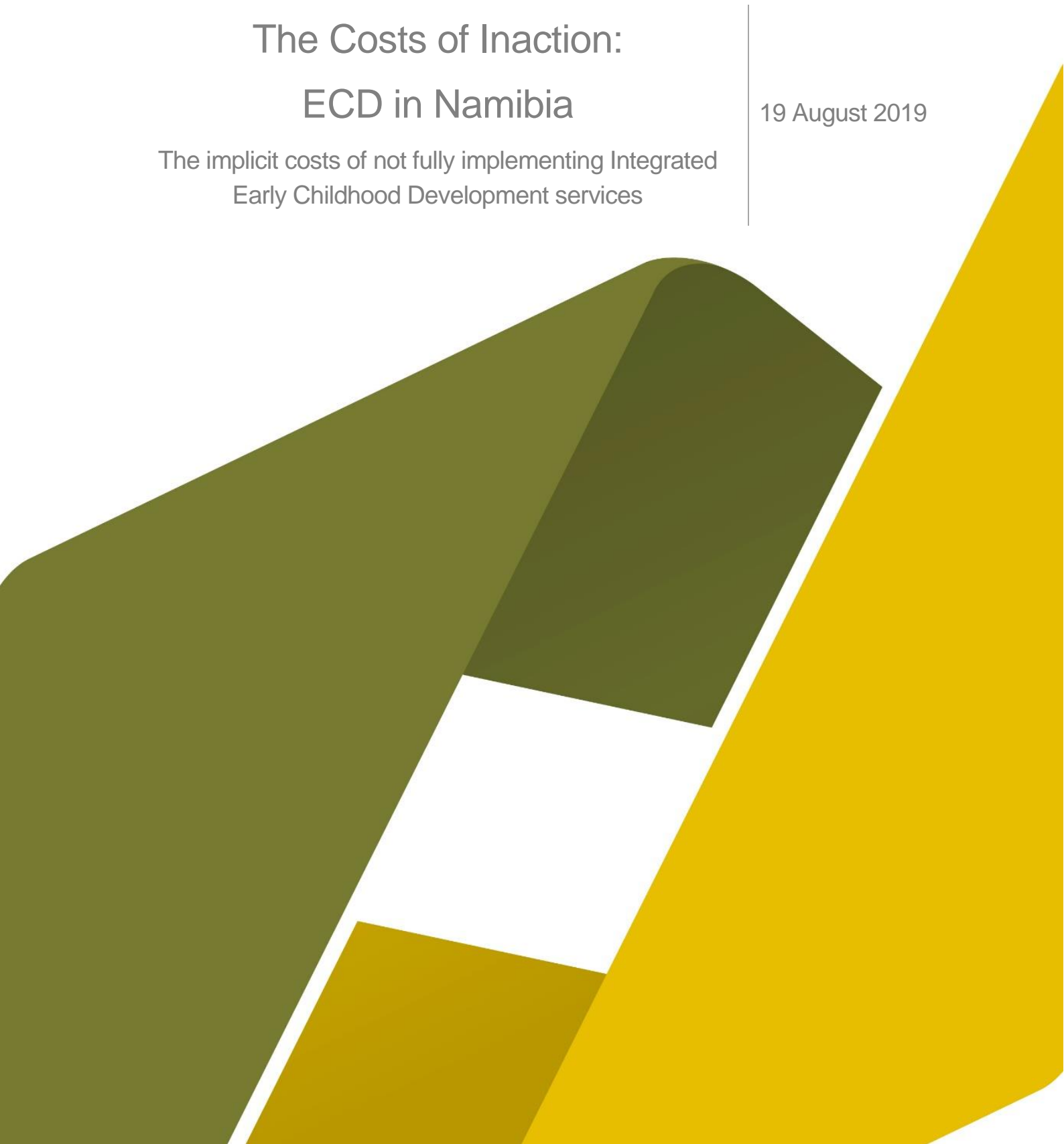# DNA Economics

*Making economic sense of common problems*

# The Costs of Inaction:

# ECD in Namibia

The implicit costs of not fully implementing Integrated
Early Childhood Development services

19 August 2019

## ACKNOWLEDGEMENTS

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## Suggested Citation

DNA Economics (2019) *The Cost of Inaction: ECD in Namibia.* InterTeam Namibia.

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| | |
|---|---|
| CAFO | Church Alliance for Orphans |
| ECD | Early Childhood Development |
| EU | European Union |
| GDP | Gross Domestic Product |
| IECD | Integrated Early Childhood Development |
| LFS | Labour Force Survey |
| MoGECW | Ministry of Gender and Child Welfare |
| MoEAC | Ministry of Education, Arts and Culture |
| MoF | Ministry of Finance |
| MoHSS | Ministry of Health and Social Services |
| NAD/N$ | Namibian Dollars |
| NDP | National Development Plan |
| NGO | Non-Governmental Organization |
| R-PDQ | Revised Personality Diagnostic Questionnaire |
| THE | Total Health Expenditure |
| UNICEF | United Nations Children's Fund |

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# COST OF INACTION
## Expanding Early Childhood Development (ECD) in Namibia

Expanding access to quality ECD is one of the best investments in the future a country can make. And yet, expenditure on ECD remains insufficient globally, with Namibia being no exception. As this research shows, there are significant costs attached to such inaction, particularly the short, medium and long-term societal benefits Namibians are currently foregoing.

## Existing ECD Provision in Namibia

### ECD in the First 1000 Days

Namibia's early ECD provision - which predominantly centres around health care provision to mothers and infants - has made significant and commendable progress in recent years.

One of the **highest per capita spend** on health care in Southern and Eastern Africa

Approx. **97%** antenatal and postnatal care coverage

**90 - 94%** vaccination coverage
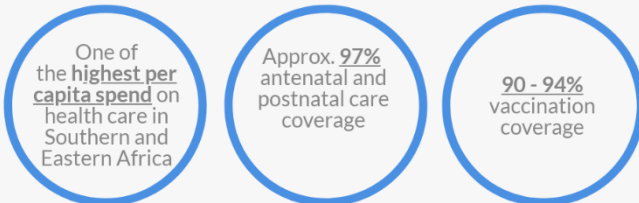
### Government per child expenditure very low on ECD centres, making it unaffordable for many parents

N$ 16 607

N$ 15 990

N$ 4 037

N$ 294
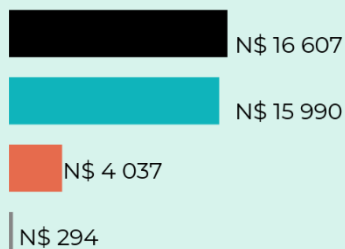
Average Namibian Gov Spending per Phase, per Child, per Year

■ Secondary School ■ Primary School
■ Pre-Primary School ■ ECD

### Existing ECD Provision at later ages

ECD provision to ages 3 to 7 is focused around ECD centres. Provision in Namibia however is still relatively limited.

**20%** of children between the ages of 0 and 6 have access to ECD centres

Only 63% of educarers trained and of those, only 45% receive a monthly state stipend

**1 in 4** children under 5 are **stunted**, limiting their development and learning

## KEY FINDING
## 01

Strengthening of the ECD centre system in Namibia is both a pressing need and policy priority

## Costs of expanding ECD Provision

### Cost Scenarios

Implementation of ECD services in Namibia is guided by the Integrated Early Childhood Development (IECD) framework.

To estimate costs of ECD centre expansion, the expenditure implications of several scenarios were modeled in line with the IECD. Two of these scenarios are presented here.

Scenario Five: Implement all the short term goals of the IECD.

Scenario Six: Implement medium to long term targets of the IECD

### Scenario assumptions

**Scenario Five (Short term targets)**

- Introducing a feeding scheme to cover all children attending ECD

- Equipping all educarers with relevant training

- Stipends of either N$1 500 or N$2 000 to all qualified educarers

- Increasing the ECD enrolment rate

**Scenario Six (Medium term targets)**

- Tripling stipends for all educarers

- Training for all educarers

- Doubling expenditure on furniture, learning aids, and toys

- Increasing coverage to 66% of all children

### Daily ECD Centre Cost Per Child
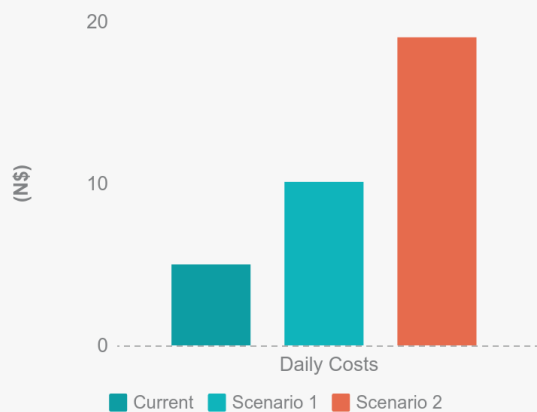


### Total Operational Cost of the ECD centre System
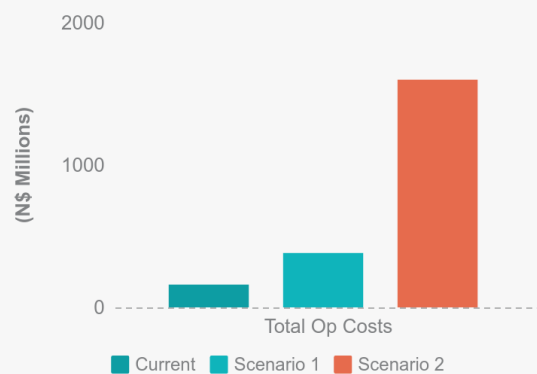


## KEY FINDING 02

**Even under higher cost scenario 6, per child cost (N$ 19) is less than half spent per primary school child**

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## Benefits of expanding ECD Provision

## Benefits of ECD in International Literature

### Feeding Schemes Reduce Stunting Effects

Feeding schemes reduce the negative effects of stunting on scholastic performance, thereby improving outcomes such as enrollment rates and test scores.

### Long Term Societal Benefits

Despite limited developing country data, ECD centre interventions in the USA have improved school completion rates, tertiary achievement, criminal justice and employment outcomes.

### ECD priorisation leads to better grades

Chile's systemic prioritisation of ECD resulted in higher than average grades in mathematics, reading and social sciences. This reduced grade repetition and school dropout rates.

### Teacher Training Improves Educational Performance

Learning at ECD centres is central to childhood development, highlighting the importance of good quality teaching.

Note: Effective implementation is key to realising optimal benefits from ECD investments

## Estimating Benefits of Expanding ECD in Namibia

The model estimates the improvement in a child's lifetime earnings as a result of ECD centre attendance and access to a nutritious feeding scheme. It assumes that ECD centre attendance results in improvements to schooling outcomes (under different assumptions for graduation rates), which then leads to increased earnings over the rest of the child's life.

The present value of the resulting lifetime benefits varies between approx.. N$16k and N$156k per child. As shown below, any intervention that increases graduation rates by more than 1% will result in a positive return on investment; typically far greater than the associated cost.

Comparison of per child total ECD centre costs and per child lifetime benefit

N$ 156k
N$ 78k
N$5k  N$9k  N$17k  N$16k

A  B  C  D  E  F
COSTS    BENEFITS

COSTS

A - Current Cost per Learner

B - Scenario 1

C - Scenario 2

BENEFITS

D - 1% Increase in Graduation Rates

E - 5% Increase in Graduation Rates

F - 10% Increase in Graduation Rates
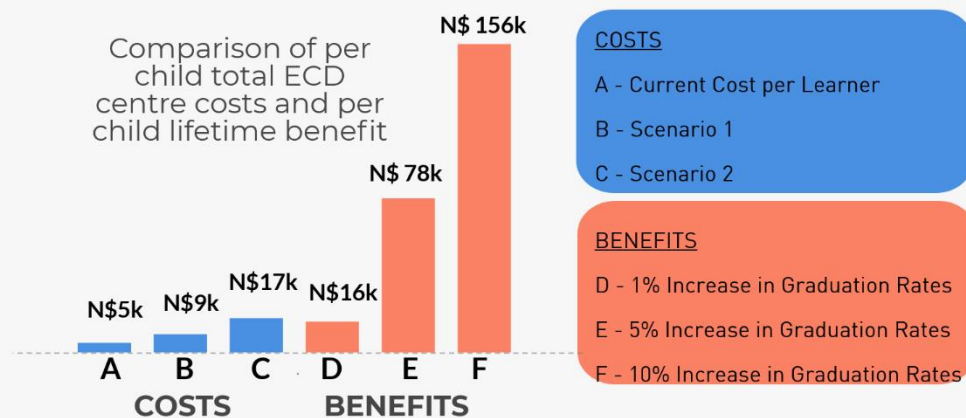
**KEY FINDING 03** | Benefits exceed costs by several multiples under a wide range of scenarios, making a strong case for investment

# A broader case for ECD

There are several ECD benefits that cannot be easily quantified, including:
1. Increased enrolment rates
2. Reduced repetition rates
3. Parents more able to work
4. Tertiary achievement
5. Lower rates of crime
6. Health and nutrition savings
7. Subjective welfare gains

The full benefit of ECD investment thus likely even larger than estimated

A significant potential efficiency saving in Namibia are declines in schooling repetition

In 2018, there were 101 171 children repeating a grade in primary school in Namibia; approx. 10% of all primary school children. The government spent N$15 590 per learner for one year of primary school, which implies that repetition of primary school children currently costs the state over N$1.5 billion per year.

1. Improved Access to Quality Early Childhood Education

2. Improved immediate and long-term Academic Performance

3. Improved employment and labour market prospects

4. Improved criminal justice, health and social outcomes, *inter alia*

5. Increased public welfare and economic prosperity

Well-funded, well-implemented, context-appropriate ECD interventions enable a virtuous cycle of improvements

Positive effects of ECD interventions on childhood education and labour market outcomes can thus be self-sustaining in the longer term.

Improves prospects for the next generation - the virtuous ECD investment cycle reinforces itself and strengthens in impact over time.

## KEY FINDING 04 | The full benefits of quality ECD will likely far outweigh its costs, creating a compelling financial and moral argument for investment
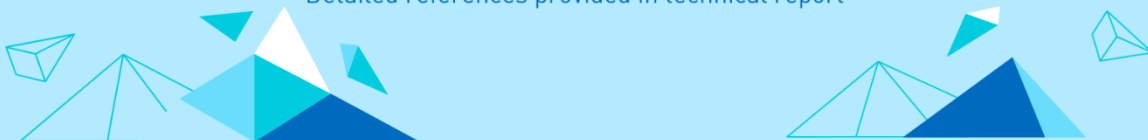
# EXECUTIVE SUMMARY

## *1. Introduction*

An extensive body of evidence shows that **early childhood development (ECD) can be a powerful investment in the future**, both socially and economically. Effective ECD programmes have been shown to benefit not only the child and their direct family but also their community and the economy at large as and when they become productive adults. As such, expanding quality ECD provision has been shown to be one of the best investments a country can make in its future.

However, **investment in ECD remains insufficient globally, and Namibia is no exception**. Two of the main reasons for the continued low investment in ECD across the world are that (i) **ECD,** beyond basic health services, was **historically largely seen as parents' own responsibility**; and (ii) **the returns to investment in ECD are often either long term or at least not clearly visible in the short term**. This second factor implies that it's not straightforward to attribute benefits to ECD, even for those who directly benefit, which incentivises governments to focus on programmes with more immediate observable, albeit often lower, societal benefits.

In this context, it is critical that policymakers and funders appreciate and consider the tremendous potential of investment in ECD. To this end, **DNA Economics was commissioned by Interteam Namibia to estimate the "cost of inaction"** – or benefits foregone - associated with continued low investment in ECD in Namibia, relative to costs of expanding such investment. The study proceeded by first investigating the current ECD service provision in Namibia, then identifying the areas where strengthening would be most beneficial (based on the domestic need and international literature), before finally estimating the costs and benefits that would be associated with expanding ECD under different scenarios. **The focus in this report is for ECD which relates to the meeting of a child's social and functional needs, below the age of 6 years old.**

While the study discusses the range of ECD services in Namibia, its focus is on **Early Childhood Education**[1]. The study shows that this form of ECD is in particular need of strengthening in Namibia and that investment in this area could lead to significant societal benefits based on international evidence. In addition to the setting out the short, medium- and long-term benefits of ECD, we show that **the present value of lifetime benefits accruing from quality ECD interventions are likely to outweigh the costs of such interventions**.

---

[1] This is defined as early childhood developmental assistance at creches/ECD centres which focuses on childhood schooling before the age of 6. This is predominantly for children between the ages of 2 and 6, but a fair number of ECD centres offer services for smaller children as well.

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## 2. Methodology

The study employed a three-phased methodology, as summarised in the following table:

| Phase | Detail |
|---|---|
| **(1) Literature Review** | a) A review of the **international literature** on the benefits of ECD <br> b) A review of **Namibian ECD policy, legislation and grey literature** |
| **(2) Primary and Secondary Data Collection** | a) **Project Steering Committee meetings** and member inputs[2] <br> b) **Key informant interviews**[3] with a broad range of ECD stakeholders <br> c) **Site visits** to 50 ECD centres in seven regions4 across the country |
| **(3) Data analysis and modelling** | **Cost benefit analysis (CBA)** is undertaken in two steps: <br> a) Development of a **costing model** to estimate <br>   (i) the total costs of the existing early childhood education system using a combination of primary and secondary data <br>   (ii) the costs of strengthening provision under various scenarios for increasing access to and / or improving quality of creche-based services <br> b) Development of a **benefit model** to estimate the "cost of inaction" in ECD under different scenarios and assumptions. In particular, the model estimates the present value of the per-child lifetime benefits that are likely to result from ECD interventions |

Beyond a comparison of costs and benefits, it also provides policymakers with:

1. A detailed analysis of the costs and challenged faced by ECD centres at both a centre and national level; a first of its kind in Namibia

2. An **exposition of the many short- and longer-term benefits** that have resulted from quality ECD in different parts of the world, beyond what can be quantified or monetised. It is critically important that policymakers are aware of and consider the holistic set of ECD benefits.

## 3. Overview of ECD policy and provision in Namibia

Policy documents in Namibia already highlight improved ECD provision as a national priority, as articulated through the National Development Plan (NDP5). Implementation of ECD services is guided by the **Integrated Early Childhood Development (IECD) framework**. The IECD framework aims to **ensure that all ECD services are comprehensively delivered** in a manner that covers all aspects which affect childhood development (namely health and nutritional, educational and social security outcomes). To enhance coordination management and development of ECD services in Namibia, the IECD framework **allocates roles and responsibilities to the key ministries involved in the development of children**.

---

[2] Representatives from Ministry of Gender Equality and Child Welfare, Ministry of Education, Arts and Culture (MoEAC), Ministry of Health and Social Services (MoHSS), Ministry of Finance (MoF), the National Planning Commission (NPC), the Office of the First Lady and CAFO make up the steering committee of the project.

[3] DNA Economics also liaised with the Perivolli Trust, Roger Federer Foundation, UNICEF, the City of Windhoek and the EU

[4] Oshana, Omaheke, Hardap, Khomas, Caprivi, Kavango East and Kavango West

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For the purpose of this study, ECD was divided up into two distinct segments, discussed in turn:
1. The **first 1000 days** of a child's life (starting from conception)
2. **Early Childhood Development** pertaining to the education received by children between the ages of 0 to 6 years old.

## 3.1 Existing first 1000 days ECD provision (health-based interventions)

ECD interventions focussing on the first 1000 days predominantly centre around health care provision to mothers and infants. Namibia has **one of the highest per capita spend on health care in the Southern and Eastern Africa**. Total Health Expenditure is approximately 14% of the national budget and translates to per capita expenditure of approximately N$6 050. Such high per capita expenditure is reflected in high coverage of antenatal and postnatal programmes at approximately 97% (including iron and folic acid supplements, as well as clinic visits and general breastfeeding/dietary counselling). This puts Namibia approximately 13% above the average antenatal care coverage in Eastern and Southern Africa (which is currently around 84%). Also, antenatal care coverage in Namibian is higher than the average experienced in Latin America and the Carribean (of approximately 96% in 2018).[5] In respect of children, vaccination coverage is between 90-94%. While there is still much room for extending healthcare related to the first 1000 days – as evidenced by the MoHSS drive towards expanding care to children – and literature highlights the value of early health interventions, **Namibia has made significant and commendable progress in recent years**.

One significant problem that remains however is that approximately **1 in 4 children under the age of five in Namibia is stunted.**[6] For this reason, the focus of the study is on providing improvement nutrition programmes, alongside addressing the ECD issues discussed below.

## 3.2 Existing ECD Centre-based service provision in Namibia

The data shows that ECD service provision in Namibian is still relatively limited. Currently, there are **2 961 registered** ECD centres in Namibia, serving an average of **26 children per centre**[7]. Estimates calculated in this report show that approximately **20%[8] of children between the ages of 0 and 6 have access to these centres**. In total, there are **4 516 registered educarers** in the country, of which only **63%[9] are trained** (either by MoGECW, or through tertiary learning institutions). Of those that are trained, **only 45% (1 288) receive a monthly stipend from the state**. When compared to the number of registered ECD centres, there are approximately 0.6 trained educarers per centre[10].

---

[5]  (The United Nation's Children's Fund, 2018)

[6] (Ministry of Health and Social Services, 2014)

[7] The total number of children enrolled for ECD in 2018 was 76 718

[8] Submission from MoGECW dated 22 March 2019

[9] Submission from MoGECW dated 22 March 2019

[10] Training of educarers in Namibia is offered by (either with MoGECW, or with a Certificate or Diploma in ECD from institutes of higher learning)

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Based on data collected, **the total cost of ECD at the Creche (centre) level was estimated to be approx. N$152 million in 2018[11].** This translates to approximately N$ 1 977 per child per year (or, N$ 5.42 per child, per day).

ECD in Namibia is predominantly funded by the private sector (parents and communities). Government funding towards ECD operational expenses constitutes only about **2%[12] of total ECD centre funding** in the 50 ECD centres visited for this study, with 94% of funding coming through fees. The current structure of government spending in the education sector can be viewed as an **inverted pyramid.** As shown in **Figure 1**, per child expenditure by the state into education is largest in senior and primary school, and much lower at the pre-primary and

**Figure 1: Average government spending per School Phase, per Child, Per Year**
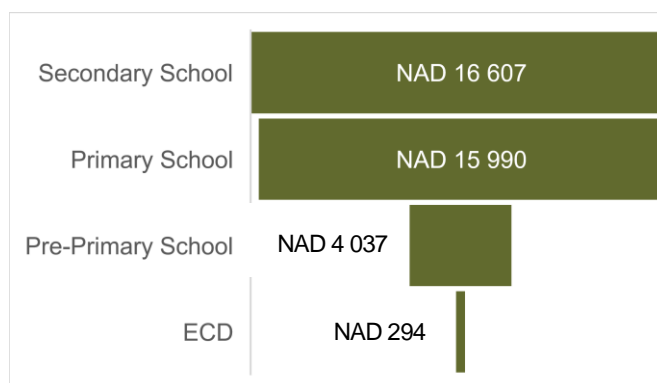


*Source: (UNICEF, 2018a), (Ministry of Gender Equality and Child Welfare, 2018)*

particularly ECD levels. The inability of many parents to afford and pay fees exacerbates the challenges to ECD centres in the country, both in terms of expanding provision or improving the quality in existing centres. Given the above-mentioned challenges, ECD was seen as the sub-area of greatest policy relevance and need. As a result, the quantitative Cost Benefit Analysis presented below was restricted to ECD.

## 4. The costs of expanding or enhancing ECD Centre-based service provision

To **estimate the potential costs of expanding ECD provision**, we identified a basket of ECD services that are likely to be effective in changing a child's lifetime outcomes based on international literature, the Namibian policy framework, and the country's context. When effectively implemented, these services provide robust avenues to improve childhood development. The factors varied between the different costing scenarios are:

A. Proportion of Children Fed
B. Number of Qualified Educarers
C. Number of Educarers Receiving Stipends
D. Enrolment rate in ECD centres
E. Non-Educarer Expenses

---

[11] Note that this figure doesn't include the cost of infrastructure or the costs associated with child-specific health-based interventions (for which data was not available).

[12] While this may be slightly lower than the national average of N$359 per child, per year, or approximately 18% of funding ECD Centre funding in 2018, it is indicative of the extent of inadequate funding of ECD service provision by government. In addition, the national average of N$359 also includes infrastructure costs.

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The model created estimated the cost implications of **six different scenarios**. As set out in Table 1, below, the first four scenarios incrementally estimate the cost impact of implementing specific interventions in line with IECD short term targets. Scenario 5 combines scenarios 1 to 4 as an estimate of the annual cost to implement all the **short-term goals of the IECD**. Scenario 6 provides the cost of implementing the **medium to long term targets of the IECD and NDP5**.

**Table 1: ECD Costing Scenario Assumptions**

| Scenario | Brief description of Costing Scenario assumptions |
|---|---|
| 1 | **Introducing a feeding scheme to cover all children attending ECD**<br>Currently one in five children who go to ECD centres receive meals. The scenario increases this to having all (100%) of children receiving the recommended daily amount of nutritious food. |
| 2 | **Equipping all educarers with training (either MoGECW or an ECD Certificate/Diploma)**<br>Currently only 63% of educarers are trained. The scenarios assume a training programme is in place to eventually train all educarers. This involves 212 per year receiving training from the MoGECW, 96 additional practitioners receiving certified training for ECD at a university/college, and 30 additional receiving diploma based ECD training at a university/college |
| 3 | **In addition to scenario 2, granting stipends of either N\$1 500 or N\$2 000 to every relevantly qualified educarer.** At baseline, 3228 educarers do not receive any form of government stipend/grant. In the costing scenario, only 1316 educarers do not receive stipends. |
| 4 | **In addition to scenario 3, increasing the ECD enrolment rate.** Increases ECD enrolment rate from the current 20% of children to the NDP5 0-4-year-old target of 26% enrolment. |
| 5 | **Short-term full IECD target scenario:** Whereas scenarios 1-4 were incremental, scenario 5 combines these scenarios to create system-wide change. This scenario is seen as a significant, but achievable short term strengthening of the system. |
| 6 | **Medium- to Long-Term Full Policy Implementation.** A more ambitious longer-term scenario that strengthens all aspects of the ECD system: (i) tripling stipends for all educarers (either N\$4500 or N\$6000 depending on their level of qualification) (ii) training to ensure that all educarers (iii) Doubling expenditure on furniture, learning aids, and toys (iv) Increasing coverage to 66% of all children (a 3-4 year projected target for ECD coverage in NDP5). |

Figure 2 shows that the total operational cost of the system increases from N\$160 Million currently to N\$382 under scenario 5 and N\$1.6 Billion under scenario 6**.** Similarly, the cost, per child, per day, increases from N\$ 5.42 currently to N\$10.10 under scenario 5 and N\$ 19.03 under scenario 6. Thus, even under scenario 6, which involves substantial expansion of provision, **the average cost per child would be less than half that spend per child in primary school in 2018**. Therefore, while this level of spending increase is likely not achievable in the short term, scenario 6 could be sustainably affordable in the longer term if a greater proportion of budgets could over time be allocated to this area, particularly since government would not necessarily have to cover the full cost.

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**Figure 2: Total ECD System Operational Cost by Costing Scenarios**
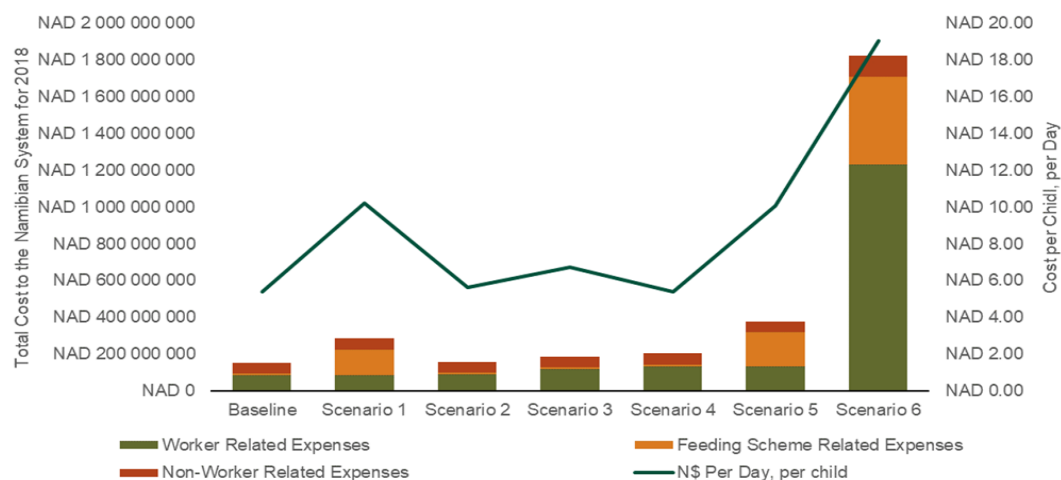


## 5. Benefits of expanded ECD

### 5.1 Benefits evident in international literature

An extensive review of literature was done to highlight how effective implementation of health and educational development interventions at early stages of life can significantly affect a child's outcomes (e.g. school performance). The table below summarises some of the interventions shown to be effective.

| Country & research question | Impact of intervention |
|---|---|
| Tanzania: How does a **feeding scheme** influence school attendance, enrolment and academic performance? | - Schools with feeding schemes exhibited **increased enrolment** <br> - Children who benefited from the feeding scheme had between 6 and 10 more attendance than those not on the scheme <br> - Children who benefited from the feeding scheme experienced increased pass rates of between 2 and 10% |
| South Africa: Does **stunting** negatively influence scholastic and psychosocial outcomes in children? | - A stunted child will score between 1-3 questions lower on a standardized R-PDQ (the Revised Personality Diagnostic Questionnaire) test signalling weaker psychosocial outcomes |
| Burkina Faso: How do **feeding schemes** influence school enrolment and health outcomes of children? | - Children who benefited from the feeding scheme had showed between a 5 and 6% increase in enrolment at school <br> - Children below the age of 5 who benefited from the feeding scheme enjoyed an improved weight-for-age ratios by 0.38 standard deviations |
| What does a meta-analysis of various **ECD-based interventions** say for child-development? | - Interventions targeted at child health (adequate feeding and combating malnutrition, inter alia) have an extremely large probability of a child's lifetime outcomes. |
| South Africa**:** How does teacher training at pre-primary level influence outcomes? | - Teacher training (dependant on whether centralized or in-class) relates to improved educational performance by between 0.12 and 0.24 standard deviations |
| USA: How does increased enrolment in ECD influence school completion? | - Attending preschool improved enrolment at tertiary learning institutions by approximately 11.3 percent |
| USA: How does access to preschool in low-income areas influence educational outcomes in America? | - Increased access to kindergarten improved high school graduation in girls by approximately 14% |

*Source: Detailed references provided in body of report*

Findings that emerge from the literature review include:

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(1) **Stunting has a significant negative effect on scholastic performance** across contexts. Feeding schemes have been shown to reduce stunting and hence improve outcomes such as enrolment rates and test scores.

(2) Meta-analyses of the literature[13] highlight **the value of improving the quality of teaching in ECD centres** and that it is the learning at the centre itself, which is central to the child's development, given that the child is healthy and able to learn. Interviewees for this study reiterated this view and viewed it as the "low-hanging fruit" in the system. Beyond the child him/herself, another intuitive benefit of expanding ECD services is that it can enable current caregivers to (re-)enter the labour market, thereby expanding the economy.

(3) Evidence on **longer term outcomes** is limited in the developing world (due to a lack of long term studies), but evidence from particularly the USA shows benefits across a range of outcomes, including school completion, tertiary achievement, health and nutrition (resulting in reduced health spending and longer lives), criminal justice outcomes and employment.

(4) A short **case study of ECD in Chile** showed significant rewards to **country-level ECD prioritisation**. In total, Chile spends $3544 per child on early childhood education.[14] In the context of childhood development, this includes comprehensive centre-based interventions to children who are socially and economically vulnerable from birth until the age of 9 years, implemented through a universal national ECD curriculum. In this context, learners who received ECD education tend to score higher than average grades in mathematics, reading and social sciences, which also reduces the likelihood of grade repetition and school dropout rates.

## 5.2 Estimating the size of benefits of expanding ECD in Namibia

In the absence of a significant evidence base on the impact of ECD in Namibia, the study relies on international literature to identify the range of benefits that stem from effectively implemented ECD interventions. It is, however, important to note that **effective implementation is key to the realisation of optimal benefits** from the potential improvements to these programmes.

The study modelled the benefits stemming from the ECD interventions outlined in the costing model scenarios – related introducing feeding schemes and improving access to, and quality of, centre-based education. The model estimated the possible **improvement in an individual's lifetime earnings, given that the individual had gone through an ECD programme**, which then resulted in improvements to her/his schooling outcomes. In particular, improved schooling outcomes (modelled as a higher graduation rate), lead to increased earnings over the rest of the child's life based on current earnings data by level of school achievement.

The present value of the resulting lifetime benefits varies between approx. N$16 000 and N156 000 per child, as shown below. These per-child benefits amounts are contextualised by comparing them to the per-child ECD cost scenario presented earlier. As shown in the figure below - **we find that the**

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[13] Black, et al., 2017

[14] Cortázar, A. 2015. Long-term effects of public early childhood education on academic achievement in Chile. Early Childhood Research Quarterly, 32(1): 13–22

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**present value of benefits (under reasonable assumptions for increases in graduation rates) significantly exceeds benefits**.
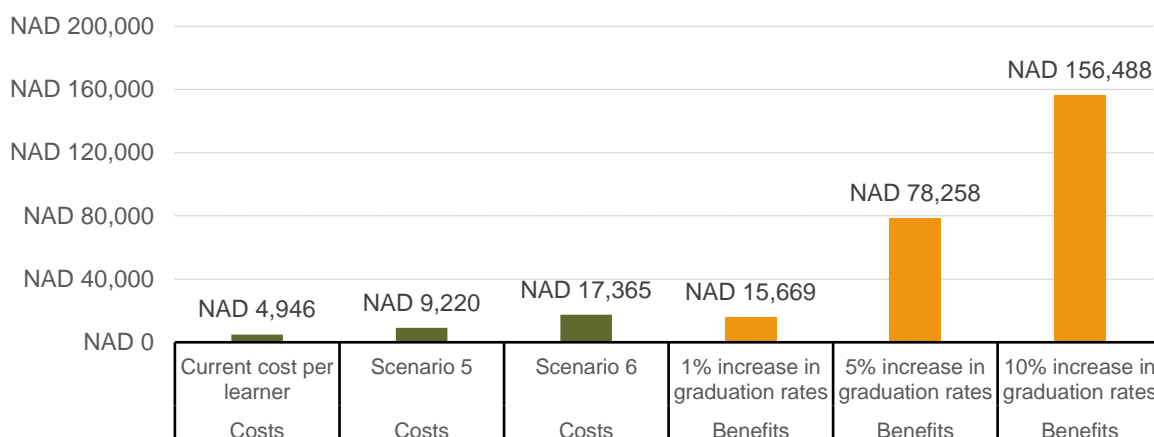


In all but the "worst" case (at the high cost per child of scenario 6, but with graduation rates increasing by only 1 percent), the **benefits per child outweigh the costs by a large margin**. Even in this somewhat pessimistic "worst" case, the costs only slightly exceed benefits. In all other instances, N$1 invested yields significantly more back. Given the most promising potential benefit model, if ECD improves lifetime graduation by up to 10%, N$1 invested into a child will yield almost N$17 worth of returns, making the investment extremely attractive in the long term. The exact increase in graduation rates cannot be estimated with great precision or directly be linked to a specific cost scenario, since it will depend on the exact nature and quality of service provision. Nonetheless, the analysis shows that the investment is justified within a wide range of likely outcomes.

Critically, the above figures **only consider a subset of potential benefits** from ECD. There are several ECD benefits that cannot be easily quantified, including[15]

1. Increased enrolment rates
2. Reduced repetition rates
3. Parents more able to work
4. Tertiary achievement
5. Lower rates of crime
6. Health and nutrition savings
7. Subjective welfare gains

The full benefit of ECD investment is thus likely even larger than estimated, which reinforces the strong case for investing in ECD services.

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[15] These benefits are seen to be enjoyed in international case studies based both in other African countries and in more developed countries, making the case for these ECD interventions even stronger given that it is highly likely for Namibia to gain even from these unquantified benefits.

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## *5.3 Shorter term efficiency improvements*

In addition to the longer-term benefits that result from improvements in ECD, several **shorter-term efficiency improvements have also been identified in the African literature**.

For example, ECD interventions have been shown to improve learning outcomes, and hence reduced repetition and drop-out rates, in several contexts. Such reductions could result in significant efficiency savings in Namibia. In 2018, there were 101 171 children repeating a grade in primary school in Namibia; approximately 10% of all primary school children and equivalent to 4046 classes of 25 children. The government spent N\$15 590 per learner for one year of primary school, which implies that **repetition of primary school children currently costs the state over N\$1.5 billion per year**.

A study using Filipino data found a decrease in repetition rates of 8% for a one standard deviation increase in early height (i.e. decrease in stunting). If rates of improvement of the same size can be achieved in Namibia, this would translate into an efficiency gain to the system of approximately N\$130m per year just from reduced repetitions. Thus, although these efficiency gains have not been modelled explicitly, this analysis shows the possibility for significant short-term efficiency gains which can be realized through effective ECD interventions aimed at improving child health, nutrition and educational outcomes

## *5.4 Creating a virtuous cycle of Early Childhood Development*

A well-funded, well-implemented, context appropriate **ECD interventions would enable a virtuous cycle of improvements**. An increase in graduation rates improves employment/employability and lifetime income. This in turn increases Namibia's Gross Domestic Product. At the same time, it is expected that this improvement in national income (and employment) will lead to improvement in justice, health and psycho-social outcomes for the nation.

**The positive effects of ECD interventions on childhood education and labour market outcomes can thus be self-sustaining in the longer term**. This then improves the prospects for the next generation, creating a virtuous ECD investment cycle which reinforces itself every generation and strengthens in impact over time. On this basis, the report concludes that the possible benefits arising from ECD interventions have the potential to outweigh the costs thereof.

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Thus, we conclude that that there is a **compelling not just moral, but also financial, case for investing in ECD services in Namibia**. This investment should be seen as the joint responsibility of government, donors and the private sector. Using the structures and coordinating mechanisms of the IECD framework, short, medium- and long-term plans should be put in place to collaboratively build a sustainable ECD system that creates a better future for the country.

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# 1 INTRODUCTION

Early Childhood Development (ECD) is broadly described as the meeting of a child's educational, health and psycho-social needs during their early years (Black, et al., 2017). Broadly speaking, ECD interventions can further be broken down into two distinct parts:

1. Interventions focused predominantly on the first 1000 days of a child's life, from conception.
2. Interventions focused on their formation after the first 1000 days, primarily between 3-8 years old, but before the child enters primary school.

In Namibia, this paper argues that the provision of certain ECD services is severely underfunded by both the private and public sectors. As such, this paper aims to estimate the consequences of continued underfunding of certain ECD activities in Namibia – referred to as the "Cost of Inaction" – and compares this to the financial costs of increasing provision in this area. The cost of inaction, rather than being explicit, is the "cost" of giving up/foregoing benefits which usually are attributed to improved ECD service offerings (Desmond, et al., 2012).

The paper is divided into the following sections:

2. A broad outline of the methodology and data collection approach used in this study.
3. A summary of current ECD situation in Namibia. In particular:
   a. An overview of important policy documents and discussions pertaining to the ECD climate in Namibia currently and historically.
   b. A high-level description of ECD service provision in Namibia by quality and quantity.
   c. A summary of the amount currently invested in ECD in Namibia.
4. A literature analysis (from Namibian, African and globally) which relates the provision of adequate ECD services to possible benefits which could accrue throughout a child's lifetime
5. A cost benefit analysis in two parts:
   a. The total cost of ECD services using a costing model to estimate total current investment and estimate the cost of improving various areas which, through discussions with stakeholders, have been identified to be a hindrance to the improvement of access to and quality of Namibian ECD
   b. An estimate the benefits accruing due to the current system in ECD. We also estimate probable long-term benefits accruing due to improved ECD service offerings.
   c. A comparison of the possible benefits of ECD to the costs of improving ECD service provision and a discussion whether these benefits exceed these costs by any meaningful margin. The report concludes with a call to action to increase investment in the sector.
6. A brief discussion of the financing strategies which may aid in the funding of such ECD interventions.
7. A short conclusion, summarising the main findings and recommendations emanating from the analysis done

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# 2   METHODOLOGY

This section briefly outlines the methodology in this study. This is broken down into three parts: the qualitative literature survey, the collection of data, and the analysis of that data in order to ascertain the current cost of ECD in Namibia as well as the benefits being foregone while continuing to underinvest in the space. This methodology is summarized below:

**Literature Review**:

- •**Domestic**: In order to understand the Namibian ECD service offering and policy objectives, domestic literature analysis was done, making special use of academic articles, legislation (IECD Framework and NDP5, predominaitly) and grey literature (ministry reports from MoGECW, MoEAC and MoHSS)
- •**International**: So as to understand the possible short- and long-term ensuing from ECD, African and American literature was reviewed for its applicability and relevance to various Namibian contexts.

**Data Collection**:

- •**Primary Data**:
- •**ECD Centre Interviews**- Both qualitative and quantitative data was collected from questionnaires filled out by 50 ECD centres around the country (Oshana, Hardap, Omaheke, Khomas, Kavango East and West, and Caprivi. This mix of regions was recommended by the project's steering committee, as it was seen as relatively representative of the Namibian context.
- •**Key informant interviews**- Interviews with stakeholders in various arms of government office (MoGECW, MoEAC, MoF, MoHSS, the Office of the First Lady and the NPC), as well as various private stakeholders/non-profit organizations (CAFO, Perivolli Trust, the Roger Federer Foundation, NamCol, UNICEF and the EU).
- •**Secondary Data**: Microeconomic data dealing with labour market outcomes was adapted from the 2016 Labour Force Survey and Macroeconomic data adapted from The World Bank (2019) which focussed predominantly on gauging whether potential ECD benefits had the prospect of reinforcing childhood and adult health, educational and social outcomes.

**Data Analysis:**

- •**Costing Model**: A scenario-based costing model was developed to estimate (i) the current (status quo) expenditure in ECD per child, (ii) the cost of improving or expanding ECD services under various scenarios (Section 4.1)
- •**Benefit Scenario Analysis**: A scenario-based benefit model is developed to estimate the "cost of inaction": the potential benefits under each of the costing scenarios identified. The model focusses on ECD's potential to improve educational attainment and as a result, labour market prospects. It then estimates the potential benefits associated with those improved labour market outcomes (see Section 4.3).
- •**Regression Analysis**: Micro- and Macroeconomic regression analysis is done so as to understand the possible benefits ensuing from changes in the ECD space, but more generally to understand the Namibian context were ECD outcomes to change (for a brief discussion of this, see Section 4.3.1, although a more thorough discussion can be found in the appendices).

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# 3 SITUATIONAL ANALYSIS

## 3.1 Policy Framework

Implementation of ECD services in Namibia is guided by the IECD framework and the NDP5. The objective of the IECD framework is to ensure that all ECD services are comprehensively delivered in a manner that covers all the aspects which affect child development, namely health, education and social security. Oversight and coordination for the implementation of the IECD Framework is provided by the National High Level IECD Coordination Group.

To ensure better coordination management and development of ECD services in Namibia, the IECD allocates roles and responsibilities to the key ministries involved in the development of children. The MoGECW leads initiatives aimed at children aged 0-4 years[16]. MoEAC is responsible for services to children aged 5-8 years. The MoEAC is also responsible for pre-primary education, and the training and curriculum development for pre-primary. All other aspects related to health and nutrition, among children in ECD facilities and home-based care settings are under purview of the MoHSS.

Figure 3 below shows a schematic presentation of the policy framework influencing the ECD environment in Namibia.

**Figure 3: Legislative and policy framework for the ECD sector in Namibia**



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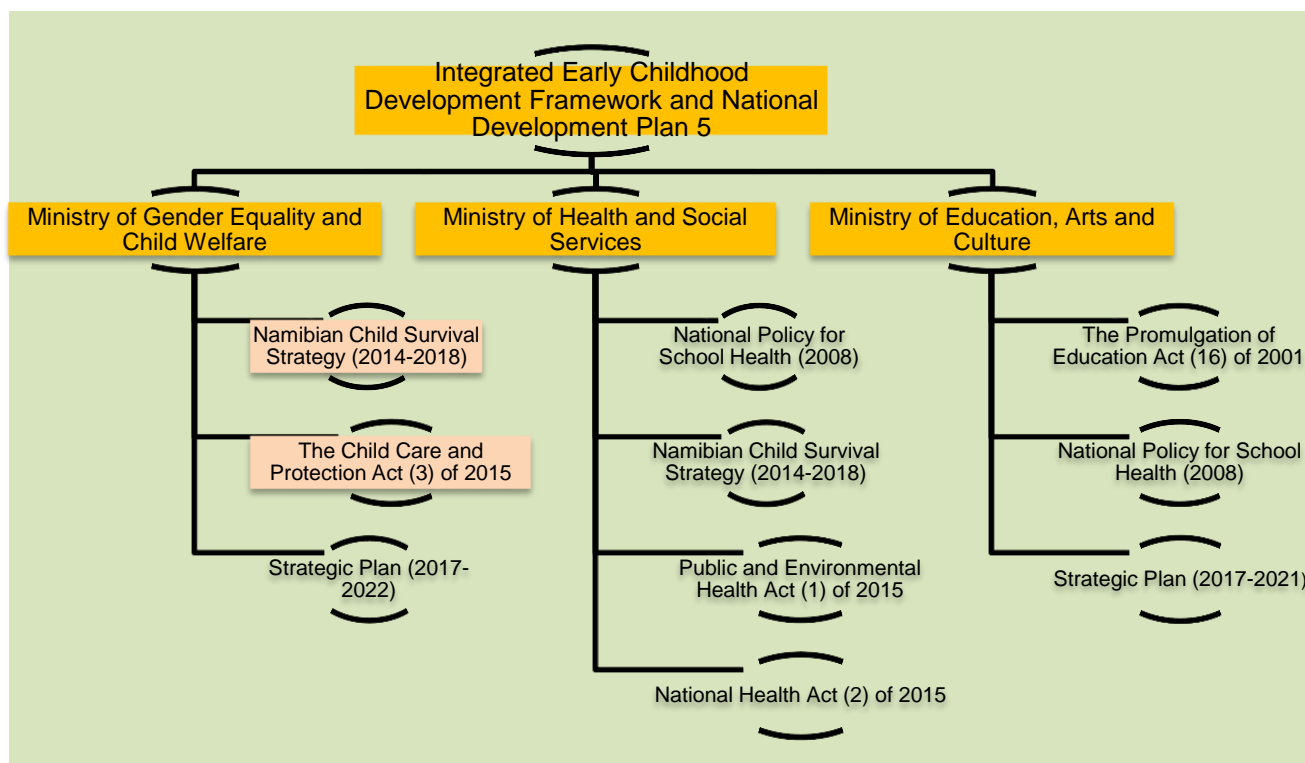
[16] However, there is current discussions to transfer the responsibility of ECD from MoGECW to MoEAC in order to better integrate ECD with other aspects of education.

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In addition to the ECD access and quality targets set in the IECD framework (up to 2017/18), the NDP5 refines and extends them over the NDP5 period (2018-2022). These targets include (*inter alia*):

1. An increase in the percentage of children below the age of 4 enrolled in ECD centres from 13% in 2011, to 40% by 2022
2. An increase in the percentage of children between the ages of 5 and 8 enrolled in educational centres (including pre-primary and primary schools) from 38% in 2011, to 80% by 2022
3. An increase in the percentage of qualified pre-primary teachers from 45% as at 2016, to 60% by 2022

To realise these targets, the IECD framework seeks to create synergies across the relevant ministries and stakeholders in ECD sector. Thus, there is need to continue explore ways to strengthen inter-ministerial and multi-sectoral coordination to support the implementation of the IECD.

## 3.2 Current Investment in ECD

This section analyses the current level of investment by different stakeholders in the Namibian ECD system. This current investment is looked at from both private (inclusive of donor agents and development partners) and public perspectives. Information used in this section is drawn on both semi-structured interviews conducted (with representatives from various ministries, the private sector, and community members) and primary data collected from a sample of 50 ECD centres.

The analysis of investment in ECD services will be split into two major parts- Early Childhood Health Outcomes, and Early Childhood Education Outcomes.

### 3.2.1 Early Childhood Health Services (focussing on the first 1000 days)

In 2017, Total Health Expenditure (THE) in Namibia amounted to just over 9% of GDP. This is approximately 14%[17] of the National budget (Ministry of Health and Social Services, 2018), and translates to per capita expenditure of approximately N$ 6050. This figure, as Piatti-FunfKirchen, et al. (2018) point out, is arguably one of the highest- if not, the highest- per capita spend on health care in the Southern and Eastern Africa regions.

Figure 4 below shows that in the SADC region Namibia has the highest government expenditure towards the health sector.

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[17] This figure includes both public and private expenditure

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**Figure 4: Comparison of government expenditure as a % of GDP: SADC countries**
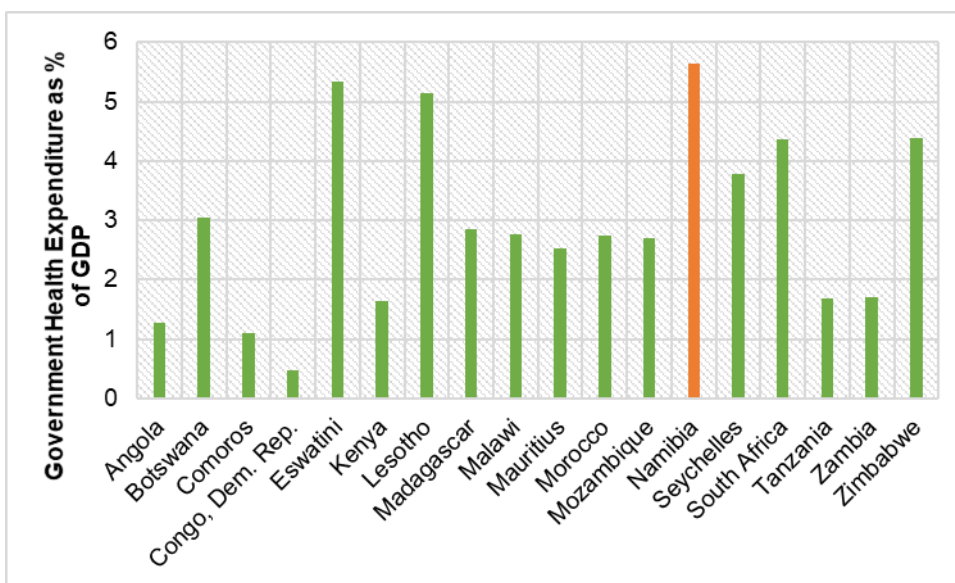


*Source: Own analysis based on World Development Indicators (2019)*

Financing health expenditure in Namibia is driven by four sources of funding; the public sector, private companies, households, and donors. The breakdown of sources of health expenditure financing is shown in Figure 5. This shows that the biggest share of health sector expenditure is funded by the public sector. The second and third largest sources of healthcare financing are private companies and households.

**Figure 5: Trends in Financing Sources for the Health Sector in Namibia**
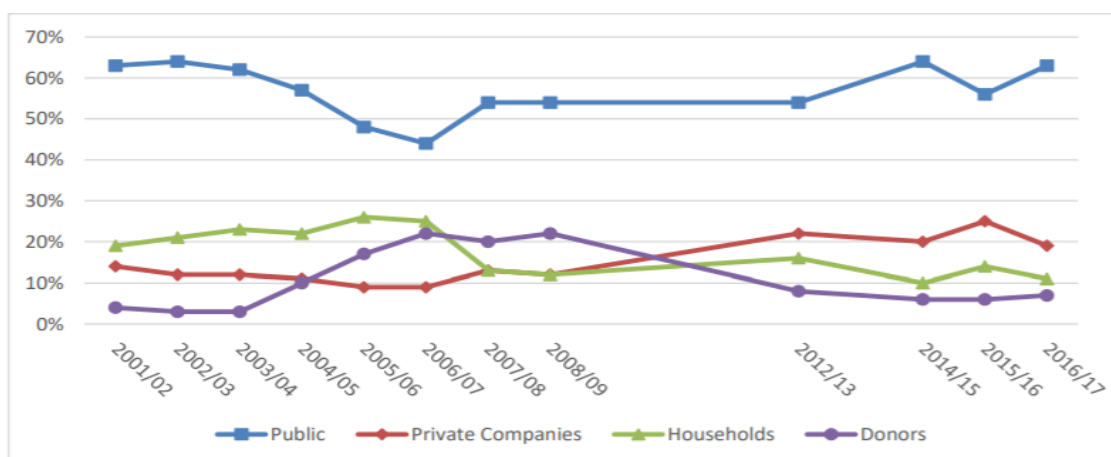


*Source:* (Ministry of Health and Social Services, 2018, p. 9)

In respect of ECD, the MoHSS provides access to antenatal and postnatal care programmes (iron and folic acid supplements, as well as clinic visits and general breastfeeding/dietary counselling). As per Ministry of Health and Social Services (2014), 97% of women received some form of antenatal care (i.e., one visit or more), while approximately 69% of women received postnatal care (2 and 4% improvements from the DHS 2006/7 respectively).

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From an antenatal perspective, this puts Namibia approximately 13% above the average antenatal care coverage in Eastern and Southern Africa (sitting at approximately 84%). More encouragingly, this figure measured in 2014 puts the antenatal care coverage of Namibian women at higher than the maximum worldwide average experienced in Latin America and the Carribean (of approximately 96% in 2018) (The United Nation's Children's Fund, 2018). In terms of postnatal care coverage, Namibian data appears to also be on the upper end of the scale when focusing on Eastern and Southern Africa (as per another atricle from The United Nations Children's Fund (2018), it appears as though only Swaziland covers more women as a proportion than Namibia in the Eastern and Southern African cohort).

In addition to ante- and postnatal care, the MoHSS is working with the MoEAC to provide access to health care services under the in-school health programme, on a *pilot run*. This programme includes immunizations, basic health screening and sexual reproductive health services.

The pilot schools health programme is being implemented in 1 of the 14 regions and will be rolled out to the rest of the country after its pilot phase. Furthermore, in order to address the gap in access to health services at schools, the state is also following an Integrated Management of Neonatal and Childhood Illnesses (IMNCI) programme, focused on providing the abovementioned services on a national scale (not at schools, but in regional clinics)[18].

Given the information at our disposal, we find that children who are fully immunized account for 68% of the population between the ages of 2 and 12 years (Ministry of Health and Social Services, 2014). This has been drastically improved over the subsequent years, with only 4000 children in Namibia being unvaccinated. This translates to a 2017 vaccination coverage rate of between 90 and 94% for Namibian children (The United Nations Children's Fund, 2018).

Furthermore, spending on child (and mother) sexual health- in particular, spending on HIV- was approximately N$37 Million for 2017 (Ministry of Health and Social Services, 2018).

Interviews with MoHSS officials revealed that there is a large drive to further improve access to child-based health care services (although access has already vastly improved over time, and progress appears relatively robust, especially in comparison to other Eastern and Southern African nations).

### 3.2.2 *Early Childhood Education at the Creche/ECD Centre Level*

As at 2017/18, approximately 19% of the state's budget goes to the MoEAC. Of this budget vote, 1.4% of these funds are directed to pre-primary education, 64.5% of these funds flow directly to primary school education and a further 28.7% of these funds are directly allocated to secondary school education (UNICEF, 2018a). These percentages translate to per-child spending of N$4 037, N$15 990 and N$16 607 per child in pre-primary, primary and secondary, respectively.

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[18] As discussed in an interview with a representative from the MoHSS on 20 February, 2019

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These numbers show the inverted pyramid of education investment in Namibia. That is, government expenditure per child is extremely low at the base of a child's education (i.e., at pre-primary level) and increases to a maximum at secondary school level. In fact, all public schooling activities in Namibia are fully funded by the state. This includes educational material and school fees for all non-private schools, as well as feeding for the most vulnerable children within the age group (at a cost of between N$1.50 and N$1.70 per child per day)[19]. While this level of investment in education is commendable, it serves to highlight the significant underinvestment in ECD, and contradicts evidence that the long-term benefits of expenditure on childhood education are maximized when done at an early age (see for example (Doyle, et al., 2009)). We summarise government spending per child by level of education in Figure 6 below.

As indicated above, ECD services in Namibia are under the purview of the MoGECW. In 2018, a total of N$27 500 000 was spend on ECD (Ministry of Gender Equality and Child Welfare, 2018). This translates to less than 1% of the MoGECW's budget vote (PwC; Standard Bank, 2019). Given the number of children enrolled in ECD centres (93 665), approximately N$294 is spent per child per annum by the state.

**Figure 6: Average government spending per child by level of education**
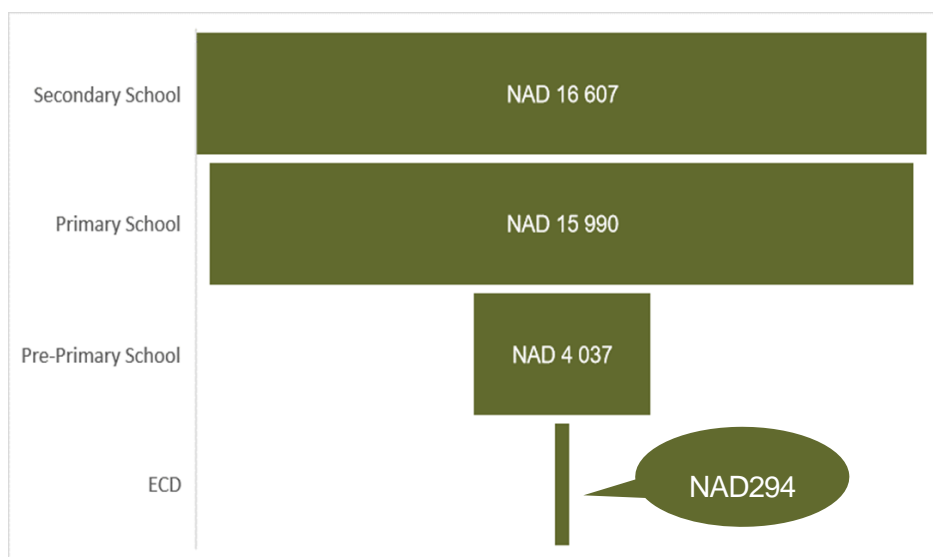


*Source:* (UNICEF, 2018a)

ECD in Namibia is thus predominantly funded by private/community-based expenditure in the form of fees, NGOs government support (only focused on stipends given to educarers). The funding split by source is shown in Figure 5 below.

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[19] As in an interview with a representative from MoEAC on February 19, 2019

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**Figure 7: Pie Chart Showing % Investment in ECD Centres from Various Stakeholders**
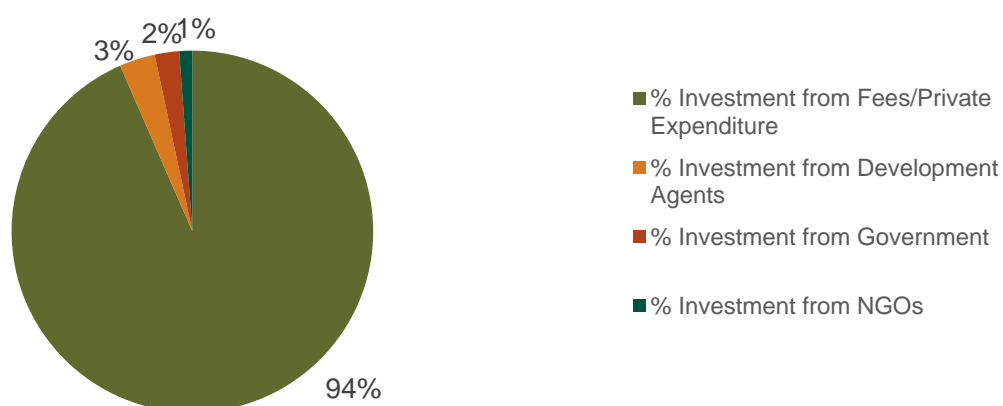


*Source: Own analysis based on own data collected between March and April 2019*

This figure was drawn from data collected from the sample of 50 ECD centres (out of a total of 2961 in the country) that were visited by the project team during March and April 2019. Thus, the number presented here should be viewed as indicative, rather than necessarily perfectly accurately for the full ECD population. However, the data confirms the accepted reality that the vast majority of funding in ECD centres stem from fees[20] and private funding.

From the data presented in this and the previous section, funding is significantly more lacking in the ECD space, relative to the early child and maternal healthcare space where Namibia has made significant progress. As a result, the remainder of the report focusses its attention primarily on education offered through ECD centres (although health interventions that are relevant to bolstering creche-based services are mentioned when relevant). In particular, the next sub-section provides an overview of the level of coverage of the current service provision at a centre-level.

## 3.3  Description of Current ECD Provision

While investment in ECD remains relatively low in Namibia, considerable effort is being committed to increase resource provision in this sector. Since 2012, the number of ECD centres increased by 46% from 2027[21] to 2961 in 2019.[22] At the same time, the number of children enrolled in ECD centres increased by 25% from 61218 in 2012 to 76718 in 2019.[23] While social protection services mainly comprise of social grants offered to orphaned and vulnerable children, in 2017 approximately 30% of eligible children received the grant, thus raising a concern that grants distribution is inequitable (UNICEF, 2018a). In the remainder of this section, we provide an overview of the current provision

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[20] A portion of fees are most probably indirectly funded by the state through child grants, although no information on the split between the number of children receiving the grant vis-à-vis the number of children enrolled in ECD centres is available.

[21] **Invalid source specified.**

[22] Submission from MoGECW dated 22 March 2019

[23] Submission from MoGECW dated 22 March 2019

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of ECD services in Namibia. The overview will focus on the number of ECD facilities/centres, the number of educarers, and the number of children enrolled.

### 3.3.1  Total number of ECD centres

Section 66(1) of the Child Care and Protection Act states that an ECD centre is a facility used to *care for children from birth to the age of formal schooling and which offers a structured set of learning activities*. Such a facility must be registered in terms of section 74 of the same Act.

Figure 9 (on the next page) shows the location of creches across different locations in Namibia. It highlights that there is a higher level of concentration of ECD centres in the Northern regions. This is likely driven by population density, which is highest in these regions. Also, given the socio-economic challenges affecting the Northern regions, these regions have been a beneficiary to several programmes targeted at children and women-headed households (UNICEF, 2018b).

Figure 8 below shows the average number of children per centre. The average was calculated by dividing the total number of children attending creche by the total number of centres in that region. The national average number of children per centre for Namibia is 27 children. Nine regions have an average number of children per centre which is below the national average, whilst only five are above this average.

**Figure 8: Average number of children per ECD centre**



Source: Own analysis based on submissions from MoGECW dated 22 March 2019
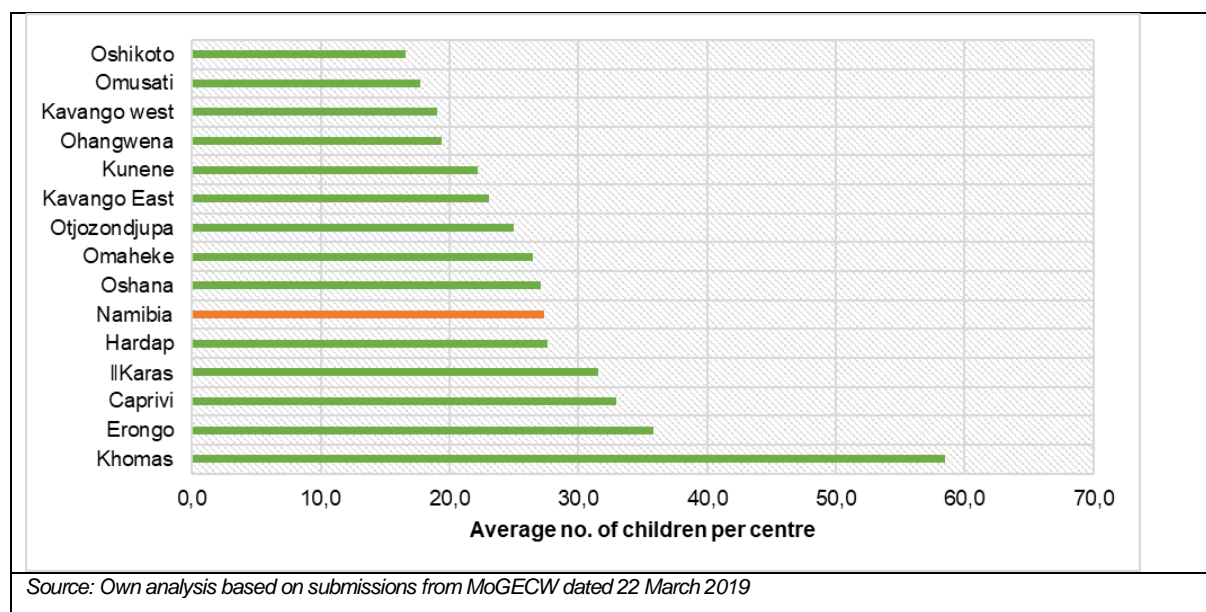
**Figure 9: Distribution of ECD centres across the 14 regions in Namibia (consider per population size)**
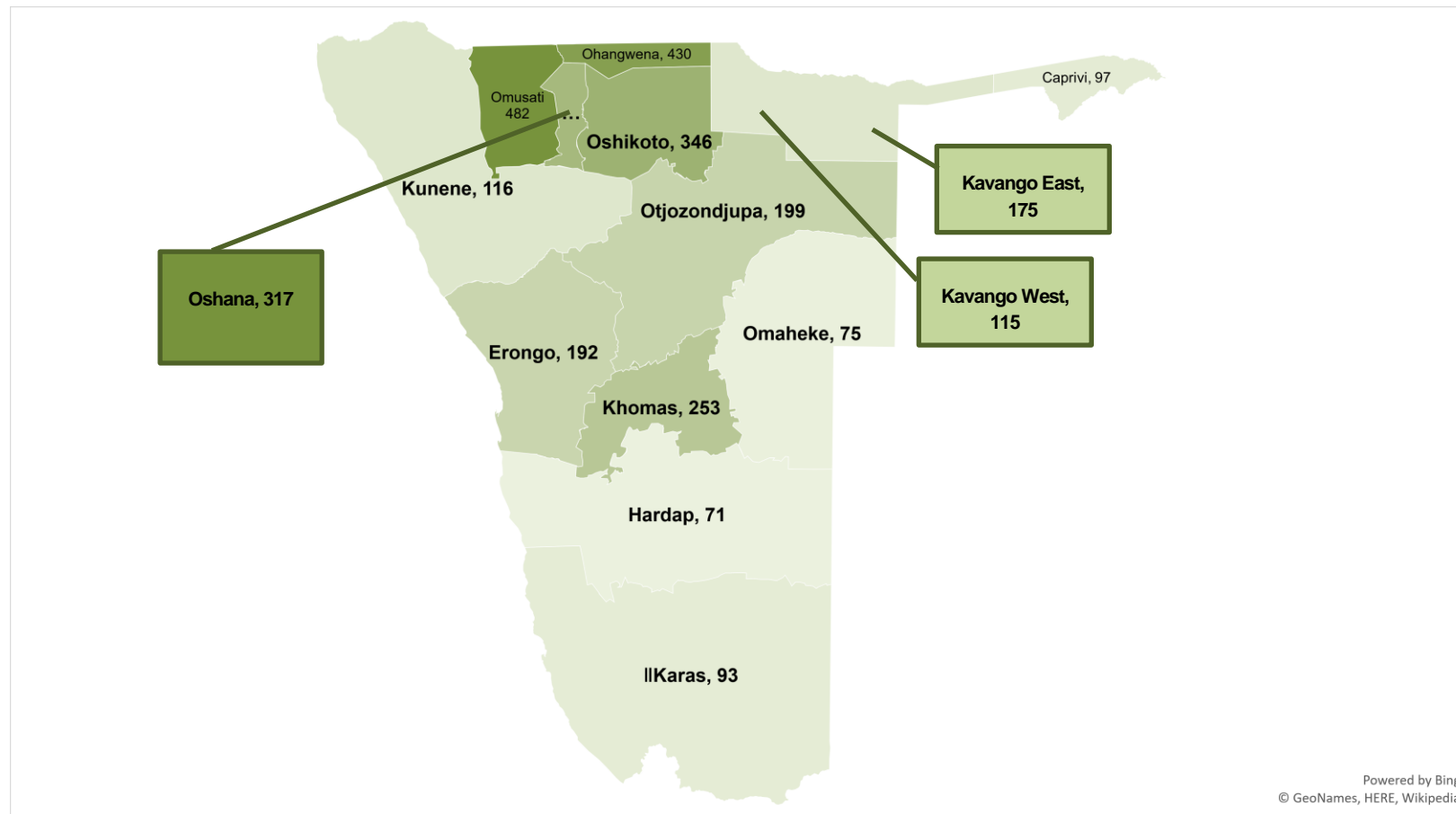


*Source: Own analysis based on submissions from MoGECW dated 22 March 2019*

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Given that most ECD centres are privately funded, mostly through fees paid by parents and some other sources, centres with more children are more likely to have more income. Although the level of the fees charged by the centre is another consideration, it is not surprising that ECD centres in Windhoek (Khomas) are better resourced. They have the highest number of children per centre; twice as much as the national average.

There has been substantial growth in ECD enrolment in recent years; from 61 218 in 2012 to 76 718 in 2019; a 25% increase. An interesting trend is that the proportion of girls to boys significantly changed. The proportion who are girls declined from 52% in 2012 to 46% in 2019. This was driven by a significant increase in the number of boys from 29 307 in 2012 to 41 272 (41% increase) in 2019, while the number of girls only increased from 31 911 to 35 446 (11%) over the same period.[24]

### 3.3.2   Coverage/access to ECD services by age-group

The NDP5 targets to increase the coverage of children below the age of four years attending ECD from 13% in 2011 to 40% in 2022. The target for children between 5 and 8 years is to increase from 38% in 2011 to 80% in 2022. However, at the moment we do not have 2019 data on ECD enrolment by age-groups to check how the country is progressing towards these targets.

Nonetheless, to arrive at an approximate estimate, Figure 10 below expresses the total number of children currently enrolled for ECD as a percentage of different age groups. As indicated above, this is strictly not a measure of the proportion of children in each age-group who are accessing ECD services. It should be read as just an indication of the level of coverage. MoGECW data[25] further suggests that 20% of children from 0 to 6 have access to centres. The "true" underlying proportion of eligible children (by age) in ECD centres is likely somewhere between 20% and 30%.



**Figure 10: ECD coverage by age-group**

| | |
|---|---|
| % coverage (3-7 years) | 25% |
| % coverage (3-6years) | 31% |
| % coverage (4-7 years) | 32% |
| % coverage (4-6 years) | 42% |
| % coverage (5-6 years) | 64% |
| % coverage (5-7 years) | 43% |

*Source: Submission from MoGECW dated 22 March 2019 and NSA dated 27 March 2019*

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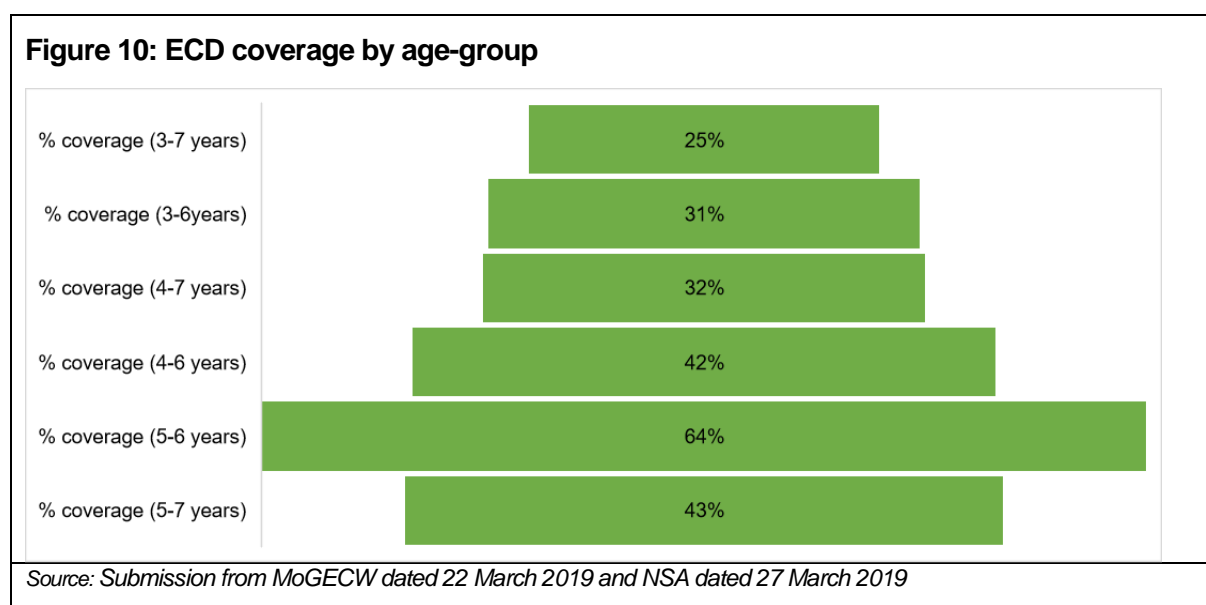
[24] Submission from MoGECW dated 22 March 2019 and Ministry of Gender Equality and Child Welfare (2014)
[25] Submission from MoGECW dated 22 March 2019

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### 3.3.3  Availability of trained ECD educarers

Literature on early childhood development shows that the quality of ECD educarers is an important determinant of education outcomes for children. However, in Namibia, only 63% of ECD centre educarers are trained. Since ECD is not part of the formal education system, ECD educarers do not receive a salary, but only receive a stipend. Currently, only 42% of the trained educarers receive this form of income. This translates to only 27% of all educarers. **Figure 11** below provides an overview of educarers in Namibia.

**Figure 11: Overview of educarers in Namibia**
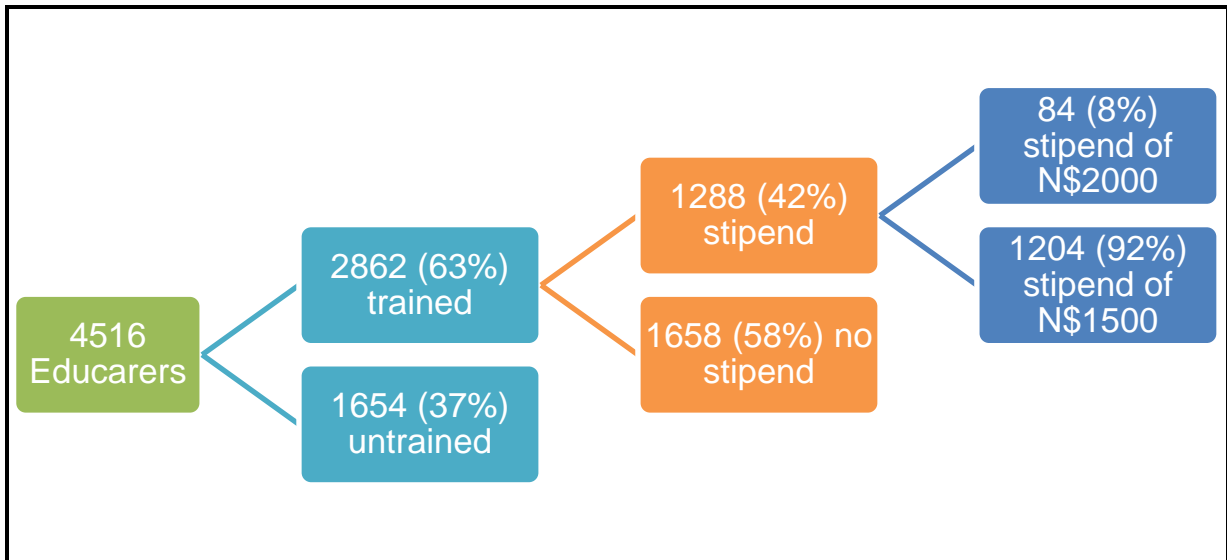


*Source: Own analysis based on IECD 2016 and submissions by MoGECW*

Figure 12 below shows the ratio of educarers to the number of registered ECD centres. The average is obtained by dividing the total number of educarers by the total number of ECD centres.

**Figure 12: Average number of educarers per centre**
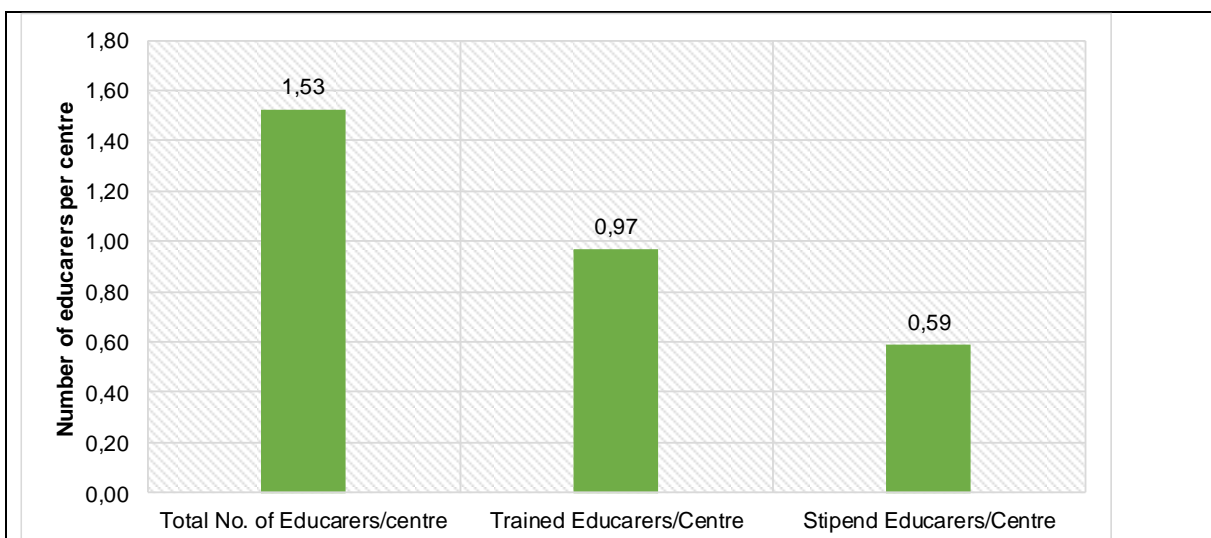


*Source: Own analysis based on submissions by MoGECW*

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Based on the total stock of ECD educarers, whether trained or not, each ECD centre is expected to have at least one and half educarers. The figure also shows that the current number of trained educarers in not sufficient just to have at least one educarers per centre. When considering only those that have been trained and are receiving a stipend, the ratio is almost half an educarer per centre. The situation is even worse when the analysing educarers receiving a stipend per centre is carried out per region.

Figure 13 below shows that only two regions have at least a trained educarers who is receiving a stipend per centre.

**Figure 13: Average number of trained educarers per each registered ECD centre per region**
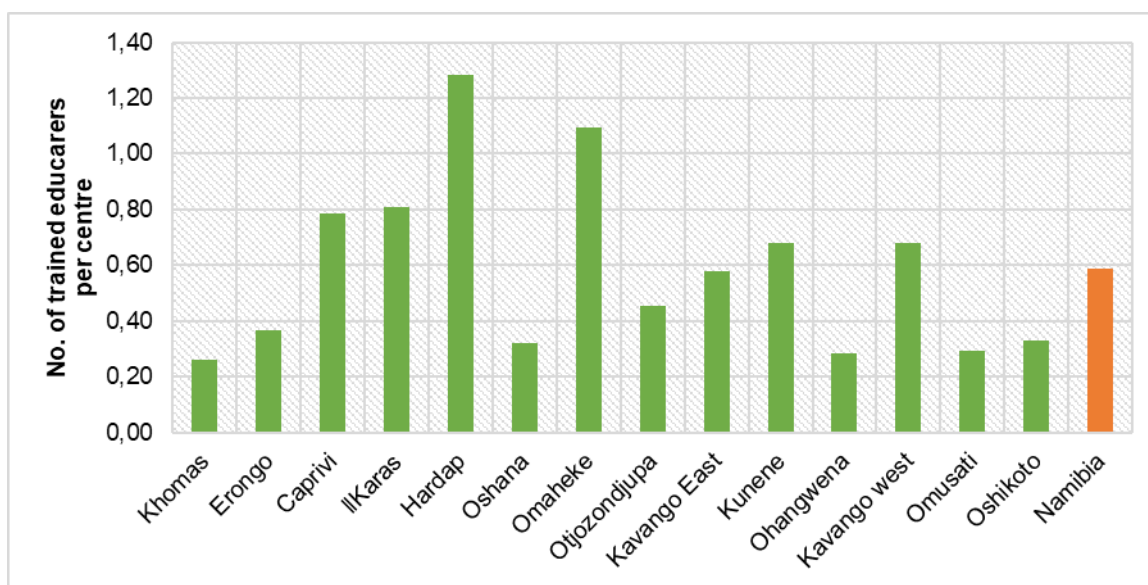


*Source: Submission from MoGECW dated 22 March 2019 and NSA dated 27 March 2019*

### 3.3.4 Preliminary evidence on the current state of ECD facilities in Namibia

The suggested sub-programmes for IECD framework are similar to those proposed internationally. This presents the impression that Namibia's intention to improve ECD is in par with international standards. Despite this well intended aspirations, current ECD sub-programmes in the country seem to be slightly far off the set targets. Based on interviews with 50 ECD centres, ECD centres' needs are aligned to that of IECD sub-programmes, particularly for education, and water and sanitation.

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**Figure 14: Centres' Current Needs (n=50)**
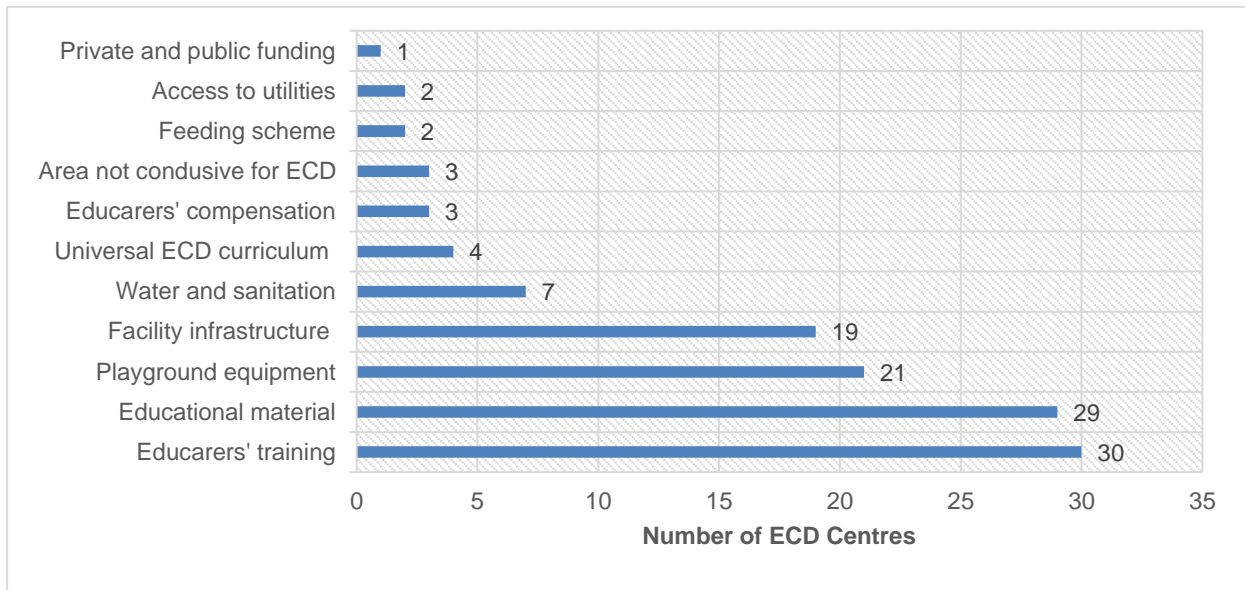


*Source: Own analysis based on data collected from interviews with ECD centres in Namibia*

The Centre's needs, with emphasis on the first four needs (educational toys/material, educarer training, playground equipment, and facility infrastructure) mentioned by at least 19 centres, indicate that achieving an IECD requires the provision of resources that support the implementation of an adequate and quality ECD for all, irrespective of geographical region. The interviewed centres' observations and opinions on challenges experienced in the provision of childhood education services in the country further reaffirm that IECD provision goes beyond drafting a framework but taking into account that sufficient funding and resources are needed.

**Figure 15: Challenges in ECD (n=50)**
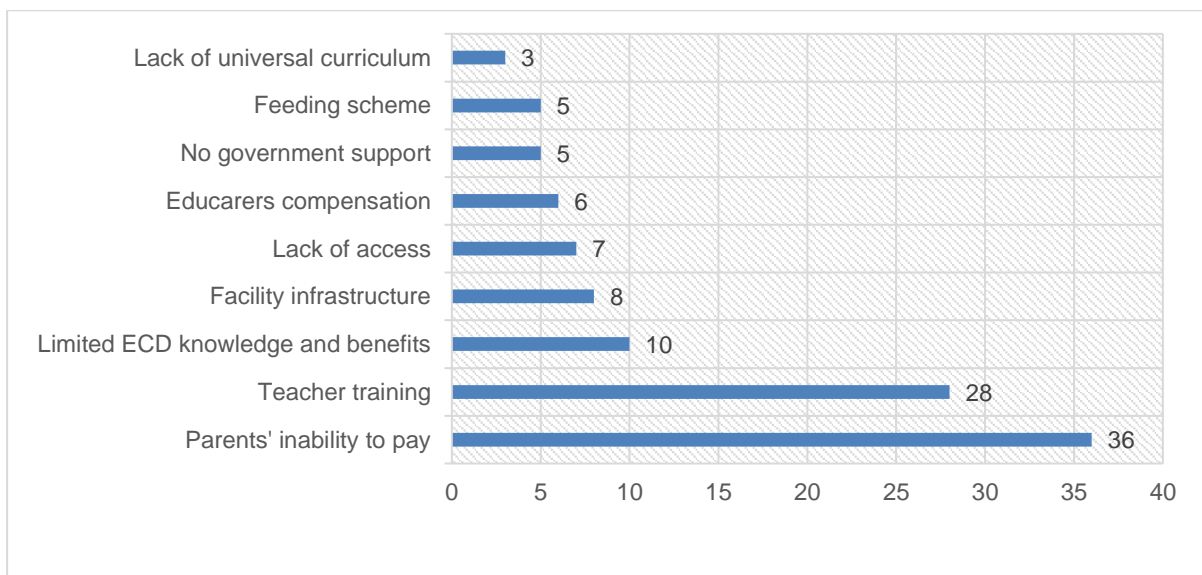


*Source: Own analysis based on data collected from interviews with ECD centres in Namibia*

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This study acknowledges that the main reason for the difference between the IECD framework and actualized activities is primarily the lack of investment, more so since the country is experiencing a cut in public expenditure. The matter is further perpetuated by the fact that the key ministry, MGECW, is one of the lowest funded ministries in the country. In fact, current public ECD investment in Namibia across the three key ministries' budgets accounts for less than three percent and a mere 0.24 per cent of the GDP[26] (Instiglio; Fondation Botnar, 2018).

Nonetheless, it is worth emphasising that even minimal, but well targeted, budget increases towards ECD have the potential to bring forth long-term benefits, as will be argued in the rest of this paper.

# 4  REVIEW OF LITERATURE ON ECD INTERVENTIONS

The objective of this section is to provide a summary of ECD interventions that have proved successful in other countries. The selection of these interventions[27] was to, as far as possible, ensure that the conditions under which they were implemented are comparable to Namibia. Hence, DNA Economics believes that if similar interventions are effectively implemented in Namibia, they will produce comparable results. It should be noted however that some evidence is included from the developed world, which is perhaps not directly comparable, but where the amount of evidence allows longer term conclusions to be drawn which should be considered in the Namibian context.

The review of these ECD interventions is categorized into two groups; those interventions which focus on improving child health outcomes during the first 1000 days, and those interventions which focus on improving child educational outcomes below the age of 6[28] (although the two are tacitly linked). It is important to note that, prior to summarizing the literature, no substantive short- or long-term impact evaluation on ECD has been done in the Namibian case, and as such, inference is necessitated from international literature.

## 4.1  Health Based Interventions (First 1000 Days)

Literature points to a number of interventions aimed at improving the health outcomes of a child, specifically focusing on policy aimed at being implemented during the first 1000 days (usually, including the child's inception).

From the perspective of the mother, these interventions include antenatal care of various forms (vitamin and nutrient supplements as well as maternal education on how to feed their child properly) and postnatal care (focusing on helping the new mother adjust to raising a child). With respect to the

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[26] Calculations were done by adding the two mentioned components of investment in ECD (MGECW support to communities and IECD and MoEAC budget for pre-primary) and dividing the result by the Namibian GDP for 2016 (NAD$ 157.3 billion) reported by the National Statistics Agency in its Annual National Accounts report

[5] At the age of 6, children in Namibia generally enter into primary school. At this stage, the benefits of intervention are low as compared to interventions targeting children below that age (Doyle, et al., 2009). Nevertheless, it is apparent that- at this stage- the Ministry of Education sets out a robust, well-funded scholastic system which definitively benefits all children's learning outcomes.

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children, however, most interventions focus on immunizations, nutrient supplementation, deworming and adequate feeding (Britto, et al., 2017).

Of these, international experience shows that the intervention most able to influence a child's long-term prospects is the presence of adequate feeding in the early stages of her/his life cycle. That is not to say that other interventions do not have a positive influence on a child's prospects (for a comprehensive list of most possible interventions which improve childhood health, see meta-analyses done by Britto, et al., (2017) or Black, et al., (2017), who themselves quote a vast array of literature), but rather that feeding is highlighted to have an unambiguous and positive effect on a child's short and long term cognitive, physical and psychosocial functioning in a wide variety of contexts. For this reason, our focus in the first 1000 days will be on the benefits associated with feeding schemes which adequately roll out a healthy meal.

Literature pertaining to this intervention in particular is summarized in Table 2.

**Table 2: Selected International Literature Investigating Impacts of Child Nutrition and Feeding Schemes**

| Source | Research Question | Quantified Outcomes |
|---|---|---|
| Chaula (2015) | How does a feeding scheme introduced in Tanzania influence school attendance, enrolment and academic performance? | - Schools with feeding schemes exhibited increased enrolment<br>- Children who benefited from the feeding scheme had between 6 and 10 more attendance than those not on the scheme<br>- Children who benefited from the feeding scheme experienced increased pass rates of between 2 and 10% |
| Casale, et al. (2014) | Does stunting negatively influence scholastic and psychosocial outcomes in children in South Africa? | - A stunted child will score between 1-3 questions lower on a standardized R-PDQ (the Revised Personality Diagnostic Questionnaire) test signalling weaker psychosocial outcomes |
| Galasso & Wagstaff (2019) | What are the short- and long-term implications of stunting on educational attainment across the globe? | - A stunted child will complete, on average, 1.6 years of school less than a non-stunted child<br>- A stunted child will score, on average, 0.625 standard deviations less in standardized tests than a non-stunted child<br>- A stunted child will earn up to 7% less in Africa than a non-stunted child |
| Kazianga, et al. (2009) | How do feeding schemes influence school enrolment and health outcomes of children in Burkina Faso? | - Children who benefited from the feeding scheme had showed between a 5 and 6% increase in enrolment at school<br>- Children below the age of 5 who benefited from the feeding scheme enjoyed an improved weight-for-age ratios by 0.38 standard deviations |
| Britto, et al. (2017) | What does a meta-analysis of various ECD-based interventions say for child-development? | - Interventions targeted at child health (adequate feeding and combating malnutrition, inter alia) have an extremely large probability of a child's lifetime outcomes. |

From the literature, it is clear to see that, in general, feeding schemes have the ability to decrease stunting (as measured by weight-for-height ratios), improve soft skills and psychosocial development (as indicated by higher R-PDQ test scores). Children, however, not benefitting from these feeding schemes experience less scholastic success both in terms of years completed and marks achieved, while also showing for decreased lifetime income (Galasso & Wagstaff, 2019).

It is due to the literature's consensus that decreasing stunting is, arguably, the intervention most able to improve a child's lifetime outcomes, and the apparent necessity for improved feeding schemes

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across interviews conducted in centres that we have chosen to model the benefits (and costs) of extending a feeding scheme to ECD learners. This is done as an attempt redress the problem of stunting in Namibia (where approximately 1 in 4 children is stunted under the age of 5 (Ministry of Health and Social Services, 2014)).

## 4.2 Centre Based Interventions (0-6 Years)

Once more, the base of literature on the quantitative impact that access to quality early childhood education has on a child's short-term learning outcomes is quite large. As per Black, et al. (2017), however, the same cannot be said for the possible long-term benefits accruing due to creche-based interventions. In light of this, our systematic approach has isolated benefits identified in the literature from areas in which tracer studies over an extremely long time horizon have been done.

The quantitative findings from these studies, although done in America, can be altered (admittedly through more art than science) to gauge the possible benefits that improving ECD may have on a child's long term prospects in Namibia. There is, however, a robust theoretical/qualitative "Transmission Cycle" which shows the expected benefits from adequate ECD over time, which is seen in Figure 14:

**Figure 16: The Virtuous Cycle of ECD**
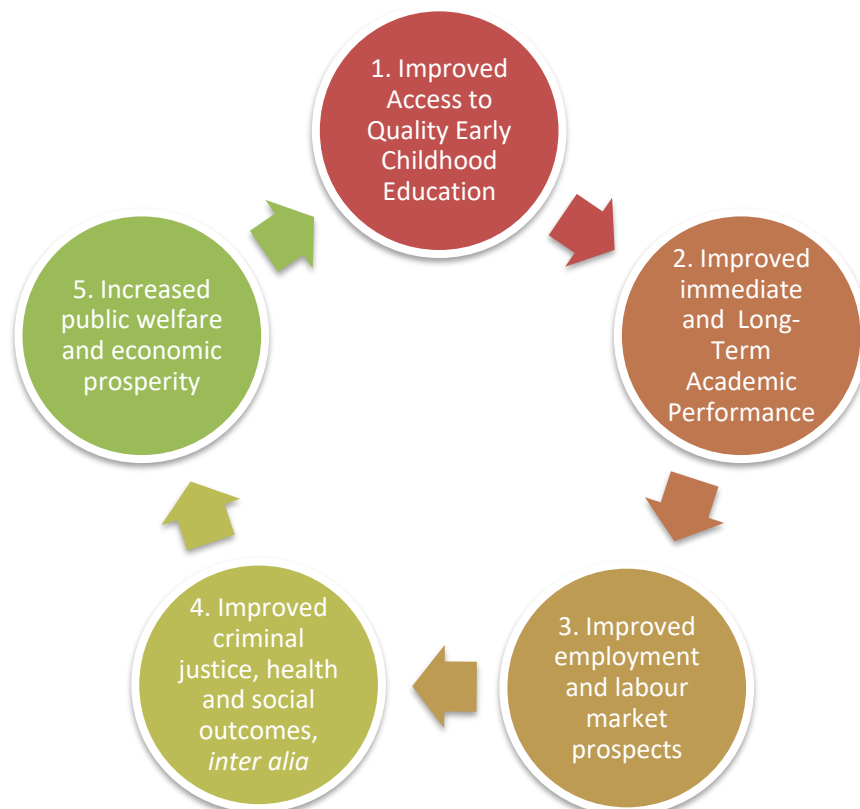


In general, a strong foundational education has long-standing benefits (Black, et al., 2017). These benefits, as outlined in the cycle above, are not all immediate (or at least not immediately clearly

observable), but rather mostly accrue once the child is old enough to either enter the workforce or enter the tertiary learning space. Importantly, though, the benefits of improving access to and quality of ECD services are perpetuating- setting up changes in the present that are able to have reverberating effects on a continued improvement in ECD over a long time-horizon. This creates a virtuous cycle of improved child-based outcomes which lead to improved adult-based outcomes, leading to an improvement of their children's child-based outcomes and so on. However, with ECD investment in Namibia currently, these benefits are not being realized fully, making the case for understanding the so-called "Cost of Inaction"- the cost of not investing in ECD in this case (Sudhir, et al., 2012).

In order to entice investment into ECD, however, and considering that a large portion of the benefits from ECD only materialize after a long period of time, the literature points to various quantitative measures of the benefits from investment in early childhood outcomes. From the perspective of improving both quality of and access to cente-based education, this base of literature focuses predominantly on the way in which educarers are adequately trained, and ways in which education centres themselves can act as a catalyst for these possible long term benefits.

These interventions, as will be seen below, are identified as being the most able to improve a child's prospects (both from an educational and labour market perspective).

**Table 3: Selected International Literature Investigating Impacts of Improved ECD Centre Service Quality**

| Source | Research Question | Quantified Outcomes |
|---|---|---|
| Cilliers, et al. (2019) | How does teacher training at pre-primary level influence educational outcomes in South Africa? | - Teacher training (dependant on whether centralized or in-class) relates to improved educational performance by between 0.12 and 0.24 standard deviations |
| Early Child Care Research Network (2003) | How does access to quality preschools in low income-areas influence educational outcomes in America? | - Improving the quality[29] of childhood educational assistance can improve standardized test results by between 0.04-0.18 standard deviations. |
| Grosz, et al. (2018) | How does increased enrolment in ECD influence school completion in America? | - Attending preschool improved enrolment at tertiary learning institutions by approximately 11.3 percent |
| Oden, et al. (2000) | How does access to preschool in low-income areas influence educational outcomes in America? | - Increased access to kindergarten improved high school graduation in girls by approximately 14% |
| Ou & Reynolds (2006) | How does access to preschool influence educational outcomes in America? | - Attending preschool increased the student's years of school completed by approximately 0.4 years<br>- Attending preschool related to improved high school completion by approximately 11% across genders |

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[29] Quality in this instance implies an improvement in teacher quality, purchasing of adequate learning materials or an amalgam of the two

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| | | - Attending preschool increased the probability of attending a tertiary institution by 6% |
|---|---|---|

As previously stated, the literature points to the fact that both the quality of and access to ECD services are integral in order to experience the largest possible benefits therefrom. These benefits, although not all stemming from African research due to the general lack of such research (Black, et al., 2017), are still valuable to the context of Namibia.

In most of the case studies and questionnaires sent out by DNA Economics, a large portion of the respondents (from line ministries, non-government organizations and ECD centre administrators themselves) suggested that improvement in both the quality of teaching and the quality of centres are low-hanging fruits in terms of improving a child's life outcomes. This is echoed in meta-analyses of the literature (Black, et al., 2017), which seem to point to the fact that it is the learning at the centre itself which is central to the child's development, given that the child is healthy and able to learn.

Furthermore, these quantitative assessments done in America echo the consensus theoretical understanding of how ECD is able to improve a child's lifetime outcomes. Thus, we would argue that it is the quantum of benefits that Namibia would experience when undergoing a particular ECD intervention which would be different from the quantums expressed in the American studies, and not necessarily the benefits themselves that would differ.

## 4.3 Case study in systemic ECD intervention: Chile

While many of benefits discussed above related to individual, often relatively narrow, programmes, it is worth exploring a more systemic ECD implementation done at a national level. Chile is well known for its success in prioritising and implementing ECD interventions, and hence this section contains a short case study specifically on the ECD interventions and programmes present in Chile.

### 4.3.1 Background

For over a hundred and fifty years, the Chilean government has been intentional in investing and protecting children, particularly socio-economically vulnerable children through the provision of a comprehensive ECD. The first educational incentive for pre-scholars was introduced in 1810, during the country's Republican period and a formal first nursery school was opened in 1864 (Peralta, 2011). Since then a plethora of ECD programmes were introduced during the tenure of multiple presidents.

Given the country's track record of ECD programmes dating as far back as early 1800's, Chile has been recognised as having and implementing ECD and Care policies that are classified as 'state-of-the-art'. A most recent policy implemented a decade ago is the Chile Crece Contigo (Chile Grows with You) Social Protection Program. The programme offers **comprehensive ECD to children who are socially and economically vulnerable from birth until the age of 9 years**. The programme has a comprehensive monitoring and referral system utilised to track and ensure that each vulnerable child in Chile receives basic health, nutrition, education, and family support services. The country's ECD curriculum is universal, i.e. the same across the entire nation.

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There are several government-funded ECD programs, principally:

1. **Junta Nacional de Jardines Infantiles (JUNJI, National Board of Pre-school Programs**): dependent on the Ministry of Education, JUNJI offers centre-based care and education for children up to four years belonging to low-income families (Peralta, 2011).
2. **Integra**: Chile's First Lady usually heads this non-profit foundation, which also depends on the Ministry of Education. Its mission is to provide comprehensive educational development through centre-based ECD services for low-income children ages 3 months to 5 years (Peralta, 2011).
3. **The Chile Crece Contigo** is intersectoral in a sense that the provision of ECD services cut across multiple departments, and most importantly, the delivery of these services requires intersectoral coordination. Moreover, the Chile Crece Contigo programme delivery involves both government and non-governmental stakeholders (Richter, 2018). Although the programme is intersectoral, a lead implementer is the Ministry of Social Development with the coordination of the Ministries of Health and Education. Initial services offered through the programme are prenatal care services in public hospitals. As of 2018, 80% (Richter, 2018) of the target population of pregnant women and their unborn children received prenatal services. Follow up services are linked to the provision of education at nursery school to pre-school for children younger than the age of 4 years. The children's vulnerable families are given services, in particular the provision of additional social protection services including cash transfers and home visits.

### 4.3.2   Funding

Government funding share of GDP dedicated exclusively to ECD in Chile is above the OECD average (1.3% 2016) (OECD, 2016). The (OECD, 2016) declares that over the past years Chile has continuously been increasing its expenditure towards ECD, which consequently led to Chile being among the high OECD spenders on ECD (*see* (UNICEF, 2016).

On average, Chile spends $3544 per child on early childhood education (Cortazar, 2015).

### 4.3.3   Measured medium-to-long term Chile Crece Contigo benefits

According to the study of (Cortazar, 2015), grade four "Chilean children who participated in public ECD programs scored on average 0.23 Standard Deviations (SD) higher in math, 0.19 SD higher in reading, and 0.19 SD higher in social sciences than children who did not attend an ECD program before entering Kindergarten". An increase in academic performance would imply that there would be a decrease in grade repetition and drop-out rates. Moreover, these children are likely to continue being high academic achievers at tertiary levels due to cognitive abilities learned earlier in life through ECD.

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# 5   COST AND BENEFIT ANALYSIS

This section presents the cost and benefits of selected ECD interventions in Namibia. The interventions are based on scenarios of selected interventions, which have proved effective in other countries. Please note that the scenarios developed are only based on centre-based educational service interventions (including centre feeding schemes), as this was deemed as the area of greatest need (as explained in section 3).

The section starts in 5.1 by setting out the cost of selected interventions, and then section 5.2 provides estimates of the size of benefits that could arise as a result of such interventions.

## 5.1   Cost estimates of expanding selected ECD service provision in Namibia

This section sets out to estimate the cost of ECD service provision in Namibia, both currently and under a number of different scenarios for expanding and / or improving educational service provision. This model is informed by primary data collected from various ECD centres in Khomas, Kavango East and West, Caprivi, Omaheke, Oshana and Hardap regions[30]. As will be seen, this section shows that- based on the collected data- the cost of quality service provision, even given a host of improvements, is relatively lower per child than the expected benefits of investing in ECD service improvement. Again, it is important to stress that we do not attempt to cost health services, but rather focus on educational service provision specifically at a centre level.

This section is comprised of a "status quo" expenditure analysis (i.e., an extrapolation of how much is currently being spent in the ECD space at a centre-level in Namibia given various outputs, based on our sample), and a set of scenarios in which specific variables are varied in line with an expanded or improved early childhood educational system.

The status quo analysis (section 5.1.1) is informed by current policy positions, as well as primary data collected from 50 ECD centres across the aforementioned 7 regions whose findings are then extrapolated in some sense to the country as a whole.

The scenario-based analysis (section 5.1.2) is based on a mixture of targets from either the IECD Framework or NDP 5 and possible benchmarks set out by policy (an explicit outline of all assumptions, per scenario, is given in Table 4 and Table 5).

From this, Figure 15 sets out the logic for the costing model.

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[30] Sites were selected in 7 regions which the steering committee on the project- experts in their own fields- felt were representative of the Namibian ECD context. Sites visited were in a mix of urban and rural, formal and informal, as well as low- and high-income areas- making the sample relatively able to account for the varied context across the country.

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**Figure 17: Costing Model logic**
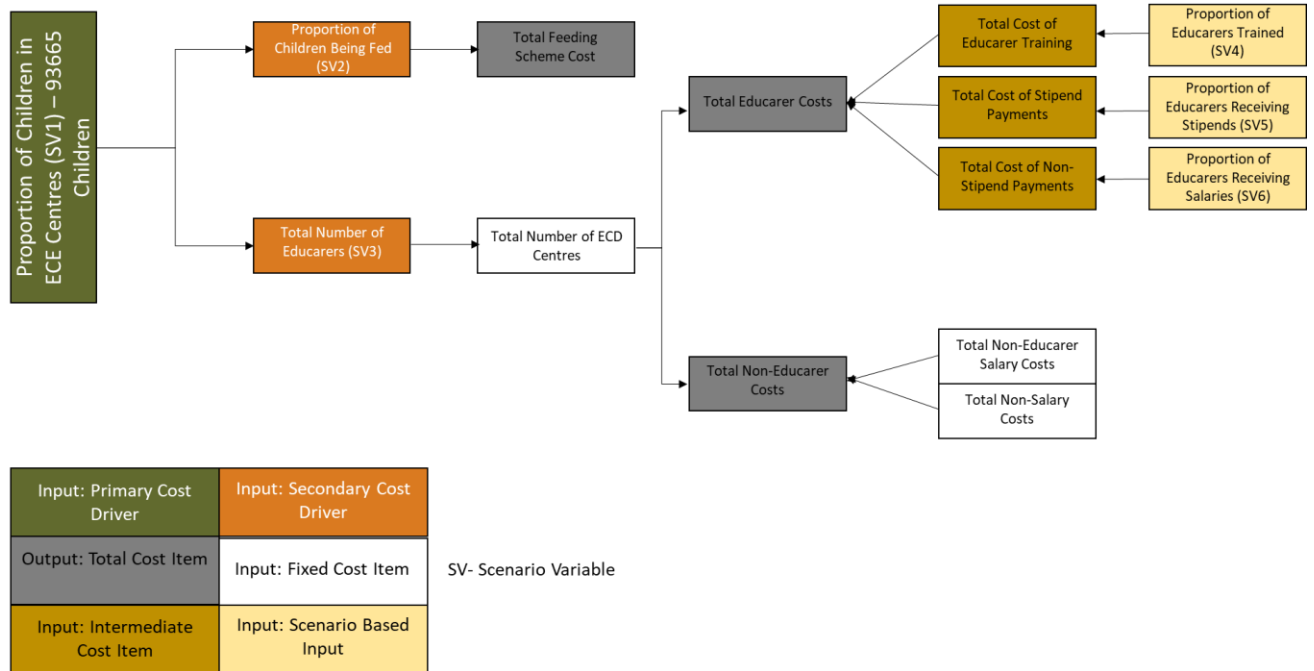


The model assumes, intuitively, that the proportion of children in ECD centres is the primary driver of costs related to providing early childhood education. This proportion of children obtaining ECD services then dictates the number of centres, the number of educarers and the value of learning materials necessitated. To adequately cost ECD, we have also assumed that service provision can be divvied up into two distinct portions- the portion of ECD dealing with a child's health and nutrition (i.e., the feeding of children), and the portion of ECD dealing directly with the quality of education that the child receives.

The cost of feeding the children, as well as total educarer and non-educarer costs, then make up the total cost of providing educational services to children below the age of 6[31].

### 5.1.1 Status-Quo Expenditure Analysis

There is no explicit breakdown of the current expenditure on ECD services in Namibia. Due to this, it is important to model the cost of education-based service provision currently under various assumptions to assess a baseline/status quo expenditure from all parties.

An unavoidable limitation to our study, however, is the lack of a large sample. As such, these findings should be taken as indicative, rather than seen as holistically understanding the ECD-space in

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[31] Considering that the provision of services from the ages of 6-8 fall under the jurisdiction of the MOEAC, it is important to note that figures regarding the cost of education per child per year of study have not been released to us. As such, this age group falls out of the scope of this study.

Namibia. This is especially true where we have had to make limiting assumptions regarding the support received from the state, and various other development agents.

Nevertheless, and focusing on state-expenditure, the MOGECW's total expenditure on ECD in 2017/18 was N$27 500 000 (Ministry of Gender Equality and Child Welfare, 2018). The vast majority of this was allocated to stipends to educarers (approximately 83% of the total budget), while smaller portions of this budget went towards ECD centre building/refurbishment and educarer training (respectively, 11% and 6%). This expenditure was split over 3009 registered centres and 93665 children across the country, coming to an average of approximately N$ 9140 per year, per centre (or, approximately N$294 per child, per year).

Using our sub-sample of centres, we also find that per region, yearly centre costs per child range from:

**Figure 18: Minimum, Average and Maximum Yearly Cost, per Region, of Running an ECD Centre**
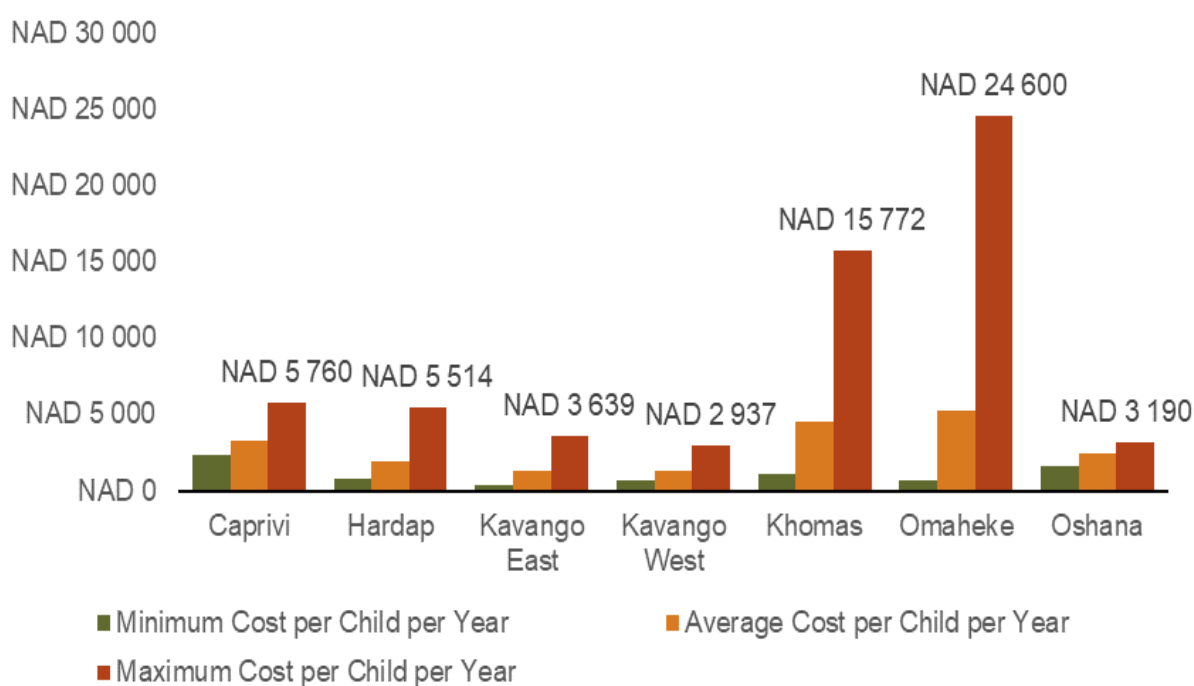


*Source: Own analysis based on own data collected between March and April 2019*

The annual per-child funding from MoGECW is often well below minimum expenditure per child in each centre. As such, the vast majority of ECD activities are thus funded by fee-payments from parents.

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In line with this, our estimate of the total cost of current ECD service provision[32] across the nation is estimated and summarized in Figure 19.

**Figure 19: Status Quo ECD Costing Analysis**
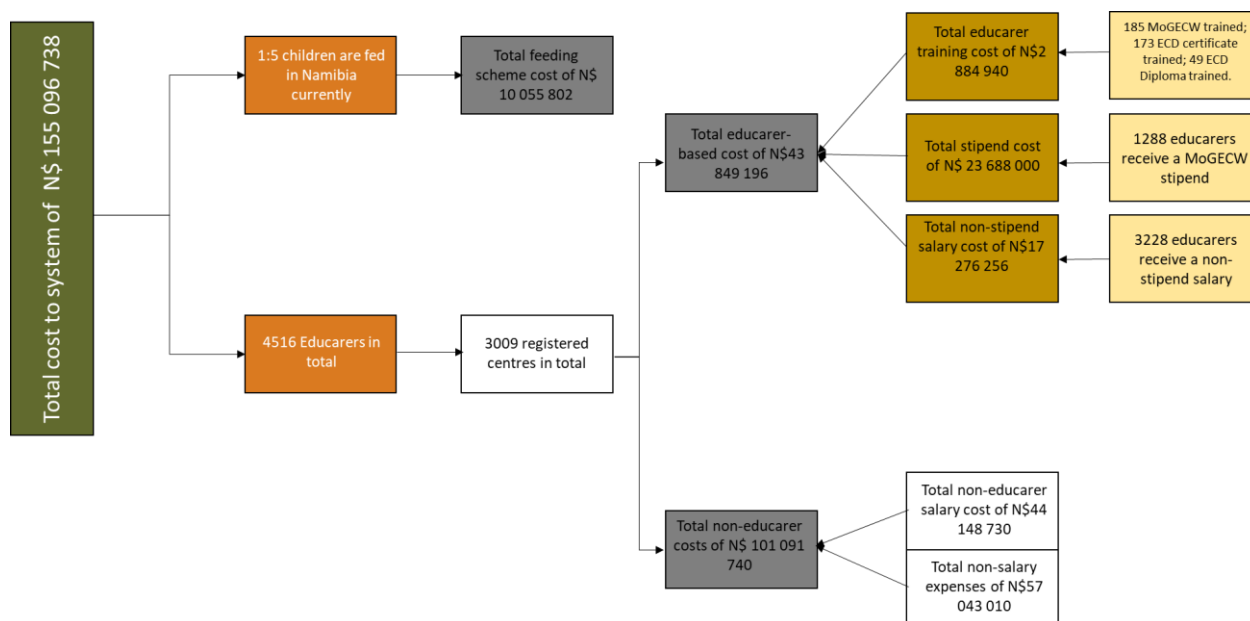


From this, we estimate that Namibian expenditure (private and public) on ECD is on average approximately N$ 4.54 per child per day[33]. This includes the cost per child of learning materials, equipment, teacher quality and creche-based feeding schemes, but excludes infrastructure costs and costs associated with child health service provision.

The total cost to the system in lieu of this is approximately N$ 155 096 738 per year. Of this, current provision of food costs approximately N$ 10 055 802, while the remainder of expenditure is split between non-compensation costs (yearly expenditure on furniture, toys, posters and sleeping equipment) and worker-based expenses (a breakdown of this can be seen in Figure 20)

### 5.1.2  Scenario-Based Analysis

In order to assess the difference between current ECD expenditure and possible expenditure on improved and expanded ECD, we study a handful of scenarios, summarized in the following table.

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[32] Relating to early childhood education/creche-level expenditure

[33] This is calculated by dividing the total cost of the system by the number of children in the system and the number of days in a calendar year

**Table 4: Costing Scenario Description**

| Scenario | Brief description of Costing Scenario assumptions |
|---|---|
| 1 | **Introducing a feeding scheme to cover all children attending ECD**<br>Currently one in five children who go to ECD centres receive meals. The scenario increases this to having all (100%) of children receiving the recommended daily amount of nutritious food. |
| 2 | **Equipping all educarers with training (either MoGECW or an ECD Certificate/Diploma)**<br>Currently only 63% of educarers are trained. The scenarios assume a training programme is in place to eventually train all educarers. This involves 212 per year receiving training from the MoGECW, 96 additional practitioners receiving certified training for ECD at a university/college, and 30 additional receiving diploma-based ECD training at a university/college |
| 3 | **In addition to scenario 2, granting stipends of either N\$1 500 or N\$2 000 to every relevantly qualified educarer.** At baseline, 3228 educarers do not receive any form of government stipend/grant. In the costing scenario, only 1316 educarers do not receive stipends. |
| 4 | **In addition to scenario 3, increasing the ECD enrolment rate.** Increases ECD enrolment rate from the current 20% of children to the NDP5 0-4-year-old target of 26% enrolment. |
| 5 | **Short-term full IECD target scenario:** Whereas scenarios 1-4 were incremental, scenario 5 combines these scenarios to create system-wide change. This scenario is seen as a significant, but achievable short term strengthening of the system. |
| 6 | **Medium- to Long-Term Full Policy Implementation.** A more ambitious longer-term scenario that strengthens all aspects of the ECD system: (i) tripling stipends for all educarers (either N\$4500 or N\$6000 depending on their level of qualification) (ii) training to ensure that all educarers (iii) Doubling expenditure on furniture, learning aids, and toys (iv) Increasing coverage to 66% of all children (a 3-4 year projected target for ECD coverage in NDP5). |

The differences in these scenarios are outlined in Table 5. As a roadmap, this table shows the ways in which each costing scenario is varied. For instance, in Scenario 1, the baseline number of children enrolled in ECD centres is used, but in scenario 6, we have assumed that half of the child population between the ages of 0 and 6 have been admitted into ECD centres (as per the NDP5 goal for 2022/23). As such, all blocks highlighted in green are those inputs that have been changed from the baseline/status quo scenario in Namibia to reflect either IECD Framework/Literature/NDP5 Targets. All blocks "highlighted" in white describe where we left baseline conditions unchanged.

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**Table 5: Scenario-Based Costing Approach- Input Changes**

| | Baseline | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 | Scenario 5 | Scenario 6 |
|---|---|---|---|---|---|---|---|
| Number of Children Enrolled in ECD Centres | 93 665 | 93 665 | 93 665 | 93 665 | 103 360 | 103 360 | 262 366 |
| % of Children Enrolled in ECD Centres | 20% | 20% | 19% | 19% | 26% | 26% | 66% |
| Cost of Feeding Schemes per month | N$ 46 | N$ 151 | N$ 46 | N$ 46 | N$ 46 | N$ 151 | N$ 151 |
| Total Number of Educarers | 4516 | 4516 | 4516 | 4516 | 6891 | 6891 | 17492 |
| Total Number of Children per Educarer | 17 | 17 | 17 | 17 | 15 | 15 | 15 |
| **Total Number of Trained Educarers** | **2862** | **2862** | **3200** | **3200** | **3200** | **3200** | **17492** |
| Number of MoGECW Trained Educarers | 1793 | 1793 | 2005 | 2005 | 2005 | 2005 | 10727 |
| Number of Certificate-trained Educarers | 810 | 810 | 906 | 906 | 906 | 906 | 5281 |
| Number of Diploma-Trained Educarers | 259 | 259 | 289 | 289 | 289 | 289 | 1486 |
| Proportion of MoGECW Trained Educarers Receiving Stipends | 67% | 67% | 67% | 100% | 100% | 100% | 100% |
| % of Certificate/Diploma Trained Educarers Receiving Stipends | 8% | 8% | 8% | 100% | 100% | 100% | 100% |
| Total Number of Educarers not receiving a stipend, but receiving a salary | 3228 | 3228 | 3218 | 1316 | 3691 | 3691 | 0 |
| Increase in MoGECW Trained educarers in one year | 185 | 185 | 338 | 338 | 338 | 338 | 14630 |
| Increase in Certificate Qualification in one year | 162 | 162 | 190 | 190 | 190 | 190 | 1060 |
| Increase in Diploma Qualification | 52 | 52 | 60 | 60 | 60 | 60 | 300 |
| Multiplier on Furniture expenditure | No Multiplier | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Doubled Funding- 100% |
| Multiplier on Toys | No Multiplier | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Doubled Funding- 100% |
| Multiplier on Books | No Multiplier | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Doubled Funding- 100% |
| Multiplier on Learning Aids/Posters | No Multiplier | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Doubled Funding- 100% |
| Multiplier on Sleeping Equipment | No Multiplier | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Inflation - 6% | Doubled Funding- 100% |

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Based on the six scenarios presented in Table 5 above, we summarise the cost per child under each of the scenarios. The summary of the cost-outcomes from each of these scenarios (including, of course, the baseline) is presented in Figure 20, mapping a breakdown of the total cost of each scenario along with the cost per child per day in N$.

**Figure 20: Cost-Scenario Breakdown (Total cost and daily cost per Child)**
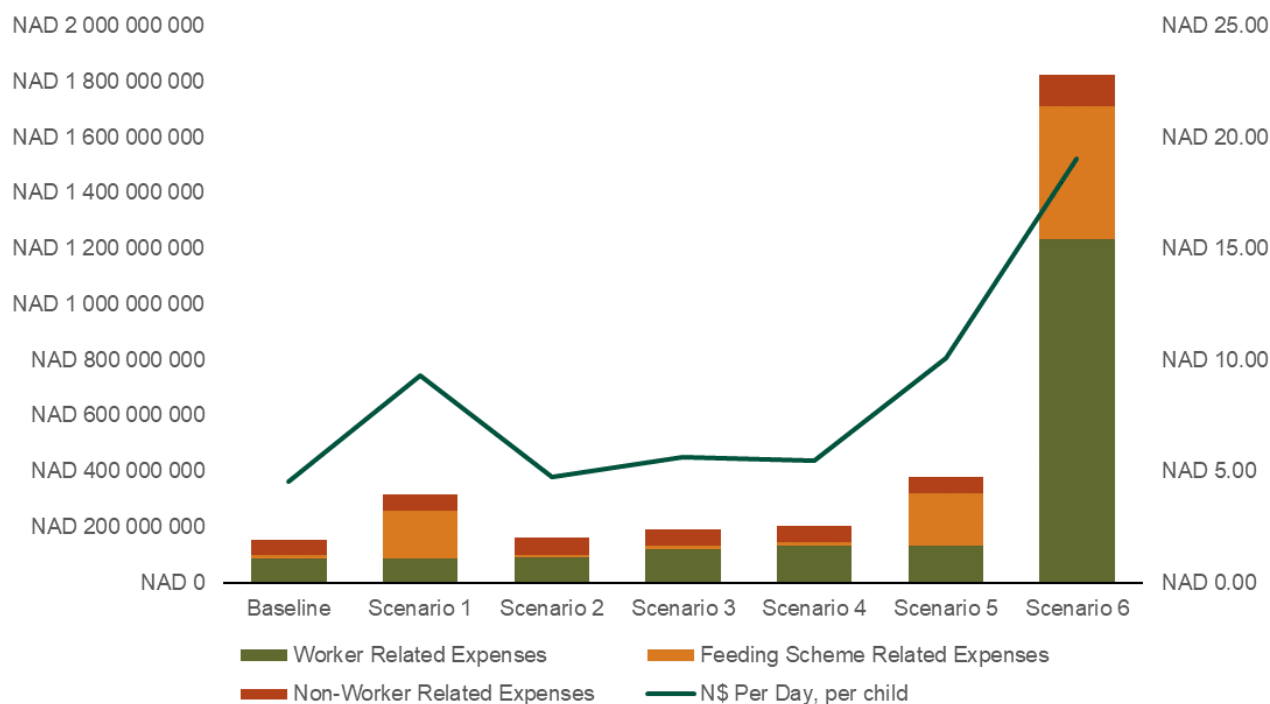


*Source: Own analysis based on own data collected between March and April 2019*

In scenario 1, the cost per child per day for the whole intervention is N$9.31. This result is driven, in majority, by the cost per child of extending a feeding scheme into the ECD centre space. Because Scenarios 2-4 do not extend this same feeding scheme (which itself is one of the more costly interventions), their per-child-per-day costs range from between N$4.73- N$5.63 (the former in scenario 4 coming about due to massively increasing the number of children enrolled at creches, decreasing per head costs on a large scale).

As a relatively realistic and holistic means to improve early childhood education, however, we present scenario 5 (whose total cost sits at approximately N$382 Million (or, N$10.10 per child per day). This, we attest, somewhat improves educarer and educational resource quality, while simultaneously giving all children in ECD centre access to a nutritious diet. This scenario, however, does not include the improvement of the quality of the centres themselves (i.e., their resources) or the improvement in the conditions of work for all those teaching in the ECD space. As such, and as an extreme case, scenario 6 shows the cost of doubling expenditure on learning materials, furniture, toys and the like, and tripling the stipends received by each trained educarer (assuming as well that training is done

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en masse from the MoGECW). At this extreme level, the total intervention cost sits at N$1 824 778 754, or N$19.06 per child, per day.

To contextualise these estimates, we briefly compare the cost of these scenarios to the annual MoEAC and overall government budgets in Table 6. It should be immediately noted that not all of these costs will in fact be borne by government, and as such this represents an upper bound for each of these estimates. The table shows that the total cost for scenario 5 (achieving all the immediate IECD targets) represents only 2.77% of the MoEAC budget of 0.57% of the total government budget. Scenario 6 (medium term targets) is a more ambitious 13.25% of the MoEAC budget but note that this is still relatively small compared to the other school phases and this level of spending could be progressively implemented.

**Table 6: Comparison of ECD intervention costs and benefits**

| Scenario | % of MoEAC Budget (Cost) | % of Total Budget (Cost) |
|---|---|---|
| Scenario 1 | 2.31% | 0.48% |
| Scenario 2 | 1.17% | 0.24% |
| Scenario 3 | 1.40% | 0.29% |
| Scenario 4 | 1.50% | 0.31% |
| Scenario 5 | 2.77% | 0.57% |
| Scenario 6 | 13.25% | 2.74% |

Translating this information into per child, per year expenditure, Figure 21 describes a possible expenditure breakdown per schooling phase:

**Figure 21: Per Child, Per Year Expenditure for Each Phase of Namibian Education**
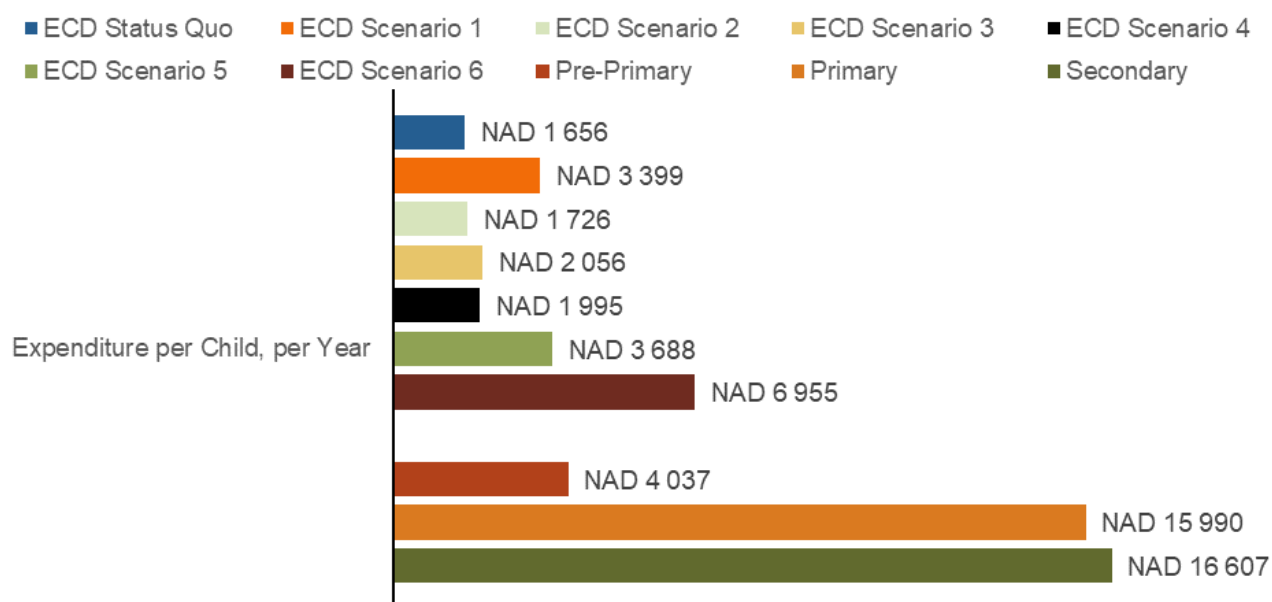


*Source: Own analysis based on own data collected between March and April 2019;* (UNICEF, 2018a)

As can be seen, in most instances, ECD expenditure is relatively lower than expenditure on other phases of education currently (with the status quo expenditure- inclusive of both private and public

funding- of N$ 1 656 being approximately two and a half times lower than only public expenditure on Pre-Primary School, and approximately 8 times lower than spending on either primary or secondary schooling). Given the most expensive ECD intervention (i.e., cost scenario 6), a per child per year spend of N$ 6 955 is half of expenditure on either primary or secondary schooling[34].

Thus, we argue that even spending as much on ECD as on Pre-Primary Schooling is able to improve the prospects of service provision in line with any of our more realistic scenarios. Having articulated the costs associated with investing in ECD, in the following section we present the benefits that are associated with investment in that sector. Once the benefits have been set out, we will compare the cost and benefits of investing in ECD to establish if the benefits outweigh the costs thereof.

## 5.2 Estimated Benefits Foregone

This section estimates the possible benefits foregone by maintaining current investment into ECD in the Namibian, which remains below the required levels. The estimation of benefits is based on the successful implementation of the following interventions based on scenarios presented in Table 4 and Table 5 above. These interventions are summarised below:

1. Introducing a **feeding scheme** at ECD centre level, decreasing the prevalence of stunting in Namibian children. The coverage of that feeding scheme could move to 100% over time or could focus on only at-risk children dependant on budgetary constraints and policy-preference.
2. **Educarer related interventions**:
    a. Expansion of **educarer training** services; this would predominantly be driven by utilizing the training course run by the Ministry of Gender Equality and Child Welfare but could be supplemented by the state funding of educarers who wish to pursue either certificates or diplomas in ECD from either NamCol or UNAM.
    b. Formalized employment of educarers with an **expansion** of both the number of **educarers employed**, and the number of educarers who receive a **monthly stipend** (with the possibility of this stipend increasing dependent on the qualification of the educarer in question)
3. Improvement of the **educational materials in the centres**; this can be rolled out, first, to those centres without adequate learning materials and can be expanded until a standardized set of learning materials is given to all centres (this includes standardizing a syllabus for "educaring" in Namibia which is balanced between learning through play and learning through reading/writing)
4. **Increased access to ECD centres** which meet expected standards (i.e., the increase of enrolment rates subject to increased numbers of trained educarers)

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[34] Expenditure on formal schooling is predominantly state-based expenditure, while ECD expenditure is a mix of private and public funding

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As discussed above, literature shows that quality ECD aid access improves the prospects of both a child's long-term life-outcomes. In the context of Namibia, these benefits include the following:

1. Efficiency gains to the health and education systems such as:
    a. Reduced repetition rates;
    b. Possible decreases in Namibian stunting rates; and
    c. More healthier babies are likely to require less health interventions over their lifetime.
2. An improvement in graduation rates across school phases as a result of:
    a. Possible improvements in cognitive abilities which leads to higher test scores (either personality or learner-outcomes based); and
    b. Possible increases in school attendance.
3. Increased lifetime earnings as employment prospects improve.
4. Any benefit to socioeconomic context other than an improvement in lifetime earnings[35]

In this way, we are able to compare the potential costs and benefits stemming from an improvement in ECD. This allows the study to conlude if investing in ECD in Namibia is a worthwile cause.

### 5.2.1  Efficiency gains to the health and education systems

Access to ECD services has a direct impact on a child's potential repetition patterns, at least throughout primary school (as African literature analysed in Table 3 show). Literature in Africa points out that an increase in enrolment coupled with nutrition intervention (school-feeding) has a significant impact the drop-out rates.

Specifically, ECD interventions have been shown to improve learning outcomes, and hence reduced repetition and drop-out rates, in several contexts. Such reductions could result in significant efficiency savings in Namibia. In 2018, there were 101 171 children repeating a grade in primary school in Namibia; approximately 10% of all primary school children and equivalent to 4046 classes of 25 children. The government spent N$15 590 per learner for one year of primary school, which implies that repetition of primary school children currently costs the state over N$1.5 billion per year.

A study using Filipino data (Daniels & Adair, 2004) found a decrease in repetition rates of 8% for a one standard deviation increase in early height (i.e. decrease in stunting). If similar rates of improvement can be achieved in Namibia, this would translate into an efficiency gain to the system of approximately N$130m per year just from reduced repetitions.

Thus, although these efficiency gains have not been modelled explicitly, this analysis shows the possibility for significant short-term efficiency gains which can be realized through effective ECD interventions aimed at improving child health, nutrition and educational outcomes

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[35] For a possible transmission mechanism into various socio-economic, health, and criminal justice outcomes, it is important to look at the Appendix on : Macroeconomic Context.

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Similarly, on the health side, a successful implementation of the first 1000 days interventions such as nutritious feeding drives for young children and creche-level feeding schemes can aid in reducing stunting, especially if coupled with other health-based interventions during the early years of their lives. Healthier babies are less likely to demand health services in the future. Thus, effective implementation of a creche-based feeding scheme is expected to reduce the demand for health services as the children become healthier, especially if these feeding schemes decrease malnutrition rates across Namibia.

It is of further importance to highlight that stunting has knock on effects of health and education outcomes. As shown above, a study carried out in South Africa showed that a stunted child will score between 1-3 questions lower on a standardized R-PDQ (the Revised Personality Diagnostic Questionnaire) test signalling weaker psychosocial outcomes (Casale, et al., 2014). Globally, evidence shows that a stunted child will complete, on average, 1.6 years of school less than a non-stunted child; score 0.625 standard deviations less in standardized tests than a non-stunted child; and earn up to 7% less in Africa than a non-stunted child. Thus, it is evident that, even in Namibia, one intervention will produce an ecosystem of other benefits. In this case, for instance, school feeding will help reduce stunting, and stunting will in turn generate a number of other benefits such as such as improved educational outcomes.

### 5.2.2 *Improvement in maximum education attainment*

Improvement of the quality of ECD educarers through training and stipend provision will increase the probability of obtaining a higher qualification. Thus, as the quality of teachers improve, the graduation rates increase, and the propbability of getting a higher qualification also increases. Figure 20 below to show that as graduation improves, more and people are likely to obtain higher qualifications.

**Figure 22: Likelihood of Completing a Phase of Schooling**
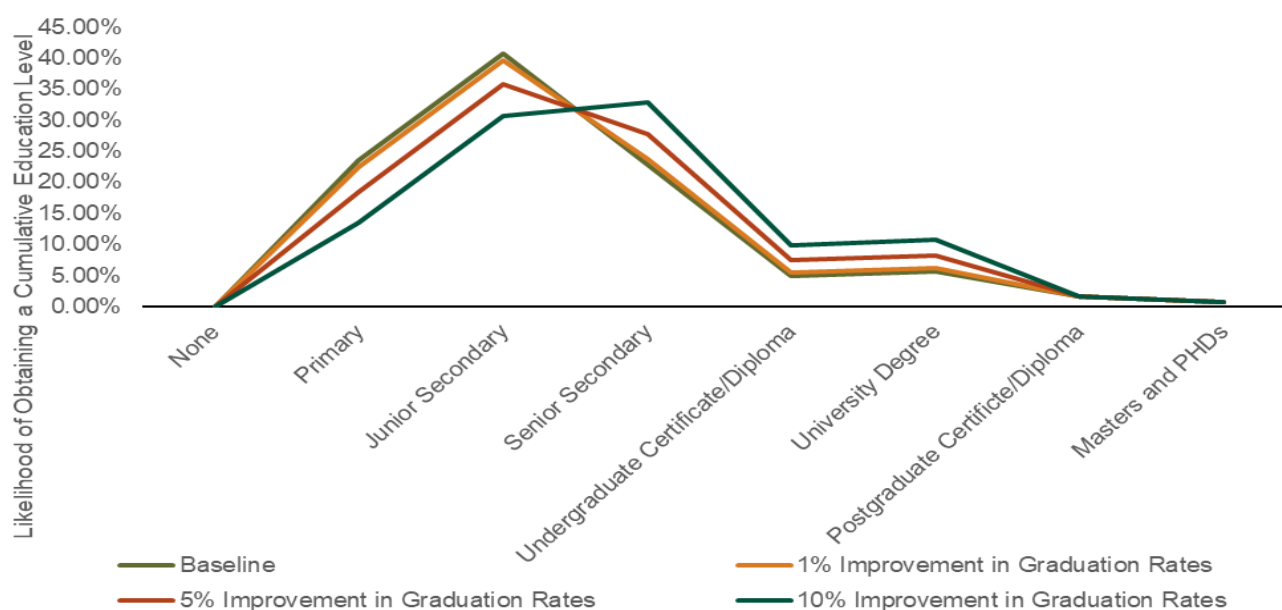
The analysis above shows that ECD interventions increase the number of students that are likely to graduate with a higher qualification than those who do not enjoy ECD services. Thus, the larger the increase in potential graduation rates as a result for better quality ECD educarers, the more the line shifts from the baseline/status quo to the right. In shifting rightwards, each line shows that the likelihood of a child completing a higher phase of education improves. With an ECD educational intervention aimed at educarers, a single child is more likely to have completed senior secondary and undergraduate tertiary studies.

### 5.2.3 Improvement in lifetime earnings

From the Microeconomic perspective, data from the 2016 Namibian Labour Force Survey[36], is used to estimate the potential benefits related to improving school outcomes. In general, two main findings from the Microeconomic context of Namibia are evident:

1. Improved school completion relates to a significant improvement in yearly income. (see Figure A 1 in 0)
2. Improved school completion post-junior-secondary improves the chance/probability of being employed in an extremely significant manner (see Figure A 2 in 0).

From the Macroeconomic perspective, this increase in employment is related to improved Gross Domestic Product. In Namibia, using data from The World Bank (2019), a 1 percent increase in Namibian employment relates to increased short-term nominal GDP by approximately N$ 80 Billion. This improvement in either employment, GDP or both, then relates to improvements in health, social, and educational outcomes.

Thus, we argue that there exists a base of evidence which supports the virtuous cycle of discussed in the previous section - that an ECD intervention from the onset of a child's life is able to improve that child's short- and long-term prospects, with positive spill-overs into other broad public welfare outcomes.

Furthermore, a child's labour market lifecycle is illustrated in Figure 23 below. We have assumed that a child who enters into ECD at age 2 will be able to start earning at age 18. In order to make the analysis more robust, we have also included cases where the child starts working at 21, and where the child starts working at 25[37].

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[36] Namibia Statistics Agency, (2019)

[37] For a technical breakdown of the benefit model, please see Appendix 2.

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**Figure 23: Earnings and ECD Life Cycle of a Child**
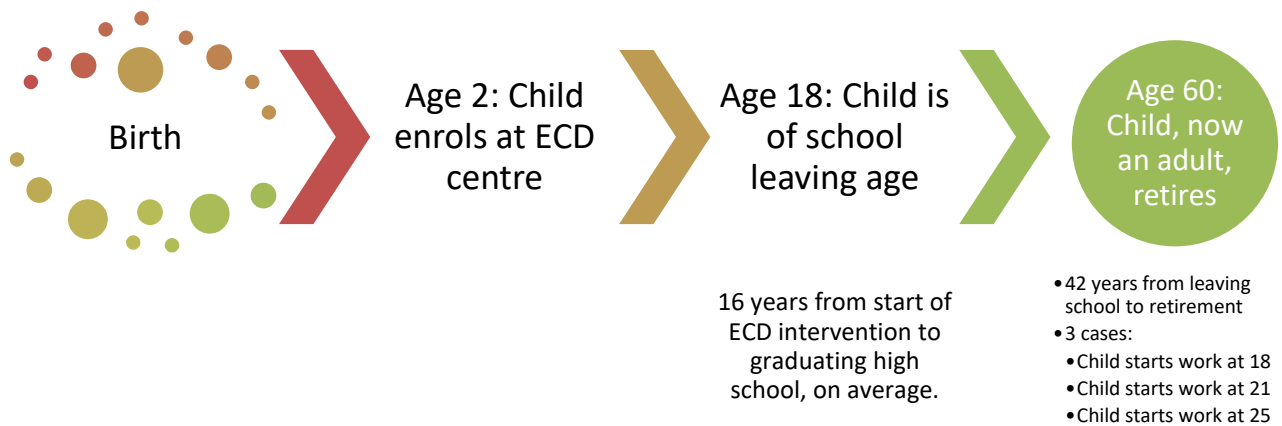


From this set of scenarios, we estimate the present value of a child's lifetime income. This is shown in Figure 24.

**Figure 24: Estimates of the Present Value of average total Lifetime Earnings, Per Child**
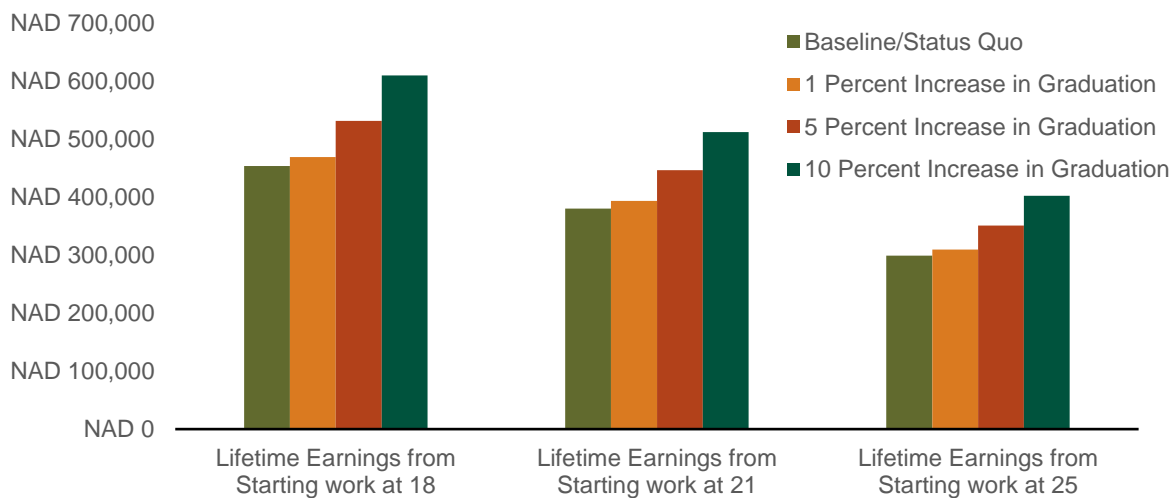


The baseline/status quo lifetime earnings per person is calculated by assuming that graduation rates do not change. These levels are, thus, the level of expected lifetime earnings in the event that there are no benefits linked to graduation rates. If a child did not attend an ECD centre, and instead, started working from the age of 18, it is expected that her/his lifetime earnings would be on average N$440 000. In comparison, a child who, upon attending ECD, experiences an increased chance of graduating by 10% would expect to have lifetime earnings of up to N$600 000 in the event that she/he started working at the age of 18.

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In all instances, these expected lifetime earnings after attending some form of ECD are higher than those lifetime incomes expected at baseline (i.e., assuming no change in long-term graduation rates).

According to Galasso & Wagstaff (2019), a child's lifetime income can increase by 7% in the developing world, given an adequate ECD offering. This 7% falls within the range of possible increases in lifetime earnings attributed to ECD in our analysis, as seen in Figure 25.

**Figure 25: Possible Increases in Lifetime Earnings, Given Changes in Graduation Rates due to Adequate ECD Service Provision**

| | % Increase of Lifetime Income for a 1 percent increase in graduation rates | % Increase of Lifetime Income for a 5 percent increase in graduation rates | % Increase of Lifetime Income for a 10 percent increase in graduation rates |
|---|---|---|---|
| Starting work at 18 | 3% | 17% | 35% |
| Starting work at 21 | 3% | 14% | 29% |
| Starting work at 25 | 2% | 11% | 23% |
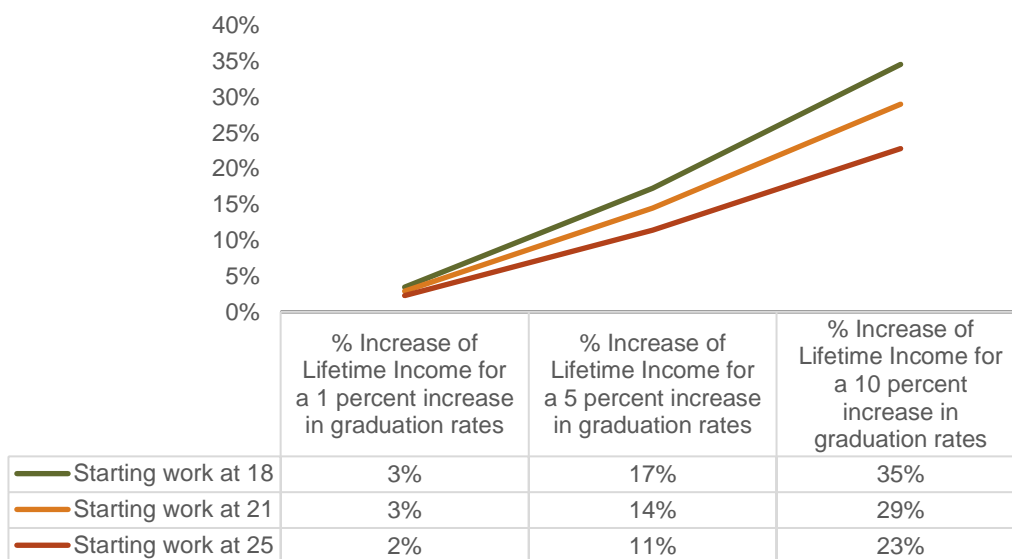
In being conservative, we would argue that the lifetime income of a child given improvement in ECD offerings could increase by at up to 17%, given that the proposed ECD intervention improves graduation by up to 5%. At least, we argue that a 1% improvement in graduation attributed to ECD could come with up to a 2% increase in lifetime earnings, per child.

From the individual perspective, it is important to stress that children who repeat usually enter the labour market later than "model" students who pass in record time. As such, we have modelled the differences in a child's lifetime earnings, given that she/he repeats either 1 or 2 years of school.

In order to do this, we use the same methodology as outlined in Appendix 3- we only assume that a child potentially either graduates from secondary school or undergraduate studies. As such, Figure 26 shows these possible lifetime earnings changes.

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**Figure 26: Possible Individual Benefits Accrued due to Decreased Years out of the Labour Force**
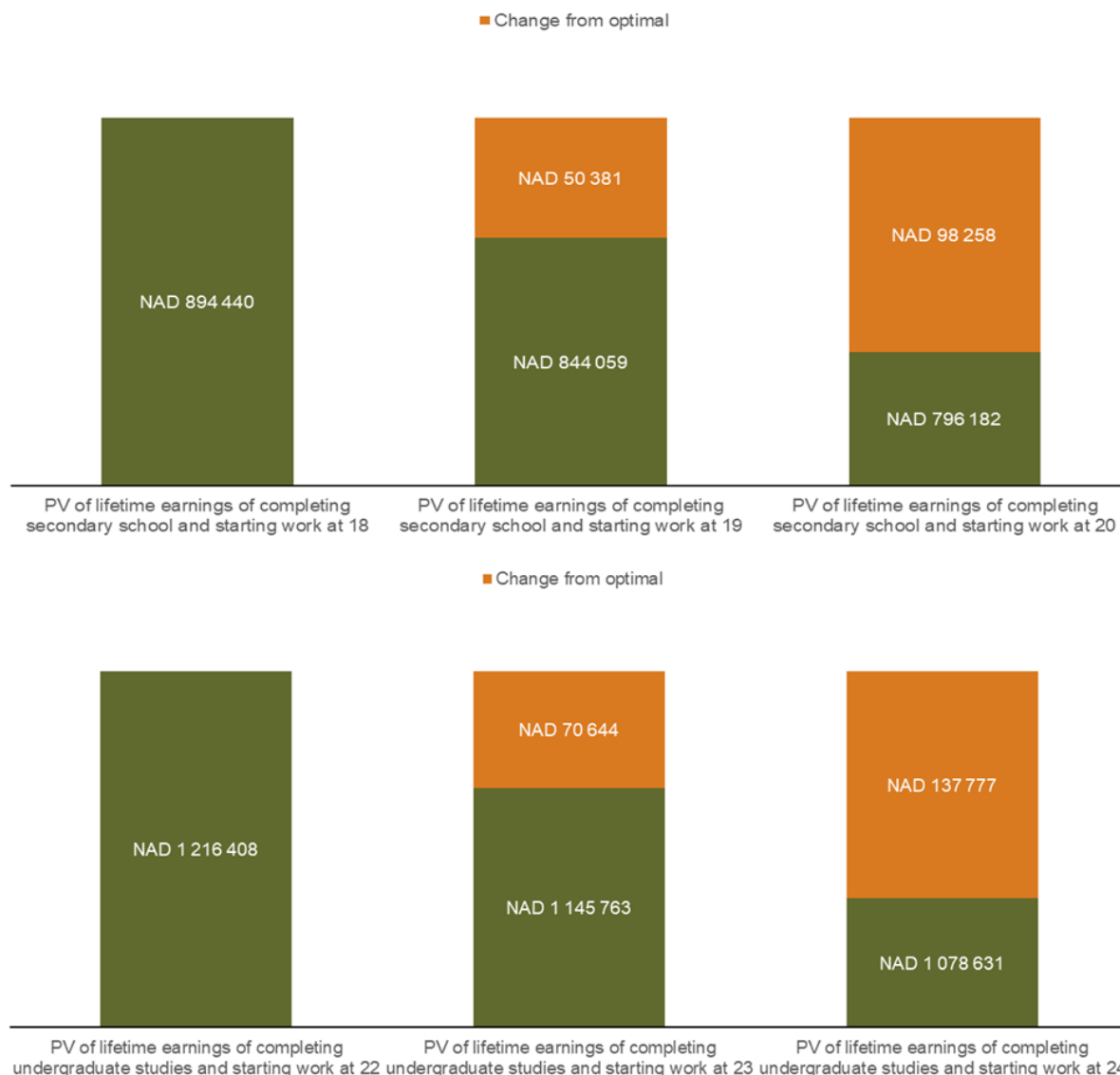


For instance, the solid green bar in the top panel of the figure show the lifetime earnings of a high school graduate who finishes in record time and starts working at the age of 18. A student is expected to have a lifetime income in this situation of N$ 894 440. If, however, that same student was to enter the labour market a year later due to the repetition of 1 year of school, his or her expected lifetime income would decline by N$ 50 381. Similarly, if that student had repeated twice, their lifetime earnings would have dwindled by closer to N$ 100 000.

Along the same lines, a student who finished undergraduate education in 4 years, who then started working at age 22, would obtain a present value of lifetime income worth approximately N$ 1 216 408. In starting work 1 year later, this student's potential lifetime income would decline by N$ 70 644. In starting 2 years later, this student's present valued lifetime earnings would decline by approximately N$ 137 777.

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Above and beyond the quality of life decline that this person would experience due to their now lowered labour market outcomes, this itself has large implications for the Namibian tax base in the future. Given that their lifetime earnings have declined, it may be that tax revenue collected from these potentially functional members of society would diminish in turn.

### 5.2.4 Socioeconomic benefits as a result of ECD interventions

Lastly, ECD interventions creates secondary level ecosystem of benefits that runs across generations. A more educated adult is less likely to engage in crime thus reducing socio and economic costs associated with crime. Secondly, educated parents are likely to vaccinate their children, provide nutritious food to their children, and be able to procure quality ECD services for them. This will ultimately create a self-reinforcing virtuous ecosystem of socio-economic benefits.

## 5.3 Comparing the costs and benefits of ECD interventions

This section compares estimated costs incurred across various scenarios with the possible benefits from effective ECD programmes. The analysis makes a strong case for increased investment in ECD, since the likely benefits associated with ECD interventions far outweigh the estimated costs, even in the case for the most expensive set of interventions (cost scenario 6). Note that the benefits calculation only quantifies a subset of the benefits of ECD[38], and hence the true benefits could be even higher than projected.

As a first basic analysis, we present the costs and benefits on the same graph in Figure 27. [39]

**Figure 27: Comparison of costs and benefits under likely scenario**



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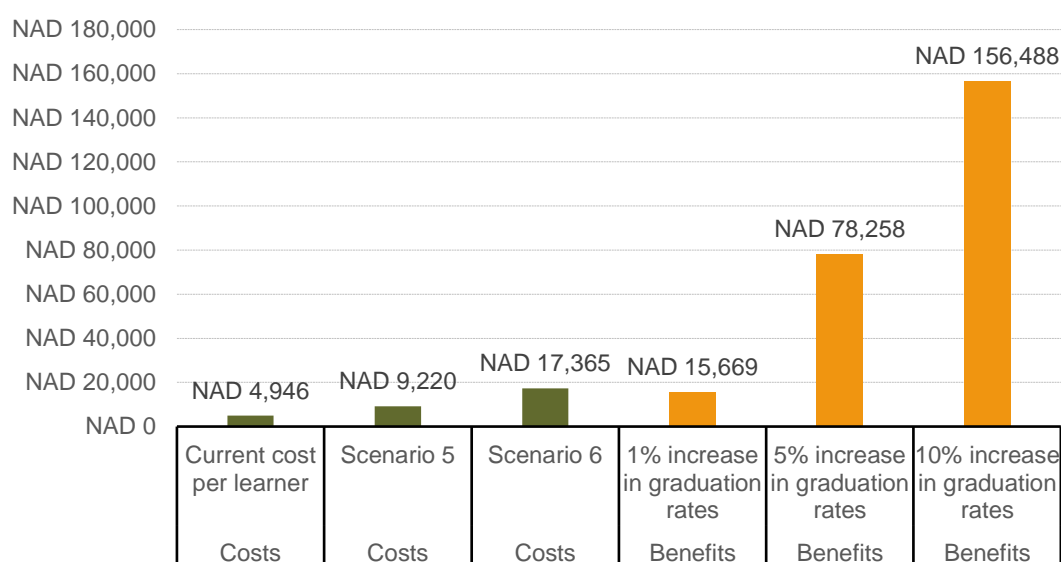
[38] The benefits resulting from the effect of ECD on employment

[39] Note that cost calculations used here assume that the average child attends 2.5 years of ECD.

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To compare costs to benefits more directly, we have calculated the possible benefit-cost ratio for a handful of cost scenarios. In particular the analysis focusses on cost scenarios 5 and 6 (see section 5.1.2 for more detail), which represent the short-term (scenario 5) and medium-term (scenario 6) costs of implementing the essential interventions identified in policy. The per-child costs for each of these scenarios is then compared to the per-child benefits under different reasonable (based on evidence) assumptions for the increase in graduation rates. These benefits to costs ratios simply estimate the possible return on each N$1 invested into the system. These benefit-cost ratios are shown in Figure 28.

**Figure 28: Benefit-Cost Ratio of ECD Interventions which Improve Graduation Rates**
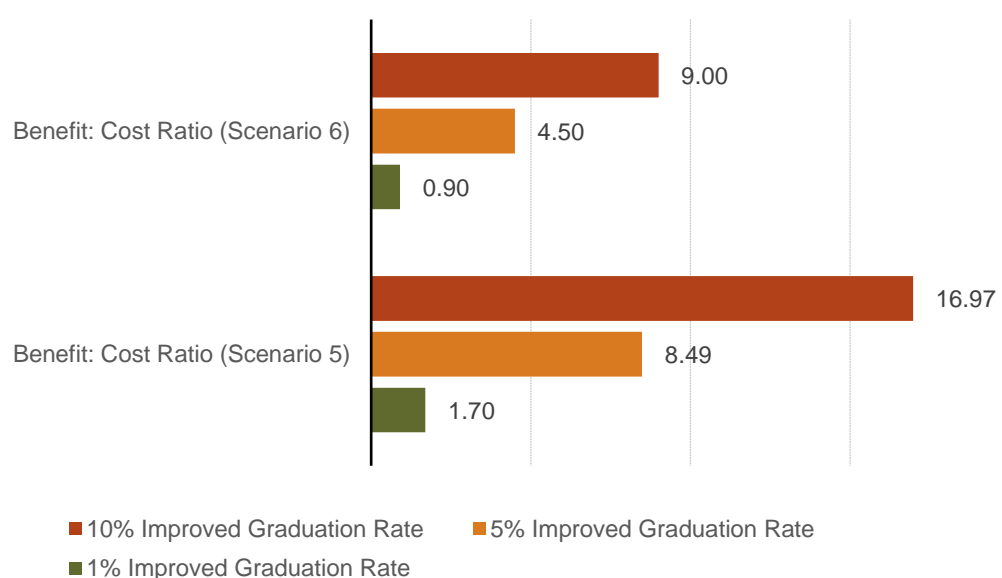


As can be seen, in all but the "worst" case (at the high cost per child of scenario 6, but with graduation rates increasing by only 1 percent), the benefits per child outweigh the costs by a healthy margin. Even in this somewhat pessimistic "worst" case, the costs only slightly exceed benefits. In all other instances, N$1 invested yields significantly more back. Given the most promising potential benefit model, if ECD improves lifetime graduation by up to 10%, N$1 invested into a child will yield almost N$17 worth of returns, making the investment extremely attractive in the long term.

Another way of interpreting this data is to estimate a "break-even point". This break-even point describes the necessitated graduation rate at which the cost of putting a child into the system would equate to the benefits of putting that child through the system. As such, this break-even point practically describes the minimum graduation rate needed in order for the ECD intervention to "pay for itself". As can be seen, even the most expensive of scenarios (scenario 6) requires approximately a 1.1% improvement in graduation rates across the lifespan of the child before the cost of investment breaks even with the benefits accruing due to these interventions. In scenario 5, the change in graduation rate required to break even is only about 0.6%. As we have alluded to across the paper,

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these changes/improvements in graduation rates are well within the bounds of feasibility, especially given international experience.

The exact increase in graduation rates cannot be estimated with great precision or directly be linked to a specific cost scenario, since it will depend on the exact nature and quality of service provision. Nonetheless, the analysis shows that the investment is justified within a wide range of likely outcomes.

Although it appears that the benefits outweigh the costs of investing in ECD, and although the requisite change in graduation rates is relatively small in order to break even, these benefits are inherently based on quality of ECD intervention. If the quality of the intervention (i.e., the quality of teacher readiness and the quality of learning materials) is low, it stands to reason that the possible benefits accruing to one such intervention will be extremely diminished.

In aggregate however, this analysis makes a strong case for investing in ECD services. This is further supported by the fact that a number of other socio-economic and individual benefits that cannot not be easily quantified.

# 6   FINANCING STRATEGIES

While the study has showed that investing in ECD in Namibia is justified, the next challenge is where to obtain resources to fund such interventions. At the time of writing, the Namibian government is implementing financial austerity measures aimed at reducing the current budget deficit, while at the same time, the country's recently classification as a middle-income country implies that major donor agencies could reduce the total amount of donations sent to Namibia.

In this context, full realisation of the suggested expansion in ECD services is likely to only be achievable through coordinated action and investment between government, individual and multi-national donors, the NGO sector and the public at large. The IECD framework has already put in place coordinating mechanisms to enable collaboration, which should be leveraged to create platforms for fruitful discussions on accessing additional resources and / or effectively reallocating existing funds.

In the short to medium term government should consider focussed investment in the priority ECD areas, potentially enabled through some reprioritisation of existing funds; particularly given the efficiency benefits that are likely to follow from such investments.

In all cases it is advisable to use a variety of funding models that are appropriate to the type of intervention being funded. For example, donor funds are likely to be more beneficial for "once-off" costs such as educarer training costs, infrastructure or support costs, or research and planning costs. Similarly, even relatively small increases in funding (from government or donor sources) can reduce the fees faced by parents and make ECD affordable and sensible for more parents. can enable current caregivers to (re-)enter the labour market, thereby expanding the economy.

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In addition, it is imperative that innovative sources of funding for ECD interventions be pursued. Below is a list of such sources, which can be further developed and evaluated:

- **Bond financing** – in this case future student fees are used to finance different types of bond issues. This method has been used in developed countries such as the United States. This concept could be developed and applied in Namibia;
- **Results based funding** – in this case, funds are only used if results connected to cost savings are achieved[40].
- **Education Venture Fund**[41] - seeks to mobilise additional resources for education through bond issues, private donations, leveraged investments and, voluntary levies. The funds are used to fund initiatives that promote innovation in the education sector. Education Venture Fund stimulates and scales up innovations, leveraging both philanthropic and investment capital;
- **Conditional cash transfers** - such transfers provide direct benefits to households in return for ensuring that their children attend ECD. Conditional cash transfers provide an incentive for families to accept the opportunity cost of sending their child to school by providing an immediate benefit to the household[42];and
- **Public Private partnerships** – partnerships between the public and private sector to mobilise funding and expertise are sustainable and more likely to generate deep changes[43].

# 7  CONCLUSION

The purpose of this study was to estimate the consequences of continued underfunding of certain ECD activities in Namibia – referred to as the "Cost of Inaction" – and compares this to the financial costs of increasing provision in this area. The cost of inaction, rather than being explicit, is the "cost" of giving up/foregoing benefits which usually are attributed to improved ECD service offerings. ECD interventions were split between those focusing on the first 1000 days of a child's life, from conception and those focusing on school-preparing age-group between 3-8 years old (before the child enters primary school).

Findings from the study are summarised in the following five points:

Firstly, in respect of expenditure to the health sector, Namibia arguably has one of the highest per capita spend on health care in the Southern and Eastern Africa regions. THE is approximately 14%[44] of the National budget and translates to per capita expenditure of approximately N$6 050. Such high per capita expenditure is reflected in high coverage of antenatal and postnatal programmes at

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[40] See Instiglio report titled: *Improving early childhood development in Namibia with Results-Based Financing (2018)*

[41] Accessed from http://www.leadinggroup.org/IMG/pdf/5-_Innovative_financing_for_Education_-_Moving_Forward-3.pdf on 23 July 2019

[42] Accessed from https://www.opensocietyfoundations.org/uploads/67be4bb0-c630-4b21-9a95-2aa39734e5e1/innovative-financing-education-20100831.pdf page 20, on 23 July 2019

[43] Accessed from http://www.leadinggroup.org/IMG/pdf/5-_Innovative_financing_for_Education_-_Moving_Forward-3.pdf on 23 July 2019

[44] This figure includes both public and private expenditure

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approximately 96%. In respect of children, vaccination coverage is between 90-94%. However, government expenditure on ECD is very low (currently less than 20% of total expenditure in the sector) and predominantly funded by parents and donors. The low level of expenditure towards ECD is reflected in low coverage of ECD services, wherein there is an average of one trained educarers receiving a stipend for every two centres. Similarly, stunting remains a significant issue in the country (with 1 in 5 children being stunted), which calls for enhanced feeding schemes and other nutritional interventions.

Secondly, a review of ECD interventions in other African countries showed that improving the quality of ECD services has a significant impact of cognitive development of a child and his/her scholastic performance. International research also shows a wide range of longer-term benefits across a range of areas, such as school performance, drop, tertiary enrolment and completion, employment and criminal justice outcomes. In addition, a review of the Chile case study showed significant rewards for investment in ECD as grade four learners who had received ECD education tend to score higher than average grades in mathematics, reading and social sciences, unlike children who did not attend an ECD programme. Such an achievement reduces the likelihood of grade repetition and overall school dropout rates and highlights the value of a national focussed response to ECD provision.

Thirdly, from a costing perspective, the study estimated the operational costs of expanding early childhood educational support, based on a basket of centre-level services that are likely to be effective in changing a child's lifetime outcomes in line with the IECD framework targets. The results focus on the final two scenarios, Scenario 5 which aimed at achieving the immediate goals of the IECD framework and Scenario 6 which aimed to achieve the IECD's (and NDP5's) more ambitious medium-term goals. The total operational cost of the centre-level system increases from N$160 Million currently to N$382 under scenario 5 and N$1.6 Billion under scenario 6**.** Similarly, the cost, per child, per day, increases from the current level of N$ 5.42 per child per day to a N$10.10 under scenario 5 and N$ 19.03 under scenario 6, respectively. Thus, even under scenario 6, which involves substantial expansion of ECD assistance, the average cost per child would be less than half that spend per child in primary school in 2018.

Fourthly, an estimation of the potential benefits from such an intervention revealed a number of benefits which could accrue to Namibia as a result of interventions in the childhood education sector:

- Improved early childhood education has the potential of reducing failure and repetition rates in primary school, and hence creating efficiency savings from the over N$1.5 billion Namibia is currently spending on those repeating primary school grades
- Similarly, reducing childcare costs (through expanding funding to ECD centres) can enable parents to (re-)enter the labour market and thereby strengthen the economy.
- The lifetime income of a child who attends creche could increase by at up to 17%, if the proposed ECD intervention improves graduation by up to 5%; even ignoring all other potential benefits and
- In fact, benefits exceed costs under almost all scenarios, and in most cases by several multiples. In other words, the increase in monetary benefits are likely to significantly outweigh monetary costs relative to their impact on the national / private budget.

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- More broadly ECD interventions creates secondary level ecosystem of benefits that runs across generations in the form of reduced crime and more productive citizens who positively contribute to the economy.

Thus, we conclude that that there is a compelling not just moral, but also financial, case for investing in ECD services in Namibia. This investment should be seen as the joint responsibility of government, donors and the private sector. In the shorter term, government should consider reallocation of some of its education expenditure towards ECD (particularly given potential efficiency savings that will result). In addition, a number of possible innovative funding options are listed in Section 6 above which can be further explored. Using the structures and coordinating mechanisms of the IECD framework, short-, medium- and long-term plans should be put in place to collaboratively build a sustainable ECD system that creates a better future for the country.

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# APPENDIX 1    IECD PROGRAMMES

## A 1.1 : Broad ECD Interventions Identified in International Literature



FIGURE 1: 25 Key Interventions for Young Children and their Families
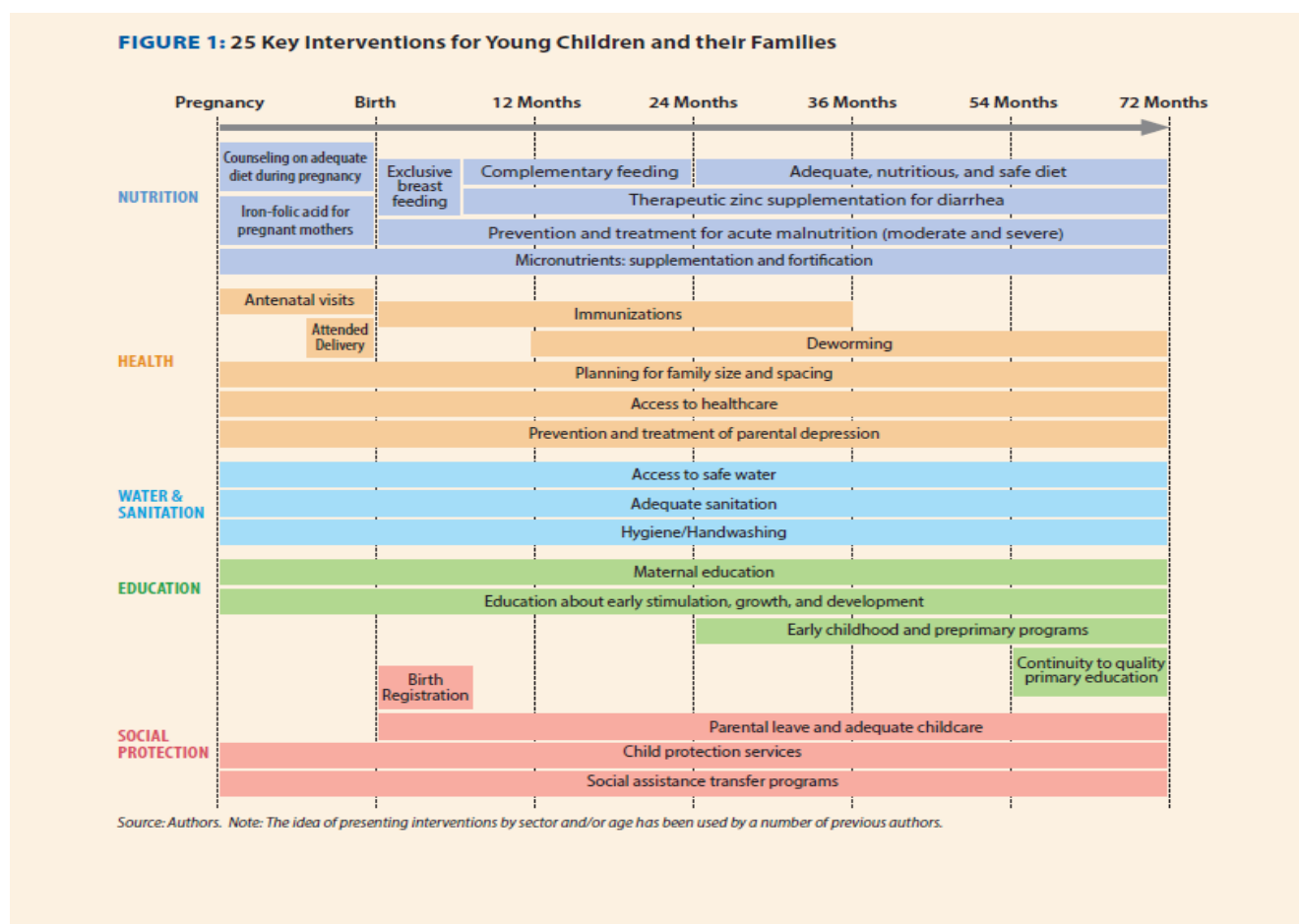
*Source:* (Black, et al., 2017)

## A 1.2 : Suggested IECD sub-programmes

| | First 1000 days (0 to 2 years) | 2-8-year olds | | |
|---|---|---|---|---|
| | Pregnancy | Birth to 2 years of age | 2-4-year olds | 5-8-year olds |
| Health<br>MoHSS;<br>MoEAC | Antenatal visits;<br>PMTCT services<br>Safe delivery<br>State gift box<br>Parenting classes | Post-natal visit/care<br>New-born care<br>HIV testing<br>Deworming<br>Immunization<br>Early disability<br>detection | Deworming<br>Hand washing | School health<br>Immunization<br>Hand Washing<br>Sanitation/<br>Personal Hygiene |
| Nutrition<br>MoHSS;<br>MoEAC | Micro-nutrient<br>supplements:<br>iron, folic acid, calcium | Growth monitoring<br>6 months exclusive<br>breastfeeding<br>IYCF information to | Vitamin A<br>Feeding at centres<br>Nutrition information<br>to caregivers | School feeding |

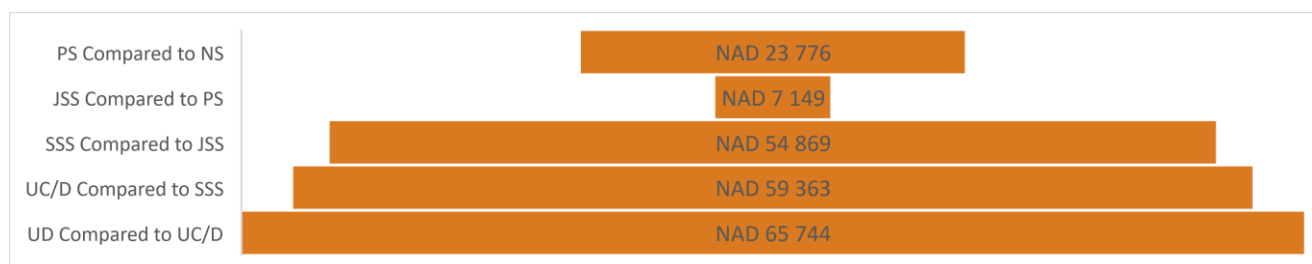| | Infant and Young Child Feeding (IYCF) information to caregivers | caregivers Vitamin A | | |
|---|---|---|---|---|
| Social Protection MGECW MoPA MHAI | Preparation for registration for child support grant | Birth registration Social grant application | Social grants | Social grants |
| Family and child protection and parent/caregiver support MoGECW, MoEAC, MoHSS | Home- Visits 1 month for vulnerable mothers Community and clinic mother groups Family and child protection addressing substance abuse, mental health, violence against children & exposure to violence | Home visits for first 9 months (4/month) (childcare workers) Parent support and skills building Day care early detection of disability and referral | Day care Parent support, service referral and skills building on protective care and discipline | Community welfare workers, social auxiliary workers, social workers Family literacy promoters |
| Opportunities for Early Learning MoEAC MoHSS MGECW | Preparation for parenting | Early stimulation and play Mother-infant play groups Early detection of disability and referral | Early Stimulation and play Early literacy Community play groups ECD Centres | Pre-primary class School readiness Grade 1 |

*Source: MGECW (2018)*

# APPENDIX 2    THE NAMIBIAN CONTEXT

## A 2.1 : Microeconomic Context

As per the diagram above, an increase in educational attainment yields improved annual income, as would be expected.

**Figure A 1: Yearly Expected Increase in Gross Income, Given an Improvement in Highest Qualification Obtained in Namibia**

| | |
|---|---|
| PS Compared to NS | NAD 23 776 |
| JSS Compared to PS | NAD 7 149 |
| SSS Compared to JSS | NAD 54 869 |
| UC/D Compared to SSS | NAD 59 363 |
| UD Compared to UC/D | NAD 65 744 |

This is in alignment with theoretical and quantitative analyses done the world-over. As per Figure A1 and Figure A2, child who has attended adequate ECD facilities should enjoy an improved chance of passing through the various phases of school[45]. Specifically, a Namibian who has graduated primary school earns N$23 776 more per year than a Namibian who has not completed any schooling at all.

**Figure A 2: Improvement in the Probability of Being Employed (%), given Highest Level of Qualification in Namibia**
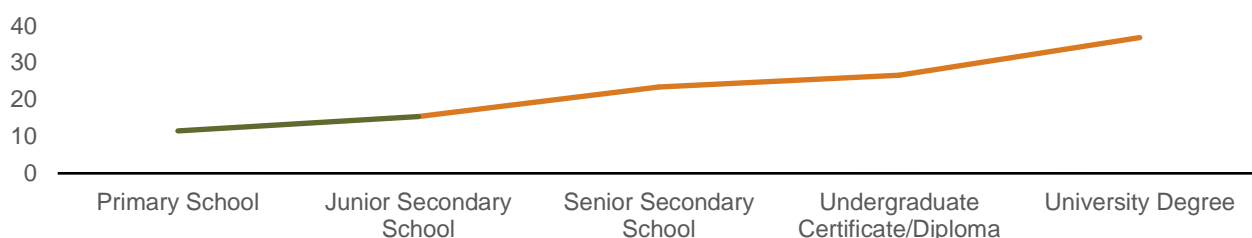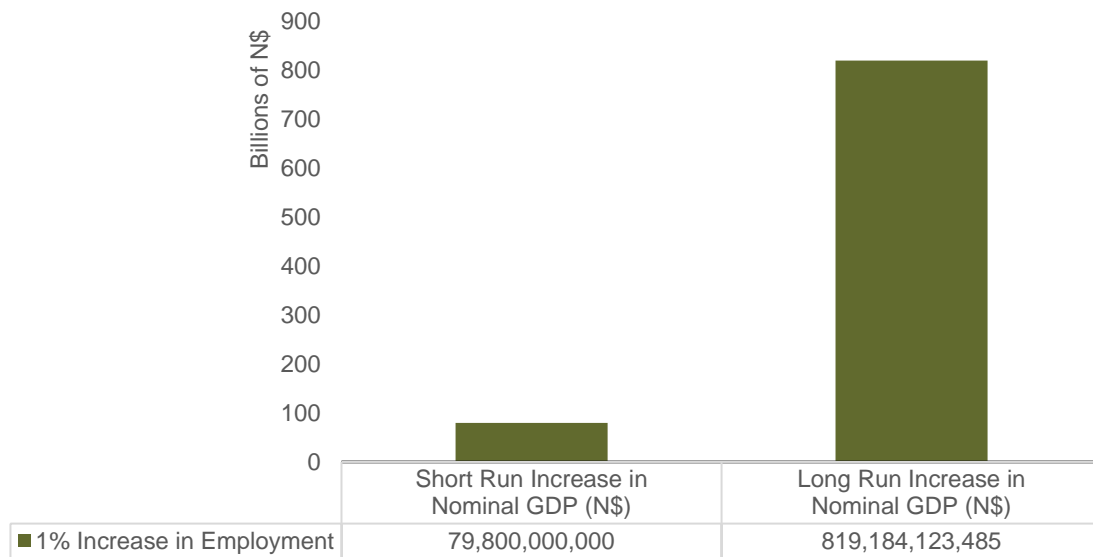


Figure A 2 shows that, upon completing a phase of schooling, the likelihood of a Namibian being employed formally in the labour force increases significantly[46]. More simply put, improved schooling outcomes relates to an improvement in the prospects of a Namibian being absorbed into the labour force by a non-negligible margin.

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[45] NS= No Schooling; PS= Primary Schooling; JSS= Junior Secondary School; SSS= Senior Secondary School; UC/D= Undergraduate Certificate/Diploma; UD= University Degree

[46] The green portion of the graph signals that the probabilities are not statistically significant. This implies that there is no statistical difference in the probability of being employed with no education as opposed to the probability of being employed when having completed primary or junior secondary school.

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## A 2.2 : Macroeconomic[47] Context

**Figure A 3: Okun's Law for Namibia**



| | Short Run Increase in Nominal GDP (N$) | Long Run Increase in Nominal GDP (N$) |
|---|---|---|
| ■ 1% Increase in Employment | 79,800,000,000 | 819,184,123,485 |

The above figure shows that, in Namibia, as employment increases, GDP has the potential to increase in both the short and in the long term. As can be seen, an increase in employment by 1% has the ability to improve GDP by up to N$ 80 Billion and closer to N$ 800 Billion in the long run (when the economy reaches "Steady-State", where the economy neither expands nor contracts, and there is efficient utilization of all factors of production).

Given even a fraction of the possible improvement in employment and/or GDP from intervening in the ECD space in Namibia, possible positive spill-overs into improved educational, judicial and health outcomes are briefly touched upon in Figure A 4.

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[47] All Macroeconomic data is measured between 1991 and 2017, and taken from The World Bank (2019)

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**Figure A 4: Quantification of the Possible Positive Spill-overs Occurring Due to Improved Labour Market Prospects in Namibia**
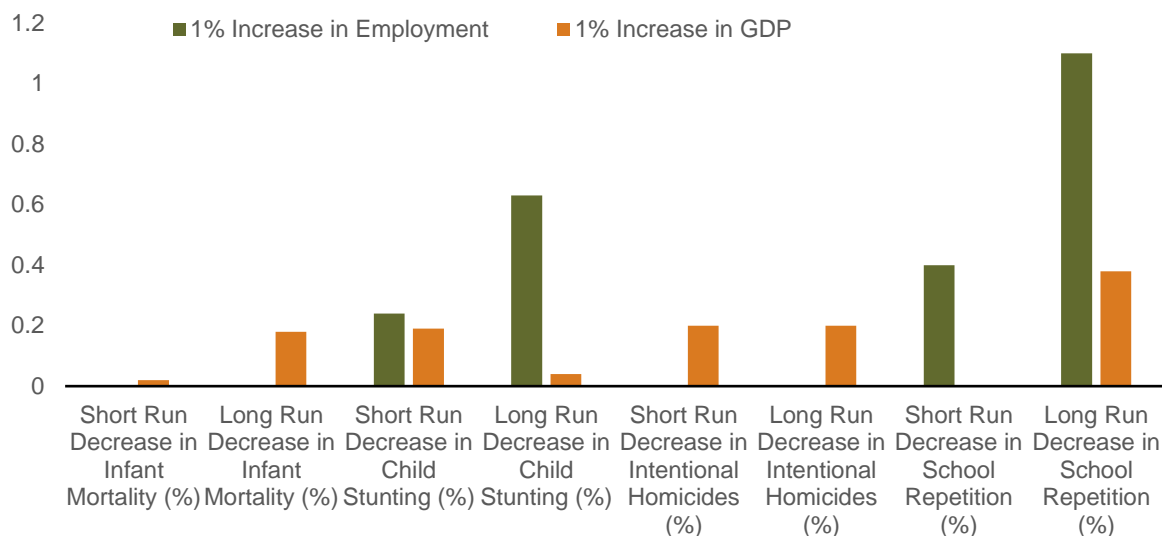


From a technical perspective once more, and in order to model both relationships found in Figure A 4 , it is assumed that all regressions are subject to a parsimonious ARDL process including only 1 lag. Upon log-transforming all variables, we simply estimate a cointegrating regression which is based on the premise that each equation reaches steady state. As an example, focusing on school repetitions (although functional form is the same across the set of regressions), we model school repetition as a function of its level in the previous year and a percentage increase in either GDP or employment separately. All R-squared values lie above 0.85, suggesting that each regression is well-fit to the data.

Ultimately, we concede that- due to the smallness of our sample- these results are nothing more than anecdotal. As such, we have not used them to model for any possible benefits but have included them in order to suggest the possibility that the notion of the virtuous cycle is not altogether unfounded.

# APPENDIX 3    MODELLING THE BENEFITS ATTRIBUTED TO ECD

In order to understand the way in which benefits accruing to ECD were modelled, it is important to outline our assumptions and processes. As per our model, we can now expand the list found in Section 5.2.4:

1. We estimate the average salary that a Namibian earns, given their various maximum qualifications

This is done by using LFS (2016) data. In order to do this, we have simplistically taken the average salary earned by Namibians sampled, given various levels of education.

2. We estimate the probability of graduating from a particular phase of schooling for a Namibian.

This probability is also measured using LFS (2016) data. This "probability" is the proportion of people sampled who have obtained a particular qualification as a ratio to the total number of people in the sample. As such, if the total sample was 10 people, and 9 people had completed primary school out of those 10, the graduation rate of the sample would be 90%.

3. We estimate the probability of being employed, given that a Namibian has a particular highest level of qualification.

This probability, once more, is measured using LFS (2016) data. In fact, this "probability" is the absorption rate in each education bracket. In this context, the absorption rate is simply the number of people employed with a given maximum qualification, divided by the total number of people with that same maximum qualification. For instance, if 10 people were sampled as having no education whatsoever, and 3 were employed of those 10, the absorption rate would be 30%.

4. We assume that, upon enjoying ECD service provision, there is a possible change in Namibian graduation rates by either 1, 5 or 10%.

As per our theoretical discussion in Section 5.2, it is impossible to say the extent to which graduation rates will improve across cohorts, given that the studies we have referenced are not Namibian- all we are certain of is that theoretically, there is a well-established and well-researched benefit linking ECD attainment to improvement in graduation rates across various levels of school obtainment. As such, we have assumed that policy interventions will improve graduation rates by some level. We assume either 1, 5 or 10% as a range with which graduations will improve.

We further assume that those graduations will filter into secondary school and undergraduate university completion. This is as per the summarized literature in section 4 as well.

5. Given all of this information, we calculate the expected present value of a single Namibian child's future income, daily.

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As will be deduced below, this is perhaps the most challenging step in the process. In general, we utilize this actuarial formula which estimates the present value of future income flows:

$$PV_{Lifetime\ Earnings} = \sum_{k=1}^{m} \sum_{n=1}^{q} \frac{1}{(1+\delta)^{k+n}} * (P_{education,j} * P_{employed,j} * X_{salary,j})$$

As such, the above can be broken down:

$m$: The number of years between the time of starting ECD (at age 2) and beginning employment

$q$: The number of years of employment assuming that retirement age is 60, and that a person will start work at either 18, 21 or 25

$\delta$: The social discount rate; as per Hamavindu (2007), this discount rate is approximately 5.231 percent for Namibia.

$P_{education,j}$: The probability of graduating with a particular level of education (as described in point 2 of the previous page), where "$j$" is an indicator of the education received (finishing primary school, secondary school, university and so on.)

$P_{employed,j}$: The probability of being employed, given that a person has completed "$j$" type of schooling

$X_{salary,j}$: The average salary, given that a person has completed "$j$" type of schooling

$(P_{education,j} * P_{employed,j} * X_{salary,j})$: The expected value of a persons' salary, given the probability that s/he was completed "$j$" type of education, and given the additional probability that s/he was employed with "$j$" education type.

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