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Household Income, Debt Service Ratio, and Early Childhood Education Participation in Indonesia

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ABSTRACT

Purpose: This study examines the relationship between household financial conditions and children's participation in Early Childhood Education (ECE) institutions in Indonesia, focusing on household income and Debt Service Ratio (DSR).

Research Method: This study employs a quantitative approach using secondary data from the Indonesia Family Life Survey (IFLS-5) conducted in 2014–2015 across 13 provinces. The final sample consists of 775 household observations. Preschool participation is measured as a binary variable covering ECE, kindergarten, and playgroup participation. The analysis applies Binary Logistic Regression using Maximum Likelihood Estimation (MLE).

Results and Discussion: The findings show that household income is positively associated with preschool participation across all models. DSR also shows statistically significant associations across several specifications, although the relationship should be interpreted with caution, as DSR reflects only the household debt repayment burden. Stronger associations are identified in regency areas than in municipalities.

Implications: The study highlights the importance of improving household economic resilience and equitable access to preschools.

Originality: This study integrates the household debt repayment burden into the analysis of preschool participation using Indonesian household-level survey data.

Keywords: early childhood education; debt service ratio; household income; preschool participation; ECE; DSR; IFLS.

1. Introduction

Early Childhood Education (ECE) is a strategic investment in human capital formation. Investment during this phase yields a rate of return of 7% to 10% per year, significantly higher than that of any other educational level (Heckman, 2011). This is because children's cognitive and non-cognitive development is most elastic between ages 0 and 6 (Cunha & Heckman, 2007). Globally, preschool participation has been proven to enhance school readiness, primary school test scores (Berlinski *et al.,* 2009), and long-term literacy and numeracy skills (UNICEF, 2019). In Indonesia, ECE serves as a crucial foundation for realizing the "2045 Golden Generation" vision. The government has established a 13-year compulsory education policy framework, which adds one year of preschool as a mandatory prerequisite. However, the reality on the ground reveals a substantial participation gap. According to Badan Pusat Statistik (2025), Indonesia's Gross Enrollment Ratio (GER) for ECE reached only 36.19%, remaining far below the

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Sustainable Development Goals (SDGs) target of universal access by 2030. The low PISA scores of Indonesian students in 2022, particularly in numeracy (366 compared with the OECD average of 472), further indicate persistent weaknesses in early learning readiness.

This condition is exacerbated by relatively low public investment in ECE, which accounts for only 0.1% of GDP (World Bank, 2021; Suharti, 2013). As Kim et al. (2022) found, political commitment to ECE is often not accompanied by adequate funding, while Neuman and Powers (2021) emphasized that early childhood education remains a lower policy priority than other educational levels. Consequently, access to preschool education in Indonesia continues to rely heavily on household financial capacity. This dependence creates unequal opportunities for children from economically vulnerable households, particularly in regions characterized by disparities in infrastructure, institutional availability, and educational accessibility. Despite the well-documented benefits of preschool education, access to ECE in Indonesia remains constrained by household financial limitations, especially among low-income families with unstable income conditions and limited access to formal financial services (World Bank, 2014; Lochner & Monge-Naranjo, 2011; Sosu & Schmidt, 2022). Approximately 40% of the Indonesian population is categorized as financially vulnerable (BPS, 2024). Paradoxically, children from disadvantaged households are often those who obtain the greatest marginal benefits from early educational investment (Magnuson *et al.,* 2004; Currie, 2001). Under such conditions, households frequently face difficult financial trade-offs between meeting short-term consumption needs and investing in children's early education (Suryadarma *et al.,* 2006; Lochner & Monge-Naranjo, 2011).

Recent empirical studies consistently indicate that household economic conditions play an important role in shaping ECE participation in Indonesia. Ulfa & Djamaluddin (2023), using probit regression analysis based on the 2020 Indonesia National Socio-Economic Survey, found that per capita income was significantly and positively associated with parents' decisions to enroll their children in preschool education. Similarly, Takerubun & Marsisno (2021) employed binary logistic regression using regional data from West Papua and identified average monthly household expenditure as a significant predictor of PAUD participation. These findings reinforce the argument that household economic capacity remains a central determinant of preschool participation decisions, particularly in areas characterized by socioeconomic inequality and uneven educational access. Several additional studies indirectly support the relationship between household financial conditions and early childhood development outcomes. Pujihasvuty *et al.,* (2024), examining 20,413 Indonesian households, found that families with higher levels of economic resilience were significantly more likely to engage in effective early childhood parenting practices ($P < 0.001$). Although the study focused primarily on parenting practices rather than preschool participation itself, the findings suggest that household financial stability may influence broader investments in children's development. On the institutional side, Monica et al. (2025) reported that the heavy dependence of ECE institutions on parental tuition fees reduced educational accessibility for low-income households. In addition, Kusumah (2025) found that the Family Hope Program (PKH), as a household financial support mechanism, contributed positively to increasing preschool enrollment rates alongside infrastructure expansion. Collectively, these studies indicate that household financial conditions influence ECE participation both directly through affordability and indirectly through household capacity to support early childhood development.

Income is widely recognized as an important determinant of ECE participation in developing countries such as India, Argentina, and Indonesia (Choudhury *et al.,* 2023; Tuñón & Martínez, 2021). However, existing studies primarily focus on absolute income or expenditure measures while paying limited attention to household financial pressure arising from debt repayment obligations. Current

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empirical discussions generally assume that higher income automatically reflects greater capacity for educational investment, even though households with relatively high incomes may still experience liquidity constraints due to substantial debt-servicing commitments. In this context, the Debt Service Ratio (DSR), which reflects the proportion of household income allocated to debt repayment, may provide additional insight into the household financial pressure associated with preschool participation decisions.

In line with the concept of discretionary income, households with substantial debt repayment obligations may have reduced disposable income available for educational expenditures (Keese, 2009; Mullainathan & Shafir, 2013). Nevertheless, the relationship between household debt burden and preschool participation remains theoretically ambiguous. On the one hand, debt obligations may reduce household liquidity and limit households' capacity for educational spending. On the other hand, access to credit may also reflect broader socioeconomic advantages, including financial inclusion, asset ownership, or income stability. Therefore, the relationship between DSR and ECE participation should be interpreted as an empirical association rather than direct causal evidence regarding household behavior. Previous studies have also paid limited attention to the distinction between household income and household cash-flow pressure when explaining preschool participation decisions. Moreover, empirical evidence regarding the role of household debt repayment burdens in the Indonesian ECE context remains scarce. To address this gap, this study examines the relationship between household income, Debt Service Ratio (DSR), and ECE participation using household-level data from the Indonesia Family Life Survey (IFLS). Rather than positioning debt as a direct causal mechanism, this study conceptualizes DSR as an indicator of household financial pressure associated with decisions about preschool participation. This approach is expected to provide a more nuanced understanding of how household financial conditions relate to early childhood educational participation in Indonesia.

The findings of this study are expected to contribute to discussions regarding educational accessibility and household financial vulnerability in developing countries. The novelty of this study lies in incorporating household debt repayment burden into the analysis of ECE participation while distinguishing household financial pressure from conventional income-based measures. In addition, the study compares patterns between regencies (kabupaten) and municipalities (kota) as administrative classifications, without equating them directly with rural and urban categories. Through this approach, the study seeks to provide a more balanced empirical foundation for understanding household financial conditions associated with preschool participation in Indonesia.

The remainder of this paper is organized as follows. Section 2 provides a literature review and hypothesis development. Section 3 presents the research method and design. Section 4 presents the results and discussion; Section 5 provides Concluding Remarks and Recommendations.

2. Literature Review and Hypothesis Development

2.1 Human Capital Investment in Early Childhood Education

The concept of human capital, pioneered by Adam Smith, defines individual abilities as economic assets that can be enhanced through sustained investment (Sudirman & Ramadonna, 2020). The classical human capital theory developed by Schultz (1961) and Becker (1964, 1993) asserts that education is a strategic investment that directly increases future productivity. Continuous investment in human competencies and capability development is also considered essential for strengthening long-term

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competitive advantage in the modern era (Umayna *et al.,* 2024). In this context, Early Childhood Education (ECE), including preschool institutions such as kindergartens and playgroups, occupies a critical position because the age range of 0–6 years is the period of greatest elasticity in cognitive and non-cognitive development (Cunha & Heckman, 2007).

The significance of ECE is reinforced by the "Heckman Curve," which demonstrates that investments during the preschool years yield a significantly higher rate of return compared to interventions in adulthood (Heckman, 2011). This advantage operates through the mechanisms of self-productivity and dynamic complementarity, in which foundational skills developed during ECE serve as the essential groundwork for success at subsequent educational levels (Heckman, 2000, 2006). Empirical evidence suggests that preschool participation contributes not only to cognitive achievement but also to the development of non-cognitive skills such as self-regulation, discipline, and social adaptation, which may persist into later stages of education (Berlinski *et al.,* 2009; Barnett, 2008; Heckman & Masterov, 2007).

The success of human capital accumulation is closely associated with children's developmental environments. According to the Bioecological Model, child development emerges from interactions among family conditions, educational institutions, and broader social environments (Bronfenbrenner, 1979). Within this framework, the Family Investment Model suggests that household financial capacity influences the availability of educational resources, developmental stimulation, and learning opportunities during early childhood (Kaushal *et al.,* 2011; Yeung *et al.,* 2002). Previous empirical studies consistently indicate that household economic conditions are associated with preschool participation decisions. Household income and expenditure are frequently identified as important determinants of ECE enrollment, particularly in developing countries where preschool access remains highly dependent on household resources. Nevertheless, most previous studies focus primarily on absolute income measures and provide limited discussion regarding household financial pressure arising from debt repayment obligations or liquidity constraints. In addition, previous studies rarely distinguish between household income and household cash flow pressure when explaining ECE participation. Households with relatively high incomes may still experience financial constraints if a substantial proportion of their income is allocated to debt repayment. Consequently, relying solely on income indicators may provide an incomplete understanding of household financial conditions associated with preschool participation decisions.

Beyond economic returns, the Capability Approach emphasizes that ECE contributes to expanding children's basic capabilities and opportunities from an early age (Sen, 1999). Consequently, preschool participation decisions may reflect the interaction between household financial conditions, educational preferences, and expectations regarding children's future development outcomes (Gayle *et al.,* 2018; Wang *et al.,* 2026).

2.2 Household Income and Early Childhood Education

Household financial capacity is a fundamental determinant of a family's access to Early Childhood Education (ECE) services. Theoretically, higher income levels expand a family's budgetary room to allocate expenditures beyond subsistence needs, including early educational investments for their children (Becker, 1993). In Indonesia, economic barriers remain a significant issue in preschool participation. Despite policy efforts to expand access, national evidence indicates that participation in ECE continues to vary substantially across socioeconomic groups (World Bank, 2020). Children from

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economically disadvantaged households generally have fewer opportunities to participate in preschool due to financial constraints, unequal educational access, and differences in household resources (Hutton *et al.,* 2023).

The relationship between household income and preschool participation can be understood conceptually through both material investment mechanisms and household psychosocial conditions that shape children's developmental environments. The first pathway is explained through the Family Investment Model (FIM), in which higher income enhances parents' ability to allocate material resources, educational opportunities, and time to support children's early learning (Xie *et al.,* 2020). Household income influences the quantity and quality of educational resources available at home, including books, learning materials, and access to preschool institutions with better facilities and services (Yeung & Chen, 2023). Households with adequate income tend to internalize the value of ECE as a profitable long-term investment (Kaushal *et al.,* 2011; Yeung *et al.,* 2002). Conversely, households experiencing financial constraints may prioritize immediate consumption and basic household needs over preschool expenditures, particularly because the long-term benefits of ECE are not immediately observable (Attanasio *et al.,* 2013). The second pathway is reflected in the Family Stress Model (FSM), which emphasizes the relationship between economic pressure and household psychosocial conditions. Low household income is frequently associated with chronic financial stress, which may reduce the quality of parenting interactions, emotional support, and cognitive stimulation provided within the household environment (McLoyd, 1998; Landale *et al.,* 2016). Specifically, research by Darojah et al. (2024) in rural Indonesia found that low household income was negatively associated with the probability of children's participation in ECE institutions. This finding is consistent with cross-country evidence indicating that household financial constraints are associated with lower preschool participation rates in many developing countries (Kowalski *et al.,* 2023; Sosu & Pimenta, 2023).

Although household income is consistently identified as an important determinant of preschool participation, previous studies also acknowledge that broader household and contextual characteristics, including parental education, maternal employment, household structure, regional accessibility, and institutional availability, influence educational decisions. Consequently, household income should be understood as one component within a broader set of socioeconomic factors associated with ECE participation decisions.

2.3 Debt Burden and Early Childhood Education

At the household level, access to preschool education is closely associated with household liquidity conditions and the availability of financial resources. Unlike higher education financing, formal financial instruments specifically designed to support preschool participation remain limited, causing ECE expenditures to rely heavily on household disposable income and short-term financial capacity (Nores, 2020). These liquidity constraints may limit households' ability to make long-term educational investments, particularly because preschool expenditures are often perceived as nonessential relative to basic household consumption needs during periods of economic pressure (Hazarika, 2001; Lochner & Monge-Naranjo, 2011). Households with relatively high Debt Service Ratios (DSR) may experience reduced disposable income after meeting debt repayment obligations, potentially limiting the financial resources available for preschool-related expenditures (Mullainathan & Shafir, 2013; Nores & Barnett, 2010).

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For economically vulnerable households, borrowing may function as a coping mechanism to stabilize consumption during periods of financial difficulty. However, high repayment obligations may simultaneously increase household financial pressure and reduce flexibility in allocating educational expenditures (Morduch, 1995; Ybrayev *et al.,* 2026). When preschool costs compete with debt repayment commitments and other household expenditures, participation in ECE may become more financially difficult for some households (González-Motos & Saurí Saula, 2023; Tunç & Kılınç, 2023). Salam et al. (2021) emphasized that household financial vulnerability remains an important consideration in improving educational accessibility, particularly among economically disadvantaged families. Previous studies suggest that the relationship between household debt and educational outcomes is not entirely uniform. Some forms of financial access may help households manage short-term liquidity constraints, while excessive repayment burdens may increase financial vulnerability and reduce expenditure flexibility (Berger & Houle, 2019; Yazejian *et al.,* 2015). Consequently, the Debt Service Ratio (DSR) may reflect household financial pressure stemming from the allocation of disposable income to educational and non-educational expenditures. However, because DSR does not directly identify the purpose, timing, or quality of household debt, its relationship with preschool participation should be interpreted with caution as an empirical association rather than as direct causal evidence (Tolani & Brooks-Gunn, 2008; Axford & Berry, 2023). In addition, household debt burden represents only one dimension of household financial conditions. Preschool participation decisions may also be associated with parental education, employment conditions, household structure, regional accessibility, institutional availability, and other socioeconomic characteristics that are not fully captured through DSR measures alone.

2.4 Hypothesis Development

2.4.1 The Influence of Household Income

Income is a fundamental resource in educational financing that directly mitigates household budget constraints and expands opportunities for human capital investment (Becker, 1964; Blau, 1999; Dahl & Lochner, 2012). Theoretically, household income may influence Early Childhood Education (ECE) participation through both material investment capacity and household psychosocial conditions that support children's developmental environments. According to the Family Investment Model (FIM), higher income enhances parents' capacity to allocate economic resources to provide supportive learning environments, increase access to educational facilities, and enable greater involvement in early stimulation activities (Kaushal *et al.,* 2011; Yeung *et al.,* 2002). Yeung and Chen (2023) emphasize that household income is closely associated with the quantity and quality of educational resources available within the home environment, which may support children's school readiness. Households with adequate income tend to internalize the value of ECE as a profitable long-term investment (Kaushal *et al.,* 2011; Yeung *et al.,* 2002).

Beyond the material dimension, the Family Stress Model (FSM), developed by McLoyd (1998) and Conger and Donnellan (2007), posits that household income stability may reduce economic pressure and foster more supportive parenting environments. Adequate household income may reduce parental financial stress and increase the opportunity for responsive parenting and cognitive stimulation within the household environment. From the perspective of developing countries, empirical evidence from Sosu and Pimenta (2023) confirms that socioeconomic status remains an important determinant of preschool participation and early literacy outcomes. Consequently, previous studies generally position household

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income as an important socioeconomic factor associated with children's cognitive and non-cognitive development during early childhood (Wang *et al.,* 2026; Xie *et al.,* 2020).

Previous studies in Indonesia also indicate that household economic conditions are associated with decisions about preschool participation. Yostiana Bella Ulfa and S. Djamaluddin (2023), using probit regression analysis, found that household income positively correlated with parents' decisions to enroll children in ECE institutions. Similarly, Corsensia Takerubun and Waris Marsisno (2021) reported that household expenditure significantly influenced preschool participation in West Papua. These findings strengthen the argument that household financial capacity remains an important factor associated with educational accessibility during early childhood. Nevertheless, preschool participation decisions may also be associated with broader household and contextual characteristics, including parental education, household structure, institutional accessibility, and regional socioeconomic disparities. Therefore, the relationship between household income and ECE participation should be interpreted within a broader socioeconomic context rather than as direct causal evidence.

Based on the theoretical arguments and empirical findings discussed above, this study proposes the following hypothesis regarding the statistical relationship between household income and preschool participation:

H1: *Household income is positively associated with the probability of children's participation in ECE institutions.*

2.4.2 The Influence of Debt Burden (Debt Service Ratio)

Debt repayment obligations may affect household liquidity and reduce disposable income for educational expenditures, particularly among financially vulnerable households (Keese, 2009; Lochner & Monge-Naranjo, 2011). At the household level, access to preschool education remains highly dependent on family financial capacity, as formal financial instruments specifically designed to support participation in Early Childhood Education (ECE) remain limited (Nores, 2020). Consequently, preschool expenditures often compete directly with other household obligations, including debt repayment and essential consumption.

These liquidity constraints may limit households' ability to make long-term educational investments, particularly because preschool expenditures are often perceived as nonessential relative to basic household consumption needs during periods of economic pressure (Hazarika, 2001; Lochner & Monge-Naranjo, 2011). Households with relatively high Debt Service Ratios (DSR) may experience reduced disposable income after meeting debt repayment obligations, potentially limiting the financial resources available for preschool-related expenditures (Mullainathan & Shafir, 2013; Nores & Barnett, 2010). Mullainathan and Shafir (2013), through Scarcity Theory, explain that persistent financial pressure may influence household decision-making and increase trade-offs between short-term obligations and long-term investments. Attanasio et al. (2013) further suggest that households experiencing financial pressure may prioritize short-term financial stability when allocating household expenditures. Previous studies also indicate that high repayment obligations may be associated with reduced expenditure flexibility, particularly among households with limited financial assets (Ybrayev *et al.,* 2026; Tunç & Kılınç, 2023).

Research by Xiao and Yao (2022) found that financial stress associated with debt burdens may reduce the quality of household resource allocation for educational purposes. In Indonesia, Maulida et al. (2023) demonstrated trade-offs between short-term debt repayment obligations and long-term

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investment decisions. Since ECE is generally not considered compulsory education, some households may prioritize debt repayment and essential expenditures over preschool participation (Bendini & Devercelli, 2022). Nevertheless, the relationship between household debt burden and preschool participation remains theoretically ambiguous. Debt obligations may reflect financial vulnerability and liquidity pressure, but access to debt may also correlate with broader household financial access and consumption smoothing strategies. Therefore, Debt Service Ratio (DSR) should not be interpreted as direct evidence of household behavioral mechanisms, but rather as an indicator of household financial pressure associated with decisions about preschool participation.

Existing studies suggest that household financial obligations may influence expenditure allocation decisions related to preschool participation, although the direction and magnitude of this relationship remain empirically uncertain. In addition, household debt burden represents only one dimension of household financial conditions and may interact with other socioeconomic characteristics that are not fully captured by the current model specification.

Based on the literature reviewed above, this study proposes the following hypothesis regarding the relationship between household debt repayment burden and preschool participation:

H2: *Household debt burden (Debt Service Ratio/DSR) is significantly associated with the probability of children's participation in ECE institutions.*

3. Research Method

This study employs a quantitative research approach to examine the relationship between household financial conditions and children's participation in Early Childhood Education (ECE) institutions in Indonesia. The study utilizes secondary household-level data derived from the Indonesia Family Life Survey (IFLS-5), conducted in 2014–2015 by RAND Corporation in collaboration with SurveyMETER. The IFLS covers 13 provinces, representing approximately 83% of Indonesia's population, and is widely recognized as one of the most comprehensive longitudinal socioeconomic surveys in Indonesia. This extensive coverage ensures that the research findings are highly generalizable to Indonesian household conditions.

The analytical sample was restricted to households with children in the preschool age category and to households with complete observations for all variables included in the estimation model. Observations with missing values in the dependent or independent variables were excluded via listwise deletion to ensure consistent estimation. The final analytical sample comprises 775 household observations, including 550 households in regencies (kabupaten) and 225 in municipalities (kota). These classifications are treated as administrative regional categories and are not interpreted directly as equivalent to rural and urban classifications.

Variables included in this study are classified into dependent, independent, and control variables to facilitate econometric estimation. The dependent variable is children's participation in Early Childhood Education (ECE), measured as a binary indicator: 1 denotes participation in preschool institutions, and 0 otherwise. To ensure terminological consistency, ECE in this study refers broadly to preschool participation, while kindergarten (TK/kinder) and playgroup (playgr) are treated as institutional subcategories of Early Childhood Education services. To observe participation dynamics across different institutional characteristics, the analysis is conducted across three levels: general early childhood education participation (ECE), Kindergarten (kinder), and Playgroups (playgr).

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The primary independent variables represent household economic conditions: household income, transformed into its natural logarithm (inc), to reduce data skewness, and the Debt Service Ratio (DSR), which represents the household debt repayment burden. The Debt Service Ratio (DSR) is calculated as the proportion of routine household debt installment payments relative to total household income. In this study, DSR is interpreted as an indicator of household financial pressure rather than direct evidence regarding the purpose or quality of household debt. Additionally, the child's age is incorporated as a control variable to account for individual developmental readiness, which naturally influences the probability of entering formal education.

The study acknowledges that preschool participation decisions may also be associated with additional household and contextual characteristics, including parental education, maternal employment, household structure, institutional accessibility, and regional socioeconomic conditions. However, these variables were not fully incorporated into the present specification due to data limitations and the model's scope.

The data processing and analysis were conducted in several technical stages. Initially, descriptive screening procedures were conducted to identify extreme observations in the income and DSR variables in order to improve estimation stability. An Independent Samples T-test was subsequently employed to examine differences in household economic characteristics between regency (kabupaten) and municipality (kota) groups. Given the binary nature of the dependent variable, the primary estimation method employed in this study is Binary Logistic Regression using Maximum Likelihood Estimation (MLE). The econometric model is specified as follows:

$$\text{logit}(P_i) = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 inc_i + \beta_2 dtsr_i + \beta_3 age_i + \varepsilon_i \quad (1)$$

Where:
P_represents the probability of children's participation in ECE institutions.
inc_idenotes logged household income;
DSR_irepresents the household Debt Service Ratio;
age_irefers to the child's age; and
ε_iis the error term.

The estimated coefficients from the logistic regression model are interpreted as log-odds rather than direct probability changes. Therefore, the findings are discussed in terms of statistical associations between variables and the probabilities of preschool participation, without implying direct causal relationships. To examine potential regional heterogeneity, the estimations were conducted sequentially using the full sample and separate sub-sample analyses for regency (kabupaten) and municipality (kota) groups. Given the observational nature of the data and the limited availability of several household-level variables, the estimated relationships in this study should be interpreted as associative rather than causal. Potential endogeneity, omitted variable bias, and reverse causality may still influence the estimated relationships between household financial conditions and preschool participation.

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4. Results and Discussion

4.1 Analysis Results

4.1.1 Descriptive Statistics

Table 1. Descriptive Statistics

Panel A. Mean Comparison Across Administrative Regions

Variable	Full Sample Mean	Regency Mean	Municipality Mean	Difference (Municipality – Regency)	p-value
ECE	0.650	0.656	0.636	-0.021	0.5819
Kindergarten	0.560	0.567	0.542	-0.025	0.5243
Playgroup	0.262	0.249	0.293	0.044	0.2040
Income (inc)	14.934	14.816	15.225	0.409	0.0022***
Debt Service Ratio (DSR)	4.388	4.540	4.016	-0.525	0.4082
Age	4.697	4.633	4.853	0.221	0.0163**
Observations	775	550	225	775	

Panel B. Full Sample Distribution Statistics

Variable	N	Mean	SD	Min	p25	Median	p75	Max
ECE	775	0.650	0.477	0	0	1	1	1
Kindergarten	775	0.560	0.497	0	0	1	1	1
Playgroup	775	0.262	0.440	0	0	0	1	1
Income (inc)	775	14.934	1.693	10.819	13.590	14.910	16.260	18.826
Debt Service Ratio (DSR)	775	4.387	8.009	0.010	0.317	1.093	4.800	48.000
Age	775	4.696	1.161	3	4	5	6	6

Panel C. Median Comparison Across Administrative Regions

Variable	Full Sample Median	Regency Median	Municipality Median	Difference	p-value
ECE	1	1	1	0	0.5816
Kindergarten	1	1	1	0	0.5239
Playgroup	0	0	0	0	0.2040
Income (inc)	14.910	15.306	14.372	-0.934	0.0082***
Debt Service Ratio (DSR)	1.093	1.099	1.005	-0.094	0.9339
Age	5	5	5	0	0.0221**

Notes:

*** p < 0.01, ** p < 0.05, * p < 0.10.

Regency and municipality classifications represent administrative regional categories.

Table 1 presents the descriptive statistics for all variables used in the study, for the full sample and for the administrative regional groupings of regencies (kabupaten) and municipalities (kota). The descriptive analysis is intended to provide an initial overview of household financial characteristics and preschool participation patterns prior to multivariate estimation.

The descriptive data indicate that the average participation rate of children in Early Childhood Education (ECE) institutions is 65.0%. Kindergarten participation (56.0%) is substantially higher than playgroup participation (26.2%). Statistical testing further indicates no statistically significant differences in average preschool participation between regency and municipality groups ($p > 0.05$). This finding suggests that participation rates are relatively comparable across administrative regions, although differences in household financial conditions remain observable.

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The descriptive statistics reveal significant differences in household economic conditions between regency and municipality groups. Average logged household income (inc) in municipalities (15.225) is significantly higher than in regencies (14.816), with a p-value of 0.0022. For the Debt Service Ratio (DSR), the overall mean value is 4.388%. Although the average DSR in regencies (4.540%) is slightly higher than in municipalities (4.016%), the difference is statistically insignificant. Nevertheless, the relatively large standard deviation (8.009) and the maximum DSR value reaching 48% indicate substantial variation in household debt repayment burdens across observations. These figures suggest that certain households allocate a considerable proportion of their income to routine debt installment obligations.

The average age of children included in the sample is 4.69 years. A statistically significant difference exists between municipalities (4.85 years) and regencies (4.63 years), with a p-value of 0.0163. This finding indicates that children observed in municipal groups tend to enter preschool education at slightly older ages than those in regency groups.

4.1.2 Correlation Matrix

Table 2 presents the correlation matrix among the research variables prior to multivariate estimation. The correlation analysis is intended to provide preliminary insights into the direction and strength of bivariate relationships among household financial conditions, demographic characteristics, and preschool participation.

The results show that household income (inc) has statistically significant positive correlations with all preschool participation categories, including general ECE participation (0.142), kindergarten participation (0.175), and playgroup participation (0.155), all significant at the 1% level. These findings indicate that higher household income is associated with greater participation in preschool institutions. In contrast, the Debt Service Ratio (DSR) variable does not demonstrate statistically significant direct correlations with preschool participation variables. However, DSR shows a strong negative correlation with income (-0.517), suggesting that households with lower incomes tend to experience higher debt repayment burdens. This pattern indicates household financial pressure among economically vulnerable groups, although the bivariate results alone are insufficient to infer causal mechanisms underlying educational participation decisions. Child age also demonstrates positive and statistically significant correlations with ECE participation (0.200), kindergarten participation (0.189), and playgroup participation (0.123). This finding suggests that older children in the preschool age group are more likely to attend formal preschool institutions.

Table 2. Correlation Matrix

Variable	ECE	Kindergarten	Playgroup	Income (inc)	DSR (DSR)	Age
ECE	1.000					
Kindergarten	0.827***	1.000				
Playgroup	0.437***	0.114**	1.000			
Income (inc)	0.142***	0.175***	0.155***	1.000		
Debt Service Ratio (DSR)	0.024	-0.006	0.016	-0.517***	1.000	
Age	0.200***	0.189***	0.123***	0.007	-0.007	1.000

Notes:

*** p < 0.01, ** p < 0.05, * p < 0.10.

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4.1.3 Logistic Regression Results

Table 3 presents the logistic regression estimation results examining the relationship between household financial conditions and preschool participation. The reported coefficients represent log-odds estimates rather than direct probability changes. Therefore, the findings should be interpreted as statistical associations between variables and preschool participation outcomes.

The income variable (inc) demonstrates positive and statistically significant coefficients across all estimated models. Household income is positively associated with general ECE participation (0.278), playgroup participation (0.312), and kindergarten participation (0.297), all significant at the 1% level. These findings are consistent with the Family Investment Model, which suggests that greater household financial resources are associated with broader educational opportunities and improved access to preschool institutions. The Debt Service Ratio (DSR) variable also shows positive and statistically significant coefficients across several specifications. However, these findings should be interpreted with caution because DSR only reflects the household debt repayment burden and does not provide information on the purpose, quality, timing, or source of household debt. Accordingly, the positive coefficients cannot be interpreted as direct evidence that household debt facilitates preschool participation. Instead, the results indicate a statistical association between household debt burden and preschool participation within the observed sample. The child age variable exhibits the strongest coefficients in the regression models, particularly for general ECE participation (0.370). This finding suggests that older preschool-aged children are more likely to attend preschool institutions.

In addition, the Pseudo R-squared values remain relatively modest, ranging from 0.057 to 0.058. These values indicate that the explanatory variables included in the present model account for only a limited proportion of variation in preschool participation decisions. Consequently, other household, institutional, and contextual factors not included in the current specification may also play important roles in shaping preschool participation outcomes.

Table 3. Logistic Regression Results: Early Childhood Participation

Variables	ECE Participation	Playgroup Participation	Kindergarten Participation
Income (inc)	0.278***	0.312***	0.297***
	(3.07)	(3.29)	(3.31)
Debt Service Ratio (DSR)	0.038***	0.039**	0.031***
	(2.68)	(2.37)	(2.69)
Age	0.370***	0.264***	0.343***
	(4.28)	(2.73)	(4.06)
Constant	-5.387***	-7.173***	-5.925***
	(-3.63)	(-4.51)	(-4.12)
Pseudo R^2	0.058	0.057	0.057
Observations	775	775	775

Notes:
z-statistics in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.10.

4.1.4 Regional Heterogeneity Analysis: Regency and Municipality

Table 4 presents the logistic regression estimates based on administrative regional categories, namely regencies (kabupaten) and municipalities (kota). The purpose of this analysis is to examine whether the

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relationships between household financial conditions and preschool participation differ across regional administrative contexts.

In regencies, household income (inc) demonstrates positive and statistically significant coefficients across all preschool categories, ranging from 0.305 to 0.331. In municipalities, the coefficients are generally weaker and only marginally significant in the playgroup model. These findings suggest that household financial conditions may play a relatively stronger role in preschool participation decisions among households located in regencies.

For the Debt Service Ratio (DSR), positive and statistically significant coefficients are identified across regency models, whereas in municipalities, significance is observed only in the playgroup specification. Nevertheless, these findings should not be interpreted as evidence that debt directly increases preschool participation. Instead, the results indicate that household debt repayment burden is statistically associated with preschool participation within specific regional contexts.

The age variable shows strong, statistically significant coefficients in regency models but weaker, statistically insignificant coefficients in municipality models. This finding suggests that age-related preschool participation patterns may differ across regional administrative categories.

Pseudo R-squared values in regency models range from 0.056 to 0.073, whereas municipality models range from 0.039 to 0.045. Although the explanatory power of the models remains limited overall, the regency models appear to explain relatively greater variation in preschool participation outcomes than the municipality models.

Table 4. Logistic Regression Results by Administrative Regional Category

Variables	Regency: ECE	Regency: Playgroup	Regency: Kindergarten	Municipality: ECE	Municipality: Playgroup	Municipality: Kindergarten
Income (inc)	0.305***	0.331***	0.331***	0.266	0.307*	0.261
	(2.91)	(2.85)	(3.25)	(1.63)	(1.92)	(1.61)
Debt Service Ratio (DSR)	0.038**	0.034*	0.040***	0.043	0.061*	0.008
	(2.49)	(1.79)	(2.84)	(1.28)	(1.71)	(0.37)
Age	0.454***	0.363***	0.410***	0.201	0.033	0.215
	(4.41)	(3.14)	(4.02)	(1.22)	(0.20)	(1.33)
Constant	-6.091***	-7.942***	-6.694***	-4.616*	-6.006**	-4.871**
	(-3.35)	(-4.06)	(-3.87)	(-1.92)	(-2.29)	(-2.13)
Pseudo R^2	0.073	0.056	0.069	0.039	0.040	0.045
Observations	550	550	550	225	225	225

Notes:
z-statistics in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.10.

4.2 Discussion

The findings of this study indicate that household financial conditions are statistically associated with children's participation in Early Childhood Education (ECE) institutions in Indonesia. Overall, the results demonstrate that household income consistently shows a positive association with preschool participation across all estimated models. In contrast, the Debt Service Ratio (DSR) exhibits more complex, context-dependent relationships. In addition, children's age remains one of the strongest

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predictors of preschool participation, particularly within regency (kabupaten) areas. These findings provide important insights into how household economic conditions interact with preschool participation decisions in the Indonesian context.

The positive association between household income and preschool participation supports the theoretical arguments of the Family Investment Model (FIM), which posits that greater household financial capacity enables parents to allocate more educational resources and developmental opportunities for children (Kaushal *et al.,* 2011; Yeung *et al.,* 2002). The regression results show that higher household income is associated with increased participation in general ECE institutions, kindergarten, and playgroup programs. This finding is also consistent with previous empirical studies indicating that household economic conditions remain an important determinant of preschool access, particularly in developing countries where preschool participation is still strongly influenced by household financial resources. In the Indonesian context, the findings align with Yostiana Bella Ulfa and S. Djamaluddin (2023), who reported that household income positively correlates with ECE enrollment decisions, and with Corsensia Takerubun and Waris Marsisno (2021), who found that household expenditure significantly affects preschool participation in West Papua. These results reinforce the argument that preschool participation remains associated with household socioeconomic capacity despite ongoing government efforts to expand educational access.

From a broader human capital perspective, the findings also support the arguments of Becker (1993), Schultz (1961), and Heckman (2011), which emphasize education as a long-term investment in the formation of human capabilities. Households with higher incomes may have greater flexibility to allocate spending toward preschool participation because they face fewer liquidity constraints in meeting daily consumption needs. The descriptive statistics further support this interpretation, showing significant differences in household income between regency and municipality groups. Nevertheless, the present study does not interpret income solely as a direct causal mechanism determining preschool participation. Preschool decisions are also likely influenced by broader household and contextual factors, including parental education, employment stability, family structure, institutional accessibility, and regional socioeconomic disparities. Therefore, the findings should be interpreted as associations rather than as deterministic causal effects.

The findings regarding the Debt Service Ratio (DSR) require particularly cautious interpretation. The regression estimates show positive and statistically significant coefficients for DSR across several models, particularly in regency-based estimates. However, these results should not be interpreted as evidence that household debt directly encourages or facilitates preschool participation. As emphasized in the methodological and theoretical sections, DSR measures only the proportion of household income allocated to debt repayment and does not identify the purpose, timing, quality, or source of household borrowing. Consequently, the observed positive association may reflect more complex household financial dynamics rather than a straightforward "debt as enabler" mechanism.

Several interpretations may explain these findings. First, households with access to formal financial systems may simultaneously possess better financial access, more stable income sources, or broader socioeconomic advantages that are not fully captured in the current model specification. In this context, DSR may partly reflect household integration into formal financial systems rather than purely financial distress. Second, some households may use borrowing as a short-term consumption-smoothing strategy during periods of financial pressure, enabling them to maintain routine expenditures, including preschool participation. This interpretation is broadly consistent with the arguments of Mullainathan and Shafir (2013) regarding household financial scarcity and the allocation of expenditures under economic

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pressure. Nevertheless, because the IFLS data do not provide detailed information regarding borrowing purposes or household financial decision-making processes, the study cannot conclusively determine whether debt functions primarily as a financial burden or as temporary liquidity support for educational expenditures.

Importantly, the relatively low Pseudo R-squared values across all regression models indicate that household income, DSR, and child age explain only a limited proportion of variation in preschool participation outcomes. This finding suggests that many important determinants of preschool participation remain outside the current model specification. Previous literature consistently emphasizes the importance of parental education, maternal employment, institutional availability, geographic accessibility, school quality, household composition, and local social norms in shaping preschool participation decisions. Consequently, the findings of this study should be interpreted within the limitations of the available variables rather than as comprehensive explanations of preschool participation behavior in Indonesia.

The regional heterogeneity analysis further demonstrates that the relationship between household financial conditions and preschool participation varies across administrative regions. In regency areas, household income and DSR exhibit stronger and more statistically consistent associations with preschool participation compared with municipality areas. These findings may indicate that household financial conditions remain relatively more important in regions where educational accessibility and institutional availability are more uneven. In contrast, the weaker significance of income in municipal models may reflect broader preschool availability, stronger institutional accessibility, or more established social norms that support preschool participation regardless of household financial conditions. However, these interpretations remain speculative because the present study does not directly measure school availability, infrastructure quality, transportation access, or parental educational preferences.

The findings related to child age also provide important insights into preschool participation patterns. Age consistently demonstrates positive and statistically significant associations with preschool participation, particularly in regression models. This suggests that older children in the preschool age range are more likely to attend preschool institutions, potentially reflecting parental perceptions of developmental readiness and preparation for primary school entry. This pattern is consistent with Bendini and Devercelli (2022), who noted that preschool participation in developing countries is often closely linked to preparation for formal elementary education rather than early developmental stimulation alone.

5. Concluding Remarks and Recommendation

This study examined the relationship between household financial conditions and children's participation in Early Childhood Education (ECE) institutions in Indonesia using household-level data from the Indonesia Family Life Survey (IFLS-5). Specifically, the study analyzed whether household income and household debt repayment burden, measured through the Debt Service Ratio (DSR), were statistically associated with preschool participation across general ECE participation, kindergarten, and playgroup categories. Using Binary Logistic Regression, the findings indicate that household income consistently shows a positive association with preschool participation across all estimated models. In contrast, the Debt Service Ratio (DSR) shows statistically significant but more context-dependent relationships, particularly within regency (kabupaten) models. However, the findings related to DSR should be

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interpreted with caution because the variable captures only the household debt repayment burden and does not provide information on the purpose, timing, source, or quality of household borrowing. Furthermore, the relatively low Pseudo R-squared values suggest that preschool participation decisions are influenced by broader household, institutional, and socioeconomic factors beyond the variables included in the current model specification.

The findings contribute theoretically by extending discussions regarding household financial conditions and preschool participation beyond conventional income-based measures. This study introduces household debt repayment burden as an additional dimension of household financial pressure associated with preschool participation decisions. Rather than interpreting debt as a direct enabling mechanism, the study emphasizes the importance of understanding DSR as an indicator of household liquidity pressure within broader socioeconomic contexts. In practice, the findings highlight the continued importance of household economic conditions in shaping preschool accessibility, particularly in regency areas, where household financial vulnerability appears more strongly associated with preschool participation outcomes. From a policy perspective, the study suggests that improving preschool participation may require not only educational expansion policies but also broader efforts to strengthen household economic resilience and improve equitable access to affordable preschool services across regions. The originality of this study lies in its effort to integrate household income and debt repayment burden into the analysis of preschool participation, using Indonesian household-level survey data, while explicitly recognizing the limitations of causal inference from observational data.

Despite its contributions, this study has several limitations. The current model primarily focuses on household income, Debt Service Ratio (DSR), and child age. In contrast, several important determinants of preschool participation—such as parental education, maternal employment, household structure, wealth indicators, institutional accessibility, preschool availability, school quality, transportation access, and parental educational preferences—were not fully incorporated into the analysis. In addition, the observational nature of the IFLS data limits the ability to establish causal relationships due to potential endogeneity, omitted variable bias, and reverse causality. The study also does not capture detailed information regarding the purpose or type of household debt, making it difficult to distinguish between productive financial access and financially distressing debt obligations. Future research is therefore encouraged to incorporate broader household, institutional, and regional variables, along with more detailed measures of household financial behavior and preschool quality indicators, to provide a more comprehensive understanding of the multidimensional factors associated with preschool participation in Indonesia.

Statement of Use of Generative AI

During the preparation of this work, the author used ChatGPT to assist in improving clarity and readability of the text. The author reviewed and edited the output and takes full responsibility for the content of the publication.

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