

Original articles

# Early childhood developmental status and its associated factors among children aged 36 - 59 months in Vietnam: A comparison of two nationally representative surveys

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## Abstract

**Introduction:** Early Childhood Development (ECD) is a key determinant of long-term health and human capital. In Vietnam, rapid socioeconomic changes necessitate updated national evidence on children's developmental status and its determinants. This study aimed to compare developmental status among children aged 36 - 59 months and examine associated factors using two rounds of the Vietnam Multiple Indicator Cluster Surveys (MICS 2013 - 2014 and 2020 - 2021).

**Methods:** This study analyzed two nationally representative datasets derived from the Vietnam MICS 2013 - 2014 (n = 1,035) and 2020 - 2021 (n = 1,893). ECD was measured using the Early Childhood Development Index (ECDI/ECDI2030). Analyses accounted for the complex survey design, and multivariable logistic regression was performed separately for each survey.

**Results:** The proportion of children classified as developmentally on track was lower in 2020 - 2021 than in 2013 - 2014 (76.5% vs. 89.8%), although direct comparison should be interpreted cautiously because different assessment tools were used. Across both surveys, Kinh ethnicity, higher maternal education, and participation in early childhood education programs were consistently associated with higher odds of being developmentally on track. Household wealth emerged as a significant determinant only in 2020 - 2021, when children from poorer households had lower odds of being on track. Children not exposed to violent discipline were more likely to be developmentally on track in 2020 - 2021 (AOR = 1.50, 95%CI: 1.04 - 2.13), whereas no significant association was observed in 2013 - 2014.

**Conclusion:** Compared with the MICS 2013 - 2014 survey, early childhood developmental outcomes appeared lower in the MICS 2020 - 2021 survey, although this difference was likely influenced by the adoption of the more stringent ECDI2030 assessment tool. Socioeconomic and ethnic disparities in developmental outcomes remained evident. Persistent socioeconomic and ethnic inequalities, together with the positive role of early childhood education, highlight the need for equitable access to quality early childhood services and supportive caregiving environments.

**Keywords:** Early Childhood Development; ECDI; MICS; child development; socioeconomic factors.

## 1. BACKGROUND

Early Childhood Development (ECD) provides the foundation for lifelong health, learning, and well-being. The first five years of life represent a critical period of rapid brain development during which children acquire the cognitive, language, motor, and socio-emotional skills essential for later educational achievement, economic productivity, and health across the life course [1]. Consequently, promoting optimal ECD has become a global public health priority and is explicitly reflected in the Sustainable Development Goals.

A growing body of evidence has shown that ECD is shaped by a range of socioeconomic and environmental factors, including household wealth,

parental education, ethnicity, caregiving practices, and participation in early childhood education (ECE). Despite substantial progress in expanding ECD services, developmental inequalities remain widespread, particularly in low- and middle-income countries (LMICs), where many children continue to lack access to quality early childhood care and learning opportunities [2, 3].

In Vietnam, evidence from 2011 indicated that 17.2% of children failed to achieve their full developmental potential during the first five years of life[4]. The rapid socio-economic transition of the past decade has introduced new complexities. Factors such as changing household structures, evolving educational access, and persistent ethnic disparities

necessitate an updated, comprehensive evaluation. Current national data are essential to determine whether previously identified determinants, such as maternal education and household wealth, remain the primary drivers of developmental outcomes, or whether new environmental and psychosocial stressors have emerged. Understanding whether these patterns have remained stable or shifted over time is important for informing targeted interventions and monitoring progress toward equitable child development.

The Vietnam Multiple Indicator Cluster Survey (MICS) provides nationally representative data on children's developmental status collected approximately every 7–8 years, offering a unique opportunity to examine ECD at the population level. However, no previous nationally representative study has compared the patterns of factors associated with ECD between successive MICS rounds in Vietnam. Moreover, the introduction of the Early Childhood Development Index 2030 (ECDI2030) in the 2020 - 2021 survey requires careful interpretation when comparing developmental outcomes across survey rounds.

Therefore, this study aimed to compare the early childhood developmental status of children aged 36 - 59 months and examine whether associated factors differed between the 2013 - 2014 and 2020 - 2021 Vietnam MICS surveys.

## **2. METHODOLOGY**

### **Data and sample**

We used two consecutive datasets from the Multiple Indicator Cluster Survey (MICS) conducted in 2013 - 2014 (MICS 5) and 2020 - 2021 (MICS 6) [5].

The Multiple Indicator Cluster Survey (MICS) is a comprehensive, nationally representative household survey administered by UNICEF. The survey was designed to provide estimates on a large number of indicators of the situation of children and women at the national and provincial levels. The survey covers a wide range of indicators related to the situation of children and women, including child mortality, maternal and newborn health, education, water and sanitation, gender equality, and more. The datasets are publicly available in the public domain. (<https://mics.unicef.org/surveys>)

In MICS 5 and MICS 6, questionnaires were completed for 3,316 out of 3,346 listed children (99.1 percent response rate) and 4,329 out of 4,404 listed children under age five (98.3 percent response rate), respectively. For this study, only information on children aged 36 - 59 months and their caregivers

were used for the analysis, with a final sample size of 1035 caregiver-child dyads in MICS 2013 - 2014 and 1893 caregiver-child dyads from MICS 2020 - 2021.

### **Dependent variable**

The MICS 2013 - 2014 used a 10-item module to measure Early Childhood Development Index (ECDI). It contains ten dichotomous (yes/no) items across four developmental domains: literacy-numeracy (3 items), physical (2 items), social-emotional (3 items), and learning (2 items). In addition, learning domain was measured according to whether the child could follow simple directions on how to do something correctly; or, when given something to do, was able to do it independently. The ECDI is calculated as the percentage of children who are developmentally on track in at least three of these four domains.

Early child development using MICS 2020-2021 was defined as the percentage of children aged 36–59 months who are developmentally on track in at least three of the following four domains: literacy-numeracy (The child can do at least two of the following: identify/name at least 10 letters of the alphabet; read at least 4 simple, popular words; and/or know the name and recognize the symbols of all numbers from 1 to 10), physical (the child can pick up a small object with two fingers, such as a stick or rock from the ground, and/ or the mother/ primary caregiver does not indicate that the child is sometimes too sick to play), social-emotional (the child demonstrates at least two of the following: gets along well with other children; does not kick, bite or hit other children; does not get distracted easily), and learning (the child follows simple directions on how to do something correctly and/or when given something to do can do it independently). It was measured by calculating the Early Childhood Development Index 2030 (ECDI2030) following the relevant guideline which is described elsewhere

Detailed descriptions of the methods are accessible online in household survey reports.

### **Independent variable**

- **Child's factors:** Age in months (36 - 47, 48 - 59); sex (male, female); area of living (urban, rural), and attend early childhood education, household wealth index

- **Parental factors:** Mother's age at the time of survey, mother's education level; inadequate care was defined as a child under the age of five who has been left alone for more than one hour at least once in the last week. Violent discipline was defined as a child aged under five having been subjected to physical or psychological discipline by caregivers in the previous month.

## Data analysis

Descriptive analysis was performed to characterize the distribution of independent variables and to estimate the prevalence of being developmentally on-track among Vietnamese children aged 36 - 59 months. All analyses accounted for the complex survey design using the Complex Samples module in SPSS, incorporating sampling weights, primary sampling units (PSUs), and stratification. Univariable and multivariable logistic regression analyses were performed separately for the 2013 - 2014 and 2020 - 2021 MICS datasets to examine factors associated with being developmentally on track. Results are presented as adjusted odds ratios (AORs) with 95% confidence intervals (95%CI). The statistical significance level was set at 0.05. Data analysis was performed on SPSS 20.0.

## Ethics statement

The present study was based on secondary data

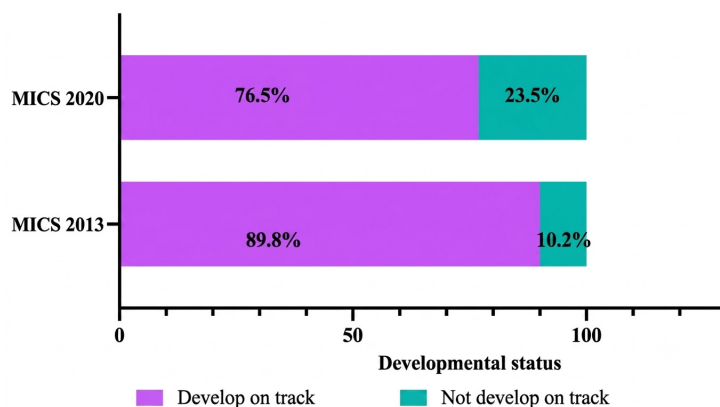
analysis of existing, publicly available survey data from which all personally identifiable information had been removed.

## 3.RESULTS

### Socio-demographic characteristics

Among the 1,035 children in MICS 5, 51.6% were girls and 56.0% were in the older age group. Most children lived in rural areas (69.9%). The majority of mothers had secondary education (39.4%). Nearly one-quarter of the children were from the poorest households, and more than three-quarters belonged to the Kinh ethnic group.

The MICS 2020 - 2021 survey included 1,893 children aged 36 - 59 months. Most children lived in rural areas (68.8%), were of Kinh ethnicity (82.9%), had mothers with secondary education (61.0%), and attended early childhood education programs (80.9%). Household wealth was relatively evenly distributed across quintiles.



**Figure 1** Distribution of developmental status of children (ECD) among children aged 36 - 59 months

The prevalence of developmentally on-track children decreased from 89.8% in 2013 - 2014 to 76.5% in 2020-2021.

**Table 1.** Comparison of the early childhood developmental status in MICS 2013 - 2014 and 2020 - 2021 (weighted percentage)

| Characteristics              | MICS 2013 - 2014 |                          |         |       | MICS 2020 - 2021 |                          |         |       |
|------------------------------|------------------|--------------------------|---------|-------|------------------|--------------------------|---------|-------|
|                              | N = 1035         | Developmentally on track |         |       | n=1893           | Developmentally on track |         |       |
|                              |                  | No                       | Yes     | P     |                  | N                        | Yes     | P     |
|                              |                  | %weight                  | %weight |       |                  | %weight                  | %weight |       |
| <b>Child's sex</b>           |                  |                          |         | 0.198 |                  |                          |         | 0.322 |
| Male                         | 48.4             | 11.6                     | 88.4    |       | 51.7             | 24.9                     | 75.1    |       |
| Female                       | 51.6             | 9.0                      | 91.0    |       | 48.3             | 22.1                     | 77.9    |       |
| <b>Age of child (months)</b> |                  |                          |         | 0.001 |                  |                          |         | 0.094 |
| 36 - 47                      | 44.0             | 14.3                     | 85.7    |       | 49.0             | 21.2                     | 78.8    |       |
| 48 - 59                      | 56.0             | 7.1                      | 92.9    |       | 51.0             | 25.8                     | 74.2    |       |

|                                           |         |      |      |      |      |      |         |
|-------------------------------------------|---------|------|------|------|------|------|---------|
| <b>Place of residence</b>                 | 0.326   |      |      |      |      |      | 0.002   |
| Rural                                     | 69.9    | 8.8  | 91.2 | 68.8 | 26.3 | 73.7 |         |
| Urban                                     | 30.1    | 10.9 | 89.1 | 31.2 | 17.6 | 82.4 |         |
| <b>Ethnicity</b>                          | < 0.001 |      |      |      |      |      | < 0.001 |
| Kinh                                      | 81.8    | 7.9  | 92.1 | 82.9 | 20.0 | 80.0 |         |
| Others                                    | 18.2    | 20.8 | 79.2 | 17.1 | 40.6 | 59.4 |         |
| <b>Mother's education</b>                 | < 0.001 |      |      |      |      |      | < 0.001 |
| < Primary school                          | 23.8    | 18.0 | 82.0 | 13.2 | 46.0 | 54.0 |         |
| Secondary school                          | 39.4    | 7.6  | 92.4 | 61.0 | 21.3 | 78.7 |         |
| Higher education                          | 36.7    | 8.1  | 91.9 | 25.9 | 17.5 | 82.5 |         |
| <b>Wealth Index</b>                       | 0.036   |      |      |      |      |      | < 0.001 |
| Poorest                                   | 22.0    | 16.7 | 83.3 | 21.4 | 39.2 | 60.8 |         |
| Second                                    | 18.8    | 9.9  | 90.1 | 17.9 | 26.1 | 73.9 |         |
| Middle                                    | 20.4    | 7.4  | 92.6 | 20.3 | 26.1 | 73.9 |         |
| Fourth                                    | 19.0    | 9.4  | 90.6 | 20.2 | 12.5 | 87.5 |         |
| Richest                                   | 19.8    | 7.2  | 92.8 | 20.3 | 13.2 | 86.8 |         |
| <b>Early childhood education programs</b> | < 0.001 |      |      |      |      |      | < 0.001 |
| Yes                                       | 72.4    | 7.6  | 92.4 | 80.9 | 20.6 | 79.4 |         |
| No                                        | 27.6    | 17.2 | 82.8 | 19.1 | 36.2 | 63.8 |         |
| <b>Inadequate care</b>                    | 0.403   |      |      |      |      |      | 0.065   |
| Yes                                       | 11.8    | 12.5 | 87.5 | 7.8  | 21.9 | 78.1 |         |
| No                                        | 88.2    | 9.9  | 90.1 | 92.2 | 28.4 | 71.6 |         |
| <b>Violent Discipline</b>                 | 0.770   |      |      |      |      |      | 0.049   |
| Yes                                       | 71.2    | 10.4 | 89.6 | 75.1 | 31.8 | 68.2 |         |
| No                                        | 28.8    | 9.8  | 90.2 | 24.9 | 22.8 | 77.2 |         |

Table 1 presents the weighted prevalence of children who were developmentally on track according to socio-demographic characteristics. Early childhood developmental status varied significantly by ethnicity, maternal education, wealth index, and participation in early childhood education programs in both survey years ( $p < 0.05$ ). Additional associations with place of residence and violent discipline were observed only in 2020 - 2021, whereas child age was associated with developmental status only in 2013–2014. No significant differences were found by child sex or inadequate care in either survey round ( $p > 0.05$ ).

**Table 2.** Factors associated with the developmental status of children

|                                           | MICS 2013 - 2014 |             |         | MICS 2020 - 2021 |             |        |
|-------------------------------------------|------------------|-------------|---------|------------------|-------------|--------|
|                                           | AOR              | 95%CI       | P       | AOR              | 95%CI       | P      |
| <b>Age of child (months)</b>              |                  |             |         |                  |             |        |
| 36 - 47                                   | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| 48 - 59                                   | 1.92             | 1.13 - 3.26 | 0.016   | 0.65             | 0.46 - 0.91 | 0.013  |
| <b>Place of residence</b>                 |                  |             |         |                  |             |        |
| Urban                                     | 1.02             | 0.57 - 1.83 | 0.938   | 1.15             | 0.77 - 1.71 | 0.483  |
| Rural                                     | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| <b>Ethnicity</b>                          |                  |             |         |                  |             |        |
| Kinh                                      | 3.06             | 1.67-5.61   | < 0.001 | 1.68             | 1.11-2.52   | 0.013  |
| Others                                    | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| <b>Mother's education</b>                 |                  |             |         |                  |             |        |
| < Primary school                          | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| Secondary school                          | 1.67             | 0.83-3.37   | 0.150   | 1.68             | 1.03-2.75   | 0.036  |
| Higher                                    | 1.91             | 1.06-3.44   | 0.033   | 2.20             | 1.52-3.17   | <0.001 |
| <b>Wealth Index</b>                       |                  |             |         |                  |             |        |
| Poorest                                   | 1.35             | 0.40-4.62   | 0.629   | 0.47             | 0.23-0.92   | 0.027  |
| Second                                    | 1.18             | 0.34-4.06   | 0.231   | 0.55             | 0.30-1.01   | 0.053  |
| Middle                                    | 1.19             | 0.40-3.55   | 0.748   | 0.46             | 0.26-0.84   | 0.012  |
| Fourth                                    | 0.80             | 0.29-2.20   | 0.721   | 1.06             | 0.59-1.92   | 0.840  |
| Richest                                   | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| <b>Early childhood education programs</b> |                  |             |         |                  |             |        |
| Yes                                       | 1.88             | 1.07-3.30   | 0.027   | 2.10             | 1.38-3.20   | 0.001  |
| No                                        | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| <b>Inadequate care</b>                    |                  |             |         |                  |             |        |
| Yes                                       | 0.92             | 0.47-1.78   | 0.812   | 0.86             | 0.54-1.36   | 0.518  |
| No                                        | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| <b>Violent Discipline</b>                 |                  |             |         |                  |             |        |
| Yes                                       | 1 (Ref)          |             |         | 1 (Ref)          |             |        |
| No                                        | 0.95             | 0.55-1.63   | 0.850   | 1.50             | 1.04-2.13   | 0.036  |

Table 2 shows the results of multivariable logistic regression analysis examining factors associated with children's developmental status in the MICS surveys 2013 - 2014 and 2020 - 2021. Multivariable analysis showed that, in 2013 - 2014, children aged 48 - 59 months had higher odds of being developmentally on track (AOR = 1.92; 95%CI: 1.13 - 3.26), whereas this association reversed in 2020 (AOR = 0.65, 95%CI: 0.46 - 0.91). Higher maternal education remained a consistent predictor (higher education:

AOR = 1.91; 95%CI: 1.06 - 3.44 in 2013 - 2014; AOR = 2.20; 95%CI: 1.52 - 3.17 in 2020 - 2021), as did Kinh ethnicity (AOR = 3.06; 95%CI: 1.67 - 5.61 in 2013 - 2014; AOR = 1.68; 95%CI: 1.11 - 2.52 in 2020 - 2021). In 2020 - 2021, children from the poorest and middle wealth quintiles had significantly lower odds of being developmentally on track than those from the richest quintile, whereas wealth was not significantly associated with developmental status in 2013 - 2014. Attendance at early childhood

education programmes was consistently associated with better developmental outcomes in both survey rounds (AOR = 1.88 in 2013 - 2014 and 2.10 in 2020 - 2021). In 2020 - 2021, children who were not exposed to violent discipline had higher odds of being developmentally on track than those who experienced violent discipline (AOR = 1.50, 95%CI: 1.04 - 2.13), while no significant association was observed in 2013 - 2014. Place of residence and inadequate care were not significantly associated with ECDI in either survey.

#### 4. DISCUSSION

This study compared early childhood developmental status among Vietnamese children aged 36 - 59 months using data from the nationally representative MICS 2013 - 2014 and MICS 2020 - 2021 surveys, while acknowledging that the two surveys used different developmental assessment tools (ECDI and ECDI2030). This results showed that the prevalence of developmentally on-track children decreased from 89.8% in 2013 - 2014 to 76.5% in 2020 - 2021.

While evidence from countries like Bangladesh suggests that developmental outcomes typically improve over time when using consistent scales [6], the observed decrease in Vietnam must be interpreted with caution. The shift from the original Early Childhood Development Index (ECDI) to the updated ECDI2030 which features more rigorous content and refined methodology likely accounts for much of this disparity. Consequently, the 76.5% estimate for 2020 - 2021 was lower than the corresponding estimate from Vietnam's previous MICS5 survey, although it remained slightly higher than the global average of 75.3% reported across 85 countries [7]. Overall, these findings highlight the importance of interpreting comparisons across survey rounds cautiously, given the differences in developmental assessment tools used.

Furthermore, this study identified persistent key socio-demographic determinants of early childhood developmental status using nationally representative data from two survey rounds. Maternal education, ethnicity, and participation in early childhood education were consistently associated with developmental outcomes across both surveys, whereas household wealth became a significant determinant only in 2020 - 2021.

Maternal education emerged as a strong and stable predictor across both surveys. Children whose mothers had higher education were significantly more likely to be developmentally on track,

consistent with prior studies highlighting the role of maternal education in improving caregiving practices and early stimulation [8, 9]. Similarly, children from Kinh ethnicity had better developmental outcomes than those from minority groups, suggesting persistent inequities in access to health and early learning services.

An interesting finding was the reversal in the association between child age and developmental status between the two survey rounds. Older children (48 - 59 months) were less likely to be developmentally on track in 2020 - 2021, whereas the opposite pattern was observed in 2013 - 2014. This may partly reflect disruptions to preschool education during the COVID-19 pandemic, although this interpretation should be made cautiously given the cross-sectional design and potential influence of unmeasured factors.

In MICS 6, household wealth was more strongly associated with developmental outcomes, with children from poorer households exhibiting significantly lower odds of being developmentally on track. Participation in early childhood education programs was positively associated with development in line with existing evidence. Studies from Ghana using MICS data have similarly reported that children attending early childhood education programs are more likely to be developmentally on track [10]. These findings suggest that ECE promotes child development through structured learning, social interaction, and support from trained educators, highlighting the importance of expanding equitable access to quality ECE in Vietnam.

The finding that children not exposed to violent discipline had significantly higher odds of being developmentally on track in 2020 - 2021 (AOR = 1.50, 95%CI: 1.04 - 2.13), but not in 2013 - 2014, suggests a strengthening association between violent discipline and early childhood development (ECD) outcomes over time in this population. Several factors may explain the differences between survey rounds. Changes in the prevalence or severity of violent discipline may have influenced the ability to detect its association with child development. In addition, refinements in the measurement of violent discipline or developmental outcomes across MICS rounds may have affected the observed relationship. Finally, broader societal changes in Vietnam, including expanded early childhood education, evolving caregiving practices, and increased promotion of positive discipline, may have modified the impact of violent discipline on child development.

The emergence of a significant association

in 2020 - 2021 (AOR = 1.50, 95%CI: 1.04 - 2.13), is consistent with growing evidence that violent discipline adversely affects child development. Multi-country studies have shown that corporal punishment is associated with poorer developmental outcomes, particularly in the social-emotional domain, and longitudinal evidence further links harsh parenting to reduced social competence and increased behavioral problems [11, 12]. In Vietnam and across Southeast Asia, violent discipline remains highly prevalent, suggesting that its developmental consequences may have become more apparent in recent years. However, this association should be interpreted cautiously, as the cross-sectional design does not establish causality. Children with existing behavioral problems may be more likely to receive violent discipline, suggesting a potentially bidirectional relationship.

Together, these findings suggest that while individual socioeconomic characteristics (maternal education, ethnicity) remained stable determinants, contextual factors such as household wealth and violent discipline became more salient in the later survey, highlighting changing patterns of social inequality in child development.

This study has several limitations. First, the cross-sectional design of the MICS surveys does not allow causal relationships to be established between associated factors and early childhood developmental status. Second, comparisons between the 2013-2014 and 2020 - 2021 surveys should be interpreted cautiously due to differences in the measurement tools used (ECDI vs. ECDI2030). Third, the datasets did not include direct measures of COVID-19-related disruptions (e.g., school closures or service interruptions); therefore, any interpretation of pandemic effects remains speculative. Fourth, several variables were based on caregiver self-report and may be subject to recall or social desirability bias. Missing data were handled using complete-case analysis, which may have introduced selection bias if excluded observations differed systematically from those included. In addition, ethnic minority groups were combined into a single "Other" category because of limited sample sizes, potentially masking heterogeneity among these populations. Finally, although the analyses accounted for the complex survey design and sampling weights, residual confounding from unmeasured factors cannot be excluded.

Overall, these findings highlight increasing disparities in early childhood development and underscore the importance of equitable access to

early childhood education and supportive caregiving environments.

## 5. CONCLUSION

This study compared early childhood developmental status and associated factors using two nationally representative MICS surveys in Vietnam. Although the proportion of children classified as developmentally on track was lower in 2020 - 2021 than in 2013 - 2014, this difference should be interpreted cautiously because the two surveys used different developmental assessment tools (ECDI and ECDI2030). Nevertheless, persistent disparities by ethnicity and maternal education were evident across both survey rounds, while household wealth and violent discipline emerged as important correlates in 2020 - 2021. These findings suggest that, beyond improving access to early childhood education, policies should prioritize reducing socioeconomic inequalities and promoting positive caregiving environments to support equitable child development.

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