

Original Article

Azerbaijan's Education System: Statistical Analysis and Structural Transformation of Preschool and General Education Indicators for 1990–2024

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Received Date: 14 March 2026

Revised Date: 01 April 2026

Accepted Date: 12 April 2026

Published Date: 18 April 2026

Abstract: *This study examines the structural transformation of preschool and general education in Azerbaijan during 1990–2024 and its implications for human capital development. Long-term, system-level evidence on education change in post-transition contexts remains limited, constraining policy evaluation and planning. Using population-level national education statistics, the study analyzes trends in educational institutions, enrollment, gender distribution, teaching staff, and the balance between state and non-state provision across education levels. A longitudinal descriptive and comparative statistical approach was applied to identify structural shifts over time. The results show that the education system remained quantitatively stable but underwent substantial structural change: preschool education expanded through community-based and non-state models, improving rural access; general education maintained institutional coverage and gender parity; vocational education consolidated; and higher education expanded markedly with increased female participation and doctoral growth. The study concludes that Azerbaijan's education system is evolving toward a diversified, inclusive, and human-capital-oriented structure aligned with national socio-economic development priorities.*

Keywords: *Azerbaijan, Education System, Preschool Education, General Education, Statistical Analysis, Structural Transformation, Human Capital, Gender Balance, Community-Based Education, Vocational And Higher Education.*

I. Introduction

Education is one of the main factors in countries' socio-economic development and plays a crucial role in children's intellectual, emotional, and social development. In particular, the preschool education stage is of strategic importance in shaping children's future academic achievements and professional skills. Educational reforms and state programs implemented in Azerbaijan in recent years are aimed at expanding the scope of preschool education, improving the quality of educational institutions and ensuring social inclusion.

The statistical analysis conducted in the field of preschool education allows us to assess the dynamics of the development of this sector, the share of state and non-state institutions, the distribution of children by gender and age groups, as well as the role of community-based education models. It also provides detailed information on structural transformations in the general education system, gender balance, and the level of social inclusion.

The aim of the study is to conduct a statistical analysis of the preschool and general education sector in Azerbaijan for the period 1990–2024, identify key trends, and assess the effectiveness of education policy. To this end, indicators such as the number of educational institutions, the number of students, the share of girls, the structure of the state and non-state sectors, as well as the development of community-based learning groups, were analyzed.

II. LITERATURE REVIEW

Education is a key driver of human capital, socio-economic growth, and social inclusion (Hüseynova, 2023; Carneiro & Heckman, 2003). Early childhood education provides a foundation for lifelong learning and professional skills, with proven long-term cognitive, social, and economic benefits (UNICEF, 2021; Heckman, 2006; Bloom, Canning, & Chan, 2006; UNESCO, 2020).

In Azerbaijan, general education has remained quantitatively stable while undergoing a qualitative transformation, ensuring equitable access and alignment with the labour market (State Statistical Committee of the Republic of Azerbaijan, 2024; Ministry of Education, 2024; World Economic Forum, 2020; UNESCO, 2015). Vocational and secondary specialized education have consolidated, improving enrollment and program quality to meet technical skill demands (Lewin, 2018; Bray, Adamson, & Mason, 2014; World Bank, 2019).



Higher education enrollment more than doubled between 1990 and 2024, with increased female participation and the expansion of doctoral programs, enhancing research capacity and knowledge-based growth (UNESCO Institute for Statistics, 2021; World Economic Forum, 2020; Hanushek & Woessmann, 2015; Psacharopoulos & Patrinos, 2018; Barro & Lee, 2013; Tan, 2019). Non-state and community-based educational models further demonstrate institutional diversification and flexibility (Aliyev & Ismayilov, 2020; UNESCO Institute for Statistics, 2021).

Despite progress, challenges remain in rural access, teacher quality, and the relevance of vocational programs, highlighting the need for longitudinal and qualitative studies to evaluate the long-term impacts on human capital and socio-economic outcomes (Lewin, 2018; Hüseyinova, 2023; Bloom et al., 2006). Overall, education in Azerbaijan is central to human capital development, social inclusion, and economic growth, with strategic investments across all levels and gender equity ensuring sustainable development.

III. METHODOLOGY

The study employed statistical analysis and comparative evaluation to examine Azerbaijan's education system from 1990 to 2024. Data were collected from the State Statistical Committee, the Ministry of Education, and other official sources, covering the number of institutions, students, teachers, gender distribution, public and non-state sectors, and community-based learning groups.

Statistical indicators were analyzed to assess trends in enrollment, institutional numbers, gender balance, sectoral growth, and teaching staff composition using tables, percentages, and long-term trend analysis. Trends such as U-shaped, increasing, or declining patterns, as well as structural and institutional changes, were identified, with particular focus on community-based and non-governmental education. Finally, indicators were interpreted in relation to social, demographic, and institutional factors to evaluate transformations and inclusion in the education system. This approach ensures scientifically robust and reliable results consistent with academic standards.

IV. STATISTICAL ANALYSES AND DISCUSSION

This section analyzes the dynamics of the development of preschool education in Azerbaijan based on statistical indicators. The analysis was conducted on the number of preschool educational institutions, the number of boys and girls studying in these institutions, as well as the share of the state and non-state sectors. According to statistical data, during the period under study, there was a general downward trend in the total number of preschool educational institutions, and in recent years, a moderate recovery trend was observed. While at the beginning of the period the total number of institutions was 2185, in subsequent years this indicator decreased to the range of 1760–1800. However, in the final stage, an increase was recorded in the number of institutions again and reached 1872.

State-owned preschools have long dominated the sector. Non-state institutions have only recently begun to operate and have shown gradual growth. This trend reflects the increasing role of private initiatives in the education sector. Data show that the total number of children in preschool institutions decreased from 180,870 at the beginning of the period and stabilized at around 110,000 in the following years. This decrease can be mainly attributed to demographic changes, migration processes, and access to early childhood education.

In recent years, there has been a renewed trend of growth in the number of children, which indicates the effectiveness of state programs implemented to expand the scope of preschool education. The increase in the number of children studying in the non-state sector from 100 to 7,000 statistically confirms the growing role of the private sector in this area.

The number of girls in preschool education institutions has fluctuated between approximately 44–47 percent of the total number of children. This indicates that the gender balance has been generally maintained. The number of girls also initially decreased in parallel with the total number of children, but in subsequent years it has shown a tendency to increase again.

The rapid increase in the number of girls, especially in non-public preschools, indicates an increase in parental interest in private educational institutions and an expansion of gender-equal access opportunities. Recent statistics show a sharp increase in the number of community-based preschool groups, from 850 to 1,177. This increase is particularly significant in terms of expanding access to preschool education in remote and rural areas.

The implementation of this model has not only reduced the institutional burden of preschool education but also had a positive impact on ensuring social inclusion. The conducted statistical analysis shows that the preschool education sector in Azerbaijan is in a stage of structural transformation. Although the public sector still plays a leading role, the development of non-state and community-based mechanisms proves that the education system is moving towards a more flexible and inclusive form. These trends can have a positive impact on the formation of human capital and the acceleration of socio-economic development in the long term.

Table 1: Statistical Dynamics of the Number of General Educational Institutions (1990–2024)

Indicators	1990	Peak period (approx.)	2024	Total change
Number of establishments (total)	4268	4555	4357	+2.1%
State institutions	4268	4549	4324	+1.3%

In 1990–2000, there was an increase in the number of general education institutions, and after 2010, a decrease and optimization trend was observed. The emergence of non-state general education institutions is an indicator of institutional diversification in the education system.

Table 2: Number of Students in General Education Institutions (persons)

Indicators	1990	Minimum	Maximum	2024	Total change
Number of students (total)	1 349 489	1 284 853	1 704 868	1 695 096	+25.6%
Public sector	1 349 489	1 277 603	1 684 733	1 671 116	+23.8%

The long-term trend in student numbers is U-shaped. Although there was a decrease in 2005–2015, an increase occurred in the subsequent period as a result of the rising birth rate and demographic recovery.

Table 3: Number and Share of Girls in General Educational Institutions

Indicators	1990	Minimum	Maximum	2024
Number of girls (total)	663 046	590 394	794 814	793 531
Total share of girls (%)	49.1%	45.9%	46.6%	46.8%

The share of girls among the total number of students has fluctuated within the range of 45–49% throughout the period. This indicator confirms that gender balance in general education is structurally maintained.

Table 4: Growth Rates and Structural Changes (1990–2024, %)

Indicator	Total change
Number of establishments (total)	2.1%
State institutions	1.3%
Number of students (total)	25.6%
Number of girls	19.7%
Share of non-public schools	0.75%

Statistical analysis conducted for the period 1990–2024 shows that the general education system in Azerbaijan is quantitatively stable, but structurally transformed. Although there has been no sharp change in the number of educational institutions, a long-term growth trend in the number of students has been observed, which is directly related to demographic factors.

While the public sector still dominates the general education system, the emergence of non-public schools indicates that alternative mechanisms are developing in the education market. The fact that the overall share of girls has remained stable over time is evidence that gender equality is being maintained. These results statistically confirm the long-term sustainability of the general education system and its strategic role in the formation of human capital.

The form of correspondence (evening) general education, which was widespread in the early 1990s, has almost completely disappeared over time. This decline is explained by the following factors:

- increasing accessibility to formal general education,
- strengthening compulsory general education,
- expansion of alternative vocational and secondary specialized education.

The sharp decline in the number of girls (from 12,370 to almost zero) indicates that correspondence education is losing its social significance.

A) Teaching staff in general education institutions

Number of teachers (core staff)

- 1990: 123,813
- Peak period (2010–2015): ~176,000
- 2024: 146,381

Share of female teachers

- Average: 58–62%
- 2024: approximately 82–83% (at certain levels)

Decrease in the number of teachers since 2015:

- optimization of the student-teacher ratio,
- merging schools,
- It is related to demographic fluctuations.

The dominance of women in the teaching staff demonstrates the stability of the gender structure in the general education system.

B) Vocational education

Institution and number of students

- Institutions: 176 → 87
- Students: 82,188 → 35,262
- Minimum: mid-2000s

Girls' share

- 1990: 41%
- 2024: ~33%

Vocational education experienced a sharp decline from 1990–2005, and then entered a phase of recovery and institutional reform after 2015. Recent growth:

- labor market demand for technical qualifications,
- related to state programs.

C) Secondary specialized education (colleges)

Key indicators

- Number of establishments: 78 → 59
- Number of students: 58,838 → 65,640
- Number of students per 10,000 population: 82 → 64

Women's share

- Steady 60–65%

Despite the relative decline in the number of institutions, the increase in student numbers indicates the consolidation of secondary vocational education, which has strengthened its position as an alternative to higher education.

D) Higher education institutions

- 1990: 17
- 2024: 51
- Share of non-governmental sector: ~22%

Number of students

- 1990: 105,063
- 2024: 231,437
- Increase: +120%

Women's share

- 1990: ~38%
- 2024: ~51%

The higher education system is the fastest expanding tier. In particular:

- increase in undergraduate and graduate enrollment,
- increasing the share of women in higher education,
- The increase in the number of students per 10,000 population from 148 → 227 indicates a qualitative improvement in human capital.

E) Doctor of Philosophy (PhD)

- Number of students: ~1,300 → 2,562
- There are fluctuations in reception and output.

F) Doctor of Science

- Students: 36 → 608
- The number of graduates has increased since 2020

The increase observed at the doctoral level:

- expanding scientific research potential,
- It is related to the strengthening of the scientific component of higher education.

Statistical analysis conducted for the period 1990–2024 shows that the Azerbaijani education system has expanded quantitatively and undergone a profound transformation structurally. Low-level and alternative forms of education (part-time, weak vocational education) have gradually disappeared, and higher and secondary specialized education have become the main carriers of human capital.

This dynamic is highly consistent with the country's socio-economic development strategy and labor market requirements.

V. RESULTS

Statistical analysis conducted for the period 1990–2024 shows that the Azerbaijani education system has expanded quantitatively and undergone a fundamental transformation in terms of structure. The number of general institutions in the field of preschool education has shown moderate changes over the period, while the number of students and their coverage, which showed a tendency to decrease at certain periods, have recovered in recent years thanks to state programs and institutional initiatives.

While the public sector still plays a leading role, the development of non-state and community-based education models confirms that the education system is diversifying and moving towards a flexible, inclusive form. The overall share of girls remaining stable in the range of 45–49% indicates that gender balance is being maintained. The increase observed in pre-school education, secondary vocational education and higher education is associated with the qualitative improvement of human capital and the expansion of the population's access to vocational, technical and academic skills.

The consolidation process in vocational and secondary specialized education, and the rapid expansion in higher education, indicate adaptation to labor market requirements and strategic development of human capital. The increase observed at the doctoral level is related to the expansion of scientific potential and the strengthening of the scientific component of higher education.

VI. DISCUSSION

The analysis reveals several important trends:

- Expanding inclusion and access in preschool education: The increase in the number of community-based learning groups from 850 to 1,177 in recent years and the increasing role of the non-governmental sector indicate increased access to education in remote and rural areas. This is of strategic importance in terms of ensuring social inclusion and reducing the institutional burden of preschool education.
- Balance of public and non-public sectors: The growth of non-state institutions has led to institutional diversification in the education system, the expansion of alternative educational opportunities, and the formation of market mechanisms. At the same time, the dominant position of the public sector ensures the stability and coverage of education policy.
- The influence of demographic and social factors: The decrease in the number of children in preschool and general education levels from 2005 to 2015 is explained by demographic changes and migration processes. In the subsequent period, the increase in the birth rate and the implementation of state programs ensured the reversal of this trend.
- Structural transformation in higher and secondary specialized education: The doubling of the number of students in higher education, the increase in the share of women, and the increased participation of the non-state sector indicate that the country is developing its human capital in both quantitative and qualitative terms. The consolidation observed in secondary specialized and vocational education reflects the optimization of the education system and the satisfaction of the labor market demand for technical specialties.
- Gender balance and the role of women: The analysis shows that the increase in the share of women in the teaching staff and among higher education students indicates an increase in gender equality and a strengthening of the strategic role of women in the education system.

The Azerbaijani education system demonstrates long-term sustainability in both quantitative and structural terms. Expanding access to pre-school education, rapid growth in higher education, and the formation of the non-state sector are closely linked to the strategic priorities of socio-economic development. This dynamic promises positive results in terms of the development of human capital in the country and adaptation to the requirements of the labor market.

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