International Journal of Contemporary Pediatrics
Mummidi PS et al. Int J Contemp Pediatr. 2026 Dec;13(12):2531-2536
https://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20264321

Original Research Article

School readiness among preschool children attending private schools and government Anganwadi centres of Eastern India: a cross-sectional comparative study using the Nursery Evaluation Scale Trivandrum (NEST-abridged)

Prithi Sureka Mummidi*, Suryakanta Baraha

Department of Pediatrics , Hi Tech Medical College and Hospital, Rourkela, Odisha, India

Received: 05 October 2026
Revised: 05 November 2026
Accepted: 20 November 2026

***Correspondence:**
Dr. Prithi Sureka Mummidi,
E-mail: drprithisureka@gmail.com

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ABSTRACT

Background: School readiness is a multidimensional construct encompassing cognitive, language, motor, and socio-emotional competencies that enable children to successfully transition into formal schooling. Despite increasing recognition of its importance in improving educational outcomes, evidence from India using culturally appropriate assessment tools remains limited. The Nursery Evaluation Scale Trivandrum (NEST-Abridged) is an indigenous, validated instrument designed to assess school readiness in preschool children. The objectives are to compare school readiness among preschool children attending private preschools and Anganwadi centres in Rourkela, Odisha, using the NEST-Abridged.

Methods: A cross-sectional analytical study was conducted among 190 preschool children aged 4–6 years, including 95 children from private preschools and 95 from Anganwadi centres. School readiness was assessed using the NEST-Abridged, which evaluates six developmental domains: gross motor, fine motor, cognition, expressive language, receptive language, and personal-social skills. Data were analysed using IBM SPSS Statistics version 24.

Results: Children attending the private preschools demonstrated significantly higher overall school readiness than those attending Anganwadi centres (mean NEST pass score: 22.7±3.7 vs. 18.8±5.1; $p<0.001$). They performed significantly better in fine motor, cognitive, expressive language, receptive language, and personal-social domains, whereas Anganwadi children showed superior gross motor performance.

Conclusions: Preschool children attending private institutions exhibited better overall school readiness than those attending Anganwadi centres, particularly in cognitive and language-related domains while those attending Anganwadi centres did better in gross motor domain.

Keywords: School readiness, NEST-Abridged, Early childhood education, Anganwadi, Preschool, Eastern India

INTRODUCTION

The early years of childhood lay the neurological infrastructure for adult health, adaptability, and cognitive ceiling. Schooling forms not only a major part in shaping an adult but probably also the most important path. We observe that not all children do equally well in a school, be it scholastically or in extracurricular activities. Some children adapt very well to the demands and routines of the school and excel at everything that is thrown at them and enjoy the learning process and make lovely memories of school days, while some have nightmares and difficulties in passing or even participating in both scholastic and non-scholastic activities. They have major

issues in adjustment and often drop out as they are unable to cope up with the demands of school life. School readiness is a measure of how ready a child is to enter the system of formal education and how able is he to adjust to the new environment and its needs. Some of these include sitting quietly, responding to commands, being able to follow rules, working together and being able to imbibe and learn what is being taught at the school. School readiness also involves the maturation of the child's nervous system, allowing him to acquire various skills based on the stimuli he receives.[1]

School readiness also has the capacity to promote enrolment, sustain the attendance and ensure increase in the retention rates of school. So, what exactly is the skill set needed to make the child school ready? Research by some authors and the council on early childhood American academy of Pediatrics states that school readiness includes not only the early academic skills of the young child but also their physical health, language skills, social and emotional development, motivation to learn, creativity and general knowledge.[1-3] The Government of India released the National Early Childhood Care and Education (ECCE) Policy in 2013, and subsequently a National Curriculum Framework and Quality Standards.

In spite of such widespread acceptance of the concept of school readiness, there are very few studies which elucidate the state of school readiness in India. Hence, it becomes even more important to have India specific tools to measure the school readiness and assess the factors influencing them. The school readiness in various domains can be assessed by multiple tools like Gessell Screen Test, Brigance K-1 Screen, Denver II, Adaptive Behaviour Assessment System (ABAS II), Vineland Adaptive Behaviour Scales (Vineland II); or in the Indian context World Bank, India's School Readiness Instrument adapted by CECED, CECED's Adaptive Behaviour Scale for Young Children; Tamil Nadu Early Childhood Environment Rating Scale and Child Learning Competency Test developed and used by the Quality Matters study.[4]

Nursery Evaluation Scale Trivandrum (NEST) is one such indigenous tool developed by Dr. MKC Nair at CDC, Trivandrum, Kerala to test the school readiness in preschool children between ages 4-6 years.[5] It was standardized on 613 preschool children and validated against DDST-II. The full version has 69 items under the following 6 domains: gross motor development (13 items), fine motor development (14 items), cognitive development (12 items), personal social development (11 items), expressive language development (7 items) and receptive language development (12 items).

The age is mentioned in months on the x axis in the NEST Abridged chart. With the different items mentioned as horizontal bars (Figure 1). The age of the child in months is identified and a vertical line is drawn. All the items falling to the left of the line must have been achieved by the child. If the child is unable to perform any of these tasks, we marked it as a delay. If the age line is cutting across the horizontal item bar, the child still has some time to catch up and achieve the target and we marked such recordings as concern. The items which the child was able to finish were marked as pass.

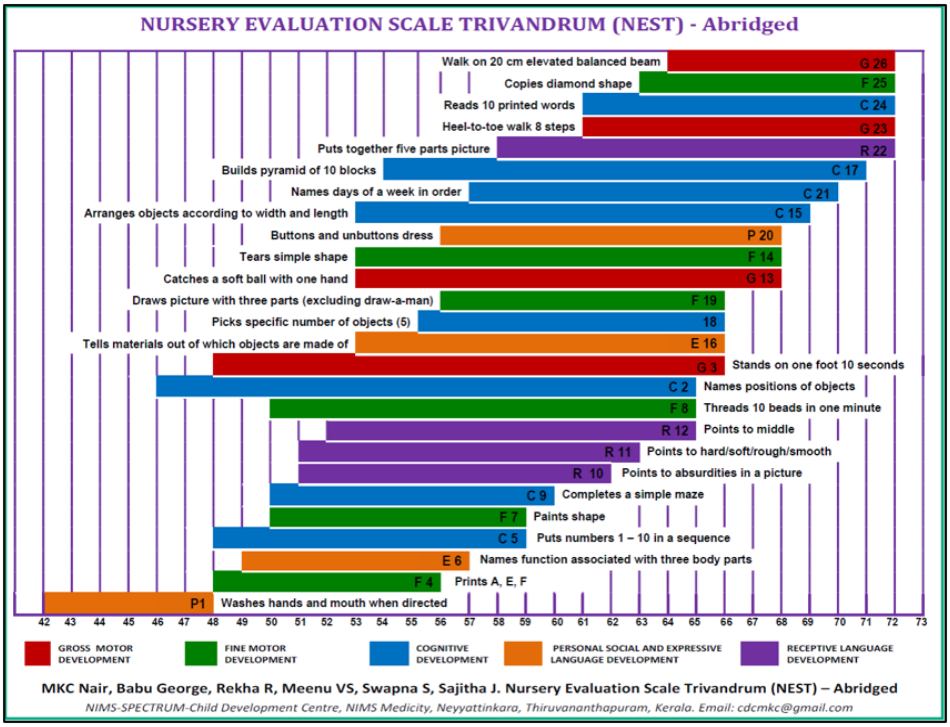


Figure 1: NEST abridged.

School readiness is not only about the child's innate skill alone, it also involves the families, early environments, schools, and communities. Their skills, attitudes and development is very strongly influenced by their immediate and extended families and their interaction with the people and circumstances in the environment around them.[6] Keeping all these points in mind and the lack of much Indian research on using NEST as the tool to assess school readiness we have undertaken this study. Through this study, our aim is to study if the preschool children in kindergarten have attained readiness to take on the rigors of the formal schooling system from standard one onwards. We have used NEST abridged version to assess school readiness in UKG children of few private schools and Anganwadi in the same area in Rourkela city, Odisha (Eastern India). The aim and objectives of this study is to assess and compare the school readiness of preschool students of private schools and Anganwadi centres in the same city of Rourkela, using Nursery Evaluation Scale Trivandrum abridged (NEST-abridged).

METHODS

Study design and setting

This was an observational, cross-sectional, analytical study performed between 2024 and 2025. Recruitment was conducted in the Upper Kindergarten (UKG) cohort of a private educational facility and a government-sponsored Anganwadi centre located within the identical urban locality of Rourkela, Odisha.

Selection criteria

Inclusion criteria: Children actively enrolled in the selected pre-primary institutions whose parents provided written informed consent.

Exclusion criteria: Children diagnosed with pre-existing developmental delays, formal learning disorders, neurodevelopmental conditions (e.g., autism spectrum disorder), or chronic medical illnesses limiting regular attendance.

Sample size calculation

Utilizing the proportion estimation formula $n = z^2_{1-\propto/2}P(1-P)/d^2$ with an anticipated population readiness proportion (P) of 43% derived from national literature, a 95% confidence level, and an absolute precision (d) of 10%, a minimal overall sample size of 188 was established. The final cohort evaluated comprised 190 children divided equally (n=95 per group).

Screening tools and data collection NEST-Abridged

A validated developmental functional evaluation tool containing 26 elements partitioned into 6 main domains: gross motor (4 items), fine motor (6 items), cognitive development (8 items), personal-social (2 items), expressive language (2 items) and receptive language (4 items). Tasks are categorized against developmental age bars as pass (achieved milestone), concern (overlapping age line), or delay (failed to achieve milestone).

Parental questionnaire: A structured survey assessing socio-demographic features including birth order, maternal/paternal education levels, mother's employment status, household composition (nuclear vs. joint), time spent as a family, and preschool environmental parameters.

Statistical analysis

Categorical parameters were expressed as frequencies and compared across school cohorts via Chi-square tests of independence. Developmental outcome indices (delay, concern and pass) did not adhere to normal distributions and were analyzed using the non-parametric Mann-Whitney U test (for two grouping variables) and the Kruskal-Wallis test (for >2 groups). Alpha was set at $p < 0.05$ for statistical significance.

RESULTS

A total of 190 preschool children were enrolled in the study, comprising 95 children from a private preschool and 95 children from Anganwadi centres. The two groups were comparable with respect to age (p=0.069) and gender distribution (p=0.884), minimizing demographic bias between the study groups.

Overall school readiness

Children attending the private preschool demonstrated significantly better overall school readiness than children attending Anganwadi centres.

The mean NEST "pass" score was 22.7 ± 3.7 in the private preschool group compared with 18.8 ± 5.1 in the Anganwadi group ($p<0.001$). Conversely, both delay and concern scores were significantly higher among Anganwadi children ($p<0.05$) (Table 1 and Figure 2).

Domain-wise comparison

Gross motor development

Anganwadi children performed significantly better in the gross motor domain.

Higher proportions of Anganwadi children successfully completed tasks such as heel-to-toe walking and walking on an elevated balance beam. Overall gross motor performance was significantly superior among Anganwadi children ($p<0.05$). Disaggregated domain analysis showed distinct trends across institutions (Table 2).

Table 1: Comparison of school readiness parameters by type of school.

School readiness	Private			Anganwadi			Mann-Whitney U
	Mean±SD	Median (IQR)	Range (Min. - Max.)	Mean±SD	Median (IQR)	Range (Min. - Max.)	
Delay	1.6±3.3	0(0-2)	(0-24)	4.0±4.3	3(0-8)	(0-14)	0.000
Concern	1.7±1.9	1(0-2)	(0-9)	3.2±4.0	2(1-3)	(0-15)	0.023
Pass	22.7±3.7	24(22-25)	(2-26)	18.8±5.1	18(14-24)	(10-26)	0.000

Table 2: Comparative performance across selected NEST domains.

Domain / Item Performance	Private School (n=95) Pass %	Anganwadi (n=95) pass %	Chi-square (χ^2)	P value
Gross motor				
Stands on one foot for 10s	87.4%	94.7%	8.372	0.015*
Heel-to-toe walk (8 steps)	66.3%	95.8%	24.795	0.000*
20cm elevated balance beam	70.5%	96.8%	24.317	0.000*
Fine motor				
Prints Letters (A, E, F)	98.9%	41.1%	64.360	0.000*
Paints shape boundary	97.9%	74.7%	23.045	0.000*
Copies diamond shape	66.3%	81.1%	12.867	0.002*
Cognitive development				
Puts numbers 1–10 in sequence	97.9%	46.3%	52.694	0.000*
Completes a simple maze	96.8%	23.2%	104.609	0.000*
Reads 10 printed words	67.4%	28.4%	23.903	0.000*
Language development				
Body part functions (Expressive)	89.5%	71.6%	11.149	0.004*
Picture absurdities (Receptive)	89.5%	37.9%	39.900	0.000*

*Statistically significant.

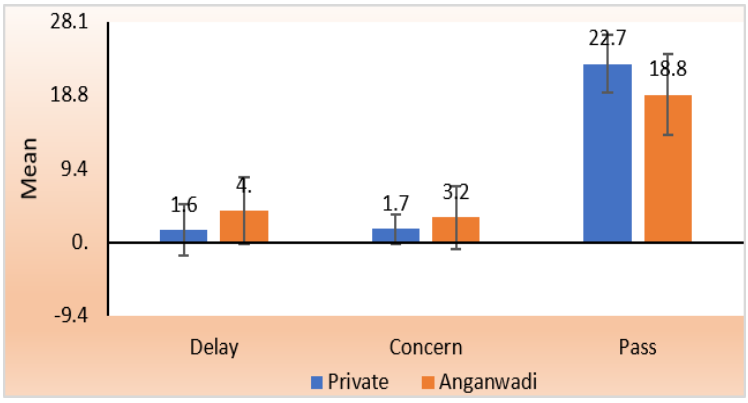


Figure 2: Mean of school readiness scores of preschool children by type of schools.

Fine motor development

Private preschool children demonstrated significantly better fine motor performance.

They achieved higher pass rates in activities including: Printing letters (A, E and F); painting within boundaries; and drawing a picture with three identifiable parts. The only fine motor task favouring Anganwadi children was copying a diamond shape. Overall, the private preschool group showed significantly better fine motor development ($p<0.001$).

Cognitive development

Children from the private preschool consistently outperformed those from Anganwadi centres across nearly all cognitive tasks. Significant differences were observed in: number sequencing; maze completion; naming object positions; identifying specified numbers;

arranging objects by size; naming days of the week; and reading printed words.

Most comparisons were highly significant ($p<0.001$).

Personal-social and expressive language

Private preschool children demonstrated significantly better expressive language and personal-social skills. They performed better in: Naming the functions of body parts; identifying the materials from which common objects are made; and no, statistically significant difference was observed for buttoning/unbuttoning clothes.

Receptive language

Receptive language performance was significantly better among private preschool children. They showed superior performance in: Identifying absurdities in pictures; recognizing texture concepts (hard, soft, rough, smooth); and completing five-piece puzzles. Performance in identifying the middle object did not differ significantly between groups ($p=0.052$).

Factors associated with school readiness

Several socio-demographic variables were significantly associated with better overall school readiness.

Children demonstrated significantly higher NEST scores when they had: female gender; better maternal educational status; better paternal educational status; and fewer siblings. Age did not show a statistically significant association with school readiness.

DISCUSSION

This study demonstrates that early childhood educational ecosystems significantly alter baseline school readiness domains. Private kindergarten frameworks provide structurally rich fine motor, cognitive, and semantic environments, driven by highly literate parental structures at home. However, their lower physical activity exposure results in lower gross motor functionality compared to Anganwadi children. Anganwadi children operate in less insulated, highly interactive community peer structures, fostering superior agility and gross motor skills.

Critically, the poor cognitive and linguistic scores among Anganwadi children stem from a lack of exposure rather than inherent developmental deficits. Most government-run centers operate within restricted infrastructure, where play objects, mazes, and print-rich components are either absent or mounted out of reach. Furthermore, Anganwadi staff are often constrained by administrative non-teaching burdens (e.g., nutritional monitoring and healthcare surveys) which reduces the delivery of structured pre-literacy stimulation.

Singh et al did an extensive systematic review of literature on quality of preschool services in aganwadi based on their review of around 25 papers and conclude that the quality of preschool education leaves a lot to be desired. They conclude on the basis of the analysis of review of literature that only 36% of anganwadi centers were providing adequate preschool education services and programs whereas 64% of anganwadi were lagging behind in preschool services and facilities that indicates serious requirement of amendment in educational services and policies. Most of the literature they analysed seems to suggest common findings like lack of proper infrastructure or material, lack of training for the workers, poor motivation to try out of the box solutions, overburdening with works not related to education, poor quality of education being imparted to be the major reasons for the poor performance of the anganwadi's.[7]

Rao et al highlighted how institutional environments and pedagogical approaches shape early cognitive growth, reflecting the observed variances in performance between structured private institutions and government-run settings in our cohort.[8] Kaul et al demonstrated that structural disparities between formal private setups and public anganwadi networks significantly influence early learning environments, contributing to the divergent preparedness levels observed in Indian settings.[9] Singal et al noted that systemic resource allocation and home environments play a critical role in mitigating or compounding gaps in school readiness domains among children from varied socio-economic strata.[10] Dhingra et al conducted comparative evaluations between ICDS Anganwadi's and private preschool models in India, pointing to the unique operational strengths and structural limitations inherent to each system.[11]

Shrivastava et al evaluated school readiness and its associated risk factors among Indian children, emphasizing that early structured preschool exposure significantly moderates developmental vulnerabilities before primary school entry.[12] Arora et al assessed cognitive and motor preparedness among children attending government-run Anganwadi centres, noting that developmental domains scale progressively with age regardless of infrastructural limitations.[13] Sharma et al highlighted that structural asymmetries in early learning environments between public and private setups necessitate context-specific assessment tools to accurately capture foundational cognitive competencies.[14]

Socio-demographically, highly educated parents scaffold early readiness through targeted cognitive dialogue at home. The correlation between single-child status and elevated scores suggests a high concentration of emotional and structural resources. Conversely, large families facing financial pressures often focus on survival rather than pre-academic preparation. A key systemic concern observed across both cohorts was the premature enforcement of formal rote-learning metrics, heavily

sidelining the play-based learning models advocated by the National Curriculum Framework.

CONCLUSION

Preschool children attending private institutions exhibited better overall school readiness than those attending Anganwadi centres, particularly in cognitive and language-related domains. Parental education and the preschool learning environment emerged as important determinants of school readiness. Socioeconomic and environmental factors may contribute to differences in developmental readiness before formal school entry.

Recommendations

To bridge these inequities and prevent primary school dropouts, the following systematic modifications are recommended:

Curriculum standardization

Introduce a uniform, developmentally appropriate preschool curriculum that balances gross motor play with cognitive-linguistic stimulation across both private and public networks.

Anganwadi capacity scaling

Relieve anganwadi workers from intensive non-teaching tasks, and mandate certified Early Childhood Care and Education (ECCE) training programs.

Play-based strategy integration

Discourage premature rote-learning and structural testing models in early infancy. Instead, implement validated home and center-based stimulation tools, such as the NEST intervention framework, to proactively target milestone delays.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Mummidi PS, Baraha S. School readiness among preschool children attending private schools and government Anganwadi centres of Eastern India: a cross-sectional comparative study using the Nursery Evaluation Scale Trivandrum (NEST-abridged). Int J Contemp Pediatr 2026;13:2531-6.