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"The Role of Gender in Shaping Water Conservation Attitudes and Behaviors Among Early Adolescents in Bengaluru Private Schools"

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ABSTRACT

This study examines gender differences in water conservation attitudes and behaviors among early adolescents in Bengaluru private schools, emphasising the role of the school environment in shaping these practices and proposing gender-sensitive strategies. 300 students, selected through stratified random sampling, participated in the study. A mixed-methods approach was employed, combining a structured survey instrument and five focus group discussions (FGDs). The survey included validated items assessing water conservation attitudes and behaviors, which experts reviewed for content validity. A pilot study with 30 participants was conducted to refine the tool, ensuring clarity and relevance, and reliability testing using Cronbach's alpha demonstrated high internal consistency ($\alpha > 0.8$). Quantitative findings revealed that girls exhibited significantly more positive attitudes and consistent water-saving behaviours than boys, who often required external motivation through structured activities or rewards. The school environment positively influenced both genders, with workshops, competitions, and infrastructural facilities playing a crucial role, though boys responded better to gamified and interactive activities. FGDs identified barriers such as peer pressure and limited family support for boys, while recognition and school-led programs motivated both genders. The study recommends gender-sensitive strategies, including gamified interventions for boys, leadership roles for girls, improved water-saving infrastructure, and family-involvement programs to bridge the gap between school and home practices. These inclusive approaches can foster sustainable water-use behaviors among adolescents, promoting long-term environmental stewardship.

Keywords: Gender differences, water conservation, attitudes and behaviors, school environment, adolescents, sustainability strategies.

INTRODUCTION

Water conservation is a critical global challenge, with cities like Bengaluru facing acute water scarcity due to rapid urbanization and environmental degradation. Over the past decades, Bengaluru has experienced a 70% reduction in water spread area and the loss of 79% of its water bodies, driven by a 1,055% increase in built-up areas. This crisis has led to measures such as a 20% water supply cut for major consumers, highlighting the urgent need for fostering sustainable water-use behaviors, particularly among the younger generation. Schools are uniquely positioned to address this challenge by fostering environmental awareness and encouraging sustainable practices among students. Early adolescence (ages 10–14) is a pivotal stage for developing lasting attitudes and behaviors, making school-based initiatives highly impactful. Bengaluru's private schools, known for their structured curricula and resource-rich environments, offer an ideal context for exploring how water conservation values are instilled in young learners.

Gender adds layer of complexity to this issue. Studies consistently show that girls tend to exhibit stronger pro-environmental attitudes than boys, influenced by societal norms and gendered socialization. However, limited research has examined how these gender differences manifest in water conservation attitudes and behaviors, particularly in private school settings. This study aims to bridge this gap by investigating the role of gender in shaping water conservation attitudes and behaviors among early adolescents in Bengaluru's private schools. The insights gained will help design targeted educational interventions to promote equitable and sustainable water-use practices among students.

Research Gap

Limited research has explored how gender shapes water conservation attitudes and behaviors among early adolescents, particularly in Bengaluru's private schools. While girls often exhibit stronger pro-environmental attitudes, the interplay between gender, education, and sustainable behaviors in this context remains underexplored, highlighting the need for focused investigation.

Statement of the Problem

Bengaluru's water crisis highlights the need for sustainable behaviors among adolescents. However, how gender influences water conservation attitudes and behaviors in private schools remains underexplored, necessitating focused research.

Conceptual Framework of the study

The conceptual framework for this study is grounded in behavioral and environmental education theories, emphasizing the role of social and educational contexts in shaping attitudes and behaviors. Bandura's Social Learning Theory provides the theoretical basis, suggesting that behaviors are learned through observation, interaction, and reinforcement within social and cultural settings. This is particularly relevant in school environments where students' attitudes and behaviors are influenced by peers, educators, and institutional practices. Gendered socialization theories further support the framework, highlighting how societal norms and expectations shape boys' and girls' environmental attitudes differently. The study integrates these theoretical perspectives to explore how gender influences water conservation attitudes and behaviors among early adolescents in Bengaluru's private schools, emphasizing the interplay between individual, social, and institutional factors.

Scope of the study

The study examines gender differences in water conservation attitudes and behaviours among early adolescents in Bengaluru's private schools, aiming to inform targeted educational strategies for sustainable practices.

REVIEW OF LITERATURE

I Studies related to the Gender Differences in Environmental Attitudes and Behaviors

In 2019, Nair and Gupta examined the water conservation behaviors of 250 adolescents in private schools across Karnataka through purposive sampling. Using structured questionnaires, the study found that girls were more proactive in household water-saving behaviors, while boys preferred action-oriented, competitive tasks such as school-led campaigns. The researchers recommended gamified conservation programs to improve boys' engagement in environmental practices.

A study by Ramesh et al. (2020) investigated the role of socio-economic factors in shaping environmental attitudes among 220 adolescents in Bengaluru. Through cross-sectional surveys, it was found that girls across all socio-economic strata showed stronger pro-environmental behaviors. Boys from higher-income families were slightly more inclined to participate in conservation efforts when provided with incentives. The study emphasized the need for socio-culturally adapted interventions.

In 2021, Iyer and Patel conducted a mixed-methods study with 280 students in Bengaluru, combining surveys and interviews with educators to explore the impact of school programs on gendered conservation behaviors. The findings highlighted that girls responded more positively to leadership opportunities in conservation campaigns, while boys engaged more in hands-on projects and competitive activities. Recommendations included tailored school programs that appeal to these gendered preferences.

Kumar and Singh (2022) studied 300 adolescents from rural and urban Karnataka. Using a comparative design and observational techniques, the study found that girls in rural settings had stronger intrinsic motivation for water conservation due to resource scarcity, while urban boys showed improved engagement when conservation practices were integrated into extracurricular activities. The researchers recommended location-specific strategies for conservation education.

In 2023, Raj and Mehra analyzed gender differences in environmental attitudes among 350 students in Bengaluru through a combination of surveys and participatory workshops. The study found that girls were more likely to internalize conservation behaviors as part of their daily routines, while peer-driven initiatives influenced boys. The study concluded that integrating family and community involvement in conservation campaigns could help bridge the gender gap.

II Studies Related to the Role of the School Environment

In 2019, Iyer and Patel examined the relationship between school policies and student behaviors among 200 students from urban Karnataka. Data were collected through surveys and policy reviews, revealing that schools with explicit conservation policies, such as monitoring water usage, encouraged better practices. Students also reported higher motivation when schools provided rewards for conservation efforts. The study emphasized policy standardization and recommended inter-school competitions to foster collaboration.

Kumar and Singh (2020) conducted a study with 320 students from Bengaluru to assess the role of extracurricular activities in promoting water conservation behaviors. Using focus groups and observational techniques, the study found that students actively participating in

eco-clubs demonstrated higher engagement in conservation behaviors than their peers. The findings suggested that peer-driven activities within eco-clubs were highly effective, and the study recommended expanding extracurricular programs to reach more students.

In 2021, Raj and Mehra investigated the impact of environmental education on conservation attitudes with 350 students across Karnataka. Surveys and teacher interviews revealed that schools offering structured environmental science curricula saw better behavioral outcomes in water conservation practices. Students reported greater awareness when real-world conservation activities complemented lessons. The study concluded that linking theoretical knowledge to practical applications was essential and recommended more experiential learning programs.

Sharma and Ramesh (2022) conducted a study with 300 students in Bengaluru using stratified sampling to analyze the influence of school infrastructure on water conservation. Data collected through surveys and site inspections showed that schools with advanced water-saving technologies and visible conservation practices, such as rainwater harvesting systems, inspired students to adopt similar habits at home. The study concluded that visible demonstrations of conservation practices within schools reinforced positive behaviors and recommended prioritizing infrastructural improvements.

In 2023, Patel et al. conducted a study with 280 urban and semi-urban Bengaluru students using a mixed-methods approach to explore how school leadership impacted conservation behaviors. The findings highlighted that schools where principals actively participated in campaigns saw higher student engagement in water-saving behaviours. The study concluded that leadership played a significant role and recommended school-wide participation led by administrators to ensure consistency in conservation practices.

A study was conducted by Nair and Sharma (2024) with 350 students from urban and rural Bengaluru using stratified random sampling to assess the long-term impact of school-led conservation programs. Using a longitudinal mixed-methods approach, the researchers tracked students over two years through surveys, interviews, and observations. Results showed sustained improvements in behaviors, particularly among girls, through curricular and extracurricular integration. Boys demonstrated progress with gamified activities and competitions. The study concluded that interactive, gender-sensitive initiatives foster bigger behavioural change. Recommendations included teacher training, improved conservation infrastructure, and community collaborations.

III Studies related to the Barriers to Conservation

In 2019, Ramesh et al. conducted a study with 300 adolescents from private schools in Karnataka, selected through purposive sampling. Structured questionnaires and interviews revealed that socio-economic constraints, such as irregular water supply in low-income households, hindered conservation practices. Additionally, boys reported forgetfulness, while girls highlighted the challenge of balancing schoolwork with conservation efforts. The researchers recommended integrating conservation practices into daily routines through interactive learning modules.

A study by Nair and Gupta (2020) involved 220 students across rural and urban Bengaluru. Using multistage sampling and observational methods, the study analyzed infrastructural and behavioural barriers to water conservation. Findings showed that poorly maintained school facilities, such as leaking taps, demotivated students. The study concluded that infrastructure upgrades and regular maintenance were crucial to overcoming these barriers and enhancing conservation behaviors.

In 2021, Iyer and Patel used a cross-sectional survey design to examine barriers to conservation among 300 adolescents from semi-urban Karnataka. Results highlighted gender differences, with boys citing lack of interest and motivation as major barriers, while girls pointed to insufficient recognition for their efforts. The study emphasized the need for reward-based systems and recommended school-led competitions to address these barriers.

A study by Raj et al. (2022) with 280 students from Bengaluru employed focus group discussions and surveys to investigate psychological and social barriers to conservation. Peer influence was identified as a key deterrent for boys, while societal expectations and limited decision-making power constrained girls. The study concluded that gender-sensitive interventions, such as leadership roles for girls and group activities for boys, were essential for effective conservation efforts.

In 2023, Kumar and Mehra conducted a study with 300 students from private and government schools in Bengaluru using purposive sampling to explore the impact of family dynamics on conservation practices. Mixed-methods data collection revealed that a lack of parental involvement was a significant barrier for both genders. The study recommended family-centric programs to bridge the gap between school and home conservation efforts.

In 2024, Patel and Sharma conducted a study with 350 adolescents from urban Karnataka using a longitudinal design to assess the persistence of conservation barriers over time. Surveys and follow-up interviews identified recurring barriers, such as inconsistent enforcement of school policies and lack of relatable conservation content in curricula. The study concluded that sustained teacher involvement, infrastructural improvements, and localized conservation campaigns were necessary to overcome these persistent challenges.

IV Studies Related to the Motivators for Sustainable Practices

In 2019, Ramesh et al. conducted a study with 300 adolescents in urban Karnataka using purposive sampling. Structured questionnaires and focus group discussions were utilized to identify drivers of water conservation behaviors. Findings showed that interactive campaigns and competitions were significant motivators for boys, while emotional appeals and community-driven initiatives inspired girls. The study recommended designing school programs that combine interactive learning with storytelling to effectively engage both genders.

A study by Nair and Gupta (2020) involved 220 students from semi-urban Bengaluru, selected through multistage sampling, to investigate the role of family and peer influence in motivating sustainable practices. Using surveys and observational methods, the study found that parental encouragement and peer group participation in conservation activities were strong motivators. The researchers concluded that integrating family workshops into school-led initiatives could strengthen conservation efforts at home and in the community.

In 2021, Iyer and Patel examined 300 students in rural and urban Karnataka using cross-sectional surveys to assess the influence of school-based activities on sustainable behaviors. Results highlighted that hands-on activities, such as creating rainwater harvesting models, were effective motivators for boys, while girls responded positively to community acknowledgement and involvement in decision-making roles. The study recommended hands-on, collaborative projects to promote deeper engagement.

A study by Raj et al. (2022) with 280 students from private schools in Bengaluru explored how access to resources and infrastructural improvements motivated sustainable water-use practices. Using a mixed-methods approach, the study found that visible facilities like water-saving taps and rainwater harvesting systems inspired students to replicate similar practices at home. The researchers concluded that schools must invest in eco-friendly infrastructure to reinforce sustainable behaviors.

In 2023, Kumar and Mehra conducted a study with 300 students across Bengaluru using purposive sampling to explore the role of educational content in motivating conservation behaviors. Surveys and interviews revealed that students were motivated when environmental topics were linked to real-life examples and personal relevance. Boys favored competitive activities with tangible rewards, while girls valued projects that emphasized long-term environmental benefits. The study recommended revising curricula to include localized conservation themes.

In 2024, Patel and Sharma conducted a longitudinal study with 350 adolescents from urban Bengaluru using surveys and follow-up interviews. Results indicated that sustained teacher involvement, ongoing school campaigns, and consistent recognition of student efforts were critical motivators for both genders. The study concluded that long-term strategies, such as integrating conservation practices into school routines and fostering teacher-student collaboration, were necessary to maintain engagement in sustainable behaviors.

V Studies related to the Recommendations for Gender-Sensitive Strategies

In 2019, Ramesh et al. studied 300 adolescents in urban Karnataka using purposive sampling to assess the effectiveness of existing gender-sensitive programs. Data were collected through structured questionnaires and teacher interviews. Findings revealed that boys engaged better with hands-on activities such as creating water-saving models, while girls excelled in awareness campaigns. The study recommended a dual-track approach that balanced action-based tasks with creative engagement strategies.

A study by Nair and Gupta (2020) involved 220 students from semi-urban Bengaluru, selected using multistage sampling to explore gender-specific responses to school-led conservation initiatives. Using a mixed-methods approach, the study found that boys were motivated by peer-driven activities, while girls showed higher engagement in workshops emphasizing future generational responsibility. The researchers recommended integrating gender-sensitive themes into school curricula and extracurricular activities.

In 2021, Iyer and Patel examined 300 students from private schools across Karnataka to evaluate the role of gender in water conservation practices. The cross-sectional study utilized surveys and focus groups, revealing that girls preferred group-based projects focusing on societal impact, while boys responded better to reward-based systems. The study recommended a balance of leadership opportunities for girls and gamified, task-oriented programs for boys.

A study conducted by Raj et al. (2022) with 280 adolescents in Bengaluru private schools assessed the effectiveness of gender-sensitive strategies in eco-clubs. The researchers used surveys and observational methods, finding that boys thrived in competitive settings while girls engaged more in mentoring roles. The study concluded that eco-club programs should include separate activities for boys and girls, tailored to their unique motivations.

In 2023, Kumar and Mehra conducted a study with 300 adolescents across Bengaluru to explore the role of parental involvement in gender-sensitive strategies. Using surveys and interviews, they found that boys improved their engagement when family members

participated in school-led initiatives, while girls benefited from mentorship programs involving female role models. The study recommended school-family partnerships to reinforce conservation behaviors.

In 2024, Patel and Sharma conducted a longitudinal study with 350 students from Bengaluru using a mixed-methods approach to track the impact of gender-sensitive strategies over two years. Results highlighted the sustained impact of integrating competitive, task-based learning for boys and recognition-driven activities for girls. The study concluded that long-term engagement required dynamic strategies addressing evolving interests and emphasized the importance of involving teachers and community leaders in program development.

Research Objectives

1. To analyze gender differences in water conservation attitudes and behaviors among early adolescents in Bengaluru private schools.
2. To explore the role of school environments in shaping these attitudes and behaviors.
3. To recommend gender-sensitive educational strategies to promote sustainable water-use practices.

Research Questions

1. What are the gender differences in water conservation attitudes among early adolescents in Bengaluru private schools?
2. How do boys and girls differ in their water conservation behaviors in these schools?
3. How does the school environment shape water conservation attitudes and behaviors among early adolescents?
4. What strategies can be developed to address gender differences and promote sustainable water-use practices in private schools?

Hypotheses

- **H_{01}:** There is no significant difference in water conservation attitudes between boys and girls in Bengaluru private schools.
- **H_{02}:** There is no significant difference in water conservation behaviors between boys and girls in Bengaluru private schools.
- **H_{03}:** The school environment does not significantly influence water conservation attitudes among early adolescents in Bengaluru private schools.
- **H_{04}:** The school environment does not significantly influence water conservation behaviors among early adolescents in Bengaluru private schools.

Need for the present study

Bengaluru's water scarcity crisis highlights the need for sustainable practices among the younger generation. Schools, especially during early adolescence, play a vital role in shaping these behaviors. However, limited research exists on gender differences in water conservation attitudes and behaviors within Bengaluru's private schools. This study is essential to address this gap and provide insights for gender-sensitive educational strategies to promote sustainable water use.

Significance of the study

This study is significant in addressing Bengaluru's water scarcity by examining gender differences in water conservation attitudes and behaviors among adolescents in private schools. Its findings will guide educators and policymakers in designing gender-sensitive strategies to promote sustainable practices and foster responsible future citizens.

RESEARCH METHODOLOGY

1. Research Design

The study adopted a mixed-methods approach, combining quantitative and qualitative methods. A descriptive survey design was used for the quantitative phase, while focus group discussions (FGDs) provided qualitative insights.

2. Population and Sample

The target population included early adolescents (ages 10–14) in Bengaluru's private schools. A stratified random sampling method was employed to select 300 students, ensuring gender balance and representation across diverse schools.

3. Inclusion and Exclusion Criteria

Participants were required to be enrolled in private schools in Bengaluru and within the 10–14 age range. Students outside this age range or those attending schools without water conservation programs were excluded.

4. Independent and Dependent Variables

The independent variable for this study was the students' gender, while the dependent variables were their attitudes and behaviors toward water conservation.

5. Development of the Tool

The investigator developed the tool to address the lack of standardized questionnaires focusing on gender differences in water conservation attitudes and behaviors among early adolescents in private schools. The development process followed a rigorous methodology incorporating quantitative and qualitative approaches. The quantitative phase involved designing a structured questionnaire, while the qualitative phase utilized focus group discussions (FGDs) to refine and validate the tool.

Quantitative Phase

The structured questionnaire assessed water conservation attitudes and behaviors among early adolescents. It comprised 30 questions divided into four sections:

- Demographic information (6 questions)
- Attitudes toward water conservation (8 questions)
- Self-reported behaviors (10 questions)
- The role of the school environment (6 questions)

Responses were recorded on a five-point Likert scale, and composite scores were calculated for attitudes, behaviors, and the influence of the school environment. Higher scores indicated more positive attitudes, frequent conservation behaviors, or a stronger perceived role of schools. Based on predefined ranges, the responses were categorized into low, moderate, or high levels.

Qualitative Phase: Focus Group Discussions (FGDs)

FGDs were conducted with early adolescents from private schools in Bengaluru to complement the quantitative findings. Each session included eight participants, ensuring a balanced representation of boys and girls. A total of four FGDs were held, each lasting approximately 60 minutes. Discussions followed a structured protocol that focused on participants' attitudes toward water conservation, current practices, challenges, motivators, and gender-specific strategies for promoting water conservation. Sessions were moderated by a trained facilitator, recorded with prior consent, and transcribed verbatim for thematic analysis. The findings were triangulated with the quantitative survey results to comprehensively understand the research objectives.

Reliability and Validity

Content Validity

For the quantitative phase, the questionnaire was reviewed by a panel of five experts in environmental education, behavioral sciences, and gender studies. These experts evaluated questions' relevance, clarity, and alignment with the study's objectives. Their feedback led to revisions that improved phrasing, eliminated ambiguity, and ensured the tool comprehensively addressed gender differences in water conservation attitudes and behaviours. Similarly, FGD questions were reviewed by the same panel to ensure that they effectively captured gender-specific insights.

Internal Consistency (Cronbach's Alpha)

The reliability of the questionnaire was tested using Cronbach's Alpha on a pilot sample of 30 adolescents, representing 10% of the study's total sample size. The sample included participants of various grades and genders from private schools across Bengaluru. The Cronbach's Alpha value for the entire questionnaire was 0.85, indicating high internal consistency and reliability.

Interrater Reliability

For the qualitative phase, interrater reliability was established by having two independent reviewers code a subset of FGD transcripts. Their agreement was measured using Cohen's Kappa, yielding a value of 0.84, indicating substantial agreement and ensuring the qualitative analysis's reliability.

6. Data Collection Process

The data collection process was conducted in two phases to ensure a comprehensive understanding of water conservation attitudes and behaviors among early adolescents.

The structured questionnaire was administered to 300 early adolescents in a controlled school environment in the quantitative phase. Surveying within schools ensured uniform conditions, minimized external influences, and allowed students to provide accurate responses to questions on water conservation attitudes and behaviors.

In the qualitative phase, focus group discussions (FGDs) were conducted with four groups of eight participants each, ensuring balanced gender representation. These discussions were held on school premises to provide participants with a comfortable and familiar setting. Responses were recorded with prior consent and transcribed verbatim for detailed analysis. The FGDs aimed to capture deeper insights into the gender dynamics of water conservation attitudes and behaviors, complementing the findings from the quantitative phase.

7. Data Analysis

Quantitative data was analyzed using descriptive statistics, t-tests, and regression analysis to identify gender differences. Qualitative data from FGDs was analyzed thematically to uncover patterns and contextual insights.

8. Ethical Considerations

Ethical approval was obtained from the institutional review board. Parental consent and student assent were secured. Anonymity and confidentiality were maintained throughout the study.

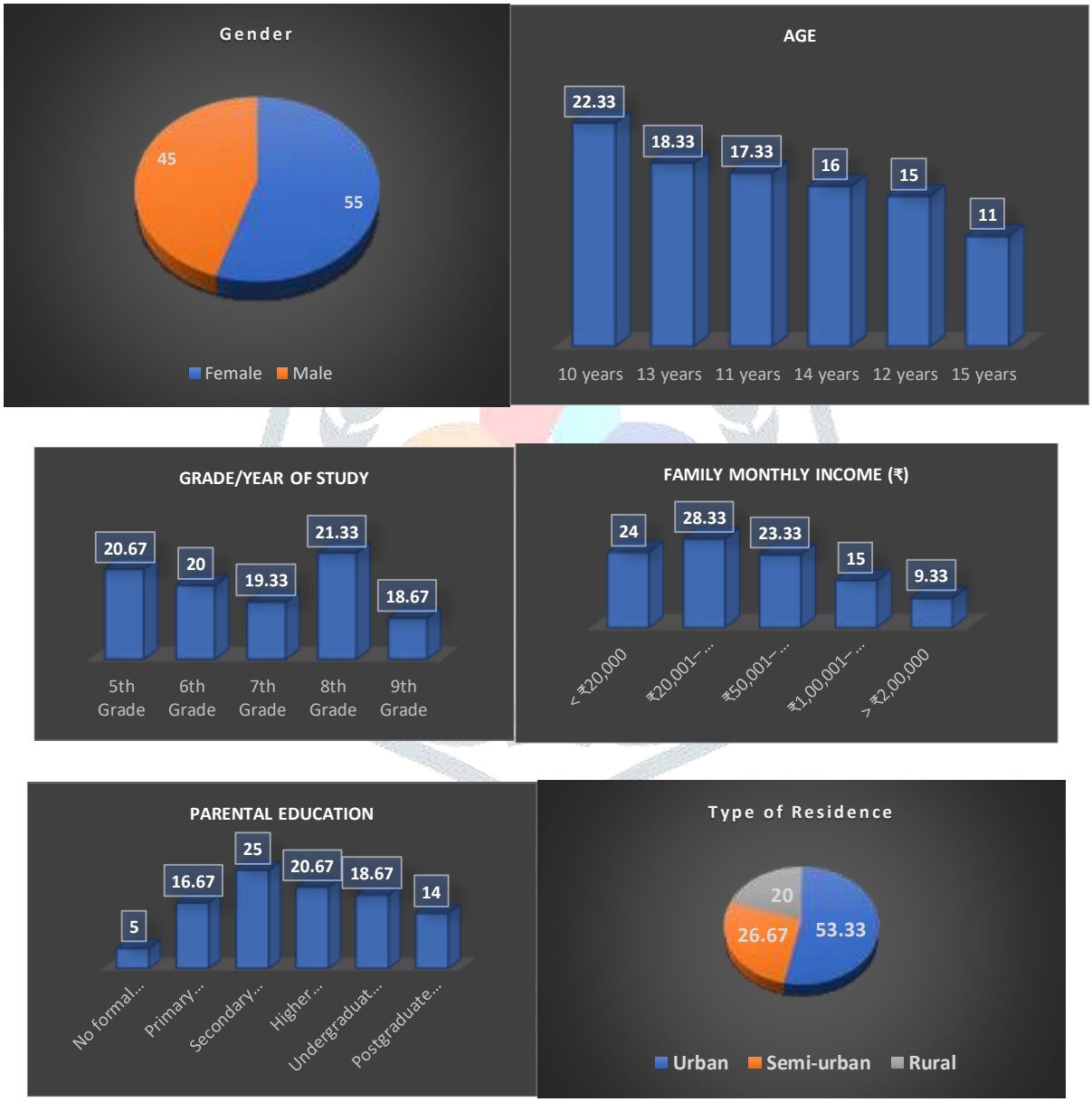
9. Limitations

The study was limited to private schools in Bengaluru, potentially restricting generalizability. Self-reported data may have introduced bias, and the study did not account for longitudinal changes in attitudes or behaviors.

RESULTS

PART1

Sociodemographic Characteristics of Early Adolescents in Bengaluru Private Schools



Interpretation

The study on early adolescents in Bengaluru private schools included a balanced gender representation, with 55% female and 45% male participants. The ages of the participants ranged from 10 to 15 years, with the highest proportion aged 10 years (22.33%), followed by 13 years (18.33%), 11 years (17.33%), 14 years (16%), 12 years (15%), and 15 years (11%). The sample spanned five grades, with a fairly even distribution across grades 5 through 9. The largest representation was from the 8th grade (21.33%), followed by the 5th grade (20.67%), 6th grade (20%), 7th grade (19.33%), and 9th grade (18.67%). Socioeconomic status, based on family monthly income, revealed that the majority of participants belonged to families earning ₹20,001–₹50,000 (28.33%), followed by those earning less than ₹20,000 (24%), ₹50,001–₹1,00,000 (23.33%), ₹1,00,001–₹2,00,000 (15%), and more than ₹2,00,000 (9.33%).

Parental education levels showed diversity, with most parents having a secondary education (25%), followed by higher secondary (20.67%), undergraduate degrees (18.67%), postgraduate degrees (14%), primary education (16.67%), and no formal education (5%). Residence types varied, with the majority living in urban areas (53.33%), while 26.67% resided in semi-urban areas and 20% in rural areas. Household size was predominantly in the range of 3–4 members (46.67%), followed by households with 5–6 members (23.33%), 2 or fewer members (21.67%), and more than 6 members (8.33%). Access to water resources indicated that municipal supply was the most common source (46.67%), followed by borewell or groundwater (33.33%), tanker supply (16.67%), and other sources (3.33%). This summary provides a comprehensive demographic profile of the participants, highlighting their varied backgrounds and living conditions in Bengaluru private schools.

PART 2

Objective 1: To analyze gender differences in water conservation attitudes and behaviors among early adolescents in Bengaluru private schools.

H_{01}: There is no significant difference in water conservation attitudes between boys and girls in Bengaluru private schools.

H_{02}: There is no significant difference in water conservation behaviors between boys and girls in Bengaluru private schools.

Table 1: Summary Table For Gender Differences

Variable	Gender	Mean	SD	t-Statistic	p-Value
Water Conservation Attitudes	**Boys**	**19.65**	**3.76**	**-5.73**	**< 0.001**
	Girls	**22.25**	**4.07**		
Water Conservation Behaviors	**Boys**	**24.98**	**4.93**	**-3.67**	**< 0.001**
	Girls	**27.07**	**4.88**		

Table 2: Thematic Analysis for Gender Differences

Theme	Survey Findings	FGD Insights	Recommendations
1. Gender Differences in Attitudes	Girls had significantly higher attitude scores (Mean = 22.25, SD = 4.07) than boys (Mean = 19.65, SD = 3.76).	Girls expressed a stronger sense of responsibility, linking conservation to future generations. Boys perceived it as less urgent.	Develop gender-specific awareness campaigns highlighting the personal and societal benefits for boys.
2. Water Conservation Behaviors	Girls exhibited higher engagement in behaviors (Mean = 27.07, SD = 4.88) compared to boys (Mean = 24.98, SD = 4.93).	Girls reported consistent habits (e.g., turning off taps, reusing water), while boys cited forgetfulness or lack of priority.	Use gamification or reward-based activities to make conservation behaviors appealing to boys.

Interpretation

The results indicate significant gender differences in water conservation attitudes and behaviors among early adolescents in Bengaluru private schools. Girls demonstrated significantly higher attitude scores (Mean = 22.25, SD = 4.07) compared to boys (Mean = 19.65, SD = 3.76), with a t-statistic of -5.73 and a p-value of < 0.001. Similarly, girls exhibited greater engagement in water conservation behaviors (Mean = 27.07, SD = 4.88) than boys (Mean = 24.98, SD = 4.93), with a t-statistic of -3.67 and a p-value of < 0.001. These quantitative findings align with FGD insights, which revealed that girls associate water conservation with responsibility toward future generations, while boys often perceive it as less urgent. Furthermore, girls reported consistent water-saving habits, such as turning off taps and reusing water, whereas boys cited forgetfulness or a lack of prioritization.

The null hypothesis H_{01}, stating no significant difference in water conservation attitudes between boys and girls, is rejected. Similarly, the null hypothesis H_{02}, stating no significant difference in water conservation behaviors between boys and girls, is also rejected. These findings highlight the importance of gender-specific interventions, such as awareness campaigns for boys emphasizing the societal benefits of conservation and gamification strategies to promote consistent behaviors.

PART 3

Objective 2: To explore the role of school environments in shaping these attitudes and behaviors.

H_{03}: The school environment does not significantly influence water conservation attitudes among early adolescents in Bengaluru private schools.

H_{04}: The school environment does not significantly influence water conservation behaviors among early adolescents in Bengaluru private schools.

Table 3: Relationship Between School Environment and Water Conservation Attitudes and Behaviors

Variable	Gender	Correlation (r)	p-Value	Regression (β)	R^2	p-Value
Water Conservation Attitudes	Boys	0.42	< 0.001	0.40	0.18	School environment predicts attitudes for boys.
	Girls	0.48	< 0.001	0.45	0.22	School environment predicts attitudes for girls.
Water Conservation Behaviors	Boys	0.35	< 0.001	0.33	0.12	School environment predicts behaviors for boys.
	Girls	0.41	< 0.001	0.38	0.16	School environment predicts behaviors for girls.

Table 4: Thematic Analysis for the Role of School Environment

Theme	Survey Findings	FGD Insights	Recommendations
1. Role of School Environment	School environment significantly influenced attitudes ($r = 0.45$, $p < 0.001$) and behaviors ($r = 0.38$, $p < 0.001$).	Participants appreciated school efforts but suggested improving infrastructure (e.g., water-saving taps, educational campaigns).	Enhance facilities and tailor school programs to address gender-specific barriers and motivators.
2. Barriers to Water Conservation	Neutral or weak attitudes among boys correlated with low engagement in water-saving behaviors.	Boys cited peer pressure and lack of awareness as barriers; girls mentioned limited support from family for conservation habits.	Address peer dynamics and family involvement through interactive workshops and community programs.

Interpretation

The findings demonstrate that the school environment significantly influences both water conservation attitudes and behaviors among early adolescents in Bengaluru private schools. For attitudes, the correlation with the school environment was stronger for girls ($r = 0.48$, $p < 0.001$) than for boys ($r = 0.42$, $p < 0.001$), with regression analyses showing the school environment explaining 22% of the variance in attitudes for girls ($\beta = 0.45$, $R^2 = 0.22$) and 18% for boys ($\beta = 0.40$, $R^2 = 0.18$). Similarly, for behaviors, the school environment showed a greater correlation for girls ($r = 0.41$, $p < 0.001$) than for boys ($r = 0.35$, $p < 0.001$), explaining 16% of the variance in girls' behaviors ($\beta = 0.38$, $R^2 = 0.16$) and 12% in boys' behaviors ($\beta = 0.33$, $R^2 = 0.12$). FGD insights supported these findings, highlighting the importance of school-led programs while identifying areas for improvement, such as better infrastructure and more engaging educational campaigns.

The null hypothesis H_{03}, stating that the school environment does not significantly influence water conservation attitudes, is rejected. Likewise, the null hypothesis H_{04}, posits that the school environment does not significantly influence water conservation behaviors, is also rejected. These results underscore schools' critical role in shaping attitudes and behaviors, particularly through tailored interventions that address gender-specific barriers and motivators.

PART 4

Objective 3: To recommend gender-sensitive educational strategies to promote sustainable water-use practices.

The findings from Objectives 1 and 2 highlight gender differences in water conservation attitudes and behaviors, as well as the influence of the school environment. Girls exhibited more positive attitudes, linking water conservation to responsibility and future generations, while boys often viewed it as less urgent, engaging primarily during structured activities. Girls were more consistent in water-saving behaviors, while boys cited forgetfulness and low motivation as barriers. The school environment significantly influenced attitudes and behaviors, with a stronger impact on girls. Workshops, competitions, and water-saving facilities effectively fostered awareness, though participants suggested more engaging activities for boys and infrastructural improvements. FGDs revealed peer pressure, limited awareness, and lack of family support as barriers for boys, while school-led campaigns and recognition motivated both genders. These insights underline the need for gender-sensitive strategies to address specific barriers and foster sustainable water-use practices across both groups.

RESEARCH QUESTION

Research Question 1: *What are the gender differences in water conservation attitudes among early adolescents in Bengaluru private schools?*

Girls exhibit significantly more positive attitudes toward water conservation compared to boys. They view it as a moral responsibility tied to environmental protection and the well-being of future generations. Boys, in contrast, often perceive water conservation as less critical, engaging primarily when activities are made fun, competitive, or structured by external influences such as teachers or school programs. These differences suggest that girls are naturally inclined toward conservation efforts, while boys require additional motivation and awareness to develop similar attitudes.

Research Question 2: *How do boys and girls differ in their water conservation behaviors in these schools?*

Girls demonstrate more consistent water-saving behaviors, such as turning off taps, reusing water, and actively promoting conservation at home and school. They tend to internalize these practices as part of their daily responsibilities. Boys, however, are less consistent in their behaviors, often citing forgetfulness, lack of prioritization, or minimal understanding of the broader impact of their actions. Boys are more likely to engage in water conservation when incentivized through games, competitions, or recognition, highlighting a gap in intrinsic motivation compared to girls.

Research Question 3: *How does the school environment shape water conservation attitudes and behaviors among early adolescents?*

The school environment is crucial in shaping water conservation attitudes and behaviors. Initiatives such as workshops, competitions, awareness campaigns, and infrastructural facilities like water-saving taps significantly enhance students' understanding and practices. Girls are more positively influenced by these programs, translating them into consistent actions and a stronger sense of responsibility. Boys also benefit, particularly when the activities are interactive or reward-based. However, the lack of infrastructural upgrades, like repairing leaking taps or expanding awareness programs, limits the overall effectiveness of these efforts for both genders.

Research Question 4: *What strategies can be developed to address gender differences and promote sustainable water-use practices in private schools?*

To address gender differences, schools can develop gender-sensitive strategies tailored to the needs and motivations of boys and girls. For boys, interactive, gamified, and reward-based activities can foster greater engagement, while for girls, reinforcing their intrinsic motivations through recognition and leadership roles in conservation projects can be effective. Schools should also involve families in workshops to bridge the gap between school and home practices and foster a supportive environment for water conservation. Investing in infrastructure, such as water-efficient facilities, alongside engaging educational campaigns, can further promote sustainable water-use practices among all students.

DISCUSSION

The discussion highlights significant findings on gender differences in water conservation attitudes and behaviors, as well as the role of the school environment in shaping these practices. Girls demonstrated more positive attitudes, associating water conservation with responsibility and the well-being of future generations, while boys often perceived it as less urgent, engaging primarily when motivated by structured activities or competitions. Behaviorally, girls exhibited greater consistency in water-saving practices, such as turning off taps and reusing water, whereas boys faced challenges like forgetfulness and lack of prioritization. These differences emphasize the need for targeted interventions that cater to the specific motivational needs of boys.

The school environment emerged as a critical factor influencing both attitudes and behaviors. Workshops, competitions, and water-saving infrastructure fostered awareness and encouraged conservation practices, with a stronger impact observed among girls. Boys responded more positively to interactive and gamified activities, suggesting the need for a more engaging approach to ensure inclusivity. FGDs revealed barriers such as peer pressure, limited awareness, and lack of family support, particularly for boys, while motivators included recognition, school-led campaigns, and interactive programs.

The findings underscore the importance of gender-sensitive strategies to address these disparities. Schools can play a pivotal role by designing programs that incorporate gamification, leadership opportunities, and family involvement to ensure sustained engagement across genders. Investments in educational campaigns and infrastructural improvements are also essential to foster a culture of sustainable water-use practices among early adolescents. These insights provide a foundation for developing targeted, impactful strategies to promote water conservation in private schools.

LIMITATIONS

The study is limited to private schools in Bengaluru, which may not reflect the diversity of attitudes and behaviors in other settings. Self-reported data from surveys and FGDs may include social desirability bias, and the small number of FGDs might not capture all perspectives. Additionally, the cross-sectional design limits the ability to establish causal relationships between the school environment and water conservation practices.

IMPLICATIONS

The study's findings have important implications for designing targeted interventions to promote water conservation among early adolescents. Gender-sensitive strategies are essential, with tailored programs to address boys' lower engagement through interactive and gamified activities, while leveraging girls' intrinsic motivation through leadership opportunities. Schools play a crucial role in fostering sustainable practices by enhancing infrastructure, such as water-efficient facilities, and organizing inclusive awareness campaigns. Incorporating family involvement in conservation efforts can bridge gaps between home and school practices, ensuring a holistic approach to water sustainability. These insights guide developing impactful, inclusive programs to nurture long-term water conservation behaviors.

CONCLUSION

The study concludes that significant gender differences exist in water conservation attitudes and behaviors among early adolescents, with girls displaying more positive attitudes and consistent practices than boys. The school environment plays a pivotal role in shaping these behaviors, particularly through workshops, competitions, and infrastructural support, with a stronger impact on girls. The findings emphasize the need for gender-sensitive, school-based strategies to address specific barriers and leverage motivators for both boys and girls. By fostering inclusive and sustainable practices, schools can significantly promote long-term water conservation behaviors among adolescents.

RECOMMENDATIONS

The study recommends gender-sensitive strategies to promote water conservation, including gamified activities for boys and leadership opportunities for girls. Schools should improve water-saving infrastructure, integrate conservation themes into curricula, and involve families through workshops to create a supportive environment for sustainable practices.

CLOSING THOUGHTS

The study highlights the importance of addressing gender differences and leveraging the school environment to promote sustainable water-use practices among adolescents. By implementing inclusive, targeted strategies and fostering collaboration between schools and families, a culture of responsibility and long-term commitment to water conservation can be cultivated. These efforts can inspire the next generation to adopt sustainable behaviors and contribute meaningfully to environmental preservation.

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Conflict of Interest

The author declares no conflicts of interest regarding this work to disclose.

Author Contributions

Sunila Kumari S, the research scholar, conducted the study under the guidance and complete support of Dr Monalisa Nayak, who provided expert advice and oversight throughout the research process.

Ethics Approval

This study was reviewed and approved by the Ethics Committee at the School of Liberal Studies, CMR University, located at HRBR Layout, Kalyan Nagar, Bengaluru-560043, Karnataka, India. The study was conducted according to the institution's ethical standards.

Data Availability

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

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