NOVEMBER 2022 - SCIENCE BRIEF
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CATALYSING SANITATION SERVICES THROUGH AN INNOVATIVE COMMUNITY-LED SERVICE MODEL

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World Toilet Day is observed internationally on 19 November each year. The day serves a reminder for the global community to prioritise sanitation and eradicate open defecation ("going in the bushes"). Every day, around 700 children are estimated to pass away due to the lack of clean water, sanitation and proper hygiene (https://www.unicef.org/wash). This Science Brief focuses on an innovative community-led water service which could bring about better sustainability in delivering Water, Sanitation and Hygiene (WASH).

SUMMARY

Community-led water and sanitation services offers numerous benefits, including local participation and involvement in project outcomes and upskilling of local labour. Despite the advantages, this approach has not been used extensively in South Africa. The current approach tends to be top-down, with the community not extensively involved and participating in the service value chain and therefore economic opportunities. Community-led water services can potentially solve numerous challenges, including reducing the waiting periods for minor servicing and Operation and Maintenance (O&M) and extending the technical capacity of a municipality in hard to reach areas. Coupled with innovative hardware that matches user aspirations and the environmental and implementation restrictions, this service model can produce greater sustainability. Through various funding partnerships, we have been able to de-risk the approach and provide evidence for new models for service delivery in rural areas and provide the business case for municipalities to adjust their service provider models.

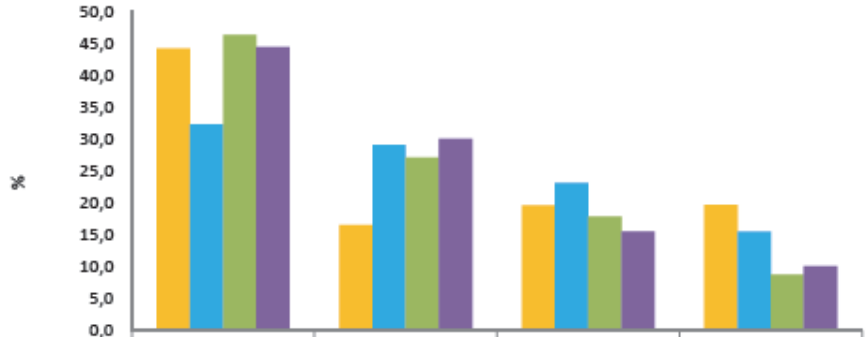
BACKGROUND

Apartheid spatial planning resulted in large parts of the country having inadequate sanitation service infrastructure. In urban centres, we typically have a flush toilet connected to sewer system. Outside the urban sewered network, dry latrine sanitation systems (no water flush) are often used, especially for indigent communities who cannot afford sanitation services. Having access to a hygienic toilet is necessary to prevent waterborne diseases and pollution. Dry latrine options are an affordable technical option for a water-stressed country such as South Africa. However, many communities aspire for flush toilets (Mkhize et al., 2017) in what is known as climbing the sanitation ladder[1] (UNICEF and World Health Organisation, 2017). The higher the rung

[1]The WHO/UNICEF Joint Monitoring Programme (JMP) developed water and sanitation 'ladders' to visualize trends in service levels and to draw attention to a broad range of issues relevant to policymakers, including open defaecation, shared sanitation, and inequalities in service provision (UNICEF and World Health Organisation, 2017)

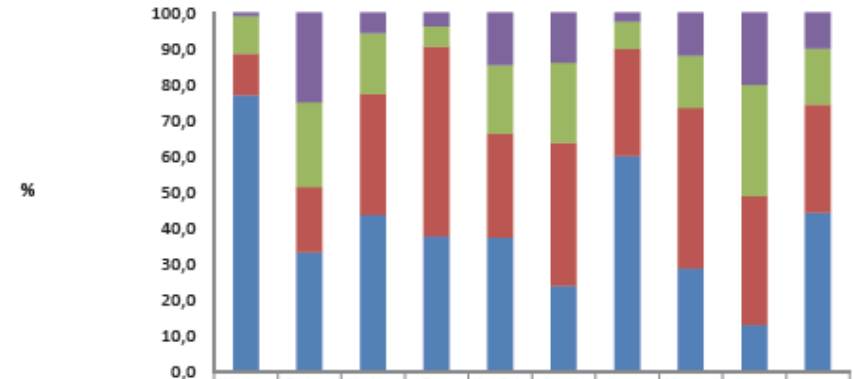
of the ladder, the more expensive the system tends to be. South Africa is unable to provide flush toilets connected to sewers to all citizens. The infrastructure cost alone is billions of Rands, the system incurs high operating costs, affordability is an issue and there is limited water availability. Many users of dry latrines, especially children, have reservations of using these systems due to unfortunate incidents of children falling inside the toilet (Louton, et al., 2015). The lack of innovation in toilets have contributed to this challenge with very little technologies that combines the benefits of both approaches (Bhagwan et al., 2019).

Rural communities in South Africa tend to be challenging to service as shown in the statistics presented in Figure 1. Provinces that have a large rural component, such as the Eastern Cape, KwaZulu-Natal and Limpopo, have the highest population without potable water. While access to appropriate sanitation has increase since 2001, there are still pockets of the population that do have appropriate sanitation (pits without ventilation, buckets and none).



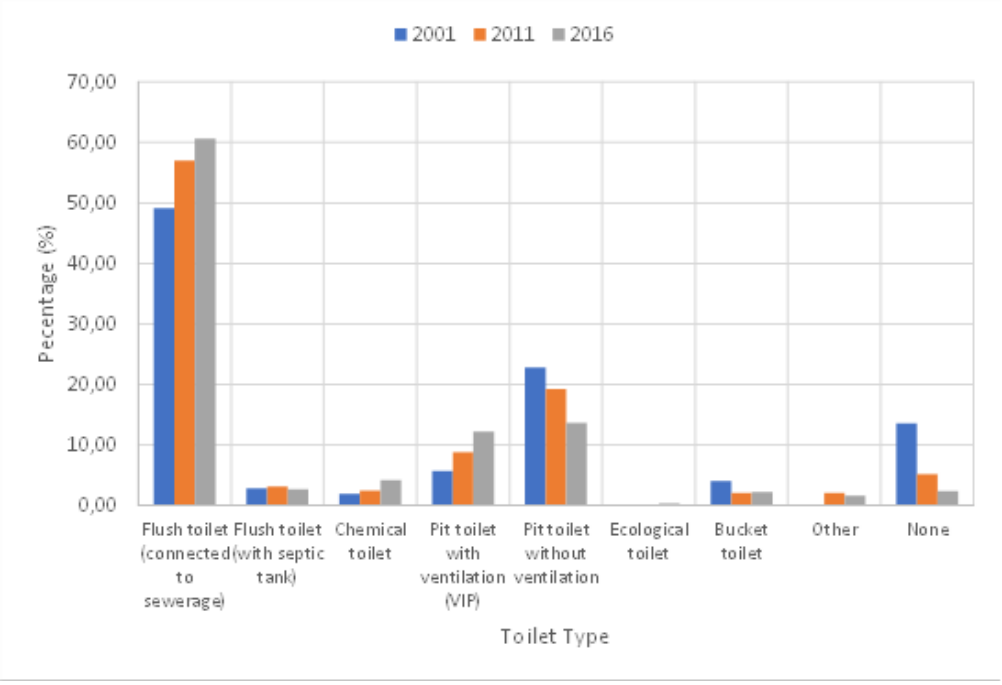
	Inside the dwelling	Inside the yard	Access point outside the yard	No access to piped water
Census 1996	44,2	16,6	19,6	19,7
Census 2001	32,3	29,0	23,2	15,5
Census 2011	46,3	27,1	17,9	8,8
CS 2016	44,4	30,0	15,5	10,1

Access to water from 2011 to 2016



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpumalanga	Limpopo	SA
No access to piped water	1,0	24,9	5,7	3,8	14,6	13,9	2,5	11,9	20,0	10,1
Access point outside the yard	10,4	23,7	17,0	5,7	19,2	22,3	7,7	14,7	31,0	15,5
Inside yard	11,6	18,0	33,5	52,7	28,8	39,8	29,7	44,4	35,8	30,0
Inside dwelling	76,9	33,4	43,7	37,8	37,4	24,0	60,0	29,0	13,1	44,4

Access to water in difference provinces in 2016



Access to sanitation in 2016. Buckets, pits without ventilation and none considered unserved

Figure 1. Water and sanitation statistics in South Africa. Data from Statistics SA (Stats SA) (Stats SA, 2016).

Municipalities with a large rural component struggle with implementing appropriate water and sanitation solutions. The lack of technical capacity for operation and maintenance (O&M) and the many widespread inaccessible areas it technically challenging to provide these services. This leaves municipalities struggling to attend to these challenges as they would like to.

Community-led water services can potentially solve some of the rural challenges, including reducing the waiting periods for minor servicing and O&M and extending the technical capacity of a municipality in hardtoreach areas. Coupled with innovative hardware that matches user aspirations and the environmental and implementation restrictions, this service model can produce greater sustainability. Through various funding partnerships, we have been able to de-risk the approach and provide evidence for new models for service delivery in rural areas and provide the business case for municipalities to adjust their service provider model. While traditional ***Community-Led Total Sanitation*** (CLTS)[2] approaches used elsewhere are not new, this needs to be adapted nationally to include government grants and should be adapted in local context due to differing attitudes to servicing the supply chain of water and sanitation.

THE INNOVATIVE LOW FLUSH TOILET SYSTEM

In 2009, the Water Research Commission (WRC) commissioned a study investigating the feasibility of adapting the Asian pour flush technology to South Africa but with a seat pedestal instead of squat one. A prototype was developed and tested which could be flushed with around 12 litres of water (1 litres with toilet paper as cleansing material; if newspaper is used then a second flush is needed). Following successful controlled prototype testing, the first units were installed in the field in September 2010. A further 20 units were installed in 2011, user responses were positive and the toilets were still in use up until 2019 (Neethling et al., 2019). Based on the research, Envirosan Enviromould, invested in developing a commercial product. Further demonstration-scale installations were carried out using the commercial product with generally positive user experiences across South Africa (Neethling et al., 2019) (Figure 2).

[2]CLTS entails the facilitation of the community's analysis of their sanitation profile, their defaecation practices and the consequences and developing a collective action to become eradicate open defaection (Kar & Chambers, 2008).

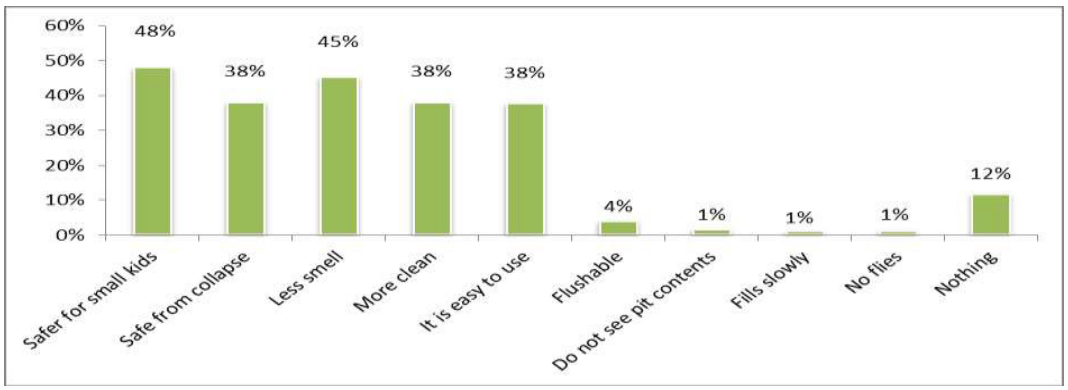


Figure 2. Survey results from users (around 500 users) on what do they like about the toilet (Neethling et al., 2019).

Safe from collapse, less smell and safe to use for small children were the most benefit derived from the technology. By far, the most common improvement cited was refilling the toilet. In its initial iteration, the technology was installed without a cistern as this was a commonly failure point of flushing technologies. A jug of water is used to flush the contents into a leach pit – hence the toilet was known as "Pour Flush"". Water (river, rainwater, greywater) can be collected in a bucket and used to flush. However, subsequent surveys of installations did point out an important finding that while many users appreciate that the use of water for flushing makes the pour flush toilets better than dry latrines, others do not think that the effort is worth the benefits (Neethling et al., 2019). The Envirosan Enviromould commercial product can include a cistern upgrade that uses 2 litres per flush.

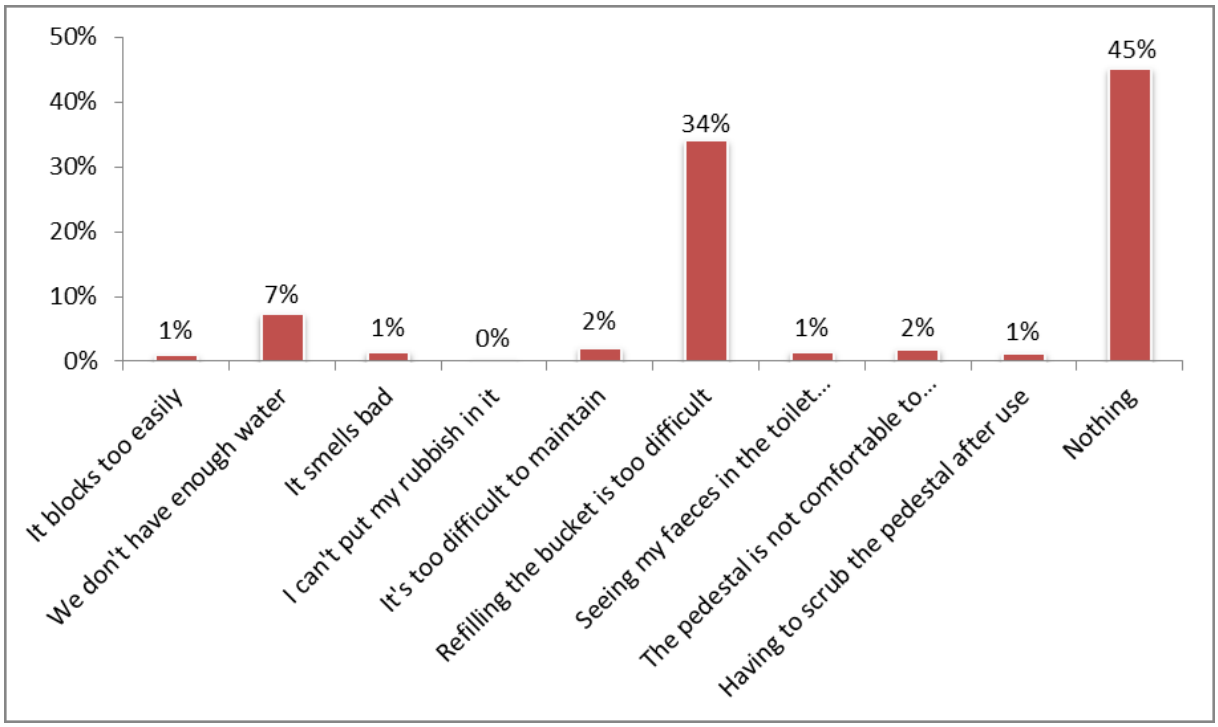


Figure 3. Survey results from users on what do they like about the toilet (Neethling et al., 2019).

WRC/PEPSICO FOUNDATION PROJECT

In 2020, the PepsiCo Foundation and the WRC partnered to implement the innovative toilet solution in Limpopo Province, South Africa. The Limpopo Province was selected as the site due to the lack of installations in that province (Figure 4) and the PepsiCo Foundation wanted to improve the lives of people close to their agricultural supply chain.

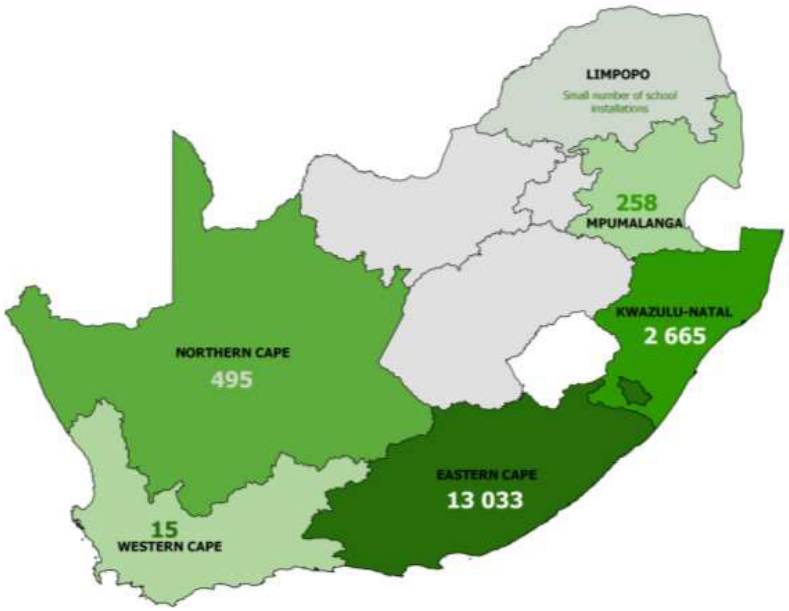


Figure 3. Survey results from users on what do they like about the toilet (Neethling et al., 2019).

The specific site was around the Ga-Moela village in Schoonoord. It is a rural village situated on top of Leolo Mountains. Access is difficult due to gravel road conditions. The village is divided into five sections namely Mabuse, Tawaneng, Letlabela, Ga-Pudi and Moela with a total number of around 120 households. All households practice livestock and seasonal farming. The site had been part of previous project named "Operationalizing Community Led Water Services for Multiple Uses in South Africa" ("MUS Project") funded through the African Water Facility (AWF) of the African Development Bank (AfDB) with Tsogang Water and Sanitation, a Nongovernmental organisation (NGO), contracted to provide operational support to the project, International Water Management Institute (IWMI) as a research partner and with the WRC as the implementing agent (van Koppen et al., 2020). Through the MUS project, the Ga-Moela site was provided with water supply through a communityled approach. Before the project, the community relied on scattered, shallow hand-dug wells and small streams, some which can turn into wetlands during the rainy season or become dry and sometimes used by animals. Water was carried from this source by wheelbarrow or buckets to households. Three earlier municipal attempts to drill boreholes had failed (van Koppen et al., 2020).

The household statistics are presented in the Table 1.

Table 1. Statistics for Ga-Moela / Sekhukhune (van Koppen et al., 2020).

General Population Statistics	Number
Average family size (persons)	6.5
Female-headed households (%)	67
Households with schooling (%)	45
Households with secondary or tertiary education (%)	34
Households with a migrant (%)	48
Households with social grants (%)	83
Households with fridge (%)	72
Households with television (%)	68
Average number of mobile phones per household (%)	3.6
Households ranked as poor (%)	54

Water and Sanitation Statistics	Number
Households satisfied with the quality of water for drinking and cooking (%)	28
Households sometimes treating water (%)	30
Households with flush toilet (%)	1
Households without any toilet (%)	25
Households accessing water at other sites and purpose (%)	27 (cattle) 20 (laundry)

In the MUS project, the researchers aimed to provide baseline information on lowincome rural communities and their management of water resources to meet their multiple water use needs (van Koppen et al., 2020).

The authors classified households according to "poor" based on the following criteria:

- receiving social grants so being categorized as indigent;
- house with poor building materials;
- often employed as labour;
- often food insecure; and
- does not own major livestock such as cattle.

In contrast, "wealthier" households were classified according to the following criteria:

- lived in houses with cement, iron and tile roofing materials;
- house with multiple rooms;
- owning cattle – the number of cattle increases their wealth;
- owning a car; and
- not receiving social grants.

Female headed household accounted for around three-thirds of households surveyed and around half of all households were classified as poor.

The community-driven MUS project enabled all five sections except Ga-Pudi to access water for 24 hours. It also increased the availability of the water, improved people lives, and women spent less time collecting water as they did before. Surveys undertaken through the MUS project revealed that almost all members noted technical improvements: the taps are nearer to the house, new and of better quality, blocked and leaking taps were repaired, and bigger pipes of better quality.

Another major finding from the MUS project was that the community had a good experience through participatory process led by Tsogang Water and Sanitation. Responses included "reliable", "keeps promises" and appreciation of the transparency around the budget (van Koppen et al., 2020). Community members in Ga Moela expressed willingness to undertake small breakdowns and to organize the purchase of fuel and operate the borehole pumps (van Koppen et al., 2020). As resources are limited in the area, this effort would be greatly enhanced by the municipality providing financial support.

While the MUS project enabled more reliable water supply, the village lacked appropriate sanitation facilities. Around three-quarters of all households in the community had access to sanitation albeit traditional latrines built by the owners without external support. Traditional latrines are still considered below the minimum accepted standard in South Africa. A quarter of all households had no sanitation facilities.

An opportunity arose to provide sanitation services to the community through the financial assistance of the PepsiCo Foundation via Charities Aid Foundation America (CAF America). The Limpopo province was seen as favourable for the PepsiCo Foundation who wished to improve water services close to their agricultural supply chains.

The MUS project with Tsogang Water and Sanitation built upon a good foundation and through funding support from the PepsiCo Foundation, there was an opportunity to provide WASH services:

- Including sanitation services with water provision in the community;
- Extend community capacity to construct sanitation facilities and roll out hygiene promotion to women, youth, old and the community at large, including new households.
- There was willingness to co-operate, participate and contribute into the development of this project which can be controlled, managed, operated and maintained locally.
- Create opportunities for young entrepreneurs to operate and maintain systems once installed.

Through the WRC/PepsiCo Foundation project, 120 innovative low flush toilets were installed in the community around Ga-Moela in the Makhuduthamaga Local Municipality, Limpopo Province, South Africa. Contract negotiations with the toilet manufacturer enabled the project to deliver to all houses in the target area; initially it budgeted for three-quarters but through negotiation, the project managed to deliver to all and Envirosan Enviromould included a no additional cost low flush cistern. Previous studies highlighted earlier have shown that users prefer the convenience of cistern flushing. Community members were trained on sanitation planning and hygiene education and selected individuals trained on toilet installation through

Tsogang Water and Sanitation and with assistance from the toilet manufacturer. A local committee was established in the community to ensure hygiene education messages were delivered to the households. People from the village were upskilled and employed through the project. The benefit of this approach is that it provides skills to the community that they potential use later and in servicing the toilets. The community had access to budgeting information and decided where they would like their toilet to be positioned relative to the household.

PROJECT METHODOLOGY

The project inception covered the following activities:

- Identified Community stakeholders and target groups (households, small scale farmers, women's clubs, and burial societies and youth formations).
- Met community stakeholders, discussed their roles and responsibilities.
- Met local government officials.
- Convened and attended community project introduction meetings.
- Confirmed and established community structures.
- Checked and ensured representation of youth and women, also emphasised roles & responsibilities.
- Conducted training needs assessment-skills audit sessions.
- Conducted training and compiled reports.

Household interviews and focus group discussions were held with the community and facilitated by Tsogang Water and Sanitation. Pre-construction community surveys started on the 27 uly 2021 for four days. The main objective was to collect household sanitation information including population statistics, understand hygiene practices against cultural believes, issues of food security and livelihoods, productive assets, available water resources and its uses. Global Position System (GPS) technology was used by enumerators to survey and map the village improved the efficiency and accuracy of activities conducted.

The total number of people living in the area is 751 and spread across the five sections as follows: Ga-Pudi (122), Moela (101), Mabosa (145), Letlabela (148), and Tawaneng (235). Migration patterns were a common theme in households with occupants migrating elsewhere for job opportunities.

Table 2. Population statistics for target area

NAME OF THE VILLAGE	Total Male	Total Female	Total Youth	TOTAL
GA-PUDI	26	37	59	**122**
MOELA	35	37	29	**101**
MABOSA	44	47	54	**145**
LETLABELA	50	38	60	**148**
TAWANENG	68	65	102	**235**
TOTAL	**223**	**224**	**304**	**751**

Sections of the area are scattered and households are at a distance apart from each other on top of hills. The survey team was properly introduced to the village leaders and a community survey questionnaire were used to gather the necessary information. Enumerators and committee members were divided into groups of 4, each equipped with stationery to use and the necessary ***Personal Protective Equipment*** (PPE) to guard against the spread of COVID-19.

A community participation process was undertaken in which the technology choice was discussed. A technical expert visited the site numerous times and assisted with the design and planning. Construction started in November 2021 and ended in March 2022. All 120 units were completed and beneficiaries trained to use and look after facilities. Twenty-four (24) workers were recruited, trained and allocated resources to install sanitation facilities. The approach assists to create jobs and impart skills to local people as compared to the use of contractors. It also strengthens community spirit, sense of ownership and served as an incentive for high-quality work. The group consisted of eleven (11) females and thirteen (13) males willing to work hard to develop the community of Ga Moela. Construction teams worked on their own segment, schedule of activities and pace as payment was task based.

Specific key construction components such as site identification, marking, digging and assembly of toilets structures were checked regularly to ensure good quality of the infrastructure built. Site inspections were conducted by the engineer supported by the committee, households and supervisors to ensure that facilities are well constructed and faults are rectified. Workers were paid upon completion of the first 60 and second 60 units built in the area. Payment vouchers were filled and signed by each worker after the work has been checked and approved. Households and the implementing team has signed off checklist or completion certificates after the last site inspection which formed part of post-implementation survey process.

OUTCOMES AND IMPACTS

Through the project, 751 people living in 120 households (223 Male, 224 Female, 304 Youth) have benefited from improved sanitation and open defaecation prevented in around 30 households. Other accomplishments include:

- Water, Sanitation and Hygiene (WASH) community structure was established. The WASH community consists of male, female and youth members. It was established to provide for communitydriven processes in the implementation of the sanitation project and provide commitment from community.
- Capacity-building in the form of various training. This included sanitation systems planning and building, and aspects of team work and participation, explaining the role of technical drawing and specifications, excavation for toilets, erecting superstructures, Occupational Health and Safety (OHS), and environmental health and

community hygiene practices (Figure 5).

- 24 people trained in the toilet construction (13 Male, 11 Female).
- 6 people hired from Tsogang Water and Sanitation to oversee the project.
- Toilet manufacturer, Envirosan Enviromould, assisted in training needs with Tsogang Water and Sanitation and the community and undertook engineering site checks to ensure build quality. This mutually beneficial relationship ensured skills transfer to the community and assurance to the manufacturer that their product was installed to their specifications.
- Community health multiplier effect through leveraging on previous water supply project.

Figure 5. Installation of low flush units. Community members were trained in sanitation planning and hygiene education, and local community members were employed through a process facilitated by Tsogang Water and Sanitation.

CONCLUSION

This project showed the many spin-offs of community-led water services. Despite the advantages, this approach has not been used extensively in South Africa. The current approach tends to be more topdown with the community having little involvement in the service value chain and therefore economic opportunities by building the competency and skills in the community to undertake minor servicing and maintenance. It also prevents long waiting periods while the municipality sources a contractor. This innovative approach we have demonstrated can be applied in other municipalities which struggle to provide services in rural areas.

ACKNOWLEDGEMENTS

Charities Aid Foundation America (CAF America) and the PepsiCo Foundation through CAF America Grant ID: 315276 Makhuduthamaga Local Municipality.

Research findings in this brief have been compiled using van Koppen et al. (2020) and Deliverable reports by Tsogang Water and Sanitation.

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