

# Drinking Water Regulation Report Technical Webinar



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# Te Whakatauākī a Taumata Arowai

Ko te wai ahau, ko ahau te wai.  
He whakaaturanga tātou nō te wai.  
Ko te ora te wai ko te ora o te  
tangata.  
He taonga te wai me tiaki.  
Ko wai tātou.  
Ko wai tātou.

I am water, water is me.  
We are reflections of our water.  
The health of the water is the health of  
the people.  
Water is a treasure that must be  
protected.  
We are water.  
Water is us.



# Drinking Water Regulation Report

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## Overview

- INTRODUCTION
- PART ONE: Drinking water safety
- PART TWO: Drinking water supplier performance
- PART THREE: Source water



# Introduction

Richard

# Introduction

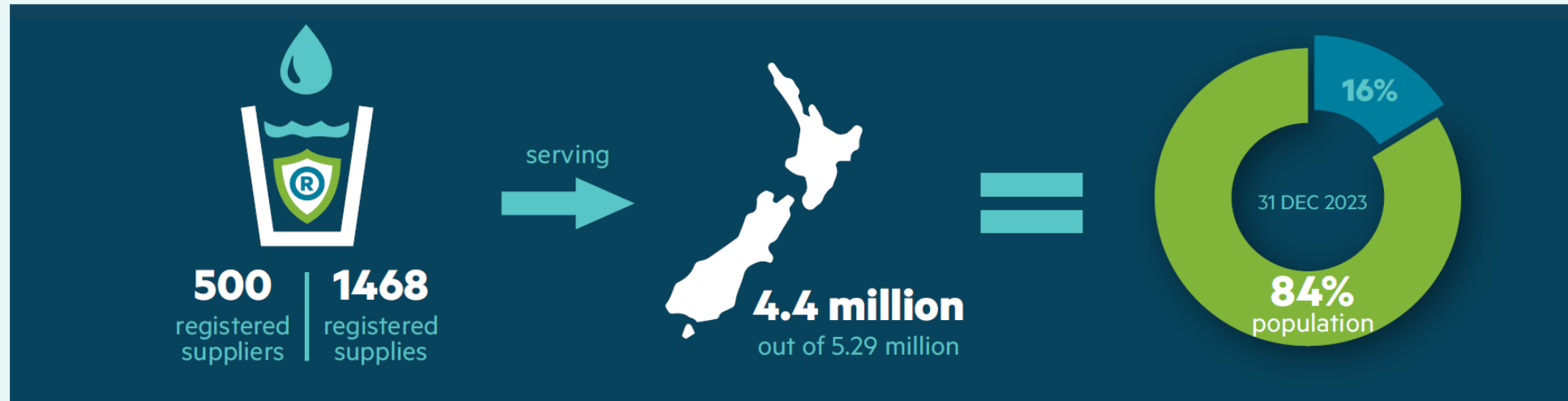
## Suppliers and Supplies

Supplier types and supplies	Description
<b>Council suppliers</b> (operating 529 registered supplies)	Territorial authorities, regional councils and unitary authorities.
<b>Government suppliers</b> (operating 467 registered supplies)	Ministry of Education - Te Tāhuhu o te Mātauranga (schools). Department of Conservation - Te Papa Atawhai – (campsites, huts and villages). Department of Corrections - Ara Poutama Aotearoa (prisons). New Zealand Defence Force - Te Ope Kātua o Aotearoa (facilities).
<b>Private and community suppliers</b> (operating 472 registered supplies)	<b>Māori suppliers</b> – this group includes iwi entities, kura supplies, kōhanga reo, marae, papakāinga and Māori community supplies.
	<b>Facilities</b> – such as universities, private schools, hospitals, airports and ski fields.
	<b>Other</b> – such as mixed-use rural supplies, residential and other private or community supplies not owned by councils.
	<b>Water carriers</b> – operators who transport drinking water without reticulation.
<b>Unregistered suppliers</b>	Suppliers who own or operate a supply that is not yet registered on the public register of supplies maintained by Taumata Arowai.
<b>Not a drinking water supplier under the Water Services Act 2021</b>	
<b>Domestic self-supplies</b>	Own, stand-alone domestic dwelling supply, like a roof water supply for a single household unit.

# Introduction

## Suppliers and Supplies

### About drinking water suppliers and supplies






# Introduction

## Suppliers and Supplies

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Breakdown of those 1468 supplies and the population they serve by type of supplier



Supplier Type	Registered Supplies	Approximate Supply Population
Council	<b>529</b>	<b>4,294,000</b>
Department of Conservation	<b>38</b>	<b>9,000</b>
Department of Corrections	<b>3</b>	<b>4,000</b>
Ministry of Education	<b>415</b>	<b>45,000</b>
New Zealand Defence Force	<b>11</b>	<b>14,000</b>
Private and Community	<b>472</b>	<b>74,000</b>
<b>TOTAL</b>	<b>1468</b>	<b>4.4 million</b>

# Introduction

## Annual renewals

As of 31 December 2023, supplies which have renewed their registration included

- 97% of council supplies
- 39% of government supplies
- 75% of private and community supplies





# Introduction

## Data Analysis Overview

We have included analysis of the following data sources:

- Registration information
- Drinking Water Safety Plans
- Consumer advisories
- Notifications
- Reporting on the Drinking Water Quality Assurance Rules
- General and residual disinfection exemptions.



# Drinking Water Safety

Noah

# Drinking water safety

## Summary

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In this part, we:

- describe drinking water safety in the context of risk management
- address how suppliers proactively manage the safety of their supplies
- look at data and information collected from consumer advisories and notifications about the safety of drinking water in Aotearoa New Zealand.



# Drinking water safety

## Multi-barrier approach

A multi-barrier approach is one which:

1. prevents raw water contamination
2. removes contamination
3. kills or inactivates pathogens
4. maintains the quality of treated water throughout a reticulation system.



# Drinking water safety

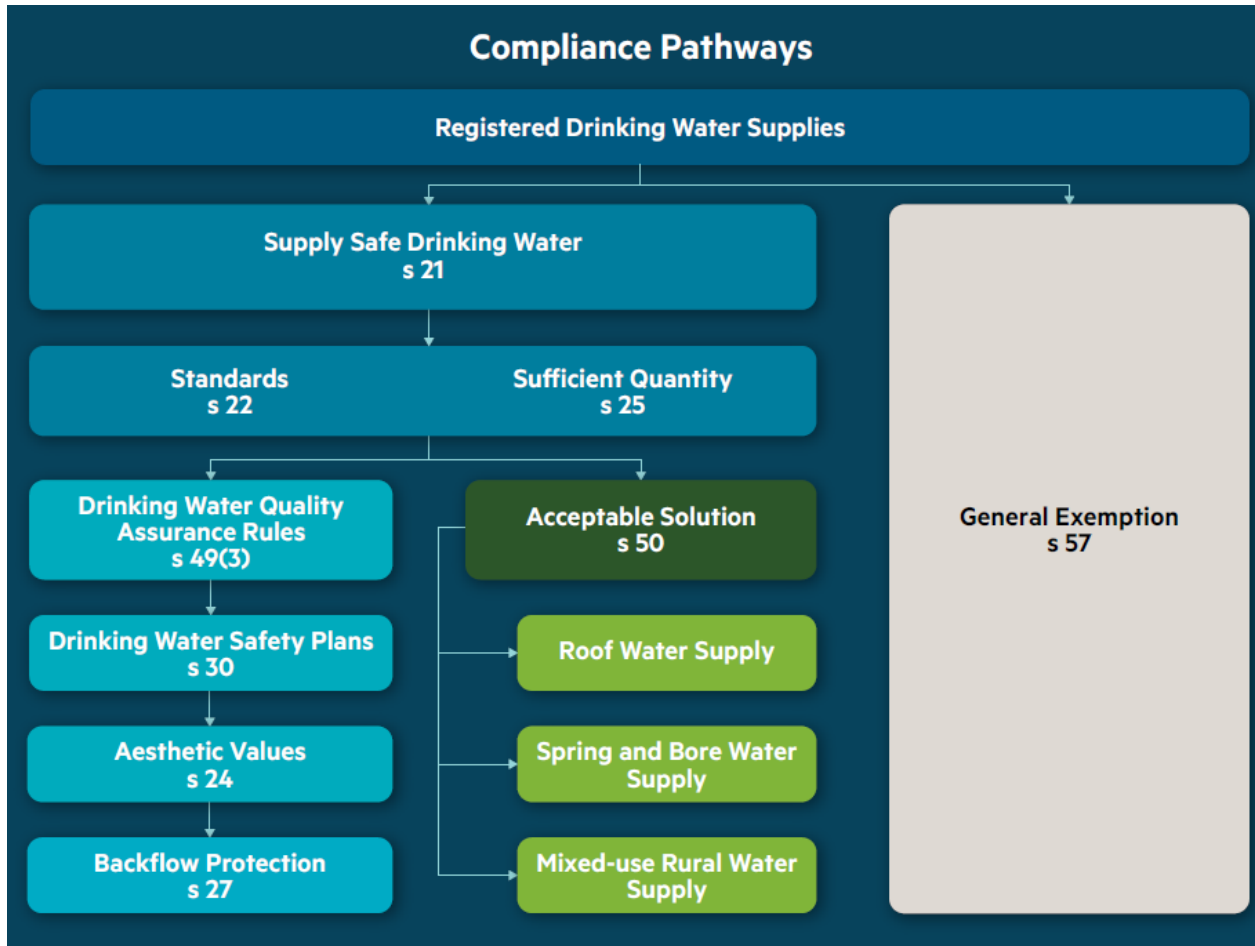
## Multi-barrier approach

- The Drinking Water Quality Assurance Rules (Rules) and Acceptable Solutions set out the minimum requirements for barriers to be effective.
- There will be additional measures that suppliers put in place for barriers to be effective and to mitigate risk other than what is included in the Rules.
- We consider that these barriers must be in place and effective to ensure a multi-barrier approach is implemented.

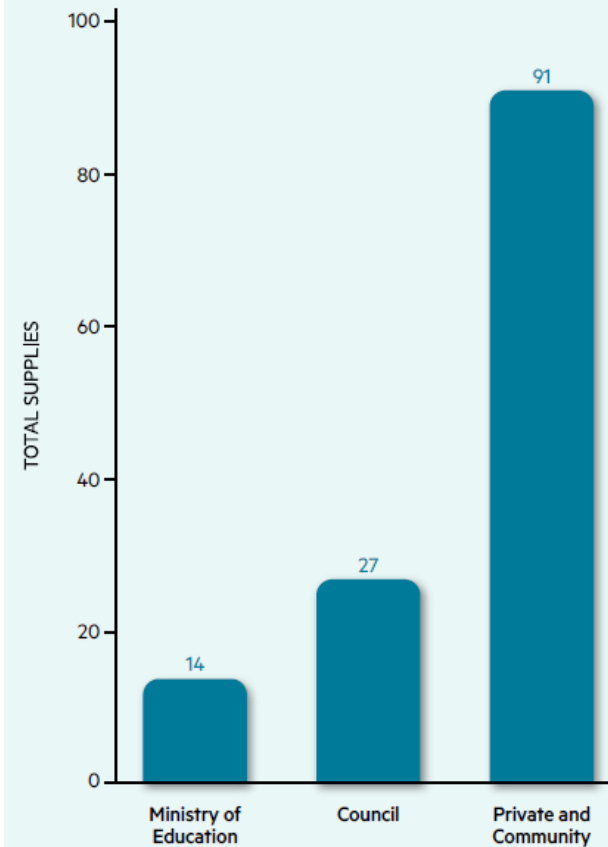


# Drinking water safety

## Compliance pathways – Acceptable Solutions



Supplies that have adopted acceptable solutions



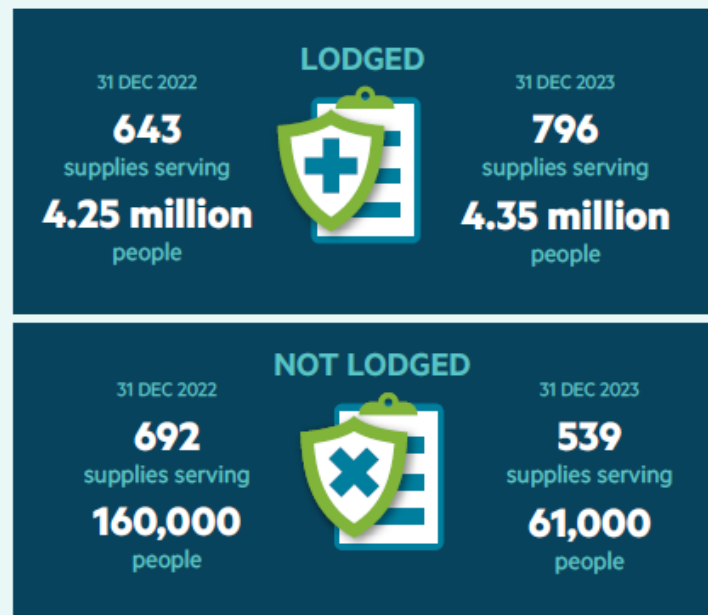


# Drinking water safety

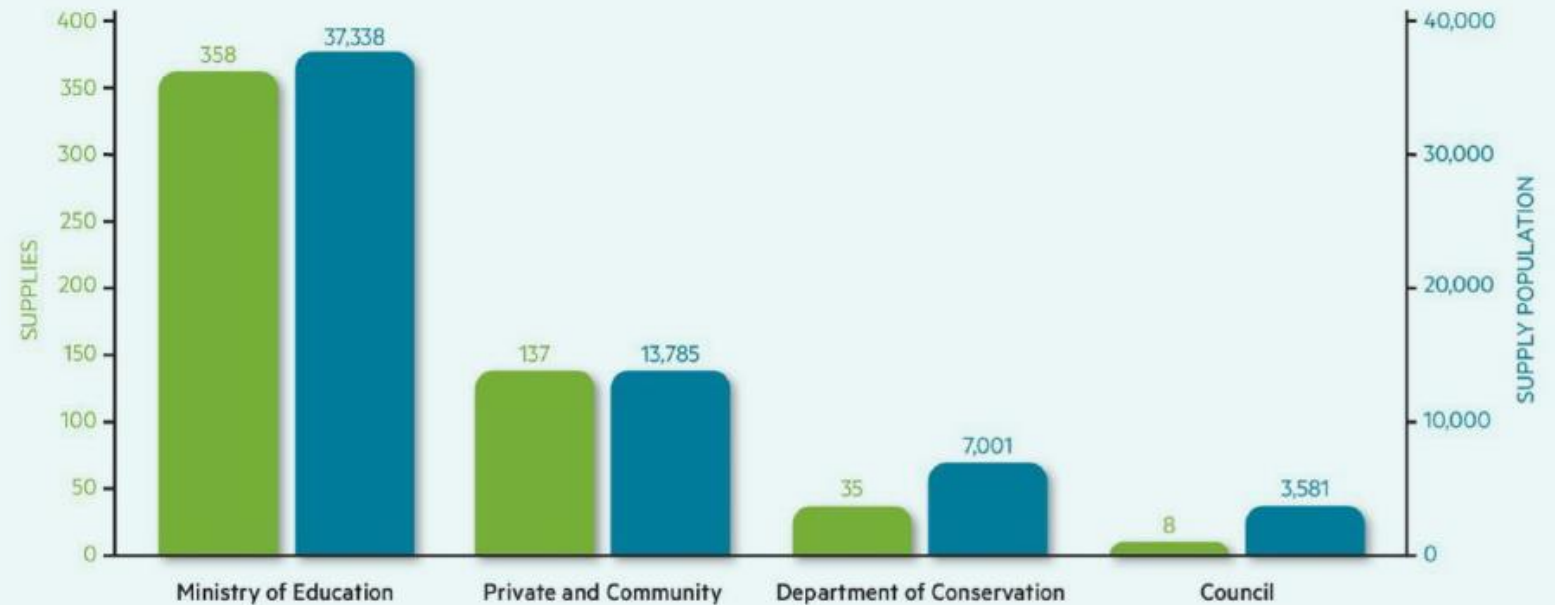
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## Compliance pathways – Drinking Water Safety Plans

### Drinking water safety plans lodged



### Supplies that have not lodged a drinking water safety plan as of 31 December 2023



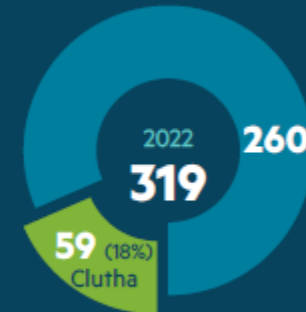
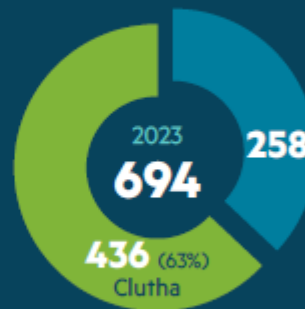
# Drinking water safety

## Notifications – Maybe or is unsafe water

### Notifications from registered supplies that drinking water is or may be unsafe



	2021*	2022	2023
Supply Notifications	59	319	694
Supplies	41	155	163
Suppliers	25	61	61



**Marginal Decrease**  
in Supply Notifications  
\*Clutha excluded

\* 2021 notifications only cover a 6-week period

# Drinking water safety


## Notifications – MAV Exceedances

We received:

- 335 supplier notifications of MAV exceedances.
- 604 laboratory notifications of MAV exceedances.

### Supply notifications of MAV exceedance

	Year Submitted	2021 (6 weeks)	2022	2023
	Notifications	<b>37</b>	<b>199</b>	<b>335</b>
	Notifications of Bacterial Exceedance	<b>26</b>	<b>91</b>	<b>114</b>
	Notifications of Chemical Exceedance	<b>11</b>	<b>109</b>	<b>221</b>

	Year Submitted	2021 (6 weeks)	2022	2023
	Notifications	<b>53</b>	<b>330</b>	<b>604</b>
	Notifications of Bacterial Exceedance	<b>42</b>	<b>210</b>	<b>235</b>
	Notifications of Chemical Exceedance	<b>11</b>	<b>120</b>	<b>369</b>

# Drinking water safety

## Notifications – Bacterial exceedances


- A number of communities across New Zealand continue to experience events where unsafe water is being supplied to consumers
- We expect suppliers to recognise that any notification of *E. coli* is serious and requires an effective response and investigation.
- England and Scotland have exceptionally low rates of detection of *E. coli* in drinking water.



# Drinking water safety

## Notifications – Chemical exceedances

### Chemical MAV exceedances



Chemical determinand	Lab notifications received in 2021	Lab notifications received in 2022	Lab notifications received in 2023	Number of supplies affected by notifications made in 2023	MAV (mg/L)	Median lab result received in 2023 (mg/L)	Maximum lab result received in 2023 (mg/L)
Aluminium	0	0	210	10	1	1.8400	115
Chlorate	0	8	87	16	0.8	2.5440	11.9
Arsenic	7	90	27	9	0.01	0.0120	0.024
Disinfection by-products	3	11	21	8	Varies	-	-
Lead	1	7	10	10	0.01	0.0136	0.021
Manganese	0	1	7	4	0.4	0.6550	2.3
Chlorine	0	1	6	5	5	5.7500	33

### Notifications of MAV exceedance – Chemical





# Drinking water safety

## Consumer advisories

### Consumer advisories - 2023

				
	Boil water	Do not drink	Do not use	All
Long-term	<b>105</b>	<b>7</b>	<b>0</b>	<b>112</b>
Temporary	<b>93</b>	<b>23</b>	<b>2</b>	<b>118</b>
All	<b>198</b>	<b>30</b>	<b>2</b>	<b>230</b>



# Supplier performance

Ryan/Noah

# Supplier performance

## Categories

Supply component	Performance Categories
Abstraction Points	<ul style="list-style-type: none"><li>• Source Water Monitoring (S1,S2,S3)</li><li>• Cyanobacteria risk assessment (S2,S3)</li></ul>
Treatment Plants	<ul style="list-style-type: none"><li>• Treatment barriers (registration information)</li><li>• Treatment performance for small and medium supplies (T1,T2)</li><li>• Bacteria treatment performance for large supplies (T3)</li><li>• Large supplies meeting protozoa log credit requirements (T3)</li><li>• Treatment chemical monitoring (T2,T3)</li></ul>
Distribution Zones	<ul style="list-style-type: none"><li>• Bacterial monitoring (D1,D2,D3)</li><li>• Residual disinfection barrier (registration information)</li><li>• Residual disinfection monitoring (D2,D3)</li><li>• Distribution chemical monitoring (D1,D2,D3)</li><li>• Backflow prevention (D2,D3)</li><li>• Distribution storage practices (D3)</li><li>• Hygiene procedures (D3)</li><li>• Interruption to supply (notifications by suppliers)</li></ul>

# Supplier performance

## Methodology

### Overview of steps

1. Suppliers provide information (Rules reporting, registration information).
2. We group individual rules and requirements into categories.
3. We calculate average performance for all supplies submitting reports, assigning a value from 0-100% for each category for each supply.
4. We report on all council supplies.

Analysis Outcome	Percent of category requirements reported to us as met
All met	100%
Almost met	95-99%
Partially met	1-94%
None met	0%
No valid reports found	No valid reports received by 31 March 2024 for the category

# Supplier performance

## Categories

1. Appendix which shows rules in analysis
2. Some rules are made up of Rule IDs
3. Each rule ID is treated with equal weighting

**Some rules with multiple requirements are weighted more heavily in our analysis.**

Treatment performance for small and medium supplies	Bacteria treatment	Large supplies meeting protozoa log credit requirements
Level 1 rules: T1.8	Level 1 rules: None	Level 1 rules: None
Level 2 rules: T2.1 to T2.3 T2.9 to T2.14 T2.18 to T2.21	Level 2 rules: None	Level 2 rules: None
Level 3 rules: None	Level 3 rules: T3.1 to T3.6 T3.7 to T3.11 T3.12 to T3.14 T3.15 to T3.18	Level 3 rule: T3.22

# Supplier performance

## Validation

1. Validation checks which reject submissions.
2. Post-submission, pre-reporting validation checks.
3. Suppliers should be verifying their data prior to submitting to us to be confident in their reporting on compliance with the Rules.
4. In some cases, we have to use registration information in combination with Rules reporting data.

# Supplier performance

## Methodology

Summary of individual rule ID analysis

- i. Rule reported?
  - a. Yes -> proceed to (ii)
  - b. No -> exclude from performance calculation
- ii. Is it reported correctly?
  - a. Yes -> proceed to (iii)
  - b. No -> exclude from performance calculation
- iii. Calculate rule (rule ID) performance
  - i.  $(\# \text{ of compliant periods in reporting period}) / (\# \text{ of compliance periods in reporting period})$
  - ii. Assigned value between 0 and 1.



# Supplier performance

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## Methodology

1. Supply component performance = average of rule ID performance for each performance category for a single supply component
2. Supply performance = average performance of each relevant supply component

```
select
  r.[Supply_UUID]
, r.[Component_UUID]
, 'Bacterial Treatment' as Rule_Category
, r.rule_id
, avg(cast(r.valid_nc_periods * r.valid_comp_units as float)) as p_valid_compliance
, 1-sum(cast(r.non_compliant_periods as float)) / sum(r.compliance_period_units) as [p_complies]
from rules as r
```

Supply ID	Component ID	Rule Category	Rule ID	Compliance Rate
SUP001	TP001	Bacterial Treatment	T3.15-flow	100.0%
SUP001	TP001	Bacterial Treatment	T3.15-sens	100.0%
SUP001	TP001	Bacterial Treatment	T3.15-turb	100.0%
SUP001	TP001	Bacterial Treatment	T3.15-uvf	50.4%
SUP001	TP001	Bacterial Treatment	T3.16	100.0%
SUP001	TP001	Bacterial Treatment	T3.17	100.0%
SUP001	TP001	Bacterial Treatment	T3.18	100.0%
SUP001	TP001	Bacterial Treatment	T3.19	100.0%
			Average	93.8%

```
select
  [Supply_UUID]
, [Component_UUID]
, [Rule_Category]
, avg(cast(p_complies as float)) as p_complies
```

Supply ID	Component ID	Rule Category	Compliance Rate
SUP001	TP001	Bacterial Treatment	93.8%
SUP001	TP002	Bacterial Treatment	100.0%
SUP001	TP003	Bacterial Treatment	100.0%
		Average	97.9%

Supply ID	SUP001
Rule Category	Bacterial Treatment
Average Compliance Rate	97.9%
Performance	Almost met

# Supplier performance

## Challenges and assumptions

1. Complex and nuanced set of data -> We had to simplify and not use all the data.
2. Completeness is not analysed this year. We analyse data reported on and make no assumptions about rules which were not reported in a category.
  - We do not recommend comparing performance against other supplies this year.
  - All suppliers should have reported on all the rules in categories which apply to their supply components and elected/mandatory rule level.
3. Only reports received as of 31 March 2024 are in the snapshot of the report.
4. We do not verify or audit the accuracy of supplier data at this stage, it is the supplier's responsibility to comply with Rules and provide reporting.
5. Only rules applicable to each category were used to calculate performance.
6. Some cases where lower performance may be linked to plants which produce no or little water. All supply components **which were reported on** were used in analysis.

# Supplier performance

## Example

1. “Little River” supply reports on T2 rules their only treatment plant.
2. “Treatment performance for small and medium supplies” is a category that applies to this plant and uses T2.1 to T2.3, T2.9 to T2.14, and T2.18 to T2.21.
3. T2.1 has six requirements applicable to this category, leaving in total 18 requirements.
4. The supplier reports full compliance with all requirements except that the supply was non-compliant with T2.1-fac and T2.19 for 3 months each.

Rule ID being reported	Compliance rate
T2.1-fac	75%
T2.19	75%
16 other rule IDs used in category	100%
Calculated performance	
Treatment performance for small and medium supplies	$(16 \times 100\% + 75\% + 75\%) / 18 = 97.2\%$ Almost Met

# Supplier performance

## Example calculation

1. “Big River” supply reports on T3 rules for two treatment plants.
2. “Bacterial treatment” is a category that applies to this plant and uses T3.1 to T3.6, T3.7 to T3.11, T3.12 to T3.14, and/or T3.15 to T3.18.
3. Some of these rules have multiple requirements, but only one set need be reported as only one bacteria barrier is required.
4. The supplier reports the supply was compliant with rules T3.1, T3.2, T3.4, and T3.5 fully, but had 20 days of non-compliance with T3.3.

Rule ID being reported	Compliance rate
T3.3	$345/365 * 100\% = 94.5\%$
11 rule IDs used in category	100%
Calculated performance	
Treatment performance for small and medium supplies	$(11 * 100\% + 94.5\%) / 12 = 99.5\%$ Almost Met

# Supplier performance

## Supplies reported on

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### Registered supplies expected to provide Rules reporting

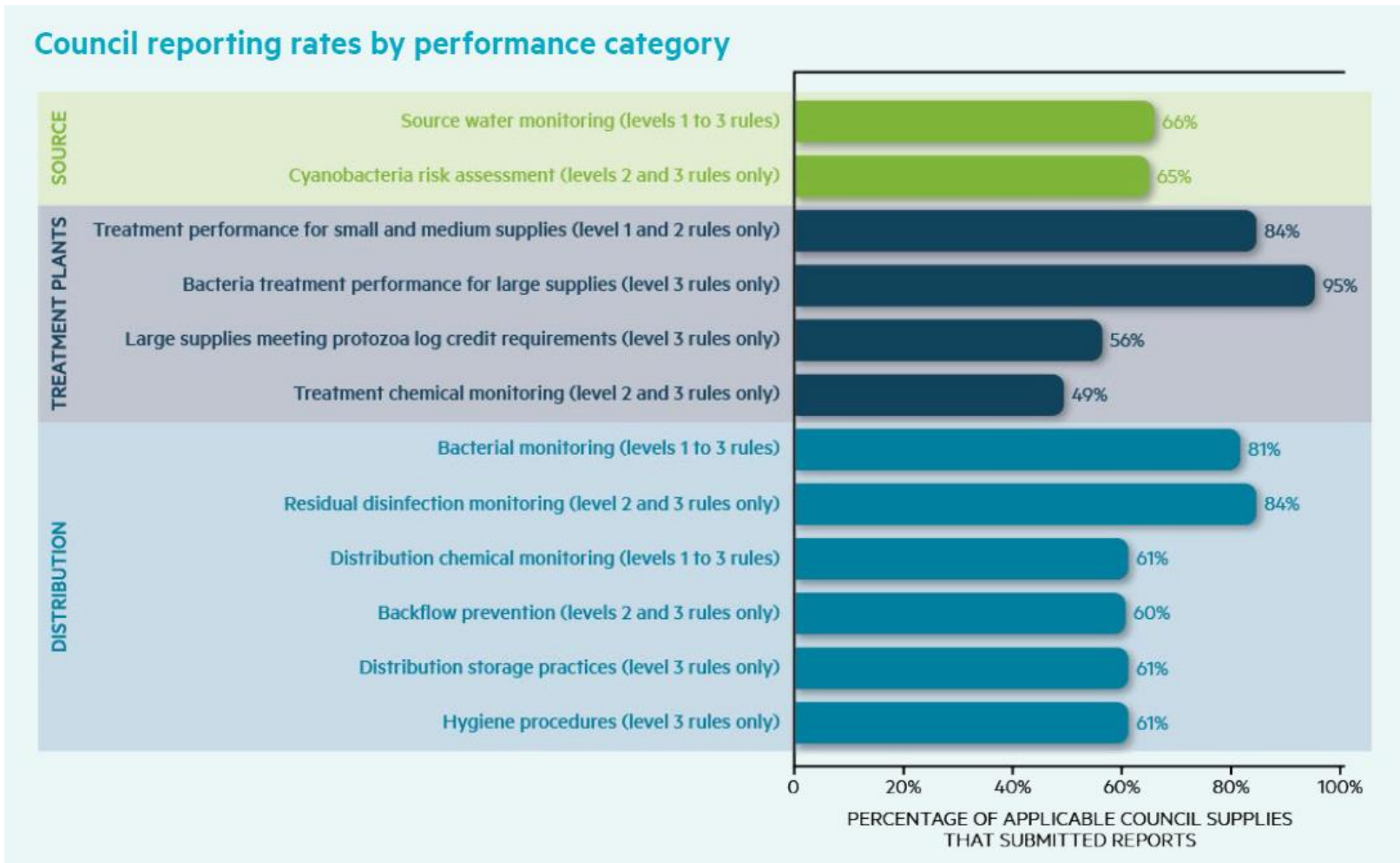


Supplier Category	Supplies reported on	Supplies requiring reports
Council	<b>463</b>	<b>486</b>
Department of Conservation	<b>2</b>	<b>35</b>
Department of Corrections	<b>3</b>	<b>3</b>
Ministry of Education	<b>-</b>	<b>362</b>
New Zealand Defence Force	<b>-</b>	<b>8</b>
Private and Community	<b>30</b>	<b>175</b>
<b>TOTAL</b>	<b>498</b>	<b>1,069</b>



# Supplier performance (council only)

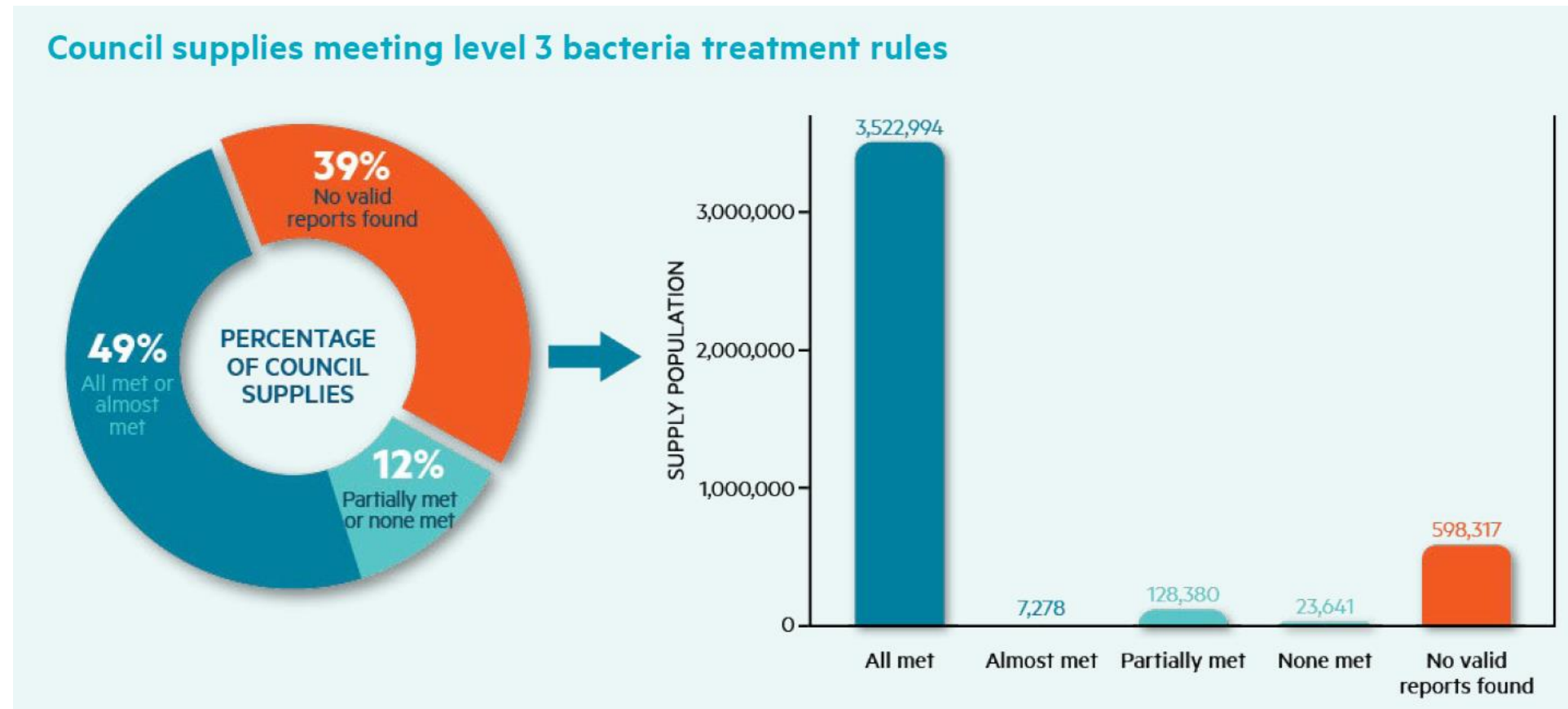
## Supplies reported on





# Supplier performance (council only)

## Bacteria treatment for large supplies



# Supplier performance

## Looking forward

We will be considering the following:

1. additional validation checks upon submission of reports
2. displaying what you've submitted in Hinekōrako and category results for your supplies
3. T3 Protozoa Rules and treatment performance
4. incorporating reporting completeness into categories (e.g. if you didn't report and should have, you fail your requirement).

# Source water

## India

# Source water

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## Prevent hazards from entering the raw water


- Source water protection is the first barrier available to suppliers to maintain safe drinking water.
- Source Water Risk Management Plan required as a part of a drinking water safety plan, to then inform source water monitoring.
- Source water monitoring is the minimum action available to suppliers to understand and manage the risks in their source water catchment.



# Source water

## Source water samples

### Registered supplies that submitted Source Water samples



Supplier Category	Supplies
Council	<b>313</b>
Department of Conservation	<b>2</b>
Department of Corrections	<b>3</b>
Private and Community	<b>15</b>
TOTAL	<b>333</b>

All supply sources require some form of source water monitoring, either continuously or grab sampling.

If a supplier identifies an issue (e.g. elevated determinand), more sampling is required to monitor the situation and address associated risks.

Considerably fewer sample results were reported than expected.

# Source water

## *E. coli* sample results

MAVs apply to drinking water only (i.e. post-treatment) but can be indicative of treatment requirements.

However, they provide an insight into demands of treatment plant and eventual treated water quality.

*E. coli* in source water indicates the presence of microorganisms that need to be managed.

Supplies using Interim Class 1 bores have increased microbiological sampling.

### Summary of *E. coli* results from different source types received from registered supplies in 2023



Units: cfu/100ml or mpn/100 mL<sup>1</sup>

Source Water Detailed	0 or <1	1 to 10	11 to 100	over 100	TOTAL SAMPLES
Bore (>30 m deep)	<b>8,956</b>	<b>470</b>	<b>15</b>	<b>3</b>	<b>9,444</b>
Bore (10-30 m deep)	<b>908</b>	<b>38</b>	<b>6</b>	<b>2</b>	<b>954</b>
Bore (<10 m deep)	<b>513</b>	<b>82</b>	<b>22</b>	<b>11</b>	<b>628</b>
Spring	<b>219</b>	<b>96</b>	<b>10</b>	<b>1</b>	<b>326</b>
River, Stream, Creek	<b>765</b>	<b>805</b>	<b>831</b>	<b>893</b>	<b>3,294</b>
Lake	<b>163</b>	<b>385</b>	<b>214</b>	<b>79</b>	<b>841</b>
Roof	<b>56</b>	<b>70</b>	<b>103</b>	<b>95</b>	<b>324</b>
<b>TOTAL</b>	<b>11,580</b>	<b>1,946</b>	<b>1,201</b>	<b>1,084</b>	<b>15,811</b>

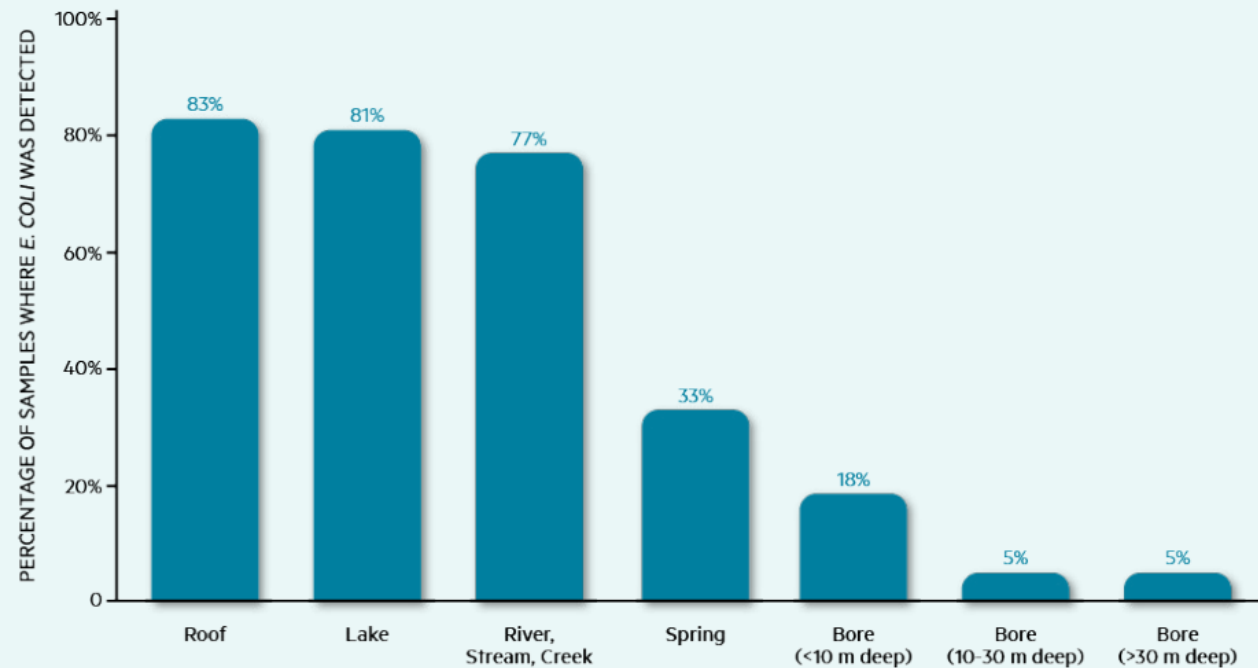
<sup>1</sup> Colony-forming unit – cfu <sup>1</sup> Most probable number – mpn

# Source water

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## *E. coli* detections by source type

Percentage of samples from different source types in registered supplies where *E. coli* was detected



Summary of *E. coli* results from different source types received from registered supplies in 2023



Units: cfu/100ml or mpn/100 mL<sup>1</sup>

Source Water Detailed	0 or <1	1 to 10	11 to 100	over 100	TOTAL SAMPLES
Bore (>30 m deep)	8,956	470	15	3	9,444
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Spring	219	96	10	1	326
River, Stream, Creek	765	805	831	893	3,294
Lake	163	385	214	79	841
Roof	56	70	103	95	324
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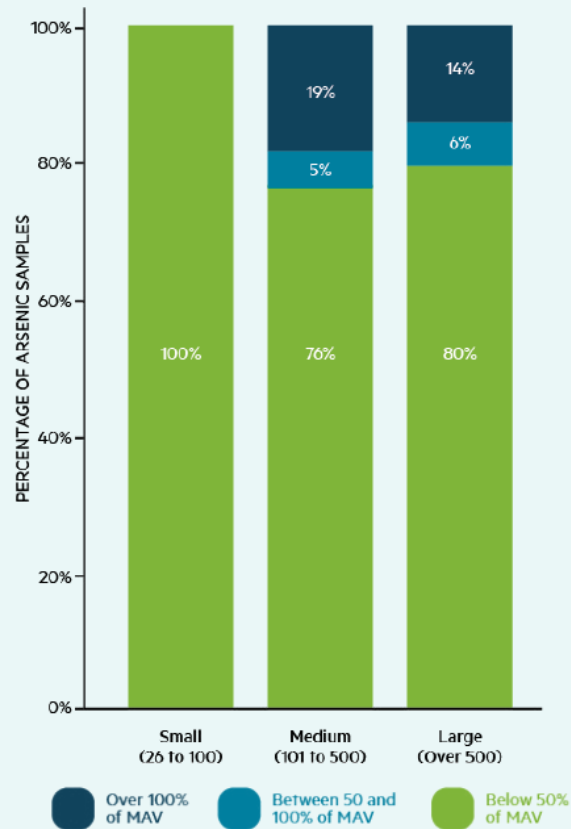
<sup>1</sup> Colony-forming unit - cfu <sup>1</sup> Most probable number - mpn



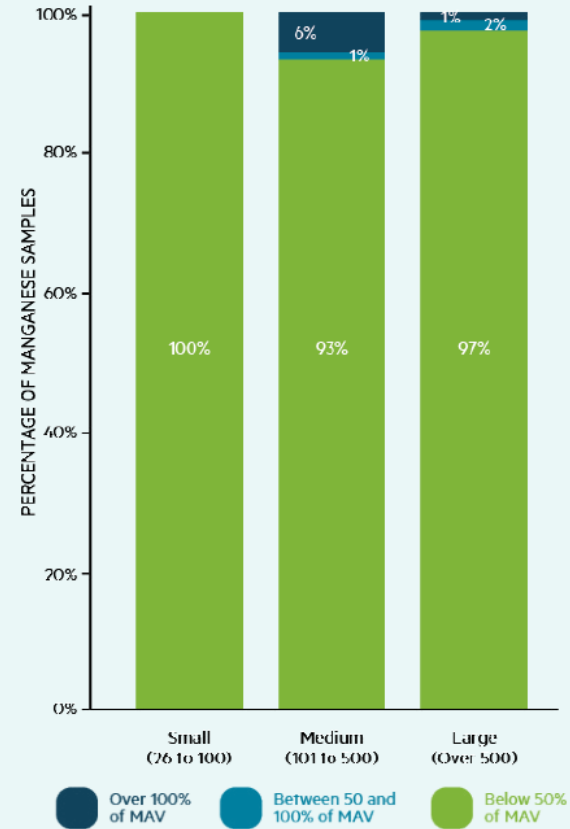
# Source water

## Chemical determinands

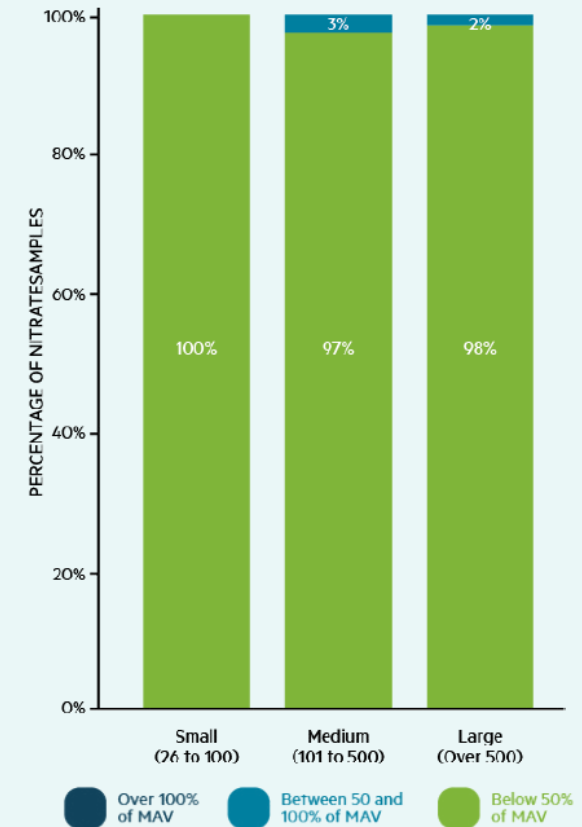
Distribution of Arsenic samples by population size



Distribution of Manganese samples by population size



Distribution of Nitrate samples by population size



Unclassified

# Pātai?