ARTICLE

# ECD INDICATORS AND NUTRITIONAL STATUS OF GRADE R CHILDREN: AN INTEREST TO SOCIAL WORKERS

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## ABSTRACT

Provision of early childhood development (ECD) stimulation and adequate nutrition should be a priority for social workers who monitor ECD programmes. The objective of this study was to assess and describe ECD indicators in the context of the nutritional status of preschool children in an underprivileged community of the Nelson Mandela Bay Municipality in the Eastern Cape, South Africa. A descriptive, cross-sectional study design was selected using a quantitative approach. The study population consisted of children older than 60 months, and in Grade R classes. Descriptive and inferential statistics were used to determine associations between the nutritional status and ECD indicators. Children in the sample (n = 105) had a mean height-for-age z-score (HAZ) of −0.68 (SD = 0.91), with 11 children of the sample classified as stunted or short for their age. The assessments of the ECD indicators revealed that 30 per cent of the participants' ability levels in the domains of social-emotional development, physical-motor development and cognitive development did not meet age-appropriate requirements. Stunted children performed worse across all domains,

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particularly in terms of physical-motor development being significantly ($p < 0.05$) poorer than children with normal height for their age.

**Keywords:** early childhood development; ECD programmes; ECD policy; school social work; ECD centre; stimulation

# INTRODUCTION

Early childhood development (ECD) is prioritised in the National Development Plan (NDP) 2030 (Albino and Berry 2013). Significantly, the National Integrated Early Childhood Development Policy (Republic of South Africa and UNICEF 2015) conceptualises ECD as the period from conception until the year before children enter formal schooling, known as Grade R, or, in the case of children with developmental difficulties, until the year before they turn seven (Republic of South Africa and UNICEF 2015). Social workers are responsible for the registering, monitoring and evaluation of ECD programmes to ensure that children in South Africa receive quality early childhood intervention and stimulation. Children who have exposure to sufficient stimulation and access to good nutrition in the early years are less likely to suffer from illness, struggle to adapt to the school environment, repeat grades, drop out of school, or need remedial and special attention (Republic of South Africa 2001, 2).

ECD encompasses progress in multiple facets of growth, such as cognitive, social-emotional, physical motor, visual perception, and physiological advancements (Cohen et al. 2005, 1; Richter et al. 2017). As childhood development normally follows a sequence, developmental delays that affect psychomotor development during early childhood can have an impact on children's cognitive and social-emotional abilities as they grow older (Draper et al. 2012; Sherry and Draper 2013).

The Department of Social Development pioneered the monitoring of ECD programmes and services to ensure that minimum norms and standards are upheld (Republic of South Africa and UNICEF 2015, 114). Chapter 6 of the Children's Act (Republic of South Africa 2005) highlights the role of ECD programmes in South Africa and the importance of their expansion. Social workers working in this field are thus mandated to provide holistic interventions to children and caregivers and to empower clients as part of an ecological approach ensuring that the ECD centre environments are delivering quality ECD programmes (Albino and Berry 2013). Expanding the scope of ECD intervention in South Africa is also mandated in the National Integrated Early Childhood Development Policy (Republic of South Africa and UNICEF 2015) and supported by the United Nations Children's Fund (UNICEF 2011, 2) and Ebrahim (2014, 9).

Preschool children raised in low socio-economic status (SES) communities have shown to be more affected by limited access to adequate nutrition, health services and also cognitively stimulating material than children from affluent communities (Bradley

and Corwyn 2002, 381; Pienaar, Barhorst and Twisk 2014). Schoolchildren in these disadvantaged communities may also experience a lack of stimulation and sub-optimal nutrition which may cause further developmental delays, hindering their optimal development (Casale, Desmond, and Richter 2014; Newman, Leventhal, and Gennetian 2010).

Under-nutrition during childhood can eventually lead to stunting, wasting and an increased risk of developing severe acute malnutrition (Martínez and Fernández 2008) which may all cause developmental delays in children. ECD stimulation and adequate nutrition are therefore both essential predictors of successful child development and a priority for social workers who monitor ECD programmes.

Despite available data on challenges regarding infrastructure for ECD, training of ECD practitioners and ECD centres' access to food (Atmore 2012, 2), there is limited information about linkages between nutritional status and ECD development, especially in the Eastern Cape. Baseline data can be used to make informed decisions on possible nutrition and ECD interventions and, together with longitudinal data, may provide an indication of the efficacy of such programmes. Therefore, the study objective was to describe ECD indicators in the context of nutritional status in Grade R children in an underprivileged community in the Nelson Mandela Bay Municipality.

# METHODS

## Study Design and Population

A descriptive, cross-sectional study design was selected using a quantitative approach. The study population consisted of children older than 60 months, and in Grade R classes from schools in three underprivileged communities in the Nelson Mandela Bay Municipality. All the children in the sample (n = 105) were of the same ethnic group (black). Baseline data from a convenience sample of children from 16 schools in Zwide, New Brighton and Kwazakhele are included in this analysis.

## Sampling and Procedures

Permission to access the sample population of children was gained through the Department of Education, and principals and practitioners of the schools selected for participation. Parents of all the children in the classes of the ECD practitioners received a letter explaining the research study and inviting them to provide informed, written consent to the participation of their children in the study. Convenience sampling took place, since all children that had submitted informed consent letters on the day of data collection were included in the sample. Ethics approval (Ref.: H15-HEA-DIET-003) was obtained from the Research Ethics Committee (Human) of the Nelson Mandela University. The researchers were guided by fundamental ethical principles of social

science research throughout the research process (Brink, Van der Walt, and Van Rensburg 2012, 32–38; De Vos et al. 2011, 42).

Data collection took place during May to September 2015. The study was piloted before data collection to test the procedures, determine the time needed to conduct the anthropometry, finalise the data collection forms and improve reliability. Fieldworkers for both the ECD assessment and the anthropometric screening were trained before the pilot study. Two teams of assessors collected the anthropometric measurements within three days. To minimise observation errors, fieldworkers specialised in specific measurements and, in each of the two teams, collected the same measurements on all of the participants. Apart from the anthropometric measurements, the early inspiration ECD assessment tool (Stretch 2014) developed to measure children's ability levels in the five developmental domains, namely cognitive development, physical-motor development, language and speech development, social-emotional development, and play development, was also used in this study. The ECD indicators assessment tool used was designed specifically for South African children based on the National Early Learning and Development Standard for Children Birth to Four Years (NELDS) document (UNICEF 2011) and validated in a previous South African-based study (Ebrahim 2014). Within each developmental domain, certain tasks were completed to showcase that the age-appropriate skill was utilised to categorise individual developmental indicators. The scoring of each task was done according to the ability to accomplish the task, and provides a clear indicator of the children's developmental milestones (see Table 1). The scoring of ECD indicators was done blindly and the assessors had no indications of which of the children were stunted or not.

**Table 1:** ECD indicators' assessment scale

| Standards of achievement (based on NELDS document) | Description of competence | Percentage |
|---|---|---|
| Not achieved 0 | Not achieved, unable to perform tasks | 0–29 |
| Elementary achievement 1 | Task attempted, below average competence, room for improvement | 30–39 |
| Moderate achievement 2 | Fair achievement, but does not meet age-appropriate standard of competency | 40–49 |
| Adequate achievement 3 | Average achievement of tasks, able to fulfil instructions and tasks at an age-appropriate level | 50–59 |
| Substantial achievement 4 | Good effort, able to achieve and complete tasks well | 60–69 |
| Meritorious achievement 5 | Very good effort, increased level of confidence and ability to complete the tasks | 70–79 |
| Outstanding achievement 6 | Excellent effort, outcome noted, concrete understanding of instructions and tasks. Tasks are completed at an outstanding level | 80–100 |

The nutritional status of each of the children was established using anthropometric measurements. Anthropometric measurements were taken by trained fieldworkers who recorded measurements of the child's weight and height, the visit date, the date of birth (verified from the Road to Health booklet (Department of Health) and school records), and gender. The height of each child was measured in centimetres to the nearest millimetre using a Seca (Model 217) stadiometer. The weight of each child was measured in kilograms to one decimal point with a calibrated Seca electronic scale (Model 874). All measurements were taken according to standardised procedures (CDC 2009). Children were measured without shoes, socks, jerseys or jackets. Data were captured on a Microsoft Excel spreadsheet. The age was subsequently calculated in days and divided by 30.4375 in order to determine the age in months, which is comparable to the World Health Organization (WHO) reference for children older than 60 months.

Weight-for-age z-scores, height-for-age z-scores and BMI-for-age z-scores were generated using the National Center for Health Statistics/WHO reference with the WHO AnthroPlus program (version 1.0.4). Stunting was classified in all children with a height-for-age z-score $< -2$ standard deviations (SD) of the WHO reference.

## Statistical Analysis

Statistical analysis of data was done using a Statistica software package (version 12). Categorical and numerical data were described using frequencies and percentages, and means and standard deviations respectively. Bivariate analysis was done to determine associations between the nutritional status and ECD indicators. A comparison of means was done using Student's t-tests ($p < 0.05$).

## Results

### Demographic Information

The mean age of the participants (n = 105) was 67.44 (SD = 4.44) months, with 59 per cent (n = 62) being male.

### Early Childhood Development Indicators

ECD indicators were available for 105 children in all of the domains, except for physical development, where only 103 measurements were available, owing to two children requesting to not complete the ECD assessment. Within the sample, less than 10 per cent did not achieve the necessary milestones, or were categorised as elementary achievers in the physical development (n = 6), language development (n = 8), and play development (n = 7) categories (see Table 2). However, 15 per cent of the sample did not achieve or only achieved elementary scores in relation to the social-emotional development (n = 16) and cognitive development (n = 14) categories. This result highlights that the "at-risk"

portion of the sample struggles specifically with the social-emotional (such as naming emotions, recognising feelings) and cognitive domains (such as basic counting, naming colours) which are two significant domains for academic school achievement and life-coping skills. An effective ECD programme should promote integrated activities which stimulate development of all domains; however, these results present a different reality. Most children achieved the highest scores in language and play development (Figure 1). These domains tend to be the stronger domains, because children naturally tend to play and speak, even if not encouraged by a caregiver or an ECD practitioner. No significant differences could be demonstrated between the two gender groups for any of the ECD domains.

**Table 2:** Early childhood development in Grade R children

| **Outcome measures Achievement %** | **Physical development N = 103** | | **Language development N = 105** | | **Social-emotional development N = 105** | | **Cognitive development N = 105** | | **Play development N = 105** | | **Overall development N = 105** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Categories | n | % | n | % | n | % | n | % | n | % | n | % |
| Not achieved (0–29) | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| Elementary (30–39) | 6 | 6 | 8 | 8 | 16 | 15 | 14 | 13 | 7 | 7 | 6 | 6 |
| Moderate (40–49) | 12 | 12 | 15 | 14 | 11 | 10 | 13 | 12 | 1 | 1 | 17 | 16 |
| Adequate (50–59) | 19 | 18 | 12 | 11 | 17 | 16 | 15 | 14 | 17 | 16 | 14 | 13 |
| Substantial (60–69) | 34 | 33 | 11 | 10 | 11 | 10 | 11 | 10 | 9 | 9 | 15 | 14 |
| Meritorious (70–79) | 25 | 24 | 8 | 8 | 15 | 14 | 12 | 11 | 22 | 21 | 15 | 14 |
| Outstanding (80–100) | 7 | 7 | 51 | 49 | 35 | 33 | 38 | 36 | 49 | 47 | 38 | 36 |

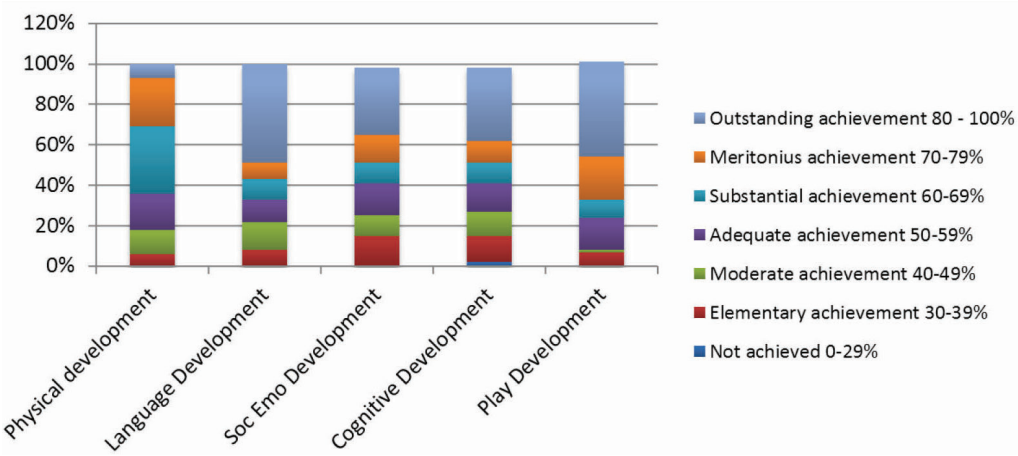


**Figure 1:** Outcome measures per domain (n = 103)

## Nutritional Status

Children within the sample had a mean height for age of −0.68 (SD = 0.91) and a mean weight for age of 0.04 (SD = 1.03).

## Associations between ECD and Stunting

Stunted children of the sample (n = 11) scored a mean physical development score of 4.05 (out of six), versus their counterparts of normal height for age (n = 92) with a mean score of 4.73 (out of six). This represents a significant difference (p = 0.041) and the Cohen's d (0.66) indicated that the outcome was of medium practical importance. Although small differences across all the domains were demonstrated with normal-height children achieving higher scores compared with stunted children, no statistically significant differences were demonstrated (see Table 3).

**Table 3:** Early child development by stunting

| Variable | Height-for-age category | n | Mean | S.D | Difference | t | df | p | Cohen's d |
|---|---|---|---|---|---|---|---|---|---|
| Physical development | Stunted<br>Not stunted | 11<br>92 | 4,05<br>4,73 | 0,96<br>1,04 | −0,68 | –2,07 | 101 | ,041 | 0,66<br>Medium |
| Language development | Stunted<br>Not stunted | 11<br>94 | 4,62<br>5,37 | 1,83<br>1,51 | −0,75 | –1,53 | 103 | ,129 | 0,49<br>Small |
| Socio-emotional development | Stunted<br>Not stunted | 11<br>94 | 4,42<br>4,89 | 1,82<br>1,63 | −0,47 | –0,88 | 103 | ,379 | 0,28<br>Small |

| Variable | Height-for-age category | n | Mean | S.D | Difference | t | df | p | Cohen's d |
|---|---|---|---|---|---|---|---|---|---|
| Cognitive development | Stunted<br>Not stunted | 11<br>94 | 4,26<br>4,97 | 1,87<br>1,66 | −0,71 | –1,33 | 103 | ,185 | 0,42<br>Small |
| Play development | Stunted<br>Not stunted | 11<br>94 | 5,06<br>5,74 | 1,97<br>1,34 | −0,68 | –1,51 | 103 | ,134 | 0,48<br>Small |
| Overall development | Stunted<br>Not stunted | 11<br>94 | 4,48<br>5,15 | 1,63<br>1,37 | −0,67 | –1,49 | 103 | ,138 | 0,48<br>Small |

A significant association was also demonstrated between children being stunted and children scoring in the bottom 50 per cent for play development ($Chi2 = 1.50$, $df = 1$, $p < .0005$, $V = 0.37$). This tendency of stunted children being more likely to score in the lower half of developmental domains, was present across all of the domains.

## Limitations

The use of a convenience sample from only 16 schools in one area was used, which limited the scope of the data collection. A cross-sectional research design may be limiting, since weight and height growth in children does not necessarily occur simultaneously. No information was collected about the activity patterns of the sampled children. Previous teaching methods and stimulation at home were not recorded. The biggest limitation to the study was the small sample size, especially during the bivariate analysis performing the comparison of means. It should, however, be acknowledged that the results do suggest that further research with larger sample sizes is warranted.

## Discussion

The scope for social workers in the ECD field warrants adequate understanding of child development and growth. The process of monitoring ECD programmes should be more than only a checklist process for social workers who monitor the ECD programme registration, and should entail a purposeful quality assurance system where centres are empowered to meet children's optimal developmental needs (Republic of South Africa and UNICEF 2015). The recent emphasis being placed on ECD intervention in South Africa should underpin the implementation of ECD programmes and centres across the country to offer adequate stimulation as well as nutrition support to ECD practitioners and caregivers. Results from previous studies indicated that appropriate nutrition, cognitive stimulation, care and healthcare services during the ECD period will increase primary school enrolment, enhance performance at school, decrease repetition of school

grades, and lower drop-out rates. This will in turn reduce the costs of remedial education and improve productivity, both economically and socially (Atmore 2012, 1).

In 2012, children aged 2–14 years in the Eastern Cape had a stunting prevalence of 21.6 per cent in boys and 15.6 per cent in girls (Shisana et al. 2013, 18). However, in this sample, only 10 per cent of the children were stunted, portraying a better nutritional status than previous provincial results. As children in rural areas were reported to be more stunted (Shisana et al. 2013), and the provincial statistics were ascertained with children in urban and rural areas, studies in urban areas will deliver improved results. ECD centres in both urban and rural settings are mandated to register their programmes with the Department of Social Development. Therefore, social workers have an opportunity to empower these centres to understand the importance of a stimulating ECD daily programme and adequate nutrition support for the children attending the centre.

Of the five domains, children in the sample achieved the highest scores in the play and language developmental domains. Physical-motor, cognitive and social-emotional development were lower than play and language development. As stunted children achieved significantly lower mean scores in physical-motor development compared with children of normal height, the developmental delays may be associated with a poorer nutritional status, most likely due to food insecurity. A large proportion of children, regardless of nutritional status, were clustered around the adequate achievement range (50–59%) for physical-motor development, which, although it is considered average, does not indicate full age-appropriate development. While assessing the physical-motor domain indicators, it was evident that fine motor development was the most compromised with handling of a pair of scissors to cut along a line and handling crayons with the correct grip the most affected. Socio-emotional development also emerged with low outcome indicators. Grade R is the year for mastering the skills required for school entrance the following year. Average scores indicate that the overall skills necessary for school admission are not at their optimum for a Grade R cohort.

Apart from the negative impact on the nutritional status of children, living in a poor socio-economic environment can cause cognitive, social and emotional developmental delays (Bradley and Corwyn 2002, 377; Pienaar, Barhorst and Twisk 2014). To deal with these developmental delays, household stimulation of the child using developmentally appropriate tasks is recommended. Specific age-appropriate activities, such as playing with blocks, puzzles or educational reading, could further stimulate these domains (Fleisch 2008, 35). Underprivileged practitioners and parents should be made aware of how to adapt low-cost household materials to create stimulation resources. Social workers could recommend that practitioners use ECD toy kits and recyclable waste materials in the making of toys (Biersteker 2007, 38; Black et al. 2017). Given the huge number of children below six years of age in South Africa, ECD and nutrition interventions may provide a huge opportunity to potentially change the current poor outcomes experienced in the early learning system. Social workers are key role players in the ECD early learning system (Republic of South Africa and UNICEF 2015). Social

workers who monitor ECD programmes have an opportunity during site visits and year programme reviews to recommend stimulation activities and intervention for children scoring below their developmental milestones.

Below-average developmental scores may contribute to further poor academic performance in the future grades, which, in turn, may result in poor class performance, and could result in the need for remedial help. This is concerning, as ECD is a specific predicting variable which is used to assess readiness to attend Grade R at pre-primary school level. A sub-par development could therefore delay a child's admission to Grade R and his or her progression to further schooling grades. If cognitive development can be supported by the prevention of stunting, then it is recommended that dietary diversity, and not only food access, should be monitored in all ECD centres. Prevention of or a reduction in stunting has been highlighted as one of the most effective ECD interventions (Engle et al. 2007; Pienaar, Barhorst and Twisk 2014.) As it is difficult to reverse stunting (UNICEF 2011; WHO 2013), more effort should be made to prevent the deterioration of nutritional status which results in stunting in the early years of life. Registered ECD programmes are required to present a planned menu and child feeding procedure which should be cognisant of the need for adequate nutrition during the early years in order to prevent possible instances of malnutrition (Berry, Jamieson and James 2011; Republic of South Africa and UNICEF 2015).

Education and resources need to be developed to assist parents and practitioners with appropriate nutrition knowledge and effective stimulation exercises for their preschool children. In South Africa, the government initiative of the National School Nutrition Programme aims to provide underprivileged children in primary and secondary schools with one nutritious meal every school day. The objectives of the scheme are to improve the children's ability to learn, to educate children and parents about a healthy lifestyle, and also to promote the use of community projects, such as school and home vegetable gardens (UNICEF and Department of Education 2008). Community development projects facilitated by social service organisations should also be implemented in conjunction with nutrition education to ensure a systemic approach to deal with challenges in underprivileged communities (August et al. 2016; Black et al. 2017; McGilloway et al. 2012, 117; Ricca et al. 2014).

ECD centres should be seen as supportive mechanisms for parents and caregivers of children aged zero to six years. Teaching strategies and domain specific lessons to target weaker domains of cognitive, physical-motor and social-emotional development, as well as child nutrition education, must be promoted and implemented in ECD centres. Interdepartmental collaboration between the Departments of Education, Health, and Social Development should be prioritised. The National Integrated Early Childhood Development Policy (Republic of South Africa and UNICEF 2015) is a strengthening tool which can be used to encourage departmental collaboration. Ebrahim (2014, 9) and Black et al. (2017) endorse such collaborative actions, thus emphasising the importance of South African-based research and collaborative efforts informing the policy, practice

and further research into ECD. Social workers and ECD practitioners should continue to advocate for the effective implementation of policy guidelines related to ECD intervention, specifically concerning the national school feeding schemes. The influence of household food insecurity on the child's nutritional status is a research need and should be investigated further.

Furthermore, it is recommended that a multidisciplinary approach be used to intervene with at-risk cases of developmental delays. It is suggested that social workers draw upon a range of expertise, such as doctors, educators, psychologists, speech therapists, occupational therapists, biokineticists, community development practitioners, social service professions, such as child and youth care workers, and other ECD service specialists.

Social workers and other professionals need to be aware of the contribution that nutrition as well as stimulation have on the overall development of children. A concerning reality for South Africa's future is that underprivileged communities are home to many children trailing their peers' overall standard of development. Developmental delays should not only be an indicator of risk, but also an opportunity for further action.

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