INNOVATION EDGE

The South African EARLY YEARS INDEX

Sponsored by First National Bank

Preliminary findings from 2019 data collection & Proposed next steps

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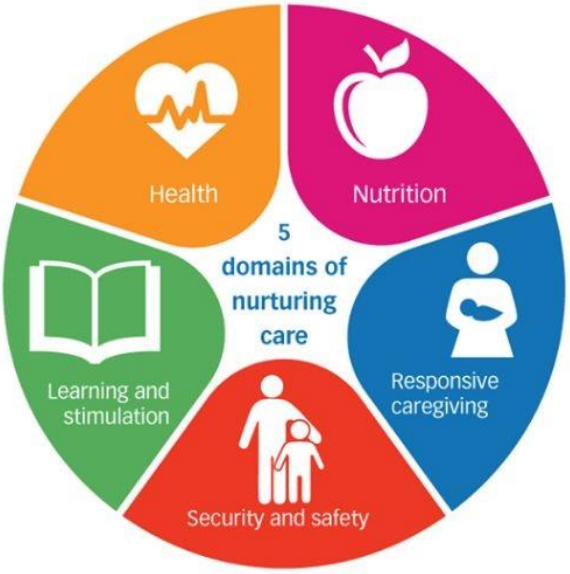
Background

At an individual level, the kinds of experiences we have during our first 6 years of life lay the foundations for our education outcomes, our employment prospects, our risk taking behaviour, our health, and our ways of engaging with others.

At a population level, these early foundations are critical for the development of human capital, economic growth, safety and security, and strong leadership. There is no conceivable way in which South Africa will realise its development goals without adequate and smart investment in our youngest citizens.

In 2018, the World Health Organisation launched the Nurturing Care Framework[1]. This Framework draws on the latest evidence to help prioritise the policies and actions needed to ensure that every child gets the best possible start in life. It is designed to serve as a roadmap to mobilise parents and caregivers, national governments, civil society groups, academics, international development agencies, the private sector, educational institutions, and service providers, to help keep every child on track.

There are five components to the nurturing care framework, illustrated in the diagram below.



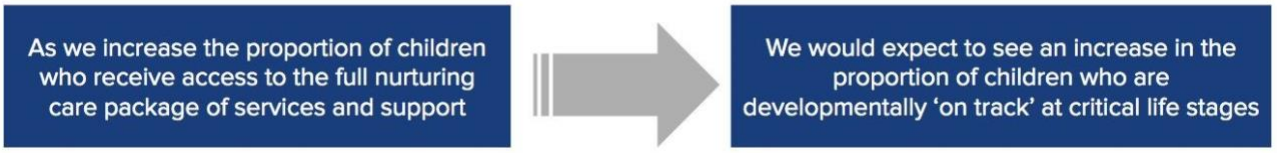
South Africa's progress with the implementation of each component of the nurturing care framework is, to some extent, monitored through administrative data, collected routinely as part of service delivery, through national surveys and national prevalence studies[2].

From these data sources we know that -

[1] World Health Organization, United Nations Children's Fund, World Bank Group. Nurturing care for early childhood development: a framework for helping children survive and thrive to transform health and human potential. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.
[2] A great summary of key child data is available through the South African Early Childhood Review (2016, 2017 and 2019 pending)

- 65% of young children live below the poverty line[3]
- 77% of children under 1 complete their primary immunisation course[4]
- 12% of children experience hunger in the home[5]
- Half of all children under 2 are never read to by their caregivers[6]
- 69% of children aged 3 to 5 years are enrolled in some form of early learning programme[7]
- About one in three children experience physical violence and sexual abuse before the age of 18[8]

While the delivery of each of the components of the nurturing care framework can (and should) be measured independently, they all ultimately converge in child outcomes that can be measured at critical life stages.



The cumulative effect of South Africa's investments in early childhood development services - good health care and nutrition, parenting support, high quality early learning programmes, and child protection - can be determined by measuring the proportion of children who are developmentally 'on track' for age.

No national data currently exist to track this important indicator.

The South African Early Years index aims to -

1. Monitor trends over time in the proportion of children aged 4 to 6 years who are on track for age in key areas of development

2. Support efforts to ensure that more children receive the nurturing care and services they need to help keep them on track

We are proposing a **3 way partnership** in the development of the Index - including Government, Business and Development Sector partners.

3 General Household Survey, 2017 analysed by the Children's Institute
4 District Health Information System 2017/2018
56 General Household Survey, 2017 analysed by the Children's Institute
General Household Survey, 2016
78 General Household Survey, 2017 analysed by the Children's Institute
Artz, L., Burton, P., Ward, C.L., Leoschut, L., Phyfer, J., Kassanjee, R., & Le Mottee, C. (2016). Optimus Study South Africa: Technical report. Sexual victimisation of children in South Africa. Final report of the Optimus Foundation Study: South Africa. Zurich: UBS Optimus Foundation.

The idea of an Index was inspired by business indices, which offer an easy way to determine the overall performance of a market or sector over time. An Index allows us to identify outliers and to understand what drives improvement. In order to be effective, the Index needs to be independent, defensible, transparent, comparable, maintainable and actionable. It must paint an honest picture of the trends in child outcomes over time, and be respected, easily understood, and appropriately interpreted by the media and the general public.

The intention is to structure the index in a way that allows us to support the work of a variety of key stakeholders in their efforts to ensure better outcomes for young children in South Africa. Examples include -

- Treasury - providing evidence to support greater investment in early childhood interventions
- Department of Education - providing information on what sort of support is needed in Grade R to help bridge the gaps for the poorest children
- Departments of Education, Health and Social Development - identifying what types of early childhood interventions need to be strengthened, and where targeting may be necessary
- DPME and StatsSA - enabling reporting against Sustainable Development Goal 4.2
- ECD resource and training organisations (RTOs) - identifying gaps in practitioner knowledge and skills to inform training and development
- Parents - creating greater public awareness of the importance of ensuring that children start school on track, and of the role that parents play in this regard e.g. making use of learning opportunities at home, and ensuring regular attendance at preschool
- Researchers - providing access to data for further analysis, through an open access data repository[3]

Progress and Plans

This initiative got under way in 2019 with an initial round of data collection. The sections that follow describe the data collection tools and processes, and present some preliminary findings for discussion with key stakeholders.

We hope to learn from this process to inform a way forward, in partnership with FNB and Government.

A report on the 2019 data collection process and outcomes

What we measured and how we measured it

[3] The anonymised data will be housed with Data First, at the University of Cape Town, an open access data repository with strict systems in place to ensure data integrity, quality and protection.

Developmental domain	Measurement tool	Description
Height for Age	Stadiometer	A stadiometer is constructed out of a ruler and a sliding horizontal headpiece which is adjusted to rest on the top of the head. Stadiometers are used in routine medical examinations and also clinical tests and experiments.
Gross Motor Development	The Early Learning Outcomes Measure (ELOM)	The ELOM is a population based child assessment tool that determines whether children are developmentally on track for their age. It is scientifically designed, rigorously standardised, culturally fair and age-normed in South Africa. It is standardised for two age bands: 50-59 months, 60-69 months. For more information on the development of ELOM, please see the ELOM technical manual.
Fine Motor Coordination & Visual Motor Integration		
Emergent Numeracy & Mathematics		
Cognition & Executive Functioning		
Emergent Literacy & Language		
Social & Emotional Development & Awareness, Self Care	Teacher and assessor rating scale	This tool includes a 4 point rating scale for self-care, a 4 point rating scale for Social Relations with adults & peers and a 3 point rating scale for Emotional Functioning. The child's teacher is required to rate the child on each scale.
Socio-economic Status	School quintile system	The quintile of the school where the child was enrolled was used to estimate the socio-economic status of the child's home environment (i.e. children enrolled in a Quintile 1 school are assumed to be from a Quintile 1 household)

Over time, we may want to expand the tools to include other measures. Ideally we would like to determine the child's level of exposure to an early learning programme prior to starting Grade R and, if possible, the quality of the programme. Data on home learning environment would also be extremely interesting.

Sampling - how we selected districts, schools and learners

District selection -

The budget allowed for assessment of 500 children in each of four provinces, namely Eastern Cape, Kwazulu Natal, North West and Western Cape.

During the inception phase, a "Sentinel" approach to sampling was used. This means that instead of selecting schools from across entire provinces, we chose two education districts per province. These districts cover a wide range of school quintiles. District-level samples of schools were stratified by quintile groups (Q1, Q2-3, Q4-5), in recognition of socio-economic status - as this is one of the most critical determinants of early developmental outcomes. Ultimately, the following steps were taken:

- We narrowed the school lists down to combined or primary public schools.
- We only considered districts with at least four schools per quintile group; the only exception being the Eastern Cape, where only one district fulfils this criterion.
- For eligible districts that fulfilled these criteria, we calculated the average distance from our homebase - the city or town where the teams were located - in the provinces, to all of the schools in the districts. This step was taken to ensure the feasibility of data collection in terms of cost and logistics.
- The two districts with the shortest average distance in each province were used for sampling.

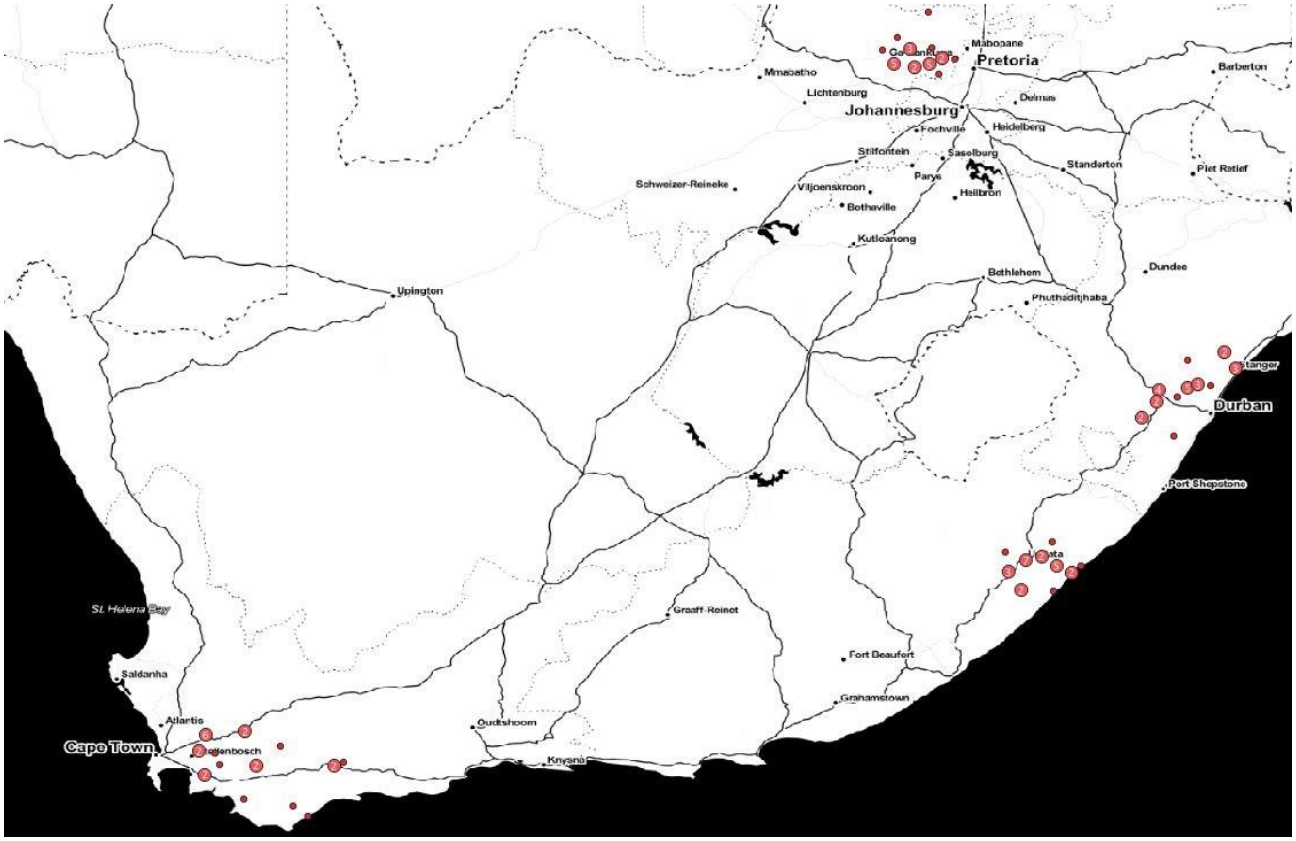
The table below provides a basic description of the school districts selected.

Province	School District	# primary and combined public schools	% Rural schools (no.)	% Urban schools (no.)	% schools Q1	% schools Q2-3	% schools Q4-5
Eastern Cape	**Mthatha**	280	91% (256)	9% (24)	48%	50%	2%
	Libode	372	99% (367)	1% (5)	63%	37%	1%
Kwazulu -Natal	**Umgungundlovu**	312	71% (222)	29% (90)	14%	65%	21%
	Ilembe	246	89% (219)	11% (27)	44%	49%	7%
North West	**Rustenberg**	53	53% (28)	47% (25)	17%	68%	15%
	Madibeng	48	77% (37)	23% (11)	23%	56%	21%
Western Cape	**Cape Winelands**	120	23% (28)	77% (92)	32%	28%	40%
	Overberg	39	13% (5)	87% (34)	20%	49%	31%

School selection -

Schools were stratified by district and quintile group and ordered randomly. The first three or four schools in each randomly-ordered district-quintile stratum list were included in the sample. As the sample sizes per stratum were unequal (we expected to sample 10 schools from each district, but there were three quintile groups) the rule was to have larger sample sizes in the lower-quintile groups (e.g. four schools in Q1, three schools in Q2-3 and Q4-5, respectively).

The geographic spread of schools is illustrated in the map below.



Learner selection -

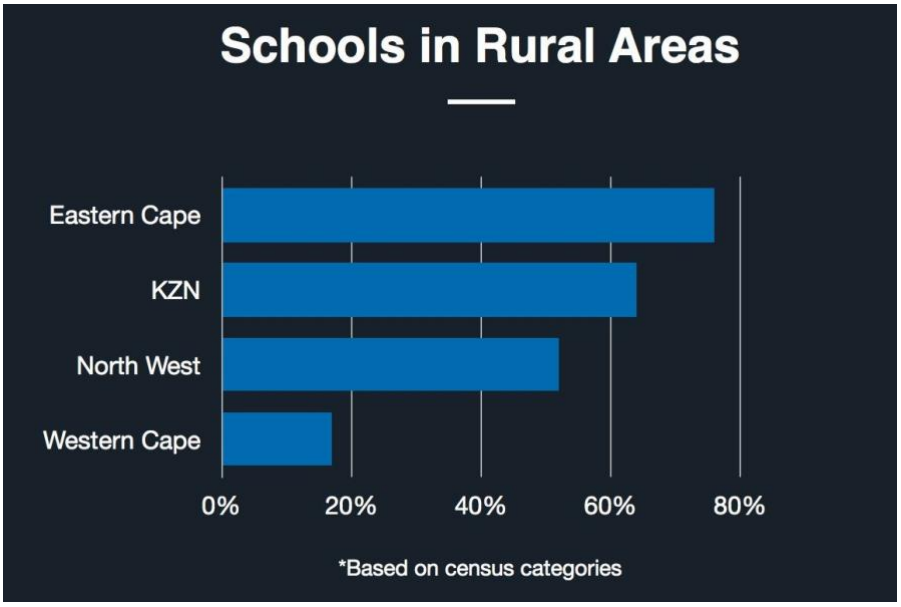
Learners were sampled on the day of the actual school visit, stratified by gender. During the inception phase it was agreed that 25 children would be assessed in each school.

- The assessors captured the number of eligible male and female children at the school.
- The assessors then sampled from schools with more than 50 eligible children at the school. In cases where there was a classroom with 25 or more eligible children, all eligible children in this classroom would be assessed.
- The children were given paper sheets with numbers ("Child IDs"; 1 2 3…), one sequence of numbers for male children and one sequence of numbers for female children.

- A random number generator on the tablet generated two lists (male and female) of Child IDs to be included in the sample, as well as a list of potential replacement Child IDs (replacement IDs had to be used in the order they appeared on the tablet).
- At schools where the teams managed to reach the target of 25 children before the end of the school day, they continued with assessments until the end of the school day, which explains why some schools have more than 25 assessments.
- A total of 2094 children were assessed, from 99 schools in 8 districts across the 4 provinces.
- While we did not intentionally stratify for rural/urban, we ended up with a mix that resembles provincial demographics. The rural / urban classification is based on census categories of the areas where schools are located.

The table below provides a basic description of the schools and learners included in the sample.

Province	School District	Number of schools	Number of children	% Rural [provincial comparison]	% Urban [provincial comparison]
Eastern Cape	**Mthatha**	**13**	**269**	**76% [84%]**	**24% [16%}**
	Libode	**13**	**235**		
Kwazulu-Natal	**Umgungundlovu**	**13**	**294**	**46% [76%]**	**54% [24%]**
	Ilembe	**12**	**232**		
North West	**Rustenberg**	**12**	**314**	**52% [72%]**	**48% [28%]**
	Madibeng	**11**	**225**		
Western Cape	**Cape Winelands**	**12**	**305**	**17% [12%]**	**83% [88%]**
	Overberg	**13**	**220**		
TOTAL		**99**	**2094**		



In practice, the sampling strategy was successful, but adjustments had to be made due to the fact that many schools did not have enough grade R learners to meet the desired sample size. This meant that additional schools had to be added to the sample. This was done using the randomly-ordered school list per stratum, and keeping the number of schools in all strata per province as equal as possible.

Field work management and quality control

Innovation Edge appointed an independent company, iKapadata, to manage data collection.

Ideally data should have been collected in January/February 2019, at the start of the Grade R year and before children are exposed to the Grade R curriculum. However, final sign-off from the sponsor was only obtained at the end of February 2019. This delayed the start of the data collection process and children who participated in this study had already been exposed to one full term of Grade R. This is likely to have influenced child outcomes.

Assessor training took place in the four provinces between the 25th of March and the 6th of April, with each training session lasting between 5 and 6 days. Only those assessors who were deemed competent were recruited for the study.

All schools were visited by an iKapadata representative ahead of the actual fieldwork visit. The purpose of these visits was to introduce the study to the principals and obtain their permission to conduct the assessments at their schools. Parent consent forms were distributed for learners to take home, and auxiliary information - such as the exact GPS locations and the relevant contact details for the school - were collected.

Child assessments took place between the 8th of April and the 24th of May, 2019.

The assessments were conducted by eight teams of assessors. Two teams were assigned per province, and each team was led by a team leader. On a typical fieldwork day, a team would arrive at the school just before the start of the school day. The first task for the team leader would be to talk to the principal to announce the team's presence and arrange space where the assessments could be conducted.

One part of the team would then proceed to prepare the desks for the assessments, including the tablet and other tools, and set up the stadiometers used for measuring the children's height. In the meantime, the other part of the team would introduce the study to the children. This part of the team would also sample children with the help of a custom-built sampling form on their tablets. Once all the eligible children had received their Child IDs and sampling had been concluded, the assessors, under the supervision of the team leader, would lead the sampled children individually from their classrooms to where the assessments were taking place.

Because more schools had to be added to the sample and because of external events (including bad weather conditions in the Eastern Cape and KZN, general teacher and learner absenteeism, unannounced school events and the elections), data collection took about two weeks longer than anticipated. It is worth noting though that in North West - the province with the largest grade R numbers and the fewest interruptions - fieldwork was concluded within the originally anticipated timeframe. "Mop-ups" were conducted at the end of the fieldwork, where assessors returned to previously visited schools to finish assessments that they did not manage to complete at their first visit to the school.

Throughout the fieldwork day the team leader would be in direct contact with a fieldwork manager at iKapadata via Slack, a company-wide messaging tool. Whenever any challenges occurred the team leader would post their observation or questions in a team-specific Slack channel and the respective fieldwork manager would reply with instructions and advice almost immediately. These Slack channels were also used for posting automated data quality control notifications and team-specific progress reports. Whenever an assessment had been completed a notification would show up in the team channel, and if there were any quality concerns an alert would be added to the submission. The reports with the list of all children assessed so far would be posted at different times throughout the day.

Summary of key data

Interpreting the findings:

ELOM is age validated for children aged 50 to 59 months and 60 to 69 months: The ELOM was validated on a sample that is very likely to be representative of the range of socio-economic backgrounds of South African children and for children speaking different languages. Children from five of the country's major languages, Afrikaans (spoken by 13.5% of total population), English (9.6% of total population), isiXhosa (16% of total population), isiZulu (22.7% of total population), and Setswana (8% of total population), were included. Cost considerations ruled out inclusion of all language groups, but the sample covered home languages spoken by the majority (~70%) of the country's children. The 2016 data collection included assessment of 1331 randomly selected children

from 173 schools in three provinces (WC, NW, KZN) and all five quintiles.

ELOM has three performance categories for the total ELOM score and for each of the five domains: Child assessments place children in three performance categories 'At risk', 'Falling behind' or 'Achieving the Standard'. The level required to achieve the standard for the older age band (60-69 months) is higher than the level required to reach the standard for the younger age band (50-59 months)[4].

- The bar for 'Achieving the Standard' was set during the 2016 age validation process. It is the score achieved by the top 40% of the children in each age band in the 2016 age validation sample (the 60th percentile). Children from all quintiles were represented in that band (fewer in quintile 1 and more in quintiles 4 and 5). A consultation with expert stakeholders in the ECD sector (both in government and civil society) resulted in the finalisation of this standard.
- The 'Falling behind' category includes children whose scores fall below the standard for their relevant age band, but by less than one standard deviation
- The 'At risk' category includes children whose scores are more than one standard deviation behind the standard, within their relevant age band. It is not expected that children will reduce this distance from the standard without intervention.

Combined Quintiles: In the 2016 age validation study, ELOM Total means of all schools were compared in order to determine whether appropriate differences existed between Quintiles 1, 2, 3, 4 and 5. Two primary observations were made. Schools in Quintile 4 and 5 showed significant overlap of confidence intervals. Quintile 2 and 3 schools also showed significant overlap of confidence intervals. This evidence suggests that these quintile categories are not meaningfully different in ELOM performance. Therefore, Quintiles 4 and 5 were combined, and Quintiles 2 and 3 were combined.

The final Index 2019 sample

After cleaning the data, 2055 children were retained in the final sample, with roughly even numbers in Quintile 1, Quintiles 2 and 3 combined and Quintiles 4 and 5 combined.

Quintiles 1, 2 and 3 are designated 'no fee' schools serving the poorest children. Since household income is used to derive income quintiles, the number of children is not evenly distributed across quintiles. Instead, there are more children in the lower quintiles as poor households tend to be larger. 77% of children are in the poorest three quintiles nationally. In our sample, 69% of children were drawn from quintile 1 to 3 schools.

[4] The ELOM team followed accepted practice in setting these standards. The task was to set standards for each domain and for the ELOM Total that were neither too high nor too low. They had to be aspirational but realistic. The standards may be re-examined and changed if necessary as experience with the ELOM is accumulated.

As expected (because of the delays in data collection), most children fell into the older age band of 60 to 69 months. It was necessary to extend the eligible age for assessment by 3 months, in order to reach the target of 2000 children. This created a third age band of children aged 70 to 72 months. This falls outside of the age validation range for ELOM and these children's scores are therefore excluded from some of the analyses.

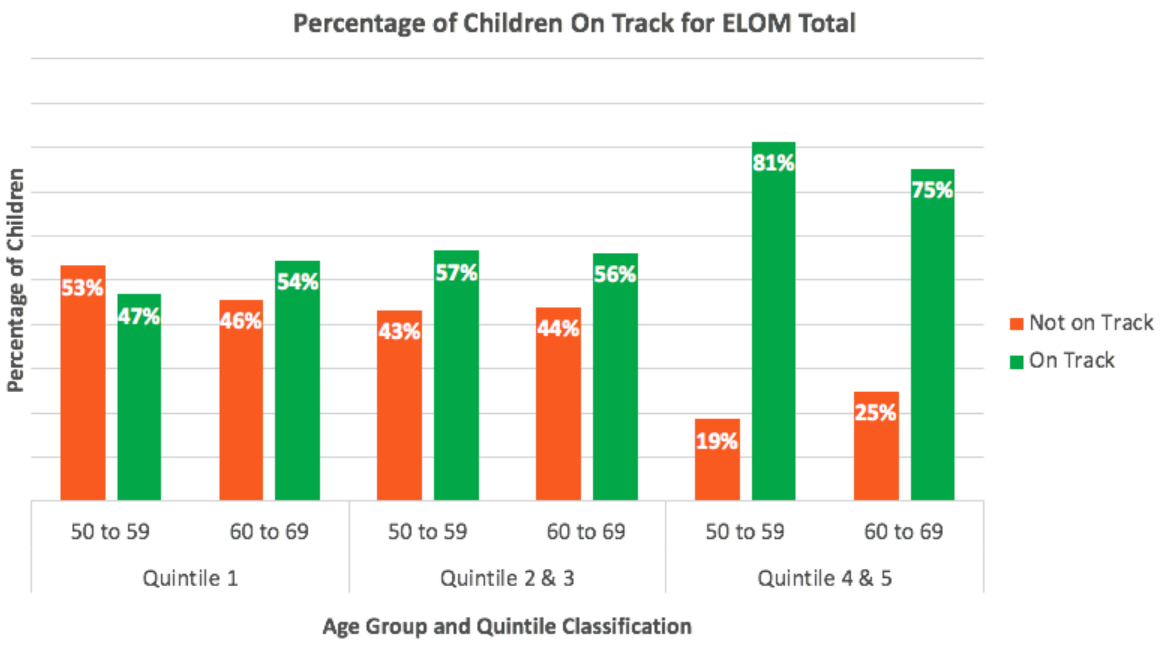
Quintile groups	Age in months			
	Number of children aged 50 to 59 months	Number of children aged 60 to 69 months	Number of children aged 70 to 72 months	All age groups combined
Quintile 1	109	485	112	706
Quintile 2 & 3	111	482	118	721
Quintile 4 & 5	59	423	146	628
All Quintiles	279	1400	376	2055

The sample was evenly balanced between boys (50.9%) and girls (49.1%).

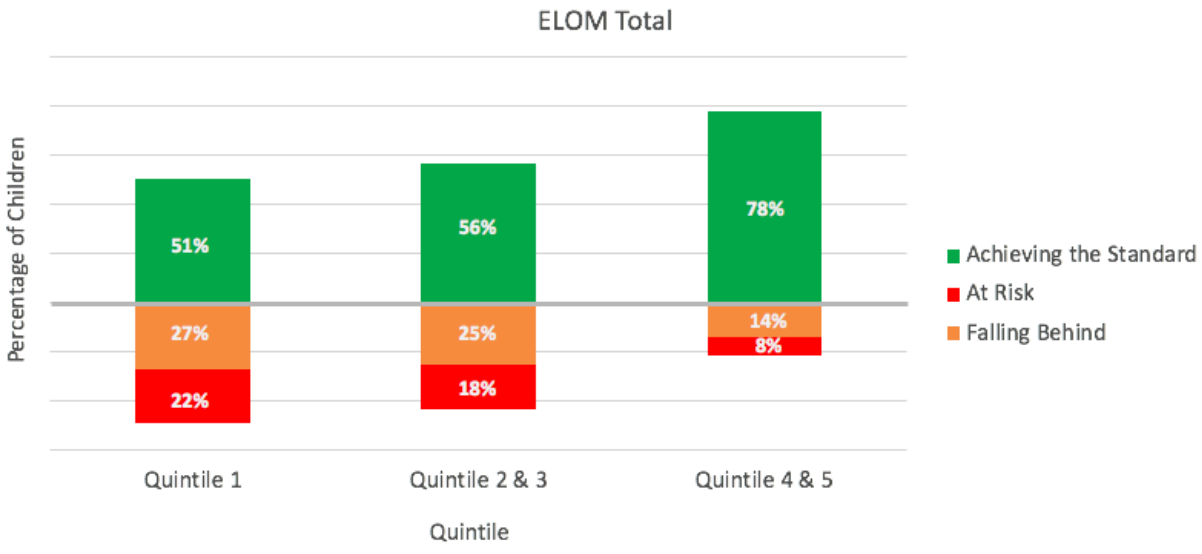
It is interesting to note that there are many more younger children in Grade R in Quintile 1-3 schools than in Quintile 4 and 5 schools. One contributing factor may be the cost of attending a preschool. While all Quintile 1 to 3 children are eligible for free primary schooling (including Grade R), free preschool is not provided for in South Africa. Even in Government subsidised centres, the amount of the subsidy is not enough to cover the full costs, and parents are typically required to pay fees to cover the shortfall. Poorer parents are therefore more likely to enroll their child in Grade R from as young as possible. This has implications for the child's readiness to engage with the curriculum.

It was not possible to collect data from every child's caregiver and we do not therefore have information on children's home learning environment or on which children had attended an early learning programme prior to starting Grade R. We know from other studies that these are both significant contributors to learning outcomes. Over time, we would like to include data on these two measures.

The data show that children from higher socio-economic quintiles perform better than their peers from poorer households. While 81% of children aged 50 to 59 months are on track in quintiles 4 and 5, only 47% of the same age children meet the standard in quintile 1. This performance gap between the quintiles at the point of entry into school places the poorest children at a disadvantage that will likely be carried through their formal schooling years.

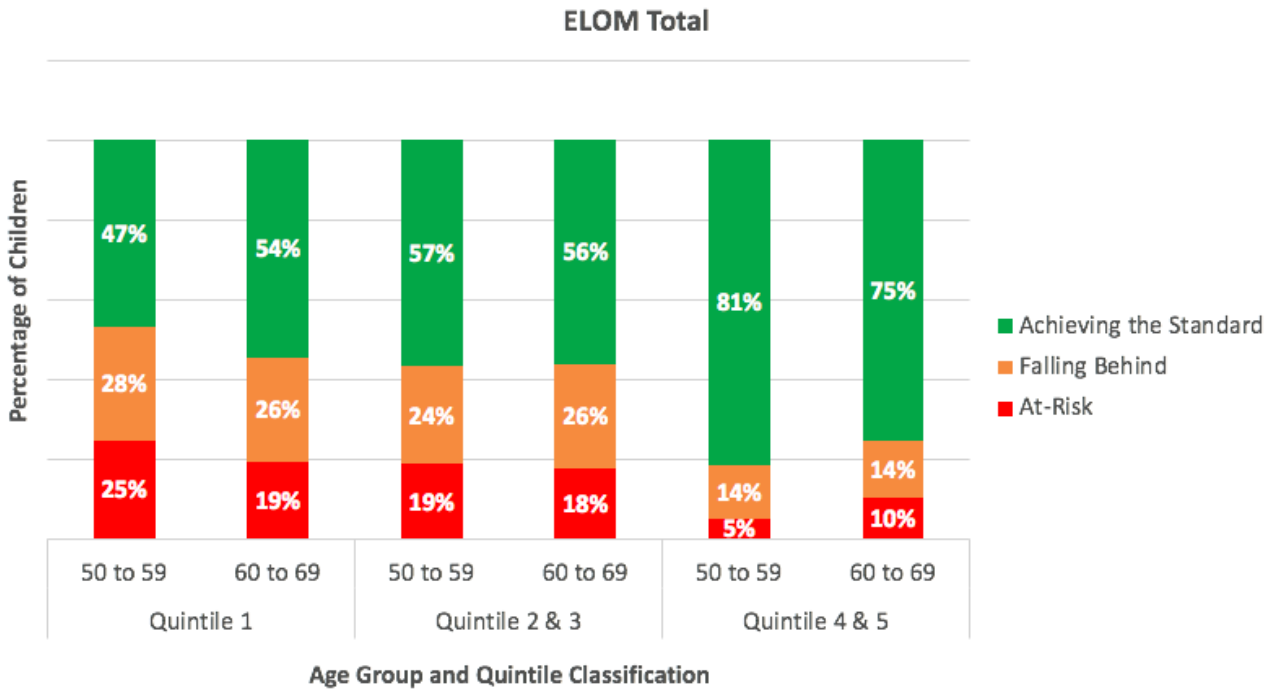


If we combine the age groups, only 51% of children in Quintile 1, 56% of children in Quintiles 2 and 3, and 78% of children in Quintiles 4 and 5 achieved the standard we would expect them to reach *before* starting Grade R. This, despite the fact that children were assessed in the 2nd term of Grade R.



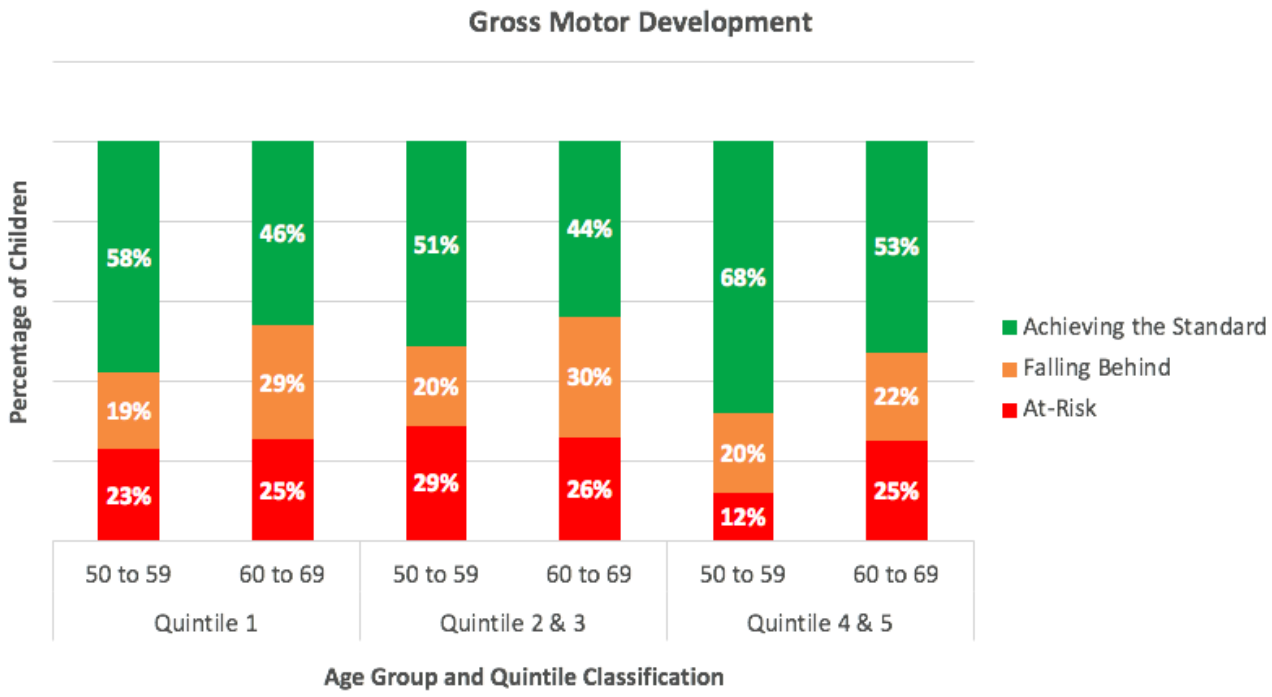
Overall, children assessed in 2019 achieved scores higher than those in the age validation sample in 2016, and the gap between the Quintiles is less pronounced. While the 2016 and 2019 samples of children are not directly comparable (notably because the 2019 sample had greater exposure to Grade R as they were assessed in the 2nd term), this finding is worth exploring further. The comparability of the 2016 and 2019 samples is discussed in more detail later in this document.

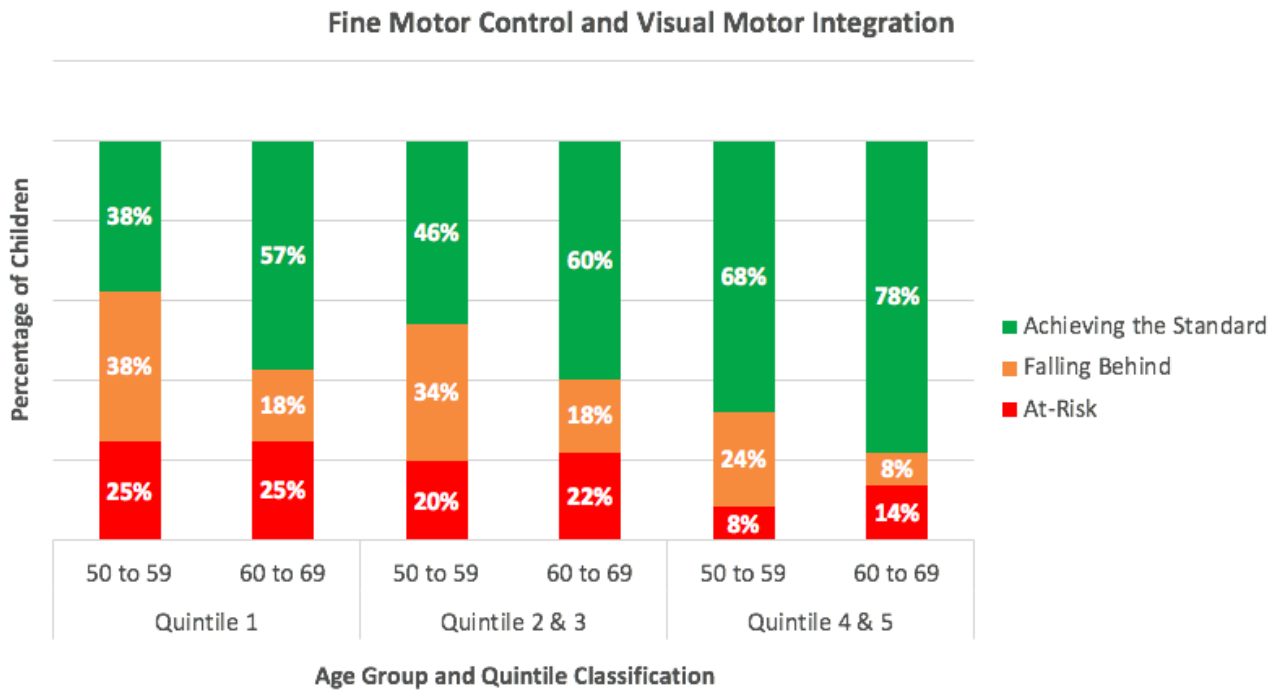
The graph below illustrates the proportion of children 'on track' (meeting the standard), 'falling behind' and 'at risk' in each quintile and age band.

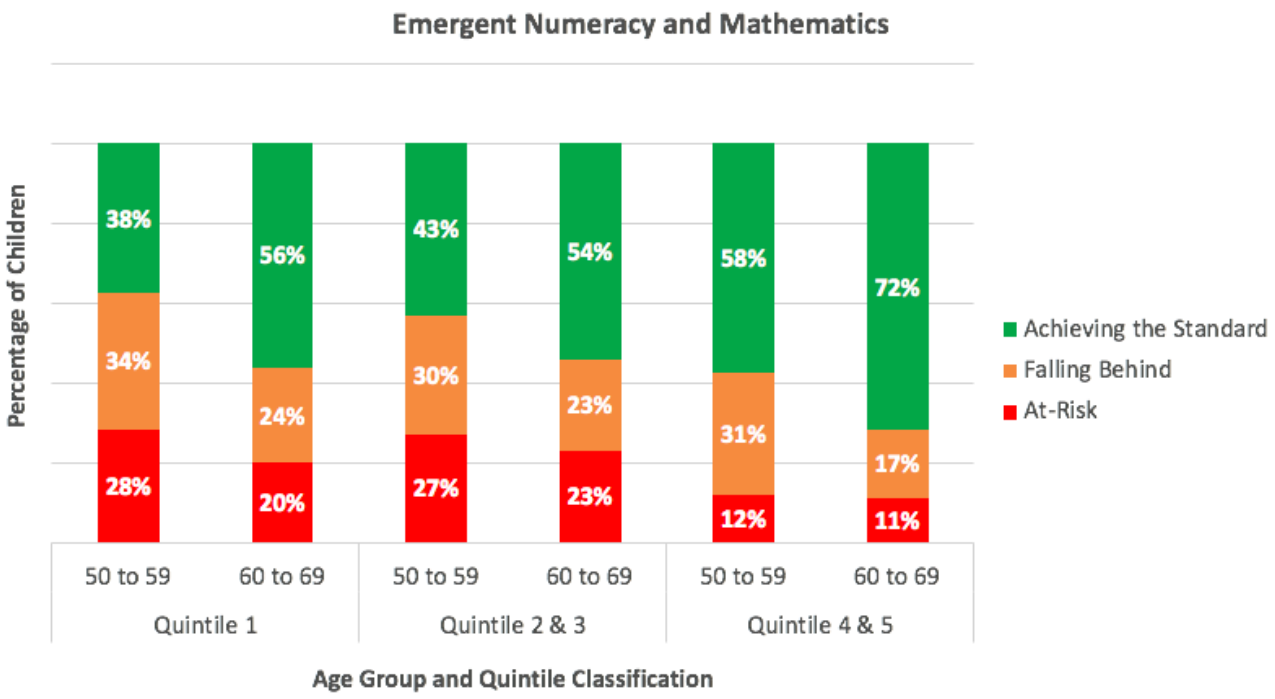


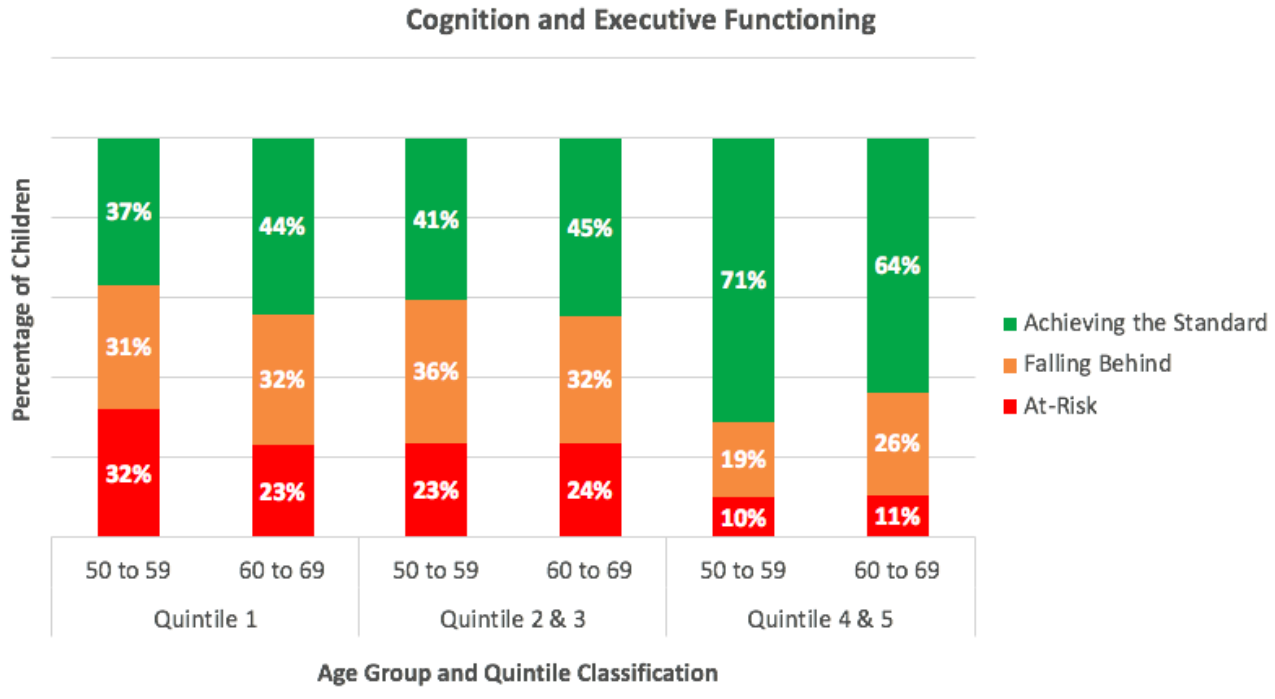
One in 4 children in quintile 1 fall into the 'at risk' category (red) with total ELOM scores more than one standard deviation below the expected level. This is a significant hurdle to overcome and catching these children up requires intense and targeted support.

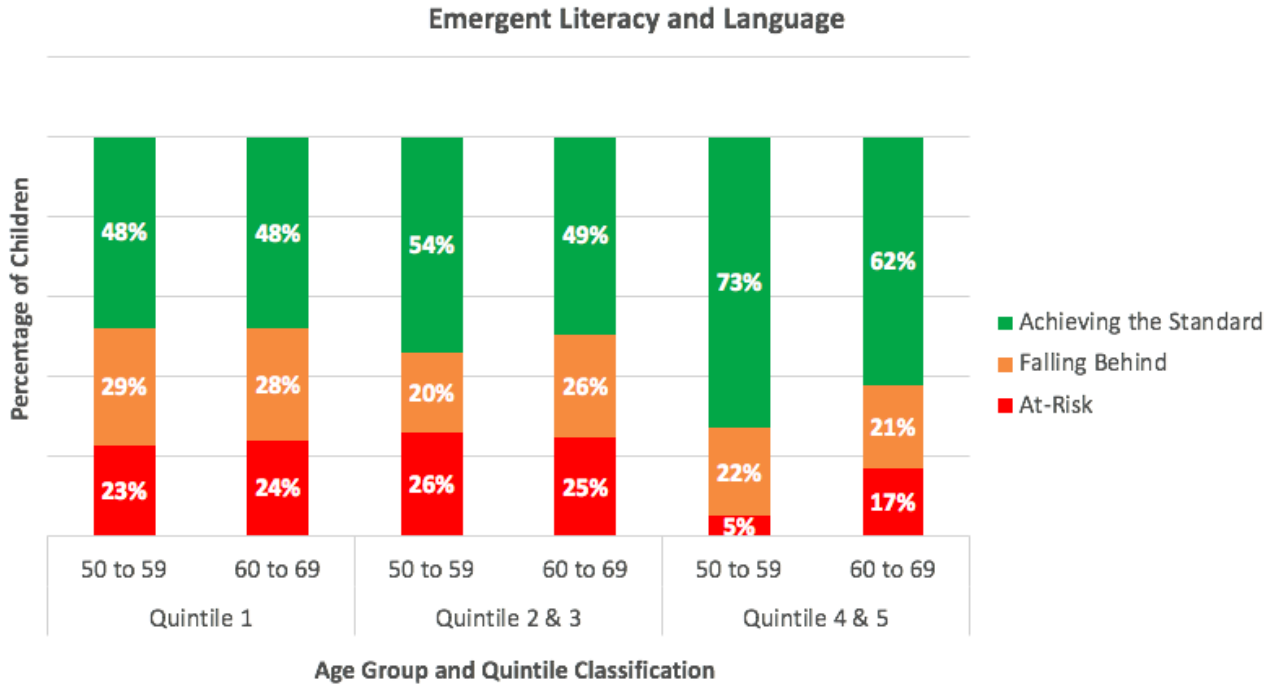
The graphs that follow show ELOM scores for each developmental domain, by age and quintile. Key gaps are evident in two domains in particular for the poorest children - cognitive and executive functioning, and fine motor control and visual motor integration. These are foundational skills necessary for focus, self-regulation, problem solving, working memory and hand-eye coordination. A concerted focus on these domains in programming may be helpful. More emphasis is also needed on building practitioner skills for strengthening emergent numeracy and mathematics.


Gross Motor Development
Percentage of Children
58%
19%
23%
46%
29%
25%
51%
20%
29%
44%
30%
26%
68%
20%
12%
53%
22%
25%
50 to 59
60 to 69
50 to 59
60 to 69
50 to 59
60 to 69
Quintile 1
Quintile 2 & 3
Quintile 4 & 5
Age Group and Quintile Classification
Achieving the Standard
Falling Behind
At-Risk

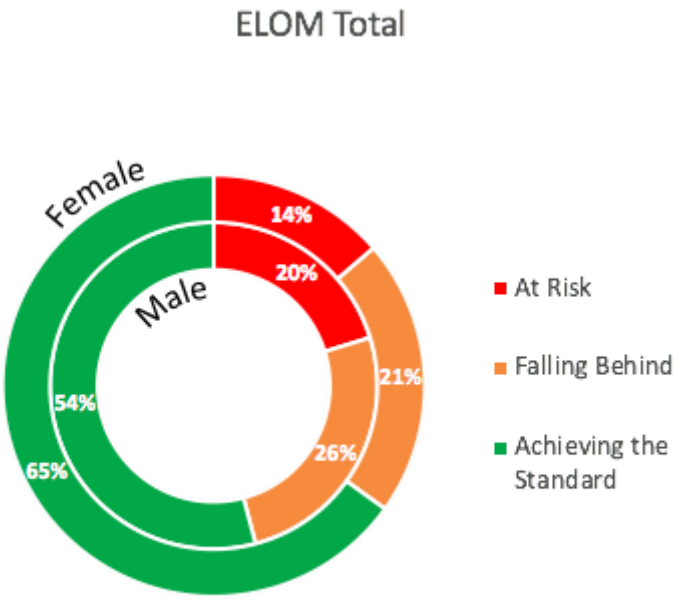

Fine Motor Control and Visual Motor Integration
Percentage of Children
38%
38%
25%
57%
18%
25%
46%
34%
20%
60%
18%
22%
68%
24%
8%
78%
8%
14%
50 to 59
60 to 69
50 to 59
60 to 69
50 to 59
60 to 69
Quintile 1
Quintile 2 & 3
Quintile 4 & 5
Age Group and Quintile Classification
Achieving the Standard
Falling Behind
At-Risk


Emergent Numeracy and Mathematics
Percentage of Children
38%
34%
28%
56%
24%
20%
43%
30%
27%
54%
23%
23%
58%
31%
12%
72%
17%
11%
50 to 59
60 to 69
50 to 59
60 to 69
50 to 59
60 to 69
Quintile 1
Quintile 2 & 3
Quintile 4 & 5
Age Group and Quintile Classification
Achieving the Standard
Falling Behind
At-Risk


Cognition and Executive Functioning
Percentage of Children
37%
31%
32%
44%
32%
23%
41%
36%
23%
45%
32%
24%
71%
19%
10%
64%
26%
11%
50 to 59
60 to 69
50 to 59
60 to 69
50 to 59
60 to 69
Quintile 1
Quintile 2 & 3
Quintile 4 & 5
Age Group and Quintile Classification
Achieving the Standard
Falling Behind
At-Risk



Girls performed on average better than boys on the total ELOM score, with 65% of girls achieving the standard compared to 54% of boys. This may indicate a need to ensure that young boys are encouraged to engage with the full range of learning opportunities on hand.



Better child health and nutrition is associated with better learning outcomes. As would be expected in line with the literature, children with higher height-for-age scores performed significantly better on the ELOM total score and on several domains. This re-emphasises that interventions that ensure adequate health and nutrition (and improved water and sanitation) in the early years are essential to achieving good educational and developmental outcomes.

		Gross Motor Development	Fine Motor Control and Visual Motor Integration	Emergent Numeracy and Mathematics	Cognition and Executive Functioning	Emergent Literacy and Language	ELOM Total Score
Height for Age	Strength of Relationship	.078	.192	.167	.206	.094	.21

Strength of Relationship	
0 - .099	
.1 - .199	
.2 - .299	
.3 - .399	
.4 - .499	

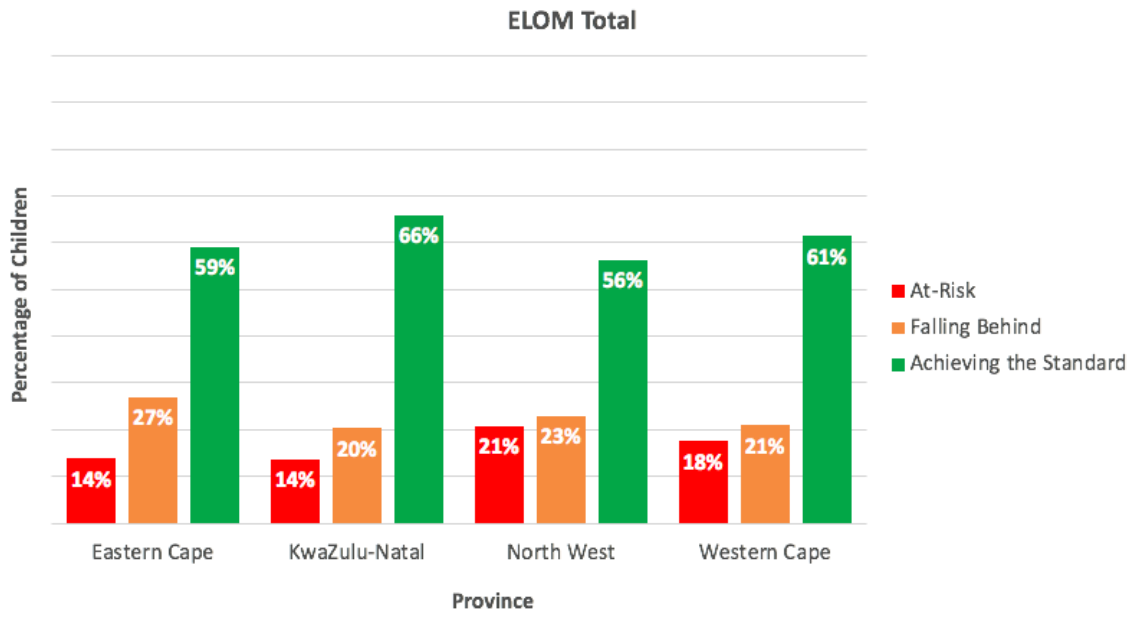
The data shows a significant correlation between socio-emotional wellbeing and learning outcomes for the total ELOM score and across all domains, except gross motor development. This suggests that interventions that serve to strengthen children's socio-emotional wellbeing will benefit their education outcomes.

Also of note is that the fact that there appeared to be no association between Quintiles and socio-emotional scores of children on average i.e. unlike the other domains, children from higher socio-economic quintiles did not perform better on average than their peers from poorer households in the socio-emotional rating scale.

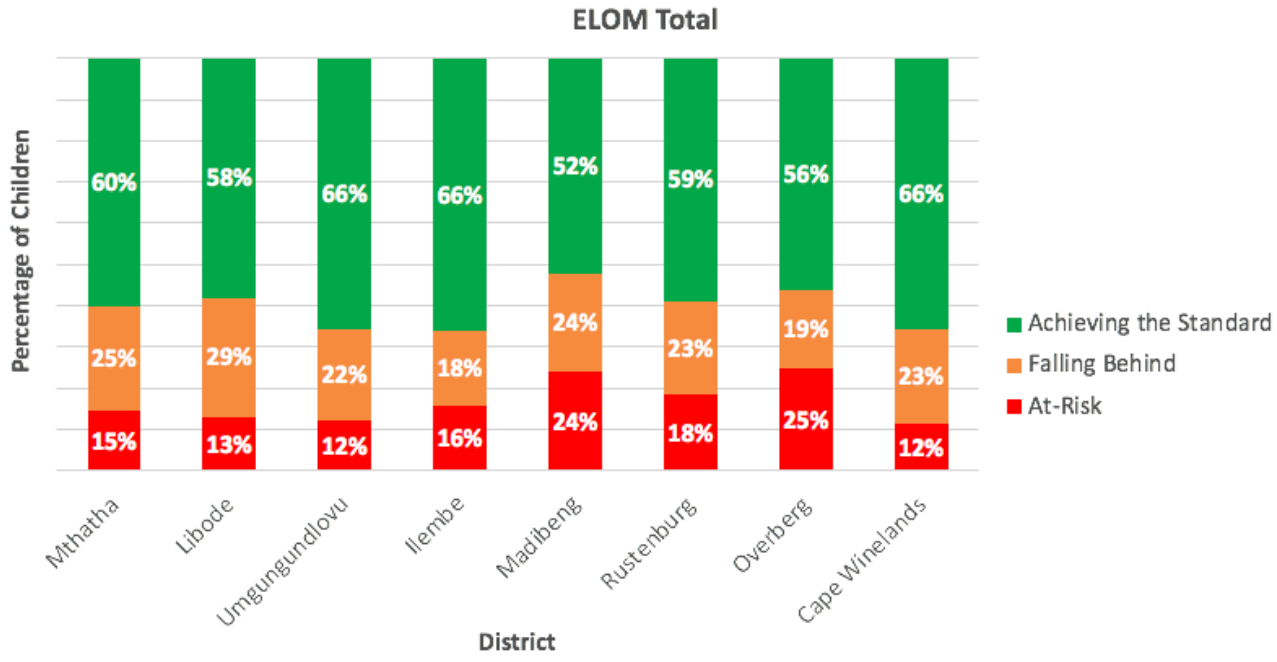
		Gross Motor Development	Fine Motor Control and Visual Motor Integration	Emergent Numeracy and Mathematics	Cognition and Executive Functioning	Emergent Literacy and Language	ELOM Total Score
Social Relations	Strength of Relationship	.032	.213	.235	.248	.246	.291
Emotional Functioning	Strength of Relationship	.146	.332	.355	.346	.343	**.452**

Strength of Relationship	
0 - .099	
.1 - .199	
.2 - .299	
.3 - .399	
.4 - .499	

There does not appear to be any notable differences in performance across provinces, *although it is important to remember that the samples were not designed to be representative of provinces.* The graph below provides information on the proportion of children in each provincial sample who fell within each of the performance bands (age and quintile are combined).



The graph below presents the same data, per district (age and quintile combined).



Comparing the 2019 data with the 2016 data - what can we and can't we say

The table below shows the proportion of children (60-69 months of age) in the 2016 and 2019 samples that are 'meeting the standard', 'falling behind' and 'at risk' for each of the quintile groupings. This is intended for illustrative purposes only and **any comparisons require careful consideration of the differences in sampling frames and the timing of data collection.**

	No Fee Schools				Fee charging schools	
	Quintile 1		Quintile 2 and 3 combined		Quintile 4 and 5 combined	
	2016	2019	2016	2019	2016	2019
Meeting the standard	10%	54%	40%	56%	48%	75%
Falling behind	34%	26%	24%	26%	35%	15%
At risk	56%	19%	36%	18%	17%	10%

Key characteristics of the 2016 and 2019 samples are outlined below.

Characteristics	**2016**	**2019**
Number of children		
50-59 months	258 (19.4%)	279 (14%)
60-69 months	1073 (80.6%)	1400 (68%)
70-72 months	0	376 (18%)
Mean age of children		
50-59 months	56.84	58.07
60-69 months	64.99	65.03
Gender breakdown		
% Boys	48.10	50.90

% Girls	51.90	49.10

Quintile breakdown		
Quintile 1	114 (9%)	706 (34%)
Quintile 2 and 3	756 (57%)	721 (35%)
Quintile 4 and 5	461 (35%)	628 (31%)
Rural/Urban breakdown		
% Rural	±16%	±48%
% Urban	±84%	±52%
Sampling		
KZN Districts	Umlazi	Umgungundlovu, Ilembe
NW Districts	2 areas in Dr Kenneth Kuanda: Matolosana and Tlokwe	Rustenberg, Madibeng
WC Districts	Metro East	Cape Winelands, Overberg
EC Districts	None	Mthatha. Libode
School selection	Registered public schools were selected within strata according to language and quintile with simple random sampling.	Combined or primary public schools were stratified by district and quintile group and ordered randomly. The first three or four schools in each randomly-ordered district-quintile stratum list were included in the sample.
Total number of schools	173	99
Learner selection	Age eligible learners were randomly sampled on the day of the actual school visit, stratified by gender.	Age eligible learners were randomly sampled on the day of the actual school visit, stratified by gender.

Exposure to early learning programme		
Pre Grade R	Unknown. Likely to be variable - including children who have some exposure and children with no exposure	Unknown. Likely to be variable - including children who have some exposure and children with no exposure. Data from the general household
		survey show that access to Early Learning Programmes has increased over the past four years. Children in the 2019 sample are therefore more likely to have had *some* exposure to an early learning programme than their counterparts in the 2016 sample.
Exposure to Grade R	None - children were assessed in Jan/Feb of their Grade R year	Children were assessed in April/May of their Grade R year, roughly midway through their second term.
What was measured [Tool]		
Quintile	Yes [school quintile ranking]	Yes [school quintile ranking]
Height for age	Yes [tape measure]	Yes [stadiometer]
Gross Motor Development	Yes [ELOM]	Yes [ELOM]
Fine Motor Coordination & Visual Motor Integration	Yes [ELOM]	Yes [ELOM]
Emergent Numeracy & Mathematics	Yes [ELOM]	Yes [ELOM]
Cognition & Executive Functioning	Yes [ELOM]	Yes [ELOM]

Emergent Literacy & Language	Yes [ELOM]	Yes [ELOM]
Social & Emotional Development & Awareness, Self Care	Not assessed	Yes [Teacher rating scale]

Comparability of scores

Both data sets must be interpreted within their data collection contexts. The 2016 results present the performance of children with no Grade R exposure, and so this is what they represent. In all cases where we interpret 2019 performance, we must interpret this as the performance of children after receiving approximately 1 to 1.5 terms of Grade R (although recent evidence[5] indicates that only children in Quintiles 4 and 5 schools are benefiting from their Grade R year).

In addition, the 2019 sample are likely to have experienced greater exposure to Pre-Grade-R interventions. We do not suggest directly comparing the results of the 2016 and 2019 samples without the use of appropriate statistical methods and procedures.

The questions raised through the 2016 and 2019 data collection exercises should inform the design and scope of the 2020 Index.

[5] DPME Van Den Berg et al. (2014). The impact of the introduction of Grade R on learning outcomes. RESEP, University of Stellenbosch. Available at: http://resep.sun.ac.za/index.php/new-report-on-the-impact-of-grade-r-on-learning

Questions to consider for 2020 and beyond

What sampling frame should be used?

Factors	Grade R	ECD programmes	Households
Coverage (Population)	Children in Grade R	Children in ECD programmes	All children
Accessibility (Sampling Frame)	Very good (complete list of schools with Grade Rs)	Bad (No complete list of ECD programmes)	In theory: good because we can use census figures In reality: bad because of refusal to participate by parents and difficulties finding children
Useful for obtaining a representative sample?	Yes	No	In theory: yes, in practice: no
Useful for identifying macro-level factors? (E.g. government policies, socio-economic environment, civil society)	Partially	Partially	Yes
Useful for identifying micro-level factors? (E.g. family background, community dynamics, personal life events)	Limited	Yes	Yes
Useful for measuring effectiveness of ECD programmes?	No because we do not know their ECD history	Yes	Depending on sample size; to some extent (would have to rely on parents' responses)

Useful for measuring role of family background?	No because we do not know their family background	No because we do not know their family background	Yes
Useful for measuring effectiveness of Grade R?	To some extent	Very limited (only in conjunction with feeder ECD sites for schools)	Depending on sample size

In theory, conducting the assessments at the household level would be the most desirable option because we would cover all children and could obtain the largest range of measurements via the parents (socio-economic and family background). In practice, however, it would arguably be impossible to obtain a representative sample using this method because of

1. the difficulties in successfully "listing" all eligible children in the sampled areas, and
2. the anticipated high refusal rate of parents.

Assessments at the ECD site level would allow for an evaluation of the effectiveness of ECD programmes. It is not a desirable approach though for obtaining a representative sample of children because -

1. many children do not participate in ECD programmes, and
2. there is no exhaustive and complete list of ECD programmes, and existing programmes are constantly in flux.

This leaves Grade R at the most reliable site for obtaining a representative sample of children in that age group. However, this sampling method has limitations in terms of what can be measured: it does not give us easy access to parents and caregivers who could answer questions about the children's socio-economic and family background, nor does it allow for an evaluation of the effectiveness of ECD programmes, unless one traces children back to their feeder ECD sites, which would be unfeasible on a scale required for a representative sample. It is also worth noting that Grade R sampling represents the most cost-effective option presented here.

In summary: if the goal is to obtain a representative sample of children in the targeted age group then doing it via schools (Grade Rs) is arguably the only feasible option. This, however, limits the scope of insights that could be gained by taking into account the impact of ECD programmes and family background. These, together with macro-level, regional and environmental factors, would probably be better covered by an approach at the household or ECD site level. If one applied, and possibly combined, these two approaches within a Sentinel framework in a spatially very defined setting where the trust of community members could be gained and maintained over time, one would be in a position to find explanatory answers ("Why?)" instead of merely descriptive ("What?") ones.

Sentinel vs Representativeness

A basic decision must be made between a Sentinel approach – focussing on a spatially defined but richly contextualised study setting – as opposed to a "representative" approach aimed at providing the clearest picture of the current status quo in terms of the development of young children in the country. Both approaches have advantages: a Sentinel approach would take into account, and possibly measure, the impact of social, economic, political and environmental change in a clearly defined setting. It would also allow us to go deeper into the role certain ECD programmes or the family backgrounds of children play. In short: they allow us to go deeper and unravel the reasons some children perform better in the assessments compared to others. This would be at the expense of representativeness though – because they are spatially confined, Sentinel approaches could only be described to be representative of the areas they are being implemented in – at best.

A representative approach would provide an opportunity to capture the actual status quo at a regional, provincial or national level. It is essentially the only option that would allow us to say, for example, that "x percent of children in South Africa are on track for age", and the only option to track these indicators over time. It also allows for comparisons, e.g. between provinces, and represents an easy-to-understand benchmark.

These two approaches are not mutually exclusive. For example, it would arguably be worthwhile to run a nationally representative round of assessments in the first year (and possibly every five years thereafter), to establish the status quo and have a reliable baseline to compare future iterations against, followed by more spatially defined Sentinel studies that explore some of the findings or the impact of specific ECD interventions in subsequent years.

How are other child indices structured?

In designing the SA Early Years Index, it is useful to consider other indices of this nature.

Index	Summary	Frequency	Sample	Data collection tool
Canada's Early Development Instrument (EDI)	Measures children's ability to meet age appropriate developmental expectations.	Canadian provinces collect as they see fit. Quebec: data collected every 5 years Ontario: data collected every 3 years In some provinces, data is collected over a 3-5 year period, but reported provincially at the 3 or 5 year interval.	All children enrolled in 5-6 year old kindergarten in a particular province. In 2017/2018, Quebec collected data on 83,335 children (a 95.8% response rate)	The EDI is a 103-item questionnaire completed by kindergarten teachers in the second half of the school year that measures children's ability to meet age-appropriate developmental expectations in five general domains
Australian Early Development Census (AEDC)	Measures the development of children in Australia in their first year of full-time school.	Data collected every 3 years	All children in their first year of full-time school. In 2018, n = 308,953 (a 96.4% participation rate)	Australian version of the Early Development Instrument (developed in Canada); a teacher completed questionnaire.

Multiple Indicator Cluster Surveys (MICS)	The MICS surveys calculate an overall Index Score as the percentage of children aged 36-59 months who are on track	Data collected every 3 - 5 years	Nationally representative sample of households. In the 68 countries participating in MICS6, average n = 11,000 per	Early Childhood Development Index; real-time observation and caregiver reporting
	in at least three of four developmental domains.		country	
Human Capital Index (HCI)	Measures the amount of human capital a child born today could expect to attain by age 18.	Data *compiled* annually (launched in 2018)	A cross-country benchmark that included 157 countries in 2018	Secondary data sourced from United Nations, Penn World Tables, World Bank, UNESCO and UNICEF databases

East Asia and Pacific Early Child Development Scales (EAP-ECDS)	A measurement tool to assess the holistic developmental progress of children from three to five years of age.	None. Ad hoc.	6 countries in the 2012-2014 implementation. Representative sample of 7,634 stratified by age, location and gender.	EAP-ECDS is a direct assessment tool. In addition, children's height, weight and body fat were measured to determine nutritional status. Parents were interviewed to gain information about participation in ECD programmes, health and hygiene practices and the nature of the learning environment at home.

What data should we collect?

The sampling strategy will to some extent define the type of data we can feasibly collect. The table below provides a high level summary of the data collected in 2016 and 2019 and offers some examples of other data we may want to collect which is likely to have a direct bearing on child outcomes. Most of these extra data points would require household level data collection.

Developmental domain	Measurement tools used to date	2016	2019	2020
Height for Age	Stadiometer	✔	✔	
Learning outcomes	ELOM			
Gross Motor Development		✔	✔	

Fine Motor Coordination & Visual Motor Integration		✔	✔	
Emergent Numeracy & Mathematics		✔	✔	
Cognition & Executive Functioning		✔	✔	
Emergent Literacy & Language		✔	✔	
Social & Emotional Development & Self Care	Teacher rating scale		✔	
Socio-Economic Status	School quintile as proxy for child SES	✔	✔	
Other data we might want to collect in 2020 which is likely to have a bearing on outcomes e.g.				
More accurate measure of household income				
Home Learning Environment				
Child's exposure to early learning programme				
Quality of early learning programme attended (if any)				
Child's exposure to toxic stress				