Appendices

Appendix 1: Anatomic therapeutic chemical and AWaRe classification for funded systemic antibiotics.

ATC group	Antibiotic agent	AWaRe classification
J01A: tetracyclines	Doxycycline, minocycline, tetracycline	Access
J01C: penicillins		
J01CA: penicillins with extended spectrum	Amoxicillin	Access
J01CE: β-lactamase-sensitive penicillins	Phenoxymethylpenicillin, benzyl-penicillin, benzathine penicillin, procaine penicillin	Access
J01CF: β-lactamase-resistant penicillins	Flucloxacillin	Access
J01CR: combinations of penicillins with β-lactamase inhibitors	Amoxicillin and clavulanic acid	Access
J01D: cephalosporins		
J01DB: first-generation cephalosporins	Cefalexin, cefazolin	Access
J01DC: second-generation cephalosporins	Cefaclor, cefuroxime	Watch
J01DD: third-generation cephalosporins	Ceftriaxone	Watch
J01E: sulfonamides and trimethoprim	Trimethoprim, trimethoprim and sulfamethoxazole	Access
J01F: Macrolides and lincosamides		
J01FA: macrolides	Azithromycin, clarithromycin, erythromycin, roxithromycin	Watch
J01FF: lincosamides	Clindamycin	Access
J01M: quinolones	Ciprofloxacin, moxifloxacin, norfloxacin	Watch
J01X: other antibacterials		
J01XA: glycopeptides	Vancomycin	Watch

Appendix 1 (continued): Anatomic therapeutic chemical and AWaRe classification for funded systemic antibiotics.

J01XE: nitrofuran derivatives	Metronidazole, ornidazole,	Access
J01XE: nitrofuran derivatives	Nitrofurantoin	Access
J01XX: other	Colistin, gentamicin, methenamine, tobramycin, vancomycin	Reserve, Access, Unclassified, Access Watch, Watch

Appendix 2: The defined daily doses per 1,000 inhabitants per day (DIDs) and number of antibiotic courses per 1,000 inhabitants per year in the Aotearoa New Zealand community from 2010 to 2019. Presented alongside the average annual change (AAC) between 2010 and 2019.

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**AAC (%)**
DIDs	20.4	21.6	22.3	22.4	22.3	22.8	21.4	21.0	20.0	19.9	−0.27
Number of antibiotic courses per 1,000 inhabitants per year	867	906	914	897	879	879	834	830	787	767	−1.7

Appendix 3: Systemic antibiotic dispensing rates in the Aotearoa New Zealand community for 2010 and 2019 by antibiotic group. Rates are presented as defined daily doses per 1,000 inhabitants per day (DIDs) and number of antibiotic courses per 1,000 inhabitants per year in the Aotearoa New Zealand community for 2010 and 2019. Presented alongside the average annual change (AAC) between 2010 and 2019.

Antibiotic group	DID				Number of antibiotic courses per 1,000 inhabitants per year			
	2010	2019	Delta: 2010–2019	AAC (%)	2010	2019	Delta: 2010–2019	AAC (%)
J01A: tetracyclines								
Tetracyclines	5.6	6.0	+0.4	−3.2	57	56	−1	−1.7
J01C: penicillins								
Penicillin with extended spectrum	3.2	4.1	+0.9	−3.0	210	222	+12	−3.8
Beta-lactamase sensitive penicillins	0.5	0.3	−0.2	−4.3	28	15	−13	−6.5
Beta-lactamase resistant penicillins	1.8	1.7	−0.1	−0.7	106	89	−17	−2.5
Penicillin with beta-lactamase inhibitors	3.2	2.3	−0.9	−8.5	165	115	−50	−5.0
J01D: cephalosporins								
First-generation cephalosporins	0.0	0.6	+0.6	+19.2	1	45	+45	+30.0
Second-generation cephalosporins	0.8	0.4	−0.4	−16.9	42	19	−23	−10.3

Appendix 3 (continued): Systemic antibiotic dispensing rates in the Aotearoa New Zealand community for 2010 and 2019 by antibiotic group. Rates are presented as defined daily doses per 1,000 inhabitants per day (DIDs) and number of antibiotic courses per 1,000 inhabitants per year in the Aotearoa New Zealand community for 2010 and 2019. Presented alongside the average annual change (AAC) between 2010 and 2019.

Antibiotic group	DID				Number of antibiotic courses per 1,000 inhabitants per year			
	2010	2019	Delta: 2010–2019	AAC (%)	2010	2019	Delta: 2010–2019	AAC (%)
Third-generation cephalosporins	0.00	0.00	0	0	0	0	0	0.0
J01E: sulfonamides and trimethoprim								
Sulfonamides and trimethoprim	1.6	1.5	−0.1	−2.6	67	61	−6	−2.5
J01F: macrolides and lincosamides								
Macrolides/ lincosamide	2.3	1.8	−0.5	−6.2	105	80	−25	−4.2
J01M: quinolones								
Quinolones	0.1	0.3	+0.2	−10.3	49	14	−35	−14.4
J01X: other antibacterials								
Imidazole derivatives	0.2	0.3	+0.1	−1.8	24	29	+5	−2.0
Nitrofuran derivatives	0.4	0.5	+0.1	−0.6	13	22	+9	+2.7
Other	0.1	0.2	+0.1	+26.6	1	2	+1	+13.0

All standard errors (SE) were minuscule (SE <0.0001); therefore, level of precision for results is how it is presented.

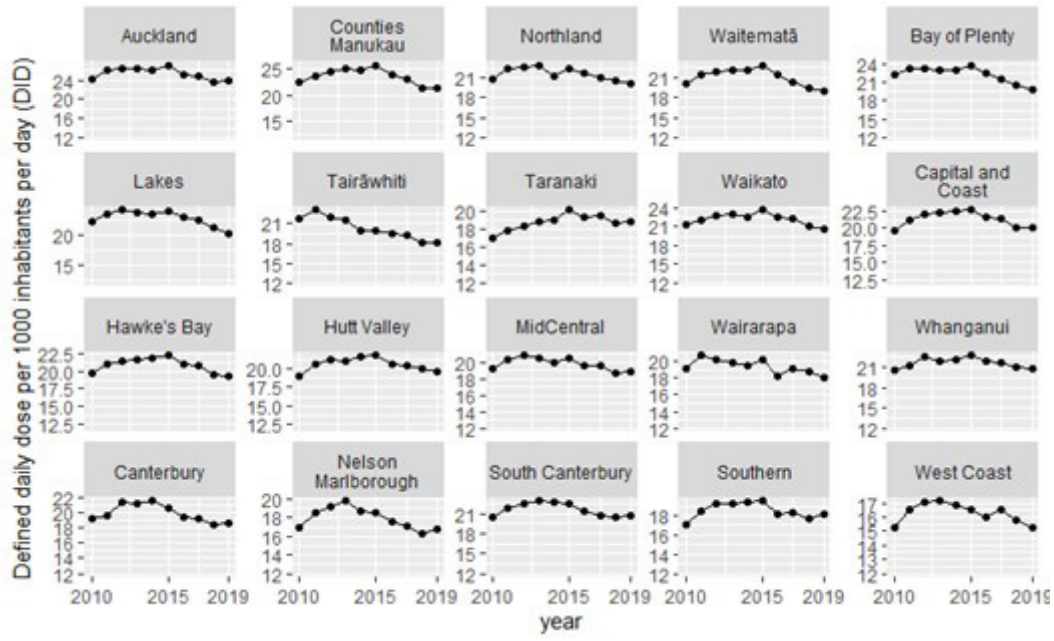
Appendix 4: Proportion of total community systemic antibiotic dispensing attributed to each World Health Organization AWaRe group in Aotearoa New Zealand for 2010 and 2019, with absolute change (delta: 2019–2010) and average annual change (AAC).

	DID				Number of antibiotic courses per 1,000 inhabitants per year			
AWaRe group	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**
Access	81	87	+7	1.0	78	86	+8	1.0
Watch	19	13	−6	−1.3	22	14	−8	−18
Reserve	0.0	0.0	0	0.0	0.0	0.0	0	0.0
Unclassified	0.2	0.9	+0.7	18	0.0	0.2	+0.2	18

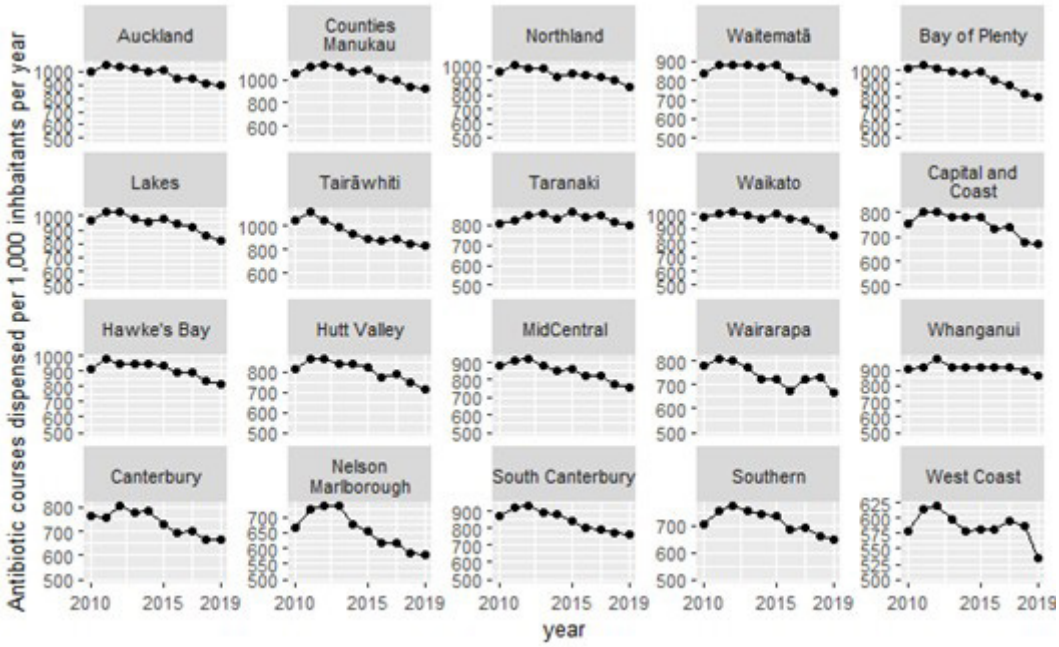
Values represent the proportion (%) of total community systemic antibiotic dispensing attributed to each AWaRe group, calculated separately for defined daily doses per 1,000 inhabitants per day (DIDs) and antibiotic courses per 1,000 inhabitants per year.

Appendix 5a: Rates of in-community systemic antibiotic dispensing between 2010 and 2019 for each district health board (DHB) region by defined daily doses per 1,000 inhabitants per day (DIDs) (a), and antibiotic courses dispensed per 1,000 population per year (b).

(a)



(b)



Graph (a) y axis limit is 10 DIDs and Graph (b) y axis limit is 500 courses dispensed per 1,000 inhabitants per year.

Appendix 5b: Systemic antibiotic dispensing rates in the Aotearoa New Zealand community by district health board (DHB) region between 2010 and 2019. Rates presented as defined daily doses per 1,000 inhabitants per day (DIDs) and number of antibiotics courses dispensed per 1,000 inhabitants per year alongside the average annual change (AAC).

	DID				Number of courses dispensed per 1,000 inhabitants per year			
DHBs	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**
Northern Region								
Auckland	24.1	23.9	−0.2	−0.7	972	665	−307	−1.6
Counties Manukau	22.4	21.2	−0.8	−1.0	1,031	899	−132	−2.1
Northland	20.9	20.1	−0.8	−0.9	959	853	−106	−1.3
Waitematā	20.0	19.1	−0.9	−1.0	816	724	−92	−1.7
Midland Region								
Bay of Plenty	22.2	19.9	−2.3	−1.4	999	798	−201	−2.6
Lakes	22.1	20.3	−1.8	−1.2	966	817	−149	+2.0
Tairāwhiti	21.7	18.1	−3.6	−2.5	1,037	831	−206	−3.1
Taranaki	17.0	18.8	−1.8	+1.0	802	797	−5	−0.2
Waikato	21.4	20.5	−0.9	−0.5	963	844	−119	−1.4
Central Region								
Capital and Coast	19.7	20.0	+0.3	−0.4	746	664	−82	−1.7
Hawke's Bay	19.7	19.4	−0.3	−0.6	910	812	−98	−1.6
Hutt Valley	18.9	19.6	+0.7	−0.2	804	712	−92	−1.7

Appendix 5b (continued): Systemic antibiotic dispensing rates in the Aotearoa New Zealand community by district health board (DHB) region between 2010 and 2019. Rates presented as defined daily doses per 1,000 inhabitants per day (DIDs) and number of antibiotics courses dispensed per 1,000 inhabitants per year alongside the average annual change (AAC).

	DID				Number of courses dispensed per 1,000 inhabitants per year			
DHBs	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**
MidCentral	19.2	18.8	−0.4	−0.7	874	754	−120	−1.9
Wairarapa	19.1	18.0	−1.1	−1.1	781	661	−120	−1.9
Whanganui	20.5	20.9	+0.4	0	905	859	−46	−0.6
South Island Region								
Canterbury	19.2	18.6	−0.6	−1.0	750	656	−94	−2.0
Nelson Marlborough	17.0	16.7	−0.3	−1.2	662	577	−105	−2.5
South Canterbury	20.6	20.6	0.0	−0.7	866	762	−104	−2.1
Southern	17.0	18.1	+1.1	−0.1	697	647	−50	−1.5
West Coast	15.2	15.2	0.0	−0.4	577	534	−43	−0.8

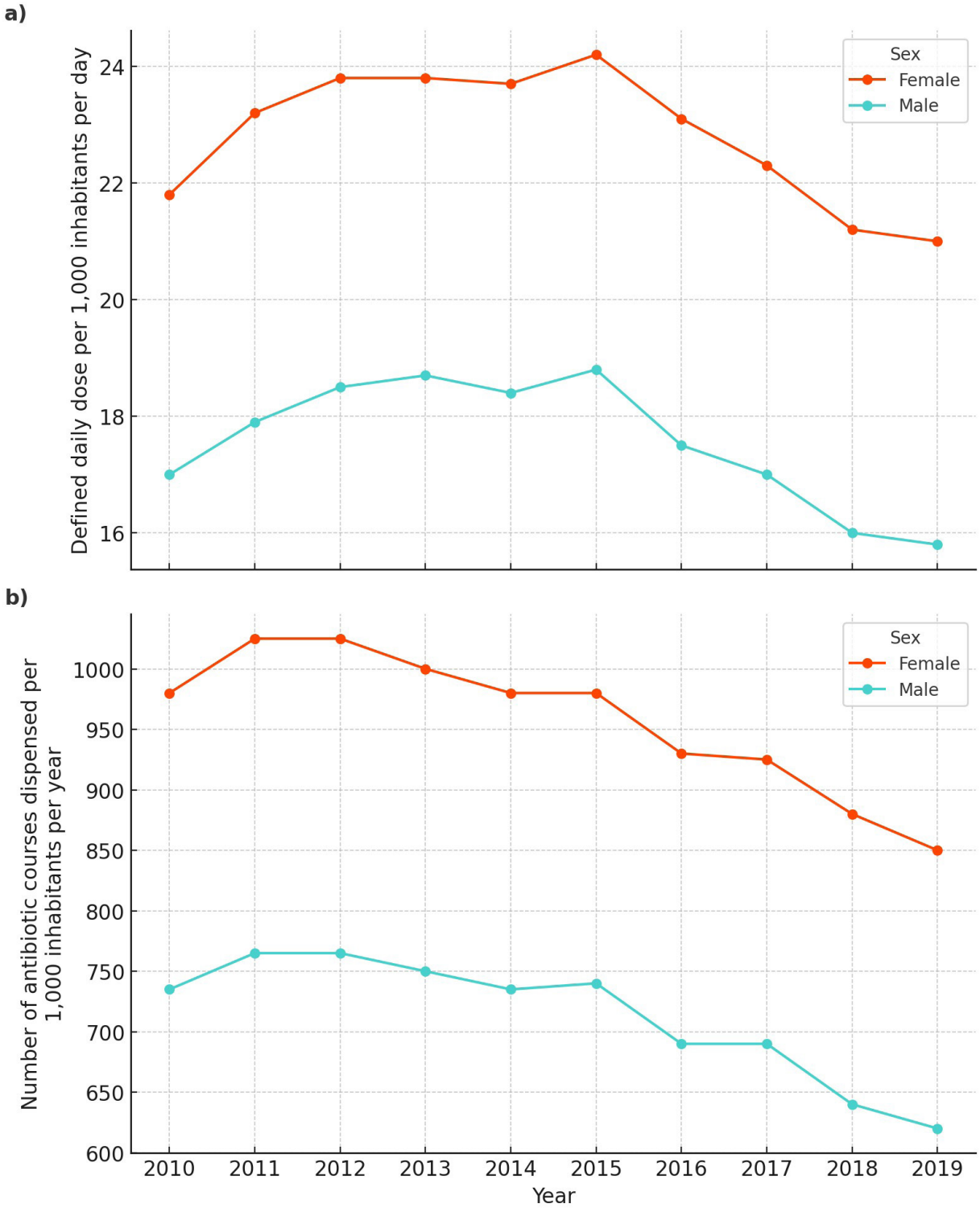
All standard errors (SE) were minuscule (SE <0.0001); therefore, level of precision for results is how it is presented.

Appendix 6a: Systemic antibiotic dispensing rates in the Aotearoa New Zealand community by patient characteristics. Rates presented as defined daily doses per 1,000 inhabitants per day (DIDs) and number of antibiotics courses dispensed per 1,000 inhabitants per year and the average annual change (AAC).

	DID				Number of antibiotic courses per 1,000 inhabitants per year			
Patient characteristics	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**
Age								
>5					1,758	1,179	−579	−1.8
5–9					975	785	−190	−1.8
10–19					695	584	−111	−1.8
20–59					692	641	−51	−1.8
60+					1,200	1,117	−83	−1.8
Sex								
Females	21.8	21.1	−0.7	−1.0	981	851	−130	−1.6
Males	17.0	15.9	−1.1	−1.0	732	625	−107	−1.6
Ethnicity								
Māori	28.1	28.5	+0.4	−0.5	1,322	1,228	−94	−1.4
Pacific people	34.7	34.6	−0.1	−0.3	1,674	1,555	−119	−1.0
Asian	20.4	20.3	−0.1	−0.6	918	838	−80	−1.3
Other	30.9	32.7	+1.8	0	1,278	1,208	−70	−0.7
Deprivation quintile								
1	30.2	30.1	−0.1	−0.6	1,371	1,235	−136	−1.3
2	29.0	31.4	+2.4	0	1,184	1,169	−15	−0.3

Appendix 6a (continued): Systemic antibiotic dispensing rates in the Aotearoa New Zealand community by patient characteristics. Rates presented as defined daily doses per 1,000 inhabitants per day (DIDs) and number of antibiotics courses dispensed per 1,000 inhabitants per year and the average annual change (AAC).

	DID				Number of antibiotic courses per 1,000 inhabitants per year			
Patient characteristics	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**	**2010**	**2019**	**Delta: 2019–2010**	**AAC (%)**
3	30.8	30.5	−0.3	−0.5	1,273	1,165	−108	−1.1
4	31.7	28.9	−2.8	−1.8	1,343	1,123	−220	−2.4
5	39.0	33.2	−5.8	−2.2	1,672	1,322	−350	−2.9

All standard errors (SE) were minuscule (SE <0.0001); therefore, level of precision for results is how it is presented.

Appendix 6b: Age-standardised rates of community systemic antibiotic dispensing between 2010 and 2019 by sex and measured in defined daily doses per 1,000 inhabitants per day (DIDs) (a), and antibiotic courses dispensed per 1,000 population per year (b).