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WASH for everyone, everywhere: marketplaces as a multiplex pathway for improving inclusive access to water, sanitation, and hygiene in Vanuatu

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ABSTRACT

The COVID-19 pandemic highlighted the need for access to safe WASH (water, sanitation, and hygiene) practices, especially in non-household settings. This study examined the COVID response measures and WASH infrastructure and services situation in and around 14 marketplaces in three provinces in the Republic of Vanuatu during the pandemic. A total of 144 surveys and 42 interviews were undertaken with market stakeholders and government officials, including structured observations. 93% of the vendors were women, with 43% forced to change their product during COVID. 56% of vendors brought their own water containers, 40% of whom shared them with family; 16% of vendors had visible soap at their stalls. Rural market vendors were less likely to follow or observe protective measures. Six of seven rainwater tanks at markets tested positive for *Escherichia coli*. Among other things, the highly gendered space of 'marketing' and the centrality of marketplaces to both local food security and livelihoods brings into sharp relief the multiplex and inter-connected character of WASH. Marketplaces stand as an optimal 'leverage point' for not only improving and scaling-up WASH services but also building greater WASH literacy and behavior change.

Key words: COVID-19, marketplaces, non-household settings, water, sanitation and hygiene (WASH), Vanuatu

HIGHLIGHTS

- The first comprehensive study of the WASH situation across multiple marketplaces and provinces in Vanuatu.
- Analyzing the Vanuatu governments' COVID-19 response in dealing with WASH.
- Improving WASH services in rural and peri-urban contexts is especially complicated in the Pacific Islands.
- Marketplaces in the Pacific Islands stand as an optimal 'leverage point' for improving WASH services alongside literacy and behavior change.

1. BACKGROUND

The worldwide spread of the novel b-coronavirus – severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) – and the disease it caused, COVID-19, shocked global and regional economies. The Pacific Island Countries and Territories (PICTs) have experienced the pandemic in different ways and with different timelines, with some experiencing large outbreaks leading to high levels of morbidity and mortality, while others have had no local transmission or delayed transmission until after vaccine rollouts started (Bell *et al.* 2022). In early 2020, most PICTs declared a state of public health emergency and implemented numerous mitigation measures, such as national border closures, localized lockdowns, curfews, physical distancing and temporary restrictions on the movement of people and goods (Ekumah *et al.* 2020; Robins *et al.* 2021). Most PICTs have a narrow economic base and suffered from a decline in overall economic activity, disruptions to supply chains, and acute job losses (ADB 2020; DFAT 2020; Cook *et al.* 2021). During the pandemic, closures and restrictions on produce markets in PICTs, like Vanuatu, worsened vulnerabilities in food supply chains due to infection risks. Marketplaces are vital for food security and livelihoods, especially for the informal economy. In Vanuatu, where 75% rely on agriculture, marketplaces in Port Vila are crucial hubs (James 2018; Vanuatu National Statistics Office [VNSO] 2010, 2017). Safe operation with hygiene measures is essential to sustain both food security and economic activities. However, according to Munster *et al.*

2018, the dense, open and public character of marketplaces is considered as a major risk of a further uncontrollable spread of infections (Munster *et al.* 2018).

Elsewhere in the world, informal market closures due to COVID-19 disrupted the availability of affordable and nutritional food services (Asante & Mills 2020; IPES 2020) and there was concern that this could occur in PICTs (United Nations 2020). A study in Solomon Islands identified food stress in both rural and peri-urban areas during the pandemic, as well as increased stress on rural WASH infrastructure and services (especially when urban residents 'returned' home under government edict) (Iese *et al.* 2021). A pandemic driven 'back-migration' (urban to rural) was also experienced in Vanuatu and Fiji, with reliable reports that this also had a negative impact on WASH infrastructure (personal communication, Misaela Volua, Water Authority of Fiji, 26 October, 2021). In Samoa, the supply of local food products to markets was disrupted significantly in the early stages of the pandemic, with a substantial decrease in available produce and an increase in prices (FAO 2020). In Vanuatu, food stress was a particular concern in Port Vila, which has the highest basic needs and food poverty line in the country (VNSO 2010). Ultimately, however, while there were disruptions and livelihood impacts resulting from the pandemic, Vanuatu fared relatively well and the resilience of the domestic food system was apparent (Love *et al.* 2021a). The COVID-19 pandemic has highlighted the critical importance of WASH (Khadka *et al.* 2020), especially in PICTs, where access to improved drinking water sources and sanitation facilities remains low (UN-Water 2021). Despite marginal improvements, Vanuatu still faces challenges in this regard (WHO and UNICEF [JMP] 2021). Marketplaces are identified as key areas for disease spread, necessitating improved WASH services in such non-household settings (Howard *et al.* 2020). Historical outbreaks like Ebola have shown how inadequate WASH infrastructure exacerbates disease impact (Korkpyah & Wreh 2015). However, enhancing WASH services in PICTs is hindered by financial, geographical, and environmental constraints (WHO/UNICEF 2020). Addressing these challenges is crucial not only for combating COVID-19 but also for mitigating other WASH-related diseases affecting the Pacific Islanders.

Vanuatu is commonly ranked the most vulnerable country in the world in regard to disasters (World Risk Report 2020), posing an extra challenge for WASH infrastructure and service delivery. In April 2020, Tropical Cyclone (TC) Harold devasted Vanuatu, impacting WASH infrastructure across much of the country. It has been estimated that the impact of TC Harold on WASH infrastructure alone was VUV319,164,119 [US$2.9 million] (GoV 2020). TC Harold was just 5 years after TC Pam, which was similarly catastrophic (Esler 2015). The Vanuatu government's TC Harold & COVID-19 Vanuatu Recovery Strategy 2020–2030 notes that 'more than any other, this compound disaster [COVID and TC Harold] has blurred the lines between response, recovery and disaster risk reduction (preparedness and prevention)' (GoV 2020:1). In March 2023, two category tropical cyclones (TC Judy & TC Kevin) hit Vanuatu in two consecutive days and left widespread damage (Daily Post 2023).

In this paper, we used qualitative and quantitative data collected from 14 marketplaces in Vanuatu to:

- Assess current WASH conditions, focusing on COVID-19 responses.
- Explore WASH literacy and behaviors among vendors and managers.
- Evaluate factors influencing WASH practices.
- Identify challenges and benefits of improving WASH services.

2. MARKETPLACES, SUSTAINABLE DEVELOPMENT, AND WASH: THE POLICY AND PRACTICE INTERSECTION

In 2016, the government released its Final Technical Report on the National Sustainable Development Plan 2016–2030 (NSDP) – known as the 'People's Plan' – which consists of three focus areas or 'pillars': (1) the environment; (2) the economy; and (3) society. Each pillar has a discrete but cross-cutting suite of goals, policy objectives, indicators, and targets. The NSDP is designed to chart the country's vision for achieving a 'stable, sustainable and prosperous Vanuatu' and sets-out the national priorities and context for the implementation of the SDGs over a 15-year period (GoV 2016). The NSDP is focused on preserving the natural environment and its resources, enhancing resilience to climate change and natural disasters, and strengthening both the traditional and formal economies to improve the well-being of ni-Vanuatu (GoV 2016; Rantes *et al.* 2022). It is noteworthy that the NSDP clearly acknowledges the relationship between WASH and the economy. Under the economy pillar, goal 2.2 seeks to ensure all people have reliable access to safe drinking water and sanitation (GoV 2016). Marketplaces, and the social, environmental and economic capitals they support, intersect with many of the NSDP objectives and the SDG targets.

3. MATERIALS AND METHODS

This paper draws on qualitative and quantitative data collected from 14 marketplaces across three provinces of Vanuatu.

3.1. Case study markets

The Republic of Vanuatu is an archipelago of 83 islands located in the Western Pacific (Figure 1) that was governed as a joint British-French Condominium (called the 'New Hebrides') from 1906 until independence in 1980. There are two main urban centers in Vanuatu: The national capital, Port Vila (pop. 49,034), located on Efate Island, Shefa Province, and Luganville (pop. 17,719) – known as the country's 'second town' – located on Espiritu Santo Island, Sanma Province (VNSO 2021).

To capture a diversity of market settings our case studies included two municipal markets – the Port Vila Municipal market and the Luganville municipal market – and one Provincial market – the Malampa market house (also referred to as Lakatoro market) – located on Malekula Island, in the small administrative capital of the Malampa Province, Lakatoro (pop. ~900). We also examined 11 'satellite' or periphery marketplaces, seven in Port Vila (Figure 2) and four in Luganville (Figure 3). Details on marketplace attributes are shown in Table 1.

3.2. Data source and collection method

Research was jointly designed and conducted by a team of local and international researchers. Qualitative interviews were conducted with 42 respondents, including: market vendors, market administrators, market association representatives, national, provincial and municipal actors, and select individuals from the private sector and civil society organizations (CSOs). Interviews were audio recorded, transcribed, and coded in NVivo™ for analysis. First cycle coding focused on

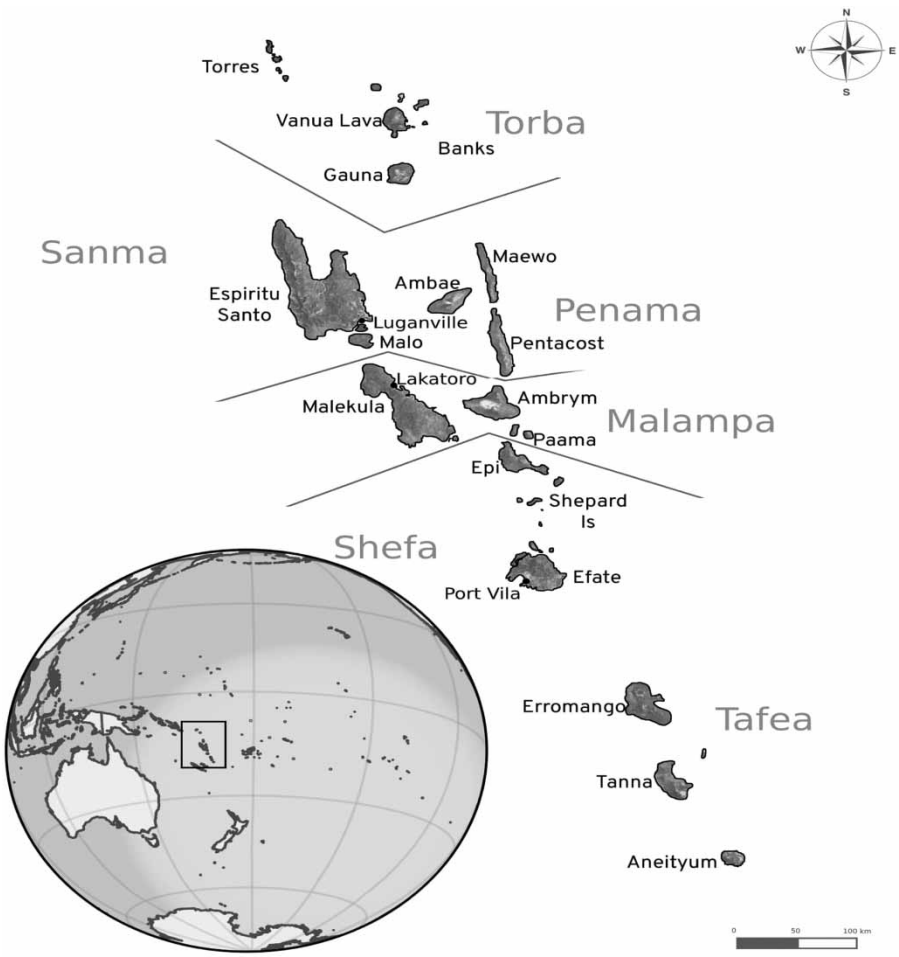

Figure 1 | Map of the Vanuatu and location of geographic study areas.

Figure 2 | Port Vila study markets.

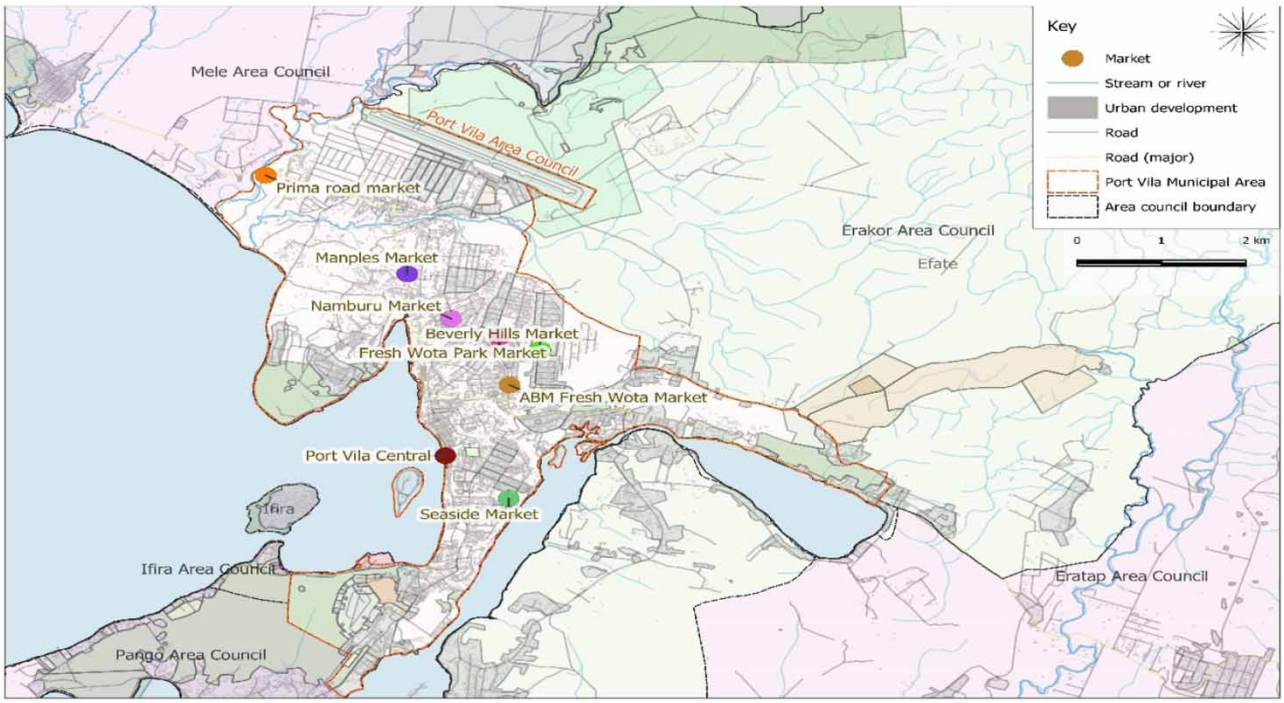

Figure 3 | Luganville study markets.

descriptive and thematic analysis, using (primarily) a pre-determined coding framework, while a second cycle of coding was undertaken using a more inductive approach, generating codes from the data (cf. Saldaña 2013). Market vendor survey data collection was undertaken on tablets linked to the mobile data collection platform SurveyCTO®, and then entered into MS Excel™ and summarized using Excel and SPSS™.

Table 1 | Select market attributes: Lakatoro, Luganville, and Port Vila

		COVID measures			WASH infrastructure and services			
Markets	**Vendor Nos.**	**One-day market**	**Hygiene stations**	**Social distancing**	**Tap***	**Toilet**	**Soap (toilet)**	**Water tank**
Lakatoro	20–80	Yes	No	little	1	Yes	No	Yes
Luganville Main Market	70	No	No	little	1	Yes	rarely	Yes
Tangara (Luganville)	20–25	No	No	Yes	No	Yes	No	No
PIM (Lug.)	10	Yes	No	Yes	No	Yes	No	No
Cairos (Lug.)	5	No	No	Yes	No	Yes	No	No
Buni Buni (Lug.)	10–15	No	No	little	No	Yes	No	No
Port Vila Municipal Market	100–140	Yes	Yes	Yes	many	Yes	Yes	Yes
ABM Freswota (Port Vila)	30	No	Often	Yes	1	Yes	rarely	No
Beverly Hills (PV)	4–10	No	No	No	1	Yes	Yes	Yes
Freswota Park (PV)	25	No	Yes	Yes	1	Yes	rarely	Yes
Manples (PV)	100	No	Yes	Yes	1	Yes	Yes	No
Namburu (PV)	15–25	No	Yes	No	1	Yes	rarely	Yes
Prima Road (PV)	10	No	No	No	No	Yes	No	No
Seaside (PV)	50	No	Yes	Yes	1	Yes	Yes	Yes

*Tap accessible by vendors (not including tap in the toilet).

A total of 114 surveys were conducted in November and December 2020 across various marketplaces in Vanuatu, utilizing purposeful sampling to ensure representation. In Luganville, logistical constraints led to smaller survey size, supplemented by 13 key informant interviews. Survey instruments were piloted in Port Vila. Additionally, 42 interviews were conducted in Bislama across three areas, involving market stakeholders, government officials, and civil society representatives.

In addition to vendor surveys and key informant interviews, each market was mapped during site visits, noting (especially) taps, water tanks, sinks, soap availability, toilets, septic systems, social distancing arrangements, and WASH infrastructure functionality. Lastly, we conducted 12 water quality tests using the portable Aquagenx® CBT (compartment bag test). Following data collection and initial analysis a series of stakeholder workshops were conducted in Port Vila, Luganville, and Lakatoro to identify, prioritize, ground-truth and sense-check recommendations.

4. RESULTS AND DISCUSSION

The following section is structured as follows: First, attributes for each market and sampled vendors are provided. This is followed by the key results and discussion, focusing on the WASH situation and COVID-19 response in the context of marketplaces in Vanuatu.

4.1. Marketplace attributes

The 14 marketplaces examined in this research include a wide variety of market 'types', from large central municipal marketplaces (Luganville main market and Port Vila central market) to small satellite markets as shown in Table 1 – with more data provided in Supplementary data (Tables ST1–ST3). The data are drawn from the vendor surveys, interviews and market mapping and WASH infrastructure assessment.

Among the surveyed marketplaces, all except Prima Road had water available on site. Most markets had dedicated taps for vendors, with Port Vila having the most. Toilet facilities varied, with septic systems being common, except for a pit latrine at Cairos. Luganville's main market faced septic seepage issues. Hygiene stations were present in most Efate markets but absent in Luganville. Hand washing basins at Malampa market became operational in early 2022. The Port Vila municipal market underwent a significant upgrade in 2020 worth of USD$ 1.5 million.

4.2. Vendor attributes

In Vanuatu, market vendors primarily consist of full-time traders and part-time vendors who sell their own produce. A 2011 survey of Port Vila municipal market found that 90% of vendors were farm producers, with only 10% being traders (FAO

2018). Vendors often travel long distances to sell their produce (see Supplementary material, Figures S1–S3). A rotation system, where vendors from different areas take turns selling at markets, has been in place across Efate, Santo, and Malakula. However, pandemic measures such as social distancing and the abolition of sleeping at market houses reduced the number of vendors and tables available, leading to a significant income decrease for most vendors (Love *et al.* 2021a).

Table 2 summarizes vendor attributes from the market survey ($n = 114$). The sample consisted of 93% female vendors (slightly higher than most samples, e.g. Bowman *et al.* 2009), primarily selling island food, mixed fruits and vegetables, cooked food, and kava. About 43% of vendors changed their products due to COVID-19. Vendors in Lakatoro had longer marketing experience, were older, and had lower educational levels, likely affecting their attitudes toward WASH and COVID-19 (Love *et al.* 2021b).

4.3. Marketplace WASH situation and COVID-19 response

On March 23, 2020, the Vanuatu Government closed international ports due to the COVID-19 pandemic, leading to the temporary closure of Port Vila municipal market. Following TC Harold's impact in April 2020, the State of Emergency (SOE) was extended multiple times. A COVID-19 Health Sector Preparedness and Response Plan (HPRP) was drafted, informed by WHO guidelines (MoH 2020a; WHO 2020). The Asian Development Bank allocated US$6 million to the government for COVID-19 preparedness, with 20% for infrastructure, 40% for clinical management, 23% for coordination and communication, and 17% for early detection (ADB 2020).

According to the Government's initial health response plan there are three phases – Preparedness, Containment, and Mitigation – and four scenarios. The Government's health response plan transitioned from phases to a 'level' system in 2021. The Ministry of Health issued guidelines emphasizing handwashing, hygiene, and social distancing for non-household settings (MoH 2020b; WHO/UNICEF 2020). Market management implemented measures such as reduced vendor numbers and hygiene stations. Main responses in markets included communication activities, changes in operating hours, social distancing, and hygiene station installations. At Malampa market house, two permanent hand washing basins were installed at the front of the market in September 2020 but were not operational until early 2022.

4.4. Hygiene stations and communication

The Ministry of Health's guidelines for Markets and Vendors stipulates: 'Make sure that staff and customers have access to places where they can wash their hands with soap and running clean water, especially at the entrance to the market' (MoH 2020b). In Port Vila, most markets had temporary hygiene stations, except for Prima Road and ABM Freswota sometimes. Luganville markets lacked hygiene stations. Permanent handwashing basins in Lakatoro were installed in 2020 but not connected until 2022 due to COVID-19 concerns. Market managers cited legal issues and reluctance to enforce handwashing protocols as barriers to installing and maintaining hygiene stations.

4.5. WASH-related COVID vulnerabilities at markets

WHO recommendations to combat COVID-19 infection include social (physical) distancing – or wearing a mask where that is difficult – and practicing good hand hygiene. The MoH advise only wearing a mask if there are COVID-19 cases in the

Table 2 | Vendor attributes, aggregated by the geographic area of study

Attribute	Lakatoro ($n = 21$)	Luganville ($n = 14$)	Port Vila ($n = 79$)
Years marketing	0–40 (mean 13)	0–40 (mean 7.5)	1–40 (mean 8.4)
Gender	91% F/9% M	86% F/14% M	95% F/5% M
Age	25–68 (mean 44 years)	26–61 (mean 39 years)	19–75 (mean 41 years)
Educational attainment level	Primary (1–6) 86% Secondary (7–12) 14%	Primary (1–6) 43% Secondary (7–12) 57%	Primary (1–6) 58% Secondary (7–12) 33% Other 9%
Market main income	Yes 86%	Yes 93%	Yes 94%
Main products	Root crops 32%; mixed fruit & vegetables 24%; cooked food 19%; kava 10%; crab 5%; 'other' 10%	Root crops 43%; mixed fruit & vegetables 21%; kava 21%; cooked food 7%; 'other' 7%	Root crops 68%; mixed fruit & vegetables 21%; cooked food 9%; 'other' 2%

community (Levels 2–3). In terms of WASH, then, access to safe water, sanitation and hygiene services is important in two keyways: (i) it directly affects peoples' ability to maintain hand hygiene and (ii) impacts peoples' ability to adhere to social distancing, particularly when WASH facilities are shared.

The inability or failure to maintain hand hygiene while working at markets creates a WASH-related vulnerability. Vendors frequently interact with customers, often exchanging money or goods by hand. Along with masks, frequent hand hygiene is the only practical way to provide protection from transmission of the virus either to, or from, customers. In addition to hand hygiene, face hygiene may also be relevant in this context as people frequently wipe their face with a cloth due to the heat and humidity, and a significant proportion of vendors reported sharing face clothes (87%) ($n = 113$).

4.6. Protection measures

The key protection measures for COVID-19 at marketplaces, as per government advice, are hand hygiene and social distancing (and masks if in Levels 2–3). These, then, are the key vulnerabilities that marketplaces needed to address to offer protection against COVID-19 (as well as other infectious diseases). When asked 'Do you do anything to protect yourself from COVID-19?', vendors in Port Vila were more likely to answer in the affirmative, while those in Lakatoro were least likely (Figure 4). The same trends were replicated when vendors were asked if 'other vendors' applied any protection measures. Regarding 'customer protection measures' (social distancing, hand hygiene, not touching produce, etc.), Port Vila vendors reported the highest rate of affirmative responses while there were no affirmative responses recorded among vendors in Lakatoro.

4.7. Water access and services

Access to reliable water is essential to practicing good hygiene. All marketplaces had some access to water except Prima Road. Access points were generally taps (stand alone or in toilets), sourcing water either from the water utility or from an on-site rainwater tank. Port Vila municipal market had the most taps, Luganville municipal and Lakatoro market – where there are between 40 and 80 vendors had only one water access point for both vendors and customers (a single tap, other than in the toilet which, in Luganville, you must pay to use). Most satellite markets had at least a single tap, except Cairos, Tangara and PIM (Luganville), which only had water access in/near the toilet.

The paucity of water access points is an issue in terms of availability, convenience, and social distancing. An increased number of facilities would enable the proper maintenance of social distancing when accessing water; useful not only for COVID-19 protection (Lal *et al.* 2020). More taps would also increase hand hygiene access. Across the three geographic study areas vendors reported that they accessed water services, on average, 2–3 times a day (highest in Vila [3 times], lowest in Lakatoro [1–2 times]) ($n = 114$). Water was used for a variety of purposes, primarily washing/cleaning (personal hygiene), drinking, cooking, and washing produce. Lakatoro recorded the least 'wash/clean' responses. Across all the marketplaces, vendor satisfaction with water services was lowest in Lakatoro and highest in Port Vila (Figure 5).

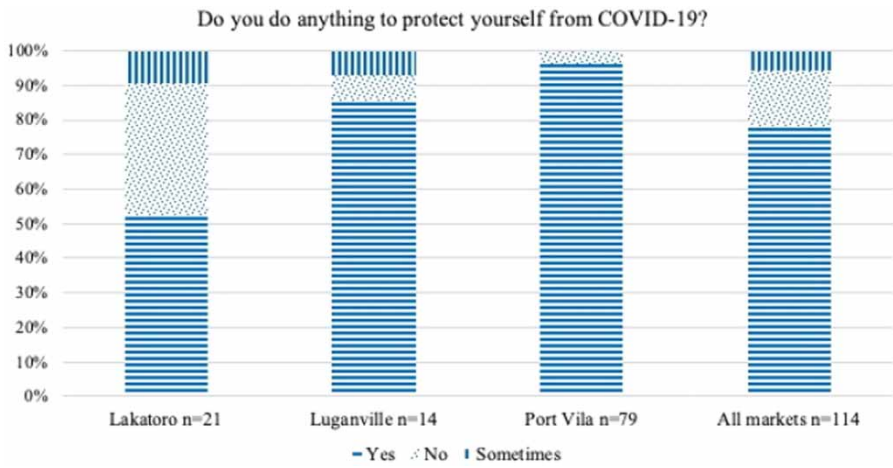

Figure 4 | Vendor protection measures.

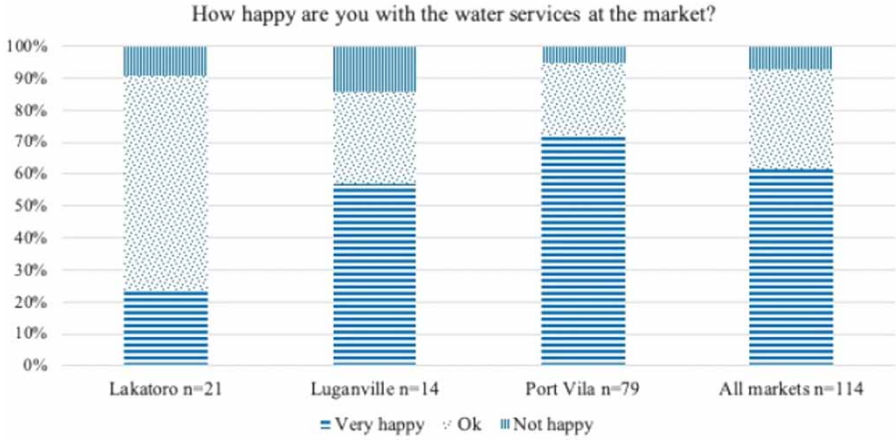

Figure 5 | Vendor satisfaction with market water services.

In terms of the satellite marketplaces in Port Vila, satisfaction levels were generally high everywhere except in Freswota Park (20% 'not happy', $n = 2$) and Prima Road ($n = 2$) ($n = 79$). With water only accessible from shared taps, vendors relied on containers to have water available at their stall throughout the day. Across the markets, 56% ($n = 64$) of vendors brought their own water container with them to market ($n = 114$). Most containers were small plastic water bottles. Of those who brought containers, 40% ($n = 27$) reported sharing their water container with others (mainly family). Sharing containers was highest in Lakatoro (58%).

4.8. Water quality

Water quality sampling and testing for the fecal indicator *Escherichia coli* (*E. coli*) was undertaken at seven markets; five markets in Port Vila, the municipal market in Luganville and the Malampa market house in Lakatoro (Table 3). All but one of the rainwater tanks tested (Seaside market) were found to be 'unsafe' according to WHO guidelines (WHO 2017) while all the utility water was found to have no *E. coli* present, hence is classified as 'low risk' (Table 3).

The most likely source for *E.coli* contamination in the sampled rainwater tanks – based on observation and photos – were bird, lizard and rat excreta, and thus are possibly lower risk than water contaminated with human or mammalian excreta. The tank at Lakatoro had no inlet screen, and most of the tanks were old. According to interviews, only a few vendors drink the rainwater; most of the water is used for washing hands and produce. Nevertheless, these results are concerning.

4.9. Hand hygiene, soap availability, and use

Concomitant access to soap and hand hygiene-related skills and knowledge are essential for public health (Tran *et al.* 2006). Based on structured observation across all markets, 16% of surveyed vendors had soap/hand sanitizer visible on their stall ($n = 114$). When asked if they carry soap/sanitizer with them to the market, 25% said 'yes' and 11% reported 'sometimes'. Nearly twice as many vendors in Port Vila and Luganville reported that they generally bring soap with them compared to vendors in Lakatoro.

Despite many market mangers reporting that they provide soap (in toilets) for washing hands, observation and vendor perspectives indicated that this was rarely the case; none of the markets outside of Port Vila had any soap available, except 'sometimes' in the toilet at Luganville municipal market. The exception was Port Vila, where across all markets only 10% of vendors reported that there was never any soap (Figure 6). At both Freswota Park and Seaside marketplaces, the market managers were reportedly very proactive, regularly reminding vendors to wash their hands.

Despite the MoH market guidelines stipulating that soap should be provided at markets, outside of Port Vila soap was generally not supplied. As one vendor at Luganville municipal market complained: 'Even though there is running water and toilets available, there are no soaps. There are no dishes or sinks to wash our hands' (market vendor, Luganville). Note that vendors and customer must pay to use the toilet at the Port Vila Central and Luganville market. In interviews with market managers, finances were cited as the main reason that they did not provide soap. At one satellite market in Luganville the manager stated that they previously provide soap but had stopped because they were 'losing money'.

Table 3 | Water quality testing results

Market	Sample location	Source	*E.coli* results MPN	Comparison to WHO Guide
Lakatoro	market tap	Utility	0.0	low risk
Lakatoro	tank tap	rainwater tank	>100	unsafe
Luganville main market	market tap	Utility	0.0	low risk
Luganville main market	tank tap	rainwater tank	>100	unsafe
Manples	market tap	Utility	0.0	low risk
Namburu	market tap	Utility	0.0	low risk
Freswota Park	market tap	Utility	0.0	low risk
Freswota Park	tank tap	rainwater tank	48.3	unsafe
Seaside	market tap	Utility	0.0	low risk
Seaside	tank tap	rainwater tank	0.0	low risk
Port Vila market	market tap	Utility	0.0	low risk
Port Vila market	tank tap	rainwater tank	>100	unsafe

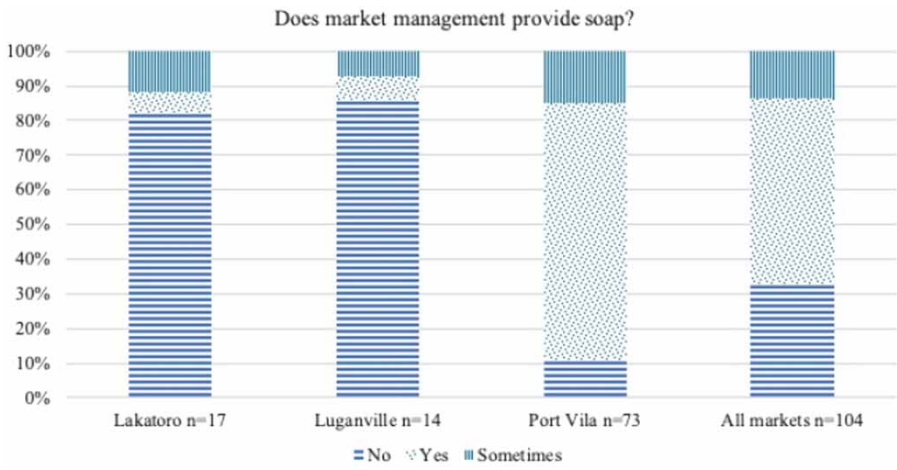

Figure 6 | Market provision of soap.

4.10. Sanitation

All markets had a toilet, ranging in type from flush toilet with septic (most markets) to a dry pit latrine (at Cairos). Problematically, there were numerous reports of septic seepage at Luganville municipal market, attracting flies, producing foul odors, and disturbing both food vendors and customers (the septic is located near the cooked food kiosks). Across all markets, the toilets at Lakatoro attracted the most critical responses (48% 'not good') followed by Luganville (21% 'not good') ($n = 114$). A vendor at Luganville municipal noted that 'There are only two toilets, we have to wait in line for our turn [...]. Toilets are also situated where the wind blows into the market, so we breathe the smell of the toilets' (market vendor, Luganville). In terms of cleanliness, based on both vendor evaluation and observation, the Luganville municipal market (which has a dedicated toilet cashier) had the least clean toilets, followed by Lakatoro. In the case of Luganville the 'pay-for-use' model is not resulting in improved services.

4.11. WASH and market governance and management

In Vanuatu, local governments are primarily responsible for ensuring safe water in non-household settings through by-laws issued by provincial and municipal councils (GoV 2021). WASH issues are governed by the Public Health Act [CAP 234] and the Vanuatu Sanitation & Hygiene Policy (2012–2030). However, under-resourced decentralized WASH strategies can decrease service delivery (Lockwood & Le Gouais 2015). Only 30% of central grants go to capital projects, and local government spending is about 3.7% of total government expenditure (CLGF 2020). Despite COVID-19 budget reallocation, some marketplaces struggle to complete public handwashing stations due to management variations.

Management at the smaller satellite markets was also diverse. Some are privately owned (e.g. Cairos, PIM), others are owned or operated by groups or associations (e.g. Freswota Park is owned by the National Housing Corporation, ABM Freswota is managed on behalf of a local Youth Association), while others still have no owners or managers at all (e.g. Prima Road). Seaside market, located in Port Vila central ward, is an exception in that it is operated by the Port Vila municipality. Market managers are crucial to supporting WASH outcomes at markets. Across the 12 case study markets that had managers, eight were male and four female. Outside of Port Vila, all the market managers were male except the Luganville municipal supervisor. This gender disparity reflects the socio-historical norms but is ultimately counterproductive – especially given the highly gendered character of markets with over 80% of vendors being women (Bowman *et al.* 2009) and needs to be addressed. The rise of market associations which are growing in number and power, combined with targeted capacity development opportunities, is an opportunity to strategically promote gender parity at market administrative levels.

4.12. Stakeholder workshops

Following initial data analysis, stakeholder workshops were conducted in each locale. Recurrent points raised during discussions with stakeholders include the following:

- Health authorities must demonstrate WASH measures practically, not just through posters.
- Lack of legislation means vendors cannot enforce COVID-19 WASH protocols.
- Market managers hesitate to install WASH infrastructure due to a lack of legal protection.
- Health departments need systematic monitoring of marketplaces for functional WASH services.

5. CONCLUSION

The high profile of COVID-19 across the world, including in Vanuatu, has heightened public awareness about the importance of 'good' WASH. Non-household settings such as marketplaces are of critical social, cultural and economic importance. Despite the government's quick and comparatively strong response, our assessment of marketplaces in Vanuatu reveals significant deficiencies in WASH infrastructure. Issues included insufficient taps, low soap usage, inadequate sanitation facilities, and high *E. coli* levels in rainwater tanks. Improving WASH facilities and maintenance at marketplaces is essential not only for public health but also for supporting food security, sustainability, and women's empowerment. Addressing these challenges can enhance overall community well-being and resilience. As such, targeted interventions, including increased access to soap and handwashing facilities, improved sanitation services, and regular maintenance of rainwater tanks, are crucial for mitigating health risks and promoting a healthier environment in marketplaces across Vanuatu.

The awareness of COVID-19 and WASH practices was generally high, but gaps persist, particularly in rural areas and the lack of involvement of women in health communication program design. Market associations play a crucial role in spreading

information, especially in rural areas. Resource constraints pose a significant challenge, limiting infrastructure investment and monitoring. Despite this, the government of Vanuatu has responded effectively. 'WASH for all' means making WASH available for everyone, everywhere – that is, in all settings, including non-household settings. While meeting national SDG targets in many PICTs remains highly challenging, focusing on WASH in marketplaces could be a practical step forward, with its centrality an opportune leverage point for not only improving and scaling-up WASH services but also building greater WASH literacy and behavior change.

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DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

CONFLICT OF INTEREST

The authors declare there is no conflict.

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