

Infrastructure as a Tool for Social Justice: Analysing the Impact of Urban Sanitation Equality on the Educational Attendance of Adolescent Girls Globally

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Abstract- Urban sanitation inequality remains a major barrier to gender equality and educational participation worldwide. This study examines how equitable urban sanitation infrastructure influences the school attendance of adolescent girls across different global regions. Using a secondary qualitative research design, twelve peer-reviewed journal articles were analysed through the PRISMA Framework to identify key journals linking sanitation access based on the study objectives, menstrual hygiene management, and educational outcomes. Findings indicate that inadequate sanitation facilities contribute to girls missing up to 20–25% of school days annually in low-resource settings. The study highlights the importance of gender-responsive sanitation policies and urban infrastructure planning to promote inclusive education, improve health outcomes, and advance global development goals.

Keywords: Urban Sanitation Inequality, Gender Equality, School Attendance, Adolescent Girls, Menstrual Hygiene Management (MHM).

I. INTRODUCTION

Background and Global Context

Urban sanitation inequality is one of the most burning development issues in the world with regard to education, health, and gender equality. The World Health Organisation and United Nations Children Fund, through international monitoring data, reveal that a good number of people in the world, numbering around 3.5 billion, do not have access to well-managed sanitation services that are well-managed, which is about 44% of the estimated world population (Dibaba, Alemu & Debela, 2024). This lack of proper sanitation facilities especially applies to the people in the fast-growing urban areas.

Adolescent girls are particularly affected by the sanitation inequality. In most places, there are no gender-segregated toilets, privacy, or menstrual hygiene management systems at schools and communities. Research has revealed that in low-income cities, females tend to skip 3 to 5 school days per month during the menstrual cycle, and this may have a strong impact on the number of school days attended annually. This can average out to 40 to 60 school days missed over a complete academic year, or almost 20 to 25% of the classroom instructional time. This kind of absenteeism leads to poor

academic performance, less participation in education and in other instances, school dropout (Neaemeka & Dikwa, 2025).

The greatest approach of urban sanitation problems can be observed in population-prone settlements where the infrastructure development has not kept up with the population. Informal urban settlements globally have over 1 billion inhabitants, and sanitation coverage in these regions may be as low as 30 to 40%, in contrast to a sanitation coverage of over 80% in the formal urban neighbourhoods (Gilbert, Eakin & McPhearson, 2022).

Problem Statement

Although the importance of sanitation is increasingly being discussed in the international community as a key human right, the lack of proper hygiene facilities in schools continues to be a common feature in most urban schools around the globe. School sanitation facilities are inadequate, in poor condition or even inaccessible to female learners in many of the low- and middle-income countries. According to surveys by Psaki et al. (2022) in developing areas show that as many as 30 to 40% of schools do not have gender-separated toilets, and many others have no running water or menstrual hygiene facilities. Lack of access to safe and private sanitary facilities may cause

embarrassment, discomfort, and health issues in adolescent girls during the school day, which may severely influence their desire to go to school regularly.

Research Aim and Objectives

Aim

The study aim to examine how equitable urban sanitation infrastructure influences the school attendance and educational participation of adolescent girls globally.

Objectives

- To analyse the relationship between urban sanitation access and girls' educational attendance in different global regions.
- To examine policy frameworks and sanitation programs in selected countries, including the UK and G20 nations.
- To propose policy and community development strategies that improve sanitation equity and girls' educational outcomes.

II. LITERATURE REVIEW

Theoretical Framework

The connection between sanitation facilities and the schooling participation of girls can be comprehended through a multidisciplinary theoretical subject through the gleaning of the disciplines of social work, development studies, and city policy. Systems Theory is one of the major theoretical platforms of this study since it focuses on the interrelation of social institutions. The systems theory holds that social problems cannot be construed in a vacuum since they are influenced by the interactions of various systems, like education, health, government, and the development of infrastructure (Corburn, 2022). This interconnection is seen in the urban sanitation problems. The absence of sanitation facilities not only impacts the health of people in society but also influences the school setting, security of the community, and even education.

The other theoretical resource that will be used to guide this research is the Anti-Oppressive Practice, which revolves around the issues of structural

inequalities that are faced by the marginalised groups. The Anti-Oppressive Practice claims that power inequity tends to be replicated by social policies and institutions at the expense of some groups, such as women, children, and low-income communities. Girls in urban slums or low-income neighbourhoods have various types of disadvantages in the context of sanitation infrastructure (Souza, Santos & Lisboa, (2025).

International Perspectives

Studies carried out in richer nations show that despite the ubiquity of the sanitation system, hygiene access disparities and menstrual health disparities have the potential to influence engagement in education. In the United Kingdom, as an example, the majority of schools allocate gender-separated toilets and hygiene facilities; however, research has revealed the problem of period poverty, or a lack of access to hygiene products during menstruation by low-income students. According to Sharma (2023), it is estimated that in the UK, one in ten schoolgirls has had difficulties in affording menstrual hygiene products, and some students have been seen to skip school because of this difficulty. The UK government responded to this by establishing a national program in 2020, which offers schools and colleges free menstrual products, which shows how policy efforts can help overcome hygiene-based obstacles to education.

Sanitation problems are worse in most emerging economies and developing countries, especially in the urban centres that are rapidly expanding. Other countries that are members of the Group of Twenty, like Brazil, Indonesia, and South Africa, have endured inequalities in sanitation in informal settlements. Indicatively, a study of Brazilian urban communities shows that close to 20% of the households in informal settlements do not have proper sewage systems, and people have to depend on common or unhygienic sanitation systems. Sanitation coverage in cities in Indonesia is highly disparate between neighbourhoods, with informal settlements reporting low access levels of less than 50% (Dsouza et al., 2023).

Literature Gap

Although more focus on the problem of sanitation and education is becoming more prevalent in global development research, there are also multiple gaps in the available literature. The primary weakness is that most publications are based on the situation of sanitation in rural areas, as opposed to urban settings. Although rural sanitation issues are not to be underscored, the mushrooming cities of developing nations have resulted in new types of inequality in the cities, especially in informal settlements, where infrastructure development is often slow compared to population growth (Wilson et al., 2024).

III. RESEARCH METHODOLOGY

Research Design

The research design used in this study is qualitative research with a secondary approach that aims at determining the relationships between the urban sanitation infrastructure and the level of educational enrolment by adolescent girls. Secondary qualitative research is where the established academic literature, reports and policy documents have been analysed to determine patterns, themes and policy implications. It is one of the most appropriate methods in global development research since it enables scholars to generalise information across several geographical settings without the logistical and economic limitations involved in extensive primary data gathering (Urme et al., 2025).

Qualitative research design comes in particularly handy when dealing with intricate social phenomena within the context of infrastructure, social norms, and policy settings. The issue of urban sanitation inequality is a technical infrastructure problem, but a social and governance issue that affects the education systems, gender equality, and the outcomes of public health. Past studies like those done by the World Health Organisation and the United Nations Children Fund have noted the fact that almost 3.5 billion individuals in the world are not connected to sanitation services that are safely managed, with a substantial number of these individuals residing in the urban centres of the third world nations (MacArthur et al., 2023).

Sampling Strategy

In the study, a purposive sampling strategy is used to identify the academic literature that is pertinent to the topic under study. In qualitative research, purposive sampling is widely discussed as it gives a researcher a chance to select the sources purposefully and receive the most topical and informative information on the research objectives. This research has chosen 12 peer-reviewed journal articles out of the main academic databases, such as Scopus, Web of Science, and Google Scholar. The articles discussed were published between 2020 and 2026, which means that the study uses recent evidence and policy changes in the area of sanitation infrastructure and gender divisions in education (Pickerill et al., 2024).

Data Collection Tools

The process will be based on the PRISMA Framework, which is a popular approach to performing systematic literature reviews as part of the research.

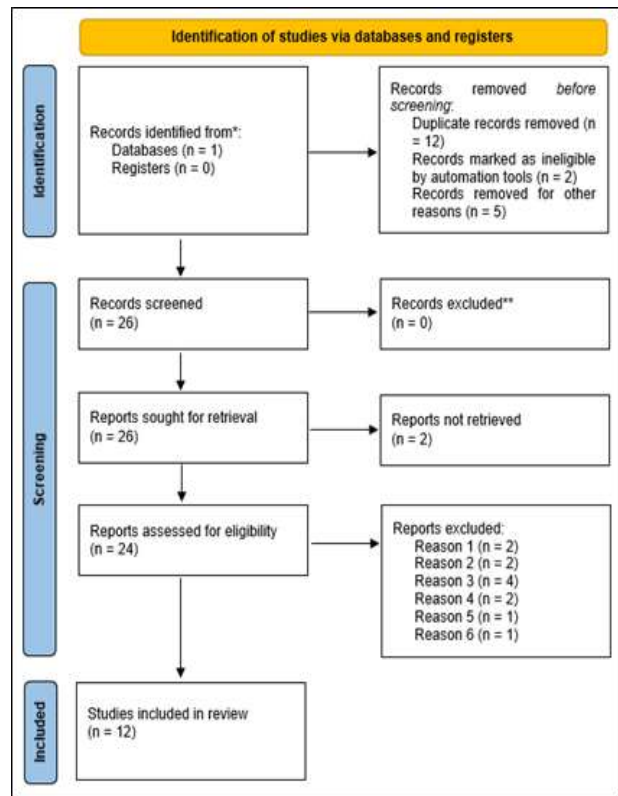


Figure 3.1: PRISMA Framework (Source: Self-Developed)

The Preferred Reporting Items to Systematic Reviews and Meta-Analyses are abbreviated PRISMA, and they offer a systematic methodology of locating, filtering, and extracting pertinent studies. The framework also improves transparency and methodological rigour as every step of the literature selection process is documented. As an illustration, original searches of databases can result in more than 100 possible articles, yet with the screening of the titles, abstracts, and full text, only 12 articles of interest are incorporated in the final analysis.

Ethical Considerations

Ethics is a significant aspect that determines the integrity and reliability of academic research. As no direct contact with a human being is involved, this research is based solely on the secondary data obtained in the form of already published academic sources. As such, the study does not need to seek the consent of participants or institutional ethical approval, which is normally linked to primary data collection processes like interviews or surveys. Nevertheless, the research also follows the rigorous ethical guidelines, concerning the openness of the academic research work, correct citation style, and the avoidance of abusing the published data.

IV. DATA ANALYSIS AND RESULTS

Data Presentation

In this research, the systematic review will be used to analyse evidence collected in the form of twelve peer-reviewed journal articles filtered using the PRISMA Framework. The results of these studies were compiled into thematic groups and displayed in the form of tables, comparative diagrams, and conceptual graphs in order to provide a picture of the tendencies in different global settings. The review used four variables as points of interest, such as access to sanitation facilities, menstrual hygiene management in school, school attendance rates of adolescent girls and how urban sanitation policies influence school attendance (Bick et al., 2025).

The literature reviewed has a wide geographical sphere, with references to India, Brazil, Indonesia, South Africa, and the United Kingdom, and thus, the study will be able to reflect the differences in

sanitation infrastructure and policy enforcement in developing and developed areas (Archer & Joshi, 2025). Some of the studies were made up of comprehensive statistical pointers like student-toilet ratio, the prevalence of school absence among females during the menstrual cycle, and national sanitation coverage rates.

Comparative Analysis: Thematic Analysis

- **Theme 1: Access to Sanitation Infrastructure**

The theme that came out first of all, with the help of data analysis, is connected with the accessibility and quality of sanitation facilities in urban schools and communities. Throughout the twelve studies we have examined, poor sanitation facilities were reported to be a significant limitation to educational enrolment by adolescent girls. As per available global monitoring data by the World Health Organisation and the United Nations Children's Fund, it is estimated that some 3.5 billion of the world continue to experience a lack of access to safely controlled sanitation facilities, and urban informal settlements are the most affected regions (Brown et al., 2023).

The situation with urban sanitation inequality is the most prominent in India, where crowded settlements continue to be the most evident. Studies carried out in Indian metropolitan areas such as Delhi and Mumbai have shown that certain urban schools in these areas possess only two or three working toilets, with over 300 students, which means that there is one toilet even though there are around 100 students. This kind of state of affairs discourages the use of sanitation facilities by the students during school hours and may result in health problems that are caused by the lack of hygiene.

- **Theme 2: Menstrual Hygiene Management in Schools**

The second theme that came out after the thematic analysis is the management of menstrual hygiene and its connection with the school attendance of girls. Menstrual hygiene management is the access to sanitary products, toilet facilities, and access to water to use in maintaining personal hygiene. A lack of these resources imposes limitations that may restrict the capacity of the girls to be in school

regularly (Ahsan & bin Ahsan, 2023). As the existing literature shows, in most of the low-resource urban communities, girls can skip three to five days of school every month because of the difficulties with menstrual hygiene.

Research in Indian cities confirms that an estimated 23% of the teenage girls do not attend school during their menstrual periods simply because there are no proper sanitation facilities and access to menstrual hygiene. The same trends can be seen in other developing countries, where cultural stigmatisation and inadequate infrastructure have served as one of the obstacles to participating in education. A study in South Africa by Ahsan & bin Ahsan (2023) revealed that one out of every four schoolgirls had missed at least one day of school because of a lack of sanitation facilities or privacy.

- **Theme 3: Impact of Sanitation Infrastructure on Educational Outcomes**

The third theme observed in the analysis of the data is the role played by sanitation infrastructure in widening the educational achievements of adolescent girls. In several studies, access to sanitary facilities that were safe and accessible showed to have higher attendance levels, retention of students and higher levels of educational participation among the female students. With proper sanitation facilities in schools, there is a high probability of the students attending school regularly and also engaging in academic activities (Avelar Portillo et al., 2023).

A study carried out in urban schools in South Asia by Charnley (2022) established that an improvement in sanitation facilities led to 10 to 12% gains in the rate of attendance of girls over two years of school. Besides minimising absenteeism, better sanitation infrastructure also helped to improve health outcomes amongst students. The results of studies have also revealed that poor sanitation is one of the risks that contribute to the spread of infectious diseases like diarrhoea and intestinal infections, which have remained in the world to be a major cause of school absenteeism.

V. DISCUSSION AND POLICY IMPLICATIONS

Interpretation of Findings

Results of the current research place an emphasis on the strong correlation between the sanitation infrastructure and the educational engagement of adolescent girls in the urban setting. The review of a dozen resources on the topic of sanitation and hygiene proves that the availability of better sanitation facilities can be a major contributor to the increased school attendance rates among schoolgirls (Dibaba, Alemu & Debela 2024). In most emerging metropolitan areas, there is a lack of gender sensitive sanitation facilities, which affects accessibility to education directly. World Health Organisation and United Nations Children Fund statistics of sanitation monitoring globally have recorded that about 3.5 billion individuals lack managed sanitation services across the globe, with a significant number of them being urban dwellers.

It is also found that poor sanitation facilities result in quantifiable decreases in school attendance in adolescent girls. Several studies examined in the research have shown that girls in urban communities with low resources miss three to five days of school every month during their menstrual periods because of a lack of privacy, adequate hygiene facilities or even menstrual hygiene products (Neaemeka & Dikwa, 2025). This trend could lead to 40 to 60 days out of school in a single academic year, which is almost a fifth of the school year. These rates of absenteeism greatly diminish the learning process and even lead to poor academic results and increased dropouts.

The findings have also reinforced the need to have privacy and safety in school sanitation facilities. Schools in some of the cities in Brazil, Indonesia and South Africa use overcrowded or poorly maintained toilets that are used by large populations of students. According to some of the studies, one toilet can be shared by 70-100 students, which is way beyond the prescribed international standards of one toilet to 25 girls (Gilbert, Eakin & McPhearson, 2022). These environments deter use of sanitary facilities when in school and may pose health risks,

embarrassment and discomfort, especially during menstruation.

Global Policy Recommendations

The presented results of this study suggest an urgent necessity for the implementation of the entire policy measures that help to combat sanitation disparity in the context of urban educational institutions. The development of gender-responsive sanitation infrastructure in schools is one of the most significant strategies that can be implemented. The governments and other learning establishments should make sure that the schools offer quality sanitation facilities where female students can use the facilities with privacy and safety (Psaki et al., 2022). This involves gender-segregated toilets, proper water supply, and proper disposal of menstrual hygiene materials. According to international development organisations, the number of girls attending school could rise by between 8 and 12% in most low-income countries by enhancing school sanitation facilities, which is a very educational advantage of investment in the infrastructure.

The other important policy that needs to be suggested relates to the implementation of menstrual hygiene management programs in schools and communities. These programs must contain the provision of cheap or free menstrual hygiene products, educational sensitisation, and better sanitation facilities tailored specifically to attend to menstrual hygiene requirements (Corburn, 2022). As an example, national campaigns launched in the United Kingdom have offered free menstrual hygiene products in educational institutions, which has contributed to less hygiene-related absenteeism among poor students. Like programs may be used in third-world countries to overcome barriers to education that may be caused by hygiene.

VI. CONCLUSION

Summary of Contribution

The current study offers valuable views on the association between education and sanitation facilities in urban areas among adolescent girls on their part. Through the synthesis of the findings of

other research conducted internationally, the study establishes that inequality in sanitation is also a significant obstacle to gender equality in education. The discussion brings out the role of poor sanitation facilities in causing absenteeism, less academic activity and educational disadvantage amongst girls, especially in low-income urban settings. Meanwhile, the study demonstrates that better sanitation facilities are also capable of boosting attendance rates, health, and general educational involvement of girls (Souza, Santos & Lisboa, 2025).

The study also adds to the broader disciplines of urban development, education policy and social justice by mentioning sanitation infrastructure as one of the important elements of inclusive development strategies. Sanitation infrastructure not only improves the health of people but also enhances the education system and gender equality. The research by Sharma (2023) has provided a bridging of sanitation infrastructure and the theoretical approach of systems theory and the capability approach, in which the development of infrastructure can increase the opportunities and capacity of marginalised people.

Future Research Directions

Although the point of this study is very insightful in terms of sanitation inequality and educational participation, it is important to continue the investigation of the problems to gain a more profound insight into these aspects. Further research may involve longitudinal research of the effects of the sanitation infrastructure development on academic success and long-term education results in the long run (Dsouza et al., 2023). These studies would present a more solid empirical support of the connection between the infrastructural development and the educational achievement.

The other area that can be researched in future with potential success is the role of digital technologies to track sanitation infrastructures in schools and urban populations. Real-time monitoring systems based on sensors and mobile reporting services may assist in monitoring the use of sanitation facilities, maintenance, and hygienic conditions to enhance management of infrastructure and responsibility.

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