

Antimicrobial Resistance (AMU) Surveillance in Hong Kong - Wholesale Supply Data (2016-2022)

January 2024



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Background



Background

- The Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2017-2022 (Action Plan) was issued in July 2017. New Action Plan was issued in November 2022.
- Activity 3.1.2 suggests collecting antibiotic supply data from different sectors as proxy to reflect the overall usage and trend of antimicrobial usage.
- Past summaries published in CHP website in 2018 (Year 2014-16), 2019 (Year 2014-17), 2020 (Year 2014-18), 2021 (Year 2016-19), 2022 (Year 2016-20) and 2023 (Year 2016-21).
- This presentation briefly accounts the surveillance findings for year 2016-2022.
- Since the Action Plan was published in July 2017, the situation of 2016 has been chosen as baseline for comparison.





Method



Scope of Data

- Antimicrobials wholesale supply data from licensed drug wholesalers (ever supplied antimicrobials under monitoring) in year 2022 to the following sectors were included:
 - Department of Health (DH)
 - Hospital Authority (HA)
 - Private hospitals
 - Private doctors (mutually exclusive with Private Hospitals)
 - Dentists
 - Veterinary surgeons
 - Community pharmacies
 - Farmers (who had the Antibiotics Permits issued by the Director of Agriculture, Fisheries and Conservation Department)



Definitions

- Surveillance period is defined by calendar year.
- Anatomical Therapeutic Chemical (ATC) classification
 - This system is developed by the World Health Organization (WHO).
 - It divided drugs into different groups according to the organ or system on which they act and their therapeutic, pharmacological and chemical properties.
- Defined Daily Dose (DDD)
 - A standardised unit adopted by WHO to facilitate comparison of drug usage.
 - Defined as “the assumed average maintenance dose per day for a drug used for its main indication in adults”.
 - Each antimicrobial was assigned a DDD constant per route of administration.
 - DDD constants are updated by WHO annually.
 - The year 2023 version of ATC/DDD was adopted in this report, which is identical as the 2022 version.



Antimicrobials monitored

- Antimicrobials fall under the following WHO ATC classification were collected from licensed drug wholesalers:
 - J01 – Antibacterials for systemic use
 - P01AB – Nitroimidazole derivatives, agents against amoebiasis and other protozoal diseases
 - A07AA – Antibiotics, intestinal antiinfectives
- Antimicrobials which can be administered by the following routes were included, as recommended by WHO:
 - Oral
 - Parenteral
 - Rectal
 - Inhalation
- Preparations for topical use were excluded.



WHO AWaRe Categorisation

- In 2017, WHO introduced the AWaRe categorisation for antibiotic stewardship at local, national and global levels, aiming to reduce antimicrobial resistance.
- The three categories are:
 - Access
Indicates the antimicrobials of choice for common infections as first- or second-choice empiric treatment options
 - Watch
Includes most of the “highest-priority critically important antimicrobials” for human medicine and veterinary use. These antimicrobials are recommended only for specific, limited indications
 - Reserve
Should only be used as a last resort when all other antimicrobials have failed
- Antimicrobials not listed under WHO AWaRe are grouped as “Others”.
- WHO encourages countries or regions to aim for 60% or more of the overall AMU to be under Access and to reduce the usage of antimicrobials under Watch and Reserve.
- In July 2023, WHO released the updated AWaRe classification of antibiotics, which has been adopted in this report.



Broad-spectrum Antimicrobials (Big Guns)

- The following broad-spectrum antimicrobials are important on treating resistant infections and being monitored in AMU surveillance with HA Dispensing Data. They are examined separately in this surveillance:
 - Piperacillin/tazobactam
 - Ceftazidime
 - Cefoperazone/sulbactam
 - Cefepime
 - Ceftaroline fosamil
 - Ceftolozane/tazobactam
 - Ceftazidime/avibactam
 - Meropenem
 - Ertapenem
 - Imipenem/cilastatin
 - Vancomycin
 - Linezolid
 - Daptomycin
 - Colistin
 - Teicoplanin



Measurement

- Units used for measurement:
 - Overall quantity of antimicrobials supplied to various sectors: **DDD**
 - Quantity supplied per capita: **DDD per 1,000 inhabitants per day (DID)**, considering the annual mid-year population of Hong Kong
- Calculated measurements:
 - Overall wholesale supply quantity
 - Wholesale supply of antimicrobials by different categories:
 - Distribution by WHO AWaRe categorisation
 - Distribution by Sector
 - ATC Pharmacological Subgroup
 - The 10 most supplied antimicrobials
 - Wholesale supply quantity of selected broad-spectrum antimicrobials

* The year 2023 version of ATC/DDD was adopted in this report, which is identical as the 2022 version.



Statistical Method

- The year 2016 was chosen as the baseline for comparison as the Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2017-2022 was issued in mid-2017 and this decision was endorsed by the High Level Steering Committee (HLSC).
- Following the ECDC, Compound Annual Growth Rate (CAGR) were used to illustrate the average annual rate of change when comparing antimicrobials dispensed in 2022 with those in 2016.

$$CAGR = (SU_{2022} / SU_{2016})^{(1/6)} - 1$$

- In this equation, SU_{2022} represents the total amount of antimicrobials supplied in the year 2022, and SU_{2016} represents the total amount of antimicrobials supplied in the year 2016.

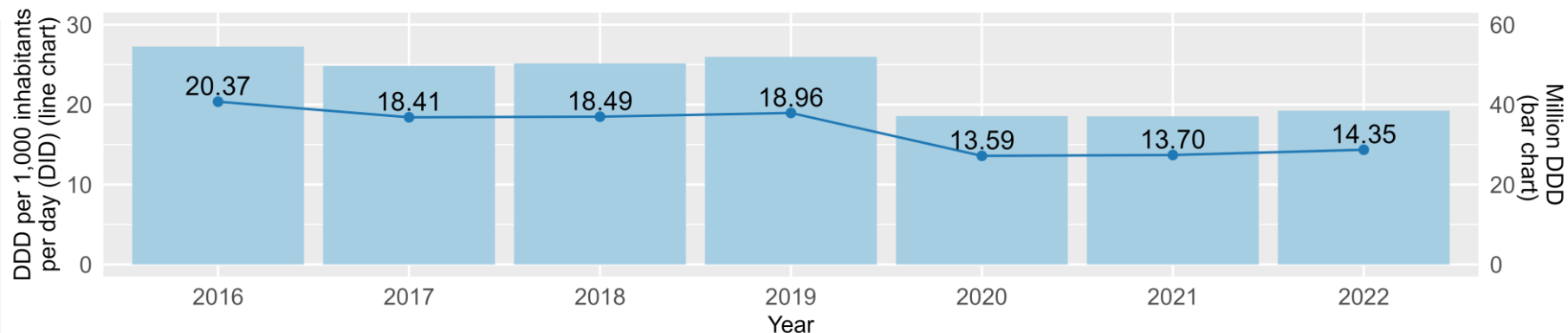


Results

1. Overall antimicrobials wholesale supply (2016-2022)



1. Overall antimicrobials wholesale supply (2016-2022)



	Year							Average annual change	p-value	Compound annual growth rate (16 to 22)
	2016	2017	2018	2019	2020	2021	2022			
DDD in million	54.54	49.68	50.29	51.95	37.12	37.06	38.48	-	-	-5.6%
DID	20.37	18.41	18.49	18.96	13.59	13.70	14.35	-1.156	<0.05	-5.7%

- A mild increase in total supply was seen ($\uparrow 0.65$ DID, $\uparrow 4.7\%$) from 2021 to 2022.
- When compared with the total supply in 2016 (baseline), a decrease of 6.02 DID ($\downarrow 29.6\%$) in 2022 was observed (CAGR: -5.7%).

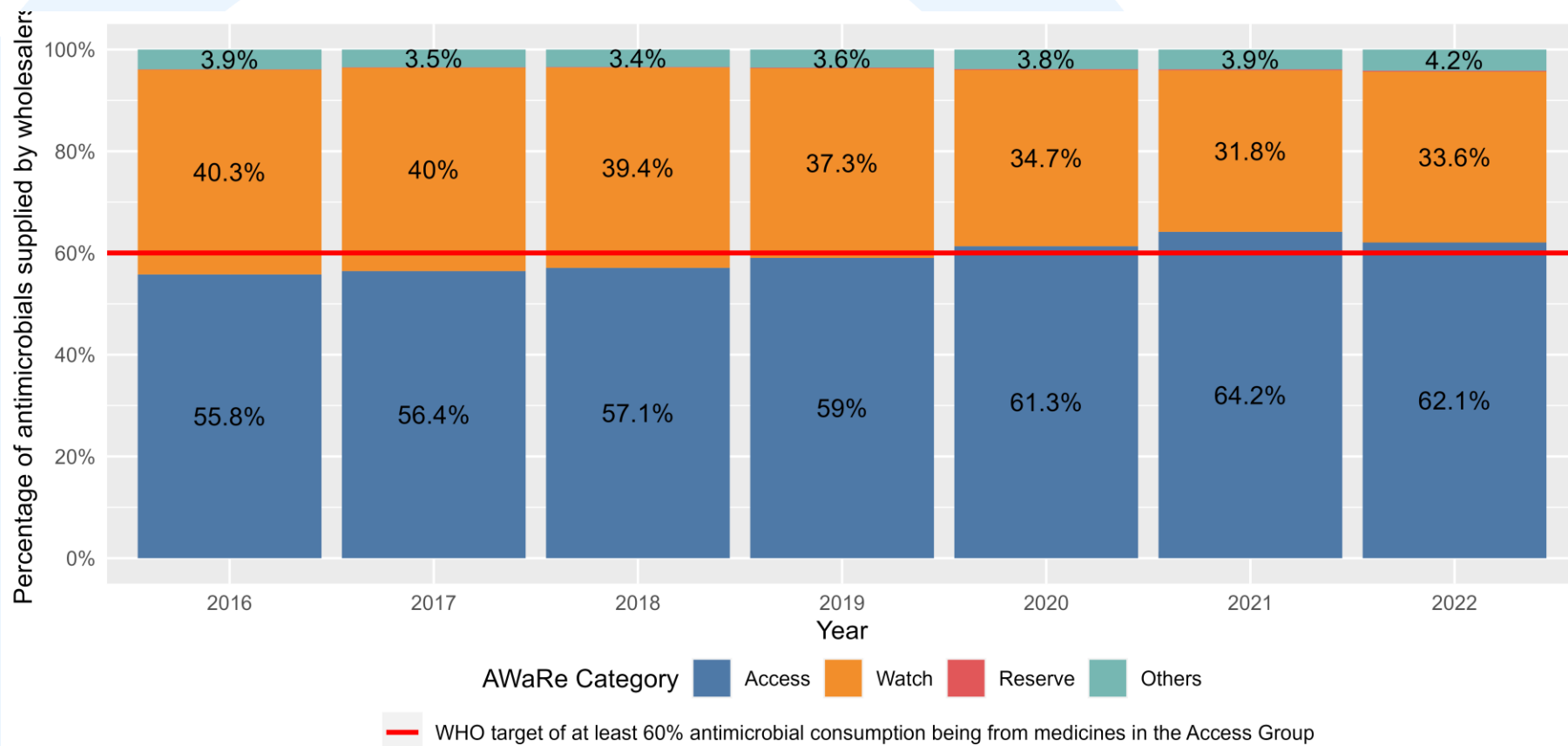


Results

2A. Overall antimicrobials wholesale supply (2016-2022)
- Distribution by WHO AWaRe categorisation



2A. Antimicrobials wholesale supply (2016-2022) - Distribution by WHO AWaRe categorisation



- Antimicrobials under Access constituted 55.8% of all antimicrobials supplied in 2016 and increased to 62.1% in 2022 (Exceeded 60%).
- The proportion of antimicrobials under Watch decreased steadily from 40.3% in 2016 to 33.6% in 2022.



2A. Antimicrobials wholesale supply (2016-2022) - Distribution by WHO AWaRe categorisation

AWaRe Categorisation	DDD per 1,000 inhabitant days							Average annual change	p-value	Compound annual growth rate (16 to 22)
	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022			
Access	11.36	10.39	10.55	11.19	8.34	8.79	8.91	-0.457	<0.05	-4.0%
Watch	8.20	7.36	7.28	7.07	4.71	4.35	4.82	-0.669	<0.01	-8.5%
Reserve	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.002	<0.01	9.7%
Others	0.79	0.64	0.64	0.68	0.52	0.53	0.60	-0.033	<0.05	-4.6%

- The supply of antimicrobials under Access and Watch showed decrease of 4.0% and 8.5% in CAGR from 2016 to 2022 respectively.
- As the total number of antimicrobials under Reserve supplied in Hong Kong increased from five in 2016 to ten in 2022, the CAGR figure must be interpreted with caution.

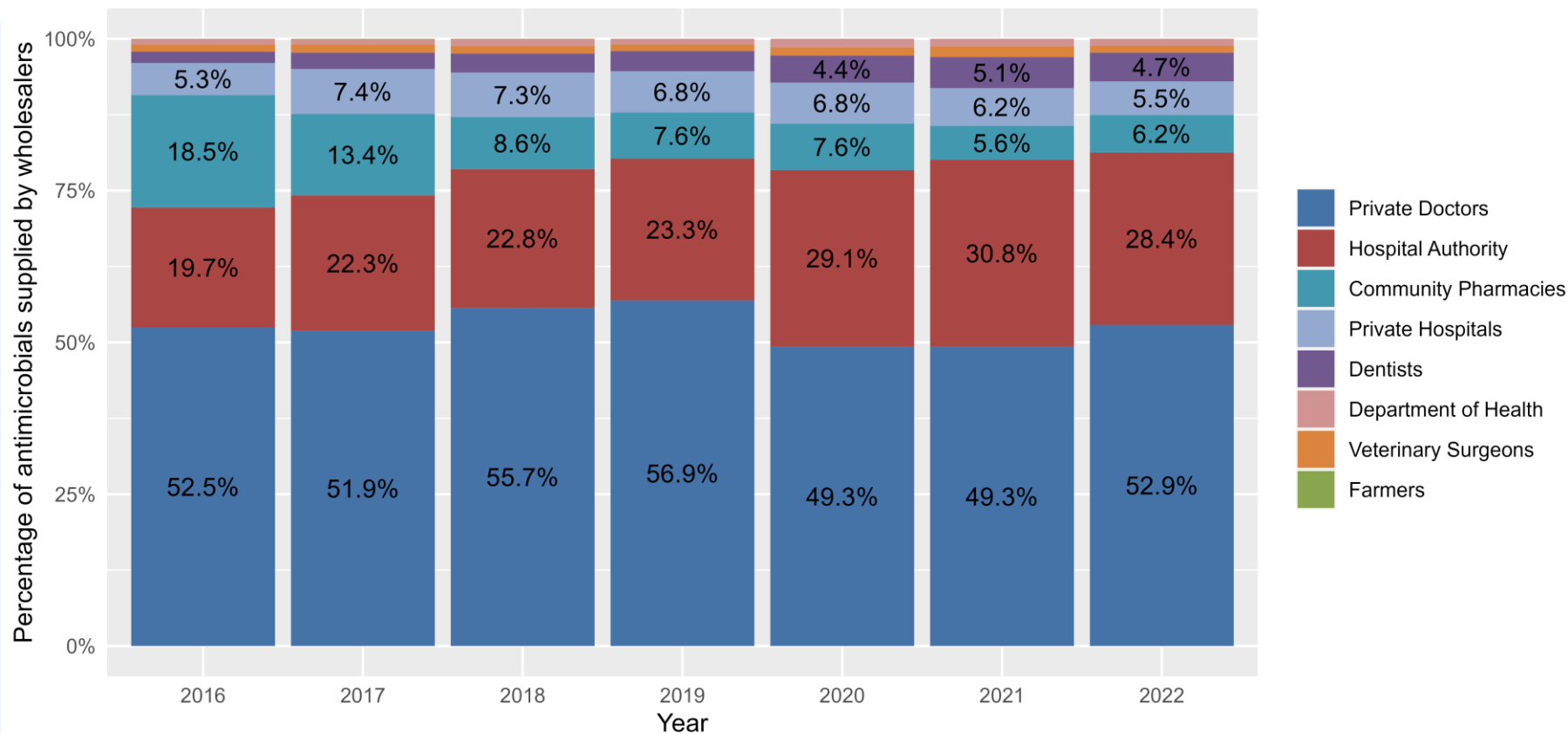


Results

2B. Antimicrobials wholesale supply (2016-2022)
- Distribution by Sector



2B. Antimicrobials wholesale supply (2016-2022) - Distribution by Sector



- In 2022, 52.9% of antimicrobials supplied in Hong Kong went to private doctors, followed by Hospital Authority (28.4%), community pharmacies (6.2%), and private hospitals (5.5%).
- Percentage of antimicrobials supplied to community pharmacies decreased from 18.5% in 2016 to 6.2% in 2022.



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Department of Health

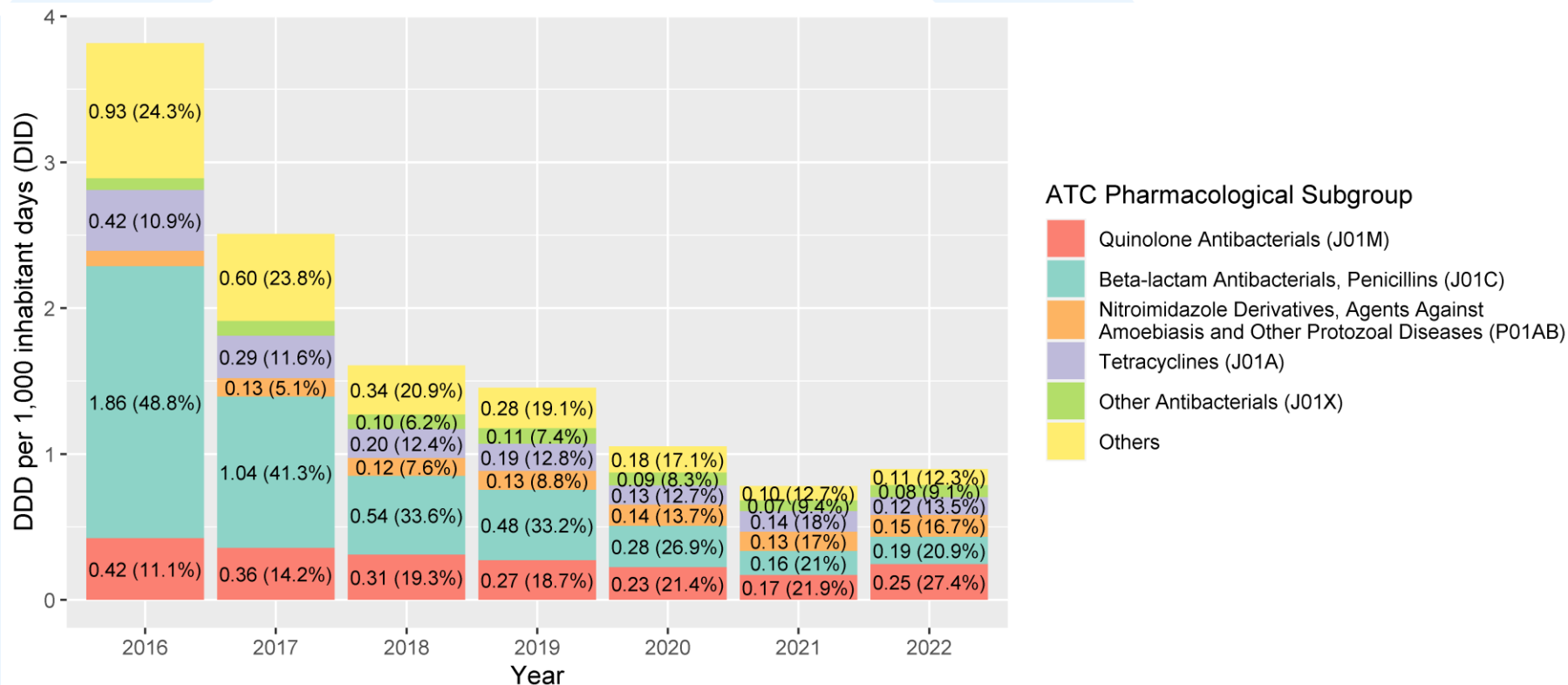
2B. Antimicrobials wholesale supply (2016-2022) - Distribution by Sector

	DDD per 1,000 inhabitant days							Average annual change	p-value	Compound annual growth rate (16 to 22)
	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022			
Human-use sectors										
Private Doctors	10.82	9.69	10.44	10.91	6.79	6.87	7.68	-0.668	<0.05	-5.6%
Hospital Authority	4.07	4.17	4.27	4.47	4.01	4.29	4.12	0.006	-	0.2%
Community Pharmacies	3.82	2.51	1.61	1.46	1.05	0.78	0.90	-0.456	<0.01	-21.4%
Private Hospitals	1.09	1.38	1.38	1.31	0.93	0.87	0.80	-0.084	-	-5.0%
Dentists	0.38	0.50	0.58	0.64	0.61	0.71	0.68	0.049	<0.01	10.4%
Department of Health	0.19	0.17	0.21	0.17	0.19	0.17	0.16	-0.003	-	-2.6%

- While supply volume of antimicrobials to community pharmacies showed a decrease of 21.4% in CAGR from 2016 to 2022, the supply to dentists showed an increase of 10.4% but started to show a decrease from 2021 to 2022.
- Meanwhile, in 2022, the supply volume of antimicrobials to private doctors and community pharmacies increased, while that to the Hospital Authority, private hospitals, dentists and the Department Health 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 reduced to 0.16 DID in 2021 and remained below 0.2 DID in 2022.
- The supply volume of quinolone antibacterials (J01M) has increased by 0.07 DID (↑43.5%), becoming the most commonly dispensed antimicrobials in community pharmacies since 2021.



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

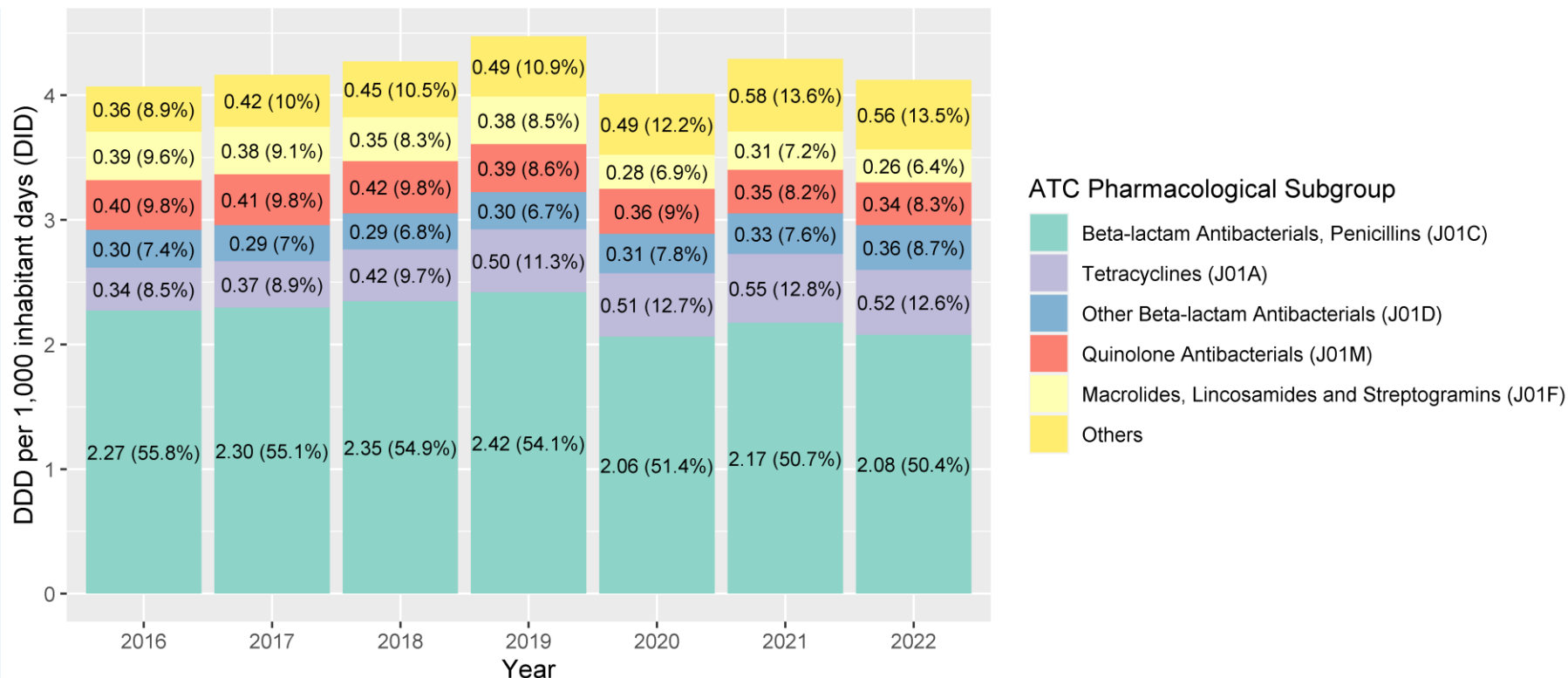


Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- For private doctors, the supply volume of beta-lactam antibacterials, penicillins (J01C) has increased by 0.78 DID (↑28.9%) since 2020.
- All of the five most commonly dispensed antimicrobial groups, except for tetracyclines (J01A), showed an increase in supply volume from 2021 to 2022.



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

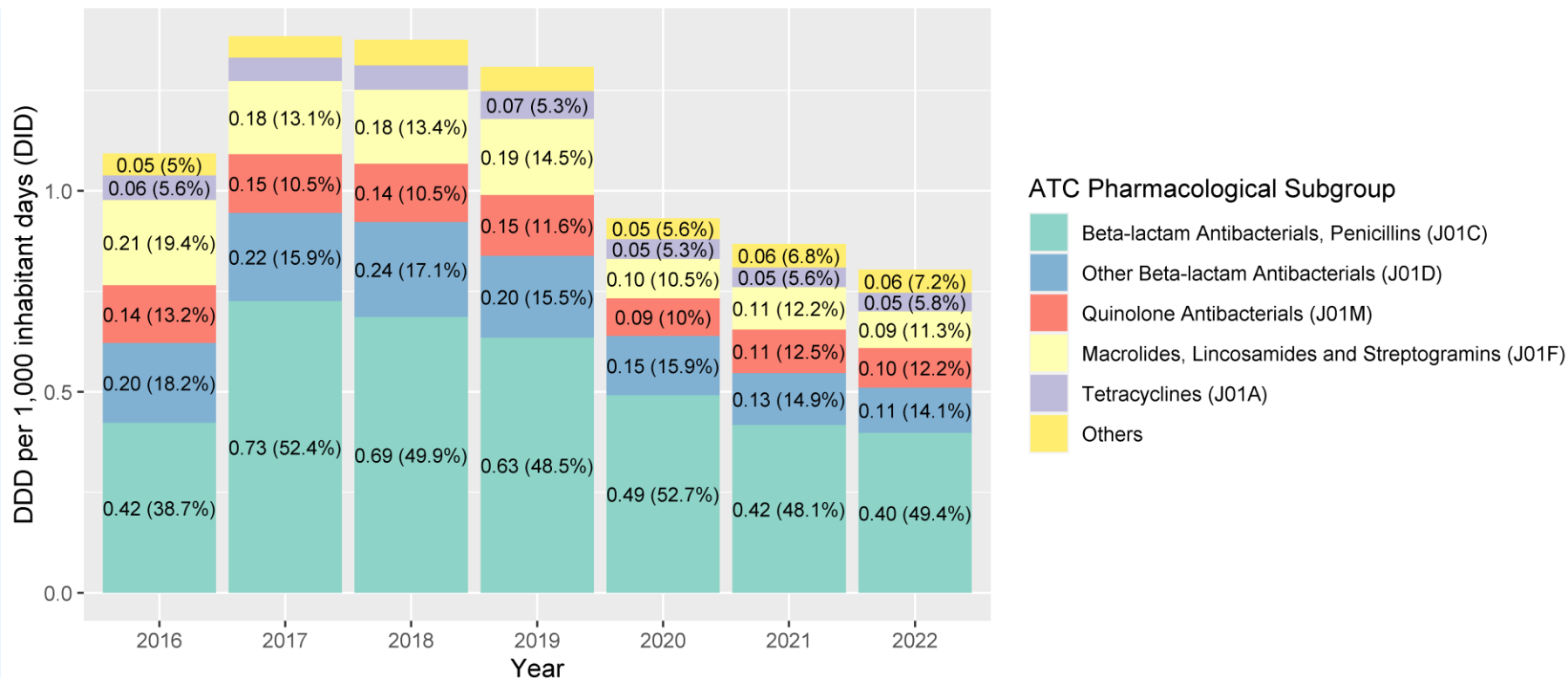


Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- All of the five most commonly dispensed antimicrobial groups in the Hospital Authority, except for other beta-lactam antimicrobials (J01D), showed a decrease in supply volume from 2021 to 2022.



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

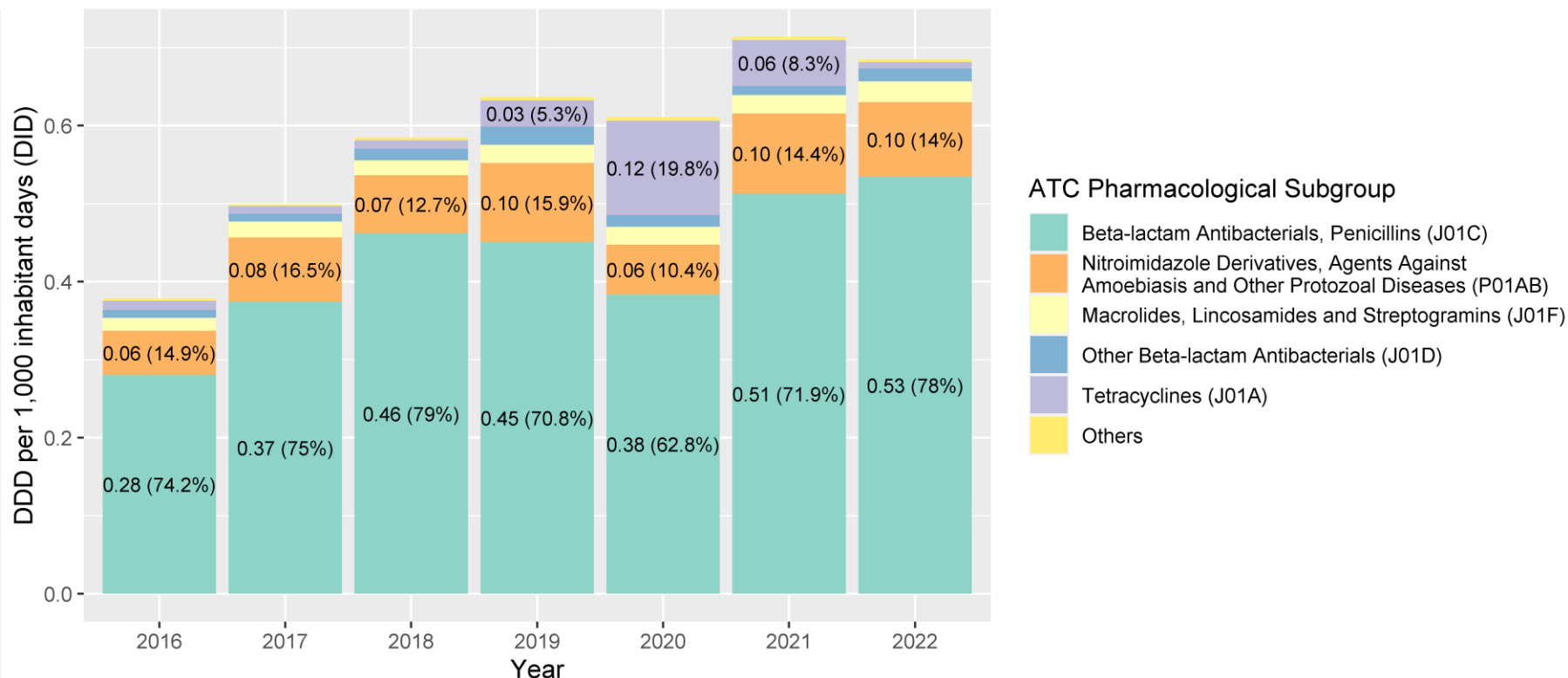


Note: Text inside bar chart refers to DID (Annual percentage)
DID with an annual percentage less than 5% is not displayed

- All of the five most commonly dispensed antimicrobial groups in private hospitals showed a decrease in supply volume or remained stable from 2021 to 2022.



Antimicrobials wholesale supply for Dentists (by ATC Pharmacological Subgroup)

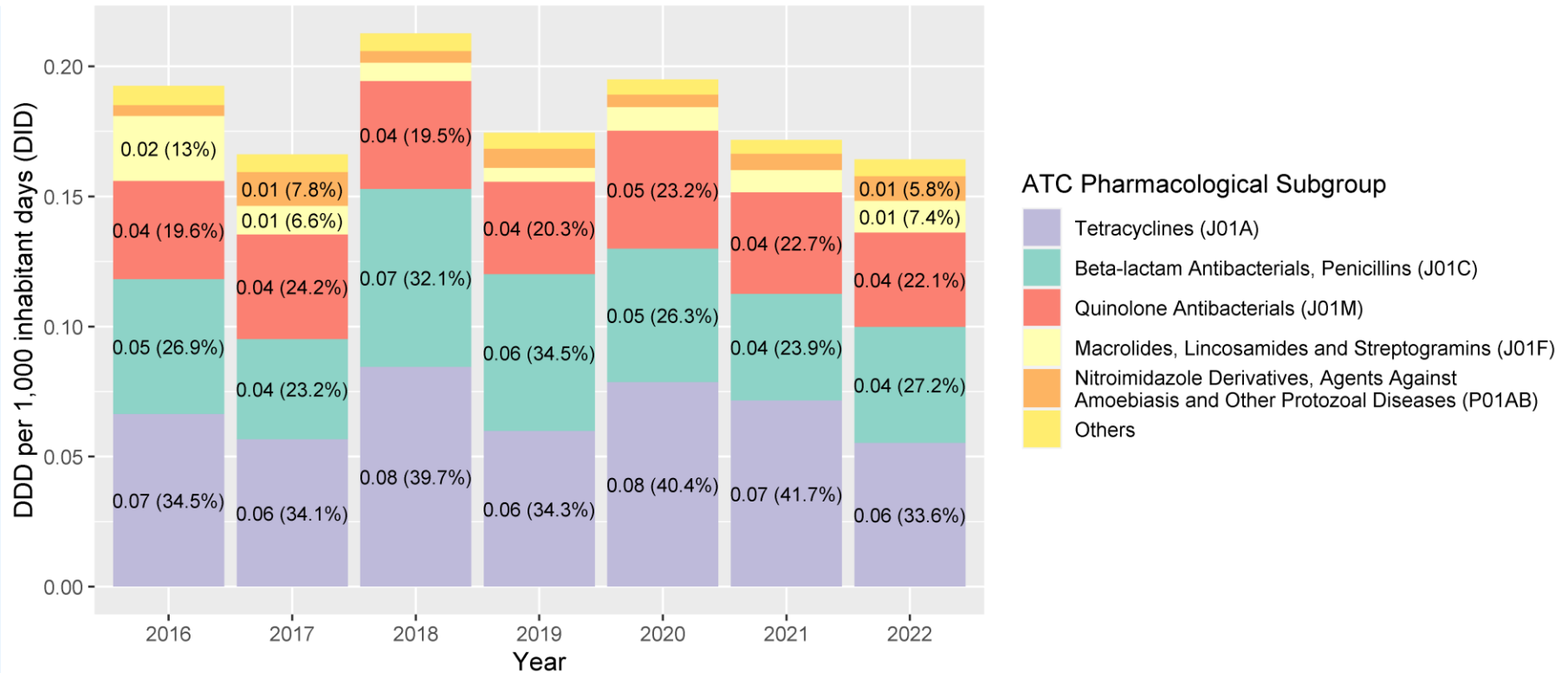


Note: Text inside bar chart refers to DID (Annual percentage)
 DID with an annual percentage less than 5% is not displayed

- Despite a small supply volume, the supply of tetracyclines (J01A) to dentists dropped from 0.06 DID to 0.01 DID (↓85.99%) from 2021 to 2022, while the supply of other groups remain rather stable in 2022 compared to 2021.



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 decreased for two consecutive years since 2020, with a total reduction of 0.031 DID (↓15.8%).
- These results should be interpreted with caution, as the absolute change for each group is very small.

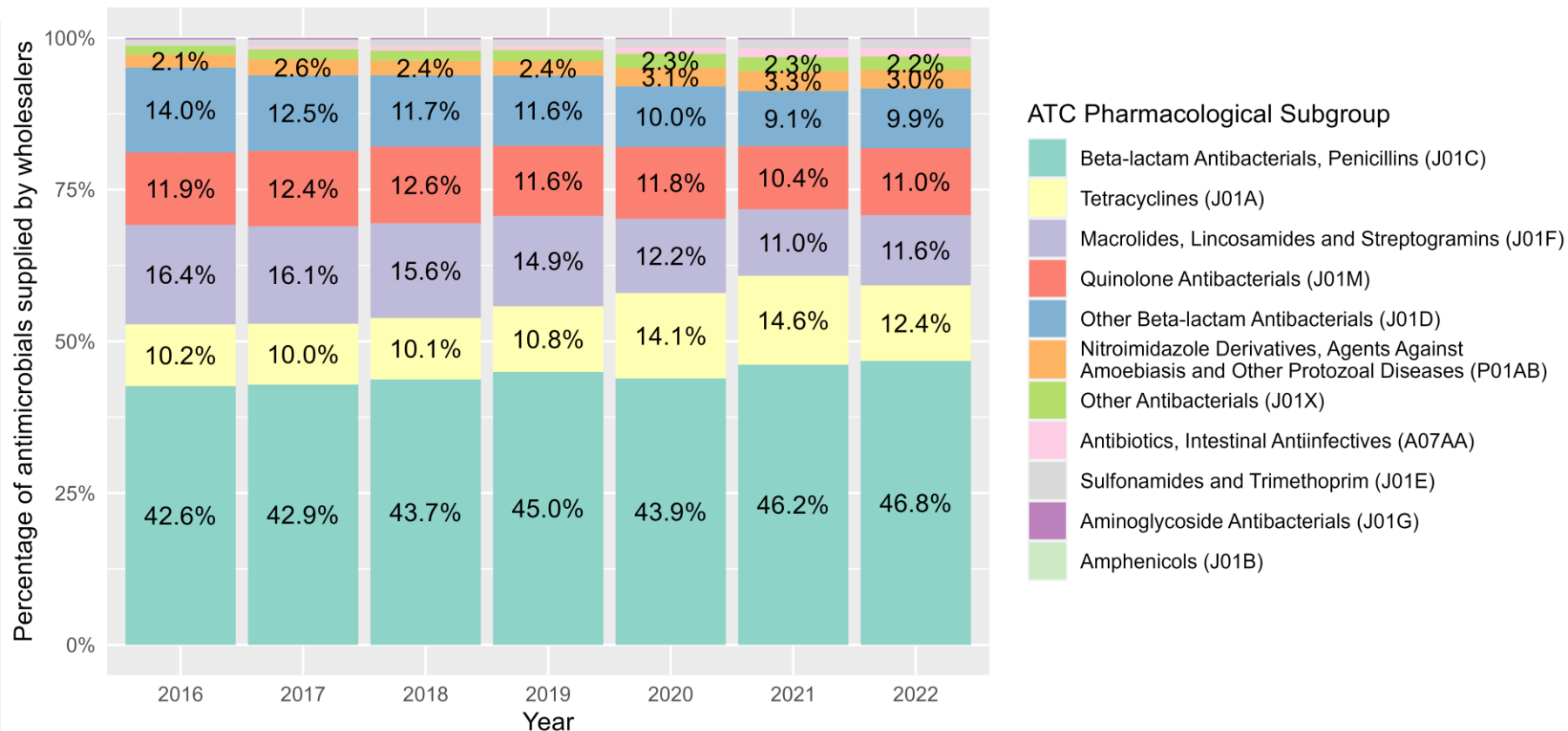


Results

2C. Antimicrobials wholesale supply (2016-2022)
- Distribution by ATC Pharmacological Subgroup



2C. Antimicrobials wholesale supply (2016-2022) - Distribution by ATC Pharmacological Subgroup



- In 2022, beta-lactam antibacterial, penicillins (J01C) was the most commonly supplied antimicrobial group, accounting for 46.8% of all supplies. They were followed by tetracyclines (J01A) at 12.4% and macrolides, lincosamides and streptogramins (J01F) at 11.6%.
- Notably, since 2020, tetracyclines (J01A) has surpassed macrolides, lincosamides and streptogramins (J01F) to become the second most commonly supplied antimicrobial group.



2C. Antimicrobials wholesale supply (2016-2022) - 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 22)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022			
J01C	Beta-lactam Antibacterials, Penicillins	8.68	7.89	8.09	8.52	5.97	6.32	6.71	-0.399	<0.05	-4.2%
J01A	Tetracyclines	2.07	1.85	1.87	2.05	1.91	2.00	1.79	-0.018	-	-2.4%
J01F	Macrolides, Lincosamides and Streptogramins	3.34	2.96	2.89	2.82	1.66	1.50	1.66	-0.328	<0.01	-11.0%
J01M	Quinolone Antibacterials	2.43	2.29	2.34	2.19	1.61	1.42	1.58	-0.179	<0.01	-6.9%
J01D	Other Beta-lactam Antibacterials	2.85	2.30	2.17	2.19	1.36	1.24	1.42	-0.258	<0.01	-11.0%
P01AB	Nitroimidazole Derivatives, Agents Against Amoebiasis and Other Protozoal Diseases	0.43	0.47	0.44	0.45	0.41	0.45	0.44	-0.002	-	0.2%
J01X	Other Antibacterials	0.29	0.32	0.32	0.34	0.32	0.31	0.32	0.002	-	1.2%
A07AA	Antibiotics, Intestinal Antiinfectives	<0.005	0.10	0.12	0.12	0.14	0.20	0.21	0.030	<0.01	#
J01E	Sulfonamides and Trimethoprim	0.21	0.19	0.22	0.21	0.18	0.20	0.20	-0.002	-	-0.9%
J01G	Aminoglycoside Antibacterials	0.05	0.05	0.05	0.05	0.03	0.04	0.03	-0.004	<0.01	-8.0%
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	14.35	-1.156	<0.05	-5.7%

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

- Similar to 2021, macrolides, lincosamides and streptogramins (J01F) and other beta-lactam antibacterials (J01D) exhibited the largest decrease, with both groups showing an 11.0% reduction in CAGR.
- Despite the overall increase in supply volume from 2021 to 2022, tetracyclines (J01A), nitroimidazole derivatives (P01AB), and aminoglycoside antibacterials (J01G) showed a reduction. Specifically, tetracyclines decreased by 0.22 DID (↓10.9%), aminoglycoside antibacterials by 0.004 DID (↓12.5%) and nitroimidazole derivatives decreased by 0.013 DID (↓2.8%).



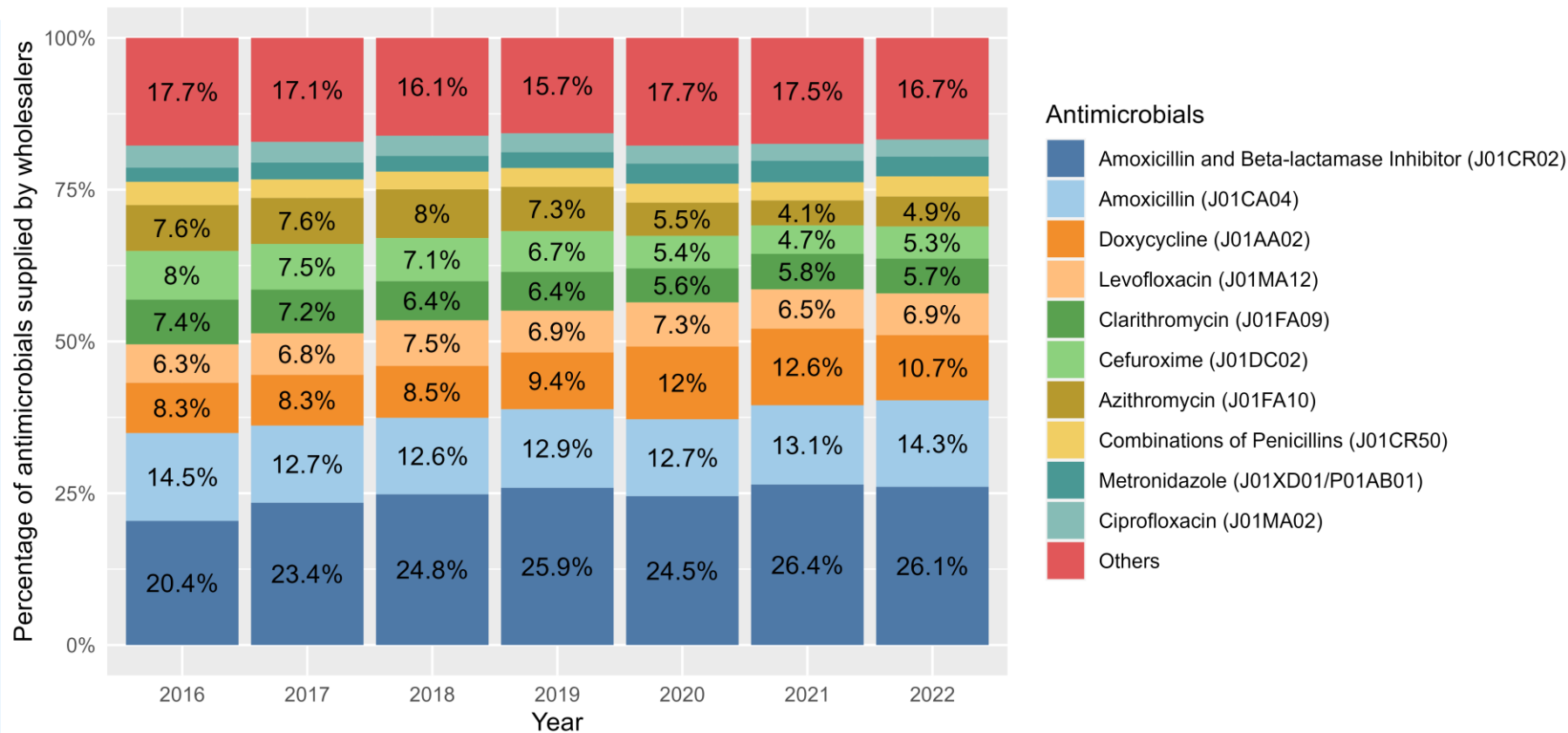
Results

2D. Antimicrobials wholesale supply (2016-2022)

- 10 most supplied antimicrobials



2D. Antimicrobials wholesale supply (2016-2022) - 10 most supplied antimicrobials



- The 10 most supplied antimicrobials contributed >80% of all antimicrobials supplied from 2016 to 2022.
- In 2022, amoxicillin and beta-lactamase inhibitor continued to be the most commonly supplied antimicrobial (26.1%) by wholesale, followed by amoxicillin (14.3%) and doxycycline (10.7%).



2D. Antimicrobials wholesale supply (2016-2022) - 10 most supplied antimicrobials

ATC Chemical Substance		DID							Average annual change	p-value	Compound annual growth rate (16 to 22)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022			
J01CR02	Amoxicillin and Beta-Lactamase Inhibitor	4.16	4.31	4.59	4.91	3.33	3.62	3.74	-0.140	-	-1.8%
J01CA04	Amoxicillin	2.95	2.34	2.33	2.45	1.72	1.79	2.05	-0.158	<0.05	-5.9%
J01AA02	Doxycycline	1.69	1.54	1.58	1.77	1.63	1.73	1.54	0	-	-1.5%
J01MA12	Levofloxacin	1.29	1.26	1.39	1.30	0.99	0.89	0.99	-0.074	<0.05	-4.4%
J01FA09	Clarithromycin	1.50	1.32	1.19	1.21	0.76	0.80	0.82	-0.125	<0.01	-9.5%
J01DC02	Cefuroxime	1.63	1.39	1.31	1.27	0.73	0.64	0.76	-0.168	<0.01	-12.0%
J01FA10	Azithromycin	1.54	1.39	1.48	1.38	0.74	0.56	0.71	-0.174	<0.01	-12.1%
J01CR50	Combinations of Penicillins	0.78	0.56	0.54	0.59	0.42	0.41	0.48	-0.048	<0.05	-7.9%
J01XD01/ P01AB01	Metronidazole	0.47	0.51	0.48	0.49	0.45	0.48	0.47	-0.004	-	-0.2%
J01MA02	Ciprofloxacin	0.74	0.63	0.62	0.59	0.40	0.38	0.40	-0.061	<0.01	-9.6%
	Others	3.61	3.15	2.98	2.98	2.41	2.39	2.40	-0.205	<0.01	-6.6%
	Total	20.37	18.41	18.49	18.96	13.59	13.70	14.35	-1.156	<0.05	-5.7%

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

- Supply of cefuroxime (J01DC02) and azithromycin (J01FA10) decreased most (-12.0% and -12.1%, respectively).
- Despite the overall increase in supply volume from 2021 to 2022, doxycycline (J01AA02) and metronidazole (J01XD01/ P01AB01) showed a reduction.
- In 2022, amoxicillin and beta-lactamase inhibitor (J01CR02) continued to be the most commonly supplied antimicrobial (26.1%) by wholesale, followed by amoxicillin (J01CA04) (14.3%) and doxycycline (J01AA02) (10.7%).

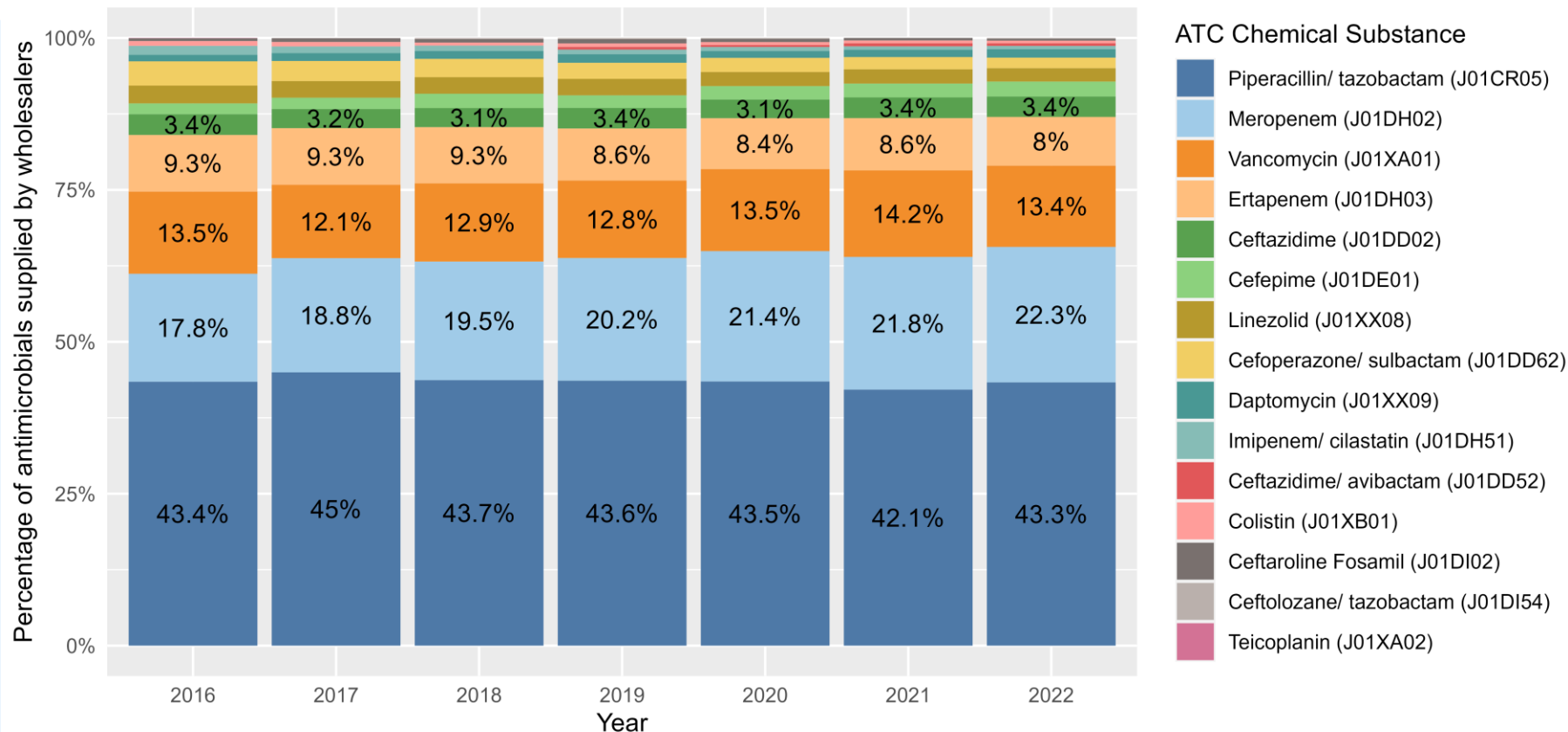


Results

3. Antimicrobials wholesale supply (2016-2022)
 - Selected broad-spectrum antimicrobials



3. Antimicrobials wholesale supply (2016-2022) - Selected broad-spectrum antimicrobials



- In 2022, piperacillin/ tazobactam was the most commonly supplied (43.3%) broad-spectrum antimicrobial, followed by meropenem (22.3%) and vancomycin (13.4%).
- Majority of these broad spectrum antimicrobials were supplied to HA and private hospitals from 2016 to 2022 (about 99%)



3. Antimicrobials wholesale supply (2016-2022) - Selected broad-spectrum antimicrobials

ATC Chemical Substance		DID							Average annual change	p-value	Compound annual growth rate (16 to 22)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022			
Beta-Lactam Antibacterials, Penicillins											
J01CR05	Piperacillin/ tazobactam	0.114	0.128	0.138	0.149	0.152	0.166	0.181	0.01	<0.01	8.0%
Other Beta-Lactam Antibacterials											
J01DH02	Meropenem	0.047	0.053	0.062	0.069	0.075	0.086	0.093	0.008	<0.01	12.2%
J01DH03	Ertapenem	0.025	0.027	0.029	0.029	0.029	0.034	0.034	0.001	<0.01	5.3%
J01DD02	Ceftazidime	0.009	0.009	0.010	0.012	0.011	0.013	0.014	0.001	<0.01	7.7%
J01DD62	Cefoperazone/ sulbactam	0.011	0.009	0.010	0.009	0.008	0.008	0.007	§	<0.01	-6%
J01DE01	Cefepime	0.005	0.005	0.007	0.007	0.008	0.009	0.010	0.001	<0.01	14.0%
J01DH51	Imipenem/ cilastatin	0.004	0.003	0.003	0.003	0.002	0.002	0.002	§	<0.01	-8.9%
J01DI02	Ceftaroline Fosamil	0.001	0.002	0.002	0.002	0.002	0.002	0.001	§	-	1.4%
J01DD52	Ceftazidime/ avibactam	-	§	-	0.001	0.001	0.002	0.002	§	<0.05	-
J01DI54	Ceftolozane/ tazobactam	-	§	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	0.004	<0.01	7.8%
J01XX08	Linezolid	0.008	0.008	0.009	0.009	0.008	0.009	0.009	§	<0.05	3.0%
J01XX09	Daptomycin	0.003	0.004	0.004	0.005	0.004	0.005	0.006	§	<0.01	12.9%
J01XB01	Colistin	0.002	0.002	0.002	0.002	0.002	0.002	0.002	§	-	-2.7%
J01XA02	Teicoplanin	§	-	§	-	-	-	§	§	-	*
Total Broad Spectrum Antibiotics											
Total		0.263	0.284	0.315	0.341	0.350	0.393	0.418	0.026	<0.01	8.0%

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 0.026 DID (↑8.0% in CAGR), a statistically significance rise.
- From 2016 to 2022, piperacillin/ tazobactam, meropenem and vancomycin were the three most supplied selected broad-spectrum antimicrobials. In 2022, they account for approximately 79% of all monitored broad-spectrum antimicrobials.



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)

- 👍 Antimicrobial supply increased slightly by 4.7% from 2021 to 2022, yet there was a notable 29.6% decrease from the 2016 baseline, with a CAGR of -5.7%. (Slide 14)
- 👍 The supply of Access category antimicrobials was 62.1% in 2022 and has fulfilled the overall 60% benchmark as recommended by WHO. (Slide 16)
- 💡 Private doctors received the majority (52.9%) of antimicrobial supplies in 2022, followed by Hospital Authority (28.4%), community pharmacies (6.2%), and private hospitals (5.5%). (Slide 19)
- 👍 Percentage of antimicrobials supplied to community pharmacies decreased from 18.5% in 2016 to 6.2% in 2022. (Slide 19)



Summary (2)

- 💡 Beta-lactam antibacterials, penicillins (J01C) dominated the supply at 46.8%, with tetracyclines (J01A) and macrolides, lincosamides, and streptogramins (J01F) following at 12.4% and 11.6%, respectively. (Slide 28)
- 💡 The top 10 antimicrobials accounted for over 80% of supplies from 2016 to 2022, with amoxicillin and beta-lactamase inhibitor leading in 2022. (Slide 31)
- 💡 Broad-spectrum antimicrobials like piperacillin/tazobactam, meropenem, and vancomycin saw an average annual increase of 8.0% in CAGR, with these three making up about 79% of all monitored broad-spectrum antimicrobials in 2022. (Slide 35)



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.





THE END

Thank you

