

# Utilization of West Virginia Pediatric Medicaid Claims Data to Guide Outpatient Antimicrobial Stewardship Interventions

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## Introduction

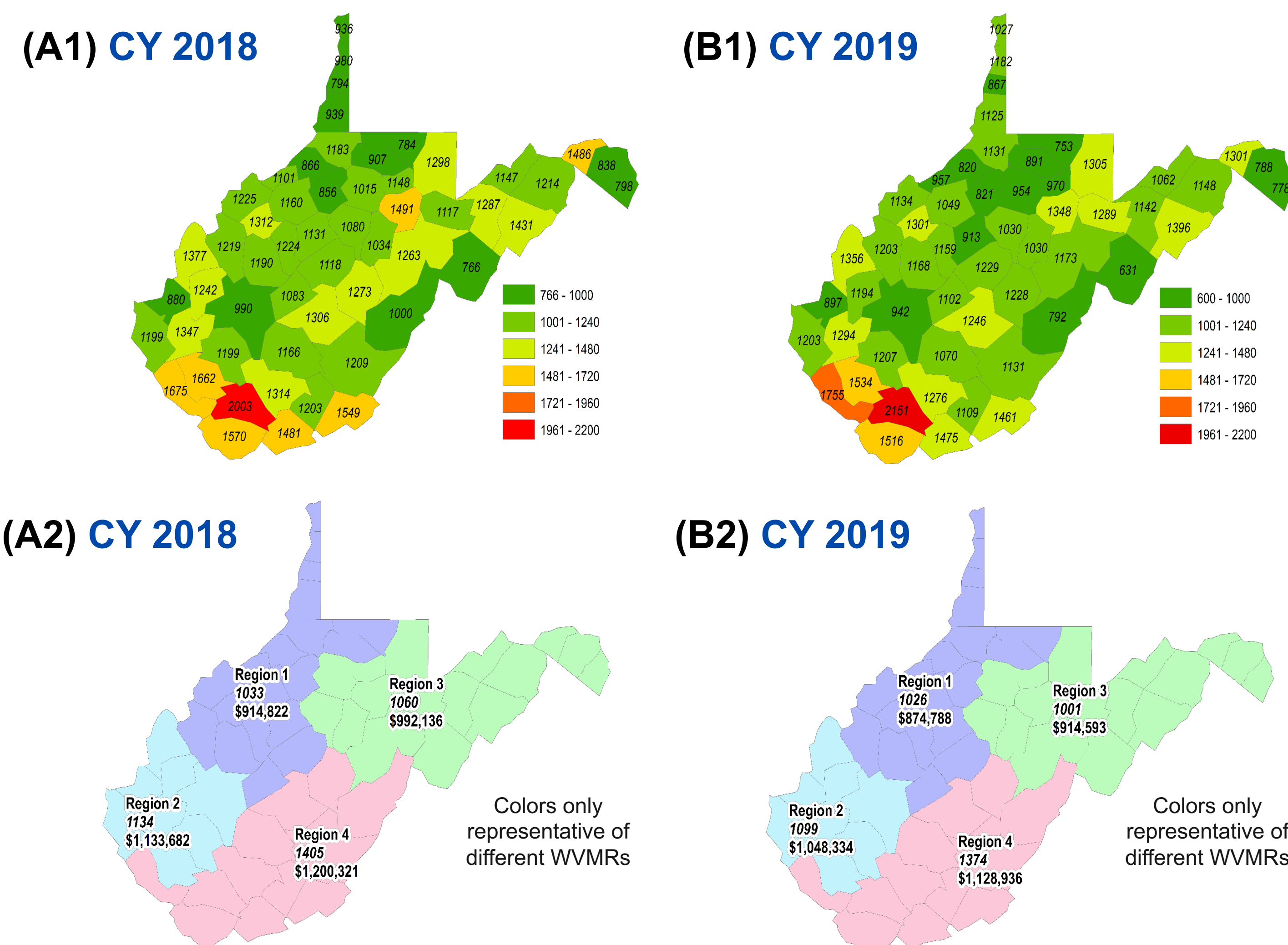
West Virginia (WV) consistently ranks in the top two states nationally for per capita antibiotic prescription rates in both pediatric and adult populations<sup>1,2</sup>. Despite resources at its major academic centers, WV faces unique challenges in many other regions including sparse provider density in rural areas<sup>3</sup>. As part of a state-supported antimicrobial stewardship initiative, our research team has collaborated with WV Medicaid to better understand the factors associated with this high outpatient antibiotic prescribing to guide stewardship interventions.

## Methods

- Cross-sectional analysis of WV Medicaid outpatient pharmacy & medical claims for recipients aged <20 years from 1/1/2018 to 12/31/2019.
- Oral antibiotics were identified using National Drug Codes (NDCs). Key demographic variables extracted from claims included patient age (in years as of December 31<sup>st</sup> of that calendar year [CY]), sex, race, ethnicity, Medicaid region, place of medical service, provider & cost.
- Narrow-spectrum antibiotics were defined as penicillin, amoxicillin & first-generation cephalosporins. All others were considered broad-spectrum in accordance with similar literature in this field<sup>4</sup>.
- Rates of prescribing were calculated as the number of prescriptions per 1,000 children and stratified by age, race/ethnicity, sex, and WV Medicaid region. Oral antibiotic prescriptions were compared across CYs 2018 & 2019 including spectrum of antibiotic coverage.
- Geographic information system (GIS) mapping was used to depict geographic variation in prescribing by county & Medicaid region (WVMR).
- Dental claims were excluded. Non-oral antibiotics were excluded outside of total cost analysis.

## Results

**Figure 1. GIS mapping of prescriptions per 1,000 WV children by county, WVMR with total cost & CY, 2018 (A1-2) & 2019 (B1-2).**



## Results (contd.)

**Table 1. WV pediatric (0-19 years\*) Medicaid patient population demographic summary by CY.**

	CY 2018				CY 2019			
	Patients	Rxs	%	Rate per 1,000	Patients	Rxs	%	Rate per 1,000
<b>Total (all WV Medicaid Claims)</b>	204,606	234,482		1,146	201,925	224,847		1,114
<b>Provider type / Specialty</b>								
Physician / Pediatrics		39,983	17.1%			38,349	17.1%	
Physician / Other Specialty		59,501	25.4%			51,759	23.0%	
Other Provider <sup>^</sup> / Pediatrics		5,278	2.3%			4,912	2.2%	
Other Provider / Other Specialty <sup>^</sup>		129,720	55.3%			129,827	57.7%	
<b>Antibiotic prescription type</b>								
Broad-spectrum		107,551	45.9%			100,847	44.9%	
Narrow-spectrum		126,931	54.1%			124,000	55.2%	
<b>Race/ethnicity</b>								
African American / Non-Hispanic	25,039	25,570	10.9%	1,021	25,607	26,333	11.7%	1,028
Caucasian / Non-Hispanic	151,606	180,770	77.1%	1,192	148,341	172,010	76.5%	1,160
Other <sup>+</sup>	27,961	28,142	12.0%	1,006	27,977	26,504	11.8%	947
<b>Sex</b>								
Female	101,040	125,941	53.7%	1,246	99,664	120,274	53.5%	1,207
Male	103,564	108,541	46.3%	1,048	102,261	104,573	46.5%	1,023
<b>Geographic location (WVMR)</b>								
Region 1	47,304	48,842	20.8%	1,033	46,838	48,056	21.4%	1,026
Region 2	54,472	61,819	26.4%	1,135	54,701	60,100	26.7%	1,099
Region 3	49,469	52,425	22.4%	1,060	49,461	49,554	22.0%	1,002
Region 4	46,291	65,027	27.7%	1,405	46,048	63,314	28.2%	1,375
<b>Age Groupings (years)*</b>								
0-2	34,732	48,719	20.8%	1,403	33,964	45,642	20.3%	1,344
3-9	75,220	91,328	39.0%	1,214	73,223	87,828	39.1%	1,199
10-19	94,654	94,435	40.3%	998	94,738	91,377	40.6%	965

\* Age for patients as of December 31<sup>st</sup> of claim year; for prescription (Rx), at date of service (DOS).

<sup>^</sup> "Other provider" = non-MD, non-DO providers including NPs & PAs. "Other specialty" = any non-pediatric specialty.

<sup>+</sup> Other includes Alaskan Natives & American Islanders race categories in addition to all those with Hispanic ethnicity.

**Table 2. Total spending (USD \$) by CY.**

Calendar year (CY)	Total Spending, oral antibiotics (USD \$)	Total spending, all antibiotics* (USD \$)	Average spending per Rx, oral antibiotics only (USD \$)
CY 2018	\$4,366,091	\$7,796,701	\$18.62
CY 2019	\$4,041,687	\$7,731,375	\$17.98

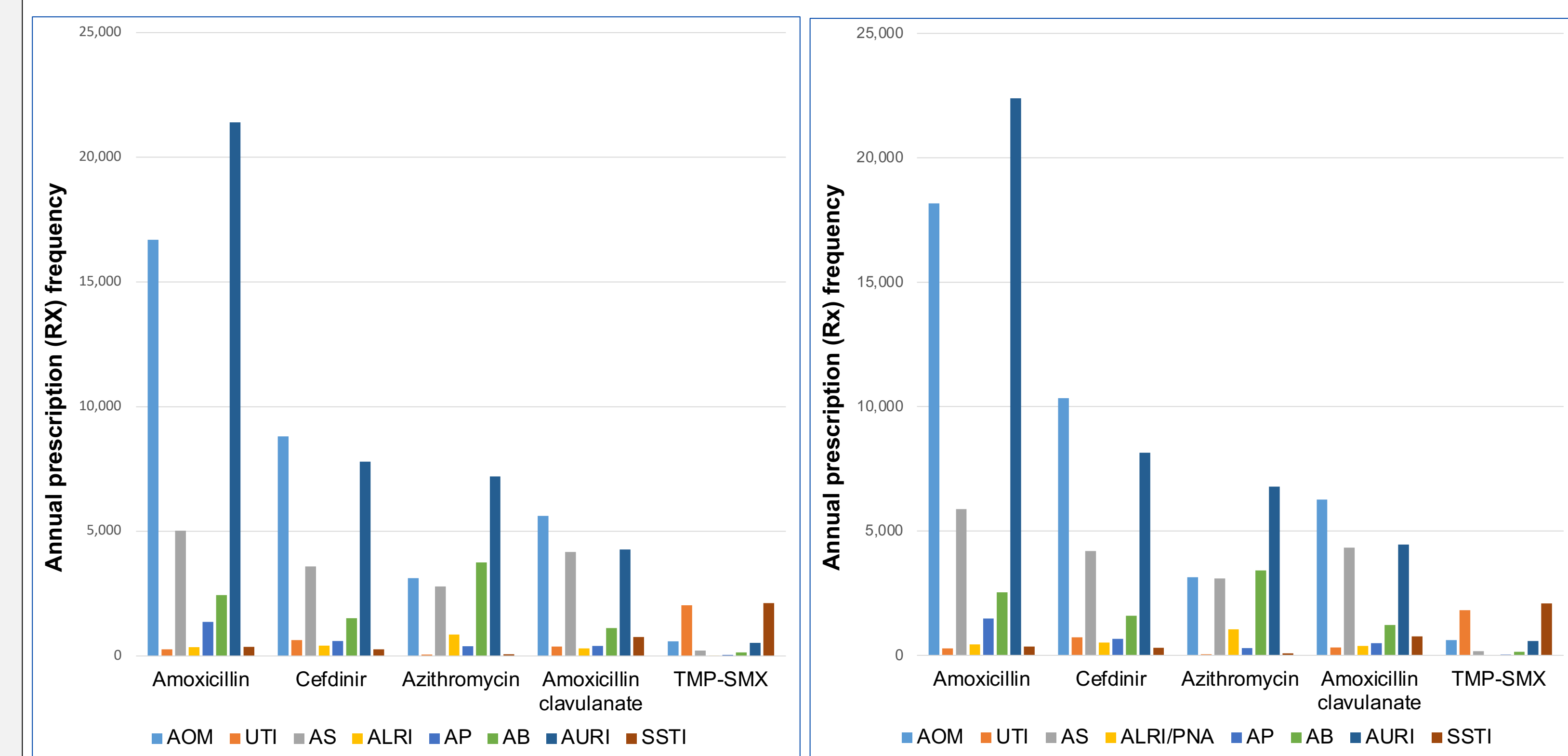
\*Includes oral, otic, ophthalmic, other topicals, intravenous (IV) & intramuscular (IM) antibiotics.

### Results summary:

- **Figure 1:** highest pediatric prescription rates & total annual cost consistently represented by WVMR 4.
- **Table 1:** overall prescription rates, 1,146 (CY 2018) & 1,114 (CY 2019). Higher among females, Caucasians and a younger (0-2) age group. Non-physician, non-pediatric specialty providers with greatest frequency of prescribing.
- **Table 2:** cost exceeding \$4 million annually for oral antibiotics alone; >\$7 million when including oral & non-oral routes of administration.
- **Figure 2:** Amoxicillin, cefdinir, and azithromycin were the most commonly prescribed antibiotics across CYs and for the majority of included outpatient infectious diagnoses.

## Results (contd.)

**Figure 2. Top five antibiotic prescription frequencies for common outpatient infectious diagnoses, CY 2018 & 2019.**



AOM = acute otitis media, UTI = urinary tract infection, AS = acute sinusitis, ALRI = acute lower respiratory tract infection (pneumonia), AP = acute pharyngitis, AB = acute bronchitis, AURI = acute upper respiratory tract infection, SSTI = skin & soft tissue infection.

## Conclusions

- There is significant variation in antibiotic prescribing across WV, notably by provider type & specialty and WVMR.
- Stewardship intervention should focus on non-physician, non-pediatric providers in WVMR 4, the southern & most rural portion of the state.
- Secondary analysis revealed an alarmingly high total number of broad-spectrum antibiotic use compared to narrow-spectrum. With overuse and misuse of antibiotics as primary drivers of antimicrobial resistance<sup>4</sup>, it remains imperative to develop novel evidence-based strategies to reduce this significant public health risk throughout this region.
- Further data analysis will examine other potential barriers to care including driving distance to providers as mapped through GIS software.

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