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Centre for Health Protection

Antimicrobial Resistance (AMU) Surveillance in Hong Kong - Wholesale Supply Data (2016-2023) Results, Summary and Recommendations

December 2024

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Department of Health

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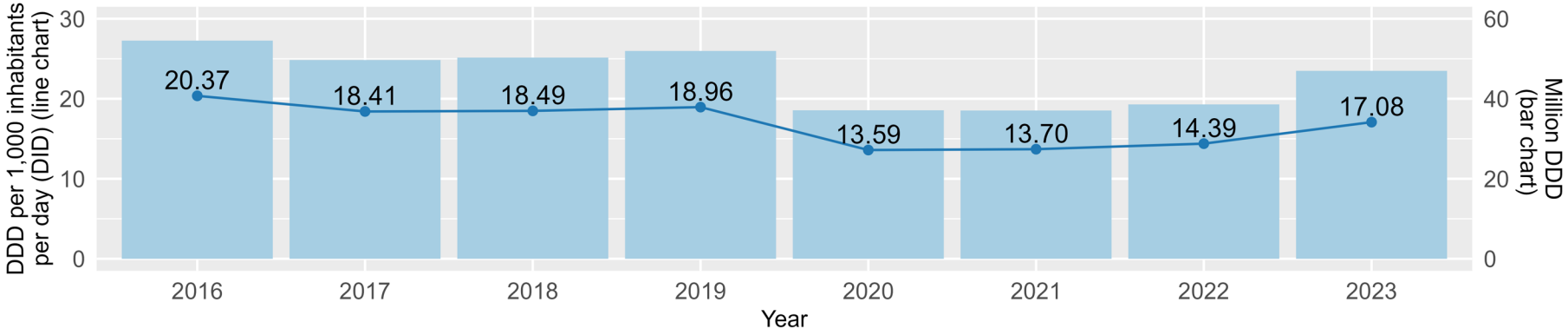
Results

1. Overall antimicrobials wholesale supply (2016-2023)

1. Overall antimicrobials wholesale supply (2016-2023)



	Year								Average annual change	p-value	Compound annual growth rate (16 to 23)
	2016	2017	2018	2019	2020	2021	2022	2023			
DDD in million	54.54	49.68	50.29	51.95	37.12	37.06	38.59	46.98	-	-	-2.1%
DID	20.37	18.41	18.49	18.96	13.59	13.70	14.39	17.08	-0.748	-	-2.5%

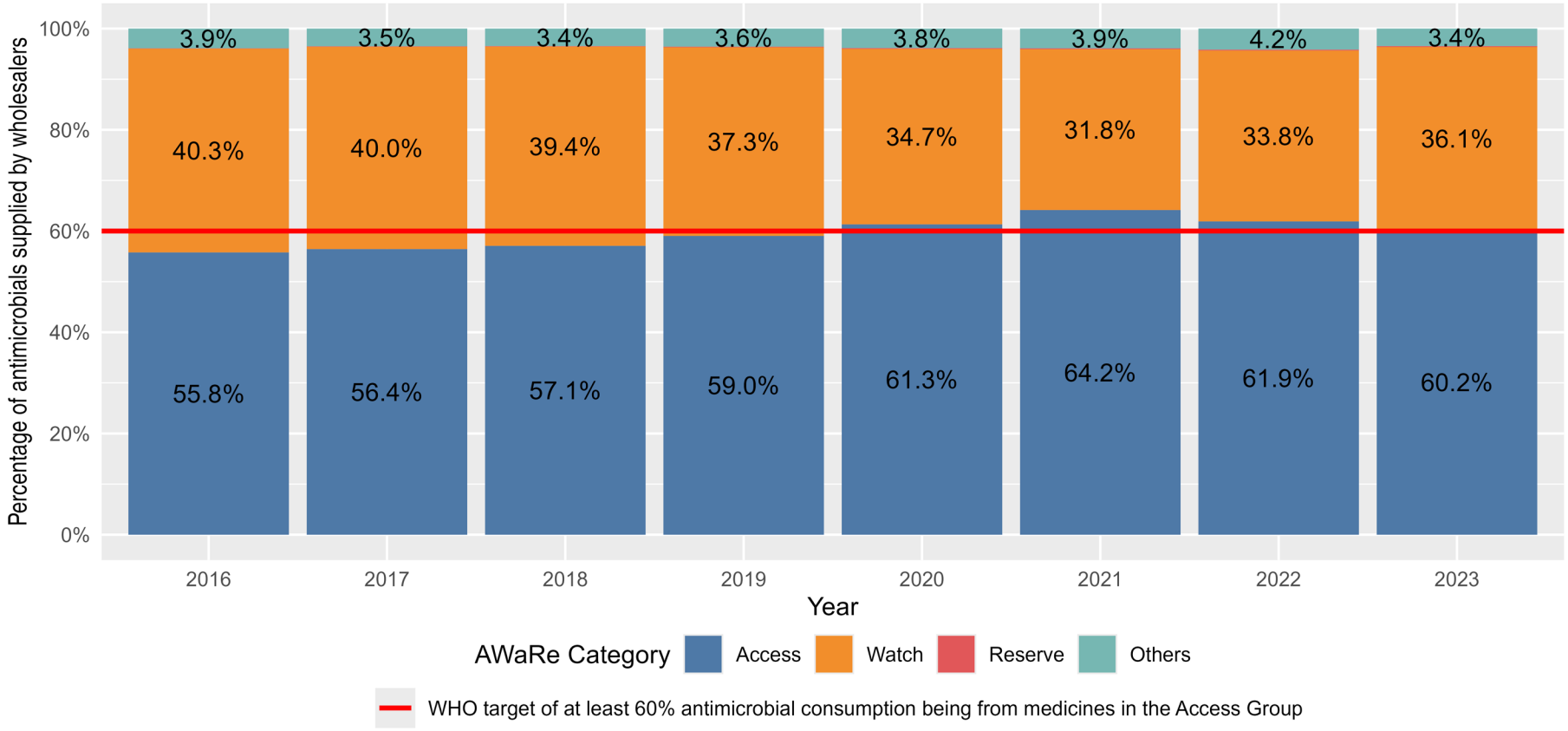
- The overall antimicrobials supply decreased from 20.37 DID (2016) to 13.70 DID (2021), followed by a mild rebound in 2022 to 14.39 DID and the increase continued in 2023 to 17.08 DID.
- 18.7% increase (↑2.69 DID) from 2022 to 2023.
- When compared with the total supply in 2016 (baseline), a decrease of 3.29 DID (↓16.2%) in 2023 was observed (CAGR: -2.5%).

Results

2A. Overall antimicrobials wholesale supply (2016-2023)

- Distribution by WHO AWaRe categorisation

2A. Antimicrobials wholesale supply (2016-2023) - Distribution by WHO AWaRe categorisation



- Antimicrobials under Access constituted 55.8% of all antimicrobials supplied in 2016 and increased to 60.2% in 2023 (Exceeded 60%).
- The proportion of antimicrobials under Watch showed a mild rebound from 33.8% in 2022 to 36.1% in 2023.

2A. Antimicrobials wholesale supply (2016-2023) - Distribution by WHO AWaRe categorisation

AWaRe Categorisation	DDD per 1,000 inhabitant days								Average annual change	p-value	Compound annual growth rate (16 to 23)
	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023			
Access	11.36	10.39	10.55	11.19	8.34	8.79	8.91	10.29	-0.275	-	-1.4%
Watch	8.20	7.36	7.28	7.07	4.71	4.35	4.86	6.17	-0.450	<0.05	-4.0%
Reserve	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.002	<0.01	11.2%
Others	0.79	0.64	0.64	0.68	0.52	0.53	0.60	0.59	-0.025	<0.05	-4.2%

- The supply of antimicrobials under Access and Watch showed decrease of 1.4% and 4.0% in CAGR from 2016 to 2023 respectively.
- As the total number of antimicrobials under Reserve supplied in Hong Kong increased from five in 2016 to thirteen in 2023, the CAGR figure must be interpreted with caution.

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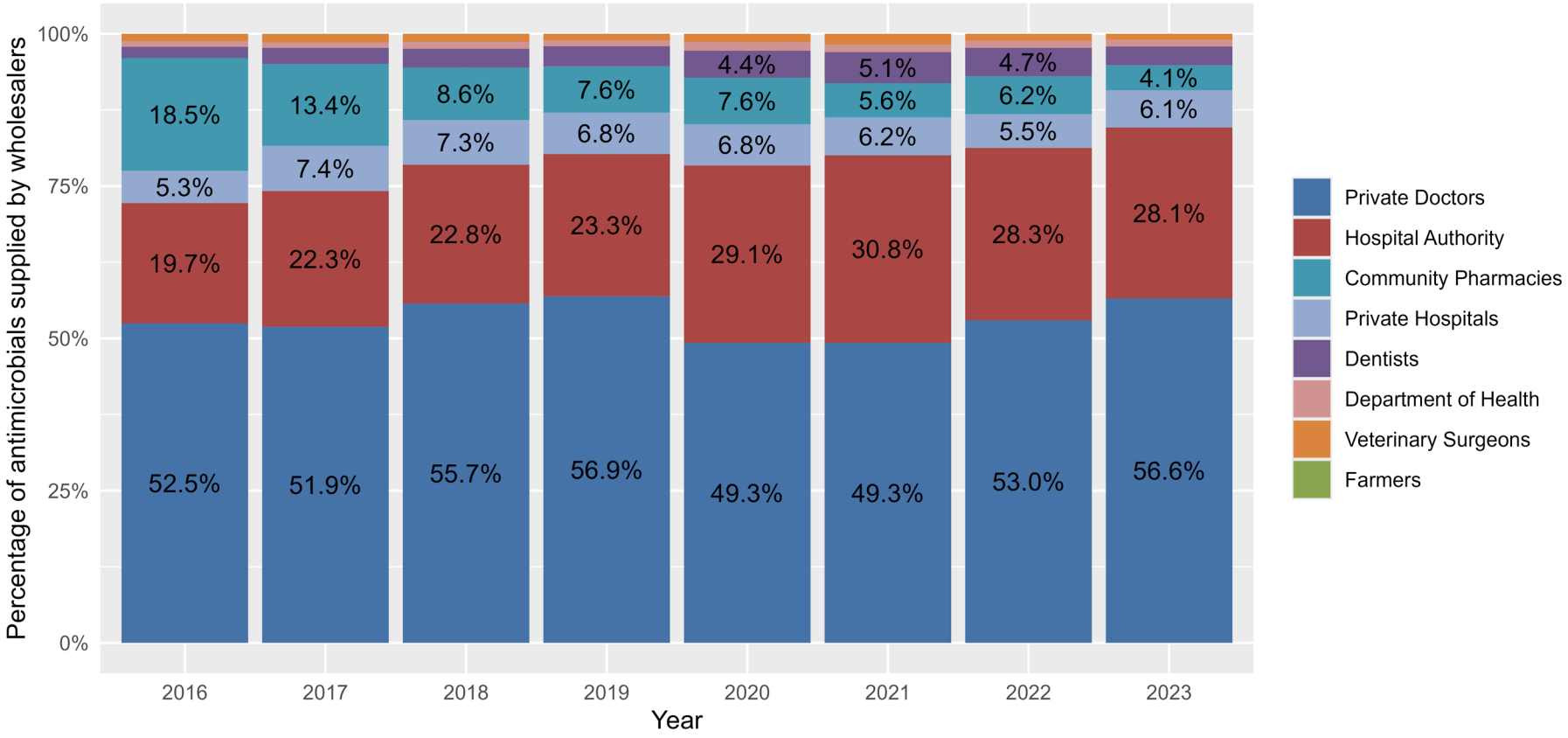
Results

2B. Antimicrobials wholesale supply (2016-2023)

- Distribution by Sector

2B. Antimicrobials wholesale supply (2016-2023) - Distribution by Sector



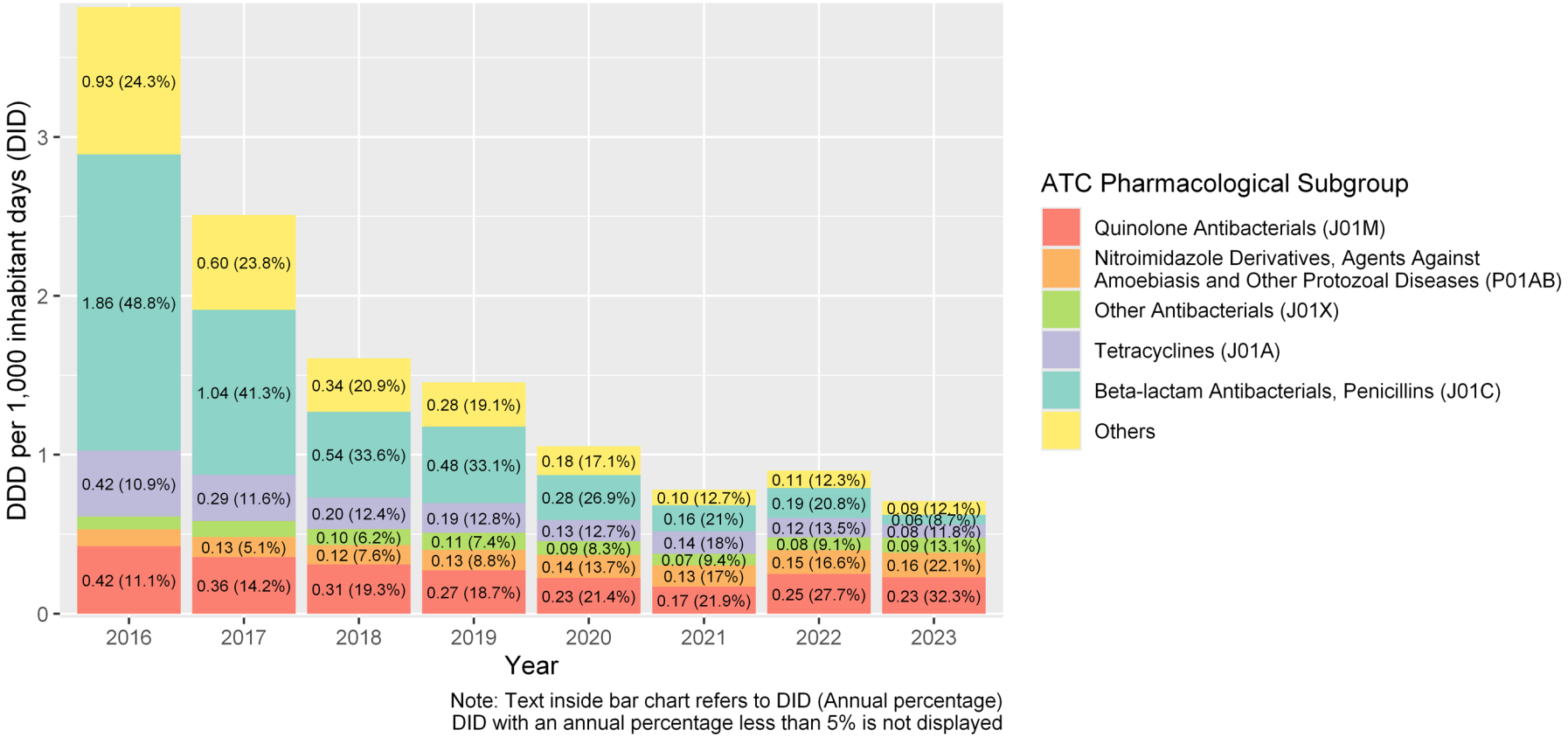
- In 2023, 56.6% of antimicrobials supplied in Hong Kong went to private doctors, followed by Hospital Authority (28.1%), private hospitals (6.1%), and community pharmacies (4.1%).
- Percentage of antimicrobials supplied to community pharmacies decreased from 18.5% in 2016 to 4.1% in 2023.

2B. Antimicrobials wholesale supply (2016-2023) - Distribution by Sector

	DDD per 1,000 inhabitant days								Average annual change	p-value	Compound annual growth rate (16 to 23)
	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023			
Human-use sectors											
Private Doctors	10.82	9.69	10.44	10.91	6.79	6.87	7.71	9.76	-0.382	-	-1.5%
Hospital Authority	4.07	4.16	4.27	4.47	4.01	4.29	4.12	4.84	0.057	-	2.5%
Community Pharmacies	3.82	2.51	1.61	1.46	1.05	0.78	0.90	0.71	-0.389	<0.01	-21.4%
Private Hospitals	1.09	1.38	1.38	1.31	0.93	0.87	0.81	1.06	-0.06	-	-0.5%
Dentists	0.38	0.50	0.58	0.64	0.61	0.71	0.68	0.53	0.028	-	4.9%
Department of Health	0.19	0.17	0.21	0.17	0.19	0.17	0.16	0.19	-0.002	-	-0.6%

- While supply volume of antimicrobials to community pharmacies showed a decrease of 21.4% in CAGR from 2016 to 2023, the supply to dentists showed an increase of 4.9% but started to show a decrease from 2021 to 2023.
- Meanwhile, from 2022 to 2023, the supply volume of antimicrobials to private doctors, the Hospital Authority, private hospitals and the Department of Health increased, while that to the community pharmacies and dentists decreased.

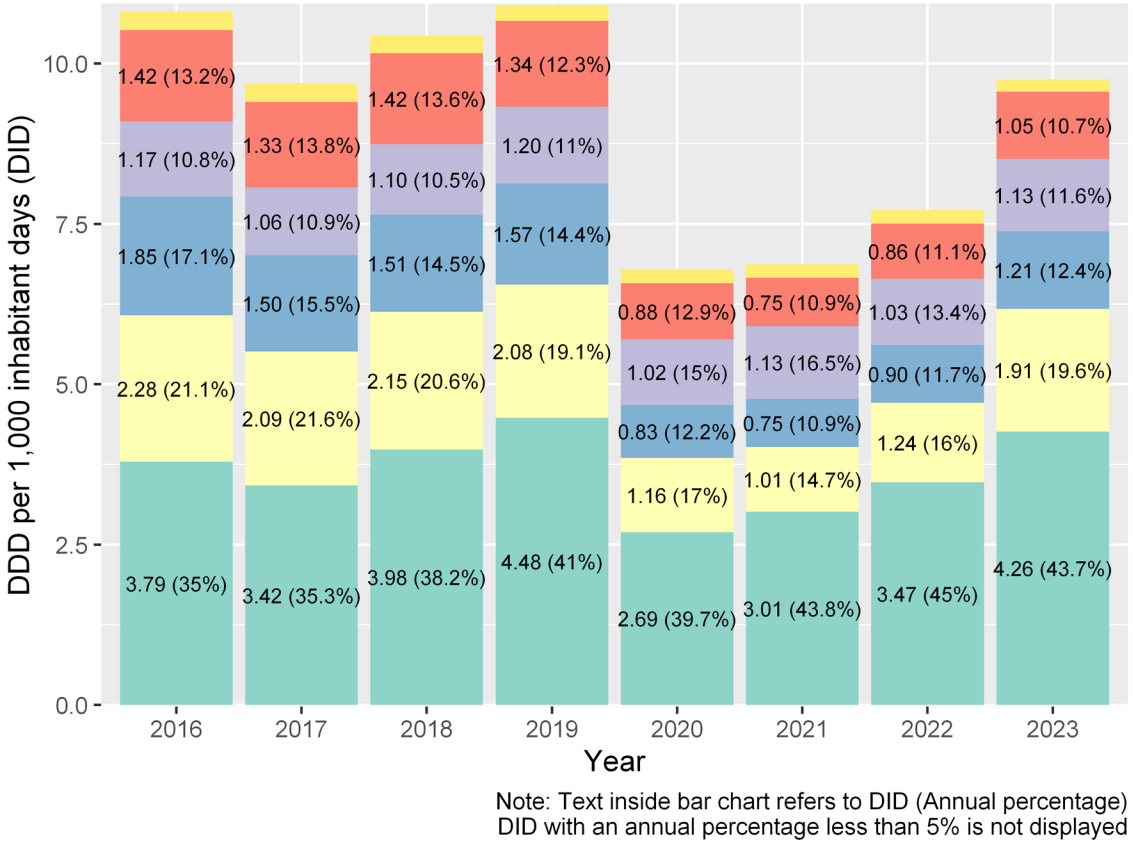
Antimicrobials wholesale supply for Community Pharmacies (by ATC Pharmacological Subgroup)



Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- The amount of beta-lactam antibacterials, penicillins (J01C) supplied to community pharmacies was 0.19 DID in 2022 and reduced to less than 0.1 DID in 2023.
- The supply volume of quinolone antibacterials (J01M) in 2023 has decreased by 0.02 DID (↓8.4%), yet this subgroup is still the most commonly dispensed antimicrobials subgroup in community pharmacies since 2021.

Antimicrobials wholesale supply for Private Doctors (by ATC Pharmacological Subgroup)



Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- For private doctors, the supply volume of beta-lactam antibacterials, penicillins (J01C) has increased by 1.57 DID (↑58.2%) since 2020.
- All of the five most commonly dispensed antimicrobial groups showed an increase in supply volume from 2022 to 2023.

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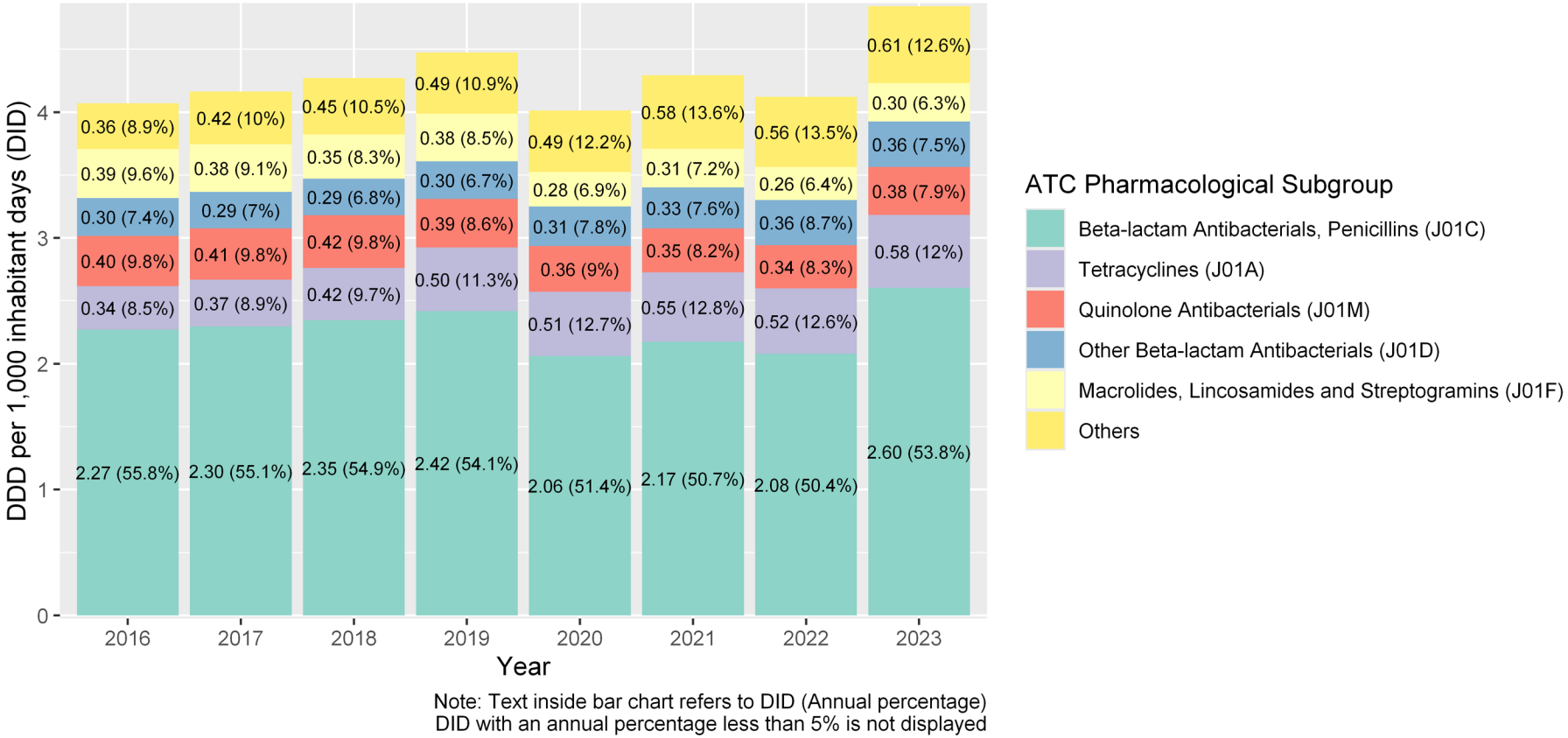
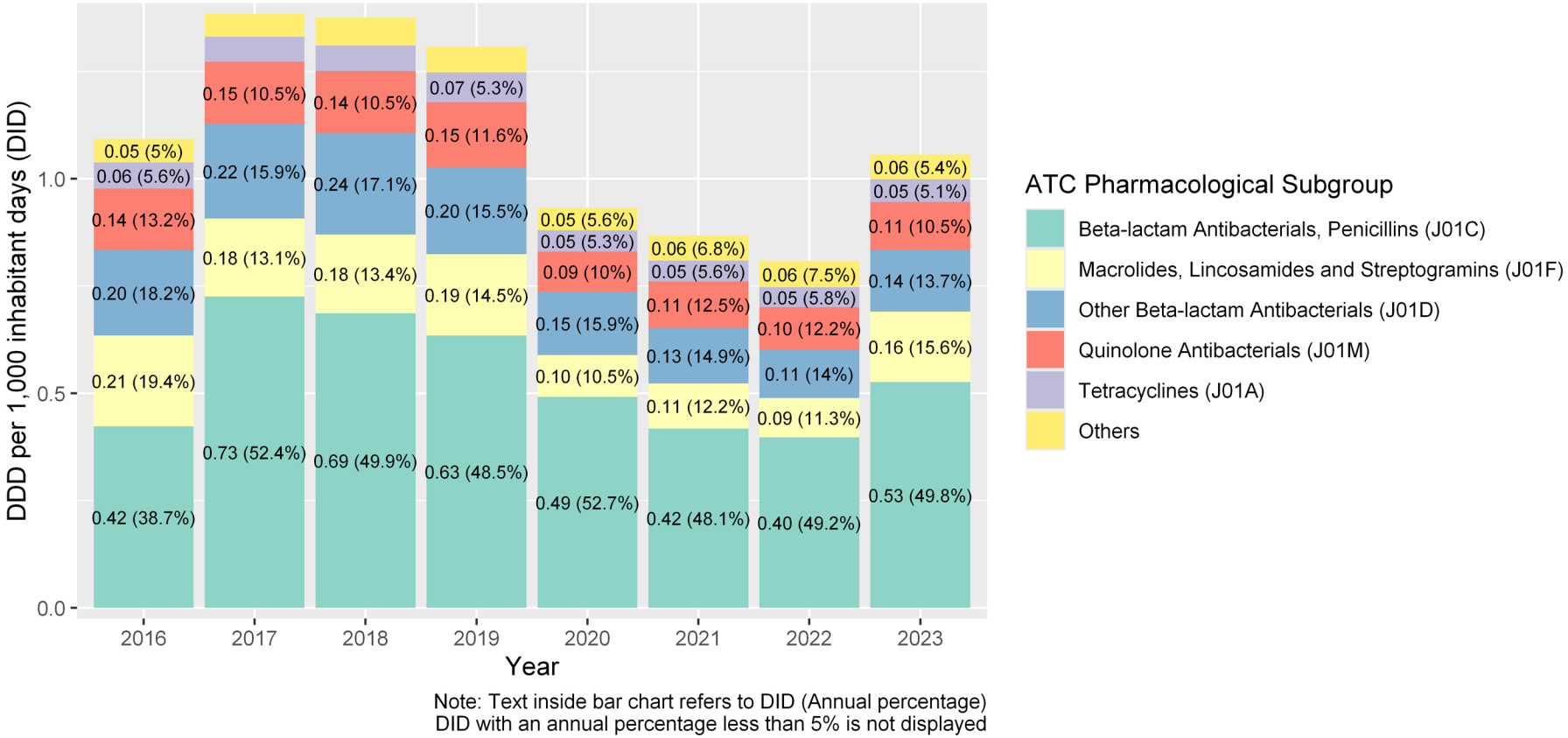
Antimicrobials wholesale supply for Hospital Authority (by ATC Pharmacological Subgroup)



Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- All of the five most commonly dispensed antimicrobial groups in the Hospital Authority, except for other beta-lactam antimicrobials (J01D), showed an increase in supply volume from 2022 to 2023.

Antimicrobials wholesale supply for Private Hospitals (by ATC Pharmacological Subgroup)



Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- All of the five most commonly dispensed antimicrobial groups in private hospitals, except for tetracyclines (J01A) showed an increase in supply volume from 2022 to 2023.

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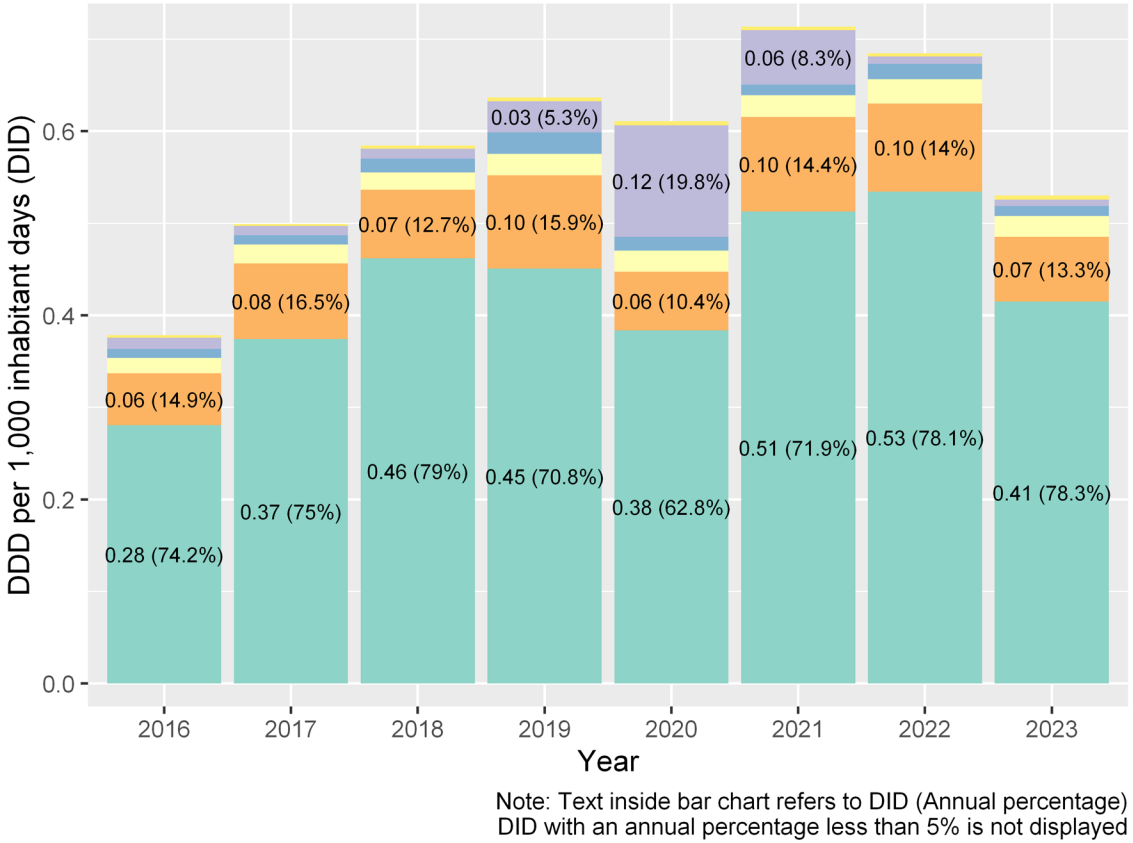
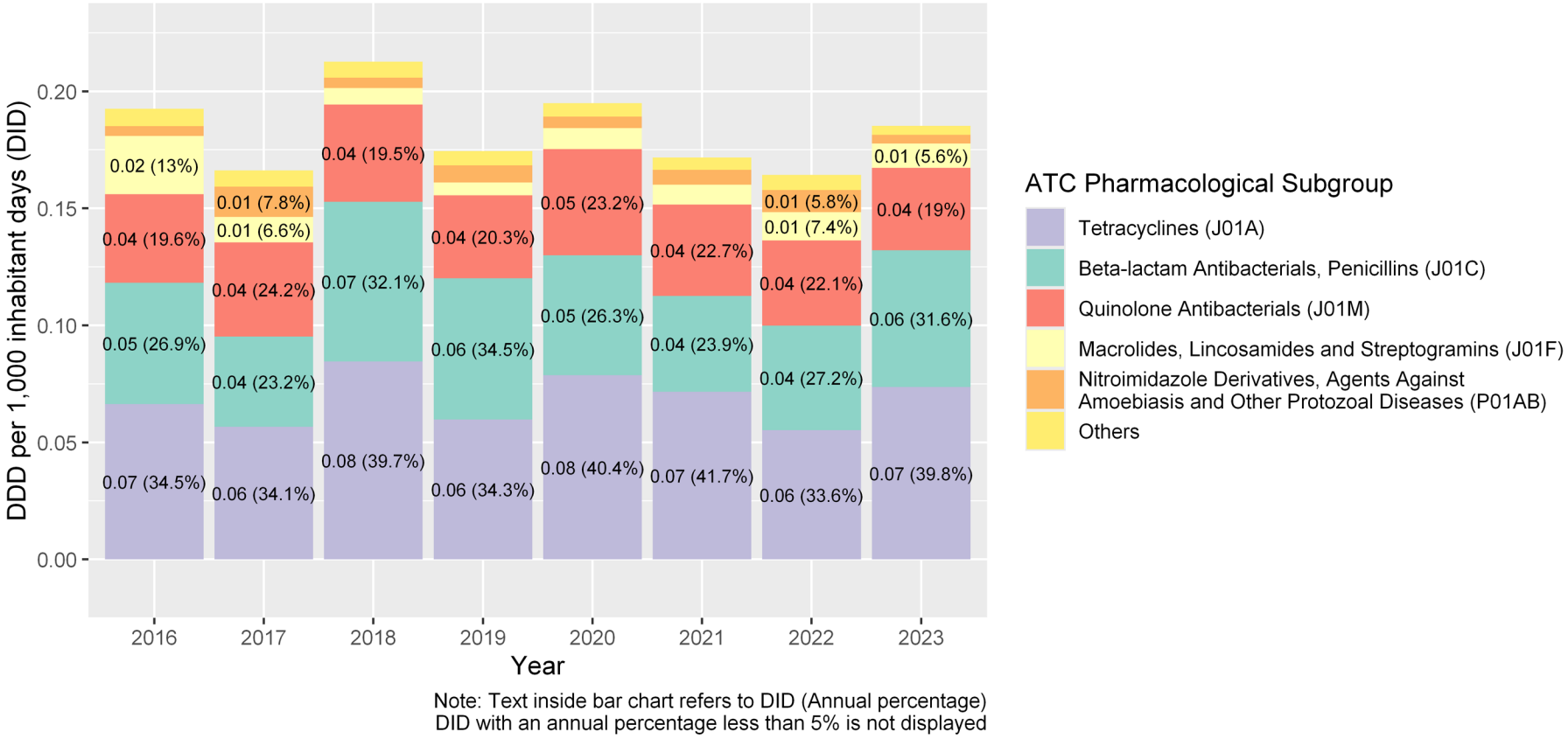
Antimicrobials wholesale supply for Dentists (by ATC Pharmacological Subgroup)



Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- Despite a small supply volume, all of the five most commonly dispensed antimicrobial groups in dentists showed a decrease in supply volume from 2022 to 2023.

Antimicrobials wholesale supply for Department of Health (by ATC Pharmacological Subgroup)



Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

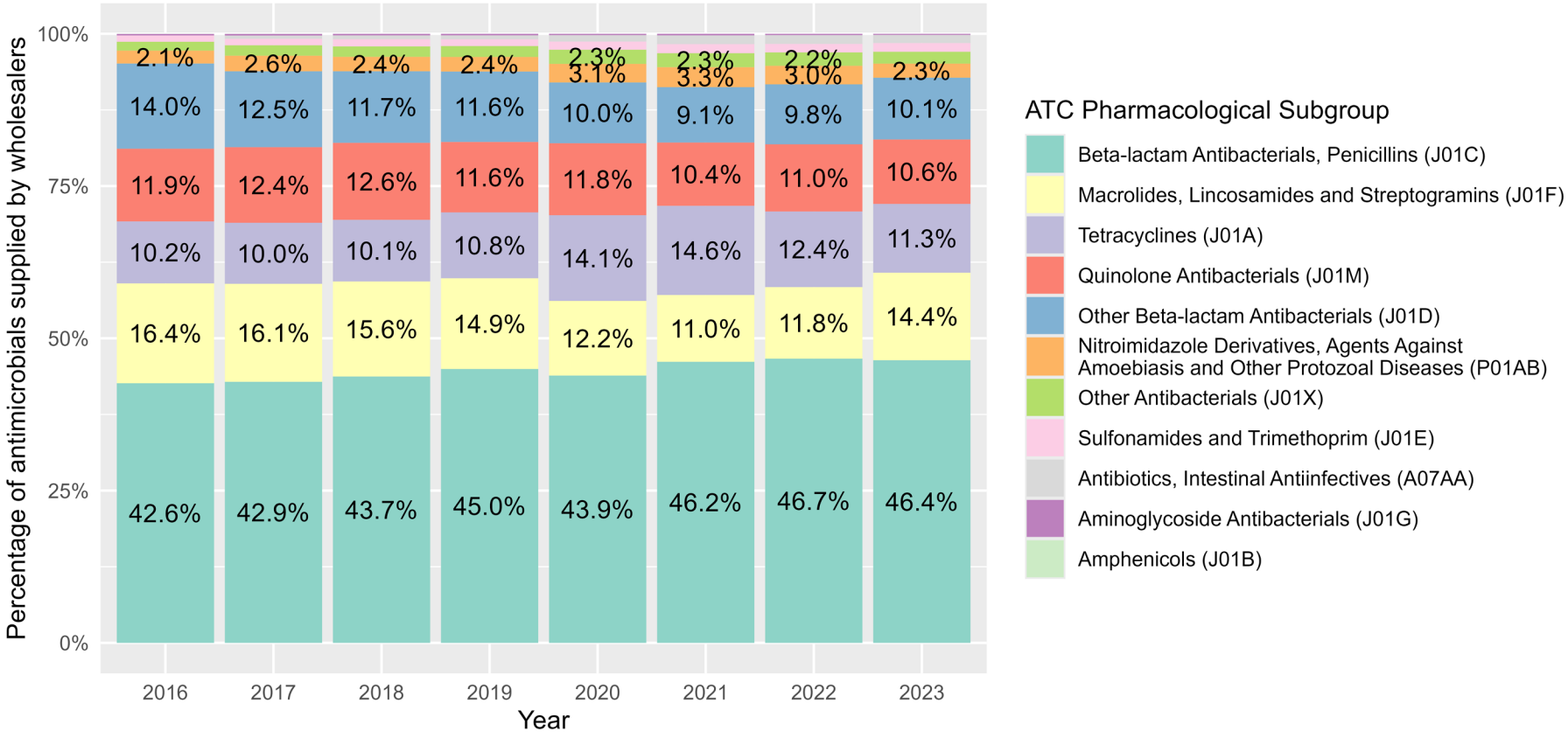
- The supply of antimicrobials to the Department of Health has increased from 2022 to 2023, with a total increment of 0.021 DID (↑12.7%).
- These results should be interpreted with caution, as the absolute change for each group is very small.

Results

2C. Antimicrobials wholesale supply (2016-2023)

- Distribution by ATC Pharmacological Subgroup

2C. Antimicrobials wholesale supply (2016-2023) - Distribution by ATC Pharmacological Subgroup



- In 2023, beta-lactam antibacterial, penicillins (J01C) was the most commonly supplied antimicrobial group, accounting for 46.4% of all supplies. They were followed by macrolides, lincosamides and streptogramins (J01F) at 14.4% and tetracyclines (J01A) at 11.3%.
- Notably, since 2020, tetracyclines (J01A) has overtaken macrolides, lincosamides and streptogramins (J01F) as the second most commonly supplied antimicrobial group, but in 2023, J01F subgroup reclaimed its second position.

2C. Antimicrobials wholesale supply (2016-2023) - Distribution by ATC Pharmacological Subgroup

ATC Pharmacological Subgroup		DDD per 1,000 inhabitant days (DID)								Average annual change	p-value	Compound annual growth rate (16 to 23)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023			
J01C	Beta-lactam Antibacterials, Penicillins	8.68	7.89	8.09	8.52	5.97	6.32	6.71	7.93	-0.226	-	-1.3%
J01F	Macrolides, Lincosamides and Streptogramins	3.34	2.96	2.89	2.82	1.66	1.50	1.69	2.45	-0.213	<0.05	-4.3%
J01A	Tetracyclines	2.07	1.85	1.87	2.05	1.91	2.00	1.79	1.93	-0.012	-	-1.0%
J01M	Quinolone Antibacterials	2.43	2.29	2.34	2.19	1.61	1.42	1.59	1.81	-0.133	<0.05	-4.1%
J01D	Other Beta-lactam Antibacterials	2.85	2.29	2.17	2.19	1.36	1.24	1.42	1.73	-0.188	<0.05	-6.9%
P01AB	Nitroimidazole Derivatives, Agents Against Amoebiasis and Other Protozoal Diseases	0.43	0.47	0.44	0.45	0.41	0.45	0.44	0.39	-0.005	-	-1.3%
J01X	Other Antibacterials	0.29	0.32	0.32	0.34	0.32	0.31	0.32	0.33	0.003	-	1.8%
J01E	Sulfonamides and Trimethoprim	0.21	0.19	0.22	0.21	0.18	0.20	0.20	0.24	0.002	-	2.0%
A07AA	Antibiotics, Intestinal Antiinfectives	<0.005	0.10	0.12	0.12	0.14	0.20	0.21	0.23	0.029	<0.01	#
J01G	Aminoglycoside Antibacterials	0.05	0.05	0.05	0.05	0.03	0.04	0.03	0.03	-0.003	<0.01	-6.8%
J01B	Amphenicols	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-0.002	<0.05	-
J01R	Combinations of Antimicrobials*	-	-	-	-	-	-	-	-	-	-	-
	Total	20.37	18.41	18.49	18.96	13.59	13.70	14.39	17.08	-0.748	-	-2.5%

Note:
Antimicrobials supplied to veterinarians, and non-human use antimicrobials (i.e. ATC code starts with Q) were not included
* There was no registered product under "Combinations of Antimicrobials" (J01R) in Hong Kong
# The compound annual growth rate for antimicrobials under A07AA is not applicable as the 2016 figure was not complete

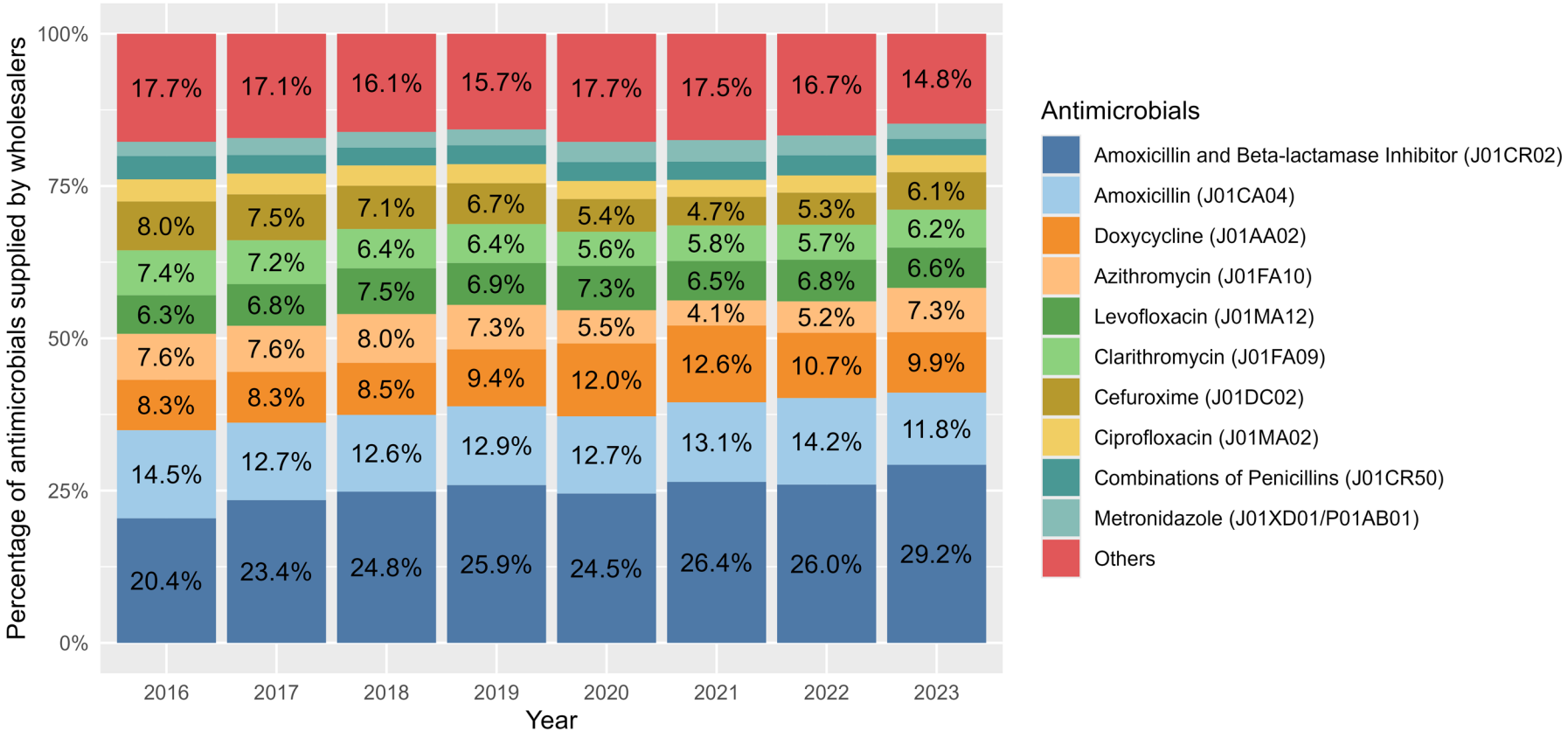
- Other beta-lactam antimicrobials (J01D) exhibited the largest decrease of 6.9% in CAGR from 2016 to 2023, but started to show an increase from 2021 to 2023.
- Among the antimicrobial groups that showed increase in supply volume from 2022 to 2023, beta-lactam antimicrobials, penicillins (J01C), macrolides, lincosamides and streptogramins (J01F) showed the largest increment. Specifically, beta-lactam antimicrobials, penicillins increased by 1.21 DID (↑18%), macrolides, lincosamides and streptogramins by 0.76 DID (↑45%).

Results

2D. Antimicrobials wholesale supply (2016-2023)

- 10 most supplied antimicrobials

2D. Antimicrobials wholesale supply (2016-2023) - 10 most supplied antimicrobials



- The 10 most supplied antimicrobials contributed >80% of all antimicrobials supplied from 2016 to 2023.
- In 2023, amoxicillin and beta-lactamase inhibitor continued to be the most commonly supplied antimicrobial (29.2%) by wholesale, followed by amoxicillin (11.8%) and doxycycline (9.9%).

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2D. Antimicrobials wholesale supply (2016-2023) - 10 most supplied antimicrobials

ATC Chemical Substance		DID								Average annual change	p-value	Compound annual growth rate (16 to 23)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023			
J01CR02	Amoxicillin and Beta-Lactamase Inhibitor	4.16	4.31	4.59	4.91	3.33	3.62	3.74	4.99	-0.019	-	2.6%
J01CA04	Amoxicillin	2.95	2.34	2.33	2.45	1.72	1.79	2.05	2.02	-0.123	<0.05	-5.2%
J01AA02	Doxycycline	1.69	1.54	1.58	1.77	1.63	1.73	1.54	1.70	0.005	-	0.1%
J01FA10	Azithromycin	1.54	1.39	1.48	1.38	0.74	0.56	0.74	1.24	-0.104	-	-3.0%
J01MA12	Levofloxacin	1.29	1.26	1.39	1.30	0.99	0.89	0.99	1.13	-0.051	-	-1.9%
J01FA09	Clarithromycin	1.50	1.32	1.19	1.21	0.76	0.80	0.82	1.06	-0.086	<0.05	-4.8%
J01DC02	Cefuroxime	1.63	1.39	1.31	1.27	0.73	0.64	0.76	1.05	-0.116	<0.05	-6.1%
J01MA02	Ciprofloxacin	0.74	0.63	0.62	0.59	0.40	0.38	0.41	0.48	-0.046	<0.01	-6.0%
J01CR50	Combinations of Penicillins	0.78	0.56	0.54	0.59	0.42	0.41	0.48	0.45	-0.039	<0.05	-7.5%
J01XD01/ P01AB01	Metronidazole	0.47	0.51	0.48	0.49	0.45	0.48	0.47	0.43	-0.007	-	-1.4%
	Others	3.61	3.15	2.98	2.98	2.41	2.39	2.40	2.52	-0.163	<0.01	-5.0%
	Total	20.37	18.41	18.49	18.96	13.59	13.70	14.39	17.08	-0.748	-	-2.5%

Note:
Antimicrobials supplied to veterinarians, and non-human use antimicrobials (i.e. ATC code starts with Q) were not included
* Metronidazole is classified as J01XD01 when used parenterally, and as P01AB01 when used orally or rectally

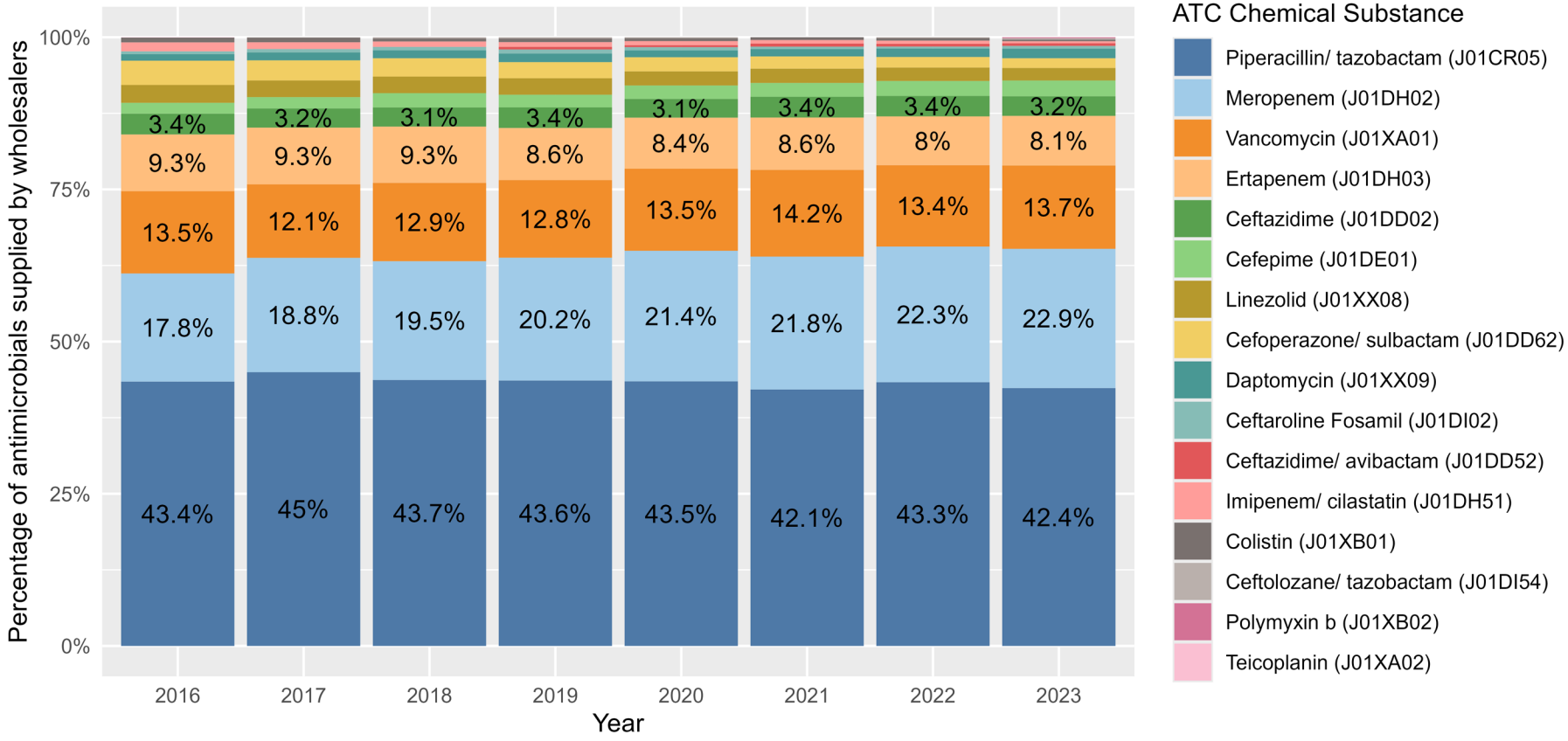
- Despite the overall increase in supply volume from 2022 to 2023, amoxicillin (J01CA04), combinations of penicillins (J01CR50) and metronidazole (J01XD01/ P01AB01) showed a reduction.
- Supply of combinations of penicillin (J01CR50) decreased the most (-7.5%).
- In 2023, amoxicillin and beta-lactamase inhibitor (J01CR02) continued to be the most commonly supplied antimicrobial (29.2%) by wholesale, followed by amoxicillin (J01CA04) (11.8%) and doxycycline (J01AA02) (9.9%).

Results

3. Antimicrobials wholesale supply (2016-2023)

- Selected broad-spectrum antimicrobials

3. Antimicrobials wholesale supply (2016-2023) - Selected broad-spectrum antimicrobials



- In 2023, piperacillin/tazobactam was the most commonly supplied (42.4%) broad-spectrum antimicrobial, followed by meropenem (22.9%) and vancomycin (13.7%).
- Majority of these broad spectrum antimicrobials were supplied to HA and private hospitals from 2016 to 2023 (about 99%)

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3. Antimicrobials wholesale supply (2016-2023) - Selected broad-spectrum antimicrobials

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ATC Chemical Substance		DID								Average annual change	p-value	Compound annual growth rate (16 to 23)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023			
Beta-Lactam Antibacterials, Penicillins												
J01CR05	Piperacillin/ tazobactam	0.114	0.128	0.138	0.149	0.152	0.166	0.181	0.193	0.011	<0.01	7.7%
Other Beta-Lactam Antibacterials												
J01DH02	Meropenem	0.047	0.053	0.061	0.069	0.075	0.086	0.093	0.104	0.008	<0.01	12.1%
J01DH03	Ertapenem	0.025	0.026	0.029	0.029	0.029	0.034	0.034	0.037	0.002	<0.01	6.1%
J01DD02	Ceftazidime	0.009	0.009	0.010	0.012	0.011	0.013	0.014	0.015	0.001	<0.01	7.2%
J01DD62	Cefoperazone/ sulbactam	0.011	0.009	0.010	0.009	0.008	0.008	0.007	0.007	§	<0.01	-5.1%
J01DE01	Cefepime	0.005	0.005	0.007	0.007	0.008	0.009	0.010	0.012	0.001	<0.01	14.1%
J01DH51	Imipenem/ cilastatin	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	§	<0.01	-12.7%
J01DI02	Ceftaroline Fosamil	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.002	§	-	7.7%
J01DD52	Ceftazidime/ avibactam	-	§	-	0.001	0.001	0.002	0.002	0.002	§	<0.05	-
J01DI54	Ceftolozane/ tazobactam	-	§	0.001	0.001	0.001	-	0.001	0.001	§	-	-
Other Antibacterials												
J01XA01	Vancomycin	0.036	0.034	0.041	0.044	0.047	0.056	0.056	0.062	0.004	<0.01	8.3%
J01XX08	Linezolid	0.008	0.008	0.009	0.009	0.008	0.009	0.009	0.009	§	<0.05	2.8%
J01XX09	Daptomycin	0.003	0.004	0.004	0.005	0.004	0.005	0.006	0.007	0.001	<0.01	14.2%
J01XB01	Colistin	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	§	<0.05	-7.2%
J01XA02	Teicoplanin	§	-	§	-	-	-	§	§	§	-	*
J01XB02	Polymyxin b	-	-	-	-	-	-	-	0.001		-	-
Total Broad Spectrum Antibiotics												
	Total	0.263	0.284	0.315	0.341	0.350	0.393	0.418	0.455	0.027	<0.01	8.1%

Antimicrobials supplied for non-human use in Hong Kong (e.g. veterinary surgeons and farmers) were not included

* The annual supply volume of teicoplanin is extremely low (<0.0005 DID), thus the compound annual growth rate is not presented to prevent potential misinterpretation

§ Less than 0.0005

- Total wholesale supply of selected broad-spectrum antimicrobials reported an average annual increase of 0.027 DID (↑8.1% in CAGR), a statistically significance rise.
- From 2016 to 2023, piperacillin/tazobactam, meropenem and vancomycin were the three most supplied selected broad-spectrum antimicrobials. In 2023, they account for approximately 79% of all monitored broad-spectrum antimicrobials.

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Remarks on interpretation of results (1)

- DDD is a technical unit of use that does not necessarily reflect the recommended or average prescribed dose.
- There are no separate DDDs for children, making the DDD estimates for paediatric formulations more difficult to interpret.

Remarks on interpretation of results (2)

- Surveillance of antimicrobials by wholesale supply in Hong Kong is based on voluntary self-reporting by licensed drug wholesalers, which may introduce reporting errors.
- Wholesale supply data serve as a proxy for the amount of antimicrobials supplied to each sector, therefore these figures do not equate to dispensing figures.
- Wholesale supply data may be influenced by marketing strategies, such as discount offers.
- Readers should exercise caution when comparing Hong Kong's figures with those of countries, as differences in healthcare systems and surveillance data collection methods may exist.

Summary (1)

- The overall antimicrobials supply decreased from 20.37 DID (2016) to 13.70 DID (2021), followed by a mild rebound in 2022 to 14.39 DID and the increase continued in 2023 to 17.08 DID. Nevertheless, the compound annual growth rate from 2016 to 2023 was decreased by 2.5%. (Slide 4)
- The supply of Access category antimicrobials was 60.2% in 2023 and has fulfilled the overall 60% benchmark as recommended by WHO. (Slide 6)
- Private doctors received the majority (56.6%) of antimicrobial supplies in 2023, followed by Hospital Authority (28.1%), private hospitals (6.1%), and community pharmacies (4.1%). (Slide 9)
- Percentage of antimicrobials supplied to community pharmacies decreased from 18.5% in 2016 to 4.1% in 2023. (Slide 9)

Summary (2)

- Beta-lactam antibacterials, penicillins (J01C) dominated the supply at 46.4%; with macrolides, lincosamides, and streptogramins (J01F); and tetracyclines (J01A) following at 14.4% and 11.3%, respectively. (Slide 18)
- The top 10 antimicrobials accounted for over 80% of supplies from 2016 to 2023, with amoxicillin and beta-lactamase inhibitor leading in 2023. (Slide 21)
- Broad-spectrum antimicrobials like piperacillin/tazobactam, meropenem, and vancomycin saw an average annual increase of 8.1% in CAGR, with these three making up about 79% of all monitored broad-spectrum antimicrobials in 2023. (Slide 25)

Recommendations

- **Strengthen Antimicrobial Stewardship:** Enhance stewardship programs in primary care and public hospitals, to ensure appropriate prescribing and curb antimicrobial resistance.
- **Monitor Broad-Spectrum Antimicrobials Use**: Continue monitoring of broad-spectrum antimicrobials, which have seen a significant supply increase, to prevent overuse and resistance development.

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THE END

Thank you

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