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Rural water supply systems in Nepal: Factors affecting equitable access to water

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Abstract

Equity in rural water supply systems has been a major concern of users, policymakers, and practitioners in Nepal. Communities continue to face persistent inequities in access to safe water amid the changing livelihood environment due to migration, the transition to federalism, and entrenched social hierarchies. In this situation, increasing competition for water, a resource that continues to diminish due to natural and anthropogenic causes, has aggravated disparities in access. It is usually the poor and marginalised groups who are disproportionately affected. The long-standing factors hindering equitable access to an adequate water supply amidst the COVID-19 pandemic when water is necessary for handwashing needs a sustainable resolution. Based on the learnings of a three-year research project that aimed to understand the role of gender and power dynamics in the functionality of community water systems, this paper provides insights into collective water management practices and equity amidst the pandemic. Evidence from the study shows deficiencies in community institutions created for inclusive and sustainable management of local water sources. The paper argues that achieving gender and social inclusion in community water management requires going beyond the implementation of prescribed quotas for women and under represented minority groups. Our learnings from the COVID-19 pandemic highlight the importance of equitable access to safe water and emphasise how low-income households are at higher risk of contracting the virus through shared water infrastructures. A household survey, together with a mix of qualitative methods, were the primary sources of data. Based on data from the case study sites—Ward No. 8, Gurans Rural Municipality (RM), Dailekh district and Ward No. 6, Chandranagar Rural Municipality, Sarlahi district—we conclude that changing socio-economic contexts, prevailing social norms and practices, and premature and frequent infrastructure breakdown are barriers to fair and equitable access to water, and that local governments' enhanced authority is a new opportunity.

Keywords: COVID-19, Water management, equity, GESI, WASH, Nepal

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1. Introduction

Article 35.4 under the Constitution of Nepal guarantees the access to clean water and hygiene as a fundamental right of every Nepali citizen. This provision is reinforced by International Covenants such as the Article 14(2) (9h) of the Convention on the Elimination of all Kinds of Discrimination against Women (CEDAW) and Article 24 of the Convention on the Rights of the Child (CRC), both of which endorse the importance of access to clean drinking water supply and sanitation for public health.

Despite substantial progress in water supply coverage, the access to equitable, adequate, and safe water for all remains elusive (WECS, 2011; Sarwar and Mason, 2017). While 99% of the total population now has access to basic sanitation facilities and 88% to basic water supply, this development is geographically uneven (DWSSM, 2021). The coverage of sanitation services in the Terai (Southern plains) districts is 93%, which is six percent below the national coverage (Budhathoki, 2019).

Nepal continues to face multiple challenges in community water supply including water depletion and scarcity of water, ineffective governance, and resistance to gender and social inclusion. These challenges collectively work against attaining equitable access to safe water, and lead to premature breakdown of water supply infrastructures (MoWSS, 2015; DWSSM, 2019). Equitable access to water supply implies a fair share of clean and safe water within reach for everybody in a community. Ensuring equitable access may require concessions or support for the poorest or the most vulnerable members of the community who cannot afford to pay periodic tariffs and other costs.

The Status Report on Water and Sanitation by the Department of Water Supply and Sewerage (2019) indicates that only 28% of the existing rural water supply schemes are fully functional, and 666,718 households (12.12%) are still deprived of a basic supply of drinking water. Basic supply is defined as daily access to 20 litres of treated or untreated water per person within a distance of a 30-minute walk in water-scarce areas (DWSSM, 2019). It has been established that the issue of inequitable access to safe water is not just due to poor functionality or diminishing water availability, but also a result of social and political factors (Sarwar and Mason, 2017).

The Constitution of Nepal 2015 transformed the governance structure from a unitary to a federal democratic republic structure. Under federalism, three tiers of government were established federal, provincial, and local (GoN, 2015). This reform has direct implications on the Water Sanitation and Hygiene (WASH) sector that requires decentralisation of policy and planning, execution, operation, and maintenance of WASH projects. The federal structure has empowered the local governments with new authorities and responsibilities that include formulating policies and laws, creating budgets, and program implementation.

The total national budget of NPR 50.5 arba (USD 377 million) allocated to the WASH sector for the fiscal year 2021/2022 is only 1.4 percent of the GDP, and 2.8 percent of the total budget of federal and provincial governments (WaterAid, 2022). However, amid COVID-19, the allocation of the federal budget to WASH during the fiscal year 2020/21 decreased by 0.83 percent compared to the previous fiscal year, while the allocation for health increased by 31.9% and 5.3 percent

respectively (WaterAid, 2020). Thus, the government prioritised the health sector over WASH during the pandemic although handwashing and hygiene were universally prescribed as the first line of defense against the spread of COVID-19.

The water resource policy addresses the need for social inclusion in community water management, where each member of the community has an equal opportunity to participate and be represented. At least 30% of the Water Sanitation User Group (WSUG) executive members have to be women, and among the elected officers of the executive committee, at least one has to be a woman and one from any disadvantaged communities. This provision, in aggregate, has increased the number of women involved in the management of local water resources and sanitation (Udas and Zwarteveen, 2010; Goodrich et al., 2017). However, in many cases, there is token representation of women in executive committees only to comply with the quota requirements. It is well documented that women usually do not have an equal voice in decision-making in local water systems (Udas, 2014; Haapala et al., 2016; Leder et al., 2017). Women from local elite families, privileged classes, or with political connections often take up the reserved executive positions (Udas, 2014).

The Sustainable Development Goal (SDG) target 6.2 calls for achieving equitable sanitation and hygiene with special attention to the needs of women, girls, and those in vulnerable situations. The bearing of social inclusion and governance in water system functionality is a less researched area, especially in post-federal Nepal (Sarwar and Mason, 2017). The lack of research and evidence at the local WASH sector constrains the local governments from independently formulating new evidence-based inclusive policies or amend existing ones (Mehta and Claudia, 2020; Sadoff and Smith, 2020). This article is based on the learnings of a three-year research project that aimed to understand how gender and social inclusion, WSUG management, and local power dynamics affect water system functionality and access in rural water supply systems. Ward No. 8 of Gurans Rural Municipality (RM) in Dailekh District and Ward No. 6 of Chandranagar RM in Sarlahi District served as case study sites for the research.

Dailekh is in the mid-hills of Nepal, while Sarlahi is located in the Terai, the flat southern plains. The majority of the households in Dailekh are dependent on decentralised local water supply systems that provide piped water to households and are managed by WSUGs. In contrast, groundwater is sourced through hand pumps in Sarlahi, where water quality has been a long-standing issue.

Objective

The objective of this study is to understand how factors affecting equitable access to water intersect with social and institutional dynamics in community-managed rural water supply systems.

2. Methodology

2.1 Research site

This article is based on a three-year (2019-2021) research project funded by Australia Aid and implemented by International Water Management Institute (IWMI)- “A gender perspective to understand and enhance the functionality of water supply systems: Lessons from Nepal” (GP4WSF). Dailekh and Sarlahi districts were selected as study sites since IWMI had a contractual commitment to co-locate the project with the SNV-implemented sister-project “Beyond the Finish Line” funded

through the same program. Ward No. 8 of Gurans RM and Ward No. 6 of Chandranagar RM were selected as the most suitable based on the following criteria: a) existence of multiple WSUGs, b) existence of functional and non-functional water supply systems, c) ethnic diversity, d) migration, e) permission of the local government, and f) accessibility. The geographical differences between the two study sites lend opportunities for insights into distinct water management practices (Raut et al., 2023). Despite these differences, we discovered underlying similarities between them, as some social and economic practices influenced both study sites, resulting in unequal water management practices on occasion.

In Dailekh, communities are dependent on small, decentralised water supply schemes sourced by local springs. Water is piped to homes for multiple water uses including WASH and livelihood, such as homestead farming and livestock rearing. The water supply schemes are managed by democratically elected Water Sanitation User Committees (WSUC), the executive committees of the WSUGs. As the executive body of the user groups, the committees are responsible for operation and maintenance including fixation and collection of tariffs.

Gurans RM was established in the early 2017 when the government restructured the local administrative units. Six village development committees (VDCs)- Khadkawada, Baraha, Seri, Goganpani, Piladi and Lalikanda- were merged to form Gurans RM. The rural municipality is further divided into eight wards.

As per the 2019 baseline survey of Gurans, Ward No. 8 has 427 households and a population of 2400 (Gurans Rural Municipality, 2019). The population is ethnically diverse comprising 62% Brahman and Chettri, 25% members of historically disadvantaged groups including Bishwokarma, Nepali, Kami and Sunar, and 13% indigenous groups (Raut et al., 2023). Although agriculture is the main occupation of the population, only four households produce enough food to sustain their families throughout the year, with 339 households producing enough for six months and 84 households only up to three months (Gurans Rural Municipality, 2019).

Similarly, Chandranagar was established by merging four VDCs- Chandranagar, Mohanpur, Babargunj, and Kisanpur. All the households in Chandranagar, by contrast, are dependent on groundwater, supplied by own or shared hand pumps. The ward has 893 households and a population of 5,445. Out of the total households, only four speak Nepali and five speak Tharu languages, and the rest speak Maithali. Among the 30 different ethnic groups that live in the ward, Kuswara and Teli are dominant in number. Agriculture is the main source of livelihood, followed by wage labor work. Only 106 households produce enough food to sustain the family year-round, while 581 have no production of their own, 191 can only sustain for three months or less, and 85 households for six months to a year.

Where access to water is concerned, Ward No. 6 of Chandranagar has one river, 513 private hand pumps or taps, 223 shared hand pumps, and two community hand pumps, besides the overhead tanks under construction. A WSUG has been formed to manage the construction of the overhead water tank funded by the Rural Water Supply and Sanitation Fund Development Board (RWSSFDB). The tank is designed to supply all the households of Ward No. 6 with safe drinking water.

The WSUG was formed through a community meeting where all the potential members were

invited to participate. An executive committee (WSUC) was formed through an election. While the required quota for women and minorities in the WSUC was fulfilled, issues related to representation and access were noted which are discussed in the Group Governance section.

In Dailekh, only two out of the seven WSUCs were functioning. In supply systems with dysfunctional WSUGs, members somehow managed on an ad hoc basis. When a technical breakdown occurred, users got together and found a solution that kept the water flowing. However, in situations where WSUCs are not functioning, it was challenging to maintain the objective of inclusive and representative management of water supply system. It is debatable whether practices were inclusive even in WSUGs that managed a working water supply system as an operational water system does not always mean fair management practices. In both the study sites, the WSUCs and the local governments were working independently, without coordination, collaboration or mutual support.

2.2 Methods

This study follows a mixed-method approach based on both qualitative data and a quantitative household survey. Qualitative data collection tools such as Participatory Rural Appraisal (PRA), Key Informant Interviews (KII), and Focus Group Discussions (FGD) were used to collect data in late 2019 and early 2020 in both the study sites. Phone interviews were conducted around mid-2020 to supplement the previously collected data with information on COVID-19. In addition, insights from eight participatory community videos (available on YouTube) and radio dialogues were utilized as additional sources of data.

In Dailekh, we engaged with members of seven WSUGs irrespective of their functional status. Among these, four FGDS were organized with participants from mixed ethnicities while one exclusively focused on individuals from a Dalit community. The objective of the latter was to gain a deeper understanding of the water-related experiences specific to Dalit communities. The participants of qualitative data collection included members and representatives from WSUGs, local water system repair and maintenance technicians and users (or consumers) of the water supply systems. This was done to ensure data from women and marginalised groups were proportionately included. An institutional analysis was undertaken at the ward office with the participation of the Ward Chairperson, members of the ward committee and other stakeholders including representatives of Civil Society Organisations (CSO).

In Sarlahi, interviews were held with the Chairperson and officers of a WSUC formed to manage the construction of an overhead water tank and distribution lines. Participant exercises including two social mapping sessions and three FGDs were conducted with participants of mixed ethnicities, including members of the Dalit community and the general community. The mapping exercise produced social maps containing visual representations of the village with roads, settlements, shops and markets, schools, government offices, water points and trees or micro forests. The FGDs were conducted based on a question guide that revolved around the access to water and related social and economic issues. A meeting with the representatives and officers of Ward No. 6 focused on the local budget for WASH, the under-construction overhead tank and other issues related to WASH. The participatory exercises in both study sites were facilitated by the authors themselves.

This study draws on a household survey conducted in September/October 2019 in Gurans and Mahabu Rural Municipalities in Dailekh and Chandranagar and Parsa RM in Sarlahi. The survey focused on the functionality of rural water supply systems, access to water supply, community participation in water management, and federalism. The sample population was selected in proportion to the population size of the municipalities and covered a total of 600 households- 241 sample households in Dailekh and 359 households in Sarlahi. A semi-structured questionnaire was first developed in English, then translated into Nepali language and pre-tested with 30 adults (15 women and 15 men) in Kavre district. The data was collected with android-based tablets and analysed through the use of the SPSS computer software. Qualitative data were put through thematic analysis on patterns of water access and distribution, roles of local institutions in water supply management and GESI participation in water supply and use.

2.3 Analytical framework: Factors affecting equitable access to water

This study uses an adaptation of Naila Kabeer's Social Relations Approach (SRA) as its analytical framework because it includes multiple-stakeholder and multiple-factor approach at the community level. Kabeer presents a framework to analyse institutions for gender inclusion recognising that institutions create, recreate, reinforce or break down inequalities in four key institutional realms: state, market, community, and family kinship (March et al., 1999; Aberman et al., 2015). SRA is based on the understanding that gender relations are constituted as relations of power that shape social, economic, and political structures. The approach seeks to understand the social relationships within a certain context and how they affect the distribution of resources, responsibilities, and power between women and men. It asserts that the causes of gender inequality go beyond family and household to the state, national and international community and the marketplace. Aberman et. al. (2020) adapted Kabeer's SRA to examine gender-inclusive governance in self-help groups in rural Kenya. In this study, we borrow concepts from the SRA at the community level and have further modified the model by including relevant internal and external factors affecting local water resource management.

Figure 1 depicts our framework on access to water as influenced by internal and external factors. Internal factors affecting equitable access to water in study sites comprise group governance and personal endowment of each member. Similarly, external factors include institutional aspects determined by governance, policy environment, and the role of CSOs. In addition, we have incorporated COVID-19 as an external factor in relation to access to community water supply.

Nepal has a long history of communities managing local water resources. This was formalised by the Water Resource Act, 1992 requiring the formation of an inclusive user group by each community that wanted to use a common source of water. Since then, community-involvement in the management of local water systems is detailed in related policies, regulations and acts. Moreover, the role of CSOs in water management in Nepal is pivotal as generators of evidence, advocates, and implementers. International organisations such as WaterAid, Oxfam, and SNV carry forward the agenda of sustainable and equitable water access for all. Besides implementing community projects, their advocacy work includes policy development and national budgeting. In Dailekh study site, Rural Village Water Resources Management Project (RVWRMP), Helvetas, SOSEC, and Everest Club are some of the organisations actively involved in development works while *Bagmati Sewa Samaj* in partnership with Oxfam works in Sarlahi.

The functionality of rural water supply systems has been a long-standing concern for the government, development partners and users. As only 28% of the water infrastructure is fully functional, premature breakdown and consequent supply disruption affect households disproportionately (DWSSM, 2019). While local elites and wealthy households find alternate means of water supply, low-income households, comprising mostly of minority ethnic groups, have to resort to carrying water or sharing a single source.

Another factor associated with equitable water access is personal endowment of water users, and how they utilise it to their own advantage. We refer to Agrawal's explanation of personal and household endowment as factors affecting participation in natural resource management (Agrawal, 2001). Personal and household endowments are among a set of conditions proposed by Agrawal (2001) that affect participation (Sultana, 2009). The author emphasises that exclusion of women in water resource management can happen even in participatory institutions with inclusive mechanisms in place. Gendered norms linked with women's involvement in institutional meeting spaces, as well as, assumptions about a woman's role, educational achievement, and general class hierarchy they belong to influence their capacity to shape decisions that benefits them. Even though the factors that influence equitable water access are discussed in separate sections, these factors interact with one another in a way that make water management at the local level complex. These factors, therefore, should not be understood as standalone factors working in isolation, but, rather as a complex web of factors operating together.

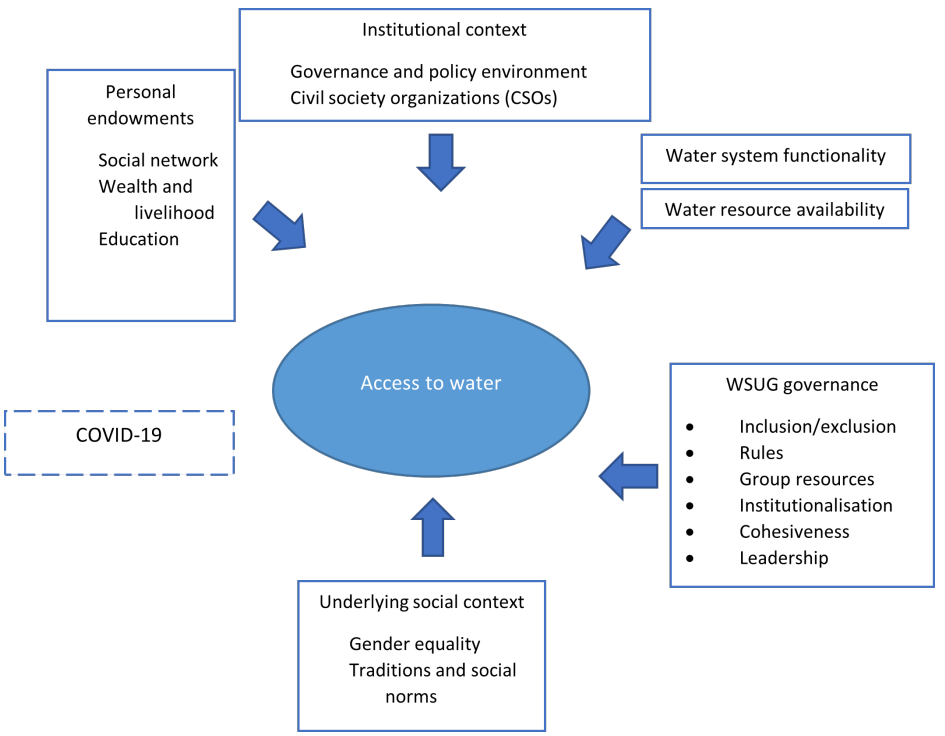

Figure 1. Analytical Framework

(Based on Naila Kabeer's SRA and adapted from (Aberman et al., 2015).)

3. Findings

3.1 Water availability

Due to limited access to water sources and infrastructure, year-round availability of safe and adequate amounts of water can be difficult for rural communities that depend on small streams, springs and hand pumps for their daily water needs. In the Dailekh study site, many water sources were unreliable during the dry months (February-May), while rainwater harvesting was not widely practiced. In Sarlahi, groundwater was available throughout the year, but water discharged by shallow hand pumps was contaminated by high levels of iron and arsenic. Uncontaminated water was available beyond the depth of 200 feet, which required investment that the income of the majority of residents would not allow.

The abundance of water does not always guarantee equitable access, while limited water availability increases competition among water users (Goodrich et al., 2017). Maldistribution of water was evident in the study site in Dailekh due to technical and economic reasons. Longstanding technical problems led to frequent breakdowns depriving low-income families of their fair share of water. However, economically well-off families were privileged with direct pipelines which ensured adequate amount of water even during the dry months. A local public school teacher from Gurans RM said that water scarcity has resulted in insufficient water for various purposes including drinking and sanitation within homes and school premises. Water users have to queue up at the community tap to get their daily quota of water, but there is no guarantee that they get their full share. She says:

> We go to fetch water from the tap every evening. For my family, we have been allocated a share of 30 liters of water per day, but sometimes we get only 10 or 15. We fill all water containers and even jugs whenever we can as we are unsure about continued supply. If the water is insufficient, we have to go and fetch it from nearby springs.
>
> (Interview with a school teacher from Gurans RM, November 2020)

Likewise, in Sarlahi, access to safe drinking water is largely concerned with the economic capacity of low-income families to install private hand pumps that extend at least 200 feet deep. As a result, they either fetch water from common community hand pumps or use their neighbors' facilities. Often a neighbor's hand pump is not accessible for women who work as day labourers as they return home late and by that time their neighbor's houses are already locked from inside. In such cases, women use water from the communal pond for washing and cleaning.

> I do not have any land to install a hand pump in my house even if someone helps me to pay for it. I work as a full time day labourer, and I am too poor to install a hand pump on my own. My neighbors do not always appreciate outsiders using their hand pumps, especially now due to COVID. In times like this, I use the pond water to clean kitchen utensils and wash clothes. I know the water is unclean but what other option do I have?
>
> (Interview with a woman from Chandrabagar RM, November 2019)

3.2 The functionality of and access to water supply systems

The household survey indicated that the functionality of water systems depends largely on fund

collection, availability of skilled manpower, and management performance of WSUCs. At the time of the survey, 92% of the piped water endpoints were functional, and 88.6% of the hand pumps were also functioning well. The cross-section data of the survey, however, did not incorporate seasonal variations of water discharge. Furthermore, the timing of the survey – September and October – were water-abundant periods since they were months after the monsoon rains.

Regarding maintenance work, the survey revealed that 98.6% of the respondents in Sarlahi who use hand pumps and almost 60% of those using piped water stated that they themselves were responsible for technical maintenance. In Dailekh, qualitative inquiries found that the lack of local skilled maintenance workers often resulted in disruption of the water supply. While water supply development projects have provided training on basic maintenance work to members appointed by WSUCs, most trained technicians end up migrating permanently or for seasonal employment. Consequently, the community is dependent upon technicians from nearby towns for repair work. In addition, according to the survey, users associated the functionality of water supply systems with factors such as lack of funds (72%), unavailability of plumbers/skilled human resources (37%), and substandard construction (34%). The constant breakdown of water supply systems disproportionately affects women and low-income community members as women are primary suppliers and users of domestic water. Furthermore, low-income communities do not have alternate sources of water and often have to depend on unsafe public sources of water such as ponds or other households with better access to water supply.

'Access to water is closely linked to wealth and power.' Chairperson of Ward No. 8, Dailekh district.

Transporting water from the water source to the residence was a year-round challenge for those without functioning pipelines or hand pumps. We observed in Dailekh that water systems depleted during dry months had a direct impact on women, girls, and people with disabilities. In such a case, communal water sources located near the village were being used to fetch water for household consumption. However, due to limited water availability for each household, it was difficult to maintain menstrual hygiene. Women reported walking long distances (more than 45 minutes) to fetch water to meet their minimum needs. Women water users reported their requirements for maintaining menstrual hygiene were never addressed/discussed during WSUC meetings. Ironically, even though women and girls spend the majority of their waking hours tending to the water needs of their households, their own monthly water needs were not a topic of discussion in WSUCs. In both study locations, individuals with disabilities disclosed difficulties accessing sufficient amount of water. Persons with disabilities were neither given priority when collecting water from water points, nor were their additional water needs taken into account. Furthermore, the design of faucets and hand pumps was inaccessible to people with disabilities. One of them said:

> As a person with disabilities, I need more water than others. When I carry a bucket of water home, half gets spilled on the way due to my disabilities. I have to stand in line like others for a long time waiting for my turn to collect water.
>
> (A person with disabilities in Dailekh, Gurans RM, Ward No. 8)

3.3 Institutional context

By institutional context, we refer to local laws and rules, norms and practices, and structures that shape the behavior and interaction of individuals and organisations within a community.

Institutional context includes both formal and informal institutions. While laws, regulations and governance mechanisms represent formal institutions; local norms, practices and traditions are informal. The institutional context plays a critical role in shaping the actions and decisions of community members in the supply and distribution of local water resources. We hereby focus on governance and policy environment, and CSOs as key factors in forming the institutional context.

Nepal's transition to federalism in 2015 emphasizes the active participation of women, children, Dalit, minorities, persons with disabilities, and elderly in social and economic development (Uprety and Lamichhane, 2017). According to the Local Government Operation Act 2017, the local governments municipalities and rural municipalities have a substantial role in the control and regulation of safe water as part of basic health and sanitation responsibilities. The local governments are authorised to formulate local drinking water policies and laws encompassing management of water services, including costing and tariff rates. Furthermore, municipalities will also have a major role in developing and implementing local-level drinking water plans such as the Water Use Master Plan (WUMP) (Uprety and Lamichhane, 2017).

The National Water and Sanitation Sector Policy 2014, Article 4.2 recognizes the poor and marginalised sections of our society as disproportionately burdened with payments such as up-front cash, connection fees, water tariff, and voluntary labour (GoN, 2014). Furthermore, the National Sanitation and Hygiene Master Plan 2011 gives special consideration to "ultra-poor and disadvantaged groups" in their access to hygiene and sanitation (GoN, 2011).

The Water Resources Act, 1992 institutionalised WSUG as an autonomous and corporate body with the responsibility of post-construction management of water supply infrastructure (GoN, 1992). The policy further states that the ownership of all water sources is vested in the state but are available to communities for collective use. This legal recognition facilitated community groups to utilise common water sources through an institutional process (GoN, 1998). Alongside this, from the international context, the United Nations Sustainable Development Goal (SDG) target 6.2 aims to support and strengthen the participation of communities in improving water and sanitation management.

According to Nepal's 15th National Plan 2019/20-2023/24, the WASH goals and priorities are in line with the SDG goals and targets (GoN, 2020). The plan highlights the depletion of water sources due to natural and human-induced causes as one of the key issues of the WASH sector. Other key challenges include protecting and conserving water sources, making WASH infrastructures climate change adaptive and enhancing capabilities of all three tiers of government for the systematic development of drinking water and sanitation sector as per the changed institutional structure.

Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (SDP) 2016-2030 acknowledges that the lack of institutional, technical, and financial capacity of WSUGs and funding issues contribute to the poor functionality of water supply systems. The Plan document also highlights the tendency to allocate resources to new projects while neglecting to allocate adequate funds for the maintenance of existing infrastructure.

Similarly, to ensure gender equality and social inclusion, WSUGs elect women in at least one-third of their executive positions and ensure proportionate representation of disadvantaged groups

in the committees. Furthermore, women are elected in at least one of the executive positions (President, Vice-President, Secretary, and Treasurer).

Under the federal system, the municipalities manage the registration of WSUGs. Out of the estimated 42,000 WSUGs in the country, only 16,400, which is less than half of the total WSUGs have been duly registered (DWSSM, 2019). Among those registered, many WSUGs face consistent challenges: only 39% have employed or involved technicians and even less, 34.5%, have adequate tools and spare parts for maintenance furthermore, only 5.7 percent have created a maintenance fund (ibid.).

The local government in both the study sites were working in their new role under the federal system at the time of data collection. The governments were starting to work towards addressing water challenges and needs faced by the communities (IWMI, 2021). The local governments, while adjusting to roles and responsibilities, were confronted with multiple long-standing challenges which could be perceived as overwhelming to solve on their own. Some of the important actions included repair and maintenance of existing water infrastructures and supply of safe water by constructing overhead water tanks in Sarlahi and providing filtered water to Persons living with disabilities (PWDs) in Dailekh. There was evidence that the need for capacity development of WSUCs was well recognized by the local leaders. At the same time, they also understood that they alone will not be able to achieve equity in water access. This required coordination among local government and WSUC and support from other levels of governments and agencies (IWMI, 2020).

Overall, the policies and plans within the institutional context aim to ensure everyone has access to safe and affordable water. Some policies specifically target vulnerable populations such as marginalised communities. The effectiveness of these policies, however, depends on many factors including the political will of the government, availability of resources, capacity of actors, and engagement of the CSOs.

3.4 CSO engagement

CSOs have an important role in establishing and driving the development agenda of the water sector. Previously, all local-level programs were overseen by the District Drinking Water and Sanitation Division Office (DDWSDO). The shift to federalism has opened avenues for CSOs to engage directly with local governments. This change is significant as resources can now flow more efficiently to community-level interventions.

In both the study sites, the involvement of donor organizations and CSOs in planning, designing, and financing local water infrastructure was evident. In Dailekh, international financial institutions and development partners such as the Asian Development Bank (ADB) and the Government of Finland were involved in supporting the construction of water infrastructure. In Sarlahi, the ongoing overhead tank has been financed by the Rural Water Supply and Sanitation Fund Development Board (RWSSFDB). The involvement of development partners usually goes beyond financial and technical support in construction to setting up WSUGs and handing over of the project to the community for post-construction management.

> Since the engineers who designed the water supply infrastructure did not consult with us about our multiple needs that include livestock and kitchen garden and sanitation, water supply has been deficient

> from the start. The standard per capita water used to design supply systems in urban areas is not adequate for multiple uses of water beyond household in homestead farming and livestock in rural area.
>
> (A resident of Ward No. 8 during focus group discussion)

Given that CSOs are important players in local water interventions, their approaches to participatory water management have evolved over time in the Dailekh study site. The respondents stated that the initial water projects designed and installed decades ago focused on water delivery without adequately incorporating differential water needs of users. In more recent water projects, emphasis was noted on participatory decision making while designing and constructing the water systems. However, the existing disparity in the community makes realising the policy-prescribed participatory approaches used by CSOs challenging. For instance, for some water users, particularly women, time constraint has become a barrier to participate voluntarily in water management, while, for others, economic opportunities render voluntary participation costly. These conditions diminish meaningful engagement of water users in CSO participatory approaches.

The majority of CSO water project time engagement and capital deployment appear to be focused on infrastructure construction. Participatory approaches are used during construction, but the engagement between CSOs and communities ends with the completion and handing over of the project. The capacity of WSUGs to sustainably manage the supply system may not fully develop by this time. The breakdown of water supply systems occurs when water user groups are unable to fully address the issues confronting the technical and operational aspects of the supply system. In Dailekh, water users were handed over the responsibility of managing the water systems with some basic capacity development activities. However, the lack of follow-up has created technical and managerial challenges for user groups in dealing with water system breakdowns and conflict resolution.

3.5 Underlying social context

Social context generally refers to the broader social, cultural, economic and political factors that can have a significant impact on people's behavior or attitude and how they interact with each other. People's perception of and reaction to social issues such as social inequity and discrimination is influenced by the social environment they live in. In this study, we focus on two key factors under social context-gender equity, and, traditions and social norms.

Water-related spaces are firmly embedded in a masculine professional culture across countries (Zwarteveen, 2008), and Nepal is no exception (Udas and Zwarteveen, 2010; Liebrand and Udas, 2017). Men hold power, authority, and knowledge in irrigation organisations. Even within institutions working in water spaces, masculine attributes of character and behavior is considered acceptable for a public servant in the water sector. Udas and Zwarteveen (2010) demonstrated over a decade ago how specific incentives and a masculine professional culture influenced the practices of civil servants at Nepal's Department of Irrigation (DOI). Promotion and performance assessment, for example, were primarily associated with engineering accomplishments and the rate of spending budget while, initiatives towards gender equality in projects were found to be seldom incentivised (Liebrand and Udas, 2017; Shrestha and Clement, 2019). In tandem with masculine institutional culture and water spaces dominated by men, water decisions that favor masculine water practice are continuously constituted and reconstituted.

In Nepal, gender and social norms vary in accordance with geographical locations. Our study sites in the districts of Dailekh and Sarlahi situated in the hilly and Terai regions respectively have some similarities and differences in traditions and social norms. According to the household survey, Nepali and Maithali were the mother tongues of majority respondents of Dailekh and Sarlahi respectively (IWMI, 2020). The average family size was 4.8 in Dailekh while that in Sarlahi was 8.3, implying greater water needs of people in Sarlahi with larger family size. On average, 90% of those defined as the head of household were men, signifying that the traditional patriarchal norms prevailed in both the study sites, which has direct bearing upon gender division of labor in water supply and use.

Consistent with the patriarchal norms, men generally dominated the productive and decision-making realms of the households, while women fulfilled domestic spaces, which typically included housework and reproductive roles. Such unspoken gender expectations have an impact on many aspects of life, including water. This translates to men assuming leadership positions in their families and communities, making the water sector a masculine space within the household and beyond. In Dailekh study site, for example, women were often appointed to serve as the treasurer of WSUGs, as they were perceived to be less likely to misuse the funds. Issues like these are discussed in detail in the group governance section.

3.6 Group governance

Despite a history of inclusive policies in local water resource management, studies consistently find that genuine inclusion and substantive engagement of women and marginalised communities are yet to be fully realised (Agrawal, 2001; Sultana, 2009; Sarwar and Mason, 2017). The quota requirements for women and minority groups in the WSUGs were met in both Dailekh and Sarlahi. However, focus group discussions revealed that while women and minority groups participate in committee meetings, their ideas and views are given little value. Traditional gender norms and male dominance in water spaces also impair women's contributions. They are discouraged from actively voicing their concerns in committees, especially when male members of their immediate or extended family are present. Personal endowment, gender, and societal standards all have a role in either enhancing or impeding genuine and substantive participation.

Qualitative inquiries in Dailekh showed that group governance is interlinked with personal endowment of members. For instance, the lack of time of women WSUC members to organise or participate in formal committee meetings limits their ability to influence decisions. 'As a woman, it is often difficult for me to attend these committee meetings because I am involved in several committees while having to carry out day-to-day domestic and agricultural responsibilities.' (Interview with a woman from a migrant family, November 2019)

Sometimes it was noted that ad hoc and informal discussions among key members of the WSUCs replace formal meetings. This, in turn, affects timely information dissemination about organising meetings, system repair and maintenance, and tariff collection. Committee meeting decisions and general information do not reach all the committee members on time. In Sarlahi, water user committees of the overhead drinking water project were unable to organise any formal meetings since April 2020 due to COVID 19, delaying the construction of the infrastructure. The project already faces equity issues for not meeting water needs of Dalit and low-income communities as

they could not afford the initial construction fee charged to all potential users of water supplied by the overhead tank project.

Underlying social context and intersectionality together with factors such as gender, class, caste, and disability play an important role in who accesses water and how. The mere presence of women or members of minority groups may not necessarily represent the concerns of their own group in WSUGs. For instance, in Sarlahi, the Dalit community representative in the overhead tank WSUC was a man from the wealthiest Dalit family with a political background who had previously worked at NGOs, and is one of the few educated members of the community. During a focus group discussion, many Dalit participants raised complaints against him and drove him away from the meeting.

The WSUC members come with different abilities, expectations, and interests. The difference of interest between the two genders is evident in the committees as well. Women, despite being aware about the issues they face regarding access to water, are usually unable to either express their concerns or able to express but unable to influence the decisions that affect them. FGDs in both the sites confirm that women members of the committees are mostly "guided" by more influential members of the committee itself, or their immediate family members. For some women members, the line between active participation and attendance is blurry and difficult to define. A woman from the Sarlahi Overhead Drinking Water Project Committee says:

> I attend committee meetings, but I am not able to fully express myself with my ideas and opinions. I am confident to speak with community members in everyday life, but when formal meetings take place in presence of more educated people than me or senior members of my community and extended family, I am hesitant to speak up.

(Interview with a woman member from the Overhead Water Tank Committee, December 2019).

The overall performance of WSUG at the national level is mixed, with many functioning very well while others fail to provide basic services (Singh et al., 2020). For instance, in the Dailekh study site, only two out of the seven user committees were working well. While this may not be a representative of other areas of the district, qualitative data suggests several challenges associated with the functioning of user committees we noted that many consider tariff collection as a challenge. Difficulty in tariff collection leads to a vicious circle of fund insufficiency, resulting in premature breakdown, eventually demotivating users from tariff payment. In addition, many are hesitant to be involved in WSUCs now due to the voluntary nature of the work and high opportunity cost of their time. Consequently, when WSUGs do not provide the expected water supply, members seek alternatives, such as gaining access to water sources via private connections if they can afford them. This also means not everyone has the need to rely on the services offered by WSUCs and they can choose to opt out of these institutions by monopolising water sources and excluding others from use.

3.7 Personal endowment

The term personal endowment refers to a person's innate talents, skills and abilities, educational attainment, along with assets, financial resources, and social and political network. Agrawal (2001) posits that personal endowment is derived from factors such as educational status, economic

status, marital status, and age. In both our study sites, it was evident that personal endowment of diverse community members as individuals affected their own and other's access to water. In Dailekh, resourceful families who could afford to install private water connections were more privileged than others in terms of water access. The installations of private lines were justified citing the unreliability of the common water supply systems or cases of vandalism where upstream households cut water pipelines during dry months depriving downstream households.

While the legality of such private connections is questionable, individuals or groups of households have been investing as much as NPR 1,00,000 (USD 800) in constructing direct pipelines. Such investment is difficult for the majority, especially in a ward where only four households out of 427 grow enough agricultural products to feed their own family for more than six months (Gurans Rural Municipality, 2019). Some resource-poor family members have expressed concerns over such exclusive use of common water sources. For example, a woman from a low-income household said that private connections are often made by families with power and connection.

'I had to withdraw from using a water source after a village elite removed me from continued access.' (Interview with a woman from a migrant household, November 2019).

In Sarlahi, different social and economic characteristics determine access to benefits from the shared overhead water project. The WSUGs are fully responsible for the operation and maintenance of the water supply system without financial and material assistance after handover. This requires the WSUCs to collect adequate funds from the users primarily through monthly tariff and fines in addition to the initial up-front payment of NPR 1,100 (USD 8.45) which many Dalit families found to be prohibitively high for their level of income. Furthermore, low-income and landless families often lack land to install their own hand pumps or taps. Although the project has the provision of constructing shared water taps for low-income groups, community members were concerned that the limited number of shared taps would not fulfill their water needs adequately.

Hand pumps that extract safe drinking water from a depth of 200 feet or more require a relatively large investment, which is beyond the reach of the average resident. Limited financial capacity, social and political links, and valuable assets compel most households to either utilise water from regular hand pumps or put their health at risk. During COVID- 19 pandemic, respondents were worried that sharing hand pumps between individuals of different families carried the risk of spreading the corona virus. A 38-year-old woman said: 'We are aware that the water pump handle can spread COVID-19, but we have to take the risk as we do not have any other option of collecting water.' (Phone interview conducted in 2020)

4. Conclusion

This study highlights some critical issues associated with equitable access to local water resources. We focus on interconnected internal and external factors affecting the outcome of the current community-based model of managing rural water supply systems. The evidences suggest that for many people living in our case study sites, access to water is still inequitable and exclusionary. Local gender and social norms, personal endowments and availability of water continue to play crucial role in the management of rural water supply systems, affecting access to adequate and safe water for women, members of minority groups, and economically disadvantaged families.

The findings of this study indicate that the quota allocated for women and the marginalised communities in the composition of WSUCs does not ensure genuine and substantive inclusion. In reality, these committees are led by one or a few resourceful members of the community. In both Dailekh and Sarlahi, the WSUCs were mostly led by wealthy community members with strong social networks. Although women hold key positions in such committees, they often lack the space and voice in decision-making processes due to underlying social norms and behavior. In fact, it is wrong to assume that simply placing quotas for women and minorities in WSUGs executive committee is enough to maintain diversity in representation. Continued monitoring and support from the WSUGs is required to achieve inclusive local water management, as envisioned in the Water Resources Act, 1992.

Poor functionality of local water infrastructure results from both social issues as well as technical shortcomings. While voluntary labor for development and maintenance is now difficult to obtain, substandard construction and lack of skilled technicians within the ward result in long and frequent breakdown of infrastructures.

A complex web of social, economic and technical factors that are both internal and external to the community affect fair access to water for all. The issue is further complicated by variation in water sources and availability among different geographical locations Dailekh and Sarlahi being a case in point. Therefore, a single blanket solution will not be adequate to address such a complex issue; it calls for persistent and flexible approaches that can adapt to location and community-specific challenges.

Amid the existing challenges, opportunities to foster a more inclusive and equitable rural water management exist. Federalism, for example, embodies the potential for better governance given that local government entities are well established in their new roles as they have the authority to influence water resource management. This can be a source of oversight on the functioning of local water-related institutions. In addition, federalism also carries the prospect of invigorating the implementation of existing inclusive policies into practices on the ground.

5. Policy implications

The emphasis on achieving gender and social inclusion through quotas in the WSUCs needs evaluation. The quota reservation does not automatically ensure effective representation due to cultural factors and diversity within women and minority groups. The gender and minority quotas must incorporate an intersectional approach and capacity development for substantive and effective participation and representation. Moreover, compliance to quota requirement in the study sites has come down to just fulfilling a formality. Before delegating communities with the important role of self-managing their water supply systems, decision makers and authorities should identify specific ways to enhance the ability of water user groups to address the complex social dimensions that influence the distribution and accessibility of local water resources. The understanding and experience of decision makers themselves in implementing water projects can be a source of guidance. Instead of relying on existing strategies and approaches that have not worked well, it is time to seek a more practical and realistic approach to gender and social inclusion in community water supply through pilot projects.

At the time of data collection, due to recent transition to the federalism, local governments, as new entities, seemed overwhelmed and lacked local level policies and clear direction. While local government is positioned to play an important role in local water governance, the practice of working in partnership with development actors and CSOs can enhance their financial and technical capacity, especially through technical assistance and matching funds.

The social and financial issues facing the WSUGs are well-established. Without technical and managerial capacity development and budgetary support, WSUGs will continue to struggle in sustainably managing of water supply systems, affecting the equitable distribution of local water supply. Local governments are well positioned and authorised to identify and fulfill the need of capacity development and resources of WSUGs to function well.

The emergence of COVID-19 was an important reminder that WSUGs are not equipped to address external risks such as pandemics. It is urgent for relevant actors to realise this and ensure that mechanisms can be built to enable the WSUC to address these challenges. The experience of COVID-19 in the study sites shows that access to inadequate amounts of safe water can put rural community members at risk of infection through sharing of hand pumps. Future drinking water projects must incorporate measures for epidemics and pandemics in its design.

The effective enforcement of existing policies and laws in some respects can help achieve equitable access to water. Specifically, prohibiting the capture of public water sources by individuals and groups monopolising water sources can increase supply and access to water for others. Due to the close proximity of local government to the local communities (which was a challenge for water project implementing agencies), they can play a significant role in monitoring the use of water sources, water flow, the technical conditions of infrastructures, and regulation of illegal water extraction.

The multiple uses of water in households, homestead farms and livestock among rural communities should be factored in while determining household water needs for new water supply systems.

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