

Thrive by five Index Report

April 2022



Acronyms

CEF	Cognition and Executive Functioning
DBE	Department of Basic Education
DSD	Department of Social Development
ECD	early childhood development
ELL	Emergent Literacy and Language
ELOM	Early Learning Outcomes Measure
ELP	Early Learning Programme ¹
ENM	Emergent Numeracy and Mathematics
FMC-VMI	Fine Motor Coordination and Visual Motor Integration
GMD	Gross Motor Development
IE	Innovation Edge
Q	Income quintile where Q1 refers to the poorest income quintile and Q5 to the richest
SEF	Social-Emotional Functioning
USAID	United States Agency for International Development

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01 | About the Thrive by Five Index

There are 1.3 million children in South Africa aged 4-5 years. Approximately 72% ($\pm 930,000$) attend some kind of Early Learning Programme (ELP).

The Thrive by Five Index 2021 is the first (baseline) in a series of surveys that will monitor trends over time in the proportion of 4- to 5-year-old children attending ELPs who are *On Track* for their age in key areas of development. This is the largest survey of preschool child outcomes ever attempted in South Africa.

The Index was initiated by First National Bank and Innovation Edge, in collaboration with the Department of Basic Education (DBE) and supported by the United States Agency for International Development (USAID) and ECD Measure.

The Thrive by Five Index provides population-level data on how well preschool children in South Africa (aged 50-59 months) are doing in three key developmental domains which are known to be associated with longer-term outcomes: Early Learning, Physical Growth and Social-Emotional Functioning.

1. Early Learning:

The Index looks at five important learning domains known to be associated with academic achievement in the Foundation Phase of school: (i) Gross Motor Development (GMD), (ii) Fine Motor Coordination and Visual Motor Integration (FMC-VMI), (iii) Early Numeracy and Mathematics (ENM), (iv) Emergent Literacy and Language (ELL) and (v) Cognition and Executive Function (CEF). We present data on each domain, as well as on the total combined score of all domains (Learning Total).

For learning domains, we look at the proportion of children who fall within each of the following categories:¹⁰

a. On Track: These children meet the learning standard and are able to do the tasks expected of children their age.

b. Falling Behind: These children are *Falling Behind* the standard and will need support in order to catch up with other children of their age.

c. Falling Far Behind: These children are *Falling Far Behind* the standard, need intensive intervention and are at risk of not catching up with their peers.

2. Physical Growth:

The Index looks at one key measure of physical growth, the child's height for age. Measuring a child's height against the World Health Organization accepted standard¹¹ for their age is important because it tells us whether the child is at risk of stunting (short for age). Growth stunting is usually associated with chronic malnutrition and is known to compromise neurological and cognitive development, with significant loss of an individual's potential.

For growth, we look at the proportion of children who fall within each of the following categories:¹²

a. Normal growth: These children's height is within the normal, expected range for age.

b. Stunted growth: These children are short for their age as a result of chronic malnutrition and are at risk of not achieving their cognitive and physical potential.

c. Severely stunted growth: These children are excessively short for their age as a result of chronic malnutrition and are at *high* risk of not achieving their cognitive and physical potential.

3. Social-Emotional Functioning:

The Index looks at two measures for this domain: Social Relations with Peers and Adults, and Emotional Readiness for School. We present data on each of these separately.

For this domain, we look at the proportion of children who fall within each of the following two categories:

a. Meets the standard: These children's scores are at the expected level for their age in terms of age-appropriate independence, their interactions with peers and adults and their emotional readiness for school.

b. Doesn't meet the standard: These children do not score at the expected level for their age.

The Index is nationally representative of children enrolled in ELPs, and data may be disaggregated to show the performance of children in different provinces, different household income groups (using school quintiles as a proxy for income) and for boys and girls.

And finally, the Index includes one combined **Composite Indicator** at national level. It comprises two equally weighted indicators: Stunting (including severe stunting) and the Early Learning total score. These were chosen as they are both based on objective, standardised measures and both are crucial for monitoring children's health and development prior to entering the Foundation Phase of school.

The Composite Indicator describes the proportions of children who fall into one of the following three categories:

a. Children who are thriving: These children are *On Track* in both Physical Growth and Early Learning.

b. Children who face barriers to thriving: These children are *On Track* for only one of either Physical Growth or Early Learning and are deemed to be at risk.

c. Children who face *significant* barriers to thriving: These children are not *On Track* for both Physical Growth and Early Learning domains and are deemed to be at high risk.



02 | Acknowledgments

The Thrive by Five Index was an ambitious undertaking, made even more challenging by the Covid-19 pandemic. It would not have been possible without the collective efforts of many individuals and the generous support of donors. We are deeply grateful for the extensive work done by Dr Colin Tredoux, Associate Professor Andrew Dawes and Frances Mattes in analysing the data and preparing the comprehensive Thrive by Five Technical Report available

on www.thrivebyfive.co.za. We wish to thank Dr Jan Schenk and Dr Lameez Alexander of ikapadata, and their fieldwork team, for conducting the Thrive by Five data collection under extraordinary conditions, and for providing the dataset used in the analyses. We are also most grateful to Dr Stephen Taylor, Dr Janeli Kotzé, Professor Servaas van der Berg and Grace Bridgman for providing the method used to weight the sample and for their contributions to our process along the way, and to the many other individuals who assisted with project management, stakeholder engagement, quality assurance and communications. Finally, we thank the ELP staff and children who agreed to participate in the study.



03 | Executive Summary

There are 1.3 million children in South Africa aged 4-5 years. Approximately 72% (±930,000) attend some kind of Early Learning Programme (ELP).

The Thrive by Five Index 2021 is the largest survey of preschool child outcomes ever attempted in South Africa. It is the first (baseline) in a series of surveys that will monitor trends over time in the proportion of children enrolled in ELPs who are *On Track* for their age in key areas of development.

The Index was initiated by First National Bank and Innovation Edge, in collaboration with the Department of Basic Education (DBE), and supported by the United States Agency for International Development (USAID) and ECD Measure.

Data for the Index was collected between September and November 2021. A multistage cluster sampling strategy was used to recruit a nationally representative sample of children aged 50-59 months enrolled in various types of ELPs. The sampling strategy allows the Index to disaggregate findings by sex, province and income levels.

The final weighted sample used for analysis included 5,139 children aged 50-59 months (48% boys and 52% girls) drawn from 1,247 ELPs across the country.

The Index provides population-level data on how well preschool children in South Africa (aged 50-59 months) are doing in three key developmental domains: Early Learning, Physical Growth and Social-Emotional Functioning.

These measures were selected because a child's performance in these domains at the point of entry into school is predictive of performance in the Foundation Phase of schooling, and beyond. Children who are nourished and nurtured in their earliest years, and who have opportunities for learning in the home and in ELPs, are more likely to start school *On Track*. Starting school *On Track* sets children up for greater success.

Data on learning outcomes was collected using the Early Learning Outcomes Measure (ELOM) 4&5, a locally developed and standardised instrument that is aligned with the South African Early Learning Curriculum. Each

child was assessed in their home language, by a trained and accredited ELOM assessor. Data was collected on five important learning domains: (i) Gross Motor Development (GMD), (ii) Fine Motor Coordination and Visual Motor Integration (FMC-VMI), (iii) Emergent Numeracy and Mathematics (ENM), (iv) Emergent Literacy and Language (ELL), and (v) Cognition and Executive Functioning (CEF).

For physical growth, the Index looks at one key measure – the child's height for age. This is important because it tells us whether the child is at risk of stunting. Growth stunting is usually associated with chronic malnutrition and is known to compromise neurological and cognitive development, with significant loss of an individual's potential.

Social Relations with Peers and Adults as well as Emotional Readiness for School were assessed using the ELOM Social and Emotional Functioning Rating Scales, completed by the child's teacher.

The Index reports a staggering 65% of children attending an ELP in South Africa fail to Thrive by Five. These children are not *On Track* for cognitive and/or physical development. They face barriers to thriving, which limit their chances of realising their full potential.

For Early Learning specifically, 45% of South African children attending ELPs are *On Track*. The remaining 55% of children are not able to do the learning tasks expected of children their age, with 28% of children *Falling Far Behind* the expected standard. These children will need intensive intervention and are at risk of not catching up with their peers.

Across all domains except gross motor, girls outperform boys, with 9% more girls *On Track* for learning overall.

While there is considerable variation in performance *within* income groups, there were significant differences on average in the performance of children across different income groups. A social gradient is clearly evident, with children in the higher income groups outperforming the rest.

This was particularly evident for FMC-VMI, and CEF. Poor performance in these domains across the board, but particularly among the poorest children, is of considerable concern given the importance of these skills for later school achievement.

One in four children (25.1%) in this study shows signs of long-term malnutrition, with equal rates of stunting in boys

and girls. Overall, 5.3% were found to be *severely* stunted. These children are excessively short for their age as a result of chronic malnutrition and are at *high* risk of not achieving their potential. The negative impact of stunting on the human capital of the country cannot be overemphasised.

The combination of risk factors faced by young children in South Africa places some children at a massive disadvantage. By way of example, by the age of 4 years, a child in the lowest income group who is severely stunted is developmentally *one whole year* (approximate) behind a child of normal growth in the wealthiest income group when it comes to early learning.

These delays may be further compounded by social and emotional issues. Social-Emotional Functioning (SEF) demonstrated a large effect on learning outcomes – children who met the standard for SEF performed better on the ELOM 4&5. For Social Relations with Peers and Adults, 27.5% of children overall did not meet the standard. This number increases to 33.4% when it comes to Emotional Readiness for School. For both measures, boys were once again less likely to meet the standard than girls.

Imagine a group of 20 children starting Grade R in 2023. On the basis of the data presented here, only seven of these children will be starting their formal education with the right foundations in place. These children are likely to start school *On Track* and are more likely to stay *On Track*. Ten of these 20 children (half) will start school already struggling, either because of physical stunting or because they lack the basic learning foundations. These children are going to need additional support as they transition into Grade R, in order to catch up and keep up. Of great concern is the fact that three of these 20 children will enter this Grade R classroom at a *significant* disadvantage. These children are both physically stunted and *Falling Far Behind* in their cognitive development. For these children, considerable efforts will need to be made to support them as they transition into school. Many of them will be unlikely to ever catch up to their peers.

Massive inequalities persist in South Africa when it comes to the experiences that children have in their first five years of life. This is evidenced in measurable child outcomes at age 4 to 5 years. Before they even enter their first school classroom, most poor children in South Africa face significant barriers to success. This is likely to impact their progression through school, and their long-term economic prospects, reinforcing intergenerational cycles of poverty and exclusion.

There is no conceivable way in which we will realise our development goals as a country without addressing the significant challenges that South Africa's children face in their earliest years.

There is a well-known proverb that says “*The best time to plant a tree was 20 years ago. The second best time is now.*”

This is profoundly applicable to the situation we find ourselves in today.

Had South Africa invested more since 1994 to ensure that young children had the best possible start in life, we would not be in the position we are now, where two out of three preschoolers begin their formal schooling journey without the right basic foundations in place.

We cannot change that. But we can learn from the lessons of the past and redefine the future. We can plant that proverbial tree today.

Urgent collective action is needed to:

1. decrease the performance gap between young children in the richest and poorest households at the point of entry into school; and
2. increase the percentage of young children in South Africa who *thrive by five*, setting more children up for success.

04 | Introduction

4.1 The importance of the early years

The first five years of a child's life are the most important because that is the period of time when the human brain is growing fastest and is most responsive to its environment, care and opportunities for learning. During this period, not only does the brain learn best but the neurological foundations are also established for lifelong learning. Experiences during early childhood shape the architecture of the developing brain.

Children who are nourished and nurtured in their earliest years, and who have opportunities for learning in the home and in ELPs, are more likely to start school *On Track* in key areas of development.

Starting school *On Track* sets children up for greater success.

Research reviewed for this study has consistently found that by 4 to 5 years of age, language and mathematics skills, executive functioning, fine motor coordination and visual motor integration are predictive of children's performance in the Foundation Phase of their schooling. Social and emotional development are both predictive of adjustment to school and to achievements in the primary phase.

4.2 Inequality and exclusion start in early childhood

There are almost 1.3 million children aged 4 to 5 years in South Africa.¹³ Approximately two-thirds of these children live in households that have per capita income below the poverty line.¹⁴ This poverty line is set by Statistics South Africa and is calculated as the amount of money needed to provide for minimum nutritional and other basic needs.

Massive inequalities persist in South Africa when it comes to the experiences that children have in their first five years of life. Poor children are more likely to live in households with poor access to early healthcare and nutrition, and with limited resources for Early Learning. They are also less likely to access an ELP. A 3-year-old child in the richest 20% of the population is twice as likely to attend an ELP, for example, as a child of the same age in the poorest 20%.¹⁵

When poor children do access an ELP, it is likely to be of inferior quality to that available to children from wealthier backgrounds.

Children who participate in high-quality ELPs are more likely to do better in school, to finish secondary school, progress to tertiary schooling and earn a higher wage than their peers.¹⁶ The inadequate and unequal provision of early learning opportunities for young children in South Africa therefore contributes to the high levels of unemployment and inequality we face as a country.

For most poor children in South Africa, the experiences they currently have in their earliest years present significant barriers to their success in school, and to their long-term economic inclusion, reinforcing intergenerational cycles of poverty and exclusion.

4.3 Rationale for the Index

One of the most important indicators we need to track as a country is whether the kinds of early life experiences we offer our young children set them up for success or failure. One way of doing this is to measure child outcomes in the year before children start formal schooling, to determine the *proportion of 4- to 5-year-old children who are On Track in key areas of development that are predictive of later success*.

Until now, we did not have national data to track this important indicator. The Thrive by Five Index will address this gap. The Index will:

- provide reliable population-based data in ways that are easy to understand and action;
- monitor and report child outcomes trends over time to ensure greater accountability; and
- analyse trends to assist those with the will to create change to direct their efforts most effectively.

Data collection for the Index took place just prior to the transfer of responsibility for early childhood development (ECD) from the Department of Social Development (DSD) to the Department of Basic Education (DBE) in April 2022. The Thrive by Five Index therefore provides the DBE with a measure of service quality and child outcomes at the time that this function shift took place. It offers a baseline measure against which to monitor progress in improving the quality of ELPs and other services for young children over time.

The intention is to repeat data collection every three years, in order to be able to track trends in the proportion of 4- to 5-year-old children who are developmentally *On Track*, and to respond accordingly to priority needs within specific domains, population groups or geographies.

In addition, the Index will permit monitoring of the country's progress towards attainment of Sustainable Development Goal Target 4.2. The relevant Sustainable Development Goal indicator is: 4.2.1: *The proportion of children under 5 years of age who are developmentally On Track in health, learning and psychosocial well-being, by sex.*

4.4 Multisectoral partnership approach

Meeting the needs of young children requires collaboration.

If a child is sick or hungry, they will not be able to learn; and chronic malnutrition is known to compromise neurological and cognitive development. The relationship between children's home environment and their cognitive development and school achievement is also well established. Family socio-economic status and caregiver education are particularly powerful predictors of early childhood outcomes, as is the quality of stimulation provided to children by caregivers and other household members during early childhood.¹⁷

The level of stress a child experiences is also important.

Children who are struggling emotionally will find the transition into school more challenging and are more likely to struggle in engagements with peers and teachers.¹⁸ Similarly, it is important to recognise that the skills in different domains do *not* develop independently, but rather influence one another. For example, early language abilities will affect a child's understanding of the instructions that must be followed to solve a mathematics problem. Short-term and working memory are executive functions that are required to solve most problems and to resist distractions, but they can be disrupted by poor emotional regulation and anxiety.

No one sector or department can single-handedly provide the full suite of services and support that are necessary to ensure that children thrive by five. Key stakeholders include multiple government departments (especially Education, Health, Social Development, Cooperative Governance, Treasury, and Planning, Monitoring and Evaluation), as well as the corporate and non-governmental sectors, community-based organisations, media and researchers.

It is for this reason that the inaugural Thrive by Five Index will be launched as a collaborative effort between the private, public and non-profit sectors. The Index will be used to strengthen *collective* efforts to ensure that more children receive the full suite of nurturing care and services they need to be *On Track*, and to support those children whose development is *Falling Behind*.

05 | Methodology

5.1 Sampling frame

A multistage cluster sampling strategy was used to recruit a nationally representative sample of children aged 50-59 months *enrolled in various types of ELPs*. This approach was agreed upfront with all key stakeholders. The sampling strategy allows the Index to disaggregate findings by sex, province and income levels.

Stage 1: Selection of clusters:

In the first stage, 48 public and private primary or combined¹⁹ schools per province (432 schools nationally) were randomly selected from the DBE's database of schools. The selection was stratified by school quintile* as a proxy for income. This was done to match the overall sample as closely as possible with the income distribution of preschool children in each province. These 432 schools (48 per province) formed the core of each cluster of ELPs.

***A brief explanation of quintiles:** Every public school in South Africa is assigned a quintile ranking by the Provincial Departments of Basic Education. This ranking is based on the relative poverty levels of the community living within 3km of the school, with quintile 1 (Q1) being the poorest and quintile 5 (Q5) the wealthiest. See 5.2 below for more information on quintiles and their limitations.

Stage 2: Selection of ELPs within clusters:

In stage two, the team sought to find as many ELPs as possible within a 5km radius of each of the selected schools. Since there was no official enumerated list of ELPs in South Africa, a multipronged strategy was used to build a sampling frame of suitable ELPs. A partial dataset of ELPs (the Vangasali²⁰ dataset) was used as the starting point, to identify programmes in the same ward as the sampled schools. The sampling team also contacted the schools and known ELPs within each ward to identify additional ELPs. ELPs were considered eligible if they (1) operated for more than eight hours per week, and (2) had at least six children aged 50 to 59 months in regular attendance who spoke at least one of the official South African languages as their home language. Each ELP that was identified was called up to five times before they were dropped from the list as being permanently out of reach. Three ELPs in each of the clusters were randomly selected out of the full list of

ELPs identified, resulting in a target sample of roughly 144 ELPs per province, and 1,250 nationwide.

Stage 3: Selection of children within ELPs:

In the final stage of sampling, the intention was for four children (two boys and two girls) in each ELP to be randomly selected for assessment. Participating children were randomly selected from the pool of children who were present on the day when consent forms were distributed and in attendance on the day assessments were undertaken. The target was 12 children per school cluster, resulting in a nationally representative target sample of 5,184 children nationwide, 576 per province.

Note: Selection of sites for baseline assessment: Within each cluster, one ELP was randomly selected to participate in a baseline assessment of ELP quality. This process included interviews with principals and practitioners, and observation of teacher-child interactions. Information from these baseline assessments is not included in this document and will be reported on separately.

5.2 Quintile limitations

In the absence of household level income data for children in the sample, school quintiles were used as proxies for the probable socio-economic background of the children who were assessed.

Data on the relative poverty levels of the community living within 3km of a public school is used by Provincial Departments of Basic Education to assign a quintile rank (quintile 1 is the poorest, quintile 5 is the wealthiest) to each school. Ranks are based on the income, education level and unemployment of households in the school catchment area. For the sampling frame, the assumption was made that the income level of children attending ELPs within each school cluster matched the income level of children attending the nearest school. In practice, however, there will be many instances where this is not the case. Furthermore, school quintiles within each province are

assigned relative to other schools within the province and there will therefore be differences in income levels between schools in the same quintile in different provinces. For these and other reasons, the quintile system is an imperfect measure of socio-economic status of children attending ELPs. However, it was the best option available at the time.

The reasonableness of the proposition that school quintiles reflect socio-economic status was checked by comparing school quintile rankings with two other data points:

- whether the ELP received a subsidy from the DSD (DSD subsidies are targeted at ELPs serving low-income communities); and
- by computing the mean (and standard deviation) scores for average school fees charged (based on interviews with 545 principals), per quintile.

The outcomes of the process offered some reassurance that school quintiles corresponded to other appropriate measures of socio-economic status (Table 1).

Table 1: School quintiles, DSD subsidy and fees comparison

School quintile	% receiving subsidy	Mean (and SE ²¹) fees charged
1	75%	R210 (R55.3)
2	65%	R196 (R25.3)
3	71%	R236 (R26.9)
4	56%	R379 (R70.1)
5	27%	R1 139 (R276)

Given the imprecision of this approach to determining the socio-economic profile of the children who were assessed, it is likely that the socio-economic gradient reported here is an underestimate of the true disparities in child outcomes between children in different income groups. While the correspondence at group level seems correct, quite a few individual children may be assigned to an income category (quintile) that does not reflect their individual circumstances. Further investigation of the relationship between income levels and child outcomes will be undertaken over the course of 2022, using additional sources of data.

5.3 Data tools

Early Learning: Data on Early Learning was collected through direct assessment of every child using the ELOM 4&5. The instrument is aligned with the South African Early Learning Curriculum Framework and was developed

and standardised for use with children in two age bands: 50-59 months (the focus of this study) and 60-69 months. The ELOM 4&5 provides a reliable and fair assessment of children regardless of their socio-economic and ethnolinguistic background, and is available in all the official languages of South Africa. Content, construct, age and concurrent validity (with the WPSSI-IV), as well as test-retest reliability, have been established.^{22,23,24}

The ELOM 4&5 has 23 items clustered in five domains:

- Gross Motor Development (GMD);
- Fine Motor Coordination and Visual Motor Integration (FMC-VMI);
- Emergent Numeracy and Mathematics (ENM);
- Cognition and Executive Functioning (CEF); and
- Emergent Literacy and Language (ELL).

A child's performance on each item in each of the five ELOM 4&5 domains is awarded a raw score, which is then transformed into a scaled score. In each domain, item

scaled scores are summed to provide a domain total score out of 20. The five domain scores are then summed to derive the ELOM 4&5 total score out of 100.

Scores for each domain and for the total fall within one of three performance bands: *On Track*, *Falling Behind* and *Falling Far Behind*.²⁵ The cut-off points for *On Track*, *Falling Behind* and *Falling Far Behind* for children aged 50-59 months were set empirically and in consultation with key stakeholders (in 2016). In order to set an expected standard for each performance band, the team drew extensively on research literature, a review of other assessment tools for preschool-aged children, South African policy, *The South African National Curriculum Framework for Children from Birth to Four*, and expert opinion. The process to set the standard also included assessments of more than 1,300 children.

Data capture on the ELOM 4&5 is fully digitised using Survey CTO. Instructions for assessors are colour-coded for ease of use, and stop rules are hard coded into the tool in such a way that if the child does not succeed on a specific item, the system automatically progresses to the next relevant item.

Further information is available in the *ELOM 4&5 Technical Manual* on the ELOM website www.elom.org.za.

Physical Growth: Growth status is measured as the child's height-for-age, using a stadiometer. The measurement is compared with the expected standard for height-for-age using the World Health Organization Multicentre Growth Reference Study Group, 2006.²⁶

Social and Emotional Functioning: To determine Social Relations with Peers and Adults and Emotional Readiness for School scores, we used the ELOM Social and Emotional Functioning Rating Scales. This tool contains two short rating scales (with a total of 13 items) completed by the child's teacher. It is intended to be used alongside the ELOM Direct Assessments to measure aspects of a child's behaviour that cannot be reliably assessed by a stranger in a testing situation. The teacher is required to rate each child in terms of their Social Relations with Peers and Adults, their Emotional Readiness for School and age-appropriate levels of independence (self-care).

Scores for each scale fall within one of two performance bands – children either meet the standard or they don't meet the standard.

The reliability and concurrent validity of these scales were established using the Strengths and Difficulties Questionnaire for comparative purposes.²⁷

While these are reliable and valid scales, unlike other measures used in the study these are not direct assessments. The tools are based on teacher reports. The reliability of a teacher's rating will depend on how well she knows a child. Also, it is probable that teachers will rate children higher who are compliant, cooperative, well controlled and more proficient in daily tasks (a halo effect). Despite these limitations, the scales provide a brief, but coarse, indication of a child's Social-Emotional Functioning.

5.4 Fieldwork

Data for the Index was collected between September and November 2021 by a team of fieldworkers managed by ikapadata. Training of fieldworkers and assessors took place over three weeks in August and September 2021, and

included a strong practical component where trainees were required to assess children under observation. Assessors were expected to score a minimum of 90% on an inter-rater reliability test to be accredited for fieldwork.

A final team of 18 ELP baseline assessors and the strongest 54 accredited ELOM assessors were selected based on their performance during the training. These 72 individuals were assigned to 18 teams (two per province), each consisting of one ELP baseline assessor and three accredited ELOM assessors.

Fieldwork preparation included pre-visit calls to introduce the research to the ELP principal and to assess whether the ELP qualified for inclusion in the sample. All principals were interviewed in their preferred spoken language. Consent forms were distributed to all participating ELPs in the month preceding fieldwork, to be shared with parents. ELPs were contacted again in the week prior to their scheduled visit, to introduce the principal to the assigned assessor and to assist with preparation. The principals were called again the day before the scheduled visit to confirm availability.

Wherever possible, assessments took place in a quiet space away from the other children, within the ELP. Each child assessment took approximately 45 minutes, and every child was assessed in their home language.

Assessors were trained on, and expected to adhere to, Covid protocols. This included daily health checks, wearing of masks at all times, sanitising of all equipment and the provision of plastic face shields for every child. No fieldworker contracted the Covid-19 virus during the course of fieldwork and no known cases were reported subsequent to their visits at any of the participating ELPs.

5.5 The final sample

The initial dataset contained 5,570 child assessments, sampled from 432 ELP clusters. Of these, 348 child assessments were flagged as "invalid" during data cleaning.

Sampling weights were constructed to ensure that the data was representative of all children aged 4-5 years attending an ELP in South Africa.²⁸ Through this process, the sample was further reduced to 5,139 cases, with between 540 and 600 children per province. (Missing information meant that additional cases had to be dropped from analyses involving weights.)

The final sample included 48% boys and 52% girls.

Table 2: Sample in each province

Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo
N = 587	N = 565	N = 571	N = 575	N = 578
Mpumalanga	North West	Northern Cape	Western Cape	National
N = 540	N = 564	N = 600	N = 559	N=5139

Table 3: Sample by school quintile

Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
N = 1727 (33.6%)	N = 1250 (24.3%)	N = 1144 (22.3%)	N = 495 (9.6%)	N = 523 (10.2%)

5.6 Fieldwork and data challenges

As with any research of this kind, there were data collection and quality challenges that must be noted.

The availability of eligible children: The sampling frame required that the team assess four children aged 50-59 months per ELP, but the irregular attendance of 4-year-old children (partly owing to Covid) posed a significant challenge throughout fieldwork. For example, one assessor in the Northern Cape reported that the ELP had 35 registered children, 13 were present on the day of the visit, and only three of those were eligible 4-year-old children. The rainy season in KwaZulu-Natal and the Eastern Cape exacerbated the problem. The only provinces where irregular attendance rates were not an issue were Limpopo and Mpumalanga.

Furthermore, attendance was significantly affected by the September school holidays. Ideally fieldwork would have started slightly earlier in the year, but data collection had to be timed to take place between the waves of Covid infections in South Africa. As a result of these challenges, the final sample included many instances in which more or fewer than four children were assessed per site. This is accounted for in the weighting exercise.

Missing data: Teacher ratings of the child's Social Relations with Peers and Adults and their Emotional Readiness for School were not obtainable for 373 children, as the practitioner (who is supposed to complete the ratings) was not present when data was collected. There were also seven cases in which height-for-age scores were missing.

Item administration errors: There was an error in the translation of one item in the Emergent Language and

Literacy domain, which might have introduced a practice effect for children in Mpumalanga who were assessed early on in the fieldwork (176 assessments were completed before the error was identified and immediately corrected). To check for any upward bias in scores, the team analysed the Mpumalanga data, including and excluding the problematic item. The observed differences were very small and did not substantially affect results. The decision was therefore taken to retain these children in the provincial sample.

Assessor inter-rater reliability: Every effort was made in the training, monitoring and support of fieldworkers to ensure inter-rater reliability, in other words that every assessor complies with the strict assessor protocols for consistency. Variation of scores between fieldwork teams was carefully monitored during the fieldwork process and, where necessary, corrective action was taken. In one instance, this included the withdrawal of two teams of assessors from the field in the early stages of data collection for additional training.

Quintile allocations: Another data matter worth noting relates to the correct variable to use for classifying an ELP's quintile status. The quintile system is specific to schools in South Africa and ELPs are not officially classified in the same way. It does, however, offer a valuable proxy for the wealth status of the children assessed and was used for stratification during the sampling process, as well as for disaggregation in the analysis. There are different approaches that can be used in assigning a quintile status to an ELP, each with its own pros and cons. The research team decided to adopt the most conservative approach (so as to introduce as little error as possible) and use the quintile status of the primary schools that were used to

construct the sample. This variable was used for both the construction of the weights as well as for disaggregation.

Covid: The Covid-19 pandemic has significantly affected the ECD sector. Closures of ELPs during various lockdown periods (particularly in 2020)²⁹ significantly disrupted the amount of programme participation possible for children attending in that year. In addition, ELPs remain subject to standard operating procedures required by the Department of Social Development to manage risks of infection. The impact of the pandemic and associated changes to the daily programmes of ELPs is likely to have changed the nature of the child's experience in several ways and in all probability reduced the amount of benefit they might normally have gained. In addition, for all children, but particularly those in the lower three school quintiles, the

impact of the pandemic on livelihoods, household resources and caregiver wellbeing is likely to have impacted on the health and development of young children.

Closures of ELPs during lockdown and hesitancy of ECD practitioners to let assessors into their ELPs during a pandemic also presented additional sampling challenges.

Furthermore, Covid protocols observed during fieldwork, such as the wearing of masks and face shields, will have impacted on the child's experience of the assessment. It is not possible to determine the extent to which this influenced performance.

As a result, one cannot regard the findings of this Index as reflecting children's development under normal societal conditions.

For more information on methodology and a comprehensive account of the data analysis, including the construction of sampling weights, and data challenges, see the Thrive by Five Technical Report. A detailed description of the approach used for the extrapolation of findings to children not enrolled in ELPs is described in the Thrive by Five Technical Supplement. All reports are available on the Thrive by Five website.

06 | National findings

6.1 What proportion of children enrolled in ELPs thrive by five?

A staggering 65% of children enrolled in ELPs in South Africa fail to thrive by five.

These children are not *On Track* for cognitive and/or physical development. They face barriers to thriving which limit their chances of realising their full potential.

Only 35% of children enrolled in an ELP in South Africa thrive by five – these children are *On Track* for both physical growth and Early Learning. Almost half (49%) of children

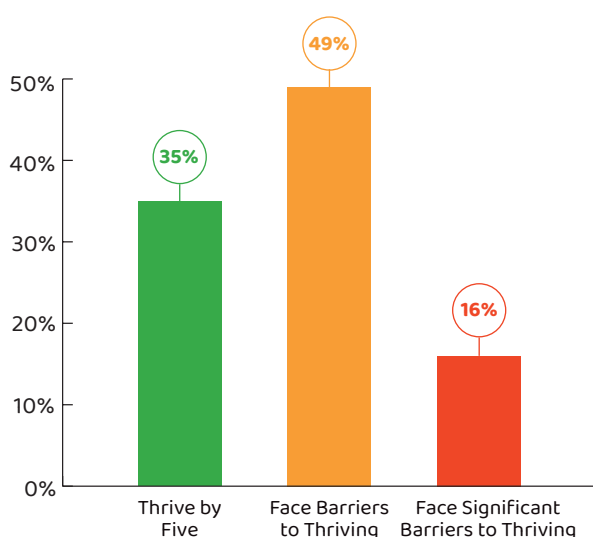
face barriers to thriving – these children are *On Track* for only one of either growth or Early Learning and are deemed to be at risk. And 16% of all children enrolled in ELPs face *significant* barriers to thriving – these children are not *On Track* for both Physical Growth and Early Learning domains and are deemed to be at high risk.

Imagine a group of 20 children starting Grade R in 2023

On the basis of the data presented here, only seven of these children will be starting their formal education with the right foundations in place. These children are in the green zone for both Early Learning and physical growth. They are likely to start school *On Track* and are more likely to stay *On Track*.

Ten of these 20 children (half) will start school already struggling, either because of physical stunting or because

Figure 1: % Children in South Africa aged 4-5 years enrolled in an ELP who *Thrive by Five*



Note: This draws on the Index sample data only. An extrapolation³⁰ of findings to all children aged 4-5 years in South Africa was undertaken to estimate the proportion of all children who thrive by five, including children enrolled in ELPs and children not enrolled in ELPs. Using this approach, the estimated proportions of children in each category are as follows: Thrive by Five: 31%; Face Barriers to Thriving: 49%; Face Significant Barriers to Thriving: 20%.

they lack the basic learning foundations. These children are going to need additional support as they transition into Grade R, in order to catch up and keep up.

Of great concern is the fact that three of these 20 children will enter this Grade R classroom at a *significant* disadvantage. These children are both physically stunted and *Falling Far Behind* in their cognitive development. For these children, considerable efforts will need to be made to support them

as they transition into school. Many of them will be unlikely to ever catch up to their peers.

There is no conceivable way in which we will realise our development goals of eliminating income poverty and reducing inequality³¹ without addressing the significant challenges that South Africa's children face in their earliest years.

6.2 What proportion of children in ELPs are *On Track* for Early Learning?

For Early Learning, the Index looks at five important learning domains known to be associated with academic achievement in the Foundation Phase of school: (i) Gross Motor Development, (ii) Fine Motor Coordination and Visual Motor Integration (iii) Early Numeracy and Mathematics, (iv) Early Literacy and Language, and (v) Cognition and Executive Functioning.

We start off by presenting data on the total combined score of all domains (Learning Total) and then share more detailed information on each of the five domains individually.

For Learning Total and for individual domains, we look at the proportion of children who fall within each of the following categories:

1. *On Track*: These children meet the learning standard and are able to do the tasks expected of children their age (green zone).

2. *Falling Behind*: These children are Falling Behind the standard and will need support in order to catch up with other children of their age (orange zone).

3. *Falling Far Behind*: These children are Falling Far Behind the standard, need intensive intervention and are at risk of not catching up with their peers (red zone).

The key difference between orange and red zones is the severity of delay and the degree of intervention needed to get the child back *On Track*.

6.2.1. Learning Total

Nationally, only 44.7% of children enrolled in ELPs are *On Track* for the Learning Total score. This score combines all five of the learning domains that were assessed:

- Gross Motor Development (GMD);
- Fine Motor Coordination and Visual Motor Integration (FMC-VMI);
- Emergent Numeracy and Mathematics (ENM);
- Cognition and Executive Functioning (CEF); and
- Emergent Literacy and Language (ELL).

It's worth reiterating here that these particular domains were selected because performance in these areas is known to be associated with longer-term learning outcomes. Research reviewed for this study has consistently found that by age 50-59 months, language and mathematics skills, executive functioning, fine motor coordination and visual motor integration are predictive of children's performance in the Foundation Phase of school.

Figure 2: Learning Total scores

More than half of 4- to 5-year-old children enrolled in ELPs in South Africa are not able to do the tasks expected of children their age, with 28.3% of children *Falling Far Behind* the expected standard.

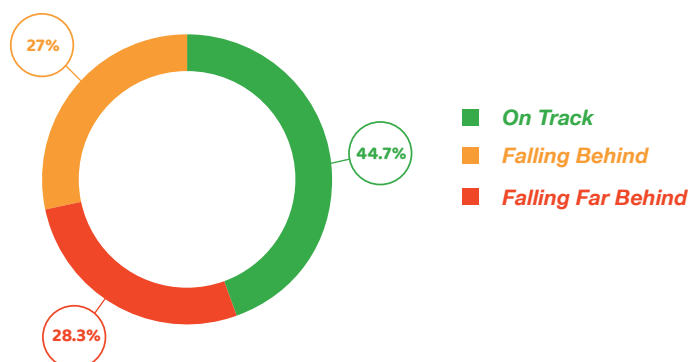
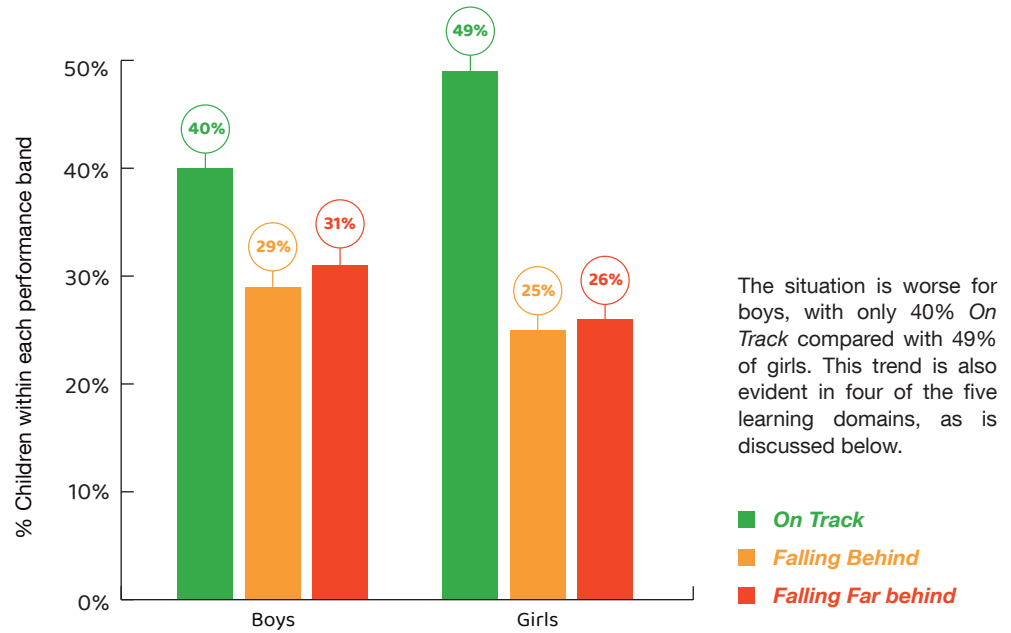


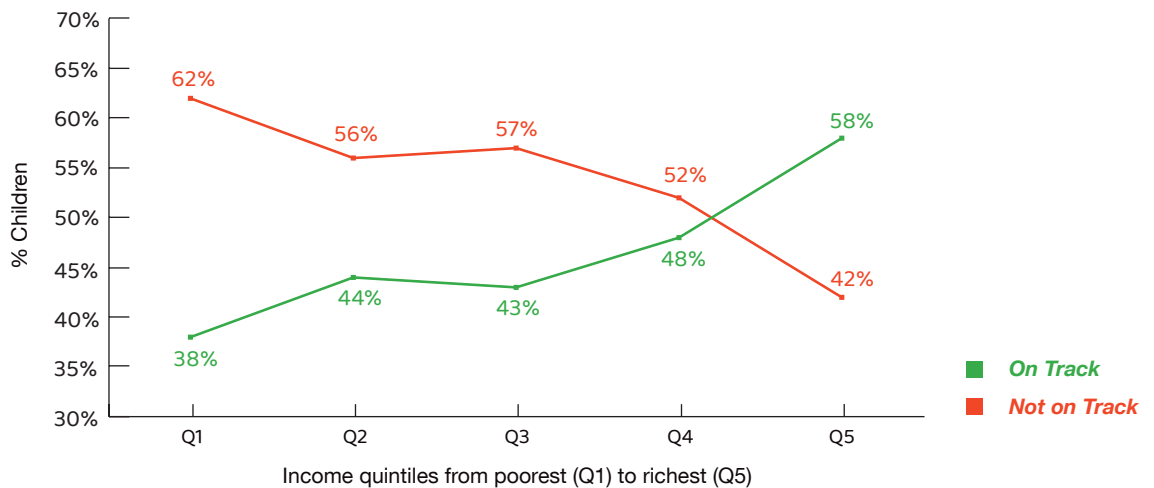
Figure 3: Learning Total scores by sex



There is a notable socio-economic gradient in learning outcomes, with a greater proportion of children from the higher-income quintiles being *On Track*. 58% of children in the highest income group are *On Track*, compared with just

38% of children in the lowest. A child's chances of starting school *On Track*/not *On Track*³² are profoundly influenced by the income level of the household they are born into.

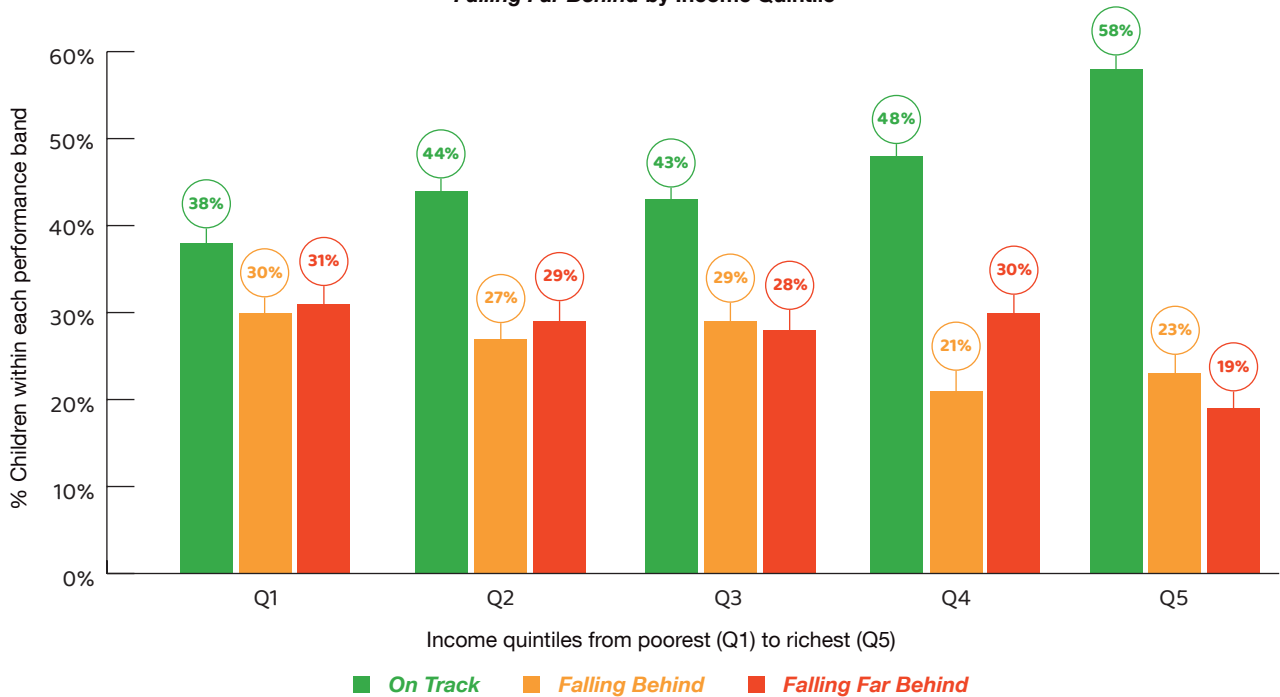
Figure 4: Learning Total - % Children *On Track* / *Not on Track*, by Income Quintile



As noted earlier, given the imprecision of the quintile allocation system to determine the income level of the children who were assessed, it is likely that the socio-economic gradient reported here is an underestimate of the true disparities in child outcomes between children in different income groups. Further investigation of the relationship between income levels and child outcomes will be undertaken over the next few months, using additional sources of data.

The figure on page 16 breaks learning scores down further into each of the three bands per quintile: green (*On Track*), orange (*Falling Behind*) and red (*Falling Far Behind*). Of particular concern is that almost one in three children in quintiles 1-4 is *Falling Far Behind* (red zone) the expected learning standard, despite participating in an ELP.

Figure 5: Learning Total - % Children On Track, Falling Behind and Falling Far Behind by Income Quintile

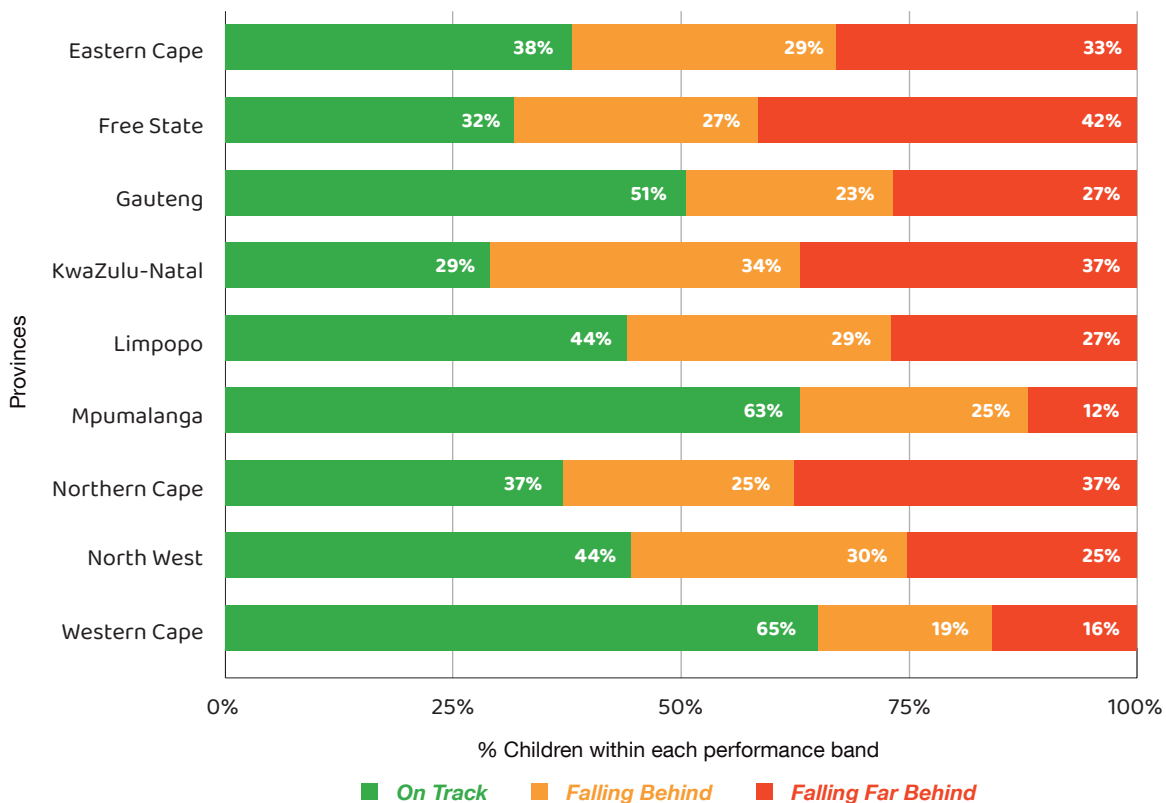


There was substantial variation in the overall learning outcomes across provinces as shown in the figure below.

While it is tempting to compare provinces' relative performance, this needs to be done with great caution.

Given the very different socio-economic profiles of each province, it is preferable to use the Index data to inform provincial baselines against which each province can set its own growth targets to be tracked over time.

Figure 6: Learning outcomes by province



We found evidence that the amount of time (years) children had spent in an ELP was correlated to their Learning Total score. As dosage increases, there is a slight increase in score.³³

We know from other research that good-quality ELP provision has the potential to play a major role in promoting the development and readiness to learn in preschool children from all backgrounds, but particularly those from poor households.³⁴ Unfortunately, about 28%³⁵ of 4-year-old children in South Africa do not attend an ELP.

Estimating performance of children *not* enrolled in ELPs

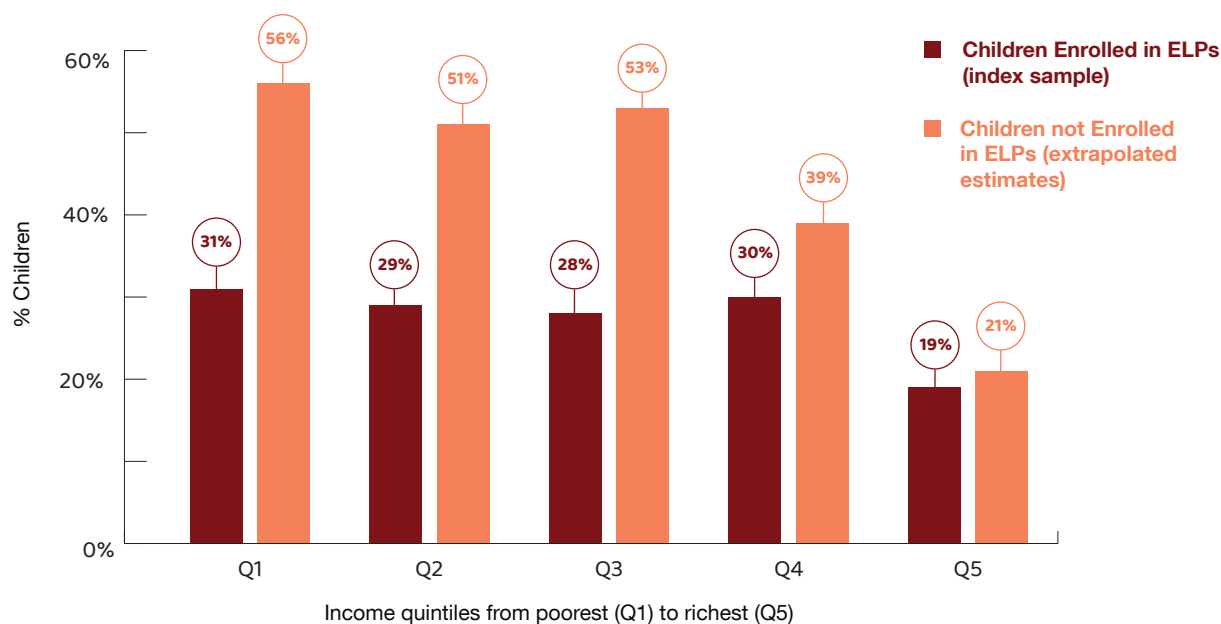
It is extremely difficult to survey and test children not participating in ELPs on the ELOM 4&5 assessment tool. However, estimating the performance of the non-enrolled population helps to complete the picture in terms of all children aged 4-5. To do so, the team investigated all available data sources on the population of children aged 4-5 years in South Africa, and particularly information on children who do not attend ELPs.

Estimated Learning Total scores for children *not attending* an ELP were calculated by looking at earlier research on the observed gains from ELP attendance in South Africa.³⁶ This calculation also accounted for the effects of ageing, the importance of home background in stimulating cognitive development³⁷ and the differential effect of ELP attendance on children with poorer home backgrounds.³⁸

Figure 7 shows the proportion of children enrolled in ELPs who are *Falling Far Behind* the learning standard (this is drawn from the Index sample and is represented by the dark red bars). These figures are compared with *estimates* of the proportion of non-enrolled children *Falling Far Behind* the standard (lighter red bars).

These estimates suggest that more than half of the non-attending children in the three lowest income groups (Q1, 2 and 3) are *Falling Far Behind* in cognitive development. Efforts to address barriers to accessing ELPs, and to encourage regular attendance, need to be strengthened alongside efforts to enhance programmatic quality.

Figure 7: Learning Total: % Children *Falling Far Behind*, by ELP enrolment



This extrapolation approach has several limitations, but it is still better than leaving the non-enrolled population of 4- to 5-year-old children out of the national picture. Their development needs, including access to ELPs, must remain part of the conversation. Over time, more information may become available to estimate child development indicators among the non-enrolled population, while rising enrolment

levels may also increase the proportion of the population for whom robust data would be available.

6.2.2 Learning Domains

The Early Learning Total score is summed across five developmental domains, but it is important to consider

the distribution of children *On Track*, *Falling Behind* and *Falling Far Behind* the standard in each of these domains separately.

Figure 8 shows how the full population of enrolled children perform in respect of each of the learning domains. The red area illustrates the relative size of the population of preschool children in South Africa who are **not On Track** (*Falling Behind* and *Falling Far Behind*) in important areas of development. Our collective responsibility is to reduce the size of this red area.

As illustrated in Figure 9, only in the ELL domain are more than 50% of children currently achieving the expected

standard. Of particular concern is poor performance in FMC-VMI and ENM, where only three out of 10 children are *On Track*; as well as the CEF domain, where only four out of 10 children are *On Track*.

The socio-economic gradients evident in key domains (detailed below) significantly disadvantage poorer children as they proceed to school. The skills gap between wealthier and poorer children is likely to endure and impact on school achievement.

We turn now to consider the importance of each of these domains, and to delve further into domain-level data.

Figure 8: Learning Total: Population of children enrolled in ELPs who are *On Track* and *Not on Track*, by learning domain

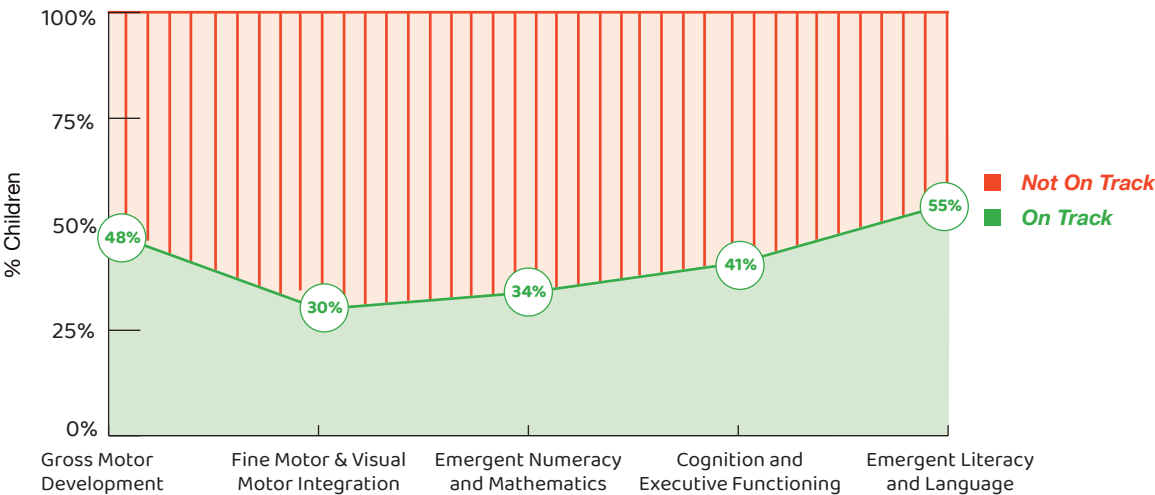
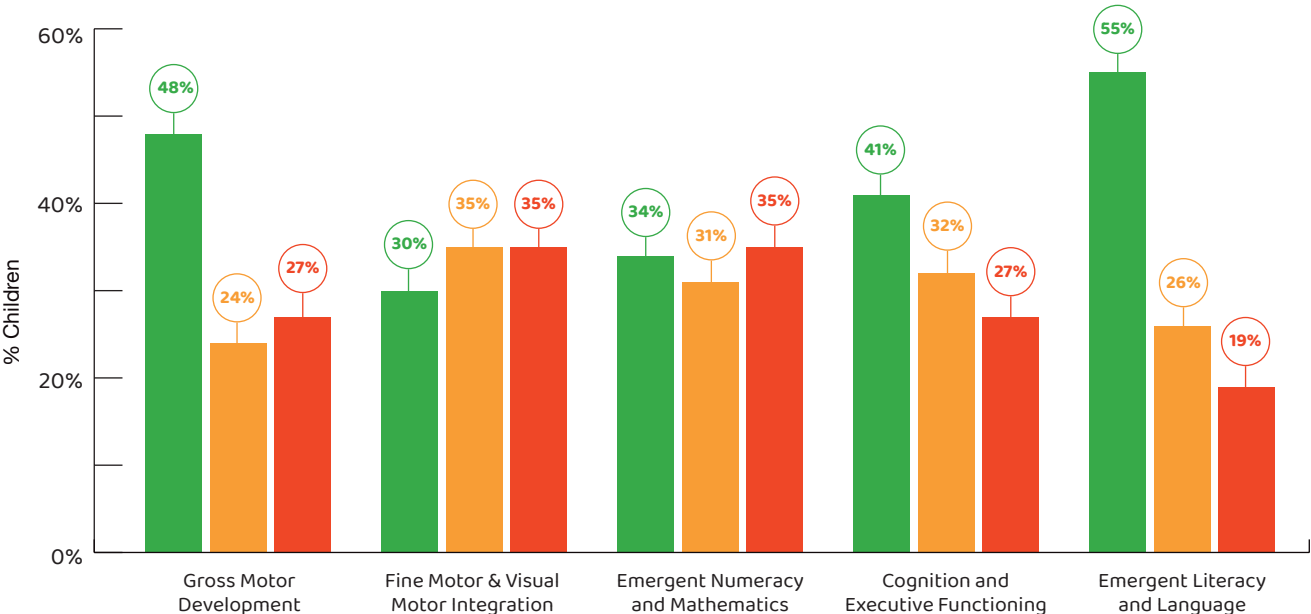


Figure 9: % Children *On Track*, *Falling Behind* and *Falling Far Behind* in each learning domain



6.2.2.1 Gross Motor Development (GMD)

What is GMD? This domain assesses the abilities required to control the large muscles of the body. Ideally, we would want to see children showing good control and coordination in their large movements.

Why is it important? GMD is particularly important in the transition to Grade R. Motor development has been found to have social benefits in the primary phase of schooling, as motor competence facilitates peer engagement through participation in games, and is associated with emotional wellbeing as well as with academic achievement.

Key findings: A total of 48.3% of children scored *On Track* for this domain, with 27.4% of children *Falling Far Behind*. This is the only learning domain in which there is little noticeable difference between scores of boys and girls. Some slight differences are apparent across income quintiles, with the higher-income children scoring slightly worse than children in lower income groups. This is the only developmental domain in which this pattern is observed.

Figure 10: Gross Motor Development: % Children *On Track*, *Falling Behind* and *Falling Far Behind*

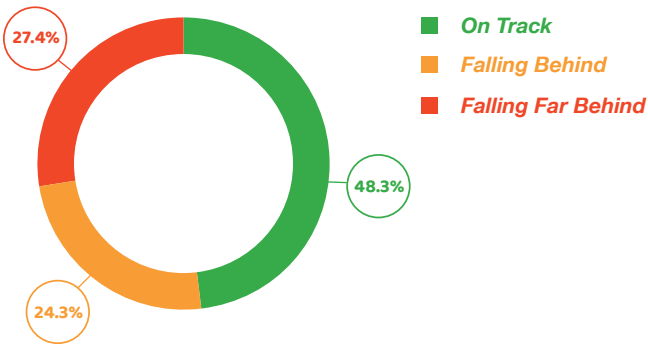


Figure 11: Gross Motor Development: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by sex

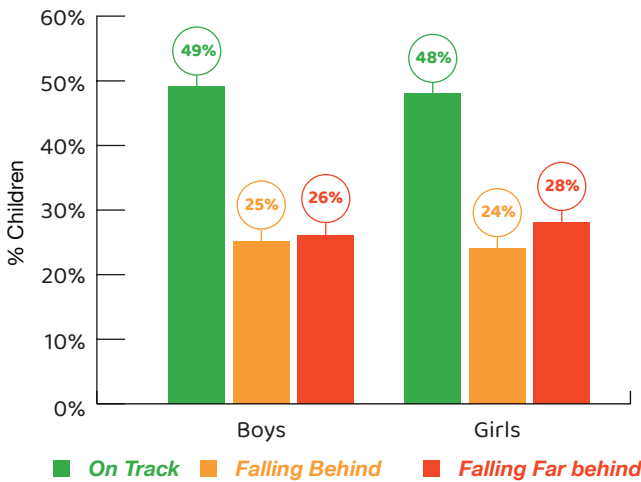
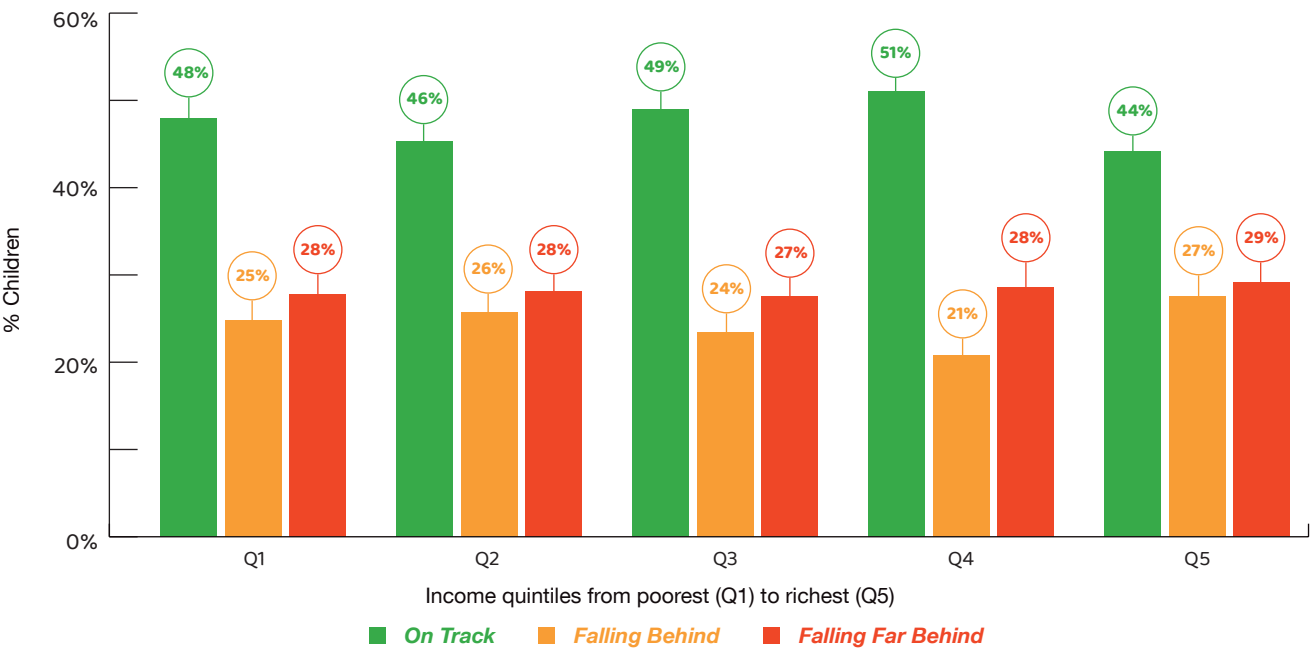


Figure 12: Gross Motor Development: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by income quintile



6.2.2.2 Fine Motor Coordination and Visual Motor Integration (FMC-VMI)

What is FMC-VMI? This domain assesses the abilities required to control the small muscles of the body and to coordinate fine motor movements with visual information.

Why is it important? Fine motor skills and visual-motor integration are important for coordinating the use of the hands and the eyes. These skills help children to, for example, copy shapes and learn to form letters correctly. Visual motor integration skills in 5-year-old children also make a specific contribution to early mathematics, most likely because they influence the child's ability to manipulate objects. Many of the

skills required for formal learning of reading and writing involve specific visual-motor abilities.

Key findings: Only 30.4% of children are *On Track* for this domain, with a notable difference between the performance of boys and girls. A total of 41% of boys are *Falling Far Behind* (red zone) for this developmental domain, compared with 30% of girls. There is also a dramatic difference between income groups. Children in the lowest income group demonstrate a much greater chance of *Falling Far Behind* in this important domain (41%), with only 25% of poor children being *On Track*. For children in the highest income group, this ratio is reversed, with 47% being *On Track* and 22% *Falling Far Behind*.

Figure 13: Fine Motor Coordination & Visual Motor Integration: % Children *On Track*, *Falling Behind* and *Falling Far Behind*

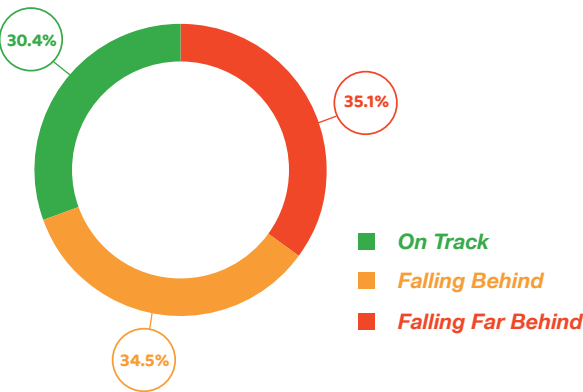


Figure 14: Fine Motor Coordination & Visual Motor Integration: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by sex

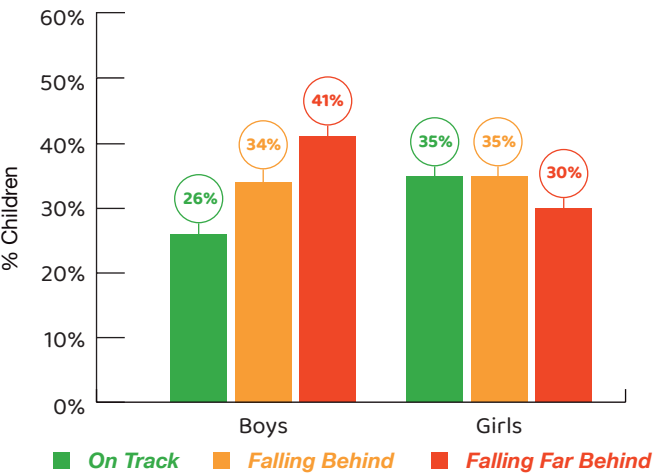
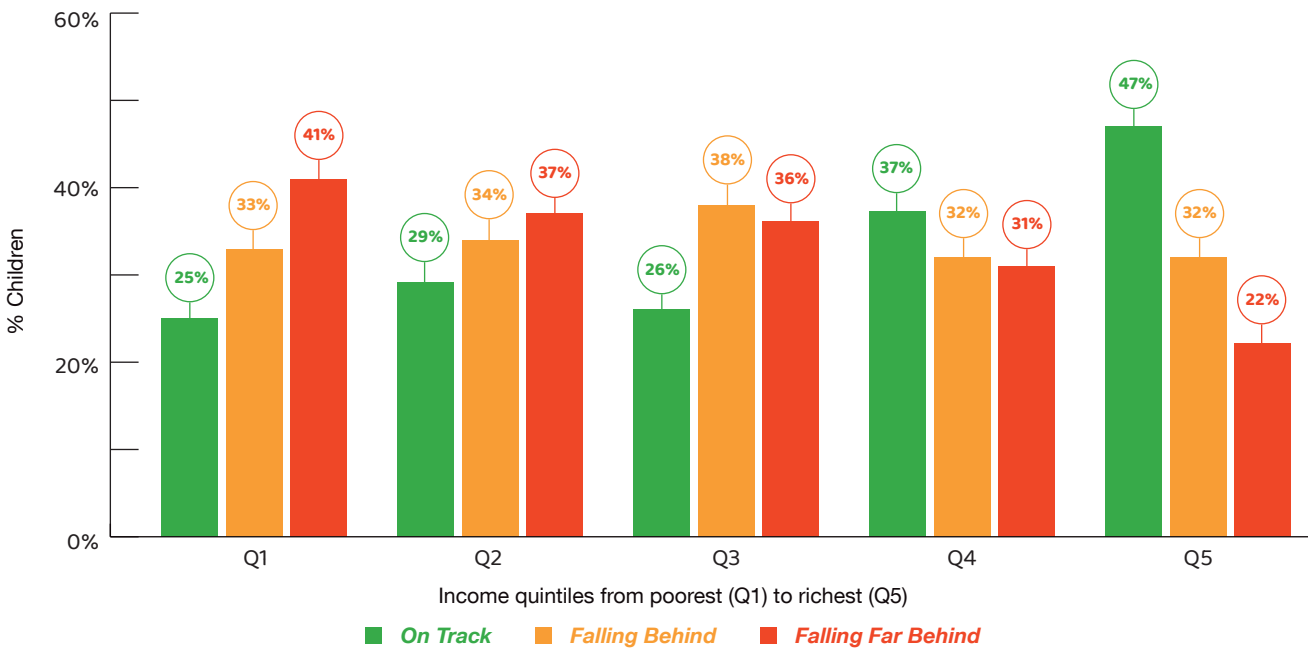


Figure 15: Fine Motor Coordination & Visual Motor Integration: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by income quintile



6.2.2.3 Emergent Numeracy and Mathematics (ENM)

What is ENM? This domain assesses the child’s ability to understand number concepts, symbols, shapes and size.

Why is it important? Early mathematics skills are strongly predictive of later school success. Good maths foundations, such as counting and being able to identify numbers and patterns, are essential for problem-solving and for a deeper understanding of more complex mathematical concepts.

Key findings: Only one-third of children meet the expected

standard for early numeracy, with 31.1% *Falling Behind* and a worrying 35% *Falling Far Behind*. Boys score lower than girls, although the difference is relatively small. As with the total ELOM 4&5 scores, a social gradient is evident in the Emergent Numeracy and Mathematics scores, although this is less pronounced than other domains. Only 30% of children in the lowest income group are *On Track*, compared with 38% of children in the highest income group. It is worth noting that the scores for this domain indicate considerable variation between individuals within the same income quintile and within the samples of boys and girls.

Figure 16: Numeracy and Mathematics: % Children *On Track*, *Falling Behind* and *Falling Far Behind*

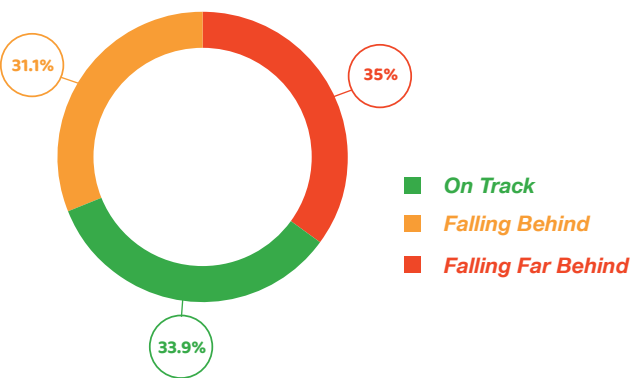


Figure 17: Numeracy and mathematics: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by sex

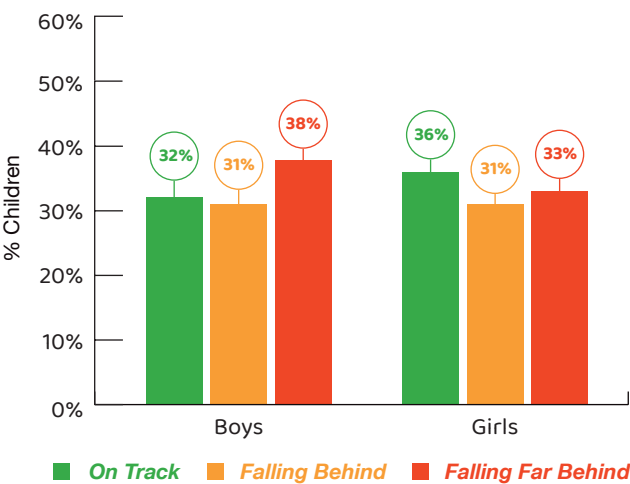


Figure 18: Numeracy and mathematics: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by income quintile



6.2.2.4 Cognition and Executive Functioning (CEF)

What is CEF? This domain assesses the child’s ability to think critically, solve problems, form concepts, attend to instructions and control impulses.

Why is it important? Executive function skills help children hold information or instructions in mind during classroom activities, focus on task-relevant stimuli during problem-solving tasks and resist distraction. Having good CEF skills means that children are able to engage and participate

more in classroom activities, which leads to better learning outcomes. CEF skills are also associated with mathematics skills in 5- to 6-year-old children.

Key findings: Overall, only 41.4% of children are *On Track* for CEF, with girls once again outperforming boys. A steep social gradient is evident for this domain and poor children are twice as likely to be in the red zone (*Falling Far Behind*) than their better-off peers. In the highest income group (Q5), 55% of children are *On Track*, compared with only 35% in the lowest income group (Q1).

Figure 19: Cognition and Executive Function: % Children *On Track*, *Falling Behind* and *Falling Far Behind*

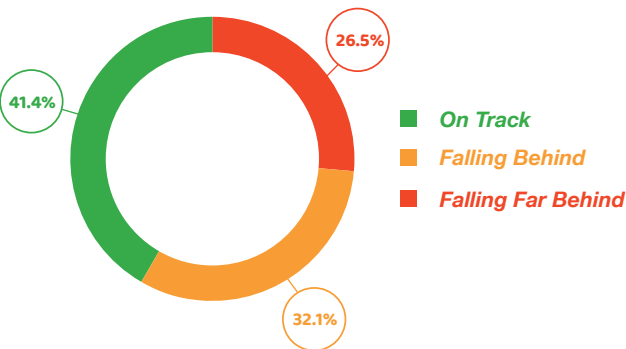


Figure 20: Cognition and Executive Function: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by sex

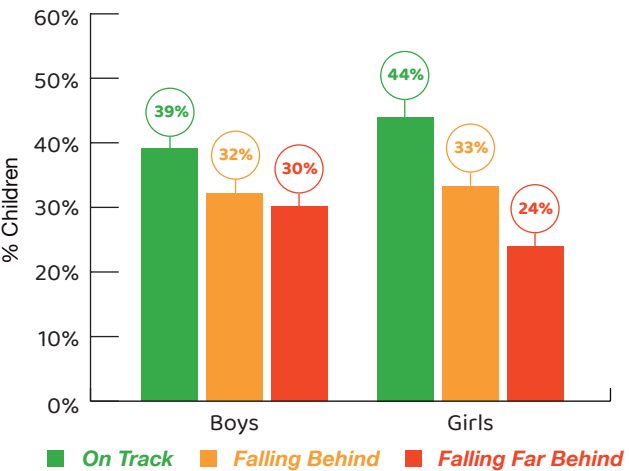
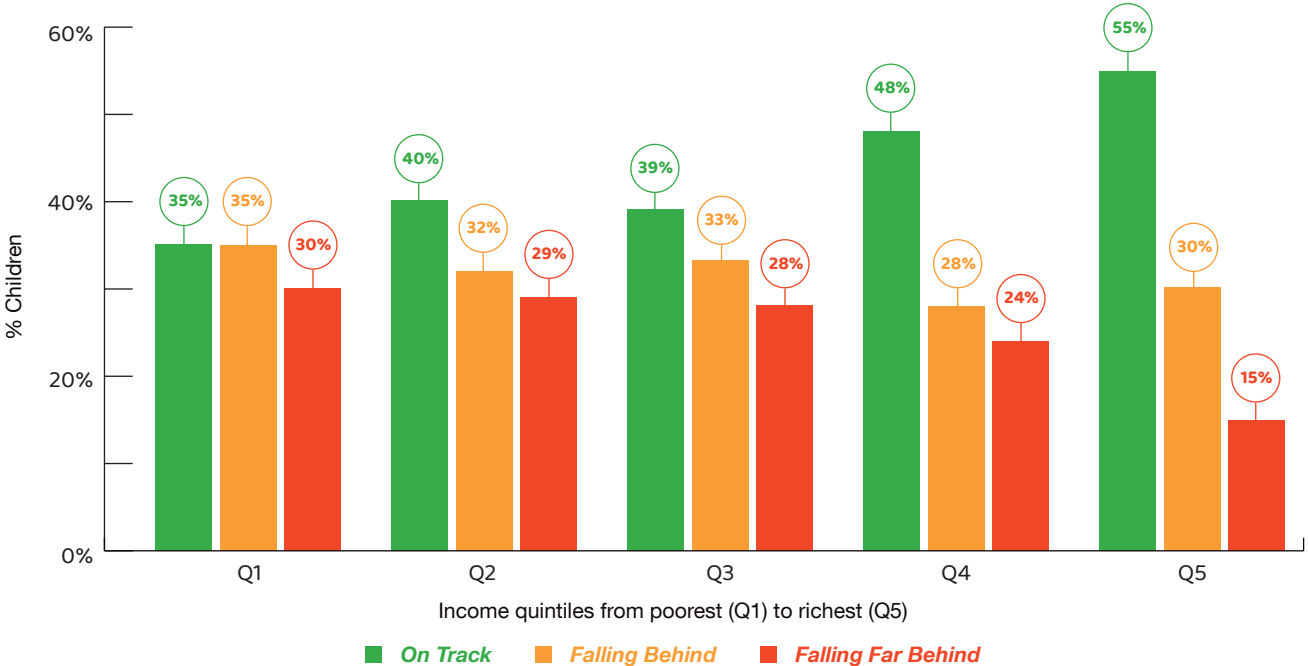


Figure 21: Cognition and Executive Function: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by income quintile



6.2.2.5 Emergent Literacy and Language (ELL)

What is ELL? This domain looks at the child’s ability to communicate effectively. This includes their ability to speak in full sentences, to recognise the initial sounds of words, to name common objects, to relay events and to listen to and understand stories told to them.

Why is it important? Being able to understand what is being said and read by a teacher and being able to communicate effectively through speech and writing are all essential for school success. Those children who have the opportunity and support to start reading early have a clear advantage,

as early reading ability is the most powerful predictor of reading ability in middle childhood. Early language abilities will affect a child’s understanding of the instructions that must be followed when they are given any task, influencing their learning in other areas such as early maths.

Key findings: Overall, children in the sample did better on this domain than the others. A total of 54.7% of children are *On Track* (57% of girls and 52% of boys) and only 19.3% of children overall are *Falling Far Behind*. Children in the highest income group (Q5) are doing particularly well, with 68% *On Track* and only 12% *Falling Far Behind*.

Figure 22: Literacy and Language: % Children *On Track*, *Falling Behind* and *Falling Far Behind*

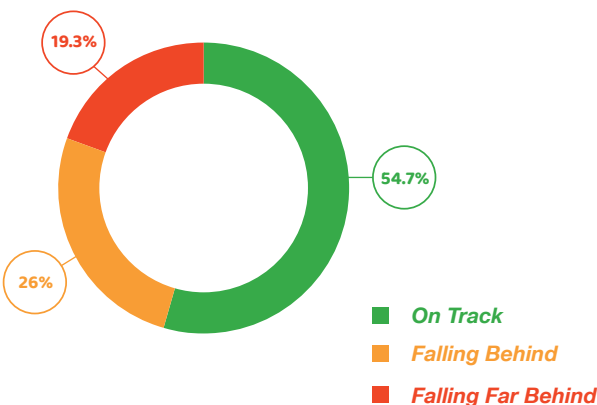


Figure 23: Literacy and Language: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by sex

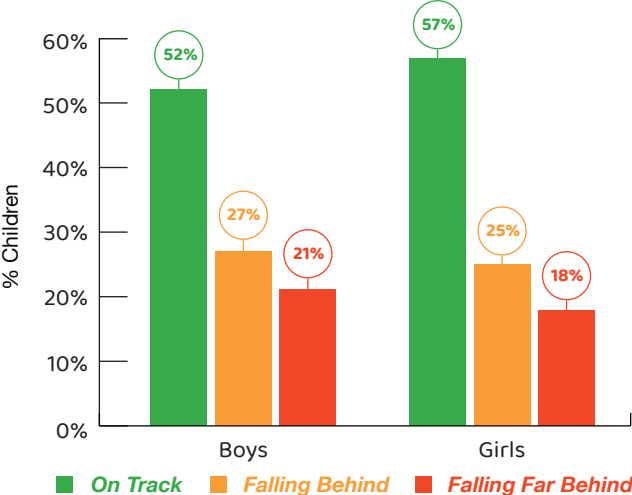
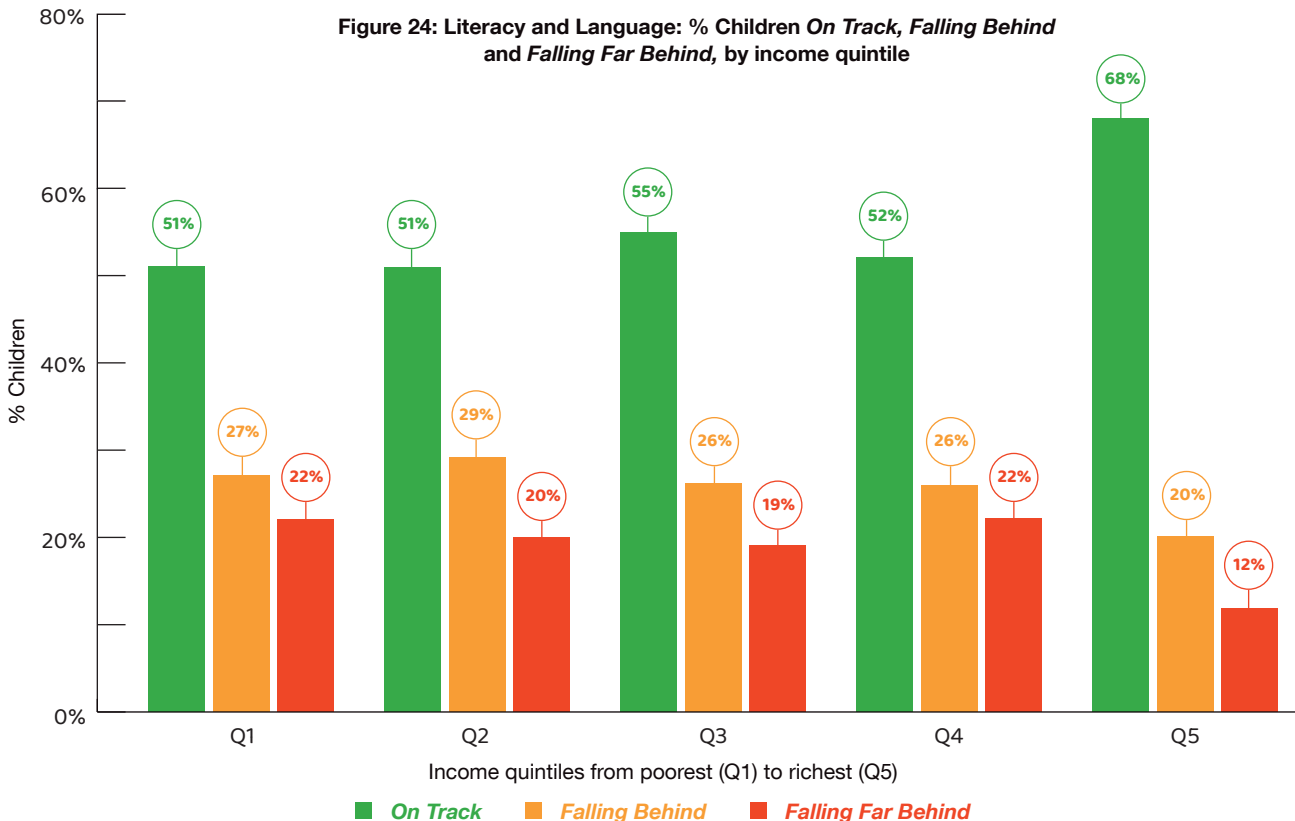


Figure 24: Literacy and Language: % Children *On Track*, *Falling Behind* and *Falling Far Behind*, by income quintile



6.2.3. Summary of learning outcomes

In sum, analysis of learning domains in this study shows that the development of *less than 50%* of South African children attending ELPs are *On Track*. Poor performance in domains related to later school achievement is of considerable concern – particularly for those children in lower income groups.

In line with the international literature, *girls outperform boys*, with 9% more girls *On Track* and achieving the ELOM 4&5 standard. Apart from the GMD domain in which boys tend to outperform girls, this pattern remains in the other domains.

A social gradient is evident, with children in the higher income groups (Q4 and Q5) outperforming the rest. That said, there is considerable variation in performance between individuals within the same income group, with the development of a proportion of children in all five quintiles being *On Track* in Early Learning domains. Similarly, there are children across all income groups who are *Falling Far Behind* and require considerable additional support. Better understanding of the variation *within* income groups can offer insights into the kinds of interventions needed to close the gap *between* groups. Further analysis will be undertaken to explore this.

Initial investigation into the predictors of Learning Total scores was done (using multiple regression analyses) to gain some insights into the way in which different variables measured in the study are associated with learning outcomes. This was only investigated at national level, as it was at that level that maximum statistical power was available.

Children's age, sex, socio-economic status (quintile proxy),

fees paid, growth status (normal, stunted and severely stunted), social and emotional development, and the extent of their exposure to an ELP (years and attendance) were all positively and significantly correlated with learning outcomes. These findings are discussed further in the relevant sections that follow.

There are multiple ways in which we can and should address the learning deficits which are evident here. These include:

- additional training and support for teachers and practitioners working in ELPs, with a focus on the most problematic developmental domains, such as early numeracy, CEF and FMC-VMI;
- enhancements to the 0-4 curriculum and the development and distribution of learning resources associated with improved outcomes for key domains;
- exploring differentiated strategies for addressing the specific areas of need identified for young boys; and
- strengthening bridging programmes for children entering Grade R, to address the gaps in foundational skills identified through the Index.

And finally, little progress will be made to improve ELP access and ELP quality without substantially increasing investment in Early Learning. Early Learning Programmes currently receive 1% to 2% of government's annual education budget,³⁹ reaching just 13% of poor children aged 0 to 5 years.

A total of 87% of children under 6 years of age living below the poverty line do not currently have access to a subsidised ELP. The implications of this are twofold: children whose caregivers cannot afford to pay fees are excluded from programmes, and efforts to enhance the quality of ELPs serving the poor are limited by severe resource constraints.

6.3 What proportion of children in ELPs are *On Track* for physical growth?

For growth, we look at the proportion of children who fall within each of the following categories:⁴⁰

- 1. Normal growth:** These children's height is within the normal, expected range for age.
- 2. Stunted growth:** These children are short for their age as a result of chronic malnutrition and are at risk of not achieving their cognitive and physical potential.⁴¹
- 3. Severely stunted growth:** These children are excessively short for their age as a result of chronic malnutrition and are at high risk of not achieving their cognitive and physical potential.⁴²

What is physical growth? An important physical indicator of child health in the age group in question is whether they have attained appropriate growth for their age. Height-for-age measures whether a child is at risk of stunting.

Why is it important? Stunting is a long-term condition that is a reflection of the overall poor health status of the child and usually results from chronic malnutrition in utero and early childhood. Growth stunting is known to compromise neurological and cognitive development, with significant loss of an individual's potential. The effects of early stunting depend on the child's age and the duration of deprivation but can persist throughout childhood and adolescence, compromising the child's ability to learn in school and eventually impacting on their life opportunities.

Key findings: One in four children (25.1%) in this study shows signs of long-term malnutrition, with equal rates of stunting in boys and girls. Of those who are stunted, 5.3% were found to be severely stunted. For the poorest children attending ELPs, rates of stunting and severe stunting are highest at 28% combined. Children's health and development is most compromised in those who reside in the Northern Cape, where 36% of children are either stunted or severely stunted, and the Free State and the Eastern Cape (30% and 32% respectively). Rates of severe stunting are highest in the Eastern Cape, with almost 1 in 10 children severely stunted. This preventable, chronic medical condition comes with devastating personal and societal costs.

Figure 25: % Children with stunted growth and severely stunted growth, by income quintile

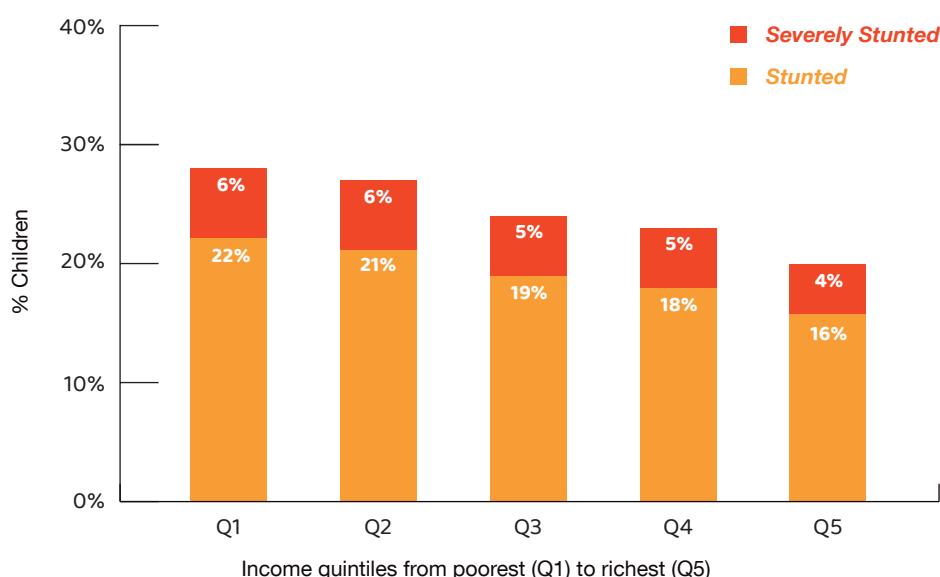
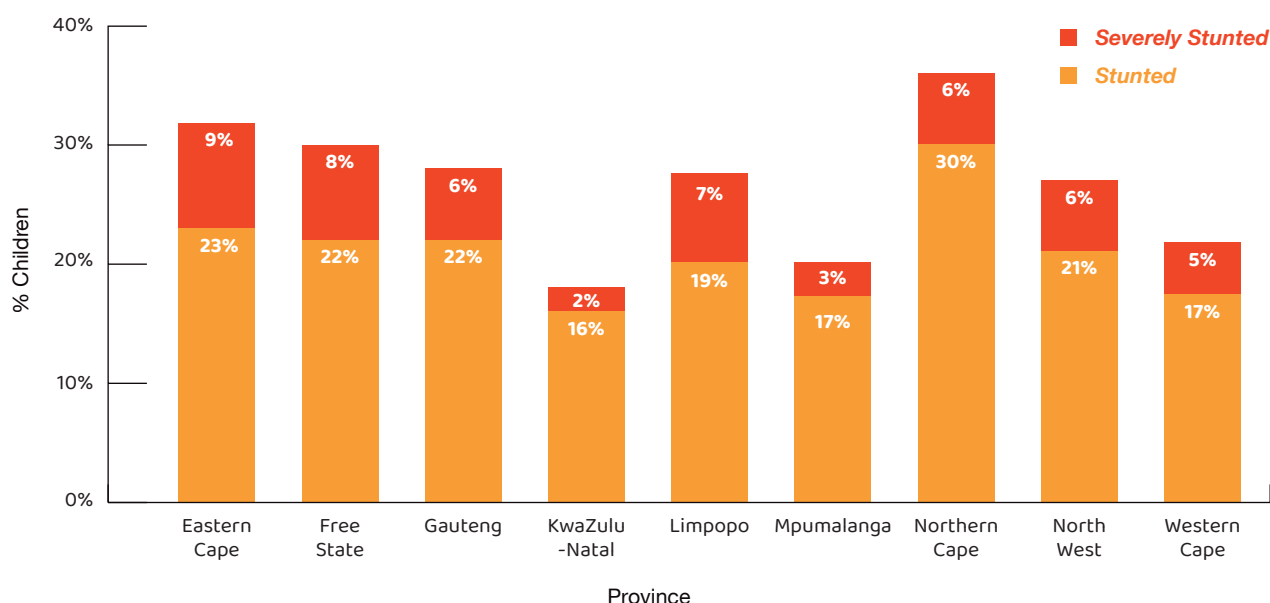


Figure 26: % Children with stunted growth and severely stunted growth, by province



Differences are evident in learning outcomes between children with normal height-for-age and those who are stunted: stunted children start out with lower scores than their counterparts at age 50 months, and these differences persist as children get older.

Further analysis was done⁴³ to determine the relative importance of different variables (such as socio-economic status, sex, Social-Emotional Functioning and stunting) for learning outcomes. Severe growth stunting had the strongest impact on the Learning Total score. In other words the greatest difference in learning outcomes will be found between children who are severely stunted and those with normal height-for-age.

By the age of 4 years, being severely stunted is roughly equivalent to being 5 to 6 months in age behind those of normal height-for-age, all other things being equal.

While a proportion of children who are stunted may recover to normal growth in the coming few years, the negative impact of stunting on the human capital of the country cannot be overemphasised. It has been estimated that stunting costs 1.3% of gross domestic product in South Africa, or R62 billion per annum.⁴⁴

Tackling stunting needs to be a national priority.

The neurological and cognitive development of significant proportions of children nationally, and in particular provinces, is being compromised by a chronic condition that is *preventable*. Prevention measures include health and nutrition interventions targeting pregnant women and children aged 0-5 years.

6.4 What proportion of children in ELPs are *On Track* for Social-Emotional Functioning?

For this domain, we look at the proportion of children who fall within each of the following two categories:

- 1. Meet the standard:** This means that the child scores at the expected level for their age in terms of age-appropriate independence, their Social Relations with Peers and Adults and their Emotional Readiness for School.
- 2. Don't meet the standard:** This means that the child does not score at the expected level for their age.

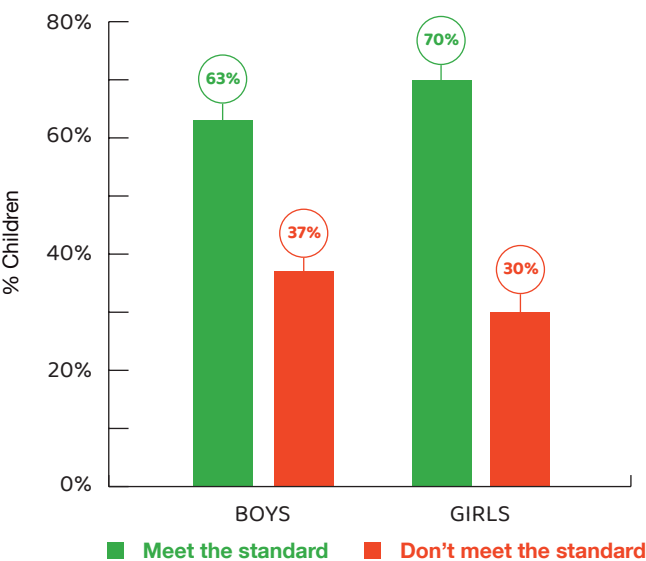
What is Social-Emotional Functioning? This domain looks at a child’s age-appropriate levels of independence, Social Relations with Peers and Adults, and Emotional Readiness for School.

Why is it important? Social-Emotional Functioning is important for school-readiness and for overall performance in primary school. Children with better social and emotional functioning tend to transition more successfully into the school environment, and these skills influence the child’s

ability to play and work with their peers in a group setting, to ask for information or help from a teacher, to complete tasks independently and to handle change.

Key findings: For Social Relations with Peers and Adults, 27.5% of children overall did not meet the standard. This number increases to 33.4% when it comes to Emotional Readiness for School. For both measures, boys were less likely to meet the standard than girls.

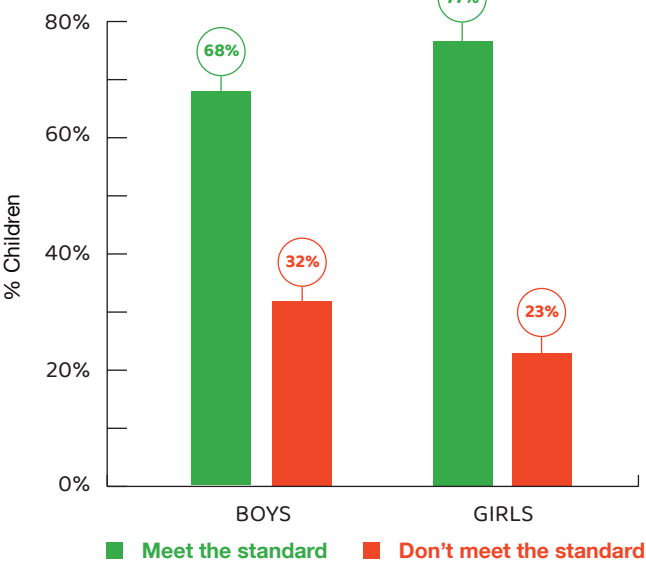
Figure 27: Emotional readiness for school: % Children meeting the standard, by sex



Social and emotional functioning was found to be correlated with learning outcomes. For both Social Relations with Peers and Adults, and Emotional Readiness for School, children who met the standards performed better in terms of learning outcomes than children who did not meet the standards.

These two scales were then combined into a composite score for Social-Emotional Functioning. Social Relations with Peers and Adults and Emotional Readiness for School

Figure 28: Social relations with peers and adults: % Children meeting the standard, by sex



were each converted to a score out of 12 and then summed to compute a new score out of 24. The resulting combined variable is labelled “Social-Emotional Functioning”.

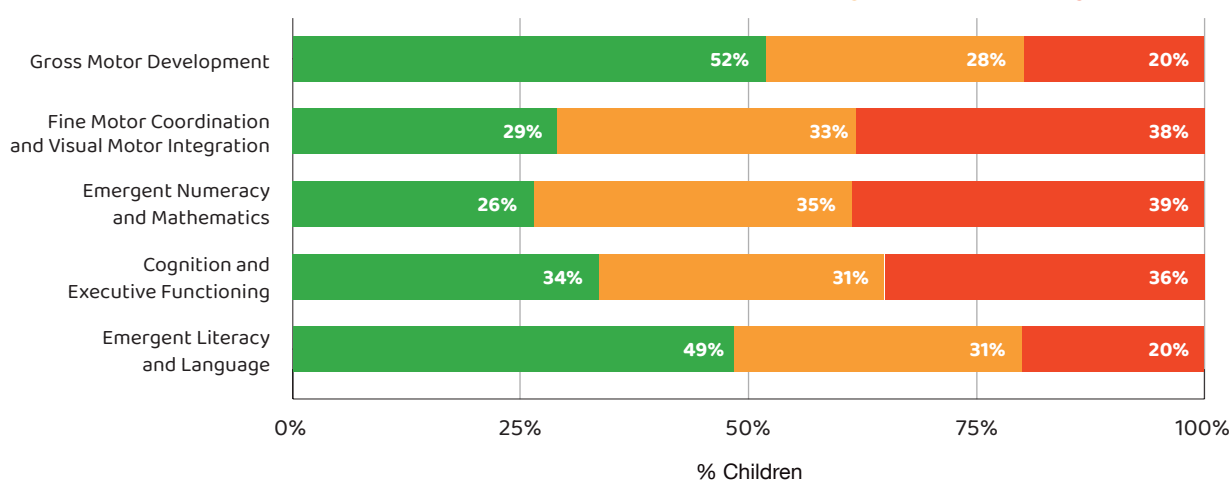
As with stunting, further analysis was done⁴⁶ to determine the relative importance of Social-Emotional Functioning for the ELOM Total score. The results: Social-Emotional Functioning demonstrated a large effect⁴⁷ on learning outcomes, highlighting the importance of paying greater attention to this important developmental domain.

07 | Provincial summaries

7.1 Eastern Cape

Child population	There are 839,000 children aged 0 to 5 years in the Eastern Cape 77% of these children live in households with income levels below the poverty line ⁴⁵
Index sample	587 children 284 (48%) boys and 303 (52%) girls Children were drawn from 145 ELPs across 44 sample clusters
The quintile breakdown of this sample	Quintile 1 n = 219 (37.3%) Quintile 2 n = 184 (31.3%) Quintile 3 n = 160 (27.3%) Quintile 4 n = 11 (1.9%) Quintile 5 n = 13 (2.2%)
Social-Emotional Functioning	27.4% of children don't achieve the expected score for Social Relations with Peers and Adults 37.9% of children don't achieve the expected score for Emotional Readiness for School
Stunting	31.8% of children have stunted growth, 9.1% of whom are severely stunted
Early Learning Total score	38.1% of children are <i>On Track</i> 28.5% are <i>Falling Behind</i> 33.4% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 29 shows the breakdown per learning domain

Figure 29: Eastern Cape learning domains ■ *On Track* ■ *Falling Behind* ■ *Falling Far Behind*



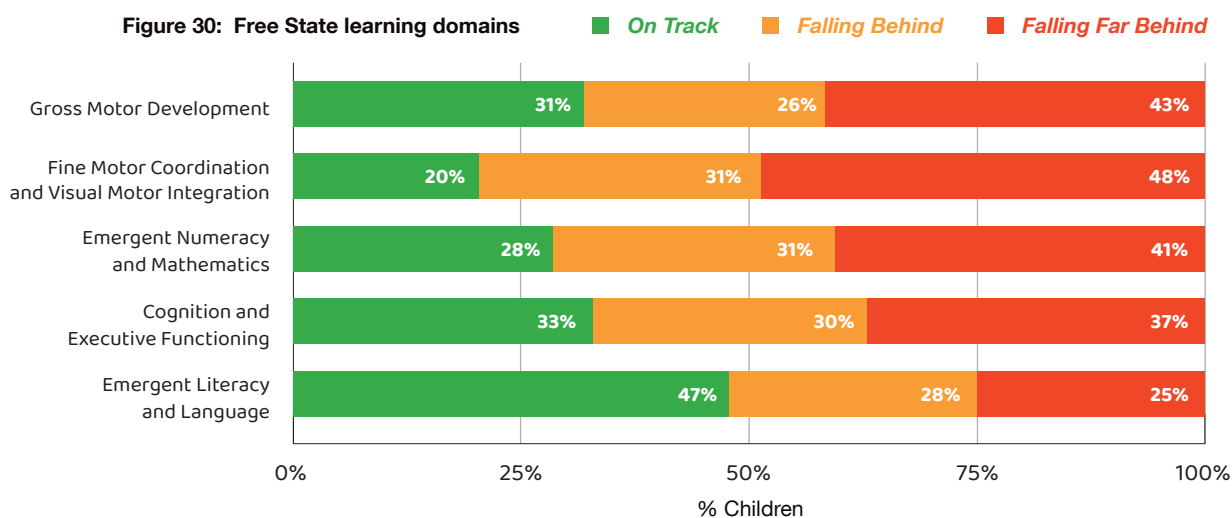
The Eastern Cape shows some promising results in gross motor development and emerging literacy and language. However, significant numbers of children perform poorly in

the Fine Motor Coordination and Visual-Motor Integration and Emergent Numeracy and Mathematics domains in particular (especially in the case of boys).

7.2 Free State

Child population	There are 332,000 children aged 0 to 5 years in the Free State 61% of these children live in households with income levels below the poverty line.
Index sample	565 children 273 (48%) boys and 292 (52%) girls Children were drawn from 135 ELPs across 42 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 244 (42.4%) Quintile 2 n = 113 (19.6%) Quintile 3 n = 132 (22.9%) Quintile 4 n = 37 (6.4%) Quintile 5 n = 50 (8.7%)
Social-Emotional Functioning	21.5% of children don't achieve the expected score for Social Relations with Peers and Adults 23.3% of children don't achieve the expected score for Emotional Readiness for School
Stunting	30% of children have stunted growth, 7.9% of whom are severely stunted
Early Learning Total score	31.8% of children are <i>On Track</i> 26.7% are <i>Falling Behind</i> 41.5% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 30 shows the breakdown per learning domain

Figure 30: Free State learning domains

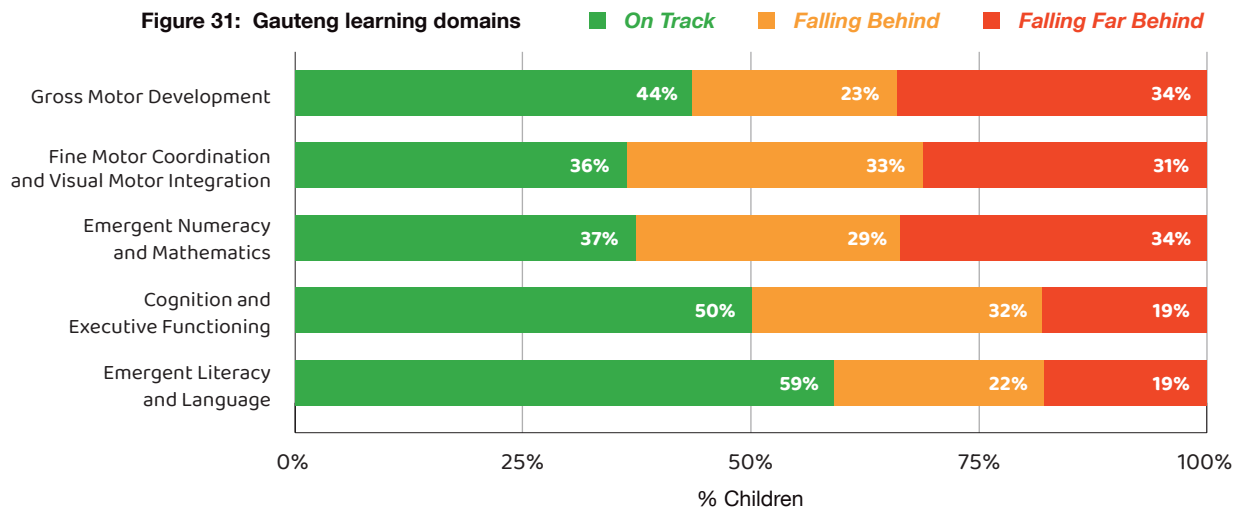


The results of the Free State are concerning. While children perform best on Emergent Literacy and Language, much attention should be paid to Free State children's development in Fine Motor Coordination and Visual Motor

Integration and Emergent Numeracy and Mathematics, and even more so boys' development in these domains is of particular concern.

7.3 Gauteng

Child population	There are 1,575,000 children aged 0 to 5 years in Gauteng 34% of these children live in households with income levels below the poverty line
Index sample	571 children 278 (49%) boys and 293 (51%) girls Children were drawn from 143 ELPs across 40 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 62 (11%) Quintile 2 n = 72 (12.6%) Quintile 3 n = 164 (28.7%) Quintile 4 n = 122 (21.4%) Quintile 5 n = 151 (26.4%)
Social-Emotional Functioning	50.7% of children don't achieve the expected score for Social Relations with Peers and Adults 34.2% of children don't achieve the expected score for Emotional Readiness for School
Stunting	27.3% of children have stunted growth, 5.6% of whom are severely stunted
Early Learning Total score	50.5% of children are <i>On Track</i> 22.7% are <i>Falling Behind</i> 26.8% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 31 shows the breakdown per learning domain



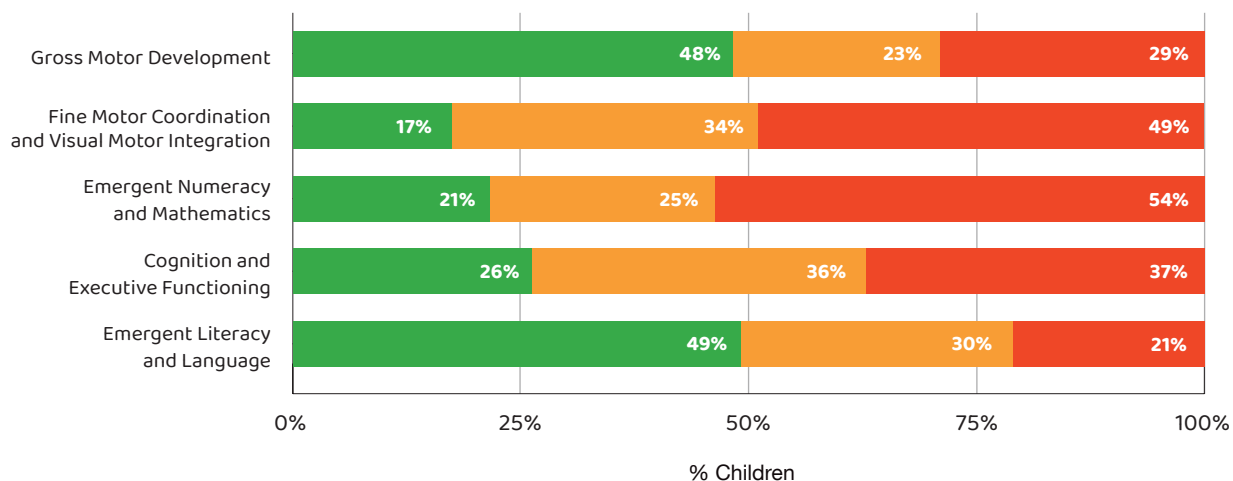
The results of Gauteng are mixed. While children perform best on Emergent Literacy and Language and Cognition and Executive Function, performance is weakest in Fine

Motor Coordination and Visual-Motor Integration and Emergent Numeracy and Mathematics, particularly in the case of boys.

7.4 KwaZulu-Natal

Child population	There are 1,418,000 children aged 0 to 5 years in KwaZulu-Natal 63% of these children live in households with income levels below the poverty line
Index sample	575 children 278 (48%) boys and 297 (52%) girls Children were drawn from 138 ELPs across 48 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 242 (42.1%) Quintile 2 n = 126 (21.9%) Quintile 3 n = 128 (22.3%) Quintile 4 n = 43 (7.5%) Quintile 5 n = 36 (6.3%)
Social-Emotional Functioning	13.9% of children don't achieve the expected score for Social Relations with Peers and Adults 22% of children don't achieve the expected score for Emotional Readiness for School
Stunting	18% of children have stunted growth, 1.9% of whom are severely stunted
Early Learning Total score	29.2% of children are <i>On Track</i> 33.6% are <i>Falling Behind</i> 37.2% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 32 shows the breakdown per learning domain

Figure 32: KwaZulu-Natal learning domains ■ *On Track* ■ *Falling Behind* ■ *Falling Far Behind*



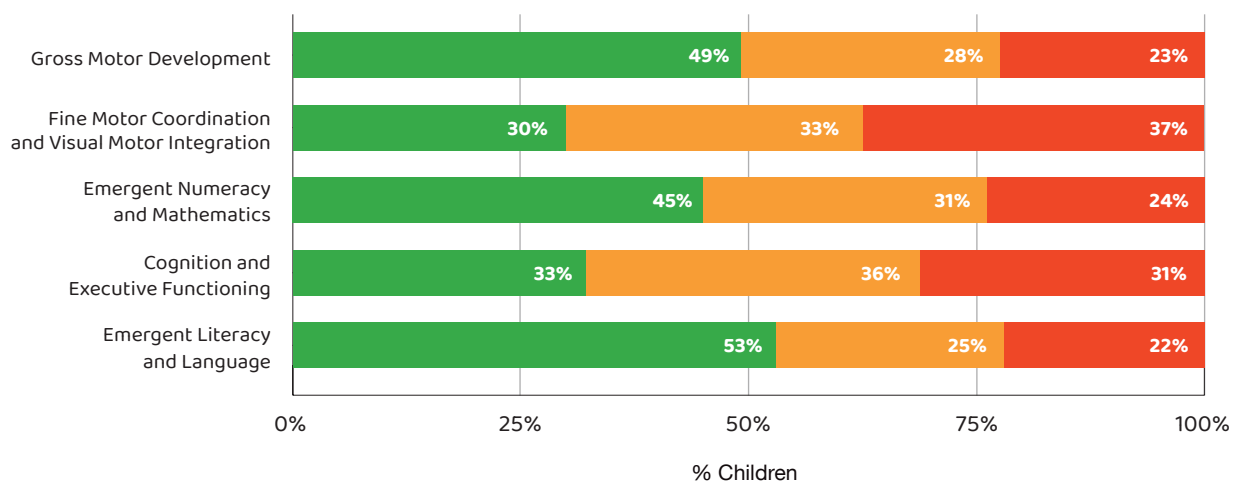
Overall, the development of most children in KwaZulu-Natal is not *On Track*. Children perform particularly poorly in Emergent Numeracy and Mathematics, Cognitive and

Executive Functioning and Fine Motor and Visual-Motor Integration domains. Girls tend to perform better than boys.

7.5 Limpopo

Child population	There are 885,000 children aged 0 to 5 years in Limpopo 72% of these children live in households with income levels below the poverty line
Index sample	578 children 295 (51%) boys and 283 (49%) girls Children were drawn from 145 ELPs across 47 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 225 (38.9%) Quintile 2 n = 247 (42.7%) Quintile 3 n = 94 (16.3%) Quintile 4 n = 0 (0%) Quintile 5 n = 12 (2.1%)
Social-Emotional Functioning	17.1% of children don't achieve the expected score for Social Relations with Peers and Adults 31.3% of children don't achieve the expected score for Emotional Readiness for School
Stunting	26.3% of children have stunted growth, 6.9% of whom are severely stunted
Early Learning Total score	44.4% of children are <i>On Track</i> 28.6% are <i>Falling Behind</i> 27% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 33 shows the breakdown per learning domain

Figure 33: Limpopo learning domains ■ *On Track* ■ *Falling Behind* ■ *Falling Far Behind*



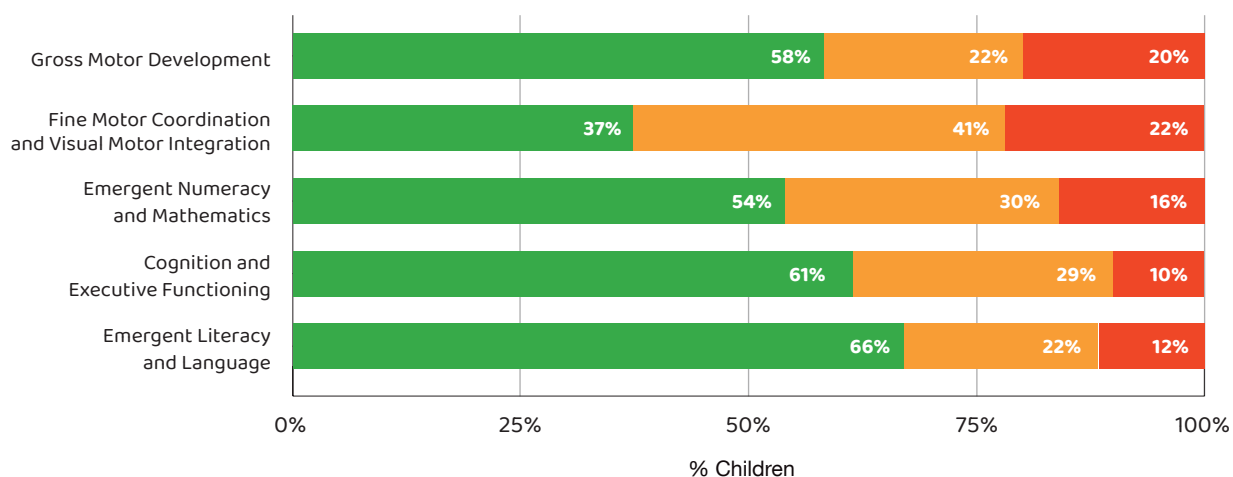
Limpopo shows some promising results for the Emergent Literacy and Language domain. However, Fine Motor

Coordination and Visual-Motor Integration and Cognition and Executive Functioning are weak, especially for boys.

7.6 Mpumalanga

Child population	There are 593,000 children aged 0 to 5 years in Mpumalanga 66% of these children live in households with income levels below the poverty line
Index sample	540 children ⁴⁸ 262 (49%) boys and 278 (51%) girls Children were drawn from 129 ELPs across 44 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 180 (33.3%) Quintile 2 n = 154 (28.5%) Quintile 3 n = 98 (18.1%) Quintile 4 n = 80 (14.8%) Quintile 5 n = 28 (5.2%)
Social-Emotional Functioning	18.0% of children don't achieve the expected score for Social Relations with Peers and Adults 36.7% of children don't achieve the expected score for Emotional Readiness for School
Stunting	19.8% of children have stunted growth, 3.1% of whom are severely stunted
Early Learning Total score	63.3% of children are <i>On Track</i> 24.5% are <i>Falling Behind</i> 12.2% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 34 shows the breakdown per learning domain

Figure 34: Mpumalanga learning domains ■ *On Track* ■ *Falling Behind* ■ *Falling Far Behind*



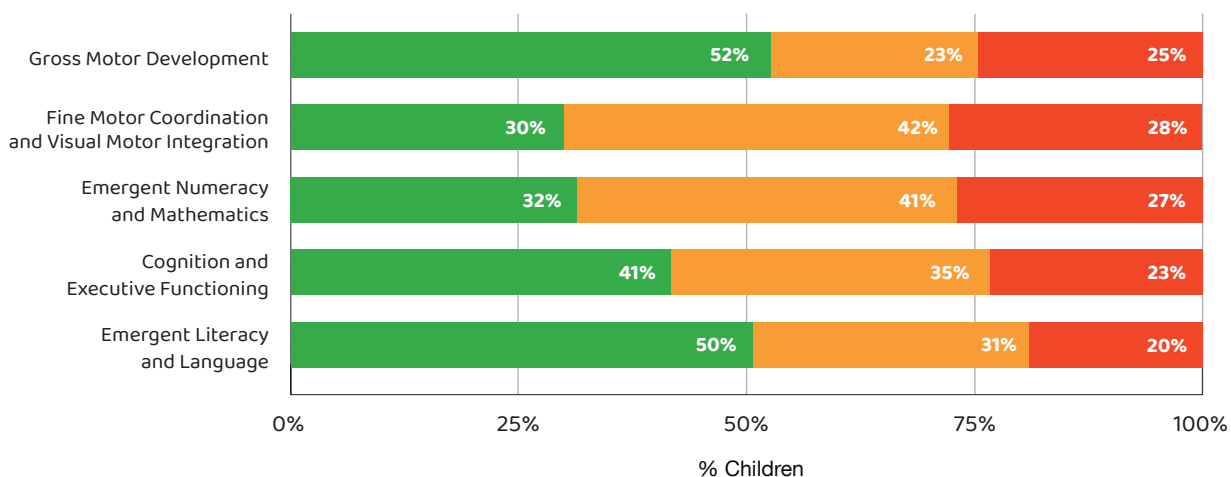
Overall, the development of most children in Mpumalanga is *On Track*. Children perform particularly well in the Emergent Literacy and Language and Cognition and Executive

Function domains. Girls tend to perform better than boys. Efforts should be made to address poor performance in Fine Motor and Visual-Motor Integration.

7.7 North West

Child population	There are 512,000 children aged 0 to 5 years in the North West 64% of these children live in households with income levels below the poverty line
Index sample	564 children 273 (48%) boys and 291 (52%) girls Children were drawn from 134 ELPs across 38 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 228 (40.4%) Quintile 2 n = 107 (19%) Quintile 3 n = 199 (35.3%) Quintile 4 n = 30 (5.32%) Quintile 5 n = 0 (0%)
Social-Emotional Functioning	32.3% of children don't achieve the expected score for Social Relations with Peers and Adults 46.6% of children don't achieve the expected score for Emotional Readiness for School
Stunting	26.7% of children have stunted growth, 5.7% of whom are severely stunted
Early Learning Total score	44.3% of children are <i>On Track</i> 30.3% are <i>Falling Behind</i> 25.4% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 35 shows the breakdown per learning domain

Figure 35: North West learning domains ■ *On Track* ■ *Falling Behind* ■ *Falling Far Behind*



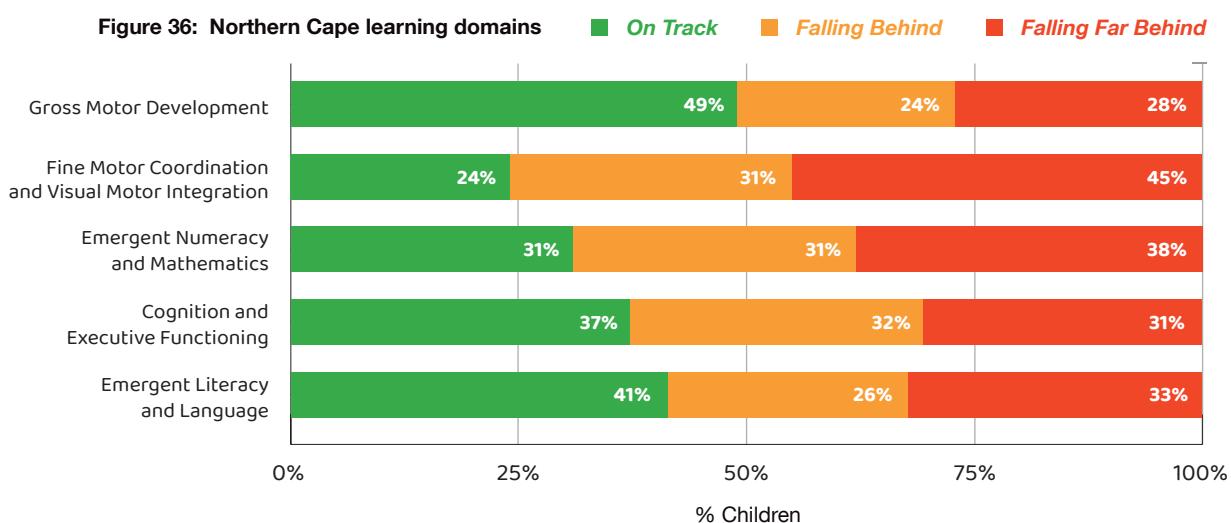
The North West shows some promising results. However, weak performances are evident in the Fine Motor and Visual-Motor Integration and Emergent Numeracy and

Mathematics domains, with boys consistently at greater risk than girls of not achieving domain standards.

7.8 Northern Cape

Child population	There are 158,000 children aged 0 to 5 years in the Northern Cape 51% of these children live in households with income levels below the poverty line
Index sample	600 children 275 (46%) boys and 325 (54%) girls Children were drawn from 144 ELPs across 48 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 206 (34.3%) Quintile 2 n = 152 (25.3%) Quintile 3 n = 920 (15.3%) Quintile 4 n = 68 (11.3%) Quintile 5 n = 82 (13.7%)
Social-Emotional Functioning	33.5% of children don't achieve the expected score for Social Relations with Peers and Adults 49.7% of children don't achieve the expected score for Emotional Readiness for School
Stunting	35.8% of children have stunted growth, 5.8% of whom are severely stunted
Early Learning Total score	37.4% of children are <i>On Track</i> 25.3% are <i>Falling Behind</i> 37.3% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 36 shows the breakdown per learning domain

Figure 36: Northern Cape learning domains

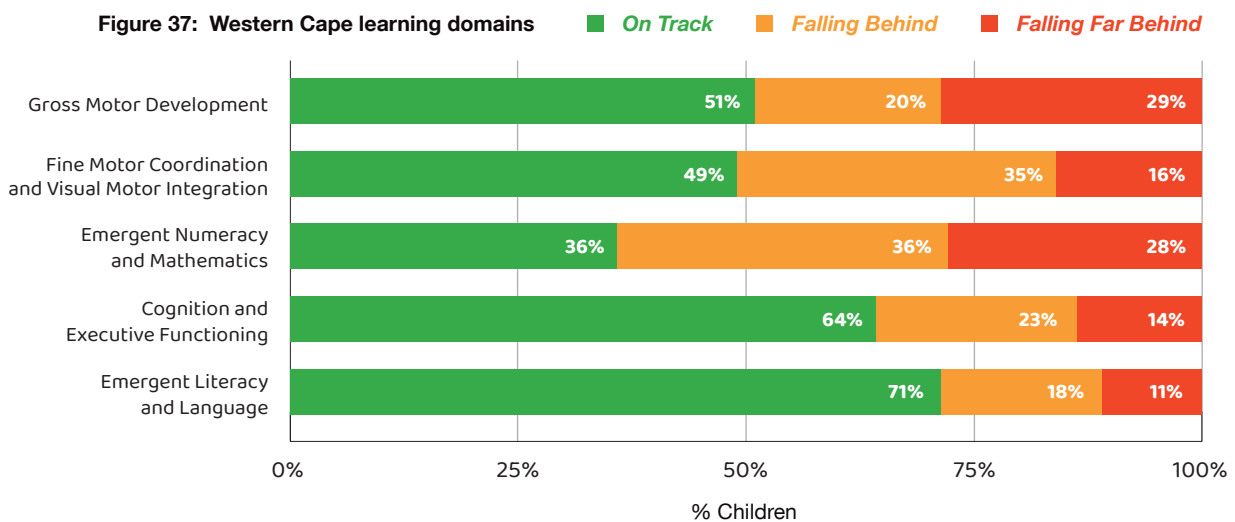


The Northern Cape shows some promising results in the Gross Motor Development domain. However, children are underperforming significantly in the Fine Motor and Visual-Motor Integration domain. Emergent Numeracy and

Mathematics and Cognition and Executive Functioning are also of concern, with only slightly better results in Emergent Literacy and Language.

7.9 Western Cape

Child population	There are 711,000 children aged 0 to 5 years in the Western Cape 27% of these children live in households with income levels below the poverty line
Index sample	559 children 268 (48%) boys and 291 (52%) girls Children were drawn from 134 ELPs across 38 sampling clusters
The quintile breakdown of this sample	Quintile 1 n = 121 (21.6%) Quintile 2 n = 106 (19%) Quintile 3 n = 77 (13.8%) Quintile 4 n = 104 (18.6%) Quintile 5 n = 151 (27%)
Social-Emotional Functioning	33.1% of children don't achieve the expected score for Social Relations with Peers and Adults 41.1% of children don't achieve the expected score for Emotional Readiness for School
Stunting	21.5% of children have stunted growth, 4.5% of whom are severely stunted
Early Learning Total score	64.8% of children are <i>On Track</i> 19.2% are <i>Falling Behind</i> 16% are <i>Falling Far Behind</i> the expected standard for Early Learning Figure 37 shows the breakdown per learning domain



The Western Cape shows promising results for the Learning Total score and across domains. Girls generally performed better than boys, with children excelling in the Early Learning Literacy and Language and Cognition

and Executive Function domains. Emergent Numeracy and Mathematics is an area of concern requiring special attention.

08 | Conclusion

There is a well-known proverb that says “*The best time to plant a tree was 20 years ago. The second best time is now.*”

This is profoundly applicable to the situation we find ourselves in today.

Had South Africa invested more since 1994 in ensuring that young children had the best possible start in life, we would not be in the position we are now, where two out of three preschoolers begin their formal schooling journey without the right basic foundations in place.

We cannot change that. But we can learn from the lessons of the past and redefine the future. We can plant that tree today.

The neurological and cognitive development of significant proportions of children nationally, and in particular provinces, is being compromised by stunting, a chronic condition that is *preventable*.

And more than half of South African children attending ELPs are unable to do the tasks expected of children their age, which are necessary for a smooth transition into the Foundation Phase of school. For the 28% of children not enrolled in an ELP, the situation is even more dire.

The combination of risk factors faced by young children in South Africa places some children at a massive

disadvantage. By the age of 4 years, a child in the lowest income group who is severely stunted is roughly one whole year behind a child of normal growth in the wealthiest income group when it comes to Early Learning. These children will need intensive intervention, and are at risk of never catching up with their peers.

Planting that proverbial tree now means greater and smarter investment in early nutrition and early learning, including efforts to support young children’s Social-Emotional Functioning.

Action Briefs are available on the Thrive by Five website, providing more detailed information on the steps that need to be taken to address the challenges highlighted in this report. These briefs are drafted by individuals with deep expertise in each of the respective developmental domains, and additional topics will be added over time.

Ultimately, we must hold ourselves and one another accountable for closing the opportunity gap between young children in the richest and poorest households, and for increasing the proportion of all young children in South Africa who thrive by five.

By repeating the Index data collection exercise every three years, we will be able to track whether our collective efforts are paying off.

¹Early Learning Programmes are also commonly referred to as pre-schools, creches, educare centres, day mothers or playgroups

²Sonja Giese was founding Executive Director of Innovation Edge (IE) and led the organisation and IE's data work for eight years. She currently heads up DataDrive2030.

³Andrew Dawes is Associate Professor Emeritus in the Department of Psychology at the University of Cape Town and a Research Associate with the Young Lives study at Oxford University.

⁴Colin Tredoux is Professor in the Department of Psychology at the University of Cape Town and a Research Associate at Université de Toulouse, Jean Jaurès.

⁵Frances Mattes is a Masters in Psychological Research candidate in the Department of Psychology at the University of Cape Town

⁶Grace Bridgman is a PhD Candidate in the Department of Economics at Stellenbosch University, focusing on the spatial inequality in child health and development, and is also a researcher with ReSEP in the same department.

⁷Servaas van der Berg is Professor of Economics at Stellenbosch University and the South African Research Chair in the Economics of Social Policy.

⁸Jan Schenk is the Director of ikapadata and has a PhD in Sociology from the University of Cape Town.

⁹Janeli Kotze is a Deputy Director in the Research Coordination, Monitoring and Evaluation Directorate at the Department of Basic Education.

¹⁰The cut-off points for *On Track*, *Falling Behind* and *Falling Far Behind* were set empirically and in consultation with key stakeholders (in 2016). In order to set an expected standard, the team drew extensively on research literature, a review of other assessment tools for preschool-aged children, South African policy, the South African National Curriculum Framework for Children from Birth to Four, and expert opinion. The process to set the standard also included assessments of more than 1,300 children.

¹¹<https://www.who.int/tools/child-growth-standards/standards>

¹²The measurements for stunting and severe stunting are determined by using the World Health Organization's Reference Group Study. It is useful to note that the WHO defines severe stunting as being when normalised height for age < -3SD (i.e., ZHFA < -3), and stunting as being when normalised height for age < -2SD (i.e., ZHFA < -2). Rough translations of these into expected percentages would mean that in a normal population we would expect 0.44% to be severely stunted, and 5.4% to be stunted

¹³Stats SA (2021) General Household Survey 2019. Calculations by K Hall, Children's Institute, UCT.

¹⁴Hall, K., Sambu, W., Almeleh, C., Mabaso, K., Giese, S., & Proudlock, P. (2019). South African early childhood review: 2019. Children's Institute; Ilifa Labantwana; the Department of Planning, Monitoring and Evaluation in the Presidency; The Grow Great Campaign; Innovation Edge.

¹⁵Ibid.

¹⁶García, Jorge Luis, James J. Heckman, Duncan Ermini Leaf, and María José Prados. "The Life-cycle Benefits of an Influential Early Childhood Program." (2016).

¹⁷Bradley, R. H., Corwyn, R. F., McAdoo, H. P., & García Coll, C. (2001). The home environments of children in the United States part I: Variations by age, ethnicity, and poverty status. *Child Development*, 72(6), 1844-1867. Taylor, S. & Yu, D. The importance of socio-economic status in determining educational achievement in South Africa. Stellenbosch Economic Working Papers: 01/09. Stellenbosch University. Tran, T. D., Luchters, S., & Fisher, J. (2017). Early childhood development: impact of national human development, family poverty, parenting practices and access to early childhood education. *Child: Care, Health and Development*, 43(3), 415-426.

¹⁸Arnold, D. H., Kupersmidt, J. B., Voegler-Lee, M. E., & Marshall, N. A. (2012). The association between preschool children's social functioning and their emergent academic skills. *Early Childhood Research Quarterly*, 27(3), 376-386. Collie, R. J., Martin, A. J., Nassar, N., & Roberts, C. L. (2019). Social and emotional behavioral profiles in kindergarten: A population-based latent profile analysis of links to socio-educational characteristics and later achievement. *Journal of Educational Psychology*, 111(1), 170. <https://doi.apa.org/doiLanding?doi=10.1037%2Fedu0000262> Denham, S. A., Bassett, H. H., Mincic, M., Kalb, S., Way, E., Wyatt, T., & Segal, Y. (2012). Social-emotional learning profiles of preschoolers' early school success: A person-centered approach. *Learning and Individual Differences*, 22, 178-189. <http://dx.doi.org/10.1016/j.lindif.2011.05.001>.

¹⁹Combined schools in this case refers to schools that include the primary phase as well as later phases. These are often smaller schools in rural or farm areas.

²⁰Vangasali is a government campaign launched in 2020 with the aim of identifying all Early Childhood Development (ECD) programmes (including ECD centres, playgroups, toy libraries, day mothers) in the country.

²¹SE = standard error (throughout the report).

²²Anderson, K. J., Henning, T. J., Moonsamy, J. R., Scott, M., Du Plooy, C., & Dawes, A. R. L. (2021), Test-retest reliability and concurrent validity of the South African Early Learning Outcomes Measure (ELOM), South African

Journal of Childhood Education, 11(1), a881. <https://doi.org/10.4102/sajce.v11i1.881>

²³Dawes, A., Biersteker, L., Girdwood, E., Snelling, M. J. T. L., Tredoux, C. G. et al (2020). Early Learning Outcomes Measure. Technical Manual. Claremont, Cape Town: The Innovation Edge. http://elom.org.za/wp-content/uploads/2020/06/ELOM-Technical-Manual_2020.pdf

²⁴Snelling, M., Dawes, A., Biersteker, L., Girdwood, E., & Tredoux, C.G. (2019). The development of a South African Early Learning Outcomes Measure: A South African instrument for measuring early learning program outcomes. *Child: Care, Health and Development*, 45, 257–270. <https://doi.org/10.1111/cch.12641>

²⁵These benchmarks are equivalent to the Achieving the Standard, Falling Behind and At Risk categories used in Dawes et al (2020). The labels have been changed in order to more clearly communicate the performance gradient.

²⁶<https://www.who.int/tools/child-growth-standards/standards>

²⁷The method used is reported in Dawes et al. (2020).

²⁸For more information on the calculation of sampling weights, please see the full Thrive by Five Technical Report.

²⁹Wills, G. & Kika-Mistry, J. (2021). Early Childhood Development in South Africa during the COVID-19 Pandemic: Evidence from NIDS-CRAM Waves 2 – 5. https://cramsurvey.org/wp-content/uploads/2021/07/14.-Wills-G_-Kika-Mistry-J.-2021-Early-Childhood-Development-in-South-Africa-during-the-n-COVID-19-pandemic-Evidence-from-NIDS-CRAM-Waves-2-5.pdf

³⁰A detailed methodology for the extrapolation exercise is described in the Thrive by Five Technical Report Supplement.

³¹Executive Summary National Development Plan 2030: Our future – make it work, 2012.

³²This figure includes those children Falling Behind and Falling Far Behind in terms of ELOM scores.

³³The huge amount of scatter in the data means we cannot conclude anything about programme effects without further analysis.

³⁴Britto, P. R., Yoshikawa, H., & Boller, K. (2010). Quality of early childhood development programs in global contexts. Rationale for investment, conceptual framework and implications for equity. *Social Policy Report*, 25 (2); Burchinal, M., Zaslow, M., & Tarullo, L. (2016). (Editors). Quality thresholds, features, and dosage in early care and education: Secondary data analyses of child outcomes. Monograph: Society for Research in Child Development; Rao, N., Sun, J., Wong, J. M. S., Weekes, B., Ip, P.,

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³⁵Stats SA (2021) General Household Survey 2019.

³⁶Dawes, A., Biersteker, L., Girdwood, E., Snelling, M., & Horler, J. (2020). The Early Learning Programme Outcomes Study Technical Report. Claremont Cape Town: Innovation Edge & Ilifa Labantwana.

³⁷Ronfani, L., Vecchi Brumatti, L., Mariuz, M., Tognin, V., Bin, M., Ferluga, V., Knowles, A., Montico, M., & Barbone, F. (2015). The complex interaction between home environment, socioeconomic status, maternal IQ and early child neurocognitive development: A multivariate analysis of data collected in a newborn cohort study. *PLOS ONE*, 10(5). <https://doi.org/10.1371/journal.pone.0127052>

³⁸This is further supported by the Thrive by Five sample data, which display a positive social gradient, but noise in the trend. This implies that the extrapolation presented here is an upper-bound estimate. That is, quintile 5 children out of ELPs may be doing worse than estimated here, but there is presently no available evidence to show the amount, or how much the social gradient is simply due to better home backgrounds.

³⁹National Treasury. Republic of South Africa. Estimates of National Expenditure 2018. Analysis by Ilifa Labantwana.

⁴⁰The measurements for stunting and severe stunting are determined by using the World Health Organisation's Reference Group Study.

⁴¹Below two standard deviations of the mean for physical growth.

⁴²Below three standard deviations of the mean for physical growth.

⁴³Using a mixed linear regression model.

⁴⁴Schultz, T. P. (2002). Wage gains associated with height as a form of health human capital. *The American Economic Review* 92(2): 349-353.

⁴⁵All child population data presented in the provincial summaries is the General Household Survey 2019. Data analysis by K.Hall.

⁴⁶Using a mixed linear regression model.

⁴⁷See Thrive by Five Technical Report for details.

⁴⁸Children for whom weights available, otherwise 588.