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Analysis of physical environment, facilities and risk factors impacting students with disabilities in selected higher education institutions post the COVID-19 pandemic in Ethiopia

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Abstract

The purpose of this study was to analyze the physical environment, facilities, and risk factors impacting students with disabilities in six selected higher education institutions post the COVID-19 pandemic in Ethiopia. The research utilized an explanatory sequential mixed-methods design. The sample of this study was 193, including 181 students with disabilities, six university administrators, and six facilitators for students with disabilities from these universities. The data-gathering tools were questionnaires, semi-structured interviews, and observation. The information obtained from the questionnaire was analyzed using percentages. The data collected from semi-structured interviews and observations were also analyzed in narrative form. Subsequently, the quantitative findings were interpreted in light of the qualitative data following the research design.The study results showed that students with disabilities encounter various physical barriers in their environment, including inconvenient buildings, inaccessible ramps, open drainages, a lack of elevators, poles on road curves, and holes in walkways, which pose risks, especially for visually impaired individuals and wheelchair users. The study also identified facilities issues, including inaccessible toilets, limited access to water supply, low health services, and sanitation problems, which negatively impacted attendance and academic success, particularly for female students in universities post-pandemic. Moreover, findings of the study revealed that existing dormitories, bathrooms, and dining halls were not inclusive to students with disabilities, particularly in third-generation universities. Therefore, the universities should implement inclusive infrastructure design principles and risk management strategies to accommodate students with disabilities and minimize risk factors that influence their social inclusion and learning experiences. Finally, the effects of inclusive WASH on the enrollment, attendance, and academic performance of students with disabilities require further investigation.

1 Introduction

Students with disabilities require access to an inclusive physical learning environment and facilities to fulfill their educational needs at various education levels, including higher education (Fossey, 2015; Tirussew, 2005). In particular, access to higher education for students with disabilities requires purposeful planning and management of the physical environment, accommodations, facilities, technology, and other related resources that support educational needs. The physical environment and facilities are crucial in supporting and enhancing educational outcomes for all higher education students. However, students with disabilities have faced numerous environmental barriers, including

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a lack of accommodations, inadequate physical environments and facilities, and insufficient health services (Alam & Kbir, 2023; Gore, 2021; Tefera Tirago, 2019).

In addition, students with disabilities face challenges related to infrastructure facilities within higher education institutions due to a lack of risk management strategies and insufficient attention from administrators. These situations affect their ability to cope with their disabilities, and the consequences of the COVID-19 pandemic have exacerbated existing inequalities in education, social environments, and support services. Hence, the COVID-19 pandemic magnified existing challenges in the social inclusion and protection of students with disabilities (United Nations Human Rights, 2020; UNESCO, 2020; World Bank, 2020).

According to the UN report, persons with disabilities were among the hardest-hit groups during the COVID-19 pandemic. Even under normal circumstances, people with disabilities worldwide are less likely to access health care and education and are more likely to live in poverty and experience violence (UNESCO, 2020). The COVID-19 pandemic has further heightened this situation, particularly for individuals with disabilities in fragile or precarious contexts and humanitarian settings. Supporting these issues, Akanzum and Pienaah (2023) and the UN (2025) noted that girls with disabilities' performance and involvement in education are impacted by inadequate sanitary and hygiene (WASH) facilities; therefore, it is crucial to ensure they have access to water, healthcare, sanitation, and hygiene services to support their academic success.

Although few students with disabilities have had the opportunity to join higher education institutions, apart from coping with the trauma of a disability, they may face difficulties accessing and affording several facilities and services while attending their education. As a result, many students with disabilities also encounter multiple forms of exclusion concerning education, health and social services, the physical environment, and facilities when attending higher education institutions. The COVID-19 pandemic created a significant crisis in the education system, leaving many students confined to their homes and facing numerous challenges (Wooldridge *et al*., 2021; Anderson, 2020; UNESCO, 2020). This hardship has left marks on students with disabilities' social and learning experiences.

Students with disabilities face attitudinal challenges and physical environmental barriers that hinder their equal participation in education, particularly in developing countries. Attitudinal challenges involve negative beliefs and stereotypes that limit opportunities for students with disabilities, fostering discrimination (Mudzingwa & Madungwe, 2019). In addition, physical environment accessibility for students with disabilities is often ignored, with infrastructure barriers such as stairs, narrow passages, and poorly designed entrances remaining common (Rama, 2023; Gore, 2021). Addressing these barriers is essential to ensure their full inclusion in education and equal access to quality education.

Creating an inclusive, barrier-free learning environment for students with disabilities (SWDs) often requires additional resources, such as specialized teaching materials, assistive technologies, and reliable internet access, as well as convenient infrastructure and accommodations that support students with disabilities. Many higher education institutions in Ethiopia still struggle to generate and allocate these supports effectively. A barrier-free physical environment can promote equality and inclusiveness (World Bank, 2017); disability inclusion has the potential to benefit everyone through the application of universally accessible buildings and infrastructure to increase educational engagement of learners.

In higher education, not only do students with disabilities face challenges due to the inadequacy of the physical and social environment and facilities, but teachers with disabilities who are working there also encounter similar obstacles. In fact, the impacts of the physical learning environment in higher education institutions contribute to low educational participation and academic achievement for persons with disabilities; primarily, this occurs due to a lack of attention to risk management when constructing truly inclusive learning environments (Wooldridge *et al*., 2021). As a result, some students are forced to drop out.

Students with special needs are significantly underrepresented in institutions of higher education. They rank among the most marginalized, vulnerable, and excluded groups within universities. Establishing a positive and inclusive learning setting is crucial for encouraging the success of these students, as it not only supports their academic performance but also their social integration. By enacting supportive policies and practices, educational institutions can offer barrier-free learning experiences for students alongside adaptive materials and assistive technologies, ensuring they feel respected and empowered to succeed (UN, 2025). Consequently, fostering an enabling learning environment is essential for students with disabilities, facilitating a learning and living environment that helps to minimize discrimination and enhance diversity and inclusion within higher education institutions.

2 Statement of the problem

Students with disabilities encounter considerable difficulties, such as academic barriers, insufficient public accommodations, inadequate physical facilities, and other related risk factors that have negatively impacted their educational experiences. The Ethiopian government has acknowledged the right to learning opportunities for all children, as stated in Federal Negarit Gazeta No. 351/2003. This proclamation also mandated that universities make their facilities and programs more accessible to students with physical challenges. However, students with disabilities face various challenges in exercising these rights, especially concerning the physical learning environment, accommodations, and infrastructure, which hinder their ability to fulfill educational, social, and economic needs while pursuing higher education.

In Ethiopia, higher education is mandated to provide equal educational opportunities for all students with disabilities. However, the enrollment of students with disabilities in universities remains low due to a lack of enabling learning environments and limited parental awareness regarding the education of persons with disabilities (Tirussew *et al.*, 2014). Support for students in higher education is crucial, as they face challenges such as inaccessible physical learning environments, inadequate accommodations, limited assistive technologies, and scarce resources, which can hinder academic performance. Research shows that these issues have created a significant gap between students with disabilities and their non-disabled counterparts in Ethiopian higher education (Tefera Tirago, 2019; Yared, 2008; Tirussew, 2005; Tirussew & Ellena, 2000). The COVID-19 pandemic introduced a new crisis that affected the learning of students with disabilities in Ethiopian higher education (UN, 2020). As a result, institutions have faced increased difficulties in the post-pandemic period, leading to greater social exclusion for these students (UNESCO, 2020; United Nations, 2020; Ntombela & Soobrayen, 2013).

Analyzing the physical environment and facilities of higher education involves identifying, evaluating, and mitigating various risk factors that may affect the educational provision, process, and achievement of students with disabilities due to inconvenient physical learning environments and inadequate facilities. The impacts of physical environments and facilities on students with disabilities have not been extensively explored and analyzed since the COVID-19 crisis. Therefore, this research is crucial for identifying and analyzing the physical environment, facilities, and risk factors influencing students with disabilities in Ethiopian higher education institutions after the COVID-19 pandemic.

This study aims to analyze the physical learning environment, facilities, and risk factors impacting the learning outcomes of students with special needs in higher education institutions (HEIs). Specifically, the study examined the adequacy of the physical learning environment and the convenience of facilities—including health, hygiene, and sanitation services—impacting students with disabilities on campus, and the measures taken by university administrators to overcome these challenges to enhance the learning outcomes of students with special needs in HEIs.

Grounded in this context, the study attempts to answer the following overarching research question: "How are the physical learning environments and facilities convenient and inclusive for students with disabilities in selected higher education institutions after the COVID-19 pandemic?"

Under this main question, the study aimed to answer the following specific research questions:

1. How are physical learning environments convenient and inclusive for students with disabilities in higher education?

2. What are the major risk factors that influence students with disabilities in universities while pursuing their education after the COVID-19 pandemic?

3. How are hygiene and sanitation facilities maintained in universities after the COVID-19 pandemic?

4. What efforts do university administrators make to minimize risk factors affecting the education of students with disabilities through risk management plans in higher education?

3 Research Method

This study employed an explanatory sequential mixed-methods design. It involved an initial phase of collecting and analyzing quantitative data, followed by a second phase in which qualitative data were collected and analyzed, building on the findings from the quantitative phase (Creswell & Creswell, 2018). Both quantitative and qualitative data were collected and analyzed separately and later integrated through triangulation, enhancing the interpretation of findings. The qualitative phase provided contextualization and explained the results derived from the quantitative phase.

3.1 Research Areas / Delimitation

This study was conducted in six selected public universities in Ethiopia. There are more than 42 public universities in the country. Among these six universities—namely Bule Horra, Dilla, Hawassa, Jimma, Wachemo, and Wolayta—were selected purposefully due to their accessibility and as representatives for students with disabilities based on their generation: first-generation (Bule Horra & Wachemo) universities, second-generation (Dilla & Wolayta) universities, and third-generation (Jimma & Hawassa) universities. Students with disabilities are not a homogeneous group and include people with physical disabilities, visual impairments, hearing impairments, intellectual disabilities, and psychosocial disabilities, among others (World Bank, 2017). Among these, the study focused on students with sensory impairments (visual and hearing) and physical disabilities who were attending these universities. Students with other disabilities are not expected to join universities in Ethiopia.

3.2 Sample and Sampling Techniques

The samples for this study were selected through both purposive and random sampling approaches. Six public universities were identified and selected using purposive sampling as representatives of 1^{st}-, 2^{nd}-, and 3^{rd}-generation universities, and based on the presence of special needs education departments. A total of 193 participants (104 males and 89 females) were selected through purposive sampling based on the characteristics of the population and the objectives of the study. Among them, 181 students with various types of disabilities were also selected through purposive and random sampling methods to gather quantitative data and complete questionnaires (see Table 1). In addition, 12 participants (8 males and 4 females) were selected for the interviews via purposive sampling (see Table 4).

Data were collected using questionnaires, interviews, and observation. Quantitative data were gathered through a close-ended questionnaire, whereas qualitative data were collected through semi-structured interviews, observation, and document review.

Questionnaire: Closed-ended questions were prepared and compiled for students with disabilities. A 99% response rate was achieved because the researchers closely monitored the completion of the questionnaires without interfering with participants' responses.

Interview: Interview data were collected from mid-level university administrators and facilitators/supporters of students with disabilities using a semi-structured interview guide. Six mid-level higher education administrators and six facilitators or supporters were interviewed. The researchers scheduled meetings with participants, and the interviews were conducted according to the specified

Table 1: Sample

Type of University	Name of University	Participant students with disability type			
		Visual	Physical	Hearing	total
1^{st} generation	Jima	13	16	1	30
	Hawassa	12	15	3	30
2^{nd} generation	Wolayita	20	19	1	40
	Dilla	13	14	3	30
3^{rd} generation	BuleHora	12	16	2	30
	Wachemo	3	9	8	20
	Other				1
	Total	73	89	18	181

format and at times most convenient for the interviewees.

Observation: In addition to the interviews, direct observation was used to gather data regarding the convenience of the physical environment and facilities, as well as health services, hygiene, and sanitation.

3.3 Data Collection Tools

3.4 Data Analysis

The study utilized both quantitative and qualitative data analysis techniques, employing descriptive statistics for quantitative data and qualitative analysis to identify themes related to accommodations, infrastructure, educational barriers, and risk factors affecting university students with disabilities.

4 Results and Discussion

This chapter presents the organization and analysis of data collected from facilitators, administrators, and students through questionnaires, interviews, and observations. Questionnaires were administered to students with disabilities, while interviews were conducted with mid-level university administrators and facilitators who support students with disabilities (SWDs) in university settings.

As shown in Table 2, 98 male students (54.1%) and 83 female students (45.9%) with disabilities participated in the study. A significant gender gap was observed between male and female students with disabilities. This information helps readers understand the participation of male and female students with disabilities in higher education institutions. The disparity highlights the need to encourage the education of female students with disabilities from primary through tertiary levels.

Table 2: Demographic Characteristics of Participant SWDs

Variable		N	(%)
Sex	Male	98	54.1
	Female	83	45.9
	Total	181	100
Age	19–24	145	80.1
	25–30	25	13.8
	31-36	11	6.1
	Total	181	100
Education	Undergraduate	168	92.8
	Graduate	13	7.2
	Total	181	100

Regarding the respondents' age distribution, the majority of participants with disabilities (n = 145, 80.1%) were between 19 and 24 years old, while a smaller group (n = 25, 13.8%) was between 25 and 30 years old, and the remaining participants (n = 11, 6.1%) were aged 31 to 36. Students in the 31–36 age range were pursuing postgraduate programs. This indicates that some students with disabilities have the opportunity to pursue postgraduate education. These age ranges were appropriate for providing reliable and relevant information. However, students with disabilities often enter higher

education later than their non-disabled peers due to social, economic, psychological, and health-related challenges.

Concerning educational level, 186 students (92.8%) with disabilities were enrolled in undergraduate programs, while 13 students (7.2%) were pursuing postgraduate studies. The number of students pursuing postgraduate degrees was considerably lower compared to those in undergraduate programs. Overall, these students are able to articulate their experiences and identify risk factors within the physical learning environment that impact their education in universities.

The participants, as indicated in Table 3, were categorized by disability type: visual impairment, hearing impairment, and physical disability. Of the three categories, 73 students (40.3%) had visual impairments, 89 students (49.2%) had physical disabilities, and 18 students (9.9%) had hearing impairments. Participation among students with physical disabilities was higher compared to those with visual or hearing impairments.

Table 3: Participants with disability type

Participant	N	%
Visual impairment	73	40.3
Physical impairment	89	49.2
Hearing impairment	18	9.9
Other	1	.6
Total	181	100

Findings from interviews and observations indicate that students with hearing impairments face significant challenges due to communication barriers and social stigma, as some universities admit only a few students without adequate preparation to support their needs. According to the Ethiopian Higher Education Proclamation, Article 650/2009, academic assistance must be provided for students with hearing impairments, including sign language support, accessible facilities, and supportive aids (Federal Negarit Gazeta, No. 35/2003).

Regarding inaccessible facilities and assistive technologies for students with hearing impairments, one facilitator explained:
"*Although the number of students with hearing impairments is small in the universities, they struggle with social, psychological, and educational problems due to communication barriers and negative attitudes more than physical facilities and supportive aids. They face significant challenges in education, including a lack of sign language interpreters and inaccessible assistive technologies, leading to difficulties in forming relationships and feelings of loneliness*."

Qualitative results further confirm that students with hearing impairments encounter barriers in communicating with classmates and teachers, facing social and educational challenges due to inadequate supportive aids and the absence of sign language interpreters. As noted by Farid, Fatima, and Jahanzaib (2023), language gaps in students with hearing impairments can lead to social, cognitive, and communication difficulties, such as challenges in interpreting social cues, managing emotions, and low self-esteem. These problems arise from the impact of hearing loss on learning and spoken language processing, which restricts effective interaction with peers and the broader community. Supporting this issue, Batista and García (2023) emphasize the social, cognitive, and communication challenges faced by students with hearing impairments, compounded by the hearing academic community's limited understanding and empathy toward these students.

In contrast, the number of students with physical disabilities exceeds that of students with visual or hearing impairments. It appears that students with physical disabilities have relatively better access to education, particularly those who can navigate independently. Unfortunately, no hearing-impaired teachers were reported among the sampled universities.

Table 4: Interview participants

Participant	Sex	N	%
Administrators	Male	5	83
	Female	1	17
	Total	6	100
Service providers/ facilitators for SWDs	Male	2	33
	Female	4	67
	Total	6	100

As observed in Table 4, five males (83%) and one female (17%) were administrators. Among the facilitators or service providers for students with disabilities, two (33%) were male and four (67%) were female. In total, 12 participants—six middle-level administrators and six facilitators/service providers—were interviewed. The interviews focused on the availability of health and hygiene services, challenges faced on campus, risk factors and barriers in the physical environment affecting students' education, and measures taken by university officials through risk management to provide students with disabilities an accessible physical environment.

Regarding the convenience of university classroom buildings, library buildings, and dormitory buildings for students with disabilities, 92 respondents (50.8%) and 30 respondents (16.6%) identified them as "inconvenient" and "highly inconvenient," respectively. This indicates that when these buildings were designed, universities did not adequately consider the challenges faced by students with disabilities or factors that influence their learning and living experiences.

Table 5: Convenience of Infrastructure and facilities for SWDS in the Universities

Variable	Highly Convenient (%)	Convenient (%)	Medium (%)	Inconvenient (%)	Highly Inconvenient (%)	Total (%)
Universities' building designs for SWDs	1.7	11.6	19.3	50.8	16.6	100
Campus compound physical facilities	3.3	11.1	20.4	48.6	16.6	100
Walkways for SWDs in Universities' compound	12.7	15.5	19.3	41.4	11.1	100
Classroom entrances	7.7	10.5	19.3	42.5	20	100
Classroom physical facilities for SWDs	4.4	13.3	13.8	49.2	19.3	100
Existing ramps	3.9	11.6	18.2	50.3	16	100

Most classroom buildings were not convenient or inclusive for students with disabilities. Muzemil (2018) and the World Bank (2017) noted that inconvenient building construction and related physical facilities can negatively affect the implementation of inclusive education at any level. Therefore, buildings and other facilities should be designed to be convenient, accessible, and inclusive, ensuring equal access for all students. These challenges were also supported by the qualitative findings.

Concerning the physical facilities on university campuses for students with disabilities, 88 participants (48.6%) and 30 participants (16.6%) reported them as "inconvenient" and "highly inconvenient," respectively. The study found that most university campuses are neither convenient nor accident-free for students with disabilities, particularly in third-generation institutions.

Interview and observation results showed that classroom physical environments were not inclusive for students with disabilities. Students with physical and visual impairments faced challenges due to inadequate classroom design, particularly in first-generation universities. The inconvenience of

walkways on campuses was also noted: 75 respondents (41.4%) and 20 respondents (11.1%) rated them as "inconvenient" and "highly inconvenient," respectively. Classroom entrances and physical facilities were similarly reported as inconvenient by 77 respondents (42.5%) and 89 respondents (49.2%). Observations confirmed that most university physical environments, including gateways and walkways, were not designed to support the education of students with disabilities. However, two universities prioritized accessibility by incorporating ramps, elevators, adjustable furniture, and inclusive design principles to accommodate diverse needs. Ali (2014) emphasized that inaccessible architecture restricts the movement of individuals with impairments, exacerbating their exclusion from learning activities.

Regarding existing ramps—inclined planes used by wheelchair users—91 respondents (50.3%) and 30 respondents (16.6%) reported them as "inconvenient" and "highly inconvenient," respectively. Observations revealed that ramps were often inaccessible for students using wheelchairs or other mobility aids, preventing independent movement and full participation in school activities. This issue was particularly pronounced in two third-generation universities. Interviews further revealed that some universities lacked risk management plans to accommodate students with disabilities, despite national agencies assigning students to these universities without prior communication.

The respondents' perceptions regarding dormitory facilities reveal that most students with disabilities found them inconvenient. Specifically, 87 participants (48.1%) rated the dormitories as "inconvenient," while 31 students (7.1%) considered them "highly inconvenient." Additionally, 46 respondents (25.4%) chose "medium," reflecting that existing dormitory services are limited and inadequately accommodate students with disabilities based on the type and degree of their impairments. Qualitative findings corroborate this, showing that nearly all university administrators did not implement risk management strategies to address the impact of facilities on students with disabilities. This highlights a lack of institutional attention to minimizing these barriers.

Table 6: Convenience of dormitories, bathrooms and dining halls facilities for SWDs

Variable	Highly Convenient (%)	Convenient (%)	Medium (%)	Inconvenient (%)	Highly Inconvenient (%)	Total (%)
Dormitories	1.1	8.3	25.4	48.1	17.1	100
Bathroom/Washrooms	2.8	6.1	21.5	40.3	29.3	100
Dining halls	–	23.7	40.3	18.9	17.1	100

Regarding bathroom facilities, 73 respondents (40.3%) and 53 respondents (29.3%) reported them as "inconvenient" and "highly inconvenient," respectively. Interview and observational data indicated that insufficient attention was given to designing accessible bathrooms for students with disabilities, reflecting both infrastructural and attitudinal barriers. The lack of convenient bathrooms and water supply hinders students' ability to meet their educational needs comfortably, limiting their full participation in academic activities. Observations confirmed that nearly all sampled universities lacked adequately designed bathrooms, despite ongoing efforts in some institutions to renovate facilities and ensure privacy for students with disabilities.

Concerning dining facilities, 73 respondents (40.3%) and 34 respondents (18.9%) rated them as "inconvenient" and "highly inconvenient," respectively. The arrangement of tables and chairs in dining halls was not suitable for students with varying disabilities. Interviews and observations revealed that most sample universities did not provide barrier-free physical environments or facilities, largely due to a lack of risk management strategies and insufficient awareness among administrators regarding students' rights to accessible campus resources.

In discussing administrative efforts to mitigate risk factors in the physical environment post-COVID-19, one facilitator stated: "*Now our university is struggling with limited resources to serve the different needs of students with disabilities and manage risk factors related to the physical environment and other facilities. Consequently, all students receive the same accommodations from the university. We are now working to improve the situation, which makes it challenging to provide significant support services for students with disabilities.*"

Table 7: Access to Water, health service, sanitation, and hygiene after COVID-19 for SWDs

Variable	Highly Convenient (%)	Convenient (%)	Medium (%)	Inconvenient (%)	Highly Inconvenient (%)	Total (%)
Access to health services	5.5	10.5	24.9	43.6	15.5	100
Sanitation and hygiene	-	13.8	22.1	45.9	18.2	100
Toilet accessibility	-	9.4	19.9	53	17.7	100

Lack of access to water, sanitation, and hygiene (WASH) services puts students with disabilities at significant risk for health problems (Table 7). Inadequate WASH services were identified as a key risk factor, particularly for female students, whose academic performance and participation are impacted by insufficient sanitation facilities (Akanzum & Pienaah, 2023; UN, 2025). As indicated in Table 6, out of the total respondents, 83 (45.9%) and 33 (18.2%) reported WASH facilities as "inconvenient" and "highly inconvenient," respectively, highlighting insufficient health services to support students with disabilities. Inaccessible sanitation facilities also created situations that disadvantaged students in attending to their most basic and private needs.

Interview and observation results revealed that hygiene problems in these universities often led to additional diseases, such as typhoid, typhus, diarrhea, and malaria, particularly in 1st- and 2nd-generation public universities. During the COVID-19 pandemic, universities prioritized hygiene by providing ample handwashing facilities, which were seen as both a right and an obligation. Post-pandemic, however, these facilities have largely been discontinued, resulting in water scarcity and declining hygiene standards.

Students who frequently encounter such challenges may be forced to drop out. Ensuring access to water, healthcare, sanitation, and hygiene services is therefore crucial to supporting their academic success (Akanzum & Pienaah, 2023). Access to water is particularly important for maintaining proper sanitation and hygiene in crowded campus areas, while good health and hygiene significantly contribute to successful class attendance and learning outcomes (Alam & Kbir, 2023; United Nations Human Rights, 2020; UNESCO, 2020).

The research also identified specific challenges regarding sanitation and hygiene services. In Table 6, 83 (45.9%) and 33 (18.2%) of respondents reported these facilities as inconvenient and highly inconvenient, respectively. These risk factors negatively influenced students with disabilities' ability to complete their education on time.

Toilet inaccessibility was highlighted as the most pressing problem across nearly all universities, with 96 (53%) and 32 (17.7%) of students rating the facilities as inconvenient and highly inconvenient, respectively. Qualitative data confirmed that, during the COVID-19 pandemic, sanitation and hygiene facilities were more accessible due to relatively easy access to water at walkways, gateways, and building corners. Post-pandemic, handwashing facilities have largely been removed, and the existing toilets remain neither comfortable nor accessible for students with disabilities. Thus, access to water, healthcare, sanitation, and hygiene services has consistently been a critical risk factor for students.

5 Conclusions and Recommendations

The convenience and inclusivity of the physical environment and facilities in higher education institutions significantly impact educational outcomes.

They enhance social interaction among students and help build self-confidence for individuals with disabilities pursuing higher education. However, the study found that nearly all universities fail to adequately address the needs of students with disabilities regarding the physical environment and facilities. This lack of preparedness necessitates an inclusive planning approach aimed at developing and addressing the specific needs of these students. It is essential to implement effective risk management and risk minimization strategies to enhance their academic success and overall well-being. This is particularly crucial for students with visual and physical disabilities, who may face additional challenges in accessing educational resources and engaging fully in the learning environment. Mechado & Oliveira (2021) and Ntombela & Soobrayen (2013) support this finding, emphasizing that to ensure the right to inclusive education for students with disabilities, higher education institutions must create high-quality, inclusive physical learning environments that address and minimize physical barriers. To enhance such environments and facilities, universities should prioritize accessible infrastructure and involve students and other stakeholders in planning and decision-making processes.

The study also identified several risk factors that hinder students with disabilities from learning and moving freely on campus, including ramps, open drainages, walkway holes, inaccessible entrances, and poles on road curves across the six universities. Therefore, universities should adopt and implement inclusive universal design principles for infrastructure to ensure that all students can fully participate in their educational journeys. Addressing these issues requires collaboration among university administrations, funding NGOs, and local authorities to improve infrastructure and create a safer environment for all students.

During the COVID-19 pandemic, water supply and sanitation facilities were well-maintained and accessible to all students. However, after the pandemic was declared over as a global health emergency, water supplies and handwashing stations that had been available in every building and at every entrance were discontinued in many universities. This change has raised concerns among students, particularly those with disabilities, regarding hygiene and health safety on campuses, including risks of typhoid, thapsus, and malaria. Universities should advocate for the reinstatement of these essential services to ensure a safe, secure, and clean environment for everyone.

Additionally, students with disabilities remain highly exposed to health risks due to limited access to water, sanitation, and hygiene services, which are particularly critical for female students. To improve educational outcomes, university administrations should ensure adequate water supply, sanitation, and hygiene facilities. Finally, the effects of inclusive WASH on the enrollment, attendance, and academic performance of students with disabilities warrant further investigation.

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