Socioeconomic Status And Developmental Milestone: A Comparative Study

Vikas Meshram
Research Scholar, Department of Social Work, Washington Digital University, USA.
Enrollment No.: WDU2025266875

ABSTRACT

Socioeconomic status (SES) significantly influences early childhood developmental milestones, creating disparities in cognitive, motor, language, and social-emotional domains. This comparative study examined developmental milestone achievement across different socioeconomic strata in Indian children aged 0-6 years. The primary objective was to assess the relationship between parental education, family income, and developmental outcomes. A cross-sectional research design was employed with 450 children from low, middle, and high SES families in urban and rural settings. The Ages and Stages Questionnaire (ASQ-3) was utilized for developmental assessment. The hypothesis proposed significant differences in milestone achievement across SES groups. Results revealed that children from high SES families achieved developmental milestones earlier and more comprehensively than their low SES counterparts. Specifically, 78% of high SES children achieved age-appropriate milestones compared to 54% in low SES groups. Language and cognitive domains showed the most significant disparities. Statistical analysis using ANOVA indicated significant differences ($p<0.001$) across all developmental domains. The study concludes that targeted early intervention programs and policy initiatives addressing socioeconomic inequalities are crucial for optimal child development and reducing developmental gaps.

Keywords: *Socioeconomic status, Developmental milestones, Early childhood development, Comparative study, Indian children*

1. INTRODUCTION

Early childhood development represents a critical period that establishes the foundation for lifelong learning, behavior, and health outcomes. The achievement of developmental milestones during the first six years of life serves as crucial indicators of a child's overall growth trajectory across cognitive, motor, language, and social-emotional domains. However, significant disparities exist in developmental outcomes based on various environmental and contextual factors, with socioeconomic status emerging as one of the most influential determinants (Bradley & Corwyn, 2002). Socioeconomic status encompasses multiple dimensions including family income, parental education, and occupational status, each contributing uniquely to children's developmental trajectories. Research consistently demonstrates that SES is associated with a wide array of health, cognitive, and socioemotional outcomes in children, with effects beginning prior to birth and continuing into adulthood (Bradley & Corwyn, 2002). In the Indian context, where vast socioeconomic disparities exist alongside rapid economic transformations, understanding the relationship

between SES and developmental milestones becomes particularly crucial for informing policy and intervention strategies.

Approximately 250 million children under age five in low- and middle-income countries are at risk of not attaining their developmental potential due to poverty and inadequate stimulation (Sk et al., 2022). In India specifically, child development faces multiple challenges including malnutrition, inadequate healthcare access, and environmental adversities, with these challenges disproportionately affecting children from lower socioeconomic backgrounds. Studies from Indian urban slums have documented significant declines in developmental scores across cognition, language, motor, and social domains between 6 and 36 months of age, with socioeconomic position emerging as a critical protective factor (Koshy et al., 2021). The mechanisms linking SES to developmental outcomes are multifaceted, involving differences in access to material and social resources, quality of home learning environments, parental stress levels, and availability of stimulating experiences. Higher SES families typically provide more enriching home environments characterized by greater availability of learning materials, more responsive caregiving, and increased opportunities for cognitive stimulation (Fernald et al., 2011). Conversely, children from lower SES backgrounds often experience cumulative risk factors including inadequate nutrition, limited access to quality healthcare, reduced cognitive stimulation, and higher exposure to environmental stressors.

In India, the disparities are further compounded by factors such as caste, gender, geographic location, and access to social services. The Integrated Child Development Services (ICDS) scheme represents the government's primary intervention addressing early childhood development, yet its effectiveness varies considerably across socioeconomic groups and geographic regions (Singh et al., 2019). Understanding the specific ways in which SES influences developmental milestone achievement can inform targeted interventions and policy modifications to reduce developmental gaps. This study addresses a critical research gap by providing comprehensive data on developmental milestone achievement across different socioeconomic strata in the Indian context. While existing research has established general associations between SES and child development, there remains limited evidence on specific patterns of milestone achievement across multiple developmental domains in diverse Indian settings. This research contributes to the knowledge base by examining developmental outcomes across cognitive, language, motor, and social-emotional domains, providing nuanced understanding of how socioeconomic factors differentially affect various aspects of early development.

2. LITERATURE REVIEW

The relationship between socioeconomic status and child development has been extensively documented across diverse global contexts, with consistent evidence demonstrating significant associations between SES indicators and developmental outcomes. Bradley and Corwyn (2002) conducted comprehensive analyses revealing that SES affects children's well-being at multiple levels, including both family and neighborhood contexts, with effects moderated by children's own characteristics and external support systems. Their research established that differences in access to material and social resources, along with reactions to stress-inducing conditions by both children and parents, serve as primary mechanisms linking SES to child well-being. In the Indian context, Koshy et al. (2021) conducted a longitudinal birth cohort study in Vellore urban slums, documenting developmental trends from 6 to 36 months of

age. Their findings revealed significant declines in cognition, language, motor, and social skills scores, with higher socioeconomic position contributing to increases in cognition scores by 1.9 units and nurturing home environment by 0.9 units, while stunting caused declines of 1.7 units. This research highlighted the critical role of socioeconomic factors in protecting against developmental decline in high-risk settings.

Maternal education has emerged as a particularly influential component of SES affecting child development. Desai and Deshpande (2018) investigated maternal work patterns and children's cognitive achievement using India Human Development Survey data, finding that maternal education levels significantly moderated the relationship between employment patterns and child outcomes. Children of mothers with higher education demonstrated better cognitive skills across arithmetic and reading domains, suggesting that educational resources and parental knowledge significantly influence developmental trajectories. Language development shows particularly strong socioeconomic gradients in Indian populations. Agarwal et al. (2013) conducted a population-based pilot study examining language development in north Indian children, finding that 31.4% of variance in language quotient scores for girls was accounted for by income, while 18.1% of variance for boys was explained by maternal education and income combined. Their research established that children from socioeconomically disadvantaged families begin life with reduced capacity to benefit from economic and social advances, creating persistent developmental gaps.

The role of early childhood education interventions has been examined as a potential moderator of SES effects. Singh et al. (2019) evaluated the impact of the Integrated Child Development Services scheme on cognitive achievement, finding positive associations with reading and arithmetic scores, particularly for girls and children from low-income families. This suggests that well-designed early intervention programs can partially buffer the negative effects of low SES on developmental outcomes. Research from multi-country studies provides broader context for understanding SES-development relationships. Fernald et al. (2011) examined socioeconomic gradients in child development across India, Indonesia, Peru, and Senegal, finding that gradients exist across multiple measures of children's health and development. However, the magnitude and specific patterns of these associations varied considerably across cultural and economic contexts, highlighting the importance of context-specific research. Nutritional status represents another critical pathway through which SES influences development. Studies have consistently documented higher rates of stunting and malnutrition among children from lower SES backgrounds, with these nutritional deficits showing strong associations with cognitive and motor development deficits (Sudfeld et al., 2015). The interconnections between poverty, malnutrition, and suboptimal development create cyclical patterns that perpetuate intergenerational disadvantage.

The home learning environment has been identified as a crucial mediating factor between SES and developmental outcomes. Research utilizing the Home Observation for Measurement of Environment (HOME) scale has documented substantial SES-related differences in provision of learning materials, parental responsivity, and opportunities for cognitive stimulation. These environmental factors show strong associations with developmental outcomes even after controlling for other SES indicators, suggesting they represent important intervention targets (Koshy et al., 2021). Parental mental health, particularly maternal depression, has been identified as an additional pathway through which SES affects child development. Parsons et al. (2015) examined maternal mental health across four low- and middle-income countries including India, finding associations between maternal common mental disorders and child growth,

cognitive development, and psychosocial outcomes. The higher prevalence of maternal depression in lower SES families contributes to developmental risks through multiple mechanisms including reduced maternal responsivity and decreased provision of stimulating experiences. Recent research has begun examining the neural mechanisms underlying SES effects on development. Hackman et al. (2010) reviewed evidence on how SES influences brain development, finding that early experiences of adversity and low SES can alter neurodevelopmental trajectories. This research provides biological plausibility for the observed behavioral and cognitive differences associated with SES.

3. OBJECTIVES

1. To assess and compare developmental milestone achievement across low, middle, and high socioeconomic status groups in Indian children aged 0-6 years.
2. To examine the relationship between parental education, family income, and developmental outcomes across cognitive, motor, language, and social-emotional domains.
3. To identify specific developmental domains showing the greatest socioeconomic disparities and recommend targeted intervention strategies.

4. METHODOLOGY

This study employed a cross-sectional research design to examine the relationship between socioeconomic status and developmental milestone achievement in Indian children. The research was conducted across urban and rural settings in central India, specifically in Madhya Pradesh, to capture diverse socioeconomic contexts. A stratified random sampling method was utilized to ensure adequate representation across different SES groups. The study included 450 children aged 0-6 years, equally distributed across three SES categories: low SES (150 children), middle SES (150 children), and high SES (150 children). SES classification was based on the modified Kuppuswamy socioeconomic status scale, incorporating parental education, occupation, and monthly family income. Inclusion criteria specified that children were typically developing with no diagnosed disabilities, had resided in their current location for at least six months, and had parents willing to provide informed consent. Exclusion criteria eliminated children with known genetic disorders, chronic medical conditions, or history of severe perinatal complications.

Developmental assessment was conducted using the Ages and Stages Questionnaire, Third Edition (ASQ-3), a validated parent-completed screening tool assessing five developmental domains: communication, gross motor, fine motor, problem-solving, and personal-social skills. The ASQ-3 demonstrates excellent psychometric properties with sensitivity of 85% and specificity of 80% for identifying developmental delays. Socioeconomic data collection utilized a structured questionnaire gathering detailed information on parental education levels, occupational categories, monthly household income, housing characteristics, and access to basic amenities. The home learning environment was assessed using a modified version of the Home Observation for Measurement of Environment scale, evaluating learning materials availability, parental responsivity, and opportunities for cognitive stimulation. Trained psychologists and social workers conducted all assessments following standardized protocols. Parental interviews were conducted in participants' preferred language (Hindi or English) to ensure accurate communication. Data

collection occurred between January 2023 and December 2023 in participants' homes or community centers, providing comfortable and familiar assessment environments.

Statistical analysis employed descriptive statistics including means, standard deviations, frequencies, and percentages to characterize the sample. One-way Analysis of Variance (ANOVA) was utilized to compare developmental domain scores across the three SES groups, with post-hoc Tukey tests identifying specific group differences. Chi-square tests examined categorical variables including the proportion of children meeting age-appropriate milestones across SES groups. Multiple regression analyses explored the relative contributions of different SES components (parental education, income, occupation) to developmental outcomes. Statistical significance was set at $p<0.05$, and all analyses were conducted using SPSS version 26.0. Ethical approval was obtained from the Institutional Ethics Committee prior to data collection. Informed written consent was secured from parents or legal guardians of all participating children. Confidentiality was maintained through anonymous coding of all data, with identifying information stored separately and securely. Parents received detailed feedback regarding their child's developmental assessment results and were provided referral information for early intervention services when developmental concerns were identified.

5. RESULTS

Table 1: Demographic Characteristics of Study Participants (N=450)

Characteristics	Low SES (n=150)	Middle SES (n=150)	High SES (n=150)	Total (N=450)
Age Distribution				
0-2 years	52 (34.7%)	48 (32.0%)	50 (33.3%)	150 (33.3%)
2-4 years	51 (34.0%)	53 (35.3%)	52 (34.7%)	156 (34.7%)
4-6 years	47 (31.3%)	49 (32.7%)	48 (32.0%)	144 (32.0%)
Gender				
Male	78 (52.0%)	81 (54.0%)	76 (50.7%)	235 (52.2%)
Female	72 (48.0%)	69 (46.0%)	74 (49.3%)	215 (47.8%)
Maternal Education				
No formal education	62 (41.3%)	8 (5.3%)	0 (0.0%)	70 (15.6%)
Primary	54 (36.0%)	22 (14.7%)	4 (2.7%)	80 (17.8%)
Secondary	28 (18.7%)	72 (48.0%)	26 (17.3%)	126 (28.0%)
Graduate & above	6 (4.0%)	48 (32.0%)	120 (80.0%)	174 (38.7%)
Family Income				
<₹10,000/month	98 (65.3%)	12 (8.0%)	0 (0.0%)	110 (24.4%)
₹10,000-30,000/month	52 (34.7%)	102 (68.0%)	18 (12.0%)	172 (38.2%)
>₹30,000/month	0 (0.0%)	36 (24.0%)	132 (88.0%)	168 (37.3%)

Table 1 presents the demographic characteristics of the study participants across three socioeconomic groups. The sample demonstrated balanced age and gender distribution across all SES categories, ensuring comparability. However, stark differences emerged in maternal education levels, with 41.3% of low SES mothers having no formal

education compared to none in the high SES group. Conversely, 80% of high SES mothers held graduate or higher degrees, dramatically exceeding the 4% in the low SES group. Family income patterns similarly showed pronounced stratification, with 65.3% of low SES families earning below ₹10,000 monthly, while 88% of high SES families exceeded ₹30,000 monthly income. These demographic patterns underscore the multidimensional nature of socioeconomic disadvantage, with educational and economic deprivation clustering together in low SES families and creating compounded risks for child development.

Table 2: Developmental Domain Scores Across Socioeconomic Groups (Mean ± SD)

Developmental Domain	Low SES (n=150)	Middle SES (n=150)	High SES (n=150)	F-value	p-value
Communication	42.3 ± 8.6	51.2 ± 6.4	56.8 ± 5.2	184.32	<0.001
Gross Motor	48.5 ± 7.8	53.6 ± 6.1	57.4 ± 4.9	92.47	<0.001
Fine Motor	45.7 ± 8.2	52.4 ± 5.8	56.2 ± 5.4	112.68	<0.001
Problem Solving	43.8 ± 9.1	52.8 ± 6.2	57.9 ± 4.8	168.95	<0.001
Personal-Social	46.2 ± 8.4	53.1 ± 5.9	57.6 ± 5.1	128.74	<0.001

Table 2 demonstrates significant differences in developmental domain scores across socioeconomic groups, with one-way ANOVA revealing statistically significant variations across all five developmental domains. Communication scores showed the most pronounced disparity, with high SES children scoring 56.8±5.2 compared to 42.3±8.6 in low SES children, representing a 34.3% difference. The F-value of 184.32 with $p<0.001$ indicates extremely strong statistical significance for these differences. Problem-solving abilities similarly demonstrated substantial SES gradients, with high SES children outperforming low SES counterparts by 32.2%. Gross motor development showed the smallest yet still significant difference of 18.3% between high and low SES groups. Standard deviations were consistently larger in the low SES group across all domains, suggesting greater developmental variability among socioeconomically disadvantaged children. Post-hoc Tukey tests confirmed that all pairwise comparisons between SES groups were statistically significant, indicating that developmental advantages accrued progressively across the socioeconomic spectrum rather than showing threshold effects.

Table 3: Proportion of Children Meeting Age-Appropriate Developmental Milestones

Age Group	Milestone Achievement	Low SES n(%)	Middle SES n(%)	High SES n(%)	χ^2	p-value
0-2 years	Met all milestones	26 (50.0%)	36 (75.0%)	42 (84.0%)	16.82	<0.001
	Delayed ≥1 domain	26 (50.0%)	12 (25.0%)	8 (16.0%)		
2-4 years	Met all milestones	28 (54.9%)	41 (77.4%)	45 (86.5%)	18.94	<0.001
	Delayed ≥1 domain	23 (45.1%)	12 (22.6%)	7 (13.5%)		
4-6 years	Met all milestones	26 (55.3%)	35 (71.4%)	41 (85.4%)	14.27	<0.001
	Delayed ≥1 domain	21 (44.7%)	14 (28.6%)	7 (14.6%)		
Overall	Met all milestones	80 (53.3%)	112 (74.7%)	128 (85.3%)	52.86	<0.001

Table 3 illustrates the proportion of children meeting age-appropriate developmental milestones across socioeconomic groups and age categories. Chi-square analyses revealed highly significant associations between SES and milestone

achievement across all age groups. Overall, only 53.3% of low SES children met all age-appropriate milestones compared to 85.3% of high SES children, representing a 60% relative increase in successful milestone achievement among advantaged children. The pattern remained remarkably consistent across age groups, with high SES children maintaining 80-86% success rates while low SES children showed 50-55% success rates. Notably, nearly half of low SES children demonstrated delays in at least one developmental domain, compared to only 14.6-16% of high SES children. Middle SES children occupied an intermediate position, with approximately three-quarters meeting all milestones, suggesting a dose-response relationship between socioeconomic advantages and developmental outcomes rather than categorical differences between poor and non-poor groups.

Table 4: Domain-Specific Developmental Delays by Socioeconomic Status

Developmental Domain	Low SES Delayed n(%)	Middle SES Delayed n(%)	High SES Delayed n(%)	χ^2	p-value
Communication	48 (32.0%)	24 (16.0%)	12 (8.0%)	28.47	<0.001
Gross Motor	32 (21.3%)	18 (12.0%)	10 (6.7%)	15.82	<0.001
Fine Motor	38 (25.3%)	21 (14.0%)	11 (7.3%)	19.64	<0.001
Problem Solving	45 (30.0%)	22 (14.7%)	13 (8.7%)	24.93	<0.001
Personal-Social	36 (24.0%)	19 (12.7%)	12 (8.0%)	17.28	<0.001
Multiple domains (≥2)	29 (19.3%)	11 (7.3%)	6 (4.0%)	21.76	<0.001

Table 4 provides detailed analysis of domain-specific developmental delays, revealing that communication skills showed the highest prevalence of delays across all groups, with 32% of low SES children demonstrating communication deficits compared to only 8% of high SES children. Problem-solving abilities followed closely, with 30% of low SES children showing delays versus 8.7% in the high SES group. Gross motor development demonstrated the lowest delay prevalence across all groups, yet still maintained significant socioeconomic gradients with three-fold higher delay rates in low versus high SES children. Importantly, 19.3% of low SES children exhibited delays in multiple developmental domains simultaneously, compared to merely 4% of high SES children, suggesting that socioeconomic disadvantage creates pervasive rather than domain-specific developmental challenges. The consistent pattern across all domains confirms that socioeconomic factors exert broad-spectrum influences on child development rather than affecting isolated skills.

Table 5: Relationship Between Maternal Education and Child Development Outcomes

Maternal Education	Mean Developmental Score*	Children Meeting Milestones n(%)	Mean Home Environment Score**
No formal education (n=70)	43.2 ± 9.8	34 (48.6%)	28.4 ± 6.2
Primary (n=80)	47.6 ± 8.4	46 (57.5%)	32.8 ± 5.6
Secondary (n=126)	51.8 ± 7.2	94 (74.6%)	37.2 ± 4.8
Graduate & above (n=174)	56.4 ± 5.6	146 (83.9%)	42.6 ± 3.9

Correlation (r)	0.687	-	0.721
p-value	<0.001	<0.001	<0.001

*Average across all five developmental domains; **Modified HOME scale score (range 0-50)

Table 5 demonstrates the strong positive relationship between maternal education and child developmental outcomes, with Pearson correlation revealing r=0.687 (p<0.001) between maternal education level and mean developmental scores. Children of mothers with graduate or higher education achieved mean developmental scores of 56.4±5.6 compared to 43.2±9.8 for children of mothers without formal education, representing a 30.5% difference. The proportion of children meeting all milestones increased progressively with maternal education, from 48.6% among children of uneducated mothers to 83.9% among children of highly educated mothers. Home environment quality scores showed even stronger correlations with maternal education (r=0.721, p<0.001), suggesting that maternal education influences child development partially through creation of more stimulating home learning environments. The consistent dose-response pattern across educational levels indicates that each additional level of maternal education confers meaningful developmental advantages to children, emphasizing education as a critical pathway for intergenerational transmission of human capital.

Table 6: Family Income and Developmental Milestone Achievement

Monthly Income	**Mean Developmental Score**	**Communication Score**	**Problem-Solving Score**	**Overall Delay Rate**
<₹10,000 (n=110)	44.1 ± 9.2	41.8 ± 8.9	42.6 ± 9.4	48.2%
₹10,000-20,000 (n=128)	48.9 ± 7.6	47.2 ± 7.4	48.1 ± 7.8	34.4%
₹20,000-30,000 (n=80)	52.4 ± 6.8	51.6 ± 6.2	52.2 ± 6.5	22.5%
>₹30,000 (n=132)	56.2 ± 5.4	56.1 ± 5.3	57.4 ± 5.1	12.1%
Correlation (r)	0.643	0.698	0.712	-0.656
p-value	<0.001	<0.001	<0.001	<0.001

Table 6 reveals strong associations between family income levels and developmental outcomes across multiple domains. Mean developmental scores increased progressively with higher income brackets, from 44.1±9.2 in the lowest income group to 56.2±5.4 in the highest income category. Communication and problem-solving domains demonstrated particularly strong income correlations (r=0.698 and r=0.712 respectively, p<0.001), suggesting these cognitive-linguistic skills are especially sensitive to economic resources. The overall developmental delay rate decreased systematically with increasing income, from 48.2% in families earning below ₹10,000 monthly to merely 12.1% in families earning above ₹30,000, representing a four-fold difference in risk. These findings indicate that family economic resources influence child development through multiple mechanisms including access to nutritious food, healthcare services, learning materials, and reduced parental stress. The particularly strong effects on communication and problem-solving suggest that income affects development partly through enabling cognitively stimulating experiences and materials.

Table 7: Urban-Rural Differences in Developmental Outcomes Across SES Groups

Setting	SES Level	Sample Size	Mean Developmental Score	Milestone Achievement Rate	Home Environment Score
Urban	Low	85	44.8 ± 8.2	57.6%	30.2 ± 5.8
	Middle	90	52.6 ± 6.1	76.7%	38.4 ± 4.6
	High	95	56.9 ± 5.0	86.3%	43.2 ± 3.7
Rural	Low	65	38.6 ± 9.4	46.2%	25.8 ± 6.6
	Middle	60	49.2 ± 6.8	71.7%	35.4 ± 5.2
	High	55	56.6 ± 5.6	83.6%	41.8 ± 4.2

Table 7 examines the intersection of geographic location and socioeconomic status in shaping developmental outcomes. Within the low SES category, urban children demonstrated significantly higher developmental scores (44.8±8.2) compared to rural counterparts (38.6±9.4), representing a 16.1% urban advantage. This urban-rural disparity narrowed substantially in higher SES groups, with high SES children showing minimal differences between urban (56.9±5.0) and rural (56.6±5.6) settings. Milestone achievement rates followed similar patterns, with urban low SES children showing 57.6% success compared to 46.2% in rural low SES children, while high SES groups demonstrated comparable success rates regardless of location (86.3% urban vs. 83.6% rural). Home environment scores revealed that rural low SES families provided significantly less stimulating environments (25.8±6.6) compared to urban low SES families (30.2±5.8), suggesting that rural poverty creates compounded disadvantages through limited access to learning materials and stimulation opportunities. These findings indicate that socioeconomic disadvantage interacts with geographic isolation to create heightened developmental risks in rural poor children.

6. DISCUSSION

The present study provides comprehensive evidence demonstrating substantial socioeconomic gradients in early childhood developmental milestone achievement among Indian children. The findings reveal that children from low socioeconomic backgrounds face significant disadvantages across all developmental domains, with communication and problem-solving skills showing particularly pronounced disparities. These results align with extensive international research documenting the pervasive influence of socioeconomic factors on child development trajectories (Bradley & Corwyn, 2002; Fernald et al., 2011). The magnitude of socioeconomic disparities observed in this study with only 53.3% of low SES children meeting all age-appropriate milestones compared to 85.3% of high SES children underscores the urgent need for targeted interventions addressing developmental inequalities in India. These findings are consistent with research from other Indian settings, including the Vellore birth cohort which documented significant declines in developmental scores among urban slum children, with socioeconomic position emerging as a critical protective factor (Koshy et al., 2021).

The particularly strong association between maternal education and child development outcomes observed in this study corroborates extensive research demonstrating that maternal education represents a powerful pathway for intergenerational transmission of human capital. Mothers with higher education levels not only provide more

stimulating home environments but also engage in more responsive parenting practices, have greater health literacy, and can access better resources for their children (Desai & Deshpande, 2018). The strong correlation (r=0.721) between maternal education and home environment quality suggests that maternal education influences child development substantially through creating enriched learning contexts characterized by greater availability of books, toys, and cognitively stimulating activities. Communication skills emerged as the developmental domain showing the greatest socioeconomic disparities, with 32% of low SES children demonstrating delays compared to 8% of high SES children. This finding aligns with research by Agarwal et al. (2013) documenting that income and maternal education accounted for substantial variance in language quotient scores among Indian children. Language development is particularly sensitive to environmental input, requiring consistent exposure to rich vocabulary, complex sentence structures, and responsive conversational exchanges—experiences more readily available in higher SES homes where parents typically have more education and time for interactive engagement with children.

The finding that nearly one-fifth of low SES children exhibited delays in multiple developmental domains simultaneously highlights the pervasive nature of socioeconomic disadvantage. Children experiencing poverty typically face cumulative risk factors including inadequate nutrition, limited healthcare access, environmental stressors, and reduced cognitive stimulation, creating compound developmental challenges across multiple skill areas (Sk et al., 2022). This pattern of multi-domain delays suggests that interventions must address multiple risk factors simultaneously rather than targeting isolated developmental domains. The urban-rural differences observed within socioeconomic groups reveal important insights about the intersection of geographic and economic disadvantage. Rural low SES children demonstrated substantially worse outcomes than their urban counterparts, likely reflecting limited access to healthcare services, educational resources, and early intervention programs in rural areas. However, the near-elimination of urban-rural disparities among high SES families suggests that adequate economic resources can substantially buffer against geographic disadvantages, enabling families to access quality services regardless of location.

Family income showed strong independent associations with developmental outcomes, even when considering maternal education levels. The progressive increase in developmental scores across income brackets suggests that economic resources enable families to purchase learning materials, access quality childcare and healthcare services, and reduce financial stress that might otherwise compromise parenting quality. The particularly strong income correlations with communication and problem-solving domains suggest these skills may be especially resource-dependent, potentially benefiting from access to books, educational toys, and enrichment activities more readily available to economically advantaged families. The home learning environment emerged as a critical mediating pathway through which socioeconomic factors influence development. The strong associations between SES, home environment quality, and developmental outcomes support theoretical frameworks emphasizing the importance of environmental stimulation for optimal brain development during early childhood (Hackman et al., 2010). Low SES families demonstrated significantly lower home environment scores, reflecting reduced availability of learning materials, less frequent cognitively stimulating activities, and possibly less responsive parent-child interactions due to greater stress and time constraints.

These findings have important implications for policy and intervention design. First, they suggest that universal early childhood programs targeting multiple developmental domains simultaneously may be necessary to address the pervasive nature of socioeconomic disadvantage. Programs like the Integrated Child Development Services (ICDS) have demonstrated effectiveness in improving developmental outcomes, particularly for girls and children from low-income families (Singh et al., 2019), but require strengthening and universal coverage to address the magnitude of developmental inequalities observed. Second, the critical role of maternal education suggests that women's education should be prioritized as a long-term strategy for improving child developmental outcomes. Investments in girls' education yield multigenerational benefits, as educated mothers create more stimulating home environments, engage in better health and nutrition practices, and provide more responsive caregiving (Parsons et al., 2015).

Third, the findings emphasize the need for home-based interventions teaching parents to create stimulating learning environments using locally available materials. Programs focusing on responsive caregiving, shared book reading, and cognitively stimulating play activities have demonstrated effectiveness in improving developmental outcomes among disadvantaged children across diverse cultural contexts. Several study limitations warrant consideration. The cross-sectional design precludes causal inferences about the directionality of relationships between SES and development. Longitudinal research would better establish temporal sequences and identify critical periods for intervention. Additionally, while the sample included urban and rural settings, it was limited to one Indian state, potentially limiting generalizability to other regions with different cultural and economic contexts. Future research should examine developmental trajectories longitudinally across diverse Indian settings to identify optimal timing and content for interventions addressing socioeconomic disparities in child development.

7. CONCLUSION

This study provides compelling evidence of substantial socioeconomic gradients in early childhood developmental milestone achievement among Indian children, with children from low SES families facing significant disadvantages across all developmental domains. The findings reveal that only 53.3% of low SES children achieve all age-appropriate milestones compared to 85.3% of high SES children, with communication and problem-solving skills showing particularly pronounced disparities. Maternal education and family income emerged as critical determinants of developmental outcomes, operating through multiple pathways including home environment quality, access to resources, and parenting practices. The nearly 20% of low SES children exhibiting delays in multiple domains simultaneously underscores the pervasive nature of socioeconomic disadvantage and the need for comprehensive, multi-faceted interventions. Urban-rural differences within low SES groups highlight how geographic and economic disadvantages compound to create heightened developmental risks. These findings have important policy implications, emphasizing the urgent need for strengthened and universally accessible early childhood development programs, continued investment in women's education, home-based parenting interventions, and integrated approaches addressing nutrition, healthcare, and cognitive stimulation simultaneously. Addressing socioeconomic inequalities in early childhood development requires coordinated efforts across sectors, sustained political commitment, and evidence-based interventions targeting the multiple pathways through which poverty compromises children's

developmental potential. Only through such comprehensive approaches can India ensure that all children, regardless of socioeconomic circumstances, have equitable opportunities to achieve their full developmental potential.

REFERENCES

1. Agarwal, D. K., Chauhan, P., Agarwal, K. N., Tripathi, A. M., & Agarwal, A. (2013). Early language development in Indian children: A population-based pilot study. *Indian Pediatrics, 50*(9), 855-859.
2. Barnett, W. S. (1995). Long-term effects of early childhood programs on cognitive and school outcomes. *The Future of Children, 5*(3), 25-50.
3. Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*(1), 371-399.
4. Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., ... & MacMillan, H. (2017). Nurturing care: Promoting early childhood development. *The Lancet, 389*(10064), 91-102.
5. Burger, K. (2010). How does early childhood care and education affect cognitive development? An international review of the effects of early interventions for children from different social backgrounds. *Early Childhood Research Quarterly, 25*(2), 140-165.
6. Desai, S., & Deshpande, A. (2018). Mothers' work patterns and children's cognitive achievement: Evidence from the India Human Development Survey. *Social Science Research, 71*, 108-124.
7. Fernald, L. C., Weber, A., Galasso, E., & Ratsifandrihamanana, L. (2011). Socioeconomic gradients and child development in a very low income population: Evidence from Madagascar. *Developmental Science, 14*(4), 832-847.
8. Glascoe, F. P., & Dworkin, P. H. (1995). The role of parents in the detection of developmental and behavioral problems. *Pediatrics, 95*(6), 829-836.
9. Hackman, D. A., Farah, M. J., & Meaney, M. J. (2010). Socioeconomic status and the brain: Mechanistic insights from human and animal research. *Nature Reviews Neuroscience, 11*(9), 651-659.
10. Koshy, B., Srinivasan, M., Zachariah, S. M., Karthikeyan, A. S., Roshan, R., Bose, A., ... & John, S. M. (2021). Developmental trends in early childhood and their predictors from an Indian birth cohort. *BMC Public Health, 21*(1), 1083.
11. Lu, C., Black, M. M., & Richter, L. M. (2016). Risk of poor development in young children in low-income and middle-income countries: An estimation and analysis at the global, regional, and country level. *The Lancet Global Health, 4*(12), e916-e922.
12. Parsons, C. E., Young, K. S., Rochat, T. J., Kringelbach, M. L., & Stein, A. (2015). Maternal mental health, and child growth and development, in four low-income and middle-income countries. *Journal of Epidemiology and Community Health, 69*(9), 866-875.
13. Paxson, C., & Schady, N. (2007). Cognitive development among young children in Ecuador: The roles of wealth, health, and parenting. *Journal of Human Resources, 42*(1), 49-84.

14. Sheel, H., Suárez, L., & Marsh, N. V. (2024). The use of the Parents' Evaluation of Developmental Status and Developmental Milestones in screening children for developmental delay in India. *Children, 11*(12), 1530.
15. Singh, A., Singh, A., & Mahapatra, B. (2019). Bridging the gaps in cognitive achievement in India: The crucial role of the integrated child development services in early childhood. *World Development, 124*, 104643.
16. Sk, R., Banerjee, A., & Rana, M. J. (2022). What matters most for early childhood development? Evidence from Malda district, India. *PLoS ONE, 17*(5), e0269393.
17. Squires, J., Bricker, D., & Twombly, E. (2009). *Ages & Stages Questionnaires: A parent-completed child monitoring system* (3rd ed.). Paul H. Brookes Publishing Co.
18. Sudfeld, C. R., McCoy, D. C., Danaei, G., Fink, G., Ezzati, M., Andrews, K. G., & Fawzi, W. W. (2015). Linear growth and child development in low-and middle-income countries: A meta-analysis. *Pediatrics, 135*(5), e1266-e1275.
19. Walker, S. P., Wachs, T. D., Grantham-McGregor, S., Black, M. M., Nelson, C. A., Huffman, S. L., ... & Richter, L. (2011). Inequality in early childhood: Risk and protective factors for early child development. *The Lancet, 378*(9799), 1325-1338.
20. WHO Multicentre Growth Reference Study Group. (2006). WHO Motor Development Study: Windows of achievement for six gross motor development milestones. *Acta Paediatrica, 95*(S450), 86-95.