



## **Academic Participation of Female Students in Biology: A Primary School Study from Western Hararghe, Ethiopia**

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### **ABSTRACT**

In Ethiopia, the enrollment of females in school is still lower than that of males. Women also struggle greatly in Dabia Primary School to participate in the educational process. This study aims to identify the factors that influence the academic achievement of grade eight female students at Dabia Primary School. A cross-sectional study was conducted from May 30 to July 01, 2024 on 53 respondents in all, including 36 female students in grade eight and 17 teachers, who were sampled for this study. The students were selected employing simple random selection techniques, whereas teachers were chosen via purposive sampling. The primary instruments for acquiring data were interviews and questionnaires. Frequency counts, percentages, and mean values were used to examine the data. The study's findings showed that psychological elements (96%) like shyness and concern of what others will think of them were highly rated by both teachers and female pupils. Psychological factors (92.5%) and sociocultural factors (92.5%) were considered the most detrimental influences, while personal factors (53%) included factors such as students with poor academic backgrounds and limited communication skills, as well as sociocultural factors (92.5%) like the respondents' reliance on their livelihood and their negative views on female education and household tasks being assigned to women.

Keywords: Academic Participation, Biology Subject, Female Students

### **INTRODUCTION**

Education is a process of teaching, training, and learning, particularly in schools and colleges, aimed at improving knowledge and developing skills (Ji et al., 2024; Somoza, 2025). The primary objective of any educational system is to develop individuals' problem-solving capacity, adaptability, and critical thinking by fostering the necessary knowledge, skills, attitudes, and competencies (Öztemur et al., 2024; Tawil & Locatelli, 2015). Education is widely recognized as a fundamental human right and plays a central role in preparing young people for their future societal responsibilities, to which every individual should have equitable access (Zendeli, 2017).

Education not only shapes individual outcomes but also reflects and perpetuates broader social inequalities, including gender disparities that influence access, participation, and long-term socioeconomic trajectories (Templeton & Korchagin, 2025). Persistent inequalities in educational access and representation constrain economic opportunities and



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broader societal participation, undermining individual and national development (Reardon, 2018).

From a development perspective, education is integral to improving the quality of life and socio-economic progress (Unesco, 2020). According to the United Nations Development Program (UNDP), development entails leading long and healthy lives, being knowledgeable, having access to resources for a decent standard of living, and participating meaningfully in community life (Baumann, 2021; Canton, 2021; Hopkins, 1991). In this context, women's education is particularly significant, as women make up roughly half of the world's population and play substantial roles in economic output, family well-being, social unity, and the intergenerational development of human capital (Antoninis et al., 2023; Bedford, 2024). Investing in girls' education is essential for inclusive and sustainable development because it enhances labor force participation, improves health and social outcomes, and accelerates socioeconomic growth (Dilaram, 2025; Elfert, 2015).

Education is also a key pathway for achieving global development goals and remains central to Ethiopia's national development agenda, including the Growth and Transformation Plan (Ababa, 2017; Ngwaru, 2013). Significant disparities in educational opportunities for men and women persist in Ethiopia, even though modern education was introduced there as early as 1908, with notable differences observed in school attendance, student retention, graduation rates, and academic performance levels (Booth, 2022; Tilahun, 2013). National education and training policies place a strong emphasis on the significance of girls' education, yet challenges such as early marriage, adolescent pregnancy, and sexual harassment remain a hindrance to girls' educational achievement and broader socio-economic involvement (Unesco, 2020; Wrigley, 2003). Female participation and performance consistently lag behind those of males at all educational levels in Ethiopia (Bealem et al., 2025; Tsegai, 2010).

At the local level, similar patterns are evident in Dabia Primary School. School records indicate that a disproportionate number of students who scored below the regional examination pass mark were female. In the most recent academic year, 23 out of 27 students who failed the regional examination were female. Additionally, female students recorded lower performance in Biology and other subjects, as reflected in both regional examination scores and continuous assessment results for the 2023 academic year (Dabia Primary School Record Office).

Despite the substantial body of literature examining factors affecting students' academic achievement, important contextual gaps remain. Existing studies have primarily focused on regional or national scales, educational stages, and urban populations, while giving limited consideration to local, school-based settings. Consequently, it remains unclear whether the factors identified in other regions or educational levels adequately explain the situation in rural primary schools such as Dabia. There is a lack of evidence detailing the specific academic performance difficulties and associated factors among female grade eight students at Dabia Primary School. This lack of localized evidence constrains the development of context-appropriate and well-targeted interventions.

This study is novel in that it provides a context-specific assessment of the factors affecting the academic achievement of grade eight female students at Dabia Primary School, a setting that has not been adequately explored in previous research. This study specifically

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concentrates on a single rural primary school, thereby producing information that is directly applicable to school level planning and intervention development. The study provides new insights by pinpointing challenges and opportunities specific to the setting, and offers evidence to support targeted approaches for improving the academic outcomes of female students at Dabia Primary School.

### RESEARCH METHOD

#### *Study Area and Period*

Sire Kelo, by north; Hida Dima, by west; Carcar and by south; Homacho. 'Weltane kebele' has a total population of 3016 on a total area of 200 hectares sharing different socio-economic and cultural aspects of lives. The primary source of income of the population of this kebele is agriculture (Zonal Agriculture office). The study was conducted from May 30 to July 01, 2024.

#### *Study Design and Population*

This study employed a cross-sectional design with a mixed-methods approach. All grade eight female students and all teachers who were present at Dabia Primary School during the study period constituted the study population.

#### *Sample Size Determination and Sampling Technique*

The sample size was determined by using [Yamane's \(1967\)](#) formula as follows. The total number of students to be interviewed (n) was calculated based on the population size (N), specifically 40 grade eight female students, and the desired level of precision (e), which is 0.5, as shown in the formula below.

$$n = \frac{N}{1 + N(e^2)}$$

The final sample size was 36 students. Students were categorized into two different strata according to their grade level. A simple random sampling method was used by drawing lots. In the case of selecting 36 students, the researcher prepared 40 pieces of papers out of which 36 said respondents and four said non-respondent. In addition to the students, all of the teacher were sampled purposively as the teachers of Dabia Primary School were small in number, thus it increases precision. Thus, all of the 17 available teachers of the school were selected purposively. For this research, 53 overall respondents were selected.

#### *Data Collection: Sources of Data, Tools, and Procedures*

Quantitative data were collected using a structured questionnaire comprising three-point Likert scale items (agree, neutral, disagree), adapted in accordance with [Best and Kahn \(2005\)](#). A questionnaire was created to determine the size and occurrence of factors thought to be obstacles to the academic success of female students in the eighth grade. Five main aspects were examined in-depth: personal traits (characterized by self-assurance, motivation, and study routines), financial constraints (including income restrictions within households and access to educational resources), sociocultural factors (including male-female stereotypes,

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parental expectations, and early marriage), mental factors (such as academic stress, anxiety, and a fear of failure), and systemic components (comprising teacher support, school infrastructure, and the learning environment). Each construct was operationalized using multiple items, with higher scores indicating a stronger perceived influence of the respective factors on academic achievement.

In addition, qualitative data were collected through key informant interviews using a semi-structured interview guide administered to selected teachers and female students. The interviews aimed to obtain an in-depth and contextual understanding of the quantitative findings by exploring participants' experiences, perceptions, and explanations related to the identified factors. The study combined quantitative and qualitative methods in order to attain methodological triangulation, which enhanced the comprehensiveness, validity, and interpretability of its findings. Quantitative data provided measurable patterns of hindering factors, while qualitative insights helped explain the underlying mechanisms and contextual dynamics influencing female students' academic achievement.

Semi-structured interviews were conducted to complement the quantitative findings and obtain an in-depth, contextual understanding of the factors affecting the academic achievement of grade eight female students. Five teachers, consisting of the school principal and subject teachers, along with eight female students from grade eight, were selected on purpose according to their roles and levels of academic achievement (high, medium, and low achievers). The interview guide centred on key themes such as students' learning experiences, sociocultural and psychological challenges, school-related and institutional factors, teacher support, and suggested strategies to enhance female students' academic performance. Each interview lasted approximately 30–45 minutes and was conducted in a private setting to ensure confidentiality. All interviews were conducted with participants' informed consent, audio-recorded, and supplemented with field notes. The recordings were transcribed verbatim and used for qualitative analysis to support and enrich the quantitative results.

Classroom observation was also conducted using a structured observation schedule to complement the quantitative and interview data. Non-participant classroom observations were conducted in five grade eight Biology classes over a period of two weeks. The observations focused on teacher–student interaction patterns, female students' classroom participation, engagement during lessons, instructional methods, and the learning environment. Each observation session lasted approximately 40 minutes, corresponding to a regular class period. The researcher did not interfere with classroom activities. Field notes were recorded immediately after each session using the observation checklist and narrative descriptions to capture key behaviors, interactions, and contextual factors relevant to female students' academic participation.

### **Data Analysis**

Quantitative data were analyzed with the help of Statistical Package for Social Science (SPSS) Version 23. The characteristics of the study population were summarized using descriptive statistics, frequency, and percentage. Qualitative data were coded into a set of categories thematically and analyzed using descriptive narrations and used to strengthen or supplement the quantitative information obtained and the findings of the study were presented through tables and charts.

## RESULTS AND DISCUSSION

### *Sociodemographic Characteristics of The Study Participants (Teachers and Students)*

A total of 53 participants (teachers and students) were included in the study. Of these, 73.6% were female, including three female teachers, whereas 26.4% were male, including 14 male teachers. Regarding age distribution, 51% of participants were aged 15–20 years, 36% were above 20 years, and 13.2% were below 15 years. Most teacher respondents had less than five years of work experience (59.4%), followed by those with 5–10 years of experience (32.8%), whereas 7.8% had 11–15 years of experience. No participant reported more than 15 years of teaching experience. All study participants (100%) reported rural residence. Concerning academic achievement in Biology, 55% of female students were categorized as low achievers, 28% as medium achievers, and only 17% as high achievers.

**Table 1** Sociodemographic Characteristics and Biology Achievement Levels of The Study Participants

Variable	characteristics	Number	Percentage
Sex	Male	14	26.4
	Female	39	73.6
	Total	53	100
Age	Below 15	7	13.2
	15-20	27	51
	>20	19	36
	Total	53	100
Residence	Urban	0	0
	Rural	53	100
	Total	53	100
Students Grade achievement in biology	Low	20	55
	Medium	10	28
	High	6	17
	Total	36	100

### *Factors Affecting the Academic Participation of Female Students in Dabia Primary School in both Students' and Teachers' Views*

Female students' academic participation was restricted by psychological factors, according to ratings from both teachers and female students, with 96% of respondents agreeing. Factors such as shyness and fear of being negatively judged by others (Table 2) were significant. These were followed by sociocultural factors, mentioned by 92.5% of respondents, including reliance on a household income, negative community attitudes toward girls' education, and unequal distribution of household responsibilities to girls. In addition, personal factors were identified by 53% of participants, including poor academic background and limited communication skills. Other barriers, such as internal and external school-related factors and economic constraints, were also reported by respondents (Table 2). Findings from interviews and classroom observations further supported the quantitative results.

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These findings suggest that female students' academic participation in Dabia Primary School is primarily constrained by psychological and sociocultural barriers, with personal and institutional factors playing a secondary but still important role. The dominance of psychological barriers indicates that many female students does not feel confident or socially supported enough to actively engage in classroom learning.

The importance of psychological obstacles corresponds with the claim by [Chickering and Gamson \(1987\)](#) that successful learning demands active participation rather than mere attendance at classroom sessions. When students experience fear of judgment or social ridicule, their willingness to participate in discussions, ask questions, and apply learning to real-life contexts is substantially reduced. This environment has a disproportionate impact on female students, especially in mixed-gender classrooms, where participation can make them targets of social scrutiny. Community norms, shaped by sociocultural factors, typically place domestic duties above academic aspirations for girls. Such expectations often limit study time and reinforce perceptions that female education is of lesser value. These findings are consistent with [Tesfaye and Berhanu \(2015\)](#), who reported that psychological and sociocultural constraints significantly hinder active learning participation among female students. Moreover, the results corroborate the study by [Tilahun \(2013\)](#), which identified similar barriers limiting female students' academic participation and achievement in Harar secondary schools. The consistency of these findings across different educational levels suggests that gender-related academic challenges persist throughout the schooling system. However, the high magnitude of these barriers in Dabia Primary School may reflect the compounded effects of rural context, limited resources, and traditional gender norms, underscoring the need for context-specific interventions.

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**Table 2** Students' Responses to Factors Limiting Female Participation and Academic Achievement in School

No	Questions /items	Total yes response		Total no response		Total in part response		Total
		NO	%	NO	%	NO	%	NO
1	Women's participation and academic achievement in school were likely restricted by sociocultural factors.	49	92.5	3	5.7	1	1.8	53
2	Economic factors restricted the degree to which women participated and succeeded in school.	30	56.6	23	43.4	0	0	53
3	Psychological factors likely restricted women's involvement and accomplishments in educational settings.	51	96	2	4	0	0	53
4	Did personal factors limit women's participation and achievement in school.	28	53	20	38	5	9	53
5	Did internal school factors limit women's participation and achievement in school.	27	51	26	49	0	0	53
6	Did external school factors limit women's participation and achievement in school.	40	75.5	10	18.9	3	5.7	53

***The Extent of Female Students Academic Participation Compared to Their Male Counterparts in Dabia Primary School***

According to the views of all study participants, the extent of female students' academic participation was consistently reported as low compared to that of male students (Table 3). Respondents indicated that female students completed homework assignments less frequently, participated less in active learning methods, and scored lower in both in-class and out-of-class assessments than their male counterparts. Furthermore, participants reported that female students often arrived late to school and demonstrated limited participation in supplementary educational programs, as confirmed by both teachers' and students' responses. Evidence from the data indicates a consistent disparity in academic engagement between male and female students, with female students showing lower levels of participation in various aspects of academic life, including classroom interactions, assignment submissions, homework completion, and supplementary learning materials. The observed lower level of academic participation among female students may be attributed to the combined effects of psychological, sociocultural, and institutional barriers identified earlier in this study. Limited homework completion and reduced engagement in active learning may reflect time constraints imposed by household responsibilities, lower academic confidence, and reduced access to academic support. This finding is consistent with the study by Yenenesh Tilahun (2013), which reported similarly low levels of female academic participation and achievement in Harar secondary schools (Tilahun, 2013). This pattern's consistency across various educational

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levels indicates that gender-based disparities in academic participation are not isolated events, but rather a component of a more extensive structural problem within the education system. In the context of Dabia Primary School, these challenges may be intensified by rural living conditions, limited educational resources, and traditional gender expectations, which collectively hinder female students' ability to participate fully in academic activities.

**Table 3** Students' Perceptions of Female Academic Participation and Motivation in Biology

No	Questions /items	Yes		No		Total
		n	%	n	%	n
1	There was a low level of interesinof doing homework properly as compared to male students.	45	85	8	15	53
2	There was low level of motivation of female students in activities such as; group discussions and presentation of biology subject.	35	66	18	34	53
3	The degree of motivation of female students in Dabia primary school was low relative to that of male students.	50	94.3	3	5.7	53
4	Female students have low mark of assessments; test and quizzes.	45	84.9	8	15.1	53
5	Most female students were low parparticipants supplemental education	40	75.5	13	24.5	53
6	In general, do you agree that there was low extent of female academic participation compared to their male counter parts?	50	94.3	3	5.7	53

***Major Driving and Constraining Forces toward Academic Participation of Female Students in Dabia Primary School***

Female students and teachers alike identified several driving and constraining factors affecting female students' academic participation and achievement (Table 4). Female students' academic participation was often influenced by factors including their educational background, special academic support received by them, the impact of female teachers as role models, family and community social attitudes, students' level of interest, self-esteem, and self-reliance, as well as teachers' motivation. These findings were further supported by qualitative interview data, which reinforced the importance of both individual and institutional influences on female students' engagement in academic activities. Data from the study suggest that the academic involvement of female students at Dabia Primary School is influenced by a complex interplay between factors that facilitate and hinder their participation at the individual, family, school, and community levels. The same factors may function as facilitators or barriers depending on the context in which they are experienced. The identification of educational background, self-esteem, and interest as major determinants highlights the role of individual-level preparedness and motivation in shaping academic participation. At the school level, the presence of female teachers as role models and the provision of special academic support appear critical in fostering confidence and sustained engagement among female students. Conversely, negative sociocultural attitudes and limited encouragement from families can undermine these positive influences, reinforcing traditional gender norms that deprioritize

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girls' education. This pattern is consistent with the findings of Yenenesh Tilahun (2013), who reported that the driving forces for female academic participation and achievement were relatively weak in Harar secondary schools (Tilahun, 2013). The persistence of similar challenges across different educational contexts suggests that improving female students' academic participation requires coordinated interventions that address both school-based support mechanisms and broader sociocultural constraints.

**Table 4** Perceived Factors Affecting Female Students' Academic Participation and Achievement in Biology

No	Questions/items	Yes		No		In part		Total
		n	%	n	%	n	%	
1	The academic participation and achievement of females from educated families were better than uninformed ones.	30	57	23	43	0		53
2	Special attention was not given through arranging tutorial class for female students.	28	53	12	23	13	24	53
3	A low proportion of female teachers had a negative impact on female students' academic participation and performance.	25	47	25	47	3	6	
4	There were negative sociocultural attitudes of the local society toward educating women.	35	66	15	28	3	6	53
5	Women have lower self-esteem.	40	75.5	13	24.5	0	0	53
6	Women have lower self-reliance.	40	75.5	13	24.5	0	0	53
7	Often, a variety of tasks in home were allocated to female students.	53	100	0	0	0	0	53
8	The dropout of female students was high in the local area?	50	94	3	6	0	0	53
9	There was low level of interest on the academic participation of female students.	40	75.5	13	24.5	0	0	53
10	There was low role of teachers in directing and regulating the female students in various activity in-class room	35	66	15	28	3	6	53
11	The teachers were not giving chances for female students to express their ideas freely in school.	35	66	15	28	3	6	53
12	In general, do you agree with the above challenges as the driving and constraining forces for female students.	53	100	0	0	0	0	53

***The Available Opportunities for Female Students to Enhance Their Academic Participation and Attainment Levels.***

Despite the generally low level of utilization, respondents identified several available opportunities that could enhance female students' academic participation and achievement at Dabia Primary School (Table 5). These opportunities included the availability of learning resources for female students, affirmative action measures aimed at supporting female learners, and the presence of sufficient female teachers serving as role models. Participants

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indicated that these factors can strengthen female students' motivation and academic engagement.

These findings suggest that although female students currently underutilize existing support mechanisms, institutional and human resource-based opportunities are present and could be leveraged to improve academic participation and performance if effectively implemented.

The availability of female role models and affirmative action strategies may play a critical role in fostering self-confidence, aspiration, and persistence among female students. Access to supportive resources can further reduce gender-based disparities by addressing academic and psychosocial needs. These findings are consistent with [Tilahun \(2013\)](#), which documented similar opportunities for enhancing female students' academic participation in Harar secondary schools. However, the limited exploitation of these opportunities in Dabia Primary School suggests a gap between policy availability and practical implementation. Addressing this gap requires strengthening school level follow-up mechanisms, enhancing awareness among students and teachers, and ensuring that available resources are actively integrated into teaching and learning processes.

**Table 5** School-Related Opportunities Supporting Female Students' Educational Participation at Dabia Primary School

No	Opportunities	Yes		No		Total	
		n	%	n	%	n	%
1	There were sufficient learning resources in the school for female	30	56.6	23	43.4	53	100
2	The location of the school accessible for transportation	10	19	43	81	53	100
3	There was an affirmative action policy for girls' education in Dabia Primary School.	53	100	0	0	53	100
4	A Number of female role models are available to boost female students' morale.	50	94.3	3	5.7	53	100
5	In general, do you agree those above opportunities accessed for female students	53	100	0	0	53	100

## CONCLUSION

This study demonstrates that female students' academic participation and achievement in Dabia Primary School remain limited despite the availability of supportive school-level opportunities. Psychological barriers, particularly low self-esteem, shyness, and fear of social judgment, were the most significant constraints, followed by sociocultural norms that undervalue girls' education and impose disproportionate domestic responsibilities. Economic and school-related factors further exacerbated these challenges. Female students showed lower engagement in classroom participation, homework, assessments, and supplementary learning compared to male students. Although affirmative action policies and female role models were widely reported, their presence alone was insufficient to ensure meaningful participation. These findings indicate a disconnect between policy availability and effective implementation. Addressing female underachievement, therefore, requires interventions that extend beyond structural provisions to include psychosocial support,

gender-responsive pedagogy, and sustained community sensitization. An integrated, multi-level approach is essential to improving female students' academic participation and educational outcomes.

### **ETHICAL CONSIDERATIONS**

Ethical clearance for the study was obtained from the Institutional Research Ethics Review Committee (IHRERC) of Oda Bultum University. An official letter of support was obtained from Dabia primary School before data collection. Informed written consent was obtained from each participant after explaining the objectives of the study. Information obtained from study participants was kept confidential.

### **AVAILABILITY OF DATA AND MATERIALS**

The data sets generated and/or analyzed during the current study are available from the corresponding authors on reasonable request.

### **CONFLICTS OF INTEREST**

The authors declare that they have no conflicts of interests

### **FUNDING STATEMENT**

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### **AUTHORS CONTRIBUTION**

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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