Assessing Strategies to Promote Equity in Rural Sanitation among Vulnerable Populations: A
Qualitative Case Study of Northern Zambia

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Abstract

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Background: Achieving equitable access to sanitation requires prioritizing the specific needs of vulnerable groups. Despite the progress made to meet target 6.2 of the Sustainable Development Goals (SDGs)—universal sanitation for all—sanitation disparities between urban and rural areas and between non-vulnerable and vulnerable populations are still evident. There are knowledge gaps regarding the adaptation, implementation, and effectiveness of strategies that equitably improve access and use of sanitation facilities in low- and middle-income countries. Considering the relatively slow progress in achieving SDG 6, a greater understanding and documentation of strategies that equitably promote sanitation is needed.

Objectives: This study identified potentially vulnerable groups in Northern Zambia and described rural sanitation strategies that promoted equitable access and use of improved sanitation facilities among vulnerable groups.

Methods: We collected qualitative data to assess rural sanitation strategies—implemented through the Sustainable Sanitation and Hygiene for All (SSH4A) program—that equitably promoted sanitation coverage and use among vulnerable groups. Fifteen key informant interviews and ten focus group discussions were conducted with community members, implementers, and decision-makers. A thematic approach was adopted to analyze the data.

Results: We identified five vulnerable groups— female-headed households, widows, persons with disabilities, the elderly, and orphans—in the study region. Fourteen strategies were identified to have equitably promoted sanitation access and use through: (1) mobilization of community members to provide support to vulnerable groups through the pooling of resources, labor, and non-monetary support; (2) strengthening of local supply capacity by training masons on innovative, inclusive, affordable, and context-appropriate toilet designs; and (3) use of behavior change communication that specifically targets each of the identified vulnerable groups.

Conclusions: Area-wide sanitation approaches such as community-led total sanitation and sanitation marketing were locally adapted to equitably reach vulnerable populations and promote access to sanitation. Future research is required to examine the long-term sustainability of these strategies among vulnerable groups to successfully attain sanitation access for all, eliminate open defecation and ultimately improve health.

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Acronyms

CLTS	Community-Led Total Sanitation
FGDs	Focus Group Discussions
IEC	Information, Education, Communication
KIIs	Key Informant Interviews
LMICs	Low- and Middle-Income Countries
NGOs	Non-Governmental Organizations
NRWSSP	National Rural Water Supply and Sanitation Program
OCSS	Ottawa Charter for Sanitation Stages
OD	Open Defecation
SaFPHHE	Sanitation Focused Participatory Health and Hygiene Education
SDGs	Sustainable Development Goals
SES	Socioeconomic Status
SSH4A	Sustainable Sanitation and Hygiene for All
VIP	Ventilated Improved Pit
WASH	Water, Sanitation, and Hygiene

1. **Introduction**

Despite increasing efforts to achieve the Sustainable Development Goals (SDGs), progress on delivering SDG 6—"ensure availability and sustainable management of water and sanitation for all"— by 2030 has been relatively slow [1, 2]. With only nine years left to meet the SDGs, achieving adequate and equitable sanitation and hygiene for all (SDG target 6.2) will require prioritizing the specific needs of vulnerable groups who may be lagging behind [2-5]. Globally, 1.3 billion people lack access to improved sanitation facilities (defined as a facility that hygienically separates excreta from human contact), with 83% of this population living in rural settings [6]. Out of the 1.3 billion that lack improved sanitation, 673 million people have no access to any form of sanitation facility and practice open defecation [6, 7].

Although access to sanitation has increased since the SDGs declaration in 2015, progress has not always been equitable; rural communities and vulnerable groups are often excluded or benefit minimally from sanitation programs [8-11]. In low- and middle-income countries (LMICs), vulnerable populations—which include persons with disabilities, elderly persons (55 years and older), women, and households with low socioeconomic status (SES) for this study— are disproportionally affected due to disparities in accessing basic sanitation [9, 11-14]. A regional study of South Asia assessed barriers to equitable sanitation among vulnerable groups [15]. Studies have also reported barriers to accessibility of sanitation facilities among persons with disabilities and the elderly [9, 11, 16, 17], and barriers to obtaining labor and financial resources for toilet construction among female-led households and low SES households [18, 19]. Regarding geographical inequalities, disparities in sanitation coverage are greater in rural areas, with 59% of rural households having access to basic sanitation globally, compared to 85% in urban areas [7]. Lack of access to sanitation tends to overlap with poverty and poor health.

Therefore, addressing inequities in sanitation could reduce poverty and improve health outcomes among vulnerable groups in rural settings [20, 21].

Addressing inequities in sanitation coverage remains a challenge, and only a few programs have documented successes in reaching vulnerable populations[22, 23]. Projects that demonstrated equitable sanitation improvements adapted inclusive water, sanitation, and hygiene (WASH) approaches to effectively address sanitation gaps and ensure that vulnerable populations were reached [22, 24, 25]. Inclusive WASH approaches refer to measures that address inequalities among individuals or communities and ensure that everyone advances the sanitation ladder [23-25].

A previous study done in Uganda and Zambia reported equitable improvements in WASH coverage; however, improvements in sanitation access were minimal among vulnerable individuals. The study found reductions in the rates of open defecation (OD) across both countries, but uptake of the accessible technology options—handrails, moveable toilet seats—was low across countries. Multi-dimensional approaches that integrated and adapted behavior change communication, finance, and supply chain activities to the local contexts were used [24]. Another multi-country report documented improved access to sanitation among households with low SES in rural areas following interventions that combined community-led total sanitation (CLTS) with low-cost sanitation marketing strategies [26]. The Sanitation Focused Participatory Health, and Hygiene Education (SaFPHHE) program is a rural sanitation approach explicitly designed to reach the most vulnerable communities in Zimbabwe. The SaFPHHE program incorporated aspects of CLTS, participatory health, and hygiene education with technology-specific hardware, reported improvements in sanitation access and met 64% of its target [27].

Most studies that documented equitable sanitation improvement stepped away from the ineffective traditional CLTS by complementing traditional CLTS activities with other sanitation service delivery factors such as marketing or governance components to improve program effectiveness [28]. Most studies that reported equitable improvements measured equity based on geographical inequalities (rural-urban disparities) [28]. Addressing inequities in sanitation requires intervention designs to consider inequalities that stem from individual status or demographics such as age, gender, income, and disability [29].

The Sanitation and Hygiene for All (SSH4A) approach is an integrated capacity-building model that focuses on demand creation, supply chain strengthening, behavior change communication, and governance [30]. The SSH4A approach has been implemented across 18 countries in sub-Saharan Africa and Asia since its development in 2008 [30]. Studies done in some countries showed equitable and sustained improvement in sanitation coverage. One quantitative study using annual household surveys assessed the SSH4A approach and found equivalent improvement in sanitation coverage between vulnerable and non-vulnerable populations [22]. However, a one-year post-intervention sustainability assessment of the SSH4A approach demonstrated that slippage was more common in low SES households and less common in households with disabled persons [31].

Understanding equitable sanitation approaches and how these approaches reduce inequalities surrounding improved access and use of sanitation facilities is needed to accelerate progress towards achieving the SDGs by 2030 [3, 20]. This study examines rural sanitation strategies that equitably promoted sanitation among vulnerable populations in Zambia and answers the following questions: (1) What strategies were implemented and emphasized to promote equity by supporting sustained improvements in access to rural sanitation across all

groups? (2) What tailored approaches were applied to increase access and use of sanitation facilities among vulnerable populations?

By assessing and describing decisions and activities that promoted equitable coverage and use of sanitation facilities among vulnerable populations in Northern Zambia, we aim to contribute scientific evidence of best practices to support equitable and sustainable rural sanitation service delivery. Drawing on previous research, our findings can be triangulated with the quantitative results published by Apanga et al. (2020) to illustrate these strategies' impact on vulnerable populations comprehensively.

2. Methods

This study was part of a research project that explored the sustainability of SNV's SSH4A program and other rural sanitation approaches [32]. The SSH4A is an integrated capacity-building approach that supports government-led measures to accelerate progress towards area-wide sanitation coverage. SNV's SSH4A combines demand creation, supply chain strengthening, behavior change communication, and WASH governance activities to improve equitable and sustainable access and use of improved sanitation and hygiene [30]. In Zambia, the SSH4A program was anchored on the government's National Rural Water Supply and Sanitation Program (NRWSSP) [33]. Committed to achieving universal access to sanitation by 2030, Zambia's NRWSSP aims to provide sustainable and equitable access to sanitation for its rural population through sanitation and hygiene education, institutional support, and capacity building [34]. A study by Sakas et al., [in progress] described in detail the service delivery modalities of the SSH4A program in Zambia[32]. Our study focuses on equity in rural sanitation, highlighting

the strategies that increased access and use of sanitation facilities among vulnerable groups in Northern Zambia. Table 1 outlines the contextual details of the wards where data was collected.

Table 1. Contextual details of the wards involved in the study

	Kasama		Mporokoso	
	Chiba	**Lua-Luo**	**Chishamwamba**	**Lunte**
Geographical features	Clay soil; Frequent rain and high-water table	Sandy soil; Frequent rain Deforestation	Heavy clay soil; Frequent and heavy rains; Very fertile land	Clay soil; Moderate rain
Rural/Urban	Peri-urban; near a large town		Connected to main towns with relatively new paved roads	Very remote, rural; Bad road network
Livelihood	Jobs in near-by town; Small businesses; Selling in markets		Successful farming compounds; small businesses	Households farming; no source of cash income

2.1. Data Collection

Data were collected from January to February 2020 in the Northern Province of Zambia through key informant interviews (KIIs), focus group discussions (FGDs), and informal discussions. Researchers also visited communities, households, health centers, and sanitation facilities for observations. The study was conducted in four wards in Kasama and Mporokoso Districts, where SNV's SSH4A program had been implemented from 2014 to 2018. Data were collected about one year post SNV intervention. This study employed a purposive sampling strategy to identify participants for both the KIIs and FGDs. The KII participants were recruited based on their involvement as implementers or decision-makers within the local WASH sector. Sub-district health officials facilitated the recruitment of FGD participants who met the sampling criteria—community members over 18 years old and lived in the SSH4A program areas from 2014 to 2018.

Key Informant Interviews

A total of 15 KIIs were held with representatives from the community to the national level involved in the design, implementation, coordination, or support of various components of the SSH4A approach (Table 2). Participants were well informed about the community, either living or working in the study areas, and were knowledgeable about sanitation in these areas. The structured interview guides covered topics including:

1. Identification of vulnerable populations within targeted areas,

2. unique challenges encountered by the vulnerable groups mentioned, and

3. approaches used to address issues related to sanitation access or use among vulnerable groups and those lagging behind.

Interviews were held in private locations, such as offices, to provide a confidential environment. All KIIs were audio-recorded, lasted between 30 and 75 minutes, and were conducted in English with the occasional assistance of a trained research assistant who served as a translator if the participant was more comfortable speaking in Bemba.

Focus Group Discussions

Ten focus group discussions were conducted in five rural villages (two peri-urban, two farmstead communities, and one remote rural) with a total of 98 participants. Participants were separated by gender for the discussions— five FGDs were conducted with women, and five FGDs were conducted with men. Forty participants were aged ≥ 55 years, and 14 participants reported having one or more disabilities (Table 3).

The focus group discussions helped to:

1. Identify vulnerable groups and their unique challenges,

2. Describe the role of community members in promoting equitable sanitation, and

3. Describe sanitation approaches and strategies used within the community and by external organizations to address the sanitation gaps.

All FGDs were audio-recorded, lasted between 90 and 120 minutes, and were conducted in the local language.

Table 2. Summary of key informant interview participants

Unit	Position held	Number of participants
District Government	CLTS Coach; Public Health Officer	2
Sub-district Government	Environmental Health Technician; WASH Coordinator	2
Community level	Community Champions[1]	5
Private sector	Masons trained by SNV	5
Total		**14**

[1]Community champions (CC) are a type of community health volunteer.

Table 3. Demographics of focus group discussion participants

Category of FGD participants	n
Women	56
Men	42
Elderly participants (≥55 years old)	40
Persons with disability	14
Total number of participants	**98**

2.2. Data Management

With permission from participants, the KIIs and FGDs were audio-recorded. Recordings were transcribed verbatim by local research assistants and translated into English. All recordings and transcriptions were password-protected and uploaded to a secure folder. After transcriptions were complete, audio recordings were deleted from recorders and personal computers.

2.3. Data Analysis

We analyzed the qualitative data to explore the impact, equity, and sustainability of the SSH4A approach and other rural sanitation approaches in Northern Zambia [32]. Specific questions in the topic guides related to equity and inclusivity of strategies can be found in Appendix A. The data were analyzed using MAXQDA 2020 (VERBI Software, 2019).

For this study, all FGD data collected were used in the analysis. Select KII transcripts were included based on their relevance to the research objectives for this paper. Sorting and selecting the KII transcripts was guided by using the MAXQDA code matrix browsers from the primary data analysis conducted to assess the impact and sustainability of rural sanitation approaches [32]. The code matrix browser was used to explore KII transcripts that were substantially coded with *equity, vulnerable populations, poverty, and support for vulnerable populations*—codes that were included in the study assessing impact and sustainability [32]. The code matrix was used to ensure that the included transcripts would have sufficient data to answer the research questions proposed for this study.

Data analysis was conducted through inductive and deductive thematic analysis to identify sanitation challenges associated with vulnerable groups, approaches used to address

those challenges, and other factors that promoted equity. Figure 1 summarizes the analysis process.

The codebook was derived from several relevant sanitation and equity frameworks and refined throughout the coding process in MAXQDA. Table 4 provides a summary of the codebook. Vulnerable groups in the codebook initially included households with low SES, persons with disabilities, female-headed households, and the elderly (≥55 years)—deducted from the Apanga et al., (2020) study. Other vulnerable groups (widows and orphans) emerged from the data, and these were added to the codebook. Development of deductive codes was guided by the Ottawa Charter for Sanitation Stages (OCSS) framework [35], the Sanitation for all: a framework for research and practice to improve equity for people with disabilities [16], and the framework for exploring gender equality outcomes from WASH programmes [36].

The OCSS and Sanitation for all frameworks provided the foundational categories, which separated factors by themes: Individual, Culture, Environment, Institutional structure, and Service delivery. The OCSS framework further describes how these categories impact the various stages of sanitation (Acceptance, Construction, Utilization, Maintenance and, Safe disposal) [16, 35]. The framework for exploring gender equality outcomes from WASH programmes has been used in various studies to identify and classify gender equality changes at the household, community, and public level associated with WASH initiatives [37, 38]. The Sanitation for all framework described sanitation challenges specific to persons with disabilities and approaches that improved sanitation.

2.4. Ethical Considerations

The study protocol was reviewed by the Emory University Institutional Review Board (Atlanta, GA, USA # IRB00115838) and exempted from further review and approval. Letters of approval were provided by the Municipal Council and SNV leadership in Zambia. Informed consent was obtained from all study participants before data collection.

Table 4. Summary of codebook used for analysis

Category	Definition	Examples of Codes
Individual factors	Factors related to the influence of individual processes, intra-household dynamics, and decision-making that encompass vulnerable groups	Gender roles, Decision making, Income opportunities, Construction capability (physical and financial), Maintenance responsibility, Intra-household support
Sociocultural factors	Factors related to social and cultural perspectives, and interactions between community members and vulnerable groups	Social norms (attitudes, behaviors and beliefs), Stigma, Ignorance, Religious leadership, Community support
Environmental factors	Factors related to the physical environment (natural or built) and sanitation accessibility for vulnerable groups	Geography (steep slopes), Distance to facility, Privacy, Safety, Toilet design (raised toilet seats, handrails)
Structural factors	Factors related to economic, political, and institutional aspects of sanitation focused on vulnerable groups	Policies, Sector financing, Advocacy to government, Institutional arrangement
Service delivery factors	Factors related to sanitation service delivery from development partners, local government, private sector, and community stakeholders that include considerations of vulnerable groups	Appropriateness of Behavior change communication materials, Household financing mechanism, External Support mechanism (targeted subsidies), Training
Actors	Groups and responsible units that implement the service delivery factor. Associated with service delivery codes.	Local government, Development partners, Private sector, Traditional leaders, Community members
Supply chain factors	Factors related to supply chain processes targeting vulnerable groups	Sanitation marketing, Availability and affordability of toilet design options, Skilled labor

Sanitation stages	Include four stages of sanitation coverage and use	Acceptance, Construction, Utilization, Maintenance
Vulnerable groups	Individuals or groups referred to as being 'vulnerable' with regard to access and/or use of toilets. Associated with all listed factors	Female-headed households, Widows, Individuals with disabilities, Households with low SES, Orphans

The categories and codes were adapted from three frameworks—the OCSS, Sanitation for all framework, and the framework for exploring gender equality outcomes [16, 35, 36]
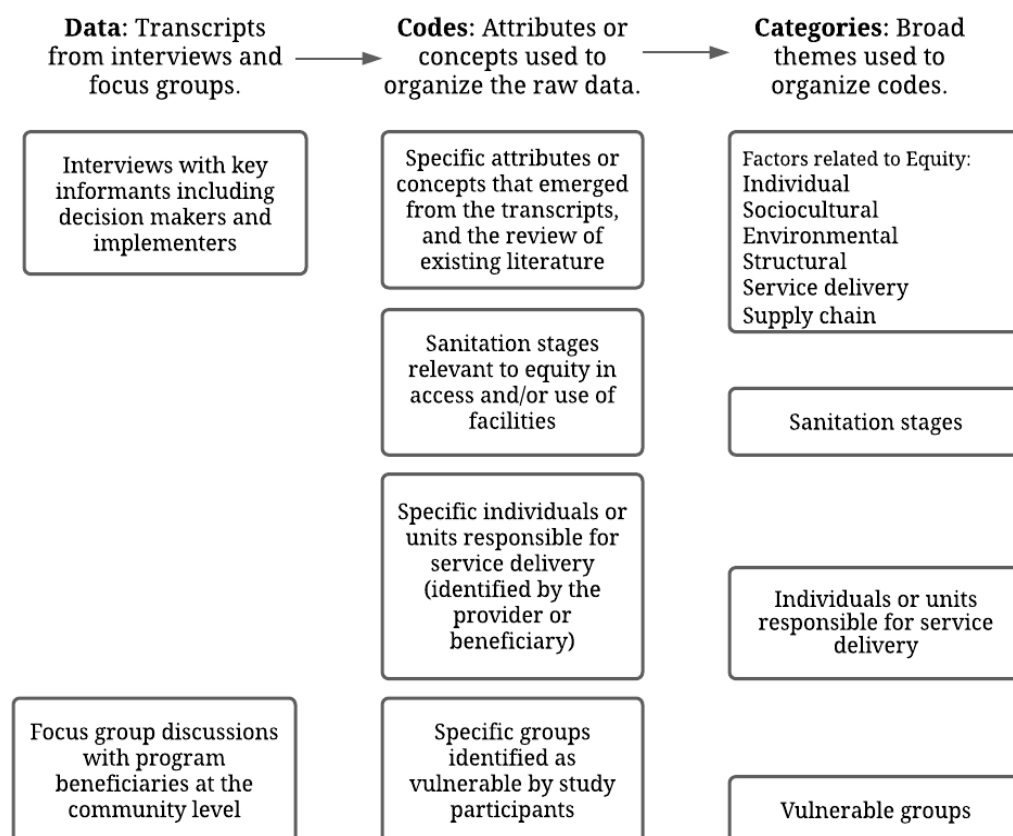
Figure 1. Data analysis process and definitions of key terms for qualitative research. KII and FGD data were read, and codes (listed in the codebook) were applied to segments of text to index the themes present in the data. Adapted from assessing rural sanitation service delivery modalities and adaptations of an integrated, universal approach for sustainable sanitation: A qualitative case study analysis by Sakas et al., (in progress).

3. **Results**

KIIs were conducted with three women (21%) and 11 men (79%) from the community and sub-national levels involved with either implementation or coordination of sanitation activities. FGDs were separated by gender, with a total of 56 women and 42 men. The median age of the FGD participants was 50.5 years (range, 18 to 90 years), and 14 of the 98 FGD participants reported having one or more disabilities. Thematic findings related to equity and inclusivity were categorized by sanitation intervention components —behavior change communication (BCC), supply chain, social mobilization, and community engagement. Categorization of the findings was based on components of the SSH4A framework [10, 39]. Key findings that emerged from our analysis are summarized in Table 5 with a description of strategies and the target groups.

Table 5. Summary of equitable strategies identified from the data

	Strategy	Description	Target groups
Behavior Change Communication	Formative research	Data gathering done before designing BCC intervention to identify current sanitation practices, potentially vulnerable groups, existing challenges, and gaps	Rural households
	Visuals	Visual illustrations and aids used to engage people who had trouble communicating; also used in areas with low literacy levels	Low SES households,
	Tailored and targeted messages	Sensitizing and sharing specific sanitation information to target groups; carried out by trained volunteer groups	Low SES households, Elderly people, Persons with disabilities, Pregnant women, Female-headed households, and Widows
	Appropriate media of communication	Media of communication varied based on communities' context to ensure access to sanitation messages by all. In low SES settings, knowledge sharing was done during community meetings rather than broadcasting through radio stations	Low SES households

	Door-to-door follow-up	Door-to-door follow-up promotion was done to reach all households and ensure no one was left behind; this also addressed geographical challenges	Rural households
Social mobilization and community engagement	Coalition building	The [1]village council and the local health sector worked together to: monitor the sanitation conditions, identify households with challenges, and provide physical and in-kind support for these households.	Low SES households, Elderly people, Persons with disabilities, Female-headed households, and Widows
	Community mobilization	Community champions collaborated with village leaders to develop collective action and mobilize people to help vulnerable groups build latrines	
	Village Savings Group	Households pooled resources together and used these as self-financing mechanisms for latrine construction among households with low SES	
	Support from religious groups and community members	Religious groups engaged and encouraged community members to assist the elderly and persons with disabilities with the construction, repairs, and maintenance of latrines	
Supply chain	Affordable toilet options such as the SAFI latrines	Masons were trained to construct various toilets that were inclusive, innovative, and affordable	Low SES households
	Elevated toilet seats		Elderly people and Persons with disabilities
	Guide ropes		Persons with visual disabilities
	Flexible payment options (in-kind and installments)	Options provided for low SES households include payments by installments or in-kind (such as farm produce)	Low SES households
	Construction of DIY pit latrines from local, low cost or free materials	People were taught and given instructions on how to construct DIY pit latrines from local materials	
	Sanitation marketing groups	Through a market committee called SanMark, funds were raised from the toilet sales and used to construct latrines for persons with disabilities, and widows.	

[1]Village council also known as village development committee, are elected community members responsible for community development initiatives.

3.1.Vulnerable groups

Vulnerable groups identified within the study region by KII and FGD participants included: female-headed households, widows, persons with disabilities (physical, visual, and cognitive impairments), the elderly, and orphans. Several participants reported that individuals within these vulnerable groups had reduced access or use of sanitation facilities. Some reasons for these challenges included the lack of financial and physical ability to: purchase building materials, construct latrines by themselves or employ the services of an artisan. Some had no support system to assist with the construction or maintenance of latrines:

> *"People with physical disabilities, the elderly, and orphans find it more difficult to build new latrines and maintain existing one. They have no one to help them and have no tools to use; some can't manage to do the work even if they tried."*(Woman, Chishamwamba , FGD)

Having access to a toilet did not always equate to utilization in households with vulnerable groups, especially for persons with disabilities (physical and cognitive impairments) and elderly people. Some reasons given by study participants included: immobility, which could be permanent or temporary (resulting from a stroke), with lack of ambulatory assistance to access the latrines; poorly designed toilets such as a toilet with a large utility hole:

> *"The physically challenged and old aged find it challenging to use sanitation facilities because they can't walk or find it difficult to walk. When there is no one to help at home, they cannot move and can't go to the toilet. Children are usually scared to use the toilets*

because of how the toilets are made with large manholes. People who have a stroke also find it difficult to use the toilets." (Man, Chishamwamba, FGD).

"Those with [poorly managed psychosis] might experience challenges when using the latrine, some even refuse to use the latrine. Even the blind may need assistance to use the latrine because they cannot see." (Woman, Chiba, FGD).

According to key informants, challenges faced by vulnerable groups were addressed through the strategies described below. Additionally, some strategies were not targeted to a specific group but were used to ensure everyone benefitted. The sections below describe strategies that promoted equitable access and use of improved sanitation facilities among vulnerable groups in the study region.

3.2. Behavior Change Communication

Study participants talked about the tailored behavior change communication (BCC) messages used by program implementers during sanitation-related training and meetings. The messages varied according to the target group. Volunteer groups trained pregnant women on correct latrine sitting positions because of the adverse pregnancy outcomes in the community, and households with elderly individuals were provided with different information. According to key informants, BCC was adopted because health officials noticed gaps in the relevance and appropriateness of sanitation messages used in communities:

"The challenge then was communication; we were giving information to everyone which some people did not need at that particular time. So, BCC brought in a component of messages tailored to specific groups of people that would make an impact. Specific groups were segmented so that when talking with pregnant women, they get a different message from that used with the elderly. This really worked." (Public Health Officer, Mporokoso, KII).

"The safe motherhood action groups train pregnant women on how to use latrines because some of them experience miscarriages." (Women, Chiba, FGD).

Key informants spoke about how formative research was used to identify sanitation opportunities, gaps, and challenges in communities to ensure that interventions were beneficial and acceptable:

"We start with what is called community diagnosis, during which we go round the community to discuss with the people, we administer questionnaires, and capture data. This is done so that we will be able to identify the problems that they are facing in that area. We also do village inspections to see what sanitation facilities are in existence." (Environmental Health Technician, Chiba, KII).

3.2.1. BCC: Use of visual aids for education and promotional materials

Key informants emphasized the use of visual tools when communicating sanitation messages to people. Sanitation messages were communicated across through in-person meetings because the target population did not have radios or other platforms to access these messages virtually. Community health promoters used brochures and posters to disseminate sanitation messages:

> *"We had to choose the media to use at community level. We could not use radios because most people do not own a radio. So, we engaged promoters who communicated sanitation messages within the community, using brochures, poster etc. depicting pictorial illustrations. And people would ask: what is this? What is this person doing here?"* (Public Health Officer, Mporokoso, KII).

3.3. Supply Chain

3.3.1 Supply Chain: Training of Masons on Innovative and Inclusive technologies

SNV's program included training of local mason on toilet construction. The masons talked about innovative toilet designs they had learned, the durability, and appropriateness for the geographical context. The latrines were durable and of high quality. These latrines had varying costs—ranging from least expensive to most expensive were the Shumba, Safi latrines, and the Ventilated improved pit (VIP) latrines. Apart from constructing these latrines, the masons occasionally improvised materials when building latrines for those who could not afford any of the above-listed latrines. In Lunte and Kasama, masons had developed molds (Figure 2a)

for creating elevated latrine seats (Figure 2b) to aid utilization for people who found it difficult to squat, such as the elderly and persons with lower limb disabilities.

> *"SNV taught us how to build the Safi, VIP (ventilated improved pit) and the Shumba latrines. The Safi latrines do not cost a lot of money and last longer than the ones we used to construct."* (Mason, Kasama, KII).

> *"We inform household that we can make the toilet to be suitable for use by persons with disabilities and the elderly. We raise the manhole using cement, so that it becomes like a stool and people are able to sit and not squat."* (Mason, Lunte, KII).

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Figure 2a. The molds used for fabricating elevated latrine seats for the elderly and persons who experienced difficulty squatting to use the latrines

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Figure 2b. A pit latrine with an elevated seat designed by SNV-trained artisans to aid latrine use by the elderly and persons who experienced difficulty squatting

3.3.3. *Supply Chain: Access to affordable skilled labor*

Households with low socioeconomic status were provided with flexible options to pay for the services of masons. These included payments by installment (which required a down-payment) or in-kind, such as payments with farm produce including livestock and food crops such as chickens and maize. Some households could not afford to use durable materials for the construction of the latrine substructure and superstructure. Instead, materials such as plastics, sackcloth, and wooden logs were used to build the superstructures to provide privacy for the user.

"People pay in kind and also have flexible payment where they give us a down payment and pay in installments. Sometimes, we accept farm produce such as chickens and maize in exchange for our services when the customers do not have money." (Mason, Kasama, KII).

"Sometimes, people only pay for the substructure of the latrine without the superstructure because of the overall cost. Those unable to afford the superstructure use poles and sacks to ensure privacy." (Mason, Kasama, KII).

3.3.3. Supply Chain: Sanitation Marketing (SanMark)

Various toilets, including Safi latrine (a cheap and affordable latrine), were advertised during Sanitation marketing. A sanitation marketing committee called 'SanMark' was created to raise funds to support persons with disabilities and widows who could not afford latrine construction costs. A SanMark committee comprised of 11 people, including artisans and people from the market, religious, and general community groups—who served as representatives within the community

"We created SanMark marketing committee so that we could raise some funds from the sale of toilets and use the proceeds to help those who need help, including the widows and people with disabilities." (Community Champion, Mporokoso, KII).

3.4. Social mobilization and Community engagement

3.4.1 Social mobilization and Community engagement: Religious groups

A religious group, St Vincent de Paul, built latrines with both sub- and super-structures for the elderly and the blind who had no support within their household. Guide ropes were also installed to help the blind easily locate the latrines. The church groups helped construct latrines to prevent sanitation-related diseases among these vulnerable groups.

"As a church, we have groups like St. Vincent de Paul that go round visiting the elderly and those who live by themselves with no help. We build latrines for them and even cover

the structure with a roof. We try to help the elderly to prevent them from getting ill." (Woman, Chiba, FGD).

"We also help the blind the same way we help the elderly, because blind people have a sense of feeling, we put something that when they touch it, they can easily be guided to the latrine without difficulty." (Woman, Chiba, FGD).

3.4.2   *Social mobilization and Community engagement: Community champions and leaders*

According to the study participants, except the support received from religious groups, the community champions—volunteers that conduct village-level triggering and monitoring of sanitation behaviors—village committee, and natural leaders also helped construct latrines for vulnerable individuals who had no other source of support. Wooden logs were provided for construction, and community members were mobilized to provide labor support.

"There were those people who could not afford the cost of building a toilet, so some churches used to take care of them and build toilets for them. Some do not belong to any church, and the village committee knows that they have nowhere to get help. The village committee organizes and builds toilets for such people." (Man, Lunte, FGD).

A community champion reported working with the village headman to mobilize the village committee to provide construction materials and build latrines for the elderly and persons with disabilities who lacked physical and financial strength and had no source of support. Support provided for the elderly included the provision of wooden logs and payment for the services of an artisan. Community members are willing to construct latrines and improve sanitation conditions for vulnerable groups because they understand the process of disease transmission and want to prevent the spread of sanitation-related diseases. The demand creation and BCC activities helped community members understand the health risk associated with open defecation.

> *"Through the village headman, I encouraged the men in the village to dig latrines for an elderly woman, and I supported them with logs and paid the bricklayer for constructing the latrine hole. After this, I encouraged the village headman to mobilize the village committee and support the elderly and those with challenges since they don't have the strength or capacity to build a toilet."* (Community Champion, Chiba, KII).

> *"People in the village are willing to help other households build a latrine because of sensitization in the community. We have talked about the dangers of not having a toilet, so people want to assist those who can't afford to have a toilet."* (Community Champion, Chiba, KII).

Key informants also talked about the village headmen's role in designing innovative facilities to increase access and use. A specific example was the design of water storage containers to address issues of theft and cost—by using soil to mold buckets near the toilets:

"In one of the villages, a headman suggested that the villagers mold a bucket near the toilet using soil and attach a tap, so that they just put water in it, and no one will steal the bucket."(WASH Focal, Kasama, KII).

Health staff from the sub-districts provided specific recommendations on assisting vulnerable groups. Environmental health technicians (EHTs) encouraged community health volunteers to mobilize individuals within their communities to construct latrines for the elderly. To reduce the financial impact on the volunteers, EHTs suggest the use of locally available materials (such as sackcloth and wooden log) to construct the superstructures of latrines:

"We make recommendations to the neighborhood health committees to organize energetic young men in the village that can help the elderly to have a toilet. We inform them that they can also construct the superstructure by using the locally available materials." (Environmental Health Technician, Chiba, KII).

Community members supported one another in the construction of latrines through a village savings group. The village savings groups served as a self-financing mechanism for its members. Members of the village savings group pooled resources to assist members who needed financial support to build improved latrines:

"The loans we get are through savings group where you get some money and payback with interest. The savings group are there, and they help us when we want to improve our latrines." (Man, Chishamwamba, FGD).

3.5.Financial support: Subsidies and Social Cash Transfers

Conversations with community members also highlighted the role of financial support provided by the government and other development partners. Zambia's Ministry of Community Development provided social cash transfers that were used by some households to construct toilets. In addition to the social cash transfer, some development partners may have provided targeted hardware subsidies for toilets in the past or offered discounts to cover a portion of the construction cost for community members, who could not afford the total construction cost.

"Through the Ministry of Community Development, the government helped us with some money under the social cash transfer project. The money was helpful in terms of building latrines." (Woman, Lunte, FGD).

"The government provided Kwaki (social cash transfer) to [persons with disabilities], widows and the elderly." (Community Champion, Chishamwanba, KII).

"There was an organization that was building toilets for people. They would charge K250 [~11 US dollars] for materials such as bricks and cement, but the organization absorbed the larger chunk of the cost." (Man, Lua-Luo, FGD).

4. Discussion

This study identified strategies that promoted equity in access and use of sanitation facilities among vulnerable populations in rural areas of Northern Zambia. Our analysis showed that achieving equitable sanitation among vulnerable groups—including the elderly, female-headed households, widows, and persons with disabilities—requires the combination of tailored and targeted strategies [10, 28, 40]. Strategies included: the use of formative research to identify existing gaps among vulnerable groups and design context-specific interventions to reach all, providing sanitation information in different formats (visual, audio, and demonstrations), promotion of affordable and accessible latrine designs, mobilizing community groups to construct latrines for vulnerable individuals, and other strategies outlined in Table 5. Our findings suggest that the SSH4A program promoted equity in sanitation access and improved accessibility and utilization of sanitation facilities among vulnerable groups through (1) using targeted behavior change communication (2) building local supply capacity by training masons on innovative, inclusive, affordable, and context-appropriate toilet designs and (3) mobilizing community members to provide support to low SES households, the elderly, widows, and persons with disabilities through pooling resources (village savings group), labor and non-monetary support.

Formative research played a key role in promoting equitable access to sanitation information. Formative research informed the development of effective BCC campaigns for vulnerable groups. It ensured that information, education, communication (IEC) materials and other BCC activities were relevant and accessible to all vulnerable groups. Formative research identifies current practices, factors that influence these practices, and sanitation gaps and needs in the community—it is important for designing equitable and relevant BCC campaigns [10, 41,

42]. Through formative research, it was discovered that women were scared of using latrines because toilets in the community frequently collapsed and had led to adverse pregnancy outcomes. Findings from this research led to the development of specific messages that targeted pregnant women. The safe motherhood action group addressed the fear of using latrines, which may reduce one's motivation to re-construct, by educating pregnant women on the importance of constructing good quality latrines and correct latrine sitting positions [43]. Providing information through different activities (community meetings, one-to-one personal communication) and formats (radio, newspaper, visual illustrations) promoted fair access to sanitation information by all [24].

Training masons, within the communities, on the construction of innovative, inclusive, and affordable latrines improved access to equitable latrine designs for vulnerable groups. The construction of extended toilet seats (for the elderly and persons with lower limb disabilities), installing guide ropes (for the blind), and the innovative and affordable SAFI-latrine contributed to the equitable access and use of facilities. Choice of options for low-technology accessible and affordable latrines is important and effective in promoting equitable access and use of sanitation facilities among persons with disabilities, the elderly, pregnant women, and households with low SES [10, 40, 44].

Sanitation marketing (SanMark) was another strategy that promoted equity in accessing sanitation facilities among low SES households. Through toilet construction sales, the SanMark committee raised funds to construct latrines for households with low SES who could not afford to build latrines. SanMark helps sanitation markets to operate more effectively to serve low SES households through leveraging and building private sector investment and capacity to produce and distribute a broader range of improved sanitation products [45]. The village savings group

was another mechanism that may have supported equitable access to sanitation among households with low SES. The village savings group is a form of credit scheme formed by members of local cooperative societies and women's clubs and promotes saving and lending among its members [46]. Although not explicitly associated with sanitation, the savings group served as a village-level financing mechanism for households with low SES to finance toilet building.

External financial supports for low SES households, the elderly, persons with disabilities, and widows may have supported improvements in sanitation access among these groups. However, these financial supports were not part of the SSH4A program activities. The financial supports included social cash transfers and targeted subsidies provided by Zambia's Ministry of Community Development and Social Services and Development partners. Social cash transfers are government-led initiatives that offer social support to vulnerable groups to promote their welfare and livelihood [47]. Some vulnerable households used the social cash transfer funds to build latrines. Although debatable, research suggests that targeted subsidies may effectively address absolute cash poverty barriers but should only be used as a last resort to target the "last majority." Subsidies should also be combined with other sanitation approaches to mitigate its traditional negative effects (lack of ownership and dependency) [41, 48-50]. However, recent movements are going 'beyond financing' and embracing other forms of pro-poor support such as low-cost toilets, community assistance, and support [51, 52].

Strengths and limitations

There were some limitations to this study. First, the primary purpose of the data collection was to analyze service delivery modalities in rural sanitation programs and not

specifically to analyze equity in rural sanitation. However, specific data on equity in sanitation among vulnerable groups were collected. Second, due to the nature of qualitative research, the findings reported here may not be generalizable beyond Northern Zambia without considering local contexts. This study's key strength is its reliance on data from two qualitative data collection methods: KIIs and FGDs. The range of experiences and positions of the participants—some were implementers and some beneficiaries—provided the opportunity to corroborate findings, contributing to the study's validity.

5. Conclusion

This study provides insight into the strategies that may have led to equitable improvements in sanitation coverage among vulnerable groups [22]. Our findings suggest that: (1) mobilizing community members to provide support to low SES households, the elderly, widows, and persons with disabilities through pooling resources (village savings group), labor and non-monetary support, (2) building local supply capacity by training masons on innovative, inclusive, affordable and context-appropriate toilet designs, and (3) using targeted behavior change communication promotes access and use of sanitation facilities among vulnerable groups contributed to the increased access and use of sanitation facilities among vulnerable groups. Employing formative research in combination with population-specific and inclusive strategies supports equitable improvements in sanitation coverage. Interventions need to be designed based on scientific and contextual evidence to improve sanitation access and use among vulnerable populations. Future research is required to examine the long-term sustainability of these strategies that promoted equitable access and use of sanitation facilities to successfully attain sanitation access for all, eliminate open defecation and ultimately improve health.

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APPENDIX A: Key informant interview guides

Questions from topic guides related to equity

Topic Guide for Community Champions and Local Government Stakeholders
What households are lagging behind in [the area where you work]? Who is hard to reach?

Probes for question:
▪ What are specific sub-groups (aka: types of households) that do not show increases in <u>access</u> to sanitation services? Why do you think that is the case?
▪ What are specific sub-groups (aka: types of households) that do not show increases in <u>use</u> of sanitation services, even though they might have access? Why do you think that is the case?
▪ What are some characteristics of households that are lagging behind or hard to reach?
   o What specific challenges do they encounter?
 	
Sub-groups to consider and to categorize while interviewing:
 	
▪ Vulnerable households
   o Female headed // Poorest // Disabled // Elderly
▪ Defiant/stubborn/resistant households
   o Working men
   o Traditional values
   o Refuse to accept education about sanitation // Does not see latrine as a priority
▪ Cultural/social barriers
   o Ethic groups // Religious groups
   o Social norms
   o Limitations related to gender
▪ Geographical/physical barriers
   o Transient populations // Tenants
   o Lack of access to roads // Far from town centers

Do you apply specific approaches for potentially vulnerable households or individuals? What approaches do you apply and why?

Probes for question:
▪ What sub-groups of vulnerable individuals or households do you think need specific, unique approaches to help them <u>access or use</u> sanitation services? Why do you think this?
 	
Have you thought about:
   o Female-headed HHs? What unique needs, challenges will they encounter?
   o Poorest households?
   o Persons with disabilities?
   o The elderly?
 	
▪ What specific approaches, activities, products, or messages have you used to address any of the potentially vulnerable populations? Why have you chosen these?

What is the role of community support and solidarity in the area where you work?
Probes for question: ▪ If a household is struggling to build or maintain their latrine, how would their neighbors react? ▪ What drives community support and solidarity?   o For example: empathy, understanding of communal health benefits, reaching ODF status ▪ What is the role of natural leaders, traditional chiefs, or religious leaders in your community related to sanitation and latrine use?

Topic Guide for Private Sector: Masons
How does your business typically work?
- What do *you* do to help households build/access latrines for defecation?   - What activities required the most effort?   - How do you obtain customers? Do you go to them, or do they come to you?   - Marketing? Advertising? Referrals?   - Once you have a household who wants a latrine, what is the process? What happens next?   - Payment models   - Loans   - Accessing materials
Have there been times where you have needed to innovate, or come up with creative, new solutions, while building or designing a latrine for a household?
- What innovations have you implemented? Why did you find that you needed to innovate? How did you come up with the creative, new design/solution that you implemented?   - Do you design specific latrines for persons with disabilities or the elderly?   - How do you customize latrines to meet a household's specific needs?