



# Factors Influencing the Performance of Visually Impaired Girls in Mathematics Education in Zambia

**Kapela Field Peter**

DMI St. Eugene University, Lusaka-Zambia

**Abstract-** This study examines factors influencing the academic performance of visually impaired girls in mathematics education in Zambia. Despite national policies promoting inclusive education, significant achievement gaps persist for this group. A mixed-methods descriptive survey design was used, incorporating questionnaires, semi-structured interviews, and classroom observations with 60 learners, 15 teachers, and 5 administrators across 5 purposively selected secondary schools in Lusaka and Copperbelt Provinces. Findings reveal four interrelated factors: 1) Psychological barriers, including math anxiety and low academic self-efficacy; 2) School-based constraints, such as inadequate teacher training in adaptive pedagogy and shortages of Braille textbooks and tactile learning aids; 3) Socio-economic challenges, particularly household poverty limiting access to assistive devices; and 4) Cultural beliefs that devalue education for girls with disabilities. The study concludes that isolated interventions are insufficient. It recommends integrated strategies: mandatory in-service training on inclusive mathematics instruction, state-funded provision of assistive technologies, school-based psychosocial support programs, and community sensitization campaigns to address stigma. These measures are essential for achieving equity in STEM education.

**Keywords:** Inclusive education, visual impairment, mathematics performance, gender, Zambia

## I. Introduction

Mathematics is fundamental to cognitive development, technological innovation, and national economic advancement. Proficiency in mathematics expands access to higher education and STEM careers, which are critical for Zambia's development goals outlined in Vision 2030.

While Zambia's Education Act of 2011 and National Policy on Disability mandate inclusive education, implementation remains inconsistent. Learners with visual impairments encounter systemic barriers to learning mathematics, a subject heavily reliant on visual representations such as graphs, diagrams, and geometric figures. Visually impaired girls experience compounded marginalization due to the intersection of gender and disability, often resulting in the lowest participation and achievement rates in mathematics.

## II. Problem Statement

Despite policy interventions, visually impaired girls consistently underperform in mathematics at the secondary school level. This underperformance restricts their progression to tertiary education and limits their participation in STEM-related fields, perpetuating cycles of inequality. There is limited empirical research disaggregating



how psychological, institutional, socio-economic, and cultural factors specifically impact this demographic in the Zambian context.

### **Objectives of the Study**

The study sought to:

- Examine school-based factors affecting mathematics performance of visually impaired girls.
- Assess psychological factors influencing their learning and achievement.
- Analyze socio-economic influences on access to mathematics learning resources.
- Evaluate cultural beliefs and practices impacting their participation in mathematics.

### **Research Questions**

- What school-based factors influence the performance of visually impaired girls in mathematics?
- How do psychological factors affect their learning of mathematics?
- What is the impact of socio-economic status on their access to mathematics resources?
- In what ways do cultural beliefs affect their participation in mathematics education?

## **III. Literature Review**

This study is framed by Gender Role Theory, which posits that societal expectations shape academic self-concept and engagement, and Inclusive Education Theory, which advocates for systemic restructuring to accommodate diverse learning needs.

Empirical studies across sub-Saharan Africa indicate that inadequate teacher preparation in special needs education significantly hinders learning outcomes for visually impaired students. Research further shows that lack of tactile materials and reliance on abstract visual instruction excludes learners who depend on auditory and kinesthetic modes. Socio-cultural studies highlight how disability stigma and gender bias jointly discourage girls from STEM subjects. In Zambia, Chitiyo and Muwana (2018) found that most mainstream teachers lack skills to adapt mathematics content, while Muzata (2019) reported acute shortages of Braille materials in secondary schools.

## **IV. Methodology**

### **Research Design**

A descriptive survey design using mixed methods was adopted to provide both breadth and depth of understanding.

### **Study Area and Population**

The study was conducted in 1 inclusive secondary schools with established special education units in Northern Province. The target population comprised visually impaired female learners in Grades 10–12, mathematics teachers, and school administrators.



### **Sample and Sampling Techniques**

Purposive sampling was used to select 60 visually impaired female learners, 15 mathematics teachers, and 5 school administrators, totaling 80 respondents.

### **Data Collection Instruments**

Data were collected using: 1) Structured questionnaires for learners, 2) Semi-structured interview guides for teachers and administrators, and 3) Non-participant classroom observation schedules.

### **Data Analysis**

Quantitative data were analyzed using SPSS v26 for descriptive statistics including frequencies and percentages. Qualitative data underwent thematic analysis following Braun and Clarke's framework. Ethical clearance was obtained from DMI St. Eugene University, and informed consent was secured from all participants. Anonymity and confidentiality were maintained.

## **V. Results and Discussion**

### **Demographic Characteristics**

- Of the 60 learners, 55% were in Grade 11, 30% in Grade 12, and 15% in Grade 10. 70% reported onset of visual impairment before age 10.
- Psychological Factors
- Data revealed that 78% of learners reported high levels of math anxiety, linked to fear of failure and negative teacher attitudes. Interviews indicated low academic self-efficacy, with learners stating "Mathematics is for those who can see."
- School-Based Factors
- The school had functional Braille embossers. 87% of teachers reported no formal training in teaching mathematics to visually impaired learners, relying instead on verbal descriptions of geometric figures. Classroom observations confirmed limited use of tactile learning aids.
- Socio-Economic Factors
- 65% of learners came from households unable to afford personal assistive devices like talking calculators, increasing dependence on inadequate school resources. This created learning gaps during holidays and exam preparation.
- Cultural Factors
- Community interviews revealed beliefs that educating girls with disabilities is a "waste of resources," leading to low family support for mathematics homework and extra lessons. Girls were often assigned more domestic duties than their male peers.

## **VI. Discussion**

The findings show these factors are interdependent. Poverty limits material access, which reinforces poor performance, which then validates cultural bias. The lack of trained teachers exacerbates psychological barriers, as learners internalize failure as personal inability rather than systemic exclusion.



## VII. Conclusion

The mathematics performance of visually impaired girls in Zambia is constrained by a nexus of psychological, institutional, economic, and cultural barriers. Policy presence without resourced implementation has not closed the achievement gap. Addressing this requires moving beyond access to ensure meaningful participation and achievement through multi-sectoral collaboration.

### Recommendations

- **Teacher Capacity:** The Ministry of Education should institute mandatory, accredited in-service training on inclusive mathematics pedagogy, including Nemeth Braille Code and tactile graphics production for all mathematics teachers in inclusive schools.
- **Resource Equity:** Establish a centralized fund under the Ministry of Education for procurement and maintenance of assistive technologies, ensuring each inclusive school meets minimum standards for Braille materials and audio-tactile aids.
- **Psychosocial Support:** Integrate guidance and counseling services with staff trained in disability psychology to address math anxiety and build self-efficacy among visually impaired girls.
- **Community Engagement:** Partner with Disabled People's Organizations and traditional leaders to run sensitization programs challenging stigma and promoting the value of educating girls with disabilities.
- **Monitoring and Evaluation:** Strengthen ECZ and school inspectorate oversight to audit inclusive education implementation, with clear performance indicators for mathematics achievement among learners with disabilities.

## References

1. Abosi, O. C. (1999). *Trends and issues in special education in Botswana*. The Journal of Special Education, 33(1), 48-53.
2. Chitiyo, M., & Muwana, F. C. (2018). *Inclusive education in Zambia: The Kalulushi example*. International Journal of Inclusive Education, 22(9), 987-1001.
3. Eshiwani, G. S. (1985). *Women's access to higher education in Kenya: A study of opportunities and attainment*. Nairobi: Bureau of Educational Research.
4. Mugenda, O. M., & Mugenda, A. G. (1999). *Research methods: Quantitative and qualitative approaches*. Nairobi: Acts Press.
5. Muzata, K. K. (2019). *Challenges in the provision of special education in Zambia*. Zambia Journal of Education, 5(2), 1-14.
6. Orodho, J. A. (2004). *Techniques of writing research proposals and reports in education and social sciences*. Nairobi: Masola Publishers.
7. UNESCO. (2000). *The Dakar Framework for Action, Education for All: Meeting our collective commitments*. Paris: UNESCO.
8. UNICEF. (1998). *The state of the world's children 1998: Focus on nutrition*. New York: UNICEF.
9. World Bank. (2000). *Education and development: Investing in the future*. Washington, D.C.: World Bank.