Effects of Inclusive Water, Sanitation, and Hygiene Intervention on Access Among Vulnerable Households Receiving Cash Transfers in Makueni County, Kenya

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ABSTRACT

Individuals with limited mobility, including people with disabilities (PWD) and older persons (OP), often encounter obstacles in accessing water, sanitation, and hygiene (WASH) services because facilities do not meet their needs. Kenya's cash transfer program seeks to enhance dignity, promote inclusion, and provide social protection for vulnerable households of OP (70+), PWD, and orphaned and vulnerable children (OVC). A combination of cash transfer with other supportive services, often referred to as "Cash plus," has been shown to improve non-monetary aspects of human development among targeted households. Conducted in Makueni County, Kenya, this quasi-experimental study assessed households' ability to make WASH facilities accessible (usable) for OP and PWD, investigated how inclusive WASH interventions affected access for OP and PWD, and analyzed how the intervention influenced expenditure priorities of OP, PWD and OVC households enrolled in the cash transfer program. Quantitative data was collected using individual questionnaires, with a total of 223 respondents. The study found significant differences between the intervention and control arms in improved water storage practices (p=0.001); improved household water treatment practices (p=0.001); household toilet modifications (p=0.001); handwashing station modifications (P =0.001); and bathing facility modifications (p = 0.002). Further, the intervention group reported 5-times higher odds of toilet modification (aOR=5.02, 95% CI: 2.67-9.76, p<0.001); 4 times higher odds of handwashing facility modifications (aOR=4.12, 95% CI: 2.19-8.03, p<0.001) 4.6 times higher odds of bathing facility modifications (aOR=4.61, 95% CI: 2.319.57, p<0.001) and 3 times higher odds of ranking WASH among the top 3 expenditure priorities (aOR=3.18, 95% CI: 1.62-6.51, p=0.001). The results indicate that implementing inclusive WASH interventions can significantly improve households' capacity to practice safe WASH behaviors, support the adaptation of existing WASH facilities to improve usability by OP and PWD through basic modifications, and promote greater prioritization of household investment in WASH-related services and resources.

Keywords: Inclusive WASH, WASH access for older persons, WASH access for people with disabilities; Cash transfer and WASH, WASH for vulnerable households.

INTRODUCTION

Background to the Study

Access to adequate water, sanitation, and hygiene (WASH) services is recognized as a fundamental human right. Despite this, vulnerable communities globally face difficulties accessing WASH services, with an estimated 76% of those lacking safe WASH in sub-Saharan Africa (WHO & UNICEF, 2023), where the burden of WASH related diseases, including deaths from diarrhoea, remains highest (Prüss-Üstün et al., 2014). In Kenya, only 37% of the population has access to basic sanitation services, and approximately 6% continue to practice open defecation (WHO & UNICEF, 2023). Vulnerable and marginalized populations, including older persons (OP), people with disabilities (PWD), orphaned and vulnerable children (OVC), and individuals living with chronic illnesses, frequently encounter additional obstacles to accessing WASH services due to context, psychological, and technical-related barriers (Dreibelbis et al., 2013). These barriers negatively impact key areas such as health, education, employment, and social engagement (WHO & UNICEF, 2025; Okesanya et al., 2024; Bick et al., 2025).

As part of a comprehensive social protection strategy, the Government of Kenya is implementing a consolidated cash transfer program focused on three vulnerable groups: OP aged 70 years and older, PWD, and OVC. The goal of this program is to promote dignity, encourage social inclusion, and offer social protection for these populations. Although cash transfer initiatives have demonstrated improvements in certain human capital outcomes such as increased household expenditure, asset accumulation, income, food security, and psychological well-being (Hongmei et al., 2019), research shows that financial support alone is insufficient to address nonmonetary barriers affecting long-term outcomes like nutrition, education, and health (Attah et al., 2016; Bastagli et al., 2016). Therefore, "cash plus" programming, which integrates cash transfers with complementary interventions to address multiple vulnerabilities, has been adopted and evaluated across various sectors in low- and middle-income countries (LMICs) (Handa et al., 2016; Seidenfeld et al., 2014; Langendorf et al., 2014). At the same time, the Inclusive WASH approach, grounded in human rights frameworks and systems thinking within the WASH sector (Shiva et al., 2025), has gained traction since the early 2000s (Casey & Crichton-Smith, 2020). This approach is designed to reduce the barriers faced by groups at risk of exclusion from WASH services. Accordingly, this study aimed to evaluate the impact of integrating inclusive WASH interventions within the existing government cash transfer program on both WASH service access and household expenditure priorities among OP, PWD, and OVC beneficiary households.

Problem Statement

Older persons and people with disabilities represent some of the most socially marginalized groups, frequently facing significant barriers in accessing WASH services due to functional limitations (WHO, 2011; HelpAge International, 2018; UNICEF, 2021). Not only do these populations experience limited access (availability) to WASH services, but they also encounter physical difficulties when using conventional WASH facilities designed without consideration for their specific needs (Hazel, 2013; Dreibelbis et al., 2013). WASH access difficulties among OP and PWD are further documented by Chumo et al. (2024), in their study in Kenya, which reported that older persons and individuals with disabilities encounter more challenges in accessing WASH services compared to the general population. The absence of adequate sanitation options puts people with disabilities at greater risk of unhygienic conditions and injuries (Wilbur et al.,2024; UNICEF, 2023). Previous "Cash plus" programming and evaluation have primarily focused on public health, education, agriculture, and livelihood enhancement. However, limited information is available on integrating cash transfer programs with inclusive WASH. Without deliberate, inclusive approaches, OP and PWD will continue to be left behind in WASH access. This study aimed to evaluate the effects of integrating inclusive WASH interventions with existing government cash transfer programs on access to WASH services and expenditure priorities of OP, PWD, and OVC cash transfer beneficiary households in selected study sites.

Study Objective

The overall objective of the study was to assess the effects of inclusive WASH intervention on WASH access and expenditure priorities among cash transfer beneficiary households of OP, PWD, and OVC. Specifically, the study sought to:

1. Assess households' ability to make WASH facilities accessible for OP and PWD enrolled in the cash transfer program.
2. Establish spending priorities of OP, PWD, and OVC households enrolled in the cash transfer program.
3. Assess the effects of inclusive WASH intervention on access to WASH services among OP and PWD enrolled in the cash transfer program
4. To assess the effect of inclusive WASH intervention on the expenditure priorities of OP, PWD, and OVC households enrolled in the cash transfer program

Hypothesis

Inclusive WASH interventions have no effect on WASH access among OP and PWD, enrolled in the cash transfer program. Additionally, inclusive WASH interventions have no effect on the expenditure priorities of OP, PWD, and OVC cash transfer beneficiary households.

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Significance of the Study

This study provides valuable insights into enhancing the accessibility of WASH services for OP and PWD by implementing simple, low-cost modifications to WASH facilities that improve usability. Furthermore, it provides insights on potential pathways for reaching vulnerable households with targeted WASH services through cross-sectoral collaborations, particularly between the WASH and social protection sectors The primary beneficiaries of this research include policymakers and decision-makers in both the WASH and social protection sectors, program implementers at national and county levels, non-governmental organizations (NGOs), and household benefiting from social cash transfer program.

MATERIALS AND METHODS

Study Design and Setting

A quasi-experimental intervention design was used to evaluate the effects of inclusive WASH interventions on WASH service accessibility (usability) and household expenditure priorities for WASH investments among vulnerable households of OPs, PWD, and OVC. The study was conducted across four sub-counties (2 control, 2 intervention). The intervention arm received an inclusive WASH behavior change communication (BCC) package. This package included training for caregivers and household heads in safe drinking water practices, simple modifications to WASH facilities to enhance usability, and prioritization of WASH improvements within household budgets. Additionally, households in the intervention group were linked to WASH service providers, such as local artisans and community health promoters. Ethical clearance and research authorization were obtained from a recognized ethics review board and a national research licensing authority, respectively. Further approvals were obtained from the State Department of Social Protection at all pertinent administrative levels, as well as from local administrative and community leaders. Informed consent was obtained from all participants, and strict confidentiality was maintained throughout the research process.

Study Population and Sampling

This study targeted vulnerable households of OP, PWD, and OVC participants enrolled in Kenya's national cash transfer program. Makueni County was purposively sampled because of its notably low coverage of WASH services, high poverty rate, and high enrolment in the national cash transfer program. These criteria ensured the inclusion of regions most affected by WASH inequities and socioeconomic vulnerability.

A sample size of 223 participants was determined using the formula as used by Nassiuma (2000). The formula was applied to determine the sample size, which was subsequently stratified into various categories, yielding a total of 223 respondents.

$$n = \frac{NCV^2}{CV_2 + [N-1]e_2} = \frac{26{,}889 \times (0.3)^2}{(0.3)_2 + [26{,}889 - 1]0.02_2} = \frac{2420.01}{10.85} \approx \mathbf{223\ respondents}$$

Where;

N is the size of the target population; n = Sample size; e = Standard margin of error (0.02 or 2% in the current study); CV = Coefficient of variation (0.3 or 30% in the current study); and p values of less than 0.05. The total sample size was therefore determined as 223 respondents (one per household).

A stratified proportionate random sampling approach was used to ensure a representative sample of the target population, comprising the three categories of cash transfer beneficiaries. Stratification was based on official overall cash transfer registration data for the three categories in the four sub-counties at the time of the study: 20,087 OP, 833 PWD, and 5,969 OVC beneficiaries (State Department of Social Protection, 2019). The final sample of 223 households was proportionally allocated to reflect the actual distribution of beneficiary categories in the cash transfer registry, yielding 167 households of older persons, 49 households of orphaned and vulnerable children, and 7 households of persons with disabilities. The relatively small number of PWD households in the

sample reflects their limited representation in the cash transfer program in the selected study areas, rather than sampling exclusion. All consenting participants were included in the study.

Data Collection Procedures

Quantitative data was collected using a semi-structured household questionnaire administered to 223 respondents. Baseline data were collected prior to the intervention to document socio-demographic characteristics, assess households' ability to make WASH facilities accessible to OP and PWD, and assess household expenditure priorities regarding WASH. At endline, data collection focused on evaluating the intervention's effects on WASH accessibility for OP and PWD, as well as any shifts in household WASH-related spending priorities. Trained research assistants conducted all data collection activities. To ensure comparability, consistent data-collection procedures were used at both the baseline and endline data-collection points.

Data Analysis Techniques

Quantitative data was analyzed using descriptive and inferential statistical methods. Descriptive statistics, including frequencies, proportions, medians, and interquartile ranges, were used to summarize and present the data in accordance with the study's objectives. To investigate associations between independent and dependent variables, a chi-square test was used, with statistical significance set at $p < 0.05$. Multiple logistic regression analyses were conducted to assess the relationship between the intervention and changes in access to WASH facilities, while controlling for demographic variables such as age, gender, and vulnerability category.

RESULTS

Baseline and endline findings for both the intervention and control groups are reported using descriptive statistics and inferential analyses, illustrating the extent to which the intervention affected WASH practices, facility modifications for older persons and persons with disabilities, and household expenditure prioritization on WASH services.

Social Demographic Characteristics

Table 1 presents the socio-demographic characteristics of participants drawn from vulnerable households of OP, PWD, and OVC. The study collected data on participants' gender, vulnerability type, educational level, and economic status. Notably, all households included in the study are active recipients of the government cash transfer program, which provides a monthly stipend of KES 2,000 (approximately USD 15) per household.

Table 1: Respondents' Social-demographic Characteristics

		Control		**Intervention**	
Variable	**Category**	**Baseline, n(%)= 115**	**Endline, n(%) = 103**	**Baseline n(%) = 108**	**Endline, n(%) = 104**
Age	**Median (IQR)**	80 (77, 87)	80 (77, 85)	78 (17, 85)	79 (17, 85)
Gender	Female	79 (68.7)	67 (65.0)	67 (62)	65 (62.5)
	Male	36 (31.3)	36 (35.0)	41 (38)	39 (37.5)
Vulnerability Type	OP	92 (80.0)	80 (77.7)	76 (70.4)	72 (69.2)
	OVC	20 (17.4)	20 (19.4)	28 (25.9)	28 (26.9)
	PWD	3 (2.6)	3 (2.9)	4 (3.7)	4 (3.9)
Education level	No formal school	27 (23.5)	22 (21.4)	39 (36.1)	27 (26.0)
	Pre-primary	6 (5.2)	6 (5.8)	15 (13.9)	12 (11.5)

	Primary	69 (60.0)	59 (57.3)	43 (39.8)	52 (50.0)
	Secondary	13 (11.3)	16 (15.5)	10 (9.3)	12 (11.5)
	Mid-level/technical and vocational training (TVET)	0 (0.0)	0 (0.0)	1 (0.9)	1 (1.0)
Source of Income	Casual/day labour	3 (2.6)	8 (7.8)	19 (17.6)	17 (16.3)
	Employed	0 (0.0)	10 (9.7)	1 (0.9)	1 (1.0)
	Housewife	25 (21.7)	8 (7.8)	0 (0.0)	2 (1.9)
	Retired	14 (12.2)	14 (13.6)	38 (35.2)	50 (48.1)
	Self-employed/business	68 (59.2)	58 (56.3)	48 (44.4)	34 (32.7)
	Unemployed	5 (4.3)	5 (4.8)	2 (1.9)	0 (0.0)
Household Head Monthly Income – Median (IQR)		2,000 (1,500, 3,000)	3,000 (2250,4,000)	4,000 (2,500, 6,000)	5,000 (2,000, 8,000)

Overall, older persons constituted the largest group, accounting for 75.3% of the sample at baseline and 73.4% at endline. The median age of the study sample was 80 years at baseline and 79 years at endline. Orphaned and Vulnerable children and people with disabilities represented 23.2% and 3.4%, respectively. The overall sample was 65.3% female at baseline, with consistent proportions of 68.7% in controls and 62% in the intervention group. This remained largely unchanged at the endline, with female participants comprising 63.7% of the overall study sample. Slightly more than 50% of participants had attained primary education (50.5% at baseline; 54.1% at endline). The primary sources of income for household heads varied, with self-employment the most common (51.4% at baseline, 49.0% at endline). The median monthly income, including funds from the government cash transfer program, was 3,000 KES (IQR: 2,000-4,250) at baseline and 3,500 KES (IQR: 2,000-5,000) at endline.

Households' ability to enhance WASH services accessible for OP and PWD at baseline

Prior to intervention, the study assessed whether households had undertaken any modifications to make WASH services safe and usable facilities for OP and PWD family members. The study investigated the factors that prevented households from modifying their existing WASH facilities to enhance accessibility for these groups.

Table 2: Practices and Modifications to make WASH services accessible to OP and PWD

Variable	**Ability to make WASH services accessible**	**Baseline**	
		Control (n=115)	**Intervention n=108**
	No	16 (13.9%)	43 (39.8%)
Have storage for Drinking Water in the house	Yes	99 (86.1%)	65 (60.2%)
Making water safe/treating drinking water	Always	43 (37.4%)	6 (5.5%)
	Sometimes	57 (49.6%)	84 (77.8%)

	Never	15 (13.0%)	18 (16.7%)
Toilets modifications before intervention		**n=95**	**n=80**
	No	88 (92.6%)	70 (87.5%)
	Yes	7 (7.4%)	10 (12.5%)
Reasons why households are unable to make modifications (multiple responses were allowed)	Lack of knowledge/to make modifications	52 (48.2%)	32 (43.2%)
	Lack of required materials	31 (28.7%)	36 (48.7%)
	No funds to pay the *fundi* (artisan)	25 (23.1%)	6 (8.1%)
Handwashing modifications	No	94 (98.9%)	74 (92.5%)
	Yes	1 (1.1%)	6 (7.5%)
Reasons why households are unable to make modifications (multiple responses allowed)	Lack of knowledge/ how to make modifications	58 (61.1%)	51 (44.4%)
	Lack of required materials	33 (34.7%)	55 (47.8%)
	No funds to pay the *fundi* (artisan)	4 (4.2%)	9 (7.8%)
Bathing facility modifications	No	80 (84.2%)	70 (87.5%)
	Yes	15 (15.8%)	10 (12.5%)
Reasons why households are unable to make modifications (multiple responses allowed)	Lack of knowledge/ how to make modifications s	53 (54.7%)	28 (37.8%)
	Lack of required materials	33 (34.0%)	28 (37.8%)
	No funds to pay the *fundi* (artisan)	11 (11.3%)	18 (24.4%)

While most households reported having storage facilities for drinking water, the actual practice of household water treatment varied significantly between groups. Only 5.5% of those in the intervention group consistently treated their drinking water, compared with a notably higher 37% in the control group.

Only 7.4% in the control group and 12.5% in the intervention group had made toilet modifications to make them accessible to OP and PWD. Lack of knowledge (the how-to) was cited as the main reason by 48.2% of households in the control group and 43.2% in the intervention group. Additionally, 28.7% of control-group households and 47.8% of intervention-group households reported a lack of required materials for modification as a constraint.

At baseline, only 1.1% of participants in the control group and 7.5% in the intervention group had made accessibility modifications to handwashing facilities. Similar to the pattern observed for toilet modifications, lack of knowledge, reported by 61.1% of control households and 44.4% of those in the intervention group, was the most significant barrier to making handwashing facilities accessible to OP and PWD. Challenges obtaining the necessary materials for modification were reported by the intervention group (47.8%) and the control group (34.7%). Although relatively low, the challenge of insufficient funds to pay fundis (artisans) was reported by slightly more respondents in the intervention group (7.8%) than in the control group (4.2%).

When it came to making bathing facilities more accessible, the trends were similar to those for toilet and handwashing modifications: 15.7% of households in the control group and 12.5% in the intervention group had made some modifications to their bathing facilities. For households that made no changes, lack of knowledge was the primary barrier for 54.7% of the control group and 37.8% of the intervention group. A lack of necessary materials was also a common barrier, with nearly the same number of households in both groups citing it (34% in the control group and 37.8% in the intervention group). One notable difference, though, was the number of people who said they could not afford to pay fundis (artisans). This was higher in the intervention group (24.4%) than in the control group (11.3%).

Households' WASH Expenditure Rankings at baseline

At baseline, the study assessed household expenditure priorities across 8 spending categories (food, WASH services/improvements, clothing, medication, bedding, mobility devices, school fees, housing improvements). The study sought to determine how WASH services and supplies were ranked in typical household budgets, as illustrated in Figure 1.

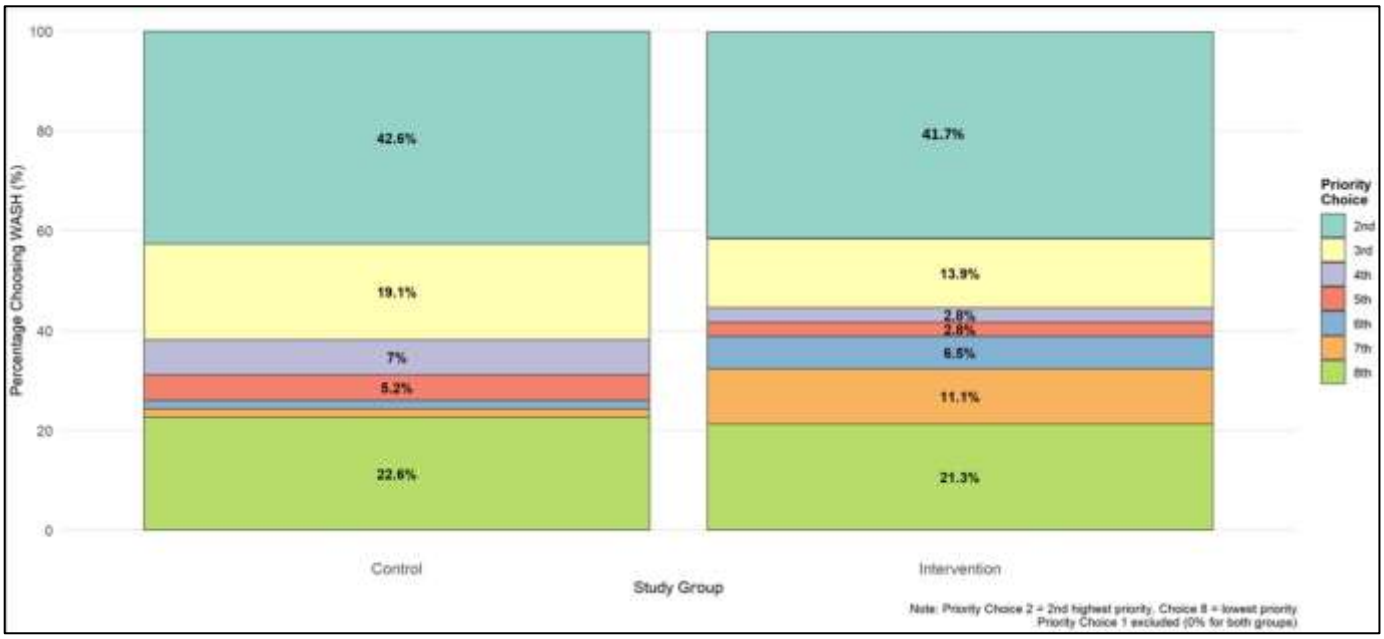

Figure 1: Households' WASH-related spending rankings at baseline

At baseline, before intervention implementation, the study households exhibited similar preference patterns in WASH spending priorities. No participants ranked WASH as their first priority choice. However, a substantial proportion of families in both groups identified WASH as their second priority: 42.6% in the control group and 41.7% in the intervention group. At the lower end, a considerable segment of families assigned WASH the lowest priority ranking (8th choice), with 22.6% of the control group and 21.3% of the intervention group selecting this option. The intermediate priority rankings (3rd through 7th) received minimal but fairly spread selection across both groups.

Effects of Inclusive WASH intervention on service access for vulnerable households

This study evaluated households' ability to improve access to WASH services for OP and PWD by analyzing changes in household practices from baseline to endline. Specifically, the assessment focused on household water storage and treatment practices and the adoption of basic modifications to ensure that toilets, handwashing, and bathing facilities were accessible (usable) for OP and PWD.

Effects of the intervention on household drinking water, storage, and treatment

At the endline, the study evaluated changes in households' practices for making drinking water safe through water treatment and safe storage.

Table 3: Access to Safe drinking water and storage among vulnerable households of OP, PWD, and OVC

Variable	Control		Intervention		p-value
	Baseline	**Endline**	**Baseline**	**Endline**	
	n(%)=115	**n(%)**=103	**n(%)**=108	**n(%)**=104	
Have storage for Drinking Water in the house.					0.001
No	16 (13.9%)	39 (37.9%)	43 (39.8%)	13 (12.5%)	
Yes	99 (86.1%)	64 (62.1%)	65 (60.2%)	91 (87.5%)	
Treating water					0.001
Always	43 (37.4%)	30 (29.1%)	6 (5.6%)	42 (40.4%)	
Never	57 (49.6%)	58 (56.3%)	84 (77.7%)	20 (19.2%)	
Sometimes	15 (13.0%)	15 (14.6%)	18 (16.7%)	42 (40.4%)	
Water treatment method					0.001
Use chlorine	5 (8.6%)	2 (4.4%)	2 (8.3%)	20 (23.8%)	
Boiling the water	25 (43.1%)	21 (46.7%)	7 (29.2%)	53 (63.1%)	
Strain through a cloth	28 (48.3%)	22 (48.9%)	15 (62.5%)	11 (13.1%)	

The intervention group showed improvement, with drinking water storage increasing from 60.2% to 87.5%. Water treatment practices varied across groups. In the intervention group, the percentage of participants consistently treating drinking water increased from 7.4% to 40.4%, whereas those never treating water decreased from 73.1% to 19.2%. Conversely, the control group showed a decline in water treatment, with those always treating water decreasing from 48.7% to 29.1%, and those never treating water increasing from 36.5% to 56.3% (p=0.001). Within the intervention group, boiling was the most common method, increasing from 24.1% to 63.1%, and the use of chlorine bleach also increased from 6.9% to 23.8% (p=0.001).

Effects of the intervention on Sanitation Access for PWD and OP

The study evaluated how inclusive WASH interventions influenced households' adoption of simple modifications to improve the accessibility of toilet facilities for OP and PWD. Table 3 compares baseline and endline data, showing changes in toilet-modification uptake among households and the specific modifications implemented to improve accessibility.

Table 4: Sanitation Facilities Modifications

Variable	Control		Intervention		p-value
	Baseline	**Endline**	**Baseline**	**Endline**	
	n(%)=95	**n(%)**= 82	**n(%)**= 80	**n(%)**= 74	
Modification to the toilet					0.001

No	88 (92.6%)	66 (80.5%)	70 (89.8%)	35 (47.3%)	
Yes	7 (7.4%)	16 (19.5%)	10 (10.2%)	39 (52.7%)	
Type of modifications made on the toilets (*multiple responses allowed)*					0.0001
Improved path	0 (0.0%)	18(75.0%)	2 (18.2%)	40(41.7%)	
Rope or other landmarks for guiding	0 (0.0%)	0 (0.0%)	0 (0%)	4 (4.2%)	
Steps/ramps	1(12.5%)	0 (0.0%)	0 (0%)	6(6.3%)	
Supporting rails	0(0%)	0 (0.0%)	0 (0%)	4(4.2%)	
The facility moved closer to the household	2 (25.0%)	2 (8.3%)	6 (54.5%)	19(19.8%)	
Improved seat/slab	5 (62.5%)	0 (0.0%)	3 (27.3%)	16(16.7%)	
Increased space inside the facility	0 (0.0%)	4(16.7%)	0 (0%)	7(7.1%)	

At baseline, only 7.4% of household toilets in the control group and 10.2% in the intervention group were already modified to enable access for people with mobility challenges. By the endline, the control group experienced a slight increase (from 7.4% to 19.5%) in the proportion of household toilets with accessibility modifications. Conversely, the intervention group showed a much higher rate of improvement, with 52.7% of toilets modified (p=0.001). Modification methods also diversified in the intervention group. These included improving toilet access pathways (41.7%); relocating facilities closer to households (19.8%); improving the toilet seat/slab (16.7%); providing landmark guidance (4.2%); installing steps/ramps (6.3%); and installing supporting rails (4.2%) (p=0.0047).

Effects of the intervention on Access to handwashing facilities among PWD and OP

The study further assessed modifications to handwashing facilities with respect to access to hand hygiene, as shown in Table 5.

Table 5: Handwashing station modifications

Variable	**Control**		**Intervention**		**p-value[2]**
	Baseline	**Endline**	**Baseline**	**Endline**	
	n(%)= 95	**n(%)**= 82	**n(%)**= 80	**n(%)**= 74	
Handwashing facilities modifications by households					0.001
No	94 (99.1%)	67 (81.7%)	74 (92.5%)	40 (54.1%)	

Yes	1 (0.9%)	15 (18.3%)	6 (7.5%)	34 (45.9%)	
Type of modification made.					0.001
Improved path	0 (0%)		0 (0%)	13 (17%)	
Rope or other landmarks for guiding	0 (0%)		0 (0%)	5 (6%)	
Steps/ramps	0 (0%)		0 (0%)	4 (5%)	
Supporting rails	0 (0%)		0 (0%)	4 (5%)	
Facility moved closer to household	1 (100%)	1 (5.6%)	2 (33.3%)	21 (27%)	
Height Adjusted	0 (%)	17 (94.4%)	4 (66.7%)	31 (40%)	

Modifications to handwashing facilities showed a transformative pattern. At baseline, less than 1% of the control group and 7.5% of the intervention group had made modifications. By endline, the control group increased to 18.3% of households with modifications, whereas the intervention group showed greater improvement, reaching 45.9% (p=0.001). For the intervention group, different types of modifications were considered; height adjustment was the most common at 40%, followed by moving the handwashing station closer to the household (27%), improving the access path (17%), steps/ramps (5%), and supporting rails (5%). The p-value for modification types between the two groups was 0.001.

Effects of the intervention on bathing Services Access among PWD and OP

At the endline, the study evaluated changes in the adoption of bathroom modifications to improve the accessibility of bathing facilities for older persons and people with disabilities.

Table 6. Bathing facilities Modifications

Variable	**Control**		**Intervention**		**p-value**
	Baseline	**Endline**	**Baseline**	**Endline**	
	n(%)= 95	**n(%)**= 82	**n(%)**= 80	**n(%)**= 74	
Modifications made to the Bathing facilities					0.0002
No	80 (84.2%)	58 (70.7%)	70 (87.5%)	28 (37.8%)	
Yes	15 (15.8%)	24 (29.3%)	10 (12.5%)	46 (62.2%)	
Type of modifications made					0.0001

Improved path	1 (6.7%)	2 (8.3%)	0 (0.0%)	12 (15.5%)	
Rope or other landmarks for guiding	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (6.4%)	
Steps/ramps	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (5.1%)	
Supporting rails	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (5.1%)	
Facility moved closer to household	0 (0.0%)	0 (0.0%)	1 (10.0%)	11 (14.1%)	
Bathing seat/bench	14 (93.3%)	21 (87.5%)	9 (90.0%)	40 (51.2%)	
Increased space inside the facility	0 (0.0%)	1 (4.2%)	0 (0%)	2 (2.6%)	

Access to bathing facilities improved at endline, with 29.3% of the control group making modifications and a significant 62.2% in the intervention group (p=0.002). In the intervention group, modifications included improving access paths (15.5%), adding guiding landmarks (6.4%), steps or ramps (5.1%), supporting rails (5.1%), relocating facilities closer to households (14.1%), and, most notably, adding a bathing seat or bench (51.2%), p=0.0001.

Effects of the intervention on households' WASH expenditure priorities

Following the intervention, the study evaluated household spending priorities to determine whether the intervention influenced how households ranked WASH investments in their household resource allocations.

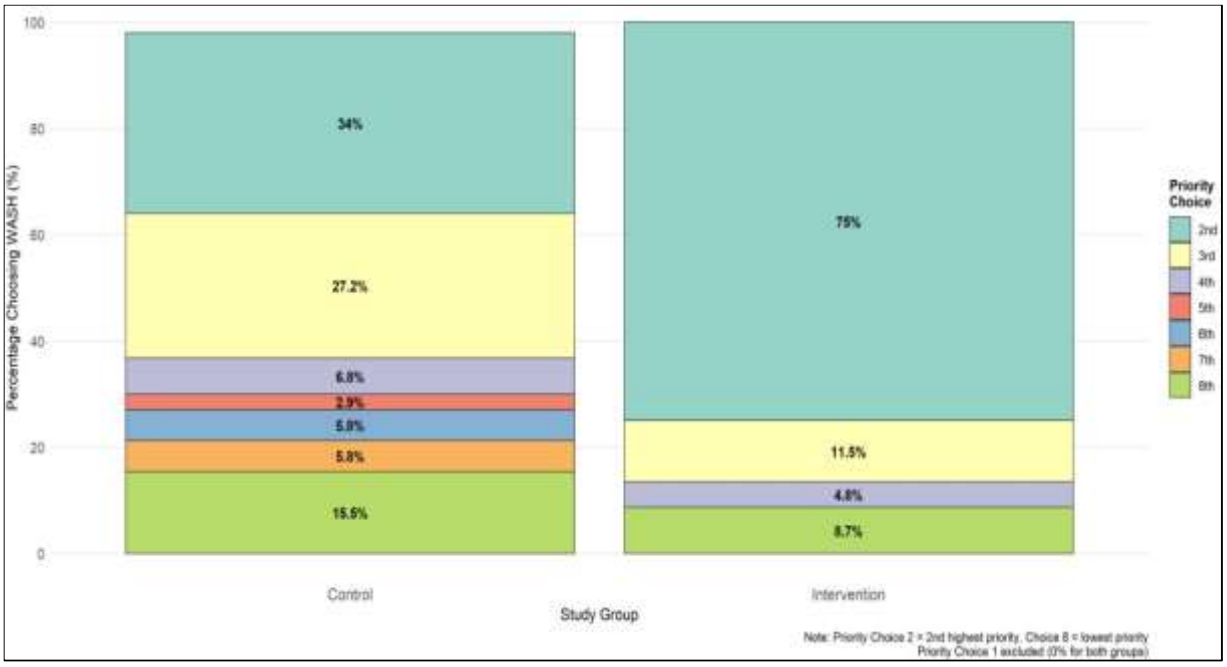

Figure 2: Effects of intervention on Households' WASH-related spending Rankings

Households' spending priorities shifted between the baseline and endline, particularly in the intervention group's focus on WASH services and supplies. The most notable change was in the second-priority choice. In the

intervention group, WASH services and supplies rose from 41.7% at baseline to 75% at endline, nearly doubling in importance. This shift contrasts with the control group, where WASH services remained relatively stable (42.6% to 34.0%).

Inferential statistics

Additional inferential analysis was performed to determine whether associations exist between the intervention, household WASH facility modifications, and spending priorities observed at the endline, while adjusting for age, gender, and vulnerability type.

Table 7: Association Between the Intervention and Modifications to WASH Facilities

	Toilet Adaptations			Handwashing Adaptations			Bathing Adaptations		
Characteristic	**aOR**	**95% CI**	**pvalue**	**aOR**	**95% CI**	**pvalue**	**aOR**	**95% CI**	**p-value**
Group									
Control	—	—		—	—		—	—	
Intervention	5.02	2.67, 9.76	**<0.001**	4.12	2.19, 8.03	**<0.001**	4.61	2.31, 9.57	**0.001**
Age	1.03	1.00, 1.07	0.084	0.98	0.94, 1.02	0.4	1	0.96, 1.05	0.9
Gender									
Female	—	—		—	—		—	—	
Male	1.38	0.71, 2.71	0.3	0.49	0.24, 0.99	**0.05**	0.33	0.14, 0.73	**0.008**
Vulnerability Type									
OP	—	—		—	—		—	—	
OVC	†	†	†	†	†	†	†	†	†
PLWD	5.57	0.55, 65.6	0.15	0.13	0.00, 2.10	0.2	2.67	0.20, 40.9	0.5

The intervention group reported 5-times higher odds of toilet modifications (aOR=5.02, 95% CI: 2.67-9.76, p<0.001), 4 times higher odds of handwashing modifications (aOR=4.12, 95% CI: 2.19-8.03, p<0.001) and 4.6 times higher odds of bathing modifications s (aOR=4.61, 95% CI: 2.31-9.57, p<0.001).

Table 8: Association Between the Intervention and WASH Prioritization by Households

	WASH Priority (Top 3)		
Characteristic	**aOR**	**95% CI**	**p-value**
Group			
Control	—	—	

Intervention	3.18	1.62, 6.51	**0.001**
Age	1	0.96, 1.05	0.8
Gender			
Female	—	—	
Male	2.13	1.00, 4.83	0.058
Vulnerability Type			
OP	—	—	
OVC	0.81	0.03, 21.6	0.9

Households in the intervention group reported 3 times higher odds of ranking WASH-related spending among their top 3 spending priorities (aOR=3.18, 95% CI: 1.62-6.51, p=0.001).

DISCUSSION

Interpretation of Findings

The lack of technical knowledge about modifying WASH facilities, combined with limited access to necessary materials for such modifications, as reported in this study, constitutes a significant institutional barrier to providing accessible WASH facilities for OP and PWD. These findings align with research from Cambodia, which identified inadequate household knowledge as a significant factor behind the lack of accessible WASH facilities (Wilbur et al., 2022). Economic barriers also hinder the modification of toilets and handwashing stations, corroborating results from Ghana that demonstrate the influence of socioeconomic factors on WASH access among OP (Dako-Gyeke et al., 2024).

Notable changes were observed following the implementation of the inclusive intervention. Households in the intervention group demonstrated improved water storage practices and greater adoption of household water treatment methods. Consistent with Geremew & Damtew (2020), who analyzed household water treatment practices across 23 sub-Saharan African countries, boiling remained the primary method for ensuring safe drinking water in both groups of this study. Additionally, household toilet modifications increased after the intervention. These findings align with results from an inclusive CLTS cluster-randomized trial in Malawi, which demonstrated a significant rise in latrine access for household members with disabilities in intervention areas (Biran et al., 2018). The intervention sites also saw a substantial increase in the availability of handwashing facilities. By comparison, Naik et al. (2004) reported that fewer than half of community-dwelling older people had accessibility-adapted bathing facilities. In contrast, this study found a significant increase in such modifications in the intervention group ($p = 0.002$ at endline). While food expenditures remained the primary household expense, as noted in previous research (Ateng' & Odhiambo, 2022), there was a clear rise in the prioritization of WASH-related services and supplies at endline.

Furthermore, the number of modifications to household toilets increased following the intervention. These findings align with those from an inclusive Community-Led Total Sanitation (CLTS) cluster-randomized trial in Malawi, which reported a significant improvement in latrine access for household members with disabilities in intervention areas (Biran et al., 2018). Similarly, this study observed a marked improvement in the number of modifications to bathing facilities in the intervention group at endline. Although food expenditures remained the predominant household expense, as confirmed by other studies (Ateng & Odhiambo, 2022), the share of household expenditures allocated to WASH-related services increased at endline.

Implications of the study

The study demonstrates that combining inclusive WASH interventions with a cash transfer program can significantly improve access to WASH services and shift the spending priorities of vulnerable households. This aligns with other research showing the advantages of cash-plus approaches. For instance, research from Bangladesh found that a cash transfer paired with social and behavior change communication (SBCC) on nutrition led to improved hygiene practices, including latrine use, bathing with soap and water, and regular handwashing (Ahmed et al., 2019). These results also emphasize the value of using a multi-sectoral approach to provide accessible WASH services to hard-to-reach groups.

CONCLUSION AND RECOMMENDATIONS

Summary of Conclusions

Overall, the "cash plus" inclusive WASH intervention notably improved the availability of accessible WASH facilities for OP and PWD and increased WASH investments among households of OP, PWD, and OVC participating in the intervention at the study site. Furthermore, findings from this study demonstrate the effectiveness of a targeted inclusive WASH program combined with a cash assistance program in addressing specific contextual barriers to WASH access. The findings highlight that capacity building in inclusive WASH improves households' ability to adopt safe WASH practices, implement simple modifications to enhance WASH facility usability, and increase their likelihood of investing in WASH services.

Policy and Practice Recommendations

The study highlights two main practices and policy suggestions: to enhance access for vulnerable populations, community-level WASH programs should adopt tailored implementation models that address contextual barriers faced by vulnerable groups, such as older adults and people with disabilities. Additionally, it recommends strategically integrating and layering inclusive WASH interventions with existing social protection programs to reach vulnerable and hard-to-reach groups at the household level effectively.

Recommendations for further study.

The study recommends further assessments of how WASH knowledge and practices of caregivers affect WASH accessibility of WASH services among OP and PWD's. Furthermore, this study recommends that subsequent studies conduct comparative analyses of household WASH investment behaviours across various cash transfer programmes, including both conditional and unconditional models.

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