EXTENDED ABSTRACT

## Background

According to the UN Population Division's 2019 report, India has 19% of the world's child population, highlighting their crucial role in national development (Baumann, 2021). Access to essentials like education, emphasized in the SDGs, is a fundamental right. School life expectancy (SLE), measuring the average duration of schooling a child can expect, reflects educational system performance and development. It is derived using life tables and event history analysis, considering factors like enrollment, dropout rates, and mortality. SLE is a key indicator for assessing education quality, tracking changes in school attendance over time, and projecting future enrollment. According to previous studies, prolonged absenteeism and exclusion often predict future attendance issues and increased dropout rates, linked to lower academic performance (Alexander et al., 2001; Gottfried, 2010). School Life Expectancy (SLE) declines with age, especially in regions with high repetition and dropout rates (Rigotti et al., 2013). Increases in enrollment do not always correlate with higher SLE (Shaw et al., 2005), as seen in India where dropout rates are high (Pandita, 2015). Factors like parental education, school quality, and infrastructure impact enrollment and retention (Dreze & Kingdon, 2001; Adukia, 2017). Studies show varied effects of government policies and infrastructure improvements on educational outcomes (Beattie et al., 2019; Arouria et al., 2019).

The literature review highlights a gap in research on school dropout rates and age-specific school entry in low- and middle-income countries, including India, where these issues significantly affect educational completion. Dropout is a major factor reducing enrollment and attendance, impacting not only India but other developing nations as well. Reliable data on age-specific enrollment rates remain limited, leading many studies to focus solely on calculating school life expectancy (SLE) for males and females. While completion rates have been widely studied, there is a lack of research examining the ages at which students complete each grade and the probability of advancing to the next year, especially for girls. Early marriage, a critical factor for female dropout, emphasizes the importance of completing education at the appropriate age to reduce dropout risks. SLE is a key component in estimating the Human Development Index (HDI), and while socio-economic inequalities in education are well-documented in both developed and developing countries, research on how these disparities evolve in terms of SLE is scarce.

Although many studies have explored factors such as enrollment, attendance, late school entry, dropout rates, and grade repetition, there remains a noticeable gap in understanding the factors that affect SLE in India. This study aims to bridge that gap and provide new insights.

## Data and Methods

This study analyzed data from three rounds of the National Sample Survey (NSS) conducted in India: the 64th (2007-08), 71st (2014), and 75th (2017-18). Managed by the National Statistical Office (NSO), the NSS provides extensive data on household social consumption, particularly focusing on education. Data collected includes both qualitative aspects, such as literacy rates, educational levels, and reasons for non-enrollment, and quantitative aspects, like education-related expenses.

The NSS employs a stratified multi-stage sampling design. In rural areas, data is gathered from Census villages, while in urban areas, it is gathered from blocks from the Urban Frame Survey (UFS). The sampling uses a Probability Proportional to Size with Replacement (PPSWR) method to select First Stage Units (FSUs), followed by simple random sampling of households.

The study focused on children aged 6 to 18 years. The sample sizes were 114,677 in the 64th round, 85,273 in the 71st, and 126,051 in the 75th round. Methods included survival analysis to estimate school life expectancy (SLE) and descriptive and multivariate analyses to assess socio-economic

disparities. Explanatory variables included residence, wealth, caste, religion, household size, literacy rates, education expenditure, school type, distance to school, availability of free education, and dropout rates.

## Results and Discussion

Table 1 shows that in 2007-08 and 2017-18, about 54% and 56% of children aged 6 to 18 were male. Urban residents represented one-third of the population in both years, rising to 40% in 2014. Enrollment rates improved significantly from 75% to 89%, while never-attended school rates fell from 9% to 6.65%.

Tables 2 and 3 reveal state-wise variations in expected years of schooling (EYS) for children. Nationally, EYS improved from 10.84 years in 2007-08 to 11.59 years in 2017-18, with Kerala having the highest EYS (12.22 years in 2007-08 and 12.44 years in 2017-18) and Bihar the lowest (9.52 years). Bihar saw the greatest increase (1.77 years) in EYS between 2007-08 and 2017-18, followed by Odisha (1.03 years). Urban children consistently had higher EYS than their rural counterparts, with urban areas showing 11.92 years in 2017-18 compared to 11.48 years in rural areas. Gender disparities persisted, with males having higher EYS (11.02 years in 2007-08 and 11.66 years in 2017-18) than females. State-wise, Kerala and Tamil Nadu led in EYS for both genders, while Bihar lagged behind. The lowest quintile saw Bihar and Punjab with the lowest EYS, whereas Kerala and Tamil Nadu had the highest. SC/ST/OBC children had lower EYS compared to others, with Kerala leading among SC/ST/OBC and Bihar among the lowest. Hindu children generally had higher SLE compared to other religious groups, with Kerala and Tamil Nadu at the top, and Bihar at the bottom.

Table 4 presents the results of linear regression analysis on school life expectancy (SLE) among children in India. The analysis revealed a significant positive association between adult literacy and SLE, with adult literacy contributing notably to SLE. Conversely, household size (Coefficient = -0.786) and dropout rate (Coefficient = -0.317) negatively impacted SLE. The adjusted $R^2$ for the overall model was 0.64, indicating a strong correlation between SLE and the explanatory variables.

For male children specifically, a 10% increase in adult literacy led to a 15% increase in SLE (Coefficient = 1.521). Free education had a positive effect (Coefficient = 0.207), while household education expenditure showed a slight positive impact (Coefficient = 0.047). However, household size (Coefficient = -0.666), distance to school (Coefficient = -0.244), enrollment in government schools (Coefficient = -0.218), and dropout rate (Coefficient = -0.285) negatively affected SLE. The model's adjusted $R^2$ was 0.77, explaining 77% of the variation in SLE among males.

Overall, SLE was positively associated with being from scheduled tribes/castes, Muslim, adult literacy rate, and education expenditure. Increased household size (Coefficient = -0.678), distance to school (Coefficient = -0.577), enrollment in government schools (Coefficient = -0.012), and dropout rate (Coefficient = -0.235) reduced SLE. The adjusted $R^2$ for this model was 0.747, indicating that 75% of the variation in SLE could be explained by the variables used.

## Discussion

At the national level, school life expectancy (SLE) has improved across all groups, though not uniformly across states. High-income states like Kerala, Tamil Nadu, and Maharashtra have higher expected years of schooling, while Bihar, Uttar Pradesh, Odisha, and Rajasthan lag behind. Male, urban, and wealthier children saw greater improvements, while females, rural children, and poorer households tend to enroll later and face more barriers.

Uneven progress was observed in completing primary and elementary education, with Kerala and Tamil Nadu achieving near 100% success, unlike states such as Bihar and Uttar Pradesh. Household size, wealth, and distance from schools significantly influence SLE, with larger households and greater

distances negatively impacting school attendance. Financial burdens and indirect costs continue to pose barriers. Higher adult literacy rates positively affect SLE, enhancing access to education and related opportunities, consistent with findings from previous studies in low- and middle-income countries.

## Conclusion

The study confirmed the survival method's effectiveness in creating school life tables for India. It found that late enrollment significantly reduces expected schooling years, irrespective of demographic factors. Improvements in school life expectancy are noted, but socioeconomic disparities persist, influenced by urbanization, household size, literacy rates, and access to education. The study suggests several policy actions: promote timely school enrollment, address gender disparities, evaluate the impact of educational policies on inequalities, enhance data quality, and adopt a holistic approach. Consistent attendance is crucial for academic and emotional development, necessitating collaboration among parents, educators, and communities to support students.

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**Results of the linear regression assessing the determinant of school life expectancy for India, 2007-2018.**

| Variables | Total | | Female | | Male | |
|---|---|---|---|---|---|---|
| Unadjusted | Unadjusted | Adjusted | Unadjusted | Adjusted | Unadjusted | Adjusted |
| Coefficient (95% CI) | Coefficient (95% CI) | | Coefficient (95% CI) | Coefficient (95% CI) | Coefficient (95% CI) | Coefficient (95% CI) |
| Scheduled castes/tribes | -0.096 (-0.259,0.066) | 0.158** (0.028,0.287) | -0.151 (-0.32,0.019) | 0.068 (-0.051,0.188) | -0.081 (-0.265,0.102) | 0.084 (-0.039,0.208) |
| Muslim | -0.002 (-0.071,0.068) | 0.056** (0.014,0.099) | 0.041 (-0.023,0.106) | 0.025 (-0.019,0.069) | 0.094** (0.021,0.167) | 0.03 (-0.011,0.071) |
| Urban population | 0.319***(0.174,0.465) | -0.015 (-0.116,0.086) | 0.327***(0.169,0.485) | -0.044 (-0.167,0.079) | 0.315***(0.152,0.478) | 0.057 (-0.046,0.159) |
| Household size | -2.131***(-2.953,-1.309) | -0.678** (-1.27,-0.086) | -2.376***(-3.218,-1.535) | -0.786** (-1.477,-0.095) | -1.975***(-2.937,-1.013) | -0.666** (-1.289,-0.043) |
| Adult literacy rate | 2.4***(1.971,2.829) | 1.593***(1.166,2.02) | 1.03***(0.502,1.557) | 0.933***(0.512,1.354) | 2.065***(1.795,2.336) | 1.521***(1.179,1.863) |
| Free education | -0.3** (-0.53,-0.07) | 0.216** (0.002,0.429) | -0.348** (-0.609,-0.086) | 0.229 (-0.031,0.489) | -0.276** (-0.519,-0.034) | 0.207** (0.008,0.407) |
| Distance from house to school | -1.407***(-1.925,-0.89) | -0.577** (-1.06,-0.094) | -0.722***(-1.148,-0.296) | -0.137 (-0.509,0.236) | -0.831***(-1.272,-0.39) | -0.244 (-0.592,0.104) |
| Government school | -0.401** (-0.724,-0.077) | -0.12 (-0.413,0.173) | -0.582***(-0.986,-0.178) | -0.183 (-0.499,0.134) | -0.403** (-0.794,-0.012) | -0.218 (-0.492,0.056) |
| Education expenditure | 0.391***(0.287,0.494) | 0.194***(0.101,0.286) | 0.398***(0.274,0.522) | 0.26***(0.123,0.398) | 0.417***(0.309,0.525) | 0.047 (-0.061,0.156) |
| Dropout rate | -0.639***(-0.787,-0.492) | -0.235***(-0.362,-0.109) | -0.538***(-0.688,-0.387) | -0.317***(-0.443,-0.191) | -0.644***(-0.819,-0.47) | -0.285***(-0.416,-0.154) |
| Constant | 6.209***(3.022,9.395) | 7.702***(4.104,11.299) | | | | 6.910***(4.340,9.430) |
| **R2** | | **0.7712** | | **0.6715** | | **0.7919** |
| **Adjusted R2** | | **0.7474** | | **0.6362** | | **0.7697** |