMUNICATION AND EDUCATION CAMPAIGN**

A Cochrane review of 5 randomised controlled trials on nutritional education found that women who received nutritional education during pregnancy increased their protein intake and were at a lower relative risk of preterm birth (by 54%) or having a low birthweight baby (by 96%). Among undernourished women, birthweight was increased by an average of 490 g by receiving nutritional education, but did not increase significantly for women who were already adequately nourished. Nutritional education took the form of in-home nutritional counselling or nutrition classes (Ota et al., 2015). However, the evidence for each outcome was based on only one or two trials, and is thus not sufficient to draw any firm conclusions on the effectiveness of nutrition education campaigns. Nutrition education could take a number of forms, for example as part of existing antenatal care visits, through nutrition education classes or by means of a mass media campaign.

**THE LINK BETWEEN LBW AND LATER OUTCOMES**

² There is some evidence to suggest that nutrition interventions may need to be continued beyond pregnancy and into the child’s first 2 years of life in order to have a sustained impact. A protein-energy supplementation programme in Guatemala for both pregnant women and children under 6 led to significant improvements in educational attainment (1.2 grades, for women only), reading comprehension and nonverbal cognition (approximately 0.25 SD) in adulthood. The effects were larger for children who received the intervention from pregnancy to age 3 than for those who only received it from age 3 to 6 (Tanner, Candland and Odden, 2015; Maluccio et al., 2009).

³ The average effect masks the fact that supplementation may have had a very large effect for some, such as undernourished mothers, but no effect for others. However, the average effect is the only data we have.

⁴ Surprisingly, birthweight is not correlated with SES or income/expenditure measures in this dataset.
There is substantial evidence that birthweight is related to outcomes in adulthood, such as height, educational attainment and earnings. LBW babies are more likely to die in infancy and are more likely to be stunted in childhood. Stunted children enrol in school later and attain a lower level of schooling. Birthweight is also related to cognitive achievement. Once they reach adulthood, those born with low birthweight are likely to be less productive and have lower earnings due to reduced schooling and cognitive ability or because those with a shorter stature tend to earn less on average. Moving a baby from a low birthweight status to a normal birthweight increases their earnings in adulthood by an estimated 5 to 10 percent a year. Costs associated with chronic diseases will also be reduced. Finally, the next generation may also benefit because stunted mothers may be more likely to have LBW children (Alderman and Behrman, 2006).

In a study of twins, Behrman and Rosenzweig (2004) find that an increase of 1lb (454g; around 0.9SD) in birthweight leads to nearly a third of a year more schooling. In Adair et al. (2013), a standard deviation increase in birthweight was associated with around 0.2 years more schooling. The average effect size of multiple-micronutrient supplementation on birthweight in Haider and Bhutta's Cochrane Review (2015) was 0.16SD. A 0.16SD increase in birthweight due to multiple-micronutrient supplementation would lead to around 5.86% of a year more schooling using Behrman and Rosenzweig’s estimate or 3.2% of a year more schooling using Adair et al.’s estimate.

**COST**

Multiple-micronutrient supplementation would cost approximately R49 per pregnant woman per year, assuming supplementation for 6 months of pregnancy (see appendix for costing assumptions). Providing multiple-micronutrient supplements for 80% of the targeted 65% of pregnant women would thus cost R25.5 million per year.

Balanced protein-energy supplementation would cost approximately R509 per pregnant woman per year, assuming supplementation for 6 months of pregnancy (see appendix for costing assumptions). Assuming coverage of 10% of all pregnant women, it would thus cost about R50.9 million per year to provide balanced protein-energy supplements for these women.

Based on the assumption used in the OneHealth tool costing of mass media campaigns for HIV prevention of US$1 (R12.76 at the average 2015 exchange rate) per person reached (Avenir Health, 2013), and assuming 80% coverage of the targeted 65% of women, a mass media campaign to promote maternal nutrition during pregnancy would cost R6.6 million. This is a very rough assumption and the cost of a nutrition education campaign would vary widely according to the form of programme chosen.

A package of nutrition interventions in pregnancy – multiple micronutrients for 65% of pregnant women, food (balanced protein-energy) supplementation for undernourished pregnant women, and a mass media and antenatal care-based education campaign targeted at 65% of women to encourage optimum nutrition during pregnancy – would cost R83 million per year.

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5 Haider and Bhutta’s Cochrane Review (2015) did not report on birthweight specifically (their outcome was the risk ratio for low birthweight). This effect size was calculated from the studies included in their review that measured birthweight and showed a significant effect on birthweight. One study was excluded because it appeared to be an outlier.
PRE-REGISTRATION FOR THE CHILD SUPPORT GRANT

The policy calls for women to be pre-registered for the Child Support Grant (Child Support Grant) during pregnancy so that children can receive the benefits of Child Support Grant from birth.

An increase in the length of exposure to the Child Support Grant may have positive effects on child outcomes. International research on length of exposure to cash transfers is limited, but there is some suggestive evidence that longer exposure is associated with greater benefits. The impact of Mexico’s Progresa programme on child illness rates was stronger the longer children were exposed to the programme (Gertler, 2004). Similarly, the longer children were exposed to Colombia’s CCT programme, the greater the improvement in their educational attainment and school registration rates (Villa, 2014).6

The effect of the Child Support Grant in South Africa has also been shown to be sensitive to length of exposure to the grant. Agüero, Carter and Woolard (2009) show that the Child Support Grant has no significant effect on HAZ when children receive the grant for less than 50% of the first 3 years of their lives (18 months). However, a child receiving the grant for two-thirds of this time period (i.e. 2 of the 3 years) has a HAZ score 0.20 higher on average than a child who receives the grant for a very short time (1% of the first 3 years)7. Using the same method, but applied to children up to 14 years of age, Coetzee (2013) finds that when children receive the Child Support Grant for 40% rather than 30% of their lives their HAZ score increases by 0.043. When children receive the Child Support Grant for 50% rather than 40% of their lives, the probability of repeating a grade decreases by roughly 4 percentage points. Monthly household food expenditure also increased.

In sum, pre-registration for the Child Support Grant during pregnancy would increase the amount of time that children receive the grant, and expose them to the benefits of the grant for a longer proportion of the crucial first two years of their lives. There is some evidence that a longer exposure to the grant may have beneficial effects on children’s height-for-age and grade progression.

In Agüero, Carter and Woolard (2009), the average application delay among children who received the Child Support Grant at some point in the first 3 years of their life was 329 days. In Coetzee (2013), the average application delay for children who received the grant was 765 days.8 Based on Agüero, Carter and Woolard (2009), we take the average delay in grant receipt to be 12 months from birth, but this may be an underestimate.

The administrative costs of delivering social grants currently make up around 5% of the total budget for social grants (National Treasury, 2016a). Assuming an administrative overhead of 5%, paying the grant to 80% of the eligible 65% of children for an extra year of their lives would require an extra R2.3 billion a year.

6 These programmes were both conditional cash transfers, so the impact of the programme may have come from the conditionalities attached to the programme rather than the cash transfer itself.
7 Given that this comparison is between receiving the grant for 2 years and receiving it for less than a month, this effect size is not very large.
8 This difference may be due to the fact that Coetzee’s analysis included children up to the age of 14, while Agüero, Carter and Woolard (2009) only included children up to the age of 3. The age limit for grant eligibility was progressively extended, and older children thus became eligible for the grant at a later age.
REFERENCES


ANNEX D: HOME VISITS FOR AT-RISK MOTHERS OF CHILDREN UNDER 2 YEARS OF AGE

INTRODUCTION

The national integrated early childhood development policy of South Africa defines home-visiting programmes as the “delivery of services at the household level to parents/primary caregivers and young children for the purposes of providing information, supporting early learning and development, and promoting referrals and linkages to support services” (p. 14). The policy identifies this as an effective strategy considering the demographics of South Africa whereby early childhood services are not accessible to a large proportion of the population whether it be due to the dispersion of population groups, financial constraints (i.e. transport) or ill health. Home-visiting programmes overcome these barriers as they enable trained individuals (i.e. community health workers) to go directly to the households with young infants in order to provide information regarding early childhood developmental needs, act as a referral system for support services such as grants, provide health and nutrition guidance, give psychosocial support, and assist caregivers in fostering an environment conducive to early learning (Republic of South Africa, 2015).

WHAT DOES THE EVIDENCE FROM DEVELOPING COUNTRIES SAY ABOUT HOME-VISITING PROGRAMMES?

Evidence from various developing countries suggests that home-visiting programs to support caregivers in the early years of a child’s life are affordable and worthwhile. Follow up studies have found that benefits accrue for the individual over their life time and for the community and society where they are implemented. Given their success, a number of these programs have been implemented. The Care for Child Development intervention has been implemented in various countries in Eurasia and sub-Saharan Africa (Petrovic and Yousafzai, 2013). A home-visiting programme in Cuba called ‘Educate Your Child Program’ became part of the national government action plan (Bernard van Leer Foundation, 2011), and the ‘Roving Caregiver Programme’ has been implemented in five Caribbean and Mediterranean countries (Wint and Janssens, 2008).

Home-visiting programs have been found to be most successful when targeting vulnerable or at-risk populations (Tanner, Candland and Odden, 2015), and these findings have informed the policy with regard to who should be included in the roll-out of the intervention. The South African policy defined vulnerable children as:

“those who experience compromised caregiving and/or compromised access to quality early childhood development services because of one or more structural, social, familial or any other risk factor associated with poor access to services, and/or poor early childhood outcomes” (p.16).

The above definition of vulnerable children incorporates a long list of possible candidates who would be considered eligible to be included in the home visiting programme. Examples of vulnerable groups that are particularly prevalent in the South African context and outlined in the policy include those who are living with a disability; residing in households with high poverty; children infected or affected with HIV and AIDS; orphans; child-headed households; living in households without municipal services; and children exposed to violence and substance abuse (Republic of South Africa, 2015).
THE JAMAICAN STUDY

We investigate the possible investment value of implementing a national home-visiting intervention in South Africa that would target at-risk caregivers and children who are under the age of two years. Since no actual programme of this description currently exists, a hypothetical case is made using data from another successful intervention that had similar objectives and context to that of the policy and South Africa respectively. Although there have been a number of successful interventions, this study was selected because of the long period of follow up (20+ years), allowing us to discuss long-term outcomes.

The Jamaican study was conducted in Kingston, Jamaica during the period of 1986 to 1987. The at-risk population they focused on was stunted children. A total of 129 stunted children aged 9 to 24 months were enrolled in the study and randomly assigned into one of four intervention groups (psychosocial stimulation; supplementation; combined stimulation and supplementation; and control) and a fifth group of non-stunted children were used for comparison purposes.

The nutritional supplementation intervention involved providing the households with a weekly supply of formula that was high in protein and energy while the psychosocial stimulation intervention involved weekly one-hour home-visits in which community health aids conducted play sessions with the infant and caregiver whilst demonstrating how to engage in play, and how to respond to the infant’s needs. The community aids brought home-made toys with to each visit which they left with the caregivers, the toys were rotated on a weekly basis (Gertler et al., 2014). For our purposes we are most interested in the stimulation aspect, not the nutrition.

OUTCOMES FROM THE JAMAICA STUDY

The psychosocial stimulation intervention was selected as its objectives coincided with the objectives of the policy under the section of early learning opportunities; that is to develop the children’s cognitive, language and psychosocial skills. Furthermore, the stimulation intervention arm demonstrated an array of social and economic benefits that accrued both over the short and long term and which outweighed the limited benefits that resulted from the supplementation arm. For example, language abilities were improved by 14 percent in the intervention stimulation group compared to the control group when participants were evaluated at age 11 and 12 years (Walker et al., 2000), and an increase of 59 percent was seen in the reading abilities of the intervention group when compared to the control group (Walker et al., 2005). In term of school years completed, the control group averaged nearly 11 years, the stimulation intervention improved this average by 0.6 years. Improved school may help explain the higher rates of employment (65% vs 77%) (Gertler et al., 2014).

The psychosocial stimulation intervention also resulted in significant improvements in average mental health outcomes. At 17/18 years of age, depression rates were nearly 40% percent lower in the stimulation group, anxiety 15 percent lower, and attention deficit disorder 36 percent lower (Walker et al., 2006). These are important differences on both a social and economic scale as the prevalence of mental health disorders is rising in South Africa and it is said that one in four citizens experience a type of disorder (Bailey, 2016). Mental health challenges can affect an individual’s ability to function and excel in life as the individual experiences negative symptoms such as fatigue, loss of appetite, lack of concentration or a loss of motivation all of which would affect health, schooling and labour market outcomes (Bailey, 2016). Mental health disorders have been estimated to cost South Africa 2.2 percent of the gross domestic product on a yearly basis as well as increase poverty rates as afflicted persons struggle to carry out their daily routines (Dreary, Strand, Smith and Fernandes, 2007).
Prioritizing investments in early childhood development in South Africa

An outcome of significant interest here is that of IQ also known as the $g$ factor which is a construct designed to represent general intelligence and which the literature has long linked to improved schooling outcomes. Multiple studies on the relationship have all indicated towards a high correlation between IQ and school performance (Dreary et al., 2007; Kaufman, Reynolds, Liu, Kaufman and McGrew, 2012; Lynn and Meisenberg, 2010). For example, Lynn and Meisenberg (2010) examined the relationship between national IQ levels and school performance in three academic areas (math, reading comprehension and science) with a sample of 86 countries and found a correlation of .92.

The stimulation intervention was seen to lead to an 18% improvement in Raven’s scores (a measure of intelligence) over the control group at age 11/12 (Walker et al., 2000). If for the purposes of illustration we assume that such an intervention would lead to similar improvements in standardized testing, we can estimate what such an improvement would look like in South Africa.

Spaull and Kotzé (2015) have estimated the learning deficits of grade 4 learners by quintile. The figure below reproduces their results. They show that children from quintiles 1 to 4 are performing well behind those from quintile 5. They measure deficits in terms of effective grade. Essentially they are suggesting that grade 4 learners from quintile 1 are performing at below the grade 1 level. Assuming that at-risk learners will be from the lower three quintiles, the right hand side of the figure shows the difference an 18% increase in IQ would make to their effective grade. The improvements are substantial, lifting all groups about the grade 1 level. However, given the magnitude of the deficit, they do little to address the inequality in outcomes.

**Figure 10: Potential reduction in learning deficits of Grade 4 learners with home visiting programme**

**WHAT WOULD IT COST TO DO THE JAMAICA STUDY IN SOUTH AFRICA?**

We estimated the cost of replicating the intervention in the South African context. We assumed that at-risk children from the poorest 65 percent of the population would be targeted. Further, we assumed that 30 percent of these children would be at risk. The primary reason for being at risk would be having an HIV positive caregiver.
To reach 80 percent coverage of this target population would cost approximately R800 million per annum. This consists of costs relating to both personnel (human resource aspect) and operational (materials etc.). Personnel costs include paying 15 600 community health workers at R3500 per month from the department of health with a ratio of one community health worker per twenty at-risk children. Furthermore, 520 supervisors will need to be employed with a ratio of one supervisor per thirty community health workers, and a project coordinator will be needed for each of the 52 health districts. Non-salary costs include materials and travel and communication stipends for the community health workers.

CONCLUSION

Home-visiting programs (as outlined in the policy) have demonstrated considerable success in a number of developing countries. We examined the likely cost and impact of replicating an early childhood stimulation intervention from Jamaica which has the benefit of over 20 years of follow up. Replicating the intervention in South Africa would cost approximately R800 million per annum to provide services to at-risk children. Such expenditure would likely lead to improved cognitive outcomes for targeted children, leading to better school performance and associated long-term employment and income benefits. Although the impacts would be substantial, they would still be small relative to the education (and associated outcomes) inequalities. Moreover, it would likely improve mental health outcomes during adolescents.

REFERENCES


Prioritizing investments in early childhood development in South Africa


ANNEX E: PLAYGROUPS FOR MOTHERS AND CHILDREN

INTRODUCTION

Play is a child human right and it is acknowledged to be a fundamental aspect of early childhood development. Through play children explore their environment and begin to accomplish early developmental milestones such as acquiring social, emotional and motor skills. Playgroups are based on the same principles and therefore include activities whereby children learn through play. It is a more informal method of learning that aims to foster language, conceptual and socio-emotional development which is overseen by a trained playgroup facilitator (Republic of South Africa, 2015).

Playgroups differ in the degree of structure (e.g. free play versus rigid curriculum); whether a community mother facilitates it or a trained professional; and whether it is held in a formal centre such as part of a school or within a community setting. Playgroups can also be differentiated according to age group and can vary in terms of the population targeted (universal; disadvantaged; affluent), as well as the type of services included (healthcare; educational; play; nutrition) (Williams et al., 2015).

The ECD Policy defines a playgroup as: ‘A group of young children organised for play or play activities for early learning and development (cognitive, language, motor, emotional, social). A playgroup is attended by children from birth until the year before they enter formal school, usually accompanied by their mothers and/or fathers or primary caregivers, and supervised by a voluntary or paid playgroup facilitator.’ (2015: 13)

Playgroups are further categorized in the policy according to age group whereby the older the age group, the more formalized the structure. This report is interested in playgroups for the age group of birth to three years. The policy specifies that these playgroups should aim to provide a stimulating play environment for children, whilst the caregivers can socialize and receive information on early childhood development (Republic of South Africa, 2015).

WHAT DOES THE LITERATURE SAY ABOUT PLAYGROUPS?

Infants are born with the potential to accomplish great things and to grow into active adults from which society benefits. Yet, research suggests that unless this potential is nurtured it fades over time. Early stimulation interventions have been shown to have the potential to place children on a life trajectory whereby their initial potential is fostered and developed preventing it from diminishing. Early stimulation interventions can take different forms (i.e. playgroups, home-visiting, centre-based) yet no matter what the design is they are all attempting to accomplish the same broad goal which is to develop the infant into an active and prosocial member of society.

A wealth of evidence exists for early stimulation programs. For example, a cluster randomized control trial was conducted in three countries in the Caribbean where caregivers were shown short films relating to early childhood development, and given demonstrations by lady health workers whilst waiting in primary health care units. The study showed significant cognitive gains as well as improved parental knowledge (Chang et al., 2015). The widely cited Jamaican study also resulted in significant outcomes across a range of domains including language, cognitive, schooling and psychosocial development (Gertler et al., 2014). Although playgroups are considered early stimulation programs, there is no high quality evidence which shows that they actually work, and that they will achieve the positive outcomes that other early stimulation interventions exhibit such as home-visiting programs. Studies on playgroups are few and far between and those that are available are methodologically weak.
For example, the World Bank undertook a comprehensive systematic review of all early childhood interventions and could not include any on playgroups as no studies met the quality criteria (Tanner, Candland & Odden, 2015). The studies that exist are mainly qualitative with a small sample size and have only short-term follow-ups making it uncertain whether any observed outcomes would persist into adulthood (Pourliakes et al., 2016; Williams et al., 2014).

The limited evidence which is available suggests that children who attend playgroups develop socialization skills and emotional adaptability, as well as exhibit more positive behaviours (Grealy et al., 2012). Furthermore, the studies suggest that playgroups result in improvements in the cognitive and language domains (Tripathy et al., 2010), as well as increasing the time spent engaging in outdoor play (Weber et al., 2014). For the female caregiver, participating in a playgroup has been shown to increase social support as they provide females with the opportunity to intermingle and increase their social networks which can raise the caregiver’s self-esteem and confidence (Grealy et al, 2012; Hancock et al, 2015; Strange et al, 2012). Increased social support has also been linked to reduced anxiety (Boyd 2002; Scrandis 2005), and decreased stress response and depression (Heinrichs et al. 2003; Tripathy et al. 2010). For example, a cluster-randomized controlled trial in rural India conducted monthly group meetings with prenatal women using a participatory action approach. The study found that one of the outcomes was a reduction in moderate depression that was attributed to increased social support and the engagement in problem solving activities (Tripathy et al., 2010). A playgroup is also a place where caregivers can become more informed about early childhood development and available services by means of communication with the playgroup facilitator (Cotlands, 2014; Grealy et al., 2012; Williams et al., 2015).

These positive outcomes are largely dependent upon regular attendance (Grealy et al., 2012) and is a recognized difficulty within the South African context (Tripathy et al., 2010). Attendance at playgroups is hindered by socioeconomic factors experienced by the poor (i.e. time and/or cost required travelling to the playgroup) who may make attendance not always feasible; furthermore, a noticeable drop in attendance occurs on grant collection days and when there is bad weather (Cotlands 2014). An example is the Ntataise Mosupatsela Playgroup and the Khululeka Infant and Toddler Support Program of the Sobambisana Project in South Africa which both experienced irregular attendance by caregivers that affected the success (Biersteker, Dawes and Hendricks, 2012).

In summation, the evidence for playgroups is weak and provides no surety of whether they would work and achieve the same outcomes as home-visiting programs. Therefore, we can only attempt to infer from existing studies what the outcomes would look like if implemented in the South African context and estimate the related costs. In doing so it is necessary to broaden the search criteria and include interventions which deliver playgroups through a home-visiting initiative as they employ a stronger research design (i.e. randomised; quasi-experimental) than the literature on standalone playgroups; and which have demonstrated the accumulative success of early stimulation interventions across the lifespan (Katz et al., 2011; Petrovic and Yousafzai, 2013).
THE PAKISTAN EARLY CHILD DEVELOPMENT SCALE UP (PEDS)

One such programme is PEDS which was selected to base the costing on as it is a cluster-randomized control trial which is widely cited in the early childhood development literature, and contains a playgroup component delivered alongside a home-visiting intervention (Gowani et al., 2014). The playgroup component involves monthly group meetings facilitated by Lady Health Workers for the duration of 1hr and 20 minutes. Both prenatal women and caregivers with infants are admissible and each group is limited to ten participants and their child. Each meeting focuses on a specific early childhood development topic and participants are given demonstrations of how to engage in play with their infants using homemade toys and household items whilst the infants and children are provided with an opportunity to engage in play activities. The group being designed in such a way promoted learning from peer group participants, building a social network that reduced stress through social interaction, and an environment which promoted problem-solving skills (Gowani et al., 2014). Similar in design to the group intervention in India, reduced maternal depression could be hypothesized to also be an outcome (Tripathy et al., 2010).

WHAT WOULD IT COST TO IMPLEMENT THE PEDS PLAYGROUP IN SOUTH AFRICA?

The PEDS research team conducted a cost-effectiveness analysis of implementing the early stimulation intervention (both home visiting and playgroup component) within existing health service infrastructures. The results estimated a monthly cost of US$4 per month per child with a concluding remark that this sum could possibly be reduced if the intervention was expanded to scale (Gowani et al., 2014; Petrovic and Yousafzai, 2013). In using the PEDS trial to estimate what it would cost to implement a playgroup in South Africa, certain adaptions were made to the original design in order to accommodate the specifications in the policy (refer to annexure 1). Some of these modifications include hosting biweekly meetings rather than monthly meetings and extending the duration of the playgroups to two hours. We estimate a cost of R1,500 per child per annum. This implies an annual cost of R2.3 billion to reach 80% of the target population of 0-3 year olds; the target population comprising of the poorest 65%. For details on the assumptions behind these figures, see the costing annex.
REFERENCES


ANNEX F: CENTRE-BASED SERVICES

BACKGROUND

The National Integrated early childhood development Policy mentions centre-based early learning programmes as part of a continuum of care and early learning services from birth until school. It emphasises the need to provide safe care in the absence of parents or caregivers, as well as the need to provide high quality opportunities for early learning and development. Programmes should promote emotional and social development and prepare children for school through play-based learning.

Centre-based services can improve children’s cognitive ability and help prepare them for school (early stimulation and learning). Moreover, they can provide a safe place for children to be cared for, thereby freeing up the time of caregivers for other tasks, including work or job search (day care). There are, however, large gaps in access to centre-based early childhood development programmes for South African children, and even larger gaps in access to quality services, which is concerning given the importance of quality in ensuring improvements in child outcomes. The ECD Policy calls for increased access to quality early childhood development centres. It proposes supporting the delivery of these services through training, post provisioning and centre subsidies.

The 2014 General Household Survey (Statistics South Africa, 2015) suggests that of the 2.1 million children 3-4 years of age 50 per cent of them are in a crèche or some form of early childhood development centre. A further 5 per cent are already in grade R. Of the just over 1 million 5 year olds, 27 per cent are in a crèche or early childhood development centre and 55 per cent are in grade R (or higher). Crèche and early childhood development attendance is lowest among the poorest households (Hall et al., 2016).

Centre-based preschool programmes have been shown to have lasting effects on child development – when they are of sufficiently high quality. Three of the best-known international studies are the evaluations of the High/Scope Perry Preschool Project, Carolina Abecedarian Project and Chicago Child-Parent Centre Programme. These were high-quality centre-based preschool programmes conducted in the 1960s, 1970s and 1980s in the USA. All three were targeted at children from low socioeconomic status families, were rigorously evaluated and showed positive effects that persisted into adulthood. These programmes improved long-term outcomes such as years of schooling completed, high school completion, college attendance and employment (Reynolds and Temple, 2008; Currie, 2001).

There are fewer rigorous studies of centre-based services in developing countries. Most of the existing studies come from Latin America. Evaluations of centre-based preschool programmes have been conducted in Chile, Argentina, Uruguay, Colombia, Guatemala, Bolivia and Mozambique. These studies found positive impacts of attending a centre-based programme on various measures of child development, both in the short and long term (Leroy, Gadsden and Guijarro, 2011). These results suggest that early childhood development centres can have positive and lasting effects in both developed and developing countries when they are of sufficiently high quality, particularly for children from less affluent backgrounds.
THE HIGH/SCOPE PERRY PRESCHOOL PROJECT

As the best-known evaluation of a high quality preschool programme, an examination of the Perry Preschool Project can give us an idea of the potential impacts of such a programme on children’s outcomes, as well as what it would cost to implement a programme of similar quality in South Africa. The Perry Preschool Project was conducted in Michigan between 1962 and 1967 and was targeted at low-income African-American children. Children attended preschool classes at ages 3 and 4 for 2.5 hours a day, following a curriculum promoting participatory learning. There was one teacher for every six children, and teachers had at least a degree and certification in education. Teachers also conducted weekly 1.5 hour home visits to each family.

The programme was rigorously evaluated using a randomised design, allowing us to attribute differences in outcomes between the control and intervention groups to the influence of the programme. The children who attended the Perry programme had better outcomes than non-participants, with these improvements persisting into adulthood. Participating children initially showed improvement in various tests of cognitive function, but this improvement appeared to fade by the second grade. However, programme participants also performed better than non-participating children on standardised achievement tests, and this improvement persisted throughout the first four years of school. By age 19, 50 per cent of those who attended the Perry programme were employed, compared to only 32 per cent of those who did not. By age 27, programme participants had completed nearly an extra year of education on average (11.9 years versus 11 years). They also had higher average monthly earnings (US$1219 versus US$766) and had been arrested an average of 2.3 times, compared to 4.6 times for non-participants (Weikart et al., 1970; Reynolds and Temple, 2008; Currie, 2001).

The Perry Preschool Project offers an example of the type of outcomes that can be achieved by a high quality centre-based early childhood care and education programme. The estimated cost of a Perry-type programme in South Africa would be R86 per child per day for 2.5 hours plus a 1.5 hour home visit roughly every week. The centre operating cost is derived from the average cost per child per day in 6 studies as calculated by Ilifa Labantwana (forthcoming). We use their non-personnel costs (32% of the total cost) plus personnel at similar ratios and qualification levels to those in the Perry preschool programme, plus an allowance for one additional assistant (for example a gardener, cook, cleaner or security) per 30 children at a salary of R3500 per month.

The estimated cost only takes into account personnel and centre operating costs, and excludes any provincial and national management, site supervision, infrastructure, equipment and training costs. It also excludes food. Essentially it is the centre-based cost of a programme with the same early childhood development practitioner-child ratios and similarly qualified personnel but remunerated at South African salary levels. The largest part of this cost is driven by the high quality of personnel inputs used in the Perry Project. As the cost is based on the Perry Preschool model, it covers only 2.5 hours per day. Such a programme would not include the benefits of providing a full day of childcare in terms of freeing up caregivers’ time and potentially allowing them to enter the labour market.

The ECD policy includes the proposal that early childhood development practitioner posts will be paid for by government, in addition to the per-child operating costs for centres. Providing practitioner posts at the maximum staff-child ratio of 1:20 for 3 and 4 year olds as stipulated in the norms and standards for early childhood development centres would cost R14 per child per day. This covers only the cost of practitioner posts and not of centre management/principals. Adding this to the current centre subsidy of R15 per child per day gives an effective subsidy of R29 per child per day. This means that implementing a project of similar quality to the Perry Project in South Africa would cost nearly 3 times
the proposed total subsidy, and provide only 2.5 hours of care per day. To achieve 80% coverage of the target population (poorest 65% of the population) would, therefore, cost more than R16 billion per annum in centre costs alone. If, as some have suggested, the state were to cover the cost of 8 hours of day care, maintaining this standard would push centre running costs to more than R33 billion.

It is highly unlikely that SA early childhood development centres would be able to achieve similar outcomes to the Perry Project unless they were allocated similar resource levels. Furthermore, even if the quality of the Perry programme could be replicated in SA, similar improvements in lifetime outcomes would only be achievable if the programme was followed up by primary and secondary education of similar quality to that in the US. A large part of the benefit of early intervention is that it allows children to get more out of subsequent services. However, if those services are absent or of very low quality, the potential to get more from them is constrained.

The Perry Preschool approach is costly. Moreover it emphasises only child development rather than child development and care. A number of actors in South Africa stress the important role of centre-based services in providing a safe environment for children while their caregivers work or seek work. This requires more than 2.5 hours per day. A large-scale developing country programme may provide a more realistic model. Such programmes operate within similar cost constraints and the importance of providing care is similarly stressed.

A randomised controlled trial of a preschool programme conducted in rural Mozambique (Martinez, Naudéau and Pereira, 2012) showed positive effects of preschool attendance on primary school enrolment and certain measures of child development (the Ages and Stages Questionnaire, but not the Peabody Picture Vocabulary Test), including cognitive development. This programme was implemented at a low cost, suggesting that it may be possible to achieve some benefits even with a low cost preschool programme (far lower than the costs of a Perry-type programme or one similar to the Chilean programmes). However, the Mozambican programme has limited applicability to the South African context. Firstly, primary school enrolment is close to full enrolment in South Africa but comparatively low in Mozambique. An increase in primary enrolment as a result of a preschool programme is thus valuable in Mozambique but would have no further benefit in South Africa. Furthermore, the positive effect on cognitive development found by the study was based on first grade teachers’ assessment of children in their class. As teachers knew whether children had attended preschool, this measure may be subject to bias. In addition, some of the measures of child development that were significantly affected by the programme may be picking up school readiness rather than cognitive development. Greater school readiness is valuable, but unlikely to have lasting effects on achievement, as it is something that is relatively easy to catch up. For the purposes of investigating the potential effects of centre-based early childhood development programmes in South Africa, it is preferable to use a study that reports on outcomes later in life than the first grade and that reports on achievement in standardised tests, such as the study of the Chilean preschool programmes by Cortázar Valdés (2011). Finally, the Mozambican study evaluated a small-scale programme that relied on volunteers. The results of such a programme would not necessarily be replicable on the national level. Mozambique is also a low-income country with a lower level of human development than South Africa, and thus the improvements in child development in this study come off a lower base. It is unclear whether a similar programme would have similar effects in South Africa.

**CHILEAN PRESCHOOL PROGRAMMES**

Chile’s preschool programmes provide a more realistic model for South Africa. The state-funded organisations JUNJI and Integra run public centre-based programmes for children aged up to 5 years,
operating for 9 hours daily. The programmes are targeted at the poorest 60 percent of children. Both programmes employ one early childhood assistant with a two-year technical degree for every sixteen children (or twenty children in the case of Integra programmes for children aged between 3 and 5), with a maximum class size of 32 children. Each centre also has a programme director with a four-year early childhood degree. A second early childhood educator with a four-year degree is employed if a centre has more than 64 children in the case of JUNJI or 161 children in the case of Integra. Both programmes also include meals that provide roughly 70 per cent of the required calories (Cortázar Valdés, 2011).

Cortázar Valdés (2011) estimated the impact of Chile’s JUNJI and Integra preschool programmes on children’s test scores several years after they had received the services. Children who attended a JUNJI or Integra ECCE programme scored between 0.17 and 0.21 standard deviations higher on Grade 4 mathematics, reading and social science tests than comparable children who did not attend an ECCE programme. These programmes had the greatest effect for children from the second and third SES quintiles (0.18 and 0.1 standard deviations respectively for mathematics). There appeared to be no effect for children from the upper SES quintiles, and for children from the lowest quintile attending an ECCE centre only had a significant (but relatively small) effect for mathematics (0.08 standard deviations).

Using previous research by Spaull and Kotzé (2015) and Van der Berg (2015) on the learning trajectories of South African learners through their school careers, we can get an idea of what an improvement in Grade 4 maths scores of a similar magnitude to that achieved by the Chilean programmes might look like in SA. Spaull and Kotzé (2015) investigate mathematics learning trajectories of SA students from Grade 3 to Grade 9 using the NSES, SACMEQ and TIMSS data. They estimate 0.3 standard deviations of test performance indicates approximately a year’s worth of learning in mathematics. Using this they calculate the learning deficits of students in Quintiles 1-4, using the average performance of Quintile 5 students as a benchmark for the grade-appropriate level. The first cluster of bars in Figure 11 shows the effective grade of Grade 4 learners by quintile. Quintile 1 and 2 students are already 3.4 grade-levels behind. In other words, they are performing at a Grade 1 level in Grade 4.

Applying the effect sizes estimated by Cortázar Valdés for each quintile and converting them into years of learning using Spaull and Kotzé’s rule of thumb that 0.3 standard deviation of mathematics scores is roughly equal to 1 year of maths learning, we can illustrate the expected improvement in effective grade if a South African early childhood development centre programme for the poorest 65 percent of children could achieve an increase in Grade 4 mathematics scores of a similar size to that achieved in Chile. The second cluster of bars in Figure 11 shows the effective grade with these learning gains. The greatest improvement would be for Quintile 2, but this equates to an improvement of 60% of one grade level – from an effective grade of 0.6 to an effective grade of 1.2 for Grade 4 learners. While this improvement would be valuable, it would still leave children 2.8 years behind the appropriate level for their grade.

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9 The effect of the JUNJI and Integra programmes was estimated using propensity score matching. This method constructs an artificial control group by matching on similar characteristics. However, it can only take into account observable characteristics. If those who attended a preschool programme and those who did not differ in their unobservable characteristics (such as their parents’ motivation or taste for education), propensity score matching may overstate the impact of the programme.

10 This graph uses the data on learning deficits and effective grade contained in the online appendix of Spaull and Kotzé (2015).
Prioritizing investments in early childhood development in South Africa

Figure 11: Potential reduction in learning deficits of Grade 4 learners

Van der Berg (2015) shows that the pattern of relative performance across quintiles in Grade 4 closely resembles matric performance patterns (Figure 12). This implies that most children who are behind in Grade 4 are unlikely to catch up. On the other hand, the relatively flat learning trajectory implies that an improvement in Grade 4 outcomes may persist to Grade 12 at least to some extent. If a centre-based early childhood development programme were to improve Grade 4 test scores as it did in Chile, it may thus also increase the number of bachelor’s passes in matric for the children who benefited from the centres approximately 14 years later.

Children in Quintiles 1-4 fall so far behind their Quintile 5 peers (and the grade-appropriate level) in the first few years of school that a centre-based early childhood development intervention on its own would be insufficient to make a major dent in this gap, and large learning deficits would remain both in Grade 4 and for the remainder of children’s school careers. Furthermore, as with the Perry Project, similar improvements to those estimated for Chile could only be attained in SA if attendance at an early childhood development centre was followed up by foundation phase education of a similar quality to that in Chile.

Figure 12: Percentage of children ‘on track’ in each grade

Source: Van der Berg (2015)
FUNDING

The estimated cost of a programme similar to the Chilean preschool programmes would be R33.60 per child per day for a 4 hour day. This estimate is derived from the average non-personnel cost per child per day in 6 studies as calculated by Ilifa Labantwana (forthcoming) plus personnel at similar ratios and qualification levels to those in the Chilean preschool programmes, plus an allowance for one additional assistant per 30 children at a salary of R3500 per month. However, the existing costings of centre-based early childhood development programmes in South Africa vary substantially. The cost of a programme similar to those in Chile could potentially be as low as R26.29 per child per day (derived from Ilifa Labantwana’s costing model for a 60-child centre but using the staffing levels of the Chile programmes) or as high as R46.87 per child per day (derived from a costing by KPMG (2012) but using the staffing levels of the Chile programmes). The total cost of subsidising 4 hours per day of centre-based early childhood development programmes of similar quality to those in Chile at a coverage level of 80% of the targeted 65% of children between the ages of 3 and 4.5 years would be R6.5 billion per year. This does not include the cost of supervision. We would expect that good management and supervision are crucial to the delivery of quality early childhood development programmes. Based on various assumptions (see costing appendix) a supervision structure would add R200 million per year.

There is some debate as to whether the conversion from annual costs to costs per day should be done on the basis of the assumption that centres are open for 200 or 248 days per year. Centres are eligible for the grant for 264 days per year, but the maximum number of working days per year is 248. The Ilifa Labantwana costing assumes that centres are open for 248 days per year, taking into account that they cannot be open on public holidays. However, many centres may follow school terms and thus only open for 200 days per year. For the purposes of comparability we follow the Ilifa assumption that centres are open for 248 days per year.

Furthermore, we assume that government will subsidise 4 hours of an 8 hour programme, and thus that only half of the fixed costs of operating a centre will be subsidised. Based on this assumption, 8 hours a day would cost double i.e. R68. It is assumed that if a centre remains open for a full day the fixed costs for the other 4 hours will be privately funded (e.g. by fees). This means that the costing is fairly conservative. If a centre only operates for 4 hours a day the subsidy would be insufficient to cover the total operating cost, because they will still face the same fixed costs (such as rental) of operating a full day programme even though the programme is only operating for half the day. This situation may increase inequality between early childhood development centres, as those centres that are unable to marshall sufficient funding from parents or other sources to cover the cost of offering a full day programme may not receive sufficient funding from the subsidy alone to cover the full cost of operating for a half day. Given the experience of Perry Preschool and similar programmes, it would not be unreasonable to assume that the developmental benefits would be realized as a result of a 4 hour investment. The care benefits would, however, be cut right back.

Even at 4 hours per day the cost is greater than the prospective total subsidy of R29 per child per day. Providing centres that could potentially achieve improvements in child outcomes similar to those achieved by the Chilean programmes would therefore require an additional R5 per child per day. One way this shortfall could be made up would be with user fees. A 2011 Department of Basic Education, Department of Social Development and UNICEF study of early childhood development centres gathered information on the average fees paid by parents in each quintile. As this data was gathered from early childhood development centres in only 3 provinces, and centres were assigned to quintiles based on the quintile of the nearest school, these figures may not be entirely accurate, but nonetheless provide a useful idea of average early childhood development centre fees. Table 1 shows average fees...
by quintile, adjusted to 2016 prices. Parents of children in Quintile 1-3 early childhood development centres pay around R5 per day, and Quintile 4 parents R10 per day. Assuming that current average fees roughly represent what parents in each quintile are willing and able to pay, this implies that Quintile 1 to 3 parents may be able to supplement fees enough to achieve outcomes similar to those achieved by the Chilean programmes. However, this is only for a 4 hour programme, so parents would have to pay substantially more if they wanted a full day of childcare.

Table 3: Average early childhood development centre fees by quintile

<table>
<thead>
<tr>
<th>QUINTILE</th>
<th>AVERAGE USER FEES PER DAY (RAND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUINTILE 1</td>
<td>3.81</td>
</tr>
<tr>
<td>QUINTILE 2</td>
<td>4.47</td>
</tr>
<tr>
<td>QUINTILE 3</td>
<td>5.72</td>
</tr>
<tr>
<td>QUINTILE 4</td>
<td>9.86</td>
</tr>
<tr>
<td>QUINTILE 5</td>
<td>34.92</td>
</tr>
</tbody>
</table>

CONCLUSION

Early childhood development centres can have large positive impacts on child outcomes. In studies of the long-term impact of a number of the high quality interventions these positive outcomes have been shown to persist into adulthood. The key messages are the potential for large benefits and that these are contingent on high quality. A study by Van der Berg et al. (2013) evaluating the impact of the introduction of Grade R in SA reinforces the message. The study found no significant impact of Grade R on subsequent mathematics or home language performance for the poorest three quintiles of schools. However, Grade R improved performance in quintile 4 and 5 schools by 0.1 and 0.2 standard deviations respectively. Unless the quality of centre-based early childhood development programmes is significantly better than that currently provided for Grade R in the poorest three quintiles, there is little reason to believe they would have any positive effect on later academic performance.

The provision of quality early childhood development centres capable of generating sustained improvements in development outcomes would require a level of investment higher than that currently under discussion. Operating costs of approximately R34 per child per day would be needed. If this investment is made, we could expect to see improvements in subsequent school performance, which would likely continue through to improvements in the matric pass rate and associated impacts on earnings. However, the inequalities in school performance are so large, that even though such centres would lead to substantial improvements, these improvements would still be small relative to the gap between wealthy and poor children. In other words, a substantial investment in early childhood development centres will help poor children get more out of a broken education system, but will not fix the system.
REFERENCES


### Multiple micronutrient supplementation

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort size</td>
<td>1 million</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Just over 1 million children are born in SA every year (Hall et al., 2016)</strong></td>
</tr>
<tr>
<td>Target coverage</td>
<td>65% of pregnant women</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Children eligible to receive Child Support Grant</strong></td>
</tr>
<tr>
<td>Coverage level</td>
<td>80% of the targeted 65%</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Assumption</strong></td>
</tr>
<tr>
<td>Days covered</td>
<td>180</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Bhutta et al. (2013) costing assumption</strong></td>
</tr>
<tr>
<td>Unit cost per pregnant woman per year</td>
<td>R38.99</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Bhutta et al. (2013) – unit cost of multiple-micronutrient supplementation is 6.15 2010 $Intl.</strong>&lt;br&gt;<strong>Converted to 2010 ZAR using 2010 PPP exchange rate of 4.57, and then adjusted to 2016 prices using the SA CPI index.</strong></td>
</tr>
<tr>
<td>Unit cost per tablet per day</td>
<td>R0.22</td>
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<tr>
<td><strong>REASON</strong></td>
<td><strong>R38.99/180</strong></td>
</tr>
<tr>
<td>Overhead for delivery and other costs</td>
<td>25%</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Assumption</strong></td>
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### Balanced protein-energy supplementation

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<tbody>
<tr>
<td>Cohort size</td>
<td>1 million</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Just over 1 million children are born in SA every year (Hall et al., 2016)</strong></td>
</tr>
<tr>
<td>Target coverage</td>
<td>10% of pregnant women</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Assumption (rates of undernourishment are fairly low among SA women)</strong></td>
</tr>
<tr>
<td>Days covered</td>
<td>180</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Bhutta et al. (2013) costing assumption</strong></td>
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<tr>
<td>Unit cost per pregnant woman per day</td>
<td>R2.26</td>
</tr>
<tr>
<td><strong>REASON</strong></td>
<td><strong>Shaheen (2015) – unit cost was 0.1978 USD in 2013. This was converted to 2013 ZAR using the average Rand-Dollar exchange rate for 2013 of 9.66, and then adjusted to 2016 prices using the SA CPI index</strong></td>
</tr>
<tr>
<td>Unit cost per pregnant woman per year</td>
<td>R406.87</td>
</tr>
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<td><strong>REASON</strong></td>
<td><strong>R2.26*180</strong></td>
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<tr>
<td>Overhead for delivery and other costs</td>
<td>25%</td>
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<td><strong>REASON</strong></td>
<td><strong>Assumption</strong></td>
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## Maternal nutrition education campaign (mass media)

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort size</td>
<td>1 million</td>
</tr>
<tr>
<td>Target coverage</td>
<td>65% of pregnant women</td>
</tr>
<tr>
<td>Coverage level</td>
<td>80% of the targeted 65%</td>
</tr>
<tr>
<td>Cost per person reached</td>
<td>R12.76</td>
</tr>
</tbody>
</table>

### ASSUMPTION REASON
Just over 1 million children are born in SA every year (Hall et al., 2016)

Children eligible to receive Child Support Grant

Assumption

OneHealth tool costing assumption for mass media campaigns for HIV prevention was US$1 per person reached (Avenir Health, 2013). This is R12.76 at the average 2015 exchange rate.

## Pre-registration for child support grant

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort size</td>
<td>1 million</td>
</tr>
<tr>
<td>Target coverage</td>
<td>65% of pregnant women</td>
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<tr>
<td>Coverage level</td>
<td>80% of the targeted 65%</td>
</tr>
<tr>
<td>Average application delay (months)</td>
<td>12</td>
</tr>
<tr>
<td>Monthly grant amount</td>
<td>R350</td>
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<tr>
<td>Administrative overhead</td>
<td>5%</td>
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</table>

### ASSUMPTION REASON
Just over 1 million children are born in SA every year (Hall et al., 2016)

Children eligible to receive Child Support Grant

Assumption

The average application delay among children who received the Child Support Grant at some point in the first 3 years of their life was 329 days (Agüero, Carter and Woolard, 2009)

Child Support Grant value 2016/17 (National Treasury, 2016b)

Administrative costs of delivering social grants make up around 5% of the total budget for social grants (National Treasury, 2016a)
### PLAYGROUPS FOR MOTHERS AND CHILDREN

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
<th>REASON</th>
</tr>
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<tr>
<td><strong>Target coverage</strong></td>
<td>30% of Child Support Grant eligible infants The high risk population was estimated to be 30% of the 65% of the population to be covered by state services. Costs are calculated assuming 80% coverage of this population.</td>
</tr>
<tr>
<td><strong>Number of home visits per week</strong></td>
<td>1 per week/every 7 days Replication of Jamaica study.</td>
</tr>
<tr>
<td><strong>Duration of home visits</strong></td>
<td>60 minutes Replication of Jamaica study.</td>
</tr>
<tr>
<td><strong>PERSONNEL</strong></td>
<td></td>
</tr>
<tr>
<td>Community health workers to child ratio</td>
<td>1:20 Each community health workers will cover the households in a designated geographic area. Each home visit is 60 minutes in duration (as specified in the Jamaican study) and each household is visited once a week. A 6 hour work day is assumed. Therefore, each community health workers can visit 4 households per day (20 per week) taking into account travelling time.</td>
</tr>
<tr>
<td>Community health workers salary (p/m)</td>
<td>R3500.00 The Department of Health already has an existing infrastructure of CHWs. The current salary in 2016 was R3500.00 for someone in that position and therefore it is assumed that the same amount will be paid to the selected incumbents.</td>
</tr>
<tr>
<td>Supervisor to community health workers ratio</td>
<td>1:30 Replication of the Jamaica study.</td>
</tr>
<tr>
<td>Supervisor salary (p/m)</td>
<td>R16 318.25 Salary derived from a starting salary for a nurse in South Africa. This is because the Department of Health Ward Based Outreach Teams use nurses to supervise the community health workers activities.</td>
</tr>
<tr>
<td>Administrator</td>
<td>9 administrators employed on a full-time basis. 1 administrator per province.</td>
</tr>
<tr>
<td>Administrator salary (p/m)</td>
<td>R15 000.00 The assumed salary is a conservative estimate for persons who have a standard tertiary qualification such as a bachelor’s degree or equivalent.</td>
</tr>
<tr>
<td>Project coordinators</td>
<td>52 project coordinators employed on a full-time basis. The CHWs are part of the municipal ward-based primary healthcare teams. A project coordinator is assigned to oversee each municipal team which are differentiated</td>
</tr>
<tr>
<td>ASSUMPTION</td>
<td>REASON</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>Project coordinator salary (p/m)</strong></td>
<td>R28 000.000</td>
</tr>
<tr>
<td><strong>Project manager</strong></td>
<td>9 project managers employed on a full-time basis.</td>
</tr>
<tr>
<td><strong>Project manager salary (p/m)</strong></td>
<td>R48 500</td>
</tr>
</tbody>
</table>

**OPERATIONAL COSTS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Offices</strong></td>
<td>2 offices per province</td>
<td>One office will be shared by the senior management staff such as the project manager and project coordinator. The second office will be used by the administrator and other staff.</td>
</tr>
<tr>
<td><strong>Office rental</strong></td>
<td>R1100</td>
<td>Space rented from an existing infrastructure (e.g. university or government office block).</td>
</tr>
<tr>
<td><strong>Laptop</strong></td>
<td>70 laptops</td>
<td>Each management level staff member assumed to need a laptop.</td>
</tr>
<tr>
<td><strong>Laptop cost</strong></td>
<td>R15 000.00</td>
<td>Each item is amortized over a 3 year period at a 3% interest rate. The 3% is assumed to be the average real interest rate and the lifespan for a laptop is assumed to be 3 years.</td>
</tr>
<tr>
<td><strong>Printer</strong></td>
<td>18 printers</td>
<td>Each office will have a communal printer.</td>
</tr>
<tr>
<td><strong>Printer cost</strong></td>
<td>R5000.00</td>
<td>Amortized over a 3 year period at a 3% real interest rate.</td>
</tr>
<tr>
<td><strong>Clothing</strong></td>
<td>2 t-shirts per community health workers</td>
<td>T-shirts with identification of “Community Health Worker” will need to be purchased. It is assumed that two t-shirts are needed per community health workers employee so that they can alternate during the week when one is in the wash.</td>
</tr>
<tr>
<td><strong>Clothing cost</strong></td>
<td>R250.00 per t-shirt</td>
<td>Assumed to be replaced annually.</td>
</tr>
<tr>
<td><strong>Data plan</strong></td>
<td>R50.00 per community health workers per month</td>
<td>Each community health workers should be provided with data/airtime in case of emergencies or in times where more experienced guidance is required.</td>
</tr>
<tr>
<td><strong>Backpack</strong></td>
<td>R99.00</td>
<td>Each community health workers is required to carry toys with them to...</td>
</tr>
</tbody>
</table>
### Prioritizing investments in early childhood development in South Africa

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
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</tr>
</thead>
<tbody>
<tr>
<td>leave/collection from each household visited which requires a form of bag to transport the materials. It is assumed that the backpacks are purchased in bulk from a large distributor.</td>
<td></td>
</tr>
<tr>
<td>Homemade toys (e.g. string through can)</td>
<td>Toys are handmade by the CHWs who distribute them between the households. For cost-effectiveness and to maintain the children’s interest, these toys are rotated between the households on a weekly basis. Each household is given 2 toys at a time.</td>
</tr>
<tr>
<td>Transport stipend</td>
<td>It is assumed that the majority of the CHWs will not have cars and therefore either walk or catch a taxi to their designated households. A R20.00 daily allowance is provided for the purpose of covering this expense.</td>
</tr>
</tbody>
</table>

### PLAYGROUPS FOR MOTHERS AND CHILDREN

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target coverage</td>
<td>Children eligible to receive Child Support Grant.</td>
</tr>
<tr>
<td>Duration of playgroup</td>
<td>PEDS trial specified that their meetings were once monthly for the duration of 1 hour and 20 minutes. It is assumed that many of the parents reside in rural areas in South Africa and often have to travel great distances to centres/schools. Therefore, it is anticipated that 1 hour and 20 minutes would be off-putting to the parents, increasing the dropout rate and absenteeism. With this in mind the sessions have been extended to 2hrs.</td>
</tr>
<tr>
<td>Children per playgroup</td>
<td>A ratio of 1 facilitator per 10 children (1:10) is used which was specified in the PEDS trial.</td>
</tr>
<tr>
<td>Groups per week per child</td>
<td>Each caregiver and child will attend two playgroups per week as opposed to once a month (PEDS) conforming to the specifications of the ECD policy.</td>
</tr>
<tr>
<td>Groups per day if full-time</td>
<td>Assuming a 6 hour workday in which 4 hours are spent conducting playgroups (2x2) and 2 hours are provided to make allowance for unexpected events.</td>
</tr>
<tr>
<td>Children per full-time practitioner</td>
<td>Assuming each playgroup facilitator conducts 10 playgroups per week with 10 children in each group and each child attends twice weekly.</td>
</tr>
</tbody>
</table>

### PERSONNEL

<table>
<thead>
<tr>
<th>Playgroup Facilitator</th>
<th>It would be unfeasible to hire an individual for two hours per day so a six hour shift is allocated whereby each facilitator runs two playgroups per day (2x2=4hrs). The remaining 2hrs are reserved for random events such as travelling from one neighbourhood to another; setup/pack up; discussions with parents; overtime etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playgroup Facilitator salary (p/m)</td>
<td>The policy specifies that the playgroup is facilitated by either a ‘voluntary or paid playgroup facilitator’. CHWs are used in an attempt to replicate the PEDS trial. Moreover, the literature indicates that playgroups facilitated by non-trained individuals can have negative outcomes for both child and caregiver.</td>
</tr>
</tbody>
</table>

Unedited version
## Prioritizing Investments in Early Childhood Development in South Africa

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A salary of R3 500 per month is assumed (same as for home visiting) as the policy specifies that the CHWs must be employed from the existing infrastructure of the department of health and the current salary paid to those incumbents (January 2016) was R3500.00.</td>
<td></td>
</tr>
<tr>
<td>Community Health Supervisor</td>
<td>22:1 2 contacts per month with the playgroup facilitators.</td>
</tr>
</tbody>
</table>
| Community Health Supervisor salary (p/m) | R9028.00  
The PEDS trial paid the lady health supervisors a salary of $77 per month in 2012 which is equal to $81.14 in 2016 when inflation is accounted for. Converting this to the South African currency (ZAR) the monthly salary for the incumbents was R1162.71 which is considered unrealistic in this context. Therefore, the salary of R9028.00 will be assumed which is taken from a previous costing for that of an early childhood development facilitator (KPMG, 2012; adjusted for inflation)  |
| early childhood development Coordinator | 18 Two incumbent will be assigned per province.                                                                                                                                 |
| Early childhood development Coordinator salary (p/m) | R24 155.00  
The incumbents are required to have a minimum of an ECD level 5 qualifications, which is equivalent to a national diploma (higher certificate in ECD) as well as a minimum of three years’ work experience. Based on this assumption, the salary will be R24 155 per month which is the median salary for that position in South Africa. |
| Project Coordinator               | 9 Project coordinator per province.                                                                                                                                                         |
| Project Coordinator salary (p/m)  | R28 000.00 Slightly above the national average salary in South Africa for a project coordinator.                                                                                             |
| Project Manager                   | 9 Per province.                                                                                                                                                                             |
| Project Manager salary (p/m)      | R48 500.00 The salary for the project manager is assumed to be similar to the average salary of someone in that position in South Africa.                                                       |
### CENTRE-BASED SERVICES

#### Perry Preschool-Type Programme

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cohort size</strong></td>
<td>1 million</td>
</tr>
<tr>
<td><strong>Target cohorts</strong></td>
<td>Children aged 3-4.5 years; 1.5 million children</td>
</tr>
<tr>
<td><strong>Target coverage</strong></td>
<td>65%</td>
</tr>
<tr>
<td><strong>Coverage level</strong></td>
<td>80% of the targeted 65%</td>
</tr>
<tr>
<td><strong>Class hours</strong></td>
<td>2.5 hrs per day</td>
</tr>
<tr>
<td><strong>Home visits</strong></td>
<td>1.5 hrs per week/every 6 days</td>
</tr>
<tr>
<td><strong>Personnel</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Teacher-child ratio</strong></td>
<td>1:6</td>
</tr>
<tr>
<td><strong>Teacher qualifications</strong></td>
<td>4 year (education) degree</td>
</tr>
<tr>
<td><strong>Number of days in year</strong></td>
<td>248</td>
</tr>
<tr>
<td><strong>Teacher salaries (full-time)</strong></td>
<td>R19082 p.m.</td>
</tr>
<tr>
<td><strong>Half day/full day</strong></td>
<td>Half day</td>
</tr>
<tr>
<td><strong>Centre costs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cost per child per day</strong></td>
<td>R8.66</td>
</tr>
<tr>
<td><strong>Full day or half day programme</strong></td>
<td>Centres operate for a full day (8 hours), but only 4 hours are subsidised by the state. The state covers only half of the fixed costs.</td>
</tr>
<tr>
<td><strong>Children per centre</strong></td>
<td>60</td>
</tr>
<tr>
<td><strong>Food included</strong></td>
<td>No</td>
</tr>
</tbody>
</table>

**Reasons:**
- Just over 1 million children are born in SA every year (Hall et al., 2016)
- Just over 1 million children are born in SA every year (Hall et al., 2016)
- Children eligible to receive Child Support Grant
- Assumption
- Perry preschool hours
- Perry teachers made 1.5 hr weekly home visits
- Perry teacher-child ratio
- Perry teachers had at least a bachelor’s degree plus education certification
- Assumption used in Ilifa Labantwana costing (forthcoming) based on the fact that there are 248 working days in a year
- Minimum 2016 salary for teacher with REQV 14+ (4 year degree) (National Professional Teachers’ Organisation of South Africa, 2016). This salary is assumed to be full-time, but only half of this (4 hours) is covered by the state.
- Assumption
- Assumption (no info on Perry class or centre size)
- KPMG costing based on 60 children per centre
- There is no indication in the Perry Project literature that food was provided
## Prioritizing Investments in Early Childhood Development in South Africa

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Target coverage</strong></td>
<td>65% Children eligible to receive Child Support Grant</td>
</tr>
<tr>
<td><strong>Coverage level</strong></td>
<td>80% of the targeted 65%</td>
</tr>
<tr>
<td><strong>Class hours</strong></td>
<td>4 hrs per day JUNJI/Integra centres operate 9 hrs per day. Assume that the benefit of JUNJI/Integra centres in terms of child development can be derived from 4 hrs per day rather than a full day</td>
</tr>
<tr>
<td><strong>PERSONNEL</strong></td>
<td></td>
</tr>
<tr>
<td>Teacher-child ratio</td>
<td>1:16 JUNJI has ratios of 1:16 for all ages; Integra has ratios of 1:16 for 2-3 year olds and 1:20 for 3-5 year olds (Cortázar Valdés, 2011)</td>
</tr>
<tr>
<td>Program director/manager ratio</td>
<td>1:60 JUNJI: Program director for each centre. If more than 64 children, hire a second. Assume that we have 60 children per centre. Integra: Program director for 95% of centres (others share). Second director hired for programs with more than 161 children.</td>
</tr>
<tr>
<td>Teacher qualifications</td>
<td>Diploma JUNJI/Integra assistants need 2 year technical degree</td>
</tr>
<tr>
<td>Program director qualifications</td>
<td>4 year education degree JUNJI/Integra programme directors need 4 year early childhood education degree</td>
</tr>
<tr>
<td>Teacher salary (full-time)</td>
<td>R9028 p.m. Child &amp; Youth Care Worker Grade 1 salary=R81966 p.a. in 2011/12 (KPMG, 2012), adjusted for inflation (2016). This salary is assumed to be full-time, but only half of this (4 hours) is covered by the state</td>
</tr>
<tr>
<td>Programme director salary (full-time)</td>
<td>R19082 p.m. Minimum 2016 salary for teacher with REQV 14+ (4 year degree) (National Professional Teachers’ Organisation of South Africa, 2016). This salary is assumed to be full-time, but only half of this (4 hours) is covered by the state.</td>
</tr>
<tr>
<td>Number of days in year</td>
<td>248 Assumption used in Ilifa Labantwana costing (forthcoming) based on the fact that there are 248 working days in a year</td>
</tr>
<tr>
<td><strong>CENTRE COSTS</strong></td>
<td></td>
</tr>
<tr>
<td>Cost per child per day</td>
<td>R12.25 Ilifa Labantwana (forthcoming) average of 6 costing studies of early childhood development centres in SA based on 4 hours per day, excluding salary costs, plus one extra assistant per 30 children at a salary of R3500 per month</td>
</tr>
<tr>
<td>Full day/half day programme</td>
<td>Centres operate for a full day (8 hours), but only 4 hours are subsidised by the state. The state covers only half of the fixed costs. Assumption</td>
</tr>
<tr>
<td>Children per centre</td>
<td>60 KPMG costing based on 60 children per centre.</td>
</tr>
<tr>
<td>Food included</td>
<td>Yes JUNJI/Integra programmes included food</td>
</tr>
<tr>
<td><strong>SUPERVISION</strong></td>
<td></td>
</tr>
<tr>
<td>Centres per supervisor</td>
<td>40 Assumption</td>
</tr>
<tr>
<td>Supervisor salary</td>
<td>R25000 p.m. Assumption</td>
</tr>
<tr>
<td>Supervisor expenses</td>
<td>R4000 p.m. Assumption</td>
</tr>
</tbody>
</table>
Prioritizing investments in early childhood development in South Africa

<table>
<thead>
<tr>
<th>ASSUMPTION</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANAGERS OF SUPERVISOR</td>
<td></td>
</tr>
<tr>
<td>Supervisors per manager</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Assumption</td>
</tr>
<tr>
<td>Manager salary</td>
<td>R30000 p.m.</td>
</tr>
<tr>
<td></td>
<td>Assumption</td>
</tr>
<tr>
<td>Manager expenses</td>
<td>R4000 p.m.</td>
</tr>
<tr>
<td></td>
<td>Assumption</td>
</tr>
</tbody>
</table>

INFRASTRUCTURE/EQUIPMENT & TRAINING COSTS EXCLUDED

REFERENCES


The demonstration model was intended to assist with graphical representations of key arguments. It is not an accurate predictive model. Assumptions were made to line up with what we know in the literature, at least in the type of impact that variables have on children’s potential. However, we do not have sufficient data to make these assumptions so that they accurately reflect the magnitude of that impact. For example, we know that more resourced families are better able to protect their children from adversity, but we do not know by exactly how much more they are able. In this case the assumption is that children in more resourced families will have lower risk, the magnitude of the risk is essentially a guess. For this reason, the focus of the discussion of the model should be on the patterns, and what they generally imply, rather than specific numerical differences. The model was developed in TreeAgePro 2016.

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>EXPLANATION</th>
<th>ASSUMPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential</td>
<td>The maximum development level possible at 18 years of age</td>
<td>Potential may vary for genetic reasons and other issues which predate conception. These are not considered. All children in the model start with an indexed potential of 100</td>
</tr>
<tr>
<td>Resilience</td>
<td>The risks for children who are resilient are assumed to be lower. The impact is specific to each risk factor.</td>
<td>For each child a number is selected from a normal distribution with a mean of 0 and a standard deviation of 1. If the number is below -1 they are considered to be resilient</td>
</tr>
<tr>
<td>Lives in poverty</td>
<td>Living in poverty increases all risks</td>
<td>No assumption of the proportion of children living in poverty was made. Rather the model was run for those in poverty and compared to it being run for those not in poverty</td>
</tr>
<tr>
<td>Home stimulation</td>
<td>A highly stimulating home environment mitigates the impact of LBW and removes the need for other services</td>
<td>For each child a number was selected from a normal distribution with mean of 0 and standard deviation of 1. For children living in poverty, if that number was greater than 1 they were assumed to live in a high stimulation household. For children not living in poverty, the threshold was set at -1.</td>
</tr>
<tr>
<td>Probability of low birth weight</td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>Coverage of micro nutrients</td>
<td>Level of access to micro-nutrient supplementation during pregnancy</td>
<td>Not in poverty: 0.9 Live in poverty: Differs by scenario. Assumed 0 in the no coverage scenario, 0.8 in the high coverage scenarios</td>
</tr>
<tr>
<td>Risk reduction micro</td>
<td>Reduction in the risk of LBW if micronutrient supplementation received</td>
<td>0.33</td>
</tr>
<tr>
<td>Impact of LBW on potential</td>
<td></td>
<td>Mean of 10 and standard deviation of 2.5. Impact half if child is resilient</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>EXPLANATION</td>
<td>ASSUMPTION</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Requires home visit</td>
<td>The proportion of households that require home visiting</td>
<td>In poverty: 0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not in poverty: 0.1</td>
</tr>
<tr>
<td>Coverage of home visit</td>
<td>The proportion of households that will receive home visits</td>
<td>Not in poverty: 0.1</td>
</tr>
<tr>
<td>Early deprivation impact</td>
<td>Impact on potential of living in a household that requires a home visit</td>
<td>In poverty: – no cover scenario, 0.8 high cover scenario</td>
</tr>
<tr>
<td>Home visit protection</td>
<td>Reduction in the impact of early deprivation as a result of home visits</td>
<td>0.9</td>
</tr>
<tr>
<td>Play group coverage</td>
<td>Coverage of playgroups for children 0-3</td>
<td>Not in poverty: 0.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In poverty: 0 in no cover scenario and 0.8 in high cover scenario</td>
</tr>
<tr>
<td>Play group protection</td>
<td>Reduction in impact of early deprivation if attends a playgroup</td>
<td>0.5</td>
</tr>
<tr>
<td>Mid deprivation impact</td>
<td>The impact of living in adversity between 3 and 5</td>
<td>Mean of 30 and SD of 10 multiplied by the percentage of potential lost to date. Half if resilient. 0 if living in a high stimulation household</td>
</tr>
<tr>
<td>Centre coverage</td>
<td>Access to centre based services for children 3-5</td>
<td>Not in poverty: 0.9</td>
</tr>
<tr>
<td>Centre protection</td>
<td>Reduction in impact of mid adversity if attending a centre</td>
<td>0.9</td>
</tr>
<tr>
<td>School impact</td>
<td>The loss of potential during schooling</td>
<td>Percentage of potential lost by school age multiplied by 40</td>
</tr>
<tr>
<td>Attend high quality school</td>
<td>Attendance at high quality schools protects against further loss of potential</td>
<td>In poverty: 0.2</td>
</tr>
<tr>
<td>School quality mitigation</td>
<td>Reduction in school impact associated with attending a high quality school</td>
<td>0.8</td>
</tr>
</tbody>
</table>