DATADRIVE 2030

DATA INSIGHTS

Reviewing the Socio-Economic Gradient in Learning Outcomes for Children who Participated in the Thrive by Five Index

By Junita Henry and Sonja Giese | **June 2023**[1]

1 This version uses Thrive by Five data corrected in March 2023. Further information is available here: https://thrivebyfive.co.za/wp-content/uploads/2023/05/Tx5-addendum-May-2023.pdf

INTRODUCTION

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 children enrolled in early learning programmes (ELPs) who are On Track for their age in key areas of development.

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.

Data on **learning outcomes** were collected using the Early Learning Measurement 4&5 Years tool (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, (ii) Fine Motor Coordination and Visual Motor Integration, (iii) Emergent Numeracy and Mathematics, (iv) Emergent Literacy and Language, and (v) Cognition and Executive Functioning.

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 and Emotional Readiness for School were assessed using the ELOM Social-Emotional rating scales, completed by the child's teacher.

In the absence of household level income data for children in the sample, school quintiles[2] were used as proxies for the probable **socio-economic background** of the children who were assessed. For the Index 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, this is often *not* the case.

For this and other reasons, the Index team acknowledged that the quintile system is an imperfect measure of socio-economic status, and that the socio-economic gradient reported in the Index is likely to be an under-estimate of the true disparities in child outcomes between children in different income groups.

Since the launch of the Index in April 2022, additional data have become available on the ELPs attended by the participating children. This new data enabled the DataDrive2030 team to replace quintile ranking with alternative and more accurate measures of socio-economic status.

The current document details the methodology and outcomes of the refined analysis of the socio-economic gradient reported in the Index.[3] This process has enabled us to more clearly characterise the nature and extent of the difference in outcomes between children from different socio-economic bands.

SAMPLE AND REFINED SOCIO-ECONOMIC LEVELS

The Thrive by Five Index contained a sample of 5,139 children. Data on the ELP that children attend were available for 4,926 of these children (96% of the originally analysed sample) distributed across 1,173 ELPs.

Refined socio-economic levels were determined using a k-means clustering approach using monthly fees (charged by ELPs) and whether the ELP receives a subsidy from the Department of Social Development (DSD). K-means clustering involves a simple unsupervised machine learning algorithm that classifies data into a number of clusters. Observations are partitioned into clusters that share similarities. The number of clusters (k) is determined beforehand. Variations of 3-6 clusters were used. Fee levels did not vary substantially when sense-checked against a model that incorporated access to services (such as water and electricity)[4] or fees only.

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2 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 3 kms of the school, with Quintile 1 (Q1) being the poorest and Quintile 5 (Q5) the wealthiest.

3 The full report can be found here and includes a comparison of the Department of Basic Education quintiles.

4 This model was based on N=4,482 observations and had a grouping of R0-R130; R140-R320; R340-R785; R800-R1,750; R1,888-R3,600.

Table 1 displays the average characteristics of ELPs using the refined socio-economic levels. Level 1 (L1) shows the ELPs with the lowest fee level while level 5 (L5) presents those in the highest fee level. As expected, receipt of a DSD subsidy decreases while access to services increases as the ELP fee increases. The differences in service and subsidy access by fee level are much starker than by quintile, pointing to a gradient more in line with what one would expect. A disadvantage of the updated socio-economic status (SES) levels however, is that the sample size of children in the highest level is substantially lower – decreasing from 507 children in what was classified as Quintile 5 ELPs to 149 children in ELPs charging more than R1,751 per month.

TABLE 1: DESCRIPTIVE CHARACTERISTICS ACROSS ELP FEE LEVEL

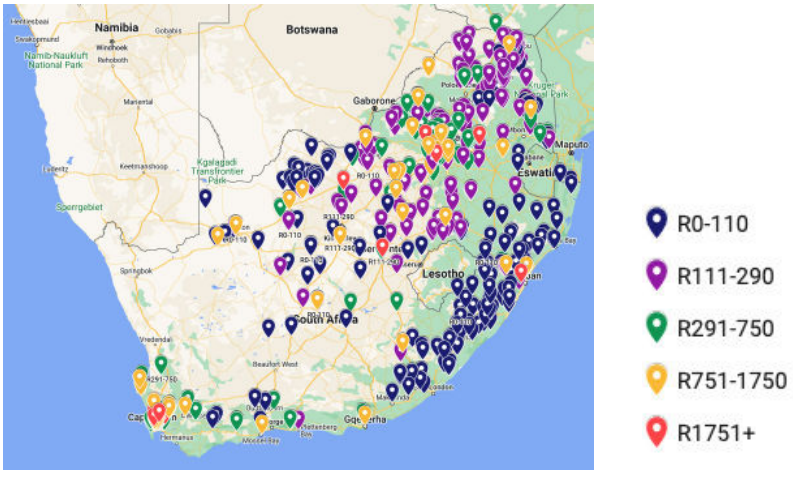
Fee level	Average monthly fees	Percent receiving subsidy	Has running water	Uses electricity for lighting	Access to a flush toilet	N Facilities	N children
L1: R0-R110	R54	83%	56%	79%	35%	398	1662
L2: R111-R290	R185	72%	83%	85%	61%	437	1836
L3: R291-R750	R404	35%	96%	95%	88%	238	984
L4: R751-R1750	R1093	7%	97%	99%	100%	72	295
L5: R1751+	R2623	0%	100%	97%	100%	32	149
Overall	**R313.62**	**62%**	**78%**	**86%**	**61%**	**1177**	**4926**

GEOGRAPHICAL SPREAD OF ELPS ACROSS THESE FEE LEVELS

Figure 1 shows the geographical spread of ELPs across the fee levels. Lower fee-charging schools are concentrated in the Eastern Cape and KwaZulu-Natal, as both provinces have very high proportions of young children living in poverty (82% and 73% respectively).[5] There is more variation in ELP fee levels in the other provinces and, on average, fees in the Western Cape are slightly higher.
A limitation of this comparison however is that it does not account for the differences in the cost of living across provinces.

Replacing quintile ranking with these five fee levels as a measure of SES, we re-examined the relationship between poverty and child outcomes, including total ELOM score, scores for each of the learning domains, socio-emotional functioning, and physical growth. All observations were weighted.

FIGURE 1: GEOGRAPHICAL DISTRIBUTION OF ELPS BY FEE LEVEL



5 General Household Survey 2021 Children's Institute Analysis

TOTAL ELOM 4&5 SCORE

In comparison to quintile groupings, the disparities between children On Track versus Not on Track across fee groupings are far greater. Using the quintile system, 59% of children in Q5 were found to be On Track, compared to 39% in Q1. Using the updated ELP fee levels (Figure 3) we find that 83% of children in L5 are On Track (depicted by the green line), compared to only a third (34%) of learners in L1 which is the poorest level. The vertical grey bars represent confidence intervals at a 5% level of significance.

FIGURE 2: TOTAL LEARNING SCORES – ON TRACK / NOT ON TRACK BY ELP FEE LEVEL

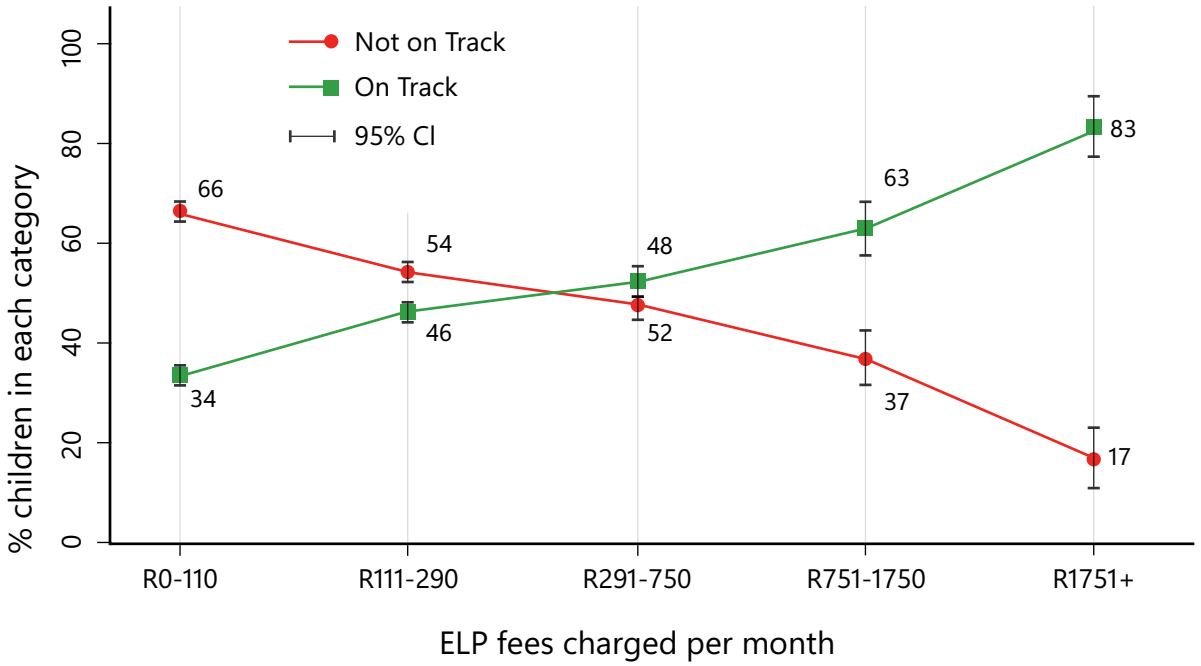
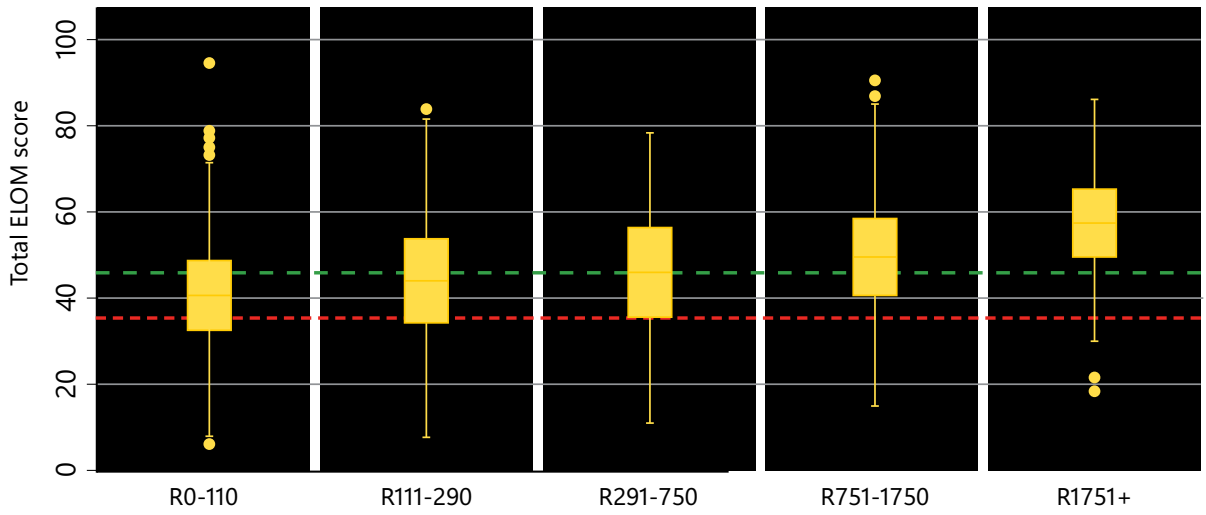


Figure 3 displays the distribution of total ELOM score across SES. The maximum total ELOM score is 100 points.[6] The boxes contain the middle 50 percent of scores (interquartile range). The whiskers (outer lines) provide a sense of the total variation in scores. The red dashed line indicates the cut off between those Falling Far Behind (below the line) and those Falling Behind (above the line). The green line indicates the cut off between those that are Falling Behind (below the line) and those On Track (above the line). For the first ELP fee level (R0-R110), the median score was 40 ELOM points and 50 percent of child scores were between 32 and 50 points. Most of these observations are below the green line. At the highest ELP fee level, the median score was 61 ELOM points and 50 percent of scores were between 52 and 69 points – this is much higher than L1. Level 1 also has the most outlier children relative to the rest of their distribution, making the case that there are poor children who are excelling and scoring on par with L5 children despite their lower fee level.

6 The ELOM tool consists of 5 domains, each with a maximum total of 20 points.

FIGURE 3: DISTRIBUTION OF ELOM SCORES BY ELP FEE LEVEL (INDEX DATA)



Notes: The red dashed line indicates the cut off between those Falling Far Behind and those Falling Behind. The green dashed line indicates the cut off between those that are Falling Behind and those On Track.

SOCIO-ECONOMIC GRADIENT FOR ELOM 4&5 DOMAIN SCORES

The table below explains the significance of each development domain.

TABLE 2: SIGNIFICANCE OF THE DEVELOPMENTAL DOMAINS

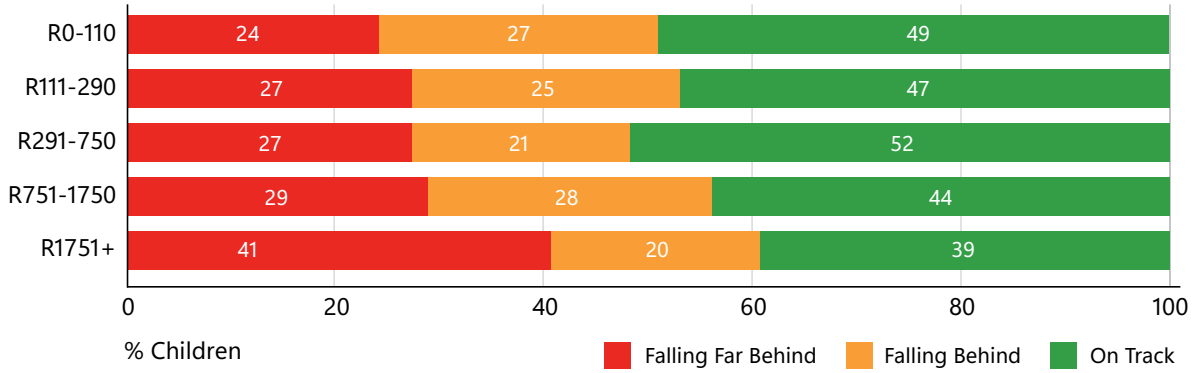
Developmental Domain	Significance
Gross Motor Development	Facilitates peer engagement through participation in games, and is associated with emotional well-being as well as with academic achievement.
Fine Motor Skills and Visual-Motor Integration	Important for coordinating the use of the hands and the eyes; and makes a specific contribution to early mathematics and early literacy.
Emergent Numeracy and Mathematics	Strongly predictive of later school success. Good math foundations are essential for a deeper understanding of more complex mathematical concepts and problem-solving.
Cognition and Executive Functioning	Helps children hold information or instructions in mind during classroom activities, focus on task-relevant stimuli during problem-solving tasks, and resist distraction.
Emergent Literacy and Language	Affects the ability to understand what is being said and read by a teacher, as well as to communicate effectively through speech and writing.

The following figures display disparities in child outcomes by ELP fee levels for each ELOM domain. The green bars indicate the percentage of children who are On Track for their development, the orange bars indicate the percentage of children who are Falling Behind and the red bars represent the percentage of children who are Falling Far Behind. The cut-off for each category is outlined in the ELOM technical manual[7] for children aged 50-59 months.

DOMAIN 1: GROSS MOTOR DEVELOPMENT (GMD)

This is the only domain in which we see a greater proportion of children in the higher ELP fee level performing poorly, relative to children in the lower fee bands. For example, half (49%) of the children in L1 are on track compared to 39% of children in L5.

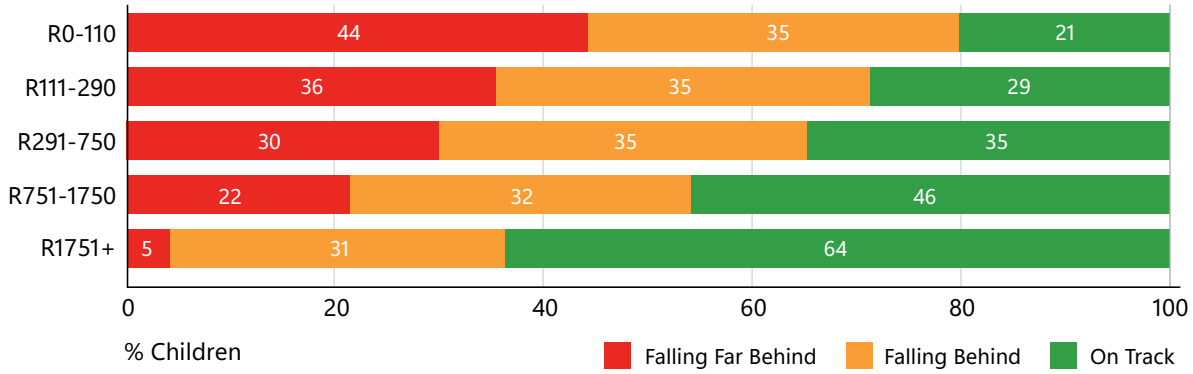
FIGURE 4: DISTRIBUTION OF GROSS MOTOR DEVELOPMENT OUTCOMES BY ELP FEE LEVEL



DOMAIN 2: FINE MOTOR COORDINATION AND VISUAL MOTOR INTEGRATION (FMC-VMI)

For FMC-VMI, there is a stark gradient in child outcomes by socio-economic status. Only one fifth of children (21%) in L1 are On Track in their development in comparison to 64% in the highest L5.

FIGURE 5: DISTRIBUTION OF FINE MOTOR COORDINATION & VISUAL MOTOR INTEGRATION OUTCOMES BY ELP FEE LEVEL

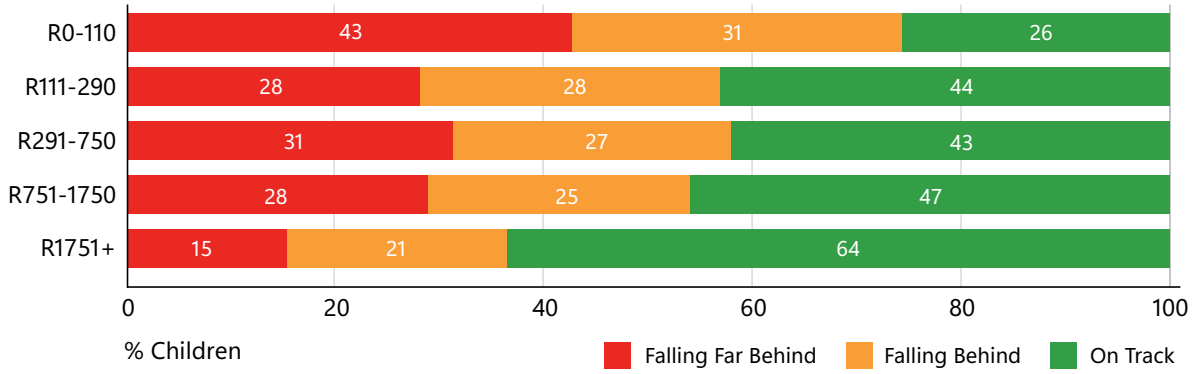


7 The full ELOM 4&5 tool technical manual can be found here: https://datadrive2030.co.za/wp-content/uploads/2022/09/ELOM-Technical-Manual_2020-1.pdf

DOMAIN 3: EMERGENT NUMERACY AND MATHEMATICS (ENM)

For ENM, learners in the highest ELP fee level outperform other levels by 20% on average, but there is little variability in the performance of children in the middle three fee levels. Once again, in this domain children attending ELPs charging less than R110 per month are most likely to be Falling Behind/Falling Far Behind the expected standard.

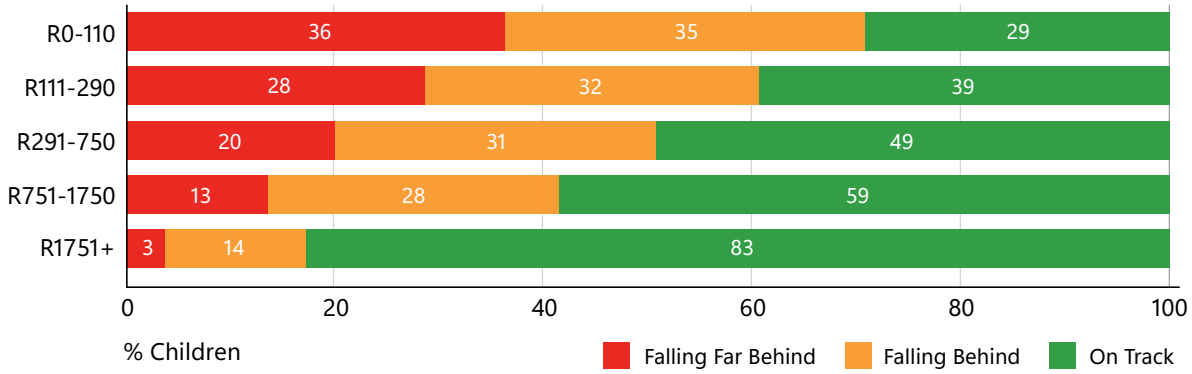
FIGURE 6: EMERGENT NUMERACY AND MATHEMATICS OUTCOMES BY ELP FEE LEVEL



DOMAIN 4: COGNITION AND EXECUTIVE FUNCTIONING (CEF)

The largest differences across fee bands relate to the CEF domain. Less than a third of children in L1 are On Track, and 36% are Falling Far Behind. In comparison, only 3% of children in the highest level are falling far behind and the vast majority (83%) are On Track.

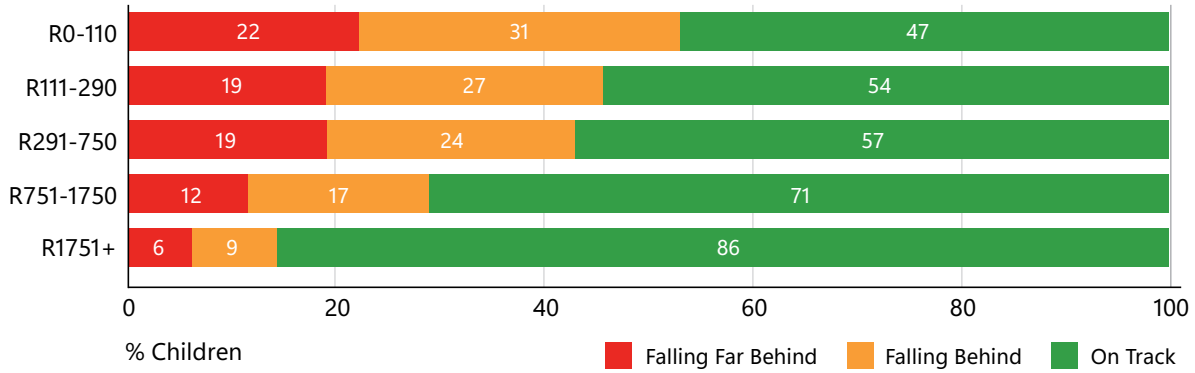
FIGURE 7: DISTRIBUTION OF COGNITION AND EXECUTIVE FUNCTIONING OUTCOMES BY ELP FEE LEVEL



DOMAIN 5: EMERGENT LITERACY AND LANGUAGE (ELL)

Finally, differences in outcomes by ELP fee levels remain pronounced for literacy and language skills where the vast majority of children are On Track (86%) in L5 in comparison to less than half (47%) of children in L1.

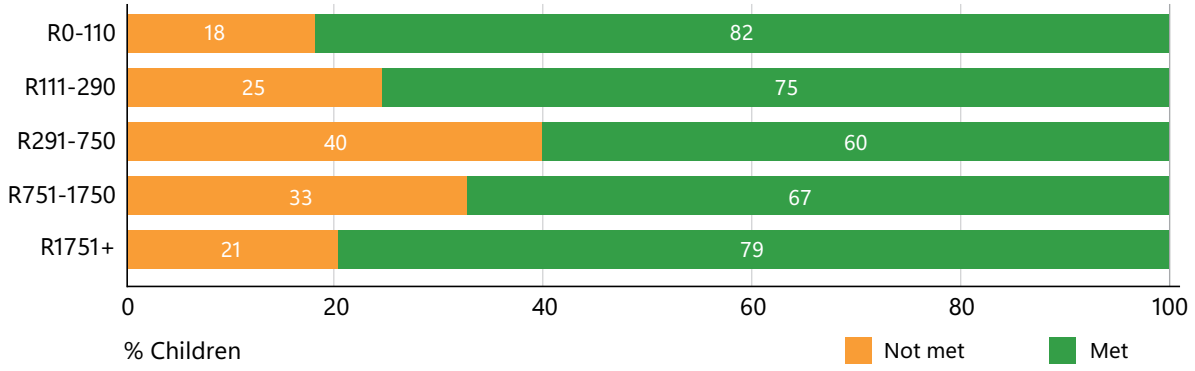
FIGURE 8: DISTRIBUTION OF EMERGENT LITERACY AND LANGUAGE OUTCOMES BY ELP FEE LEVEL



SOCIAL-EMOTIONAL FUNCTIONING: SOCIAL RELATIONS WITH PEERS AND ADULTS

The relationship between social relations and fee levels is less clear. However, children in the lowest ELP fee level are more likely to meet the required standards (82%). Children in mid-fee levels are the least likely to meet standards (60% of children in the R291-750 fee group). This increases to 79% in the highest fee group.

FIGURE 9: DISTRIBUTION OF SOCIAL RELATIONS OUTCOMES BY ELP FEE LEVEL

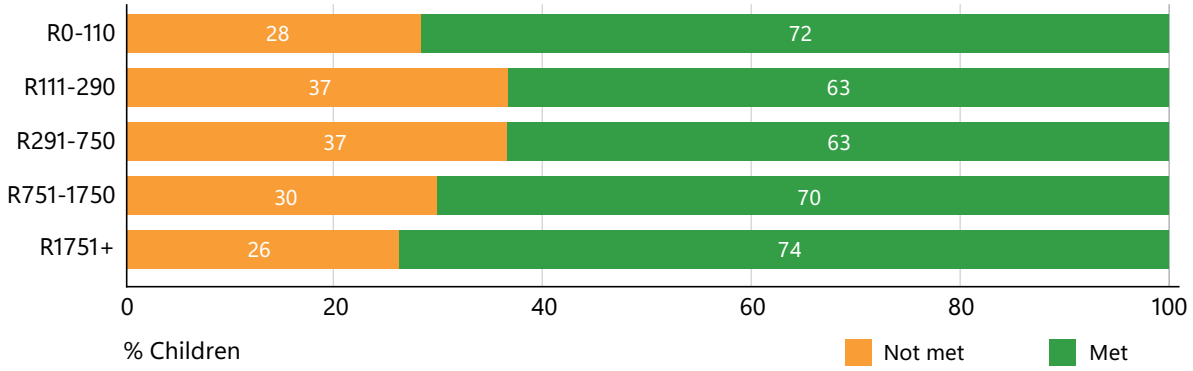


8 Height-for-age scores were calculated using age in months

SOCIAL-EMOTIONAL FUNCTIONING: EMOTIONAL READINESS FOR SCHOOL

Similarly to social relations, children in the highest and lowest fee level (74% and 72% respectively) are more likely to meet emotional readiness standards than children in the mid-fee levels, which represents roughly two thirds of children.

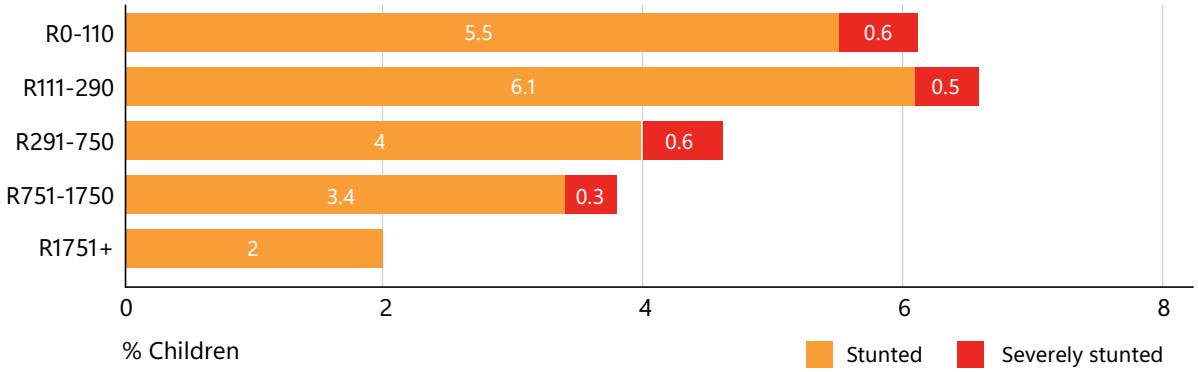
FIGURE 10: DISTRIBUTION OF EMOTIONAL READINESS OUTCOMES BY ELP FEE LEVEL



PHYSICAL GROWTH: STUNTING

Around 6 percent of children in the first two fee levels are moderately stunted, and 0.5% severely stunted. These rates decrease to 2% in the highest group for moderate stunting and 0% for severe stunting. Children are defined as 'moderately stunted' if their height-for-age[8] is more than two Standard Deviations (2SDs) below the World Health Organization Child Growth Standards median and 'severely stunted' if more than 3 SDs below.

FIGURE 11: DISTRIBUTION OF STUNTING PREVALENCE BY ELP FEE LEVEL



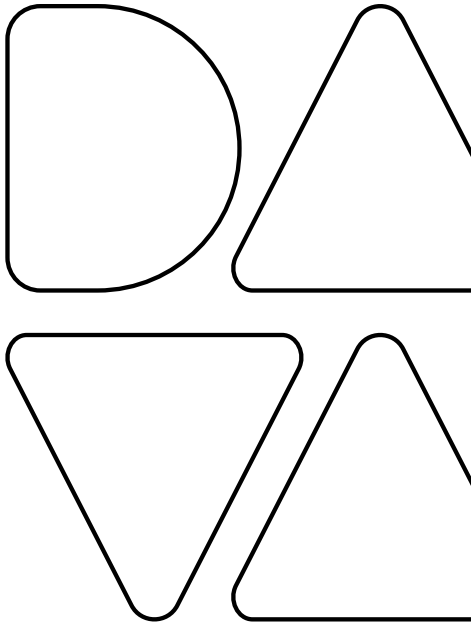
LIMITATIONS

It is possible that children excluded from this analysis due to absence of fee data may be statistically different from those included. Their descriptive characteristics point to them being children from lower socioeconomic backgrounds. Since their average scores are lower, it is possible that the outcome gap between higher and lower socioeconomic bands estimates may be biased slightly downward and outcomes may be even more disparate with their inclusion. At the same time, the Thrive by Five Index sample has a higher proportion of lower SES children in comparison to the ELP-enrolled child population based on the national ECD census. That is assuming that the census captures all ELPs and that there is no inherent bias in the providers that may have been missed. Additionally, these results do not account for the variation in the cost of living across provinces. Finally, it may be worth noting again that these results are reflective only of children enrolled in ELPs.

CONCLUSION

Using monthly fee levels at the ELP as a proxy for socioeconomic status displays the clear disparities in child outcomes across income groups. These differences are much starker than the differences observed when using the DBE school quintile system as a proxy for preschool child poverty. Moving forward, we recommend that ELOM direct child assessments be accompanied by efforts to collect information on the fee levels of the associated ELPs. These data will enrich the growing meta dataset and enable us to monitor progress in closing the opportunity gaps between children from different socio-economic backgrounds at the point of entry into school.

Finally, the presence of outliers within lower fee levels makes the case that there are children who are doing exceptionally well and perform similarly to their peers in higher level groups. Understanding the characteristics associated with positive outliers in lower socioeconomic bands may offer insights into the kinds of interventions that could drive improved child outcomes within these contexts.



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