Physical and Environmental Factors Influencing Accessibility to Sanitation and Hygiene Services Among People Living with Disabilities in Kitui County, Kenya

Moko James Gacini[1], Dr. Isaac Mwanzo[2], Dr. Edna Nyang'echi[3]

[1]School of Health Sciences, Department of Community Health & Epidemiology, Kenyatta University, Kenya

[2]Lecturer, Department of Family Medicine, Community Health &Epidemiology, Kenyatta University, Kenya

[3]Lecturer, Department of Public Health, Maseno University

ABSTRACT

This study aimed to find out the physical and environmental factors influencing accessibility to sanitation and hygiene services among PLWD in Kitui County, Kenya. The study employed a cross sectional survey method. Disability status varied, with 44.2% having physical/mobility disabilities, 34.4% with visual disabilities, and 21.4% with hearing disabilities. In terms of physical and environmental factors, 95.6% had access to latrines, Improved pit latrines were the most common (52.3%). 93.3% reported sufficient space inside latrines, challenges included slippery floors (28.2%) and limited privacy (23%). Inferential statistics, employing logistic regression, identified significant associations. The logistic regression analysis elucidated significant factors influencing hygiene and sanitation accessibility among people with disabilities in Kitui County, Kenya. Socio-economic variables, including occupation (B = -0.212, p = 0.032), income (B = -1.068, p = 0.184), and education level (B = 0.457, p < 0.001), exhibited notable associations. Physical and environmental factors, such as latrine design for people with disabilities (B = -0.566, p = 0.077), played a crucial role. This study identified substantial challenges hindering people with disabilities (PLWD) from accessing adequate sanitation and hygiene, revealing critical issues related to physical and environmental barriers.

Key Words: *Physical Factors, Environmental Factors, Sanitation and Hygiene Accessibility, People Living with Disabilities*

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1.0 Introduction

1.1 Background to the study

Persons living with disabilities are individuals with persistent mental, physical, sensory or intellectual deterioration while interacting with varied barriers may prevent equal participation in society compared to other population. (United Nations, 2006). According to the Union of Physically Impaired Against Segregation (1976), discussion on disability and WASH services is typically based on the social paradigm of disability that sees individuals with disabilities as an oppressed group where their fundamental right of complete involvement in society equally with others as imposed by the society. Persons living with disabilities are individuals with

persistent mental, physical, sensory or intellectual deterioration while interacting with varied barriers may prevent equal participation in society compared to other population. (United Nations, 2006). Accessibility to WASH is assessed by the ability of PLWD to Reach the WASH infrastructure, enter, circulate around it and use it freely and independently.

Fifteen percent of the world's population, or more than one billion people, are disabled (World Health Organization, 2021). Moreover, UN's Water evaluation on WASH (water, sanitation and hygiene) revealed 892 million people around the world are open defecating, over 3.6 billion people cannot access properly managed sanitation amenities, and 2 billion people are deficient of properly managed drinking water sources. (UN Water, 2021). People with disabilities (PLWD) have a 5.5-fold increased risk of being found in the position of being unable to access WASH as compared to normal people in the same community (UN Water,2021). The report also shows the prevalence is higher in developing countries. According to the Kenya National Survey for Persons with Disability (2019), 4.6% of Kenyans live with a disability, and 65% of them consider the environment to be one of their biggest difficulties.

Kenya has been active in the WASH sector in its development cooperation activities for a long time but it has not been keeping pace with population growth. According to UNICEF/WHO WASH Joint Monitoring Programme report (2019), 42 % of the individuals lack access to adequate water for drinking, 71% of households lack sanitation facilities in Kenya showing no improvement from 2010.UNICEF (2020) report further reveals that around 1,765 villages are open defecation free and the 2019 census data illustrates the disproportionate number of people defecating in country areas (11.5%) in comparison to town areas (0.8%) (KNBS, 2019). For people with disabilities, open defecation presents a technical problem because of the stigma linked with the practice. Because of this, physically handicapped persons (especially women) are compelled to confine themselves defecate in the dark, leaving them open to mishaps, rape, and other dangerous safety issues like animal attacks. (Mactaggart et al., 2018).

Kitui County has made great strides in improving WASH programs and was declared Open Defecation Free in 2018 by the Ministry of Health (World Vision, 2018). The county is however at limited access to sanitation and hygiene as per JMP classification. On top of that, Community Led Total Sanitation and Sustainable WASH Systems approaches aim to create awareness of the fecal-oral contamination route, and capitalizes on human emotions associated with disgust and shame to enlighten and inform community-wide change in defecation practices, and the 'open defecation free' (ODF) for entire village being the ultimate goal of the program (USAID, 2021). Due to this, more individuals now use toilets to relieve themselves, which has slowed the development of diarrheal infections (World Vision, 2018).

Poor sanitation costs Kitui County KES 859 million annually (WSP, 2018). Latrine coverage is about 91.8 percent and waste disposal happen to be a growing problem, as about 64.4 percent of the household waste is disposed in the farms (KNBS, 2019). Approximately 4.6% of people in Kitui County are considered to be disabled and are highly likely to be found in the position of being unable to access WASH as compared to normal people in the county (County Government of Kitui, 2020). Several studies have been done on both WASH access and disability; however, none of these studies have showed association between disability and access to WASH. This study therefore, intends to show the association between access to WASH and disability.

2.0 Literature Review

Social-economic factors to persons with disabilities vary in different cultures and extend beyond design and hardware issues; however, it has been reported through many existing empirical works that stigma and discrimination from others is a common experience to people with disabilities when using both household and public facilities (Mactaggart et al., 2019). According to Banks et al. (2019), stigmatizing experiences when using public restrooms cause persons with disabilities to sometimes take longer to utilize WASH facilities. Others who cannot enter latrines (or who end up not using latrines as a result of discrimination from communities' members) report that stigma is very common when accessing open defecation, as a result, disabled people (majority of them being women) opt to only going in the dark, making them susceptible to assaults, accidents, and other dangerous situations (Snider & Takeda, 2008; Gosling, 2010).

There are a few works that highlight the effects of inaccessibility to WASH facilities in learning institutions and at the place of employment, despite the fact that the majority of works addressing disability issues and WASH focus on the households and community (Al-Dababneh et al. (2017; UNICEF, 2019). There is empirical evidence that children with disabilities fail to attend learning institutions due to inaccessible toilets (Banks et al., 2019). For example, in Uganda, attempts to promote the enrollment of disabled students in learning institutions by inclusive education programs and laws have been hampered by the absence of accessible restrooms. (Nanyondo, 2019). The most affected group being physically disabled adolescent girls who are unable to discreetly enter school restrooms leading to high dropout rates. The available data from United Nations Education, Scientific and Cultural Organization reveal that impaired females leave school earlier than disabled boys, and 90% of all learners living with disabilities are school drop outs (UNESCO, 2021). Because they can't walk to the school restrooms and shut the door behind them, a lot of disabled girls drop out of school, which is regrettable.

While employment counts up to be an area of equal concern, PLWD is the most unemployed group in the world where their unemployment rate is around eighty percent (UN, 2021). Lack of accessible toilets in the workplace creates a significant barrier to employment for individuals with disabilities and may limit their access to WASH facilities (Banks et al., 2019). Disability limits at least one adult per household (a mother in particular) to remain at home rather than engage in productive activities as they will need to take care and assist persons with disabilities in toileting (Mactaggart et al., 2018). This leads to low economic productivity. It is practically impossible for mothers of disabled children to stay at home without working or end up neglecting their daily responsibilities so they visit the child's school regularly throughout the day and assist them with toileting activities because such schools lack accessible restrooms. (Al-Dababneh et al., 2017; UNICEF, 2019).

Whereas the individual career and the economic burden on families is exacerbated by the lack of accessible WASH facilities, it prevents children or people with disabilities from participating in the social economic constituent (Al-Dababneh et al., 2017). Since the earning potential is low, such families are unlikely to have the financial means to enhance access by structurally altering their home WASH facilities. Consequently, people with disabilities who are still illiterate and jobless have the minimum possible influence over decisions affecting their families and communities, particularly those involving WASH facilities. (Mactaggart et al., 2016; Mactaggart et al., 2018).

The available literature shows that there is need to adopt various strategies to address the factors and barriers affecting PLWD enjoyment of their right to WASH facilities (Mactaggart et al., 2016). Firstly, government line institutions must fulfill their responsibilities as rights - holders

and develop partnerships that meaningfully incorporate different rights holder groups (Lubega & Wanakwakwa, 2018). Another strategy to improve WASH access among PLWD is creating awareness regarding the right of PLWD in the society (Water Aid, 2013). By doing so, norms and social stigma faced by people with disability will be limited. In other words, it is essential for WASH programs to place a higher value on inclusion and diversity. To communicate messages, distinct channels must be used (for example, mass media, social media, and community events) (SNV, 2020). That is, creating enabling conditions for PLWD as someone you look up to, participation in daily activities, and respect for PLWD. Therefore, by eliminating communication factors such as inaccessible behavior change communications can improve access to WASH among PLWD.

Data on PLWD have begun to be generated recently with many of these efforts in reaction to current initiatives urged by the United Nations Convention on the Rights of Persons with Disabilities. (UN, 2008) and Washington Group on Disability Statistics, 2010. According to the available literature, much of the information on how PLWD can access WASH is unreliable or is the result of limited, primarily qualitative studies (White et al., 2016; Mactaggart et al., 2016; Mactaggart et al., 2018; Mactaggart et al., 2019). To determine what works best, why it works, and what the overall advantages are for PLWD and their family, comprehensive longitudinal evaluations addressing execution and periodical monitoring of such treatments on a bigger scale are required.

Additionally, more research is required to describe novel adaptations that are low-cost, locally applicable, and long-lasting (Groce & Trani, 2015; Mactaggart et al., 2018; Banks et al., 2019). Numerous modifications will prove to be easy, such as the use of guiding strings or threads or fences to guide visually impaired person to household latrines. The latrines are also fitted with supportive bars or hand rails made out of locally available materials like tree branches and supportive clothing. In addition, the latrine doors can be modified to provide a wider entrance and ensuring smooth non slip floors for easier cleaning. The final thing that needs more research is how and how much people with disabilities depend on other family members for help, how this affects relations within families, and what kind of economic and societal ramifications this seems to have.

3.0 Materials and Methods

The study is a cross sectional study supplemented with both quantitative and qualitative approaches. The design provides a snap shot of the characteristics, occurrence and the frequency of study data at a specific time within the target population (Gaille, 2018). The independent variables in the study are; social economic factors of the individuals, physical and environmental factors affecting design of the sanitary facilities and the knowledge factors on sanitation and hygiene issues. Social economic factors were measured through assessment of the participants' age, sex, education and occupation and income status and physical and environmental factors were assessed through designs and usability of the sanitation facilities by PLWD. The knowledge factors were to be measured through assessment of knowledge and skills by asking structured questions and observations. In addition, their ability to access sanitation and hygiene messages by assessing designing of the messages and level of training they undertake.

The dependent variable is accessibility of sanitation and hygiene services among people with disability which will be measured by; reachability to the sanitation services in terms of distance, how well they are able to enter, circulate inside and be able to use the facilities freely.

The study was conducted in Kenya's sixth-largest county, Kitui, with a total area of 30,496.4 KM2. Kitui County borders Machakos to the west and Makueni counties to the east and

southeast by Tana River County, the south by Taita Taveta County, the north-west by Embu, and the north by Tharaka-Nithi and Meru counties. It lies between latitudes 0°10 South and 3°0 South and longitudes 37°50 East and 39°0 East as shown in appendix III. It has 1,136,187 residents. There are 262,942 households, with 4.3 people per home on average. The county has a total of 256 health facilities. The target population were primary participants as people with hearing, visual and mobility disabilities, care givers (when the primary participant is unable to communicate or respond), policy makers and WASH implementers in the 8 sub counties of Kitui County.

The study population in this research focused on people living with disabilities (PLWD) in Kitui County, Kenya. The study specifically targeted individuals who experience visual, physical/mobility and hearing challenges that may hinder their equal participation in society. According the National Commission of Persons with Disability, Kitui County has 40,991 persons with disability of which 26,629 have visual, hearing and physical disabilities. All consenting people with hearing, visual and mobility type of disabilities (15 years and above) living at home and not enrolled in disabled care institution. Parental Assent was obtained for children between 15 to 18 years. All people with visual, hearing and mobility disabilities, who were seriously ill, enrolled in disabled care institution and mentally incapacitated during the study period were not eligible for the study.

Sample size estimation was done using the Cochrane Formulae. A confidence interval of 95% and a margin of error of 5% was applied. The proportion of variables of interest will be assumed at 50% (to give maximum variability). This formula was selected due to the fact that it is an accurate sample determination formula for surveys (Ibrahim, 2009).

This study used multi stage sampling technique. The sampling was done in stages using smaller and smaller sampling units at each stage (Kothari, 2004). Disability status is classified into 7 types including visual, hearing, mobility, cognition, self-care, communication and albinism. The first stage involved the most prevalent types of disability in Kitui (visual, hearing and mobility) and they constituted the Primary Sampling Unit (PSU). The sample size were allocated to the PSU based on probability proportionate to size (PPS) to form the Secondary Sampling Unit (SSU) which is the number of persons per each of the three types of disability. Further, the SSU is further disaggregated based on PPS to give the type of disability per gender and form the Tertiary Sampling Unit.

To test the feasibility as well as the adequacy of study instruments, a pre- test of the survey questionnaire was done using 10% of the sample size (42) of PLWD of Ivingoni/Nzambani ward, Kibwezi East Sub County in Makueni County. The ward has been declared Open Defeacation Free and has similar setting to Kitui County. This ensured avoidance of contamination of the information expected to be collected from the study. The validity was ensured by strict adherence to the study protocol, careful planning and working closely with supervisors. The definition as per United Nations Convention on the Rights of Persons with Disabilities will be adhered. Besides, the University supervisors further reviewed the interview guide to ensure content validity, accuracy, relevance, and language appropriateness of the research instrument. The reliability of the study tool was ensured by a well-designed interview guide. The data collection tools were pre-tested and reviewed before actual study. Also, research assistants were trained and supervised during data collection. The Washington Group list of screening questions was employed during the interviews.

A total of 18 research assistants were recruited and trained on the application of the questionnaires. Each covered district and recruit the respondents depending on the type of disability and their gender. 'Key informants,' which included village chiefs, Nyumba Kumi Clusters, neighbourhood social welfare officers will be consulted in order to identify the first

respondents. As per recommended by Washington Group list of screening questions (Washington Group on Disability Statistics, 2010), Key informants are asked to name people in their neighbourhood who they believe have "some problem," "a lot of difficulty," or are "unable to do" any of six predetermined tasks, such as walking, hearing, or seeing. The identified participants were listed. Participants were purposefully chosen from the list depending on the type of impairment, gender, age, and geographical location and randomly selected until the sample size is attained. Where there are circumstances that primary participants were unable to respond, the care givers were interviewed on their behalf. The researcher administers the FGDs with audio recording and KIIs and offers overall supervision during data collection.

4.0 Results and Discussion

4.1 Physical and Environmental factors

4.1.1 Type of latrine

Out of the 421 participants across the datasets, 95.6% (N=400) had access to latrines and only 5% (N=21) did not have access to latrines as shown in Table 4.5 below. Out of the 400 participants with access to latrines, majority used improved pit latrines with concrete (52.3%), followed by simple pit latrines with mud floor (43.5%), simple pit latrine with wood slab (4%), and water that pour flash into pit (0.3%). However, majority of people with hearing impairments reported to be using simple pit latrine with mud floor (50%), followed by improved pit latrine with concrete floor (45.2%) as shown in table 4.5 below. When respondents were asked if they used shared or not shared latrines, 58% reported to use individually owned latrines and 41.4% reported to use shared latrines as shown in table 1 below.

Table 1 Access to latrines among PLWD in Kitui County

			Type of disability			Total
			Hearing	Physical /mobility	Visual	
Presence of Latrines	Yes	Count	84	177	139	400
		% of Total	93.30%	95.20%	95.90%	95.00%
	No	Count	6	9	6	21
		% of Total	6.70%	4.80%	4.10%	5.00%
Total		Count	90	186	145	421
		% of Total	100.00%	100.00%	100.00%	100.00%
Latrine Ownership	Shared	Count	36	86	45	167
		% of Total	41.90%	48.60%	32.10%	41.40%
	Individual	Count	50	91	95	236
		% of Total	58.10%	51.40%	67.90%	58.60%
Total		Count	86	177	140	403
		% of Total	100.00%	100.00%	100.00%	100.00%
Type of Latrine	Simple pit latrine Mud floor	Count	42	68	64	174
		% of Total	50.00%	38.40%	46.00%	43.50%
	Simple pit latrine wood slab	Count	4	4	8	16
		% of Total	4.80%	2.30%	5.80%	4.00%
	Water pour that flash in to pit	Count	0	0	1	1
		% of Total	0.00%	0.00%	0.70%	0.30%
	Improved pit latrine concrete	Count	38	105	66	209
		% of Total	45.20%	59.30%	47.50%	52.30%
Total		Count	84	177	139	400
		% of Total	100.00%	100.00%	100.00%	100.00%

4.1.2. Physical design of latrine factors

From the 400 participants with access to latrines, majority (93.3%, N=373) reported that there was enough space (Atleast 2.2 x 2.2M^2) for them to move as they liked inside the latrines as shown in Table 4.5 below. However, 6.78% reported to lack enough space to move freely in the latrine. This could be attributed to the lack of available land that could allow building of spacious latrines as indicated in the interviews.

> *"we can talk of the availability of the land, because there are some areas where the land is so limited and the sanitary facilities provided are for the people without disabilities now to get a space to provide a facility for the disabled persons becomes a challenge"* KII 2.

Additionally, majority reported to have privacy when using the latrines (77%) and that the toilet layout had enough space for wheelchair or crutch user and helper to move freely (69.8%) as shown in Table 2 below.

Out of the 400 participants with access to latrines, majority (65.3%) reported to be using squatting types of latrine and some (34.8%,rported to be using sitting type of latrine. 66.3% of those who reported to be using squatting type of latrine stated that they did not have something to hold on onto when squatting, and 33.7% reported to have something to hold onto when squatting. Hanging rope (81.8%) was the most common reported devises used to hold onto when squatting. 69.8% of the participants reported that the squatting food rest was not elevated, while only 30.3% stated that the squatting foot rest was elevated as shown in Table 2 below

From the 400 participants with access to latrines, 63.5% reported that the latrines floor was cemented, 30% reported the floor were made of mud, and 6.5% used latrines with wooden floors as shown in Table 4.6 below. Most participants (57.3%) also reported that the latrines floor was firm, some (28.2%) stated that the floor was slippery, and a few (14.5%) stated that the floor was unstable. Similarly, most (92.0%) of all the participants reported to have clean latrine as shown in Table 2 below.

Table 2 Physical design of latrines factors

				Type of disability			Total
				Hearing	Physical /mobility	Visual	
Space inside Latrine	The space inside the latrine is adequate for unrestricted movement	Yes	Count	84	159	130	373
			% of Total	98.80%	90.30%	93.50%	93.30%
		No	Count	1	17	9	27
			% of Total	1.20%	9.70%	6.50%	6.80%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %
	Larine privacy	Yes	Count	63	143	102	308
			% of Total	74.10%	81.30%	73.40%	77.00%
		No	Count	22	33	37	92
			% of Total	25.90%	18.80%	26.60%	23.00%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %
	The toilet layout allows space for wheelchair users, crutch users, or users with helpers	Yes	Count	63	126	90	279
			% of Total	74.10%	71.60%	64.70%	69.80%
		No	Count	22	50	49	121
			% of Total	25.90%	28.40%	35.30%	30.30%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %
Squat hole design	The latrine is of the	Sitting	Count	16	93	30	139
			% of Total	18.80%	52.80%	21.60%	34.80%

	squatting/sitting type	Squatting	Count	69	83	109	261
			% of Total	81.20%	47.20%	78.40%	65.30%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %
	If squatting, what type of support?	Hanging Rope	Count	4	58	10	72
			% of Total	66.70%	82.90%	83.30%	81.80%
		Hand rails	Count	2	12	2	16
			% of Total	33.30%	17.10%	16.70%	18.20%
	Total		Count	6	70	12	88
			% of Total	100.00%	100.00%	100.00%	100.00 %
	If squatting, is the footrest elevated	Yes	Count	25	59	37	121
			% of Total	29.40%	33.50%	26.60%	30.30%
		No	Count	60	117	102	279
			% of Total	70.60%	66.50%	73.40%	69.80%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %
Latrine Floor design	Design of latrine floor	Muddy floor	Count	26	47	47	120
			% of Total	30.60%	26.70%	33.80%	30.00%
		Wooden	Count	5	10	11	26
			% of Total	5.90%	5.70%	7.90%	6.50%
		Cement	Count	54	119	81	254
			% of Total	63.50%	67.60%	58.30%	63.50%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %
	Condition of latrine floor	Unstable	Count	12	24	22	58
			% of Total	14.10%	13.60%	15.80%	14.50%

		Slippery	Count	20	57	36	113
			% of Total	23.50%	32.40%	25.90%	28.20%
		Firm	Count	53	95	81	229
			% of Total	62.40%	54.00%	58.30%	57.30%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %
	Latrine floor cleanliness	Yes	Count	81	162	125	368
			% of Total	95.30%	92.00%	89.90%	92.00%
		No	Count	4	14	14	32
			% of Total	4.70%	8.00%	10.10%	8.00%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00 %

4.1.3. Design and description of latrine walkway

Out of the 400 respondents with access to latrines, majority (54.5%) reported the latrines were located at least 10 meters away from the households, while 40.8% respondents reported that the distance was between 6 to 10 meters away from the household as represented in Table 4. 7 below. However, majority (48.90%) of those with physical/mobility impairments reported that the distance between the latrine and household was between 6 to 10 meters, and a considerable number (48.30%) reported to be greater than 10 meters. More than half of the participants (54.5%) reported the width of the path was 0.9m and above, and 45.5% stated that the width of the path was less than 0.8m. Most of the participants (90.30%) also reported that the status of the pathway was level and firm. At night, more than half of the participants reported that the pathway to the latrine had sufficient lighting (54%), while the others reported that the lighting was not sufficient enough (46%) as shown in Table 4.7 below. It was further emphasized in the interviews that distance to the latrines was a challenge facing PLWD in Kitui County.

> "*The distance from the household, from the living houses or from the offices to where we have these facilities. Some of the facilities are provided, but they are quite distant from the offices or the dwelling places. So basically, they affect the accessibility, especially at night. There are some areas without electricity. So, at night they are highly affected. Yes"* KII 2.

When participants were asked to describe the nature of the steps used to enter the latrines, 72.0 % reported to not have slopes or ramps to the entrance of the latrine, and 28.0% stated to have slopes or ramps at the entrance of the latrines as represented in Table 4.7 below. Majority (90.2%) of the participants reported to have non slippery slopes/ramps at the latrine entrance. However, most participants (92.5%) reported to lack hand rails or walking bars for support to enter the latrines, while only a few (7.5%) reported to have the handrails or walking bars for support to enter the latrines. For the few participants with handrails, they reported that Most of the handrails or walking bars present were between 0.5-1.5m as shown in Table 3 below.

From the 400 participants with access to latrines, almost all reported that the width of the latrine entrance was more than 0.8m wide (96.3%). Additionally most (60.5%) of the participants stated that the door opened inwards while 39.5% stated that the latrine door opened outwards as represented in Table 3 below.

Table 3. Design and description of latrine walkway

				Type of disability			Total
				Hearing	Physical /mobility	Visual	
Pathway	Distance between Latrine and Household	Less than 6 Meters	Count	2	5	12	19
			% of Total	2.30%	2.80%	8.60%	4.70%
		6-10m	Count	32	87	46	165
			% of Total	37.20%	48.90%	32.90%	40.80%
		Greater than 10Meters	Count	52	86	82	220
			% of Total	60.50%	48.30%	58.60%	54.50%
	Total		Count	86	178	140	404
			% of Total	100.00%	100.00%	100.00%	100.00%
	Width of the pathway	Less than 0.8 Meters	Count	36	88	60	184
			% of Total	41.90%	49.40%	42.90%	45.50%
		0.9 M and above	Count	50	90	80	220
			% of Total	58.10%	50.60%	57.10%	54.50%
	Total		Count	86	178	140	404
			% of Total	100.00%	100.00%	100.00%	100.00%
	Status of the pathway	Presence of obstacles	Count	4	15	6	25
			% of Total	4.70%	8.50%	4.30%	6.30%
		Surface Slippery	Count	3	9	1	13
			% of Total	3.50%	5.10%	0.70%	3.30%
		Level and Firm	Count	78	151	132	361
			% of Total	91.80%	85.80%	95.00%	90.30%
		Accesible	Count	0	1	0	1
			% of Total	0.00%	0.60%	0.00%	0.30%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00%
	Latrine light at night	Yes	Count	59	89	68	216

			% of Total	69%	51%	49%	54%
		No	Count	26	87	71	184
			% of Total	31%	49%	51%	46%
	Total		Count	85	176	139	400
			% of Total	100%	100%	100%	100%
Steps	Presence of slopes/ramps	Yes	Count	21	63	28	112
			% of Total	24.70%	35.80%	20.10%	28.00%
		No	Count	64	113	111	288
			% of Total	75.30%	64.20%	79.90%	72.00%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00%
	Slippery/Non slippery slopes/ramps	Slippery	Count	0	9	2	11
			% of Total	0.00%	14.30%	7.10%	9.80%
		Non Slippery	Count	21	54	26	101
			% of Total	100.00%	85.70%	92.90%	90.20%
	Total		Count	21	63	28	112
			% of Total	100.00%	100.00%	100.00%	100.00%
	Presence of handrails/walking bars for support	Yes	Count	2	9	19	30
			% of Total	2.40%	5.10%	13.70%	7.50%
		No	Count	83	167	120	370
			% of Total	97.60%	94.90%	86.30%	92.50%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00%
	If Yes, height of handrails	0.5-1.5 M	Count	2	9	16	27
			% of Total	100.00%	100.00%	84.20%	90.00%
		More than 1.5 M	Count	0	0	3	3
			% of Total	0.00%	0.00%	15.80%	10.00%
	Total		Count	2	9	19	30

			% of Total	100.00%	100.00%	100.00%	100.00%
Entrance	How does the door open	Inwards	Count	55	105	82	242
			% of Total	64.70%	59.70%	59.00%	60.50%
		Outwards	Count	30	71	57	158
			% of Total	35.30%	40.30%	41.00%	39.50%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00%
	Width of the latrine entrance	Less than 0.8M Narrow	Count	1	7	7	15
			% of Total	1.20%	4.00%	5.00%	3.80%
		More than 0.8M Wide	Count	84	169	132	385
			% of Total	98.80%	96.00%	95.00%	96.30%
	Total		Count	85	176	139	400
			% of Total	100.00%	100.00%	100.00%	100.00%

4.1 4. Availability to Hand washing facilities

Half of the respondents reported to lack hand washing facilities with soap near the latrine facilities (51.0%) and the other half reported to have hand washing facilities with soap near the latrine facilities as indicated in Table 4. 8 below. However majority of participants with visual impairments (53.20%) reported to have close hand washing facilities compared to those (46.50%) without. Additionally, majority (83.7%) of the participants with hand washing facilities reported that the facilities were mounted on less than 1.2m height and was accessible to them for use after visiting the latrine. When asked whether there was somewhere to dispose of the water that ensures the surrounding is hygienic and not prone to becoming slippery, majority (67.3%) disagreed, while 32.7% of them agreed, as shown in Table 4 below.

Table 4.8. Availability of hand washing facilities

				Type of disability			Total
				Hearing	Physical /mobility	Visual	
Hand washing facilities	Availability of close hand washing facility with soap	Yes	Count	42	80	74	196
			% of Total	49.40%	45.50%	53.20%	49.00%
		No	Count	43	96	65	204
			% of Total	50.60%	54.50%	46.80%	51.00%
	Total		Count	85	176	139	400
			% of Total	100.00 %	100.00%	100.00 %	100.00 %
	Hand washing facility mounted on less than 1.2 m height and accessible	Yes	Count	40	64	60	164
			% of Total	95.20%	80.00%	81.10%	83.70%
		No	Count	2	16	14	32
			% of Total	4.80%	20.00%	18.90%	16.30%
	Total		Count	42	80	74	196
			% of Total	100.00 %	100.00%	100.00 %	100.00 %
	Presence of hygienic place to	Yes	Count	15	30	19	64
			% of Total	35.70%	37.50%	25.70%	32.70%

	dispose water used	No	Count	27	50	55	132
			% of Total	64.30%	62.50%	74.30%	67.30%
	Total		Count	42	80	74	196
			% of Total	100.00 %	100.00%	100.00 %	100.00 %

4.2 Discussion

Poor access to WASH among PLWD across low-income and middle countries is widely acknowledged but little is studied. It is only recently that data on disability and development issues have only began to be collected- much of which is in response to the new efforts called for by the UN Convection on the rights of Persons with disabilities (UN, 2008) and Washington group on Disability Statistics, 2010. This analysis of eight cross-sectional surveys provides some first comparable quantitative data on the relationship between disability and WASH of PLWD in Kitui County, Kenya.

4.2.1 Physical and Environmental factors

Type of Latrine

The prevalence of access to latrines among the participants is encouraging, with 95.6% reporting access. However, the distribution of latrine types reveals disparities. Improved pit latrines, being the most common type, might suggest advancements in sanitation infrastructure. Still, the prevalence of simple pit latrines with mud floors highlights the need for more inclusive designs that cater to a diverse range of disabilities. The study result is consistent with White et al., (2016), that highlighted the challenges faced by people with physical impairments in accessing toilets/latrines with steps or those raised above ground. This study regression analysis further revealed that the type of latrine has a statistically significant impact on access to sanitation among people living with disabilities (PLWD). The odds ratio (OR) of 0.90 suggests that for each unit increase in the type of latrine, the odds of having access to sanitation decrease by 10%. This implies that individuals using certain types of latrines face higher challenges in accessing sanitation facilities.

Sharing of Latrines

The division between those using shared and non-shared latrines showcases varying preferences and requirements among participants. The strong association between latrine ownership and improved access to hygiene is a noteworthy finding from the regression analysis. With a p-value of less than 0.001 and an OR of 4.06, the results indicate that PLWD who own their latrine facilities are over four times more likely to have better access to sanitation.

Latrine design factors

The overwhelming majority reporting sufficient space inside the latrines is a positive aspect. Privacy concerns, though reported by a significant percentage, vary across locations. The prevalence of squatting-type latrines introduces challenges, particularly for those without something to hold onto. Variations in latrine floor materials and conditions necessitate a closer look at stability and slipperiness. Cemented floors are prevalent, but disparities in floor conditions suggest the importance of consistent standards and periodic maintenance to ensure safe and stable latrine use. According to Macyaggart et al., (2016) people with walking or

balancing impairments cannot walk on floors made of wood, tile or other materials because it can be too slippery for them. In such cases, majority of persons with physical impairments report that they are left with no solution other than crawling on the (often dirty) floor to reach the latrine. In this study, the impact of latrine design factors on sanitation access was also observed in the regression analysis, with a p-value of 0.05 and an OR of 1.36 (95% CI 0.56 to 3.16). While the confidence interval includes 1, indicating a lack of statistical significance, the result suggests a trend that warrants attention.

Latrine design modification factors

Differences in the distance of latrines from households and the width of pathways underscore the importance of considering environmental factors. Adequate lighting, particularly at night, is a critical aspect of ensuring safe access. The lack of slopes or ramps for latrine access, coupled with the absence of handrails, points to a critical gap in infrastructure design. Also, while most participants reported sufficiently wide latrine entrances, the absence of a significant difference suggests a consistent trend. Door-opening directions did not show variation, indicating a commonality in latrine entrance design. The study results were consistent with Mactaggart et al., (2016), stating that it proves very difficult for people with a wheelchair or crutches when they intend to use latrines because some of them are often too small to enter and close the door behind them. This study regression analysis indicated a statistically significant association between latrine design modification factors and access to sanitation and hygiene. The statistically significant association and the positive odds ratio collectively imply that modifications made to latrine designs have a positive impact on sanitation access for PLWD. In practical terms, when latrine designs are adapted or modified to better suit the needs of individuals with disabilities, there is a tangible improvement in their ability to access and use sanitation facilities

5.0 Conclusions and Recommendations

5.1 Conclusions

In conclusion, this study provides a comprehensive and nuanced exploration of sanitation and hygiene accessibility among people living with disabilities (PLWD) in Kitui County, Kenya. The findings shed light on multifaceted challenges faced by this demographic group, encompassing demographic, socioeconomic, physical, environmental, communication, and institutional factors. The study's demographic analysis highlighted a relatively even distribution of gender and a significant representation of elderly and older adult participants. Disability status varied, with a substantial proportion experiencing physical/mobility, visual, or hearing disabilities. The socioeconomic landscape revealed prevalent limitations in education, with over half of the participants having never attended school, and a majority reporting low income and high unemployment rates.

Physical and environmental factors were extensively examined, providing insights into the types of latrines, space inside, squat hole usage, latrine floor conditions, walkways, and steps. Noteworthy regional variations were identified, emphasizing the need for context-specific interventions. Latrine ownership emerged as a crucial factor positively influencing sanitation access, emphasizing the importance of personal ownership and agency in ensuring better hygiene facilities. Challenges related to space, squatting facilities, and walkway conditions revealed disparities and underscored the need for inclusive designs that consider the diverse needs of PLWD. The study highlighted the significance of factors such as the presence of hand washing facilities, their accessibility, and proper disposal methods for maintaining hygiene standards.

5.2 Recommendations

Implementing agencies should prioritize the development of inclusive sanitation infrastructure, taking into account the diverse needs of people living with disabilities (PLWD). This includes accessible latrine designs, walkways, and facilities that cater to different types of impairments. Encourage and support PLWD in owning their latrine facilities, as this was identified as a significant factor positively influencing sanitation access. Financial assistance and awareness campaigns can be instrumental in promoting ownership and ensuring that facilities are tailored to individual needs.

Develop and implement targeted educational programs that address specific knowledge gaps identified in the study. Focus on critical aspects such as proper handwashing techniques, optimal handwashing times, and the importance of hygiene practices tailored to the needs of PLWD. Improve the accessibility of WASH information for PLWD by incorporating inclusive communication strategies. This includes the provision of information in multiple formats, such as Braille, audio, and easy-to-read materials. Ensure that signage and warning systems are designed to cater to various impairments.

Enhance the involvement of PLWD in decision-making processes related to sanitation and hygiene policies. Implementing agencies should actively consult with this demographic group, ensuring their perspectives are considered in the planning and execution of WASH initiatives. Additionally, increase awareness among PLWD about existing government policies and support mechanisms. Facilitate community-based programs that promote awareness, acceptance, and inclusion of PLWD in all aspects of society, including sanitation and hygiene initiatives. Community engagement is crucial in fostering a supportive environment that recognizes the rights and needs of PLWD.

Establish a robust monitoring and evaluation system to assess the effectiveness and inclusivity of sanitation and hygiene interventions for PLWD. Regular reviews will help in identifying areas that need improvement and ensure that programs are continuously adapted to the evolving needs of this demographic group.

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