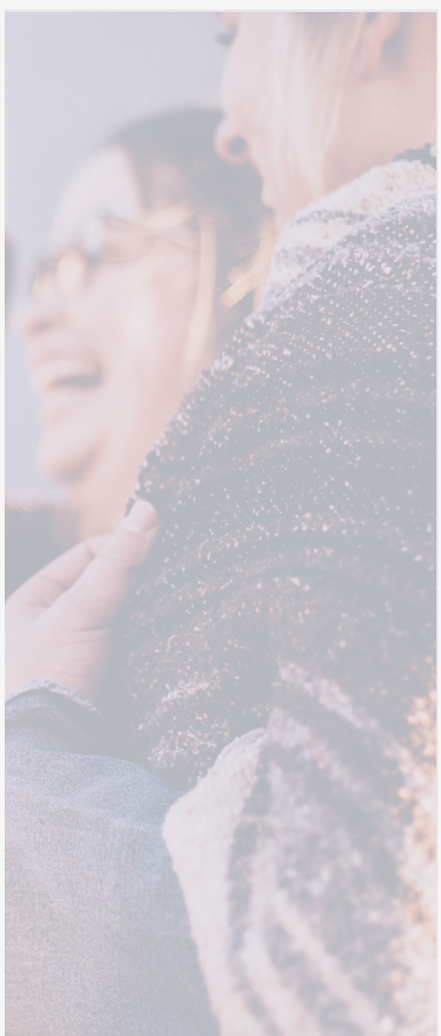
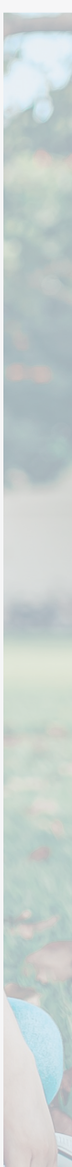
TPP Alberta
TRACKED PRESCRIPTION PROGRAM

Antibiotic Prescription Atlas *2020*





TPP Alberta
TRACKED PRESCRIPTION PROGRAM

Alberta's prescription drug monitoring program, Tracked Prescription Program Alberta (TPP Alberta), uses data to optimize safe patient care. Since it was established in 1986, TPP Alberta has been monitoring the use of certain medications prone to misuse.

The mandate of TPP Alberta is:

- To monitor prescribing, dispensing and utilization practices regarding targeted medications;
- To provide timely and relevant information on targeted medications to prescribers, dispensers, consumers, regulatory bodies and stakeholders;
- To work with stakeholders to enable system level change to ensure appropriate use of targeted medications;
- To ensure efficient and effective functioning of TPP Alberta.

Funded primarily by the province of Alberta, TPP Alberta represents a partnership with program administration by the College of Physicians & Surgeons of Alberta (CPSA). The list of partners includes:

Alberta College of Pharmacy

Alberta Dental Association and College

Alberta Health

Alberta Health Services

Alberta Medical Association

Alberta Pharmacists' Association

Alberta Veterinary Medical Association

College and Association of Registered Nurses of Alberta

College of Physicians & Surgeons of Alberta

College of Podiatric Physicians of Alberta

https://www.tppalberta.ca/

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Executive Summary

A global outbreak of COVID-19 required Alberta to declare a local state of public health emergency on March 17, 2020. On March 27, many non-essential businesses were closed and gatherings limited to 15 people. 2020 presents a very different set of patterns than previous years because of the COVID-19 outbreak and associated public health restrictions. The number of patients and prescriptions declined dramatically after the public health restrictions which may be due to lower contagion rates along with efforts made by prescribers to reduce the consumption of these prescriptions.

There is an association between socio-economic status and the consumption of antibiotics where areas with higher levels of deprivation also show higher rates of consumption for antibiotics. This is only an association and no statistical relationship was established.

An analysis of urban/rural status against observed rates indicated that suburban areas have the lowest consumption rates of antibiotics.

The geographic differences observed for the consumption of antibiotics is less dramatic than those observed in opioids and BDZ/Z products (as outlined in the 2020 TPP Atlas).

The rates for prescriptions and patients reveal similar patterns to each other and show an association with socio-economic status. Defined Daily Dose (DDD) showed fewer differences among geographic areas and lower association with urban/rural or socio-economic status.

New additions to the 2020 Atlas are:

- the effect of COVID-19 on prescribing trends;
- a comparison of rates by socio-economic status;
- an analysis of urban/rural status;
- an expanded exploration of trends for the top five geographic areas with the highest rates;
- an investigation of drug form and route;
- an exploration of dosage by specialty group;
- inclusion of population size in the rates maps;
- a redesign of the large two-page graph spread to provide more information; and,
- legal size format.

Background and Methods

About the Atlas

The purpose of this Tracked Prescription Program (TPP) Alberta Antibiotic Prescription Atlas 2020 is to provide an overview of provincial antibiotic medication utilization for the year 2020. Alberta's Pharmaceutical Information Network (PIN) is the source of medication utilization information.

Data used in the Atlas analyses were extracted on July 28, 2021. Age and Sex standardized rates are used throughout the Atlas. All antibiotic medications included in this Atlas were prescribed for administration by the oral route. Compounded medications were excluded from the analyses. Antibiotic products that have a Drug Information Number (DIN), such as amoxicillin-clavulanate, were included.

Antibiotic Prescription Data Source

2016 to 2020 PIN data were used for the analyses. PIN data consist of dispense records from community pharmacies in Alberta. Ongoing gaps within PIN data include dispensing information from hospital pharmacies and extended care centres. PIN data do not discriminate between medications actually dispensed from those awaiting release to the patient. As pharmacy records may be modified or reversed before the actual dispense, PIN data are dynamic. To capture actual dispensing as closely as possible, data were extracted from PIN on July 28, 2021, by which time most modifications and reversals would have occurred.

All prescriber types were included in the analyses. In 2020, physicians prescribed 78% of all oral antibiotic prescriptions, followed by dentists who prescribed 14%. For dentists, only the number of prescriptions and number of patients were reported, due to the lack of pharmacy use of dentist registration numbers when dispensing.

Pharmacy Local Aggregated Geographies

Pharmacy Local Aggregated Geographies (PhLAGs) merge local geographies with neighbouring geographies where their residents are dispensed medications, eliminating issues with utilization rates in local geographies being artificially low or high. In this Atlas, drug utilization rates count patients in the

numerator in each PhLAG where they received prescription dispenses. The merging of geographies has primarily occurred in smaller cities such as Red Deer, Lethbridge, Medicine Hat, Grande Prairie, Fort McMurray, Spruce Grove, etc. The total number of geographic units has been reduced from 132 local geographies to 106 pharmacy local aggregated geographies. The method used to develop PhLAGs is consistent with those used to develop other Alberta geographic aggregations used in the health system, such as subzones. Rural PhLAG names include various municipality types, such as County, Planning and Special Area, and Municipal District. Edmonton - Abbottsfield is an area with a small population and a large number of pharmacies that could not be merged with an adjacent area since its patterns were quite different from the surrounding areas. High rates are observed in this PhLAG for most measures because a high number of dispenses from a high number of pharmacies that serve patients from inside and outside its boundaries must be divided by a small population.

Antibiotic Utilization Analyses

Analyses of medication utilization were carried out based on the main ingredient of interest within each drug. In the case where a drug had two ingredients of interest, one was chosen as the main ingredient.

Only medications with an oral route of administration were included. Patients of all ages were included in analyses, including DDD calculations. Figure 15 includes all routes, not just oral.

Appendix A shows the patients, prescriptions, prescribers, and pharmacies associated with the 20 most commonly prescribed antibiotics during 2020, by main ingredient and ATC Code. Appendix B provides information on interpretation of graphs and maps.

Atlas Measures

Antibiotic utilization is presented in this Atlas using counts and age and sex standardized rates. Patient age was calculated on July 1, 2020.

Days of Treatment

Days of Treatment, also called Days of Therapy, measures are presented by main ingredient due to the large differences between antibiotics in standard days of treatment. The top 10 ingredients have been included. Treatment days is calculated by summing the "days of supply" for the entire year for each patient or prescription. The mean value for all patients and prescriptions is calculated for each of the more common antibiotics to obtain "treatment days per patient" and "treatment days per prescription". The total number of prescriptions is calculated for every patient for a whole year and the mean is calculated for the common antibiotics to obtain "prescriptions per patient."

These Days of Treatment measures highlight the length of treatment associated with each ingredient, including:

- Treatment days per patient
- Treatment days per prescription
- Prescriptions per patient

Defined Daily Dose (DDD)

The defined daily dose (DDD), as defined by the World Health Organization (WHO), is the assumed average daily maintenance dose for a drug used for its main indication in adults. Drug DDD values were obtained primarily from the WHO DDD/ATC Index.

The DDD for a specific drug dispense was calculated as follows:*

Dispense DDD = strength x quantity / drug DDD

A patient's total DDD was calculated as follows:*

Patient DDD = the sum of the DDDs for all drug dispenses to the patient in the time period analyzed

Patients = the number of patients who received at least one antibiotic prescription in the time period analyzed / 1,000 population

Prescriptions = the number of prescriptions in the time period analyzed / 1,000 population

DDDs per 1,000 Population = the sum of all patient DDDs received in the time period analyzed / 1,000 population

Urban-Rural Categories

This 2020 Atlas introduces some analyses at the urban/rural level. The urban/rural category definitions used in the Atlas are adapted from those used by Alberta Health for Local Geographic Areas (LGAs). LGAs are used to report many types of data in small geographic areas which, when aggregated, match PhLAG boundaries used in the Atlas. For a full discussion about LGAs, visit: http://aephin.alberta.ca/boundaries/

The categories are:

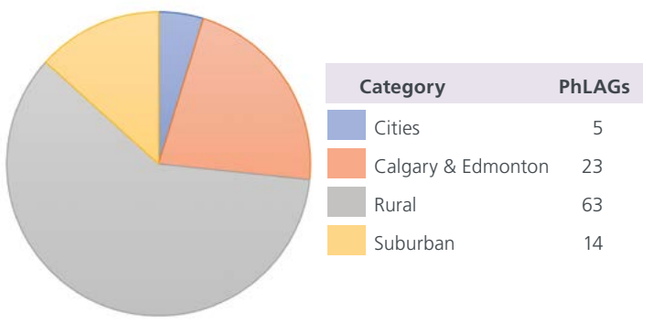
Cities — Lethbridge, Medicine Hat, Red Deer, Grande Prairie, and Fort McMurray;

Calgary & Edmonton — the areas within the cities of Edmonton and Calgary;

Rural — areas without major urban centres;

Suburban — areas surrounding larger urban areas

Figure 1. Distribution of Geographic Areas by Urban/Rural Categories, 2020



Note: Figure 1 shows the distribution of the number of geographic areas by category. The population of Alberta is concentrated in urban areas but a large percentage of the total area of the province is rural.

For an optimum viewing experience, please select the two-page layout in your PDF reader. Many pages can be viewed individually but others benefit from a two-page view.

To set a two page view in Adobe Acrobat, select "View/Page Display/Two Page View", if using Preview on a Mac, then set "View/Two Pages". Other PDF viewers have similar options.

Socio-Economic Index

This year also introduces an analysis of socio-economic status in context of the observed rates for the selected measures. In 2009, Pampalon et al.[1] introduced a deprivation index for health data analysis in Canada based on data from Statistics Canada's "The Census of Canada." The index was developed for Quebec but has been used extensively in other Canadian provinces since the same data is gathered in all administrative areas of Canada. The index measures deprivation, where higher values indicate higher deprivation. There are some challenges in adapting the index to other geographic areas. For example, rural areas show higher than expected deprivation indices because the methodology does not capture greater food and housing security in some of these areas.

Alberta Health Services adapted the Pampalon approach using Alberta census data (Khakh, A. 2020),[2] and have assigned an index to each LGA. The AHS team replicated the Material Deprivation Index (based on % without high school or higher education, average personal income, and employment to population ratio) and the Social Deprivation Index (based on % separated/widowed/divorced, % lone parent families, and % living alone). Dr. Khakh highlights that the Material Deprivation Index (MDI) is the better choice in Alberta because rates used were age/sex standardized and linearly normalized.

The socio-economic deprivation index creates five categories, from 1 (least deprived) to 5 (most deprived). These categories were used to evaluate the rates of the selected measures against the MDI. These were also evaluated in context of the urban-rural categories described earlier. Some of these analyses evaluate the aggregated geographic areas that form a category (i.e. "Rural"); these calculations were averages of the included units. Figure 2 shows the aggregation of the MDI to the urban-rural categories.

Figure 2 highlights that Suburban areas show the lowest deprivation index (2.7) and Rural areas the highest (3.6). It is essential to remember that there are areas with high and low values within any of these categories.

Figure 2. Urban/Rural Categories and Associated Socio-Economic Deprivation Index, 2020

[1] Pampalon, R, Hamel, D, & Gamache, P. (2009). A deprivation index for health planning in Canada. Chronic Diseases in Canada, 29(4): 178-191

[2] Khakh, A. (2020). How to Use the Pampalon Deprivation Index in Alberta, Research and Innovation, Alberta Health Services

Antibiotic Utilization

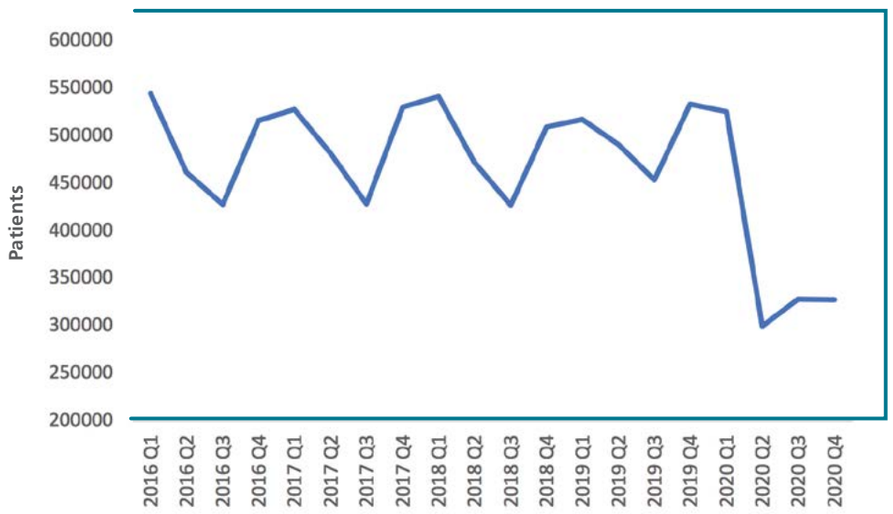
During 2020, close to 2 million oral antibiotic prescriptions were dispensed for 1.1 million unique patients (Table 1). Both of these reflect a much lower level of antibiotic utilization in 2020 than previous years. As expected, notable seasonal trends were observed in the dispensation of antibiotics between 2016 to 2020 (Figure 3 and 4) with a dramatic drop in the second quarter of 2020 (2020 Q2) corresponding with the public health restrictions implemented in the province. Differences were observed according to both age and sex (Table 2 and 3).

Table 1. Utilization of Prescription Antibiotics in Alberta, 2016–2020

Years	Patients	Prescriptions	Dispenses	Population
2016	1,379,267	2,472,645	2,602,124	4,252,720
2017	1,398,198	2,495,220	2,630,915	4,285,997
2018	1,392,725	2,478,800	2,617,811	4,306,822
2019	1,425,988	2,530,239	2,674,077	4,371,154
2020	1,093,686	1,905,261	2,063,375	4,421,681
Trends				

Years	Patients /1,000 pop	Prescriptions /1,000 pop	DDDs /1,000 pop
2016	324	581	15.8
2017	326	582	15.8
2018	323	576	15.6
2019	326	579	15.6
2020	247	431	12.3
Trends			

Figure 3. Patients by Quarter, 2016–2020



Note: Alberta declared a local state of public health emergency on March 17 due to a COVID-19 outbreak. On March 27 many non-essential businesses were closed and gatherings limited to 15 people.

Figure 4. Prescriptions by Quarter, 2016–2020

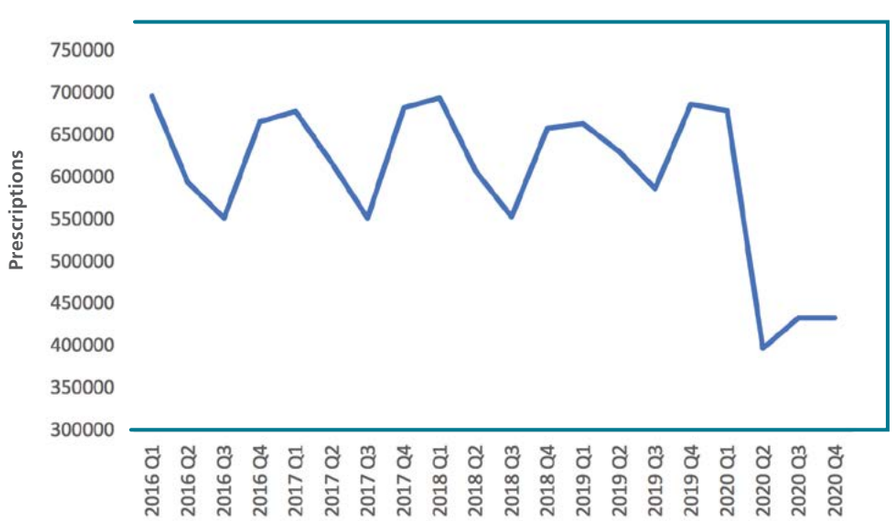
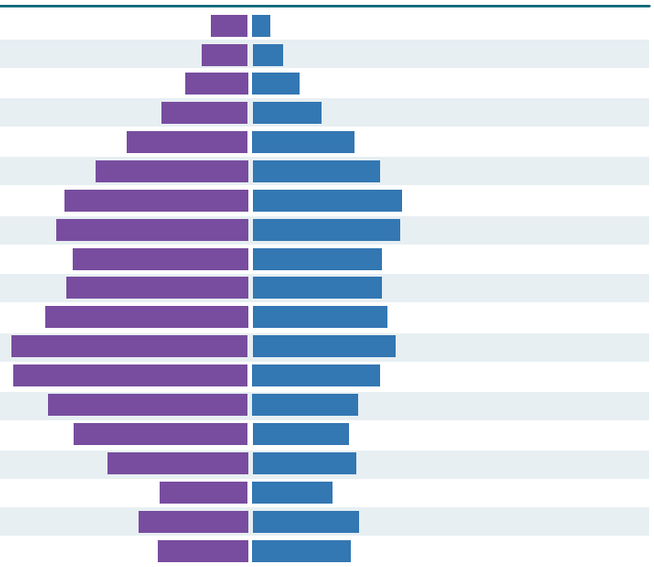


Table 2. Patients by Age and Sex, 2020*

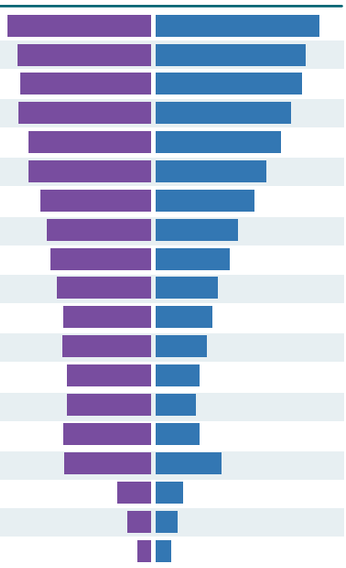
Age	Females	Males	Females	Males
90+	8,889	4,211		
85 - 89	10,529	7,016		
80 - 84	14,509	10,903		
75 - 79	20,017	16,024		
70 - 74	28,440	23,692		
65 - 69	35,930	30,059		
60 - 64	43,327	35,028		
55 - 59	45,192	34,471		
50 - 54	41,190	30,349		
45 - 49	42,522	30,248		
40 - 44	47,958	31,571		
35 - 39	55,697	33,702		
30 - 34	54,939	29,867		
25 - 29	47,026	24,914		
20 - 24	40,954	22,434		
15 - 19	33,082	24,148		
10 - 14	20,498	19,043		
5 - 9	25,910	24,929		
0 - 4	21,067	23,075		



*297 patients excluded because of unknown age, 24 excluded because of unknown sex and 5 excluded because of unknown age and sex.
694 female patients and 948 male patients less than one year old.

Table 3. Antibiotic Utilization Rates by Age and Sex, 2020

Age Group	Female Patients per 1,000 pop	Male Patients per 1,000 pop	Female Prescriptions per 1,000 pop	Male Prescriptions per 1,000 pop	Female DDDs per 1,000 pop*	Male DDDs per 1,000 pop*	Female DDDs per 1,000 pop*	Male DDDs per 1,000 pop*
90+	478	464	1,078	1,020	24.2	27.4		
85 - 89	406	388	912	840	22.5	25.2		
80 - 84	380	359	827	739	21.7	24.4		
75 - 79	366	332	782	670	22.1	22.7		
70 - 74	347	313	711	610	20.5	21.3		
65 - 69	338	290	683	542	20.4	18.6		
60 - 64	328	265	643	490	18.5	16.6		
55 - 59	318	242	608	432	17.5	13.9		
50 - 54	314	224	588	389	16.8	12.5		
45 - 49	300	206	551	340	15.6	10.6		
40 - 44	302	196	543	315	14.9	9.5		
35 - 39	313	186	555	291	14.8	8.8		
30 - 34	314	165	547	251	14.1	7.4		
25 - 29	308	154	529	228	14.0	6.9		
20 - 24	307	156	523	225	14.8	7.5		
15 - 19	264	184	428	264	14.5	11.3		
10-14	152	135	204	178	5.6	4.6		
5 - 9	191	176	256	231	4.0	3.8		
0 - 4	161	169	221	233	2.4	2.6		



*326 Patients excluded because of unknown age and/or sex.

Note: Only oral route antibiotics are shown on these two pages.

Antibiotics Prescribed by Prescriber Type

Of more than 17,000 unique prescribers, physicians prescribed 79% of all oral antibiotic prescriptions. Of prescriptions in PIN associated with an identified prescriber type, 17.1% have unknown prescribers. 0.8% of prescriptions have an unknown prescriber type (Table 4). Most patients were dispensed antibiotics from one or two unique prescribers in a year. More than 5% of patients were dispensed antibiotics from three or more prescribers (Table 5). Over 10% of patients were dispensed three or more antibiotics in a year (Table 6).

Table 4. Prescriptions, Patients and Prescribers by Prescriber Type, 2020*

Prescriber Type	Prescriptions	Dispenses	Patients	Prescribers*	% Unknown Prescribers
Physician	1,490,607	1,634,910	887,626	12,038	3.3%
Dentist	276,873	280,803	210,709	-	96.8%
Pharmacist	95,883	100,783	78,848	3,949	0.1%
Nurse Practitioner	21,884	25,605	16,775	532	10.1%
Optometrist	3,852	4,154	3,376	-	95.1%
Dental Hygenist	308	322	273	-	98.7%

* 15,720 (0.8%) prescriptions have no Prescriber Type identified.

Table 5. Patients by Number of Unique Prescribers* per Year, 2016–2020

Prescribers	2016	2017	2018	2019	2020	2016 Percent	2020 Percent	Trend 2016-2020
1 Prescriber	1,057,534	1,061,373	1,062,049	1,083,459	878,101	76.7%	80.3%	
2 Prescribers	230,327	240,041	235,492	243,021	156,601	16.7%	14.3%	
3 Prescribers	63,050	66,811	65,556	68,208	40,495	4.6%	3.7%	
4 Prescribers	18,948	19,718	19,525	20,725	12,138	1.4%	1.1%	
5 Prescribers	5,977	6,598	6,409	6,724	4,002	0.4%	0.4%	
6 Prescribers	2,128	2,245	2,250	2,360	1,382	0.2%	0.1%	
7+ Prescribers	1,303	1,412	1,444	1,491	967	0.1%	0.1%	

*The individual prescriber is not known for the majority of prescriptions with a prescriber type of Dentists, Optometrists, Dental Hygenists

Table 6. Patients by Number of Unique Antibiotics per Year, 2016–2020

Prescribers	2016	2017	2018	2019	2020	2016 Percent	2020 Percent	Trend 2016-2020
1 Antibiotic	938,165	952,300	954,477	977,696	776,836	68.0%	68.0%	
2 Antibiotics	299,379	302,525	297,569	303,806	215,338	21.7%	21.7%	
3 Antibiotics	96,293	97,313	95,422	98,164	68,964	7.0%	7.0%	
4 Antibiotics	30,816	31,111	30,546	31,625	22,132	2.2%	2.2%	
5 Antibiotics	9,905	10,177	10,121	10,061	7,087	0.7%	0.7%	
6 Antibiotics	3,255	3,324	3,207	3,220	2,307	0.2%	0.2%	
7+ Antibiotics	1,454	1,448	1,383	1,416	1,022	0.1%	0.1%	

Patients and Prescriptions by Type of Antibiotic

Figure 5 and Figure 6 show the number of unique patients and number of prescriptions by antibiotic in each year for the most commonly prescribed antibiotics. Overall, amoxicillin was the most commonly used antibiotic in 2016 to 2020.

Figure 5. Patients by Antibiotic per Year*, 2016–2020

Antibiotic	2016	2017	2018	2019	2020	Trend 2016-2020	2020
Amoxicillin	537,908	540,049	529,939	549,414	376,232		
Cephalexin	192,305	196,117	198,962	202,157	185,546		
Amox-Clav	145,075	166,067	172,620	181,672	133,713		
Azithromycin	201,010	223,081	231,911	254,472	130,448		
Nitrofurantoin	97,207	100,416	104,163	111,910	109,825		
Ciprofloxacin	155,705	141,565	133,466	124,013	103,815		
Doxycycline	82,171	90,251	98,728	108,157	82,357		
Metronidazole	76,770	78,308	80,999	83,704	77,097		
Clindamycin	72,851	70,719	68,863	66,514	59,941		
Cefixime	34,682	44,210	50,072	56,750	56,165		
Smx-Tmp	65,994	60,777	53,700	54,105	50,236		
Penicillin	62,830	63,910	62,479	61,870	42,503		
Clarithromycin	128,167	114,923	96,462	85,230	41,245		
Minocycline	30,529	29,187	27,653	26,620	24,265		
Levofloxacin	37,732	34,509	32,901	29,431	18,836		

*Only the most commonly-prescribed antibiotics are shown, representing over 95% of all oral antibiotics dispensed. Appendix A shows other commonly prescribed antibiotics in Alberta.

Figure 6. Prescriptions by Antibiotic per Year*, 2016–2020

Antibiotic	2016	2017	2018	2019	2020	Trend 2016-2020	2020
Amoxicillin	689,418	686,592	669,619	692,012	459,380		
Cephalexin	232,029	236,554	240,878	244,645	227,875		
Amox-Clav	168,814	193,441	201,936	213,037	158,492		
Azithromycin	230,399	255,321	266,065	291,377	148,604		
Nitrofurantoin	122,293	125,676	130,852	140,557	139,081		
Ciprofloxacin	192,860	174,325	166,417	153,604	130,879		
Doxycycline	100,032	110,040	120,778	131,876	104,042		
Metronidazole	91,027	92,585	95,859	98,610	91,425		
Clindamycin	89,433	86,358	84,167	80,731	73,965		
Smx-Tmp	84,651	78,500	70,698	71,338	68,313		
Cefixime	40,745	52,143	59,251	67,360	67,046		
Penicillin	69,599	70,554	69,425	68,373	47,816		
Clarithromycin	145,121	129,870	108,625	95,311	45,602		
Minocycline	43,303	41,868	40,712	37,751	35,921		
Levofloxacin	45,439	41,288	39,601	35,224	22,891		

*Only the most commonly-prescribed antibiotics are shown, representing over 95% of all oral antibiotics dispensed. Appendix A shows other commonly prescribed antibiotics in Alberta.

Note: Only oral route antibiotics are shown on these two pages.

Antibiotic Prescriptions and Treatment Days per Patient

For an optimum viewing experience, please select the two-page layout in your PDF reader.

The *average number of prescriptions* per patient by the most common antibiotics in 2020 are shown in Figure 7. Figure 8 shows the distribution of the number of prescriptions per patient per year for the same antibiotics. Overall, most patients were dispensed only one to two prescriptions for the same antibiotic. However, depending on antibiotic, one to four percent of patients were dispensed three or more prescriptions in 2020 for the same antibiotic.

For example, just over 80% of patients who received amoxicillin in 2020 had one prescription, about 15% of patients had two prescriptions, 3.5% had three to five prescriptions, 0.05% had six to 10 prescriptions and approximately 0.1% had 11 or more prescriptions (Figure 8, opposite page).

Figure 7. Average Prescriptions† per Patient by Antibiotic*, 2020

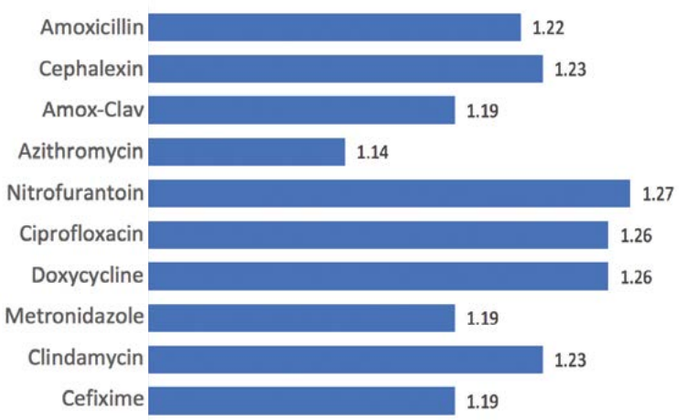


Figure 9 shows the *average* number of treatment days *per patient* by antibiotic in 2020. It accompanies Figure 10 which displays the distribution of the number of treatment days per patient by antibiotic.

Treatment days refer to the number of treatment days prescribed, regardless of patient compliance.

A substantial number of patients were dispensed antibiotics for greater than 10 treatment days in the year regardless of antibiotic. Doxycycline averaged over 30 treatment days per patient, which is known to be dispensed in longer durations for acne management. (Figure 10, opposite page).

Figure 9. Average Treatment Days per Patient by Antibiotic*, 2020

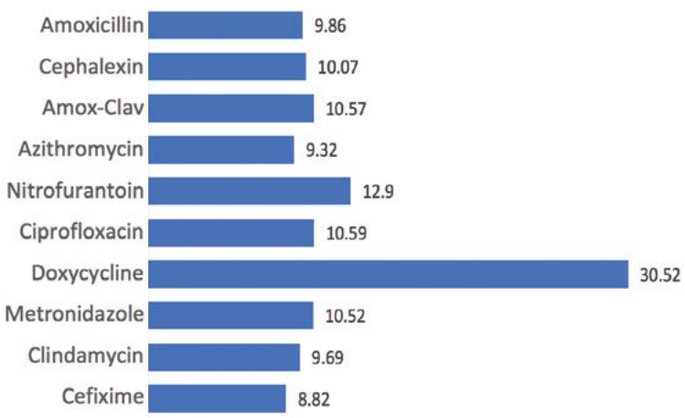
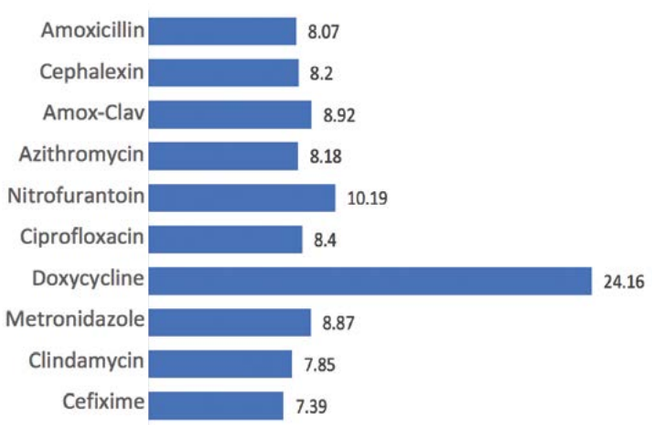


Figure 11 shows the *average* number of treatment days per prescription by antibiotic in 2020. It accompanies Figure 12 which displays the distribution of the number of treatment days *per prescription* by antibiotic. Treatment days per prescription of more than seven days was common for most antibiotics other than azithromycin (Figure 12, opposite page).

Figure 11. Average Treatment Days per Prescription by Antibiotic*, 2020



Note: An explanation for the calculation of Days of Treatment appears in page 3.
Only oral route antibiotics are shown on these two pages.

† See Figure 4 for prescription counts by antibiotic
* Order is ranked by the most common antibiotics.

Figure 8. Distribution of Prescriptions per Patient by Antibiotic*, 2020

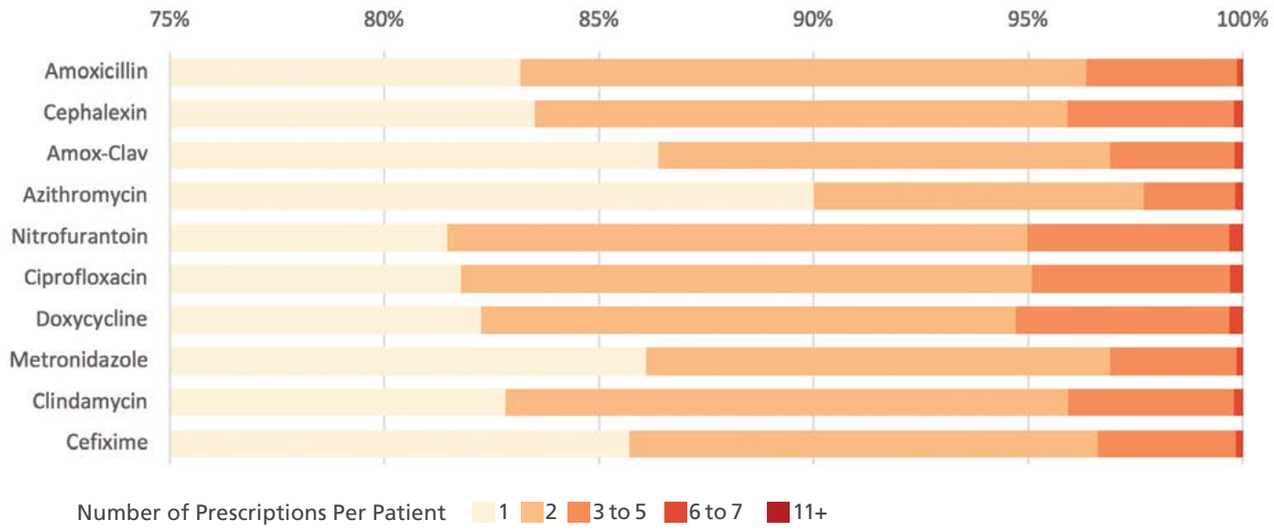


Figure 10. Distribution of Treatment Days per Patient by Antibiotic*, 2020

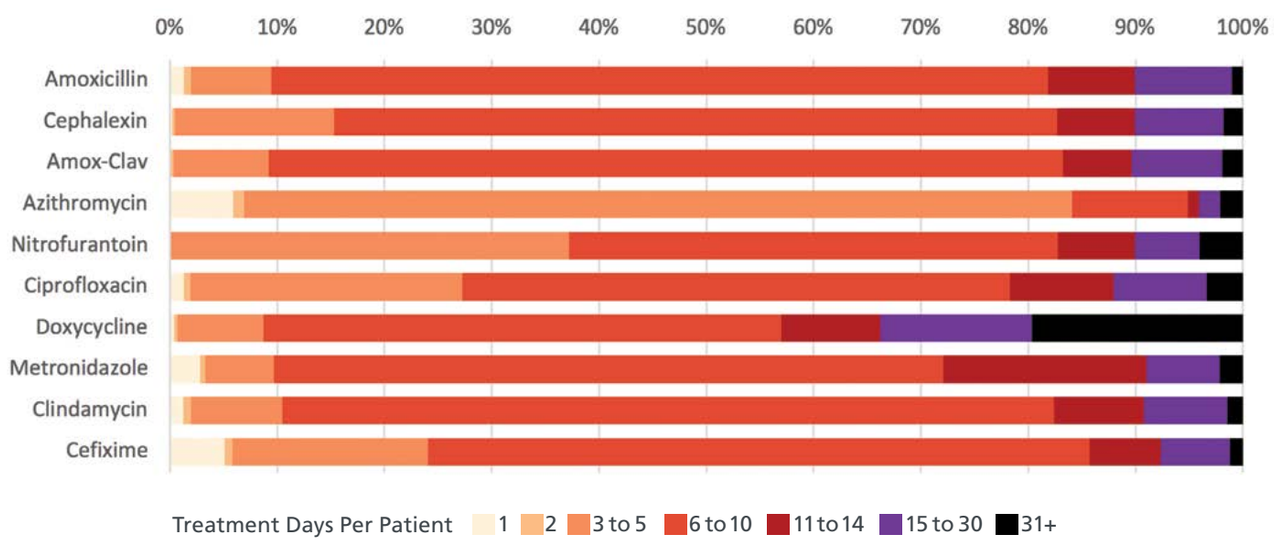


Figure 12. Distribution of Treatment Days per Prescription by Antibiotic*, 2020

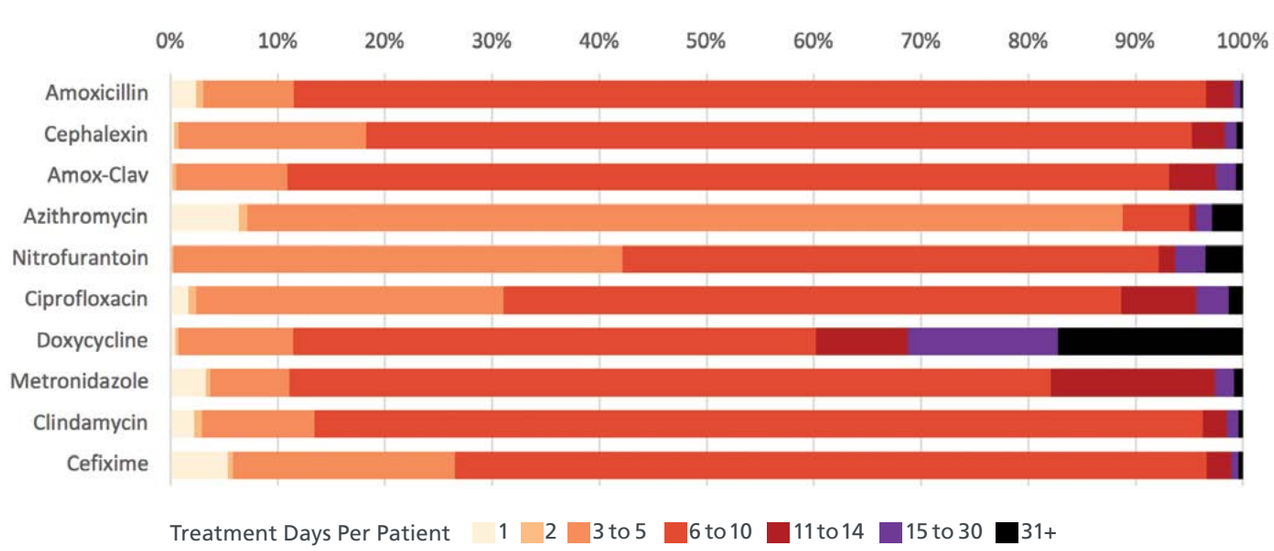
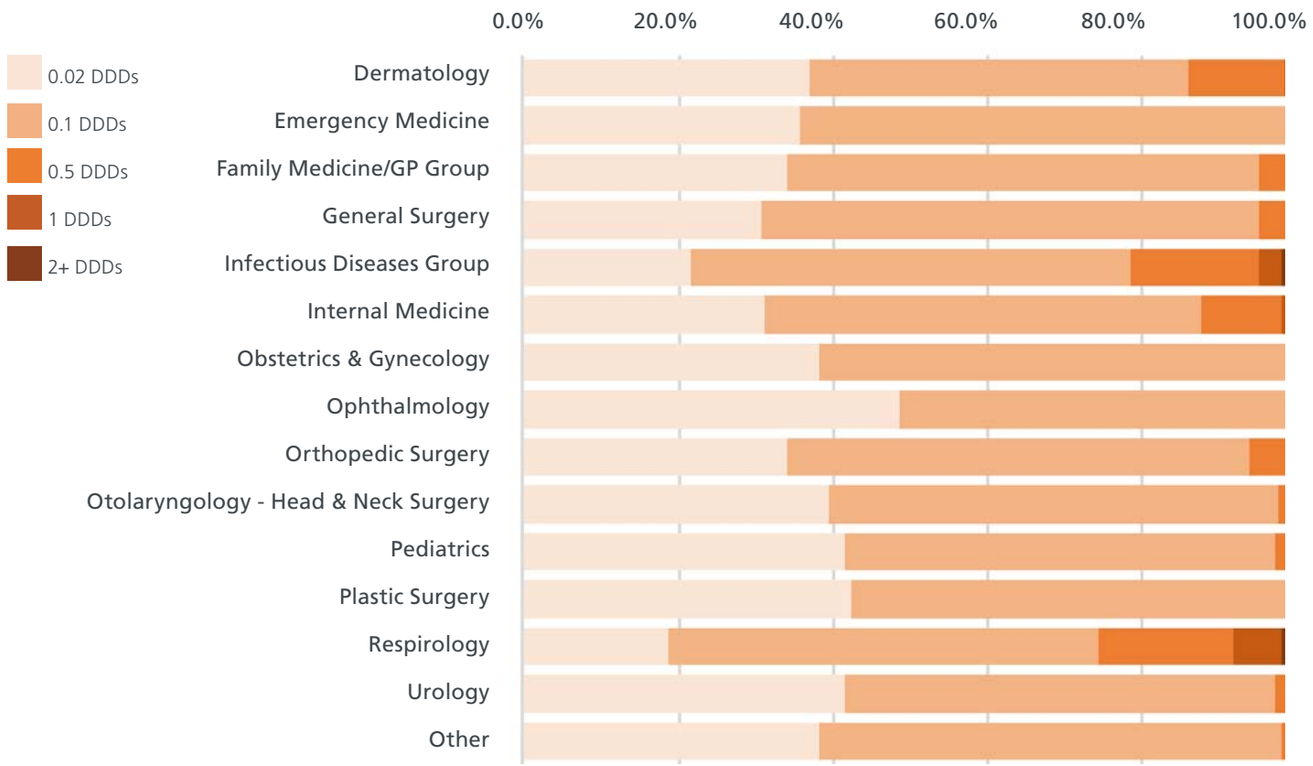


Figure 13. DDDs per Patient by Specialty Group, 2020

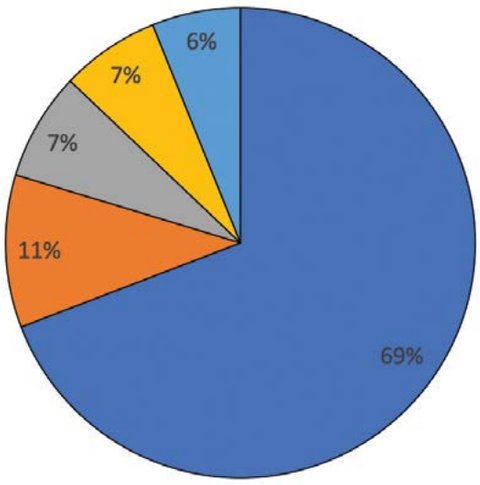


Note: Only oral route antibiotics are shown on Figures 13, 14.
All routes and forms are shown in Figure 15.

Figure 14. Percent of Patients by Specialty Group, 2020

Specialty Group	Patients
Dermatology	1.6%
Emergency Medicine	2.6%
Family Medicine/GP Group	56.7%
General Surgery	0.3%
Infectious Diseases Group	0.4%
Internal Medicine	1.0%
Obstetrics & Gynecology	0.9%
Ophthalmology	3.1%
Orthopedic Surgery	0.2%
Otolaryngology – Head & Neck Surgery	0.7%
Pediatrics	1.2%
Plastic Surgery	0.3%
Respirology	0.3%
Urology	0.9%
Other	29.7%

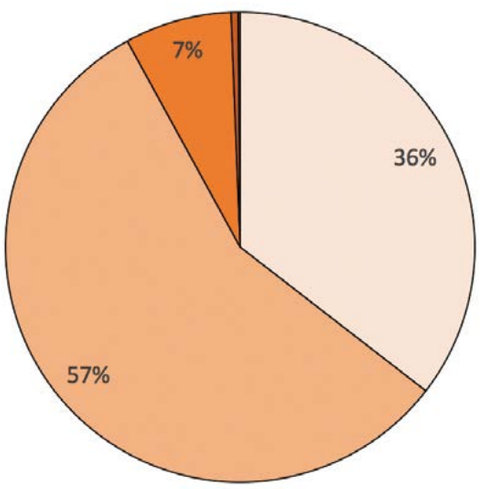
Figure 15. Antibiotic Prescriptions by Drug Form and Route, 2020



Note: 0.5% are injectables.
Topical Cream includes Topical Cream, Topical Lotion, Topical Ointment, and Topical Gel.

All routes and forms are shown in Figure 15.

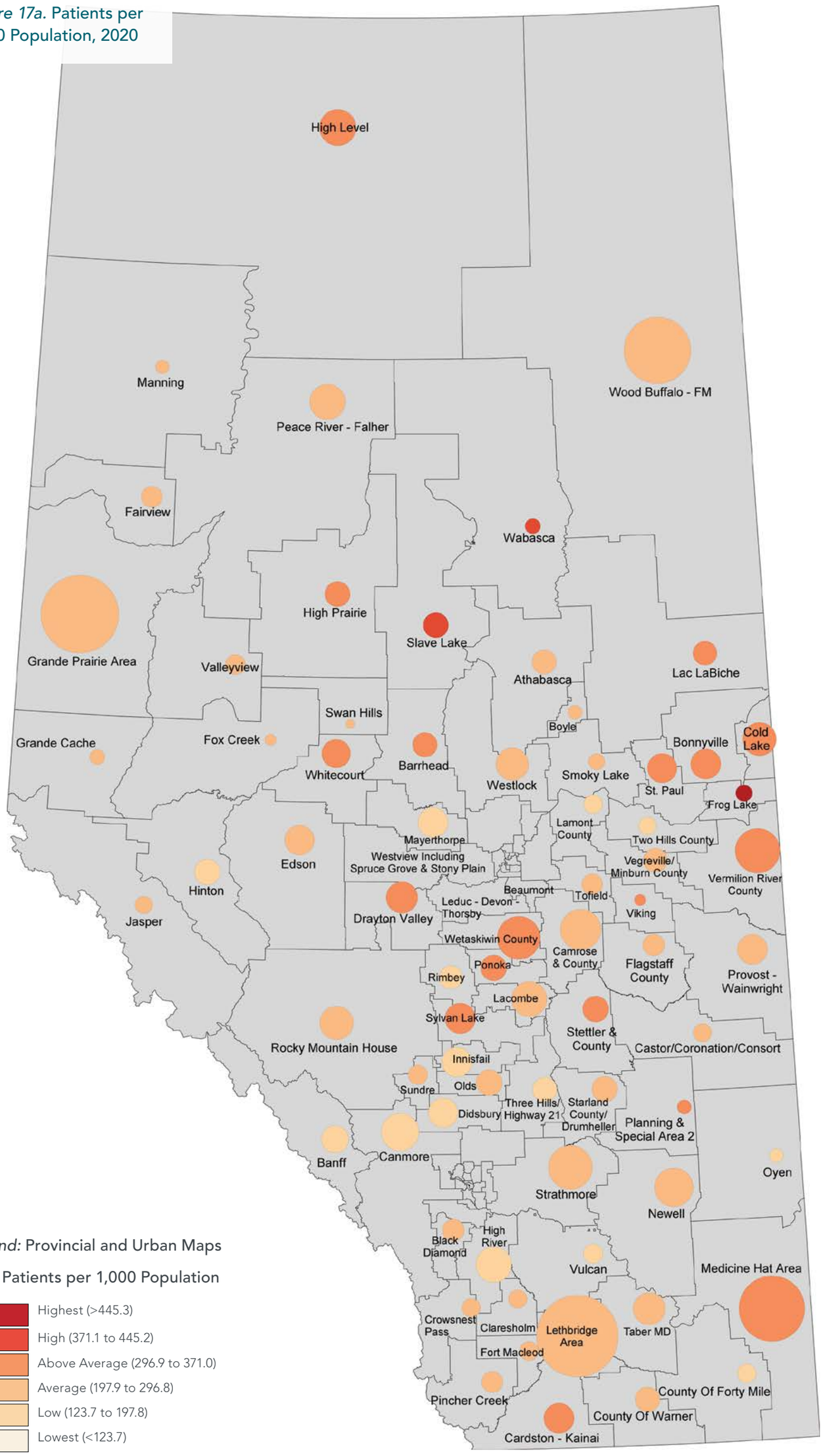
Figure 16. Patient Dose Proportion, 2020



Note: 0.02 DDD was used to identify a period of seven days of treatment.

Note: 36% of patients who received an antibiotic prescription did so for a week or less. 93% did so for 36 days or less.

Figure 17a. Patients per 1,000 Population, 2020

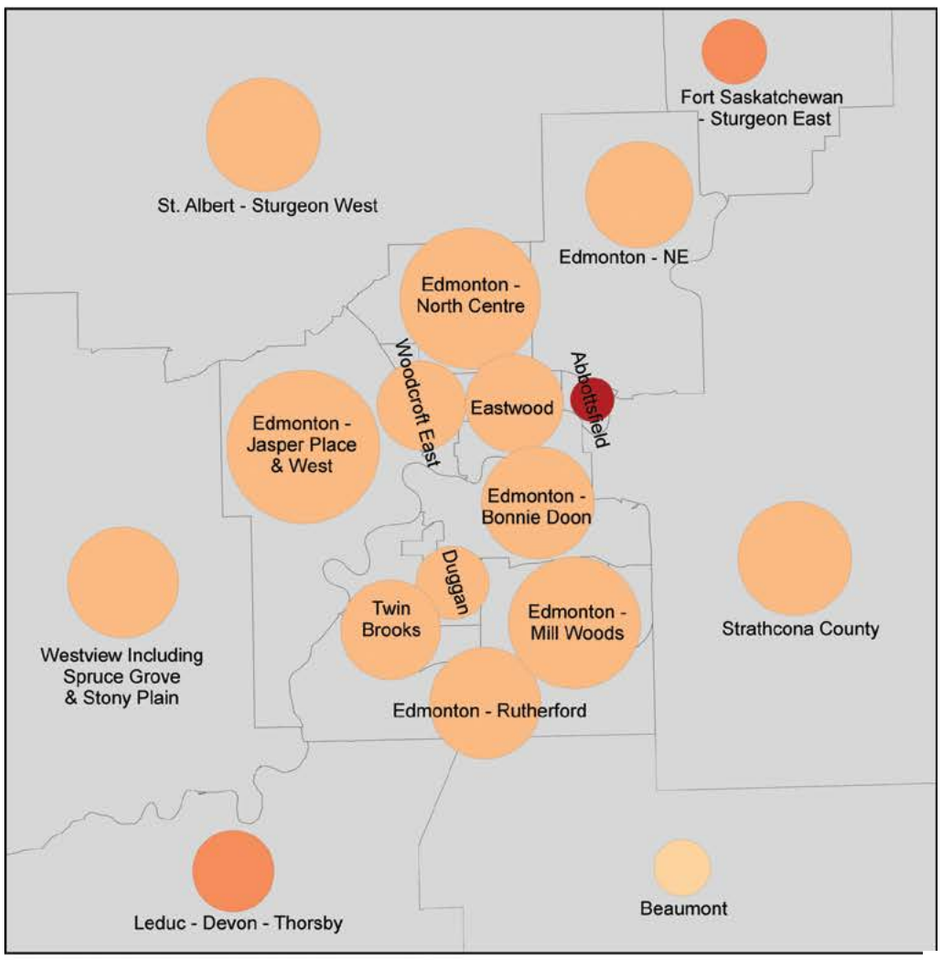


Legend: Provincial and Urban Maps

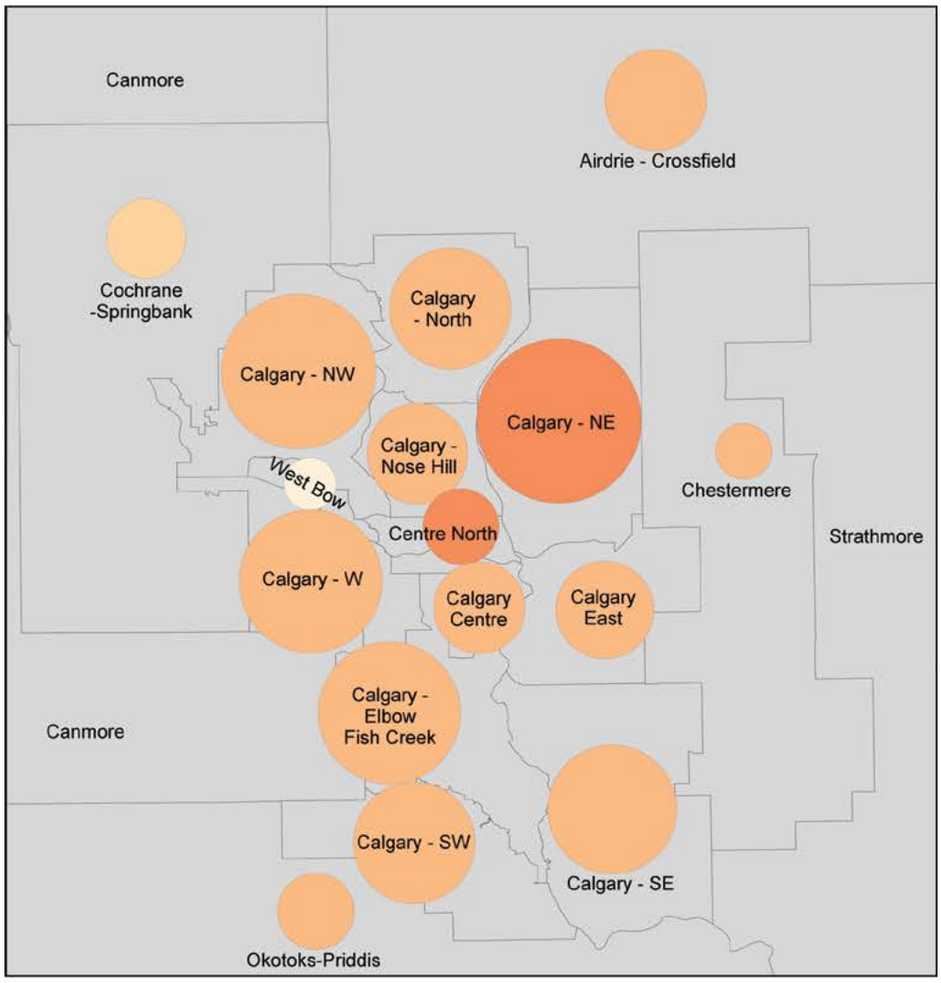
Total Patients per 1,000 Population

- Highest (>445.3)
- High (371.1 to 445.2)
- Above Average (296.9 to 371.0)
- Average (197.9 to 296.8)
- Low (123.7 to 197.8)
- Lowest (<123.7)

Edmonton



Calgary



Note: Only oral route antibiotics are shown on for all maps and associated graphics.

Figure 17b. Patients per 1,000 Population, 2020

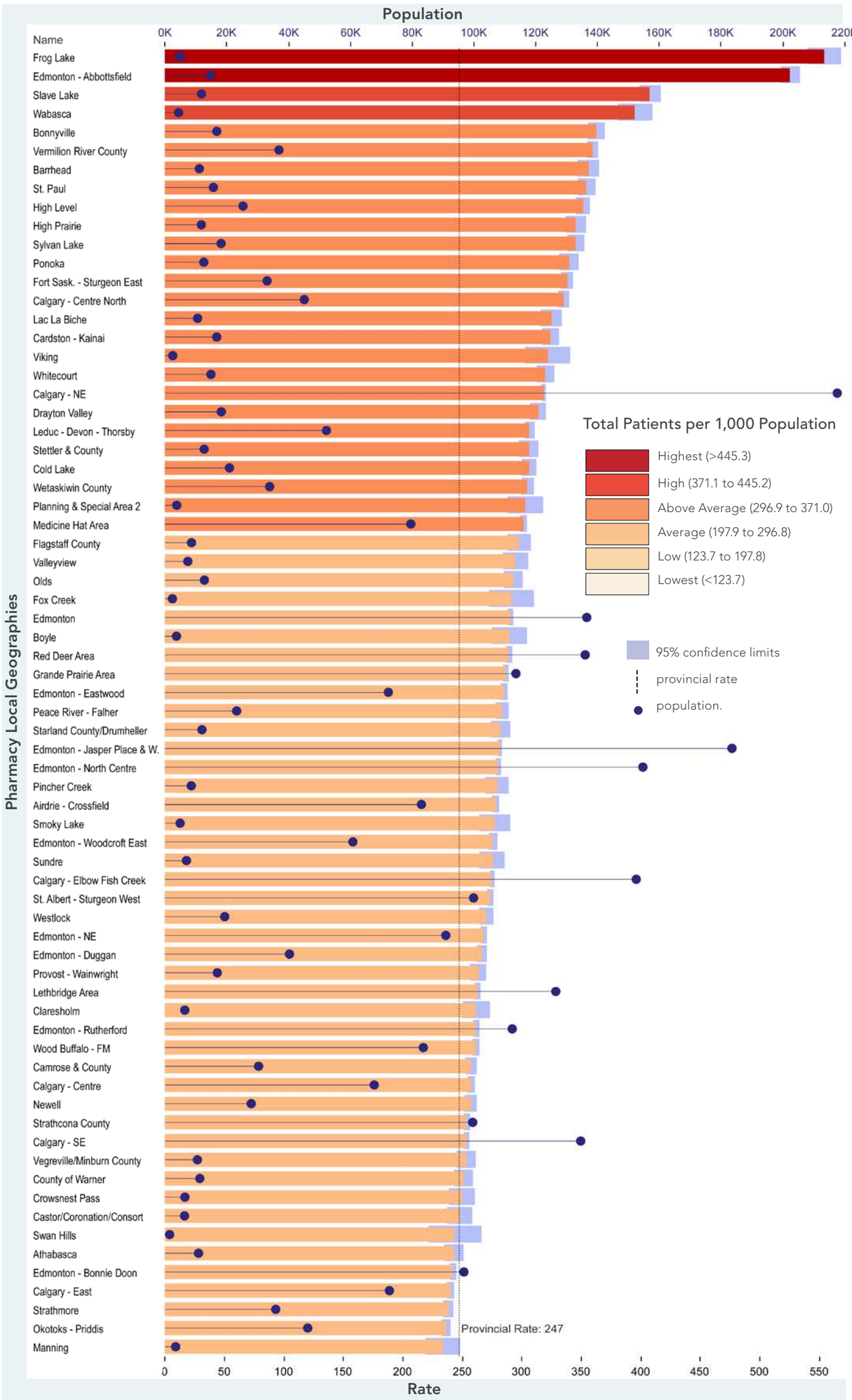
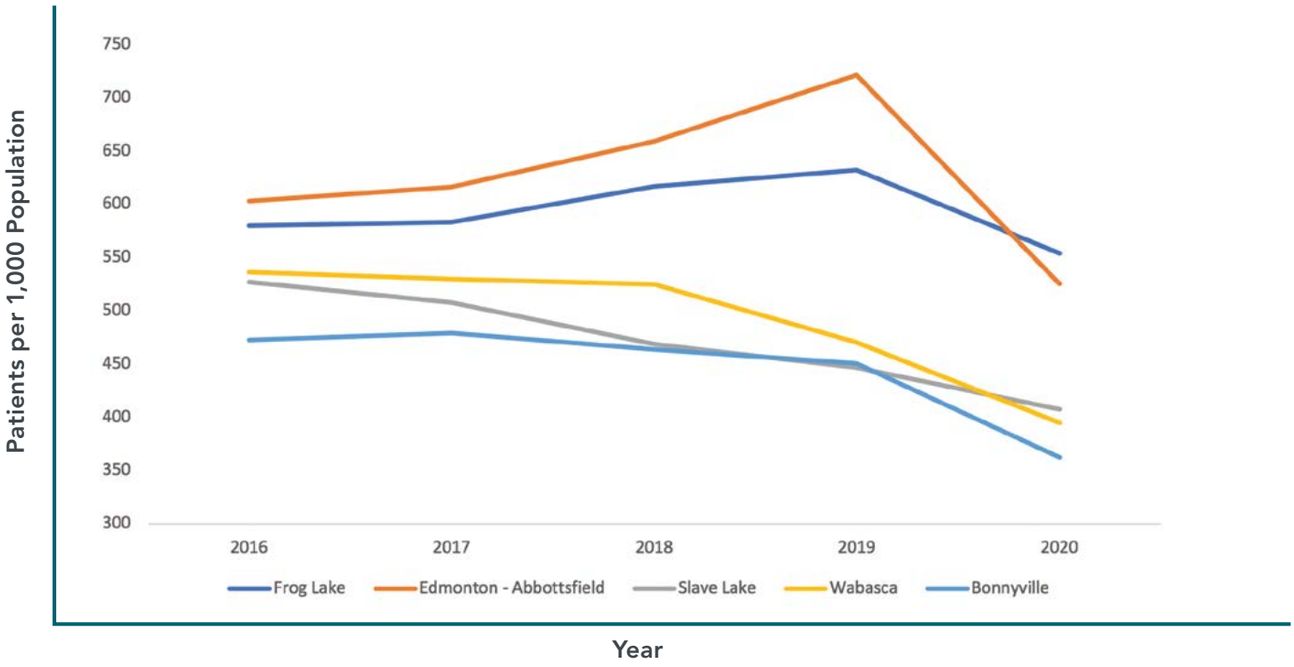
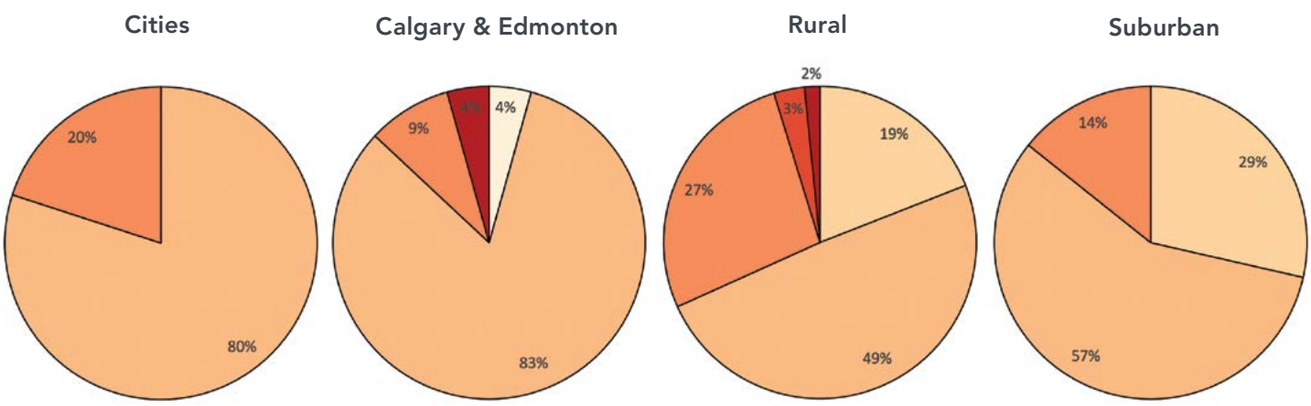


Figure 17c. Patients per 1,000 Population Trends for the Top Five PhLAGs, 2016-2020



There was a dramatic reduction in the number of patients who consumed antibiotics in 2020, especially after the COVID-19 restrictions. The areas with the highest consumption also dropped, sometimes even more dramatically. Edmonton-Abbottsfield dropped sufficiently to exchange the top category with Frog Lake. Ponoka's drop was sufficient to eliminate it from the top-five in 2020 and Bonnyville joined the top-five.

Figure 17d. Urban/Rural Distribution of Patients per 1,000 Population by Category, 2020



Pie charts show the proportions of Pharmacy Local Aggregated Geographies corresponding to each of the mapped categories for each urban/rural category. Comparing the size of the slice for a category (i.e. Lowest) across all four charts provides its context for its urban/rural association. The colours in the sections represent the categories shown in the legend on the opposing page.

Suburban areas report the lowest rates, followed by cities. Rural areas and Calgary & Edmonton PhLAGs show a mix rate categories. The PhLAG with the lowest rate was in Calgary.

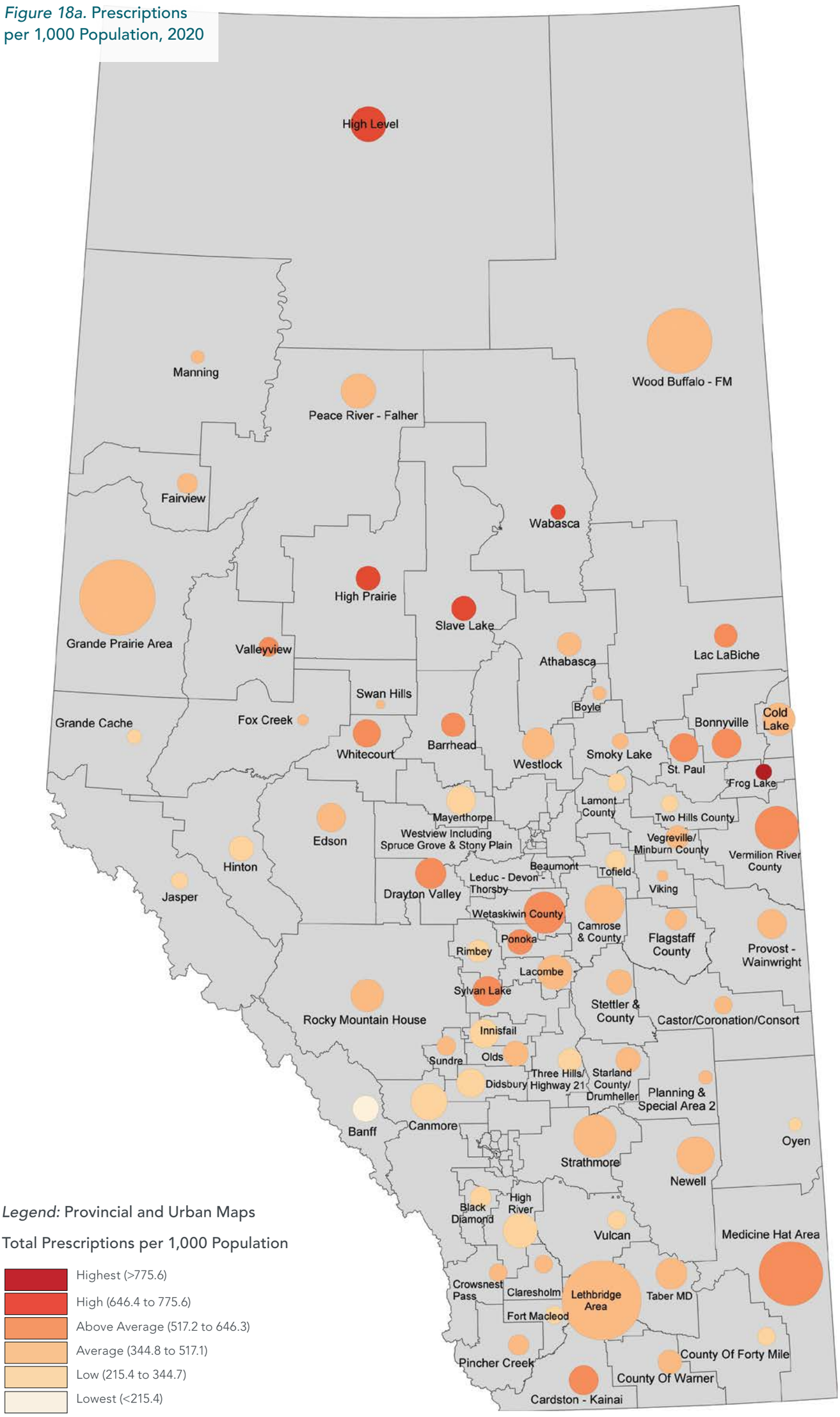
Figure 17e. Patients per 1,000 Population Mapping Categories and Socio-Economic Categories, 2020

Map Category	Socio-Economic Deprivation Index (0 1 2 3 4 5)
Lowest	3.0
Low	3.2
Average	3.2
Above Average	3.6
High	4.1
Highest	4.2

This graphic compares the legend categories that appear on the opposing page against the Socio-Economic Deprivation Index. Each bar corresponds to one of the mapping categories and uses consistent colour and labels as the legend, map, and other graphics. The length of the bar shows the calculated score for all the PhLAGs (geographic areas) within each of the corresponding categories.

Figure 17e shows a clear association between socio-economic status and antibiotic patients. The lowest rates of patients per 1,000 population are observed in areas with low deprivation index scores and the highest rates in areas with the highest scores.

Figure 18a. Prescriptions per 1,000 Population, 2020

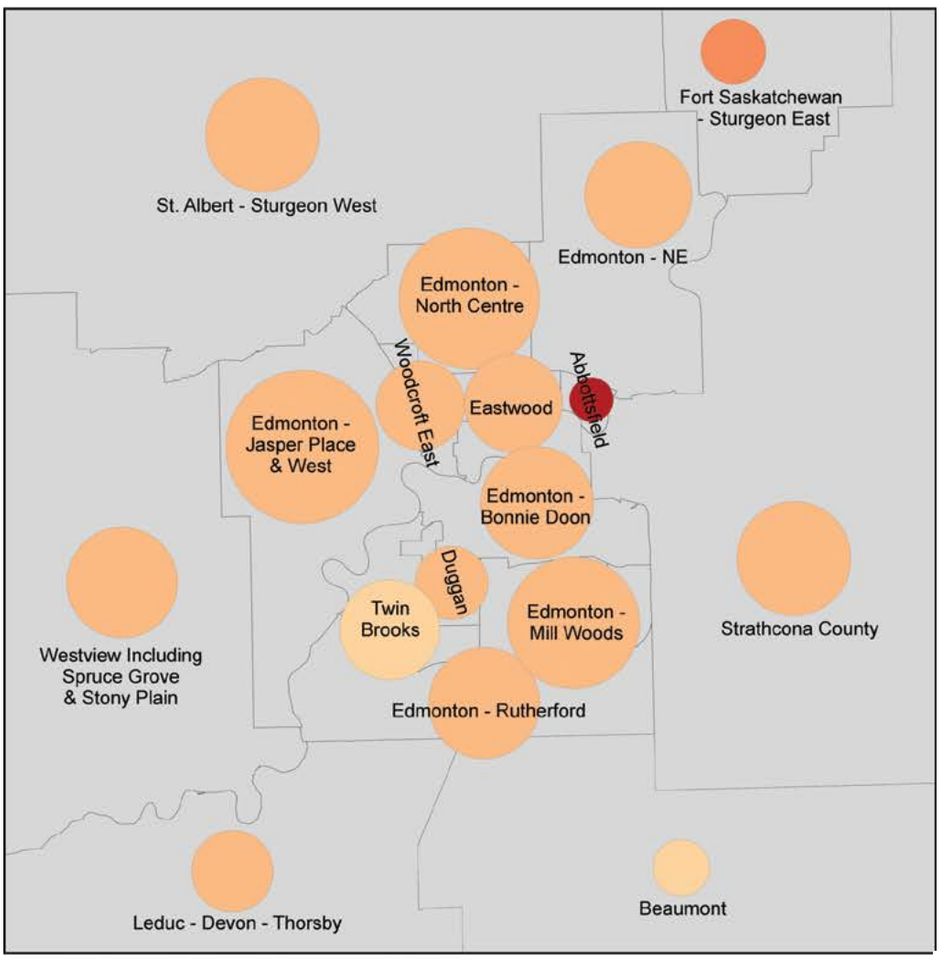


Legend: Provincial and Urban Maps

Total Prescriptions per 1,000 Population

- Highest (>775.6)
- High (646.4 to 775.6)
- Above Average (517.2 to 646.3)
- Average (344.8 to 517.1)
- Low (215.4 to 344.7)
- Lowest (<215.4)

Edmonton



Population

200,000
150,000
100,000
60,000
15,000
1,500

Calgary

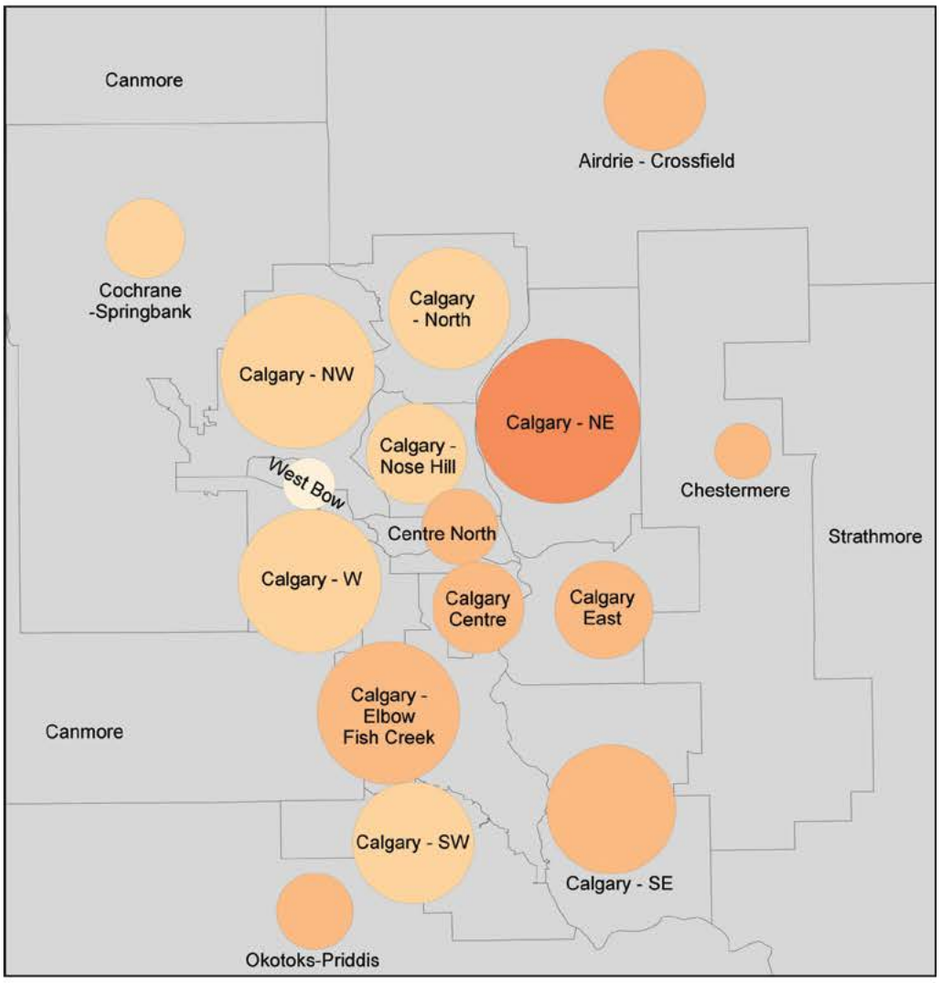


Figure 18b. Prescriptions per 1,000 Population, 2020

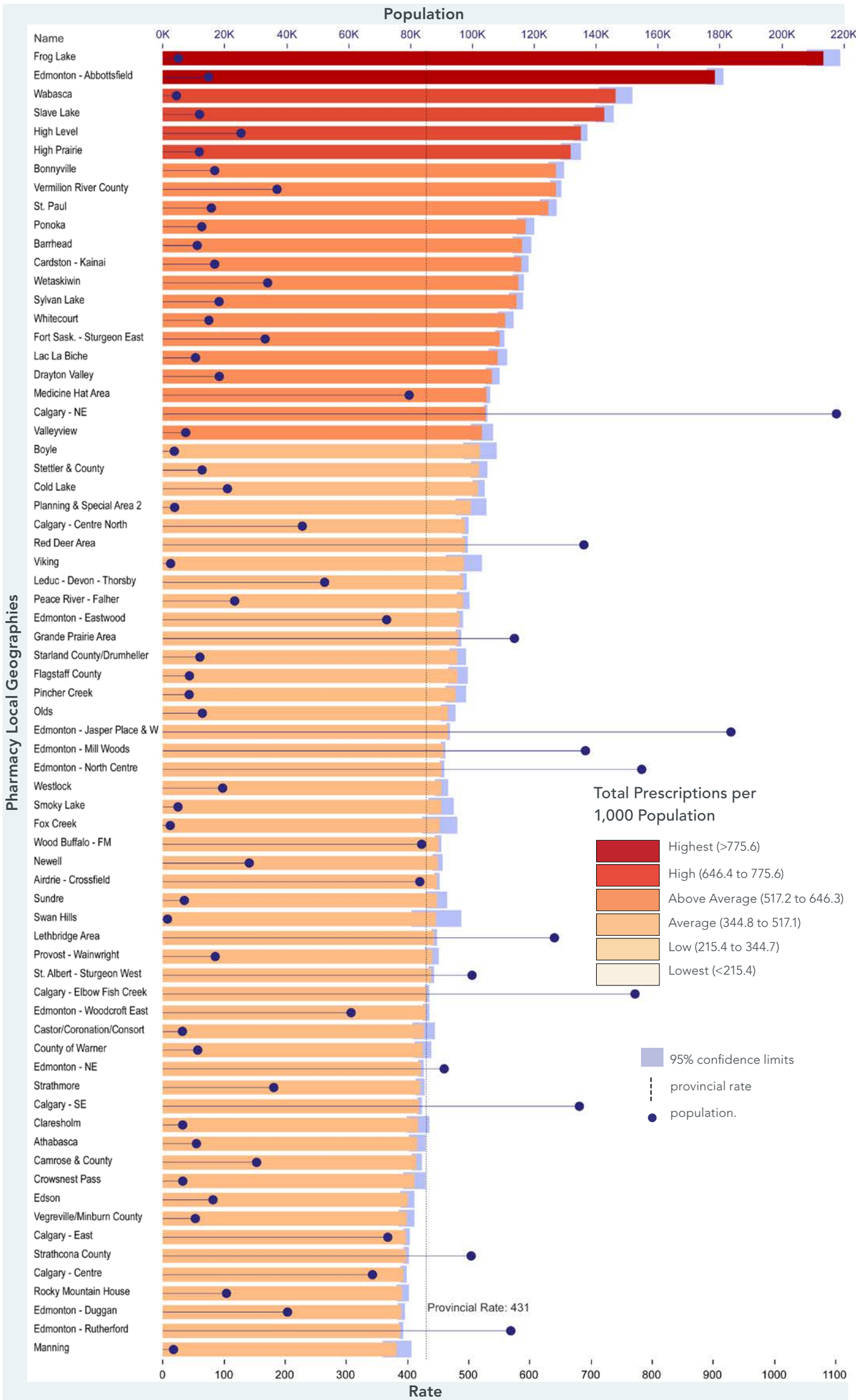
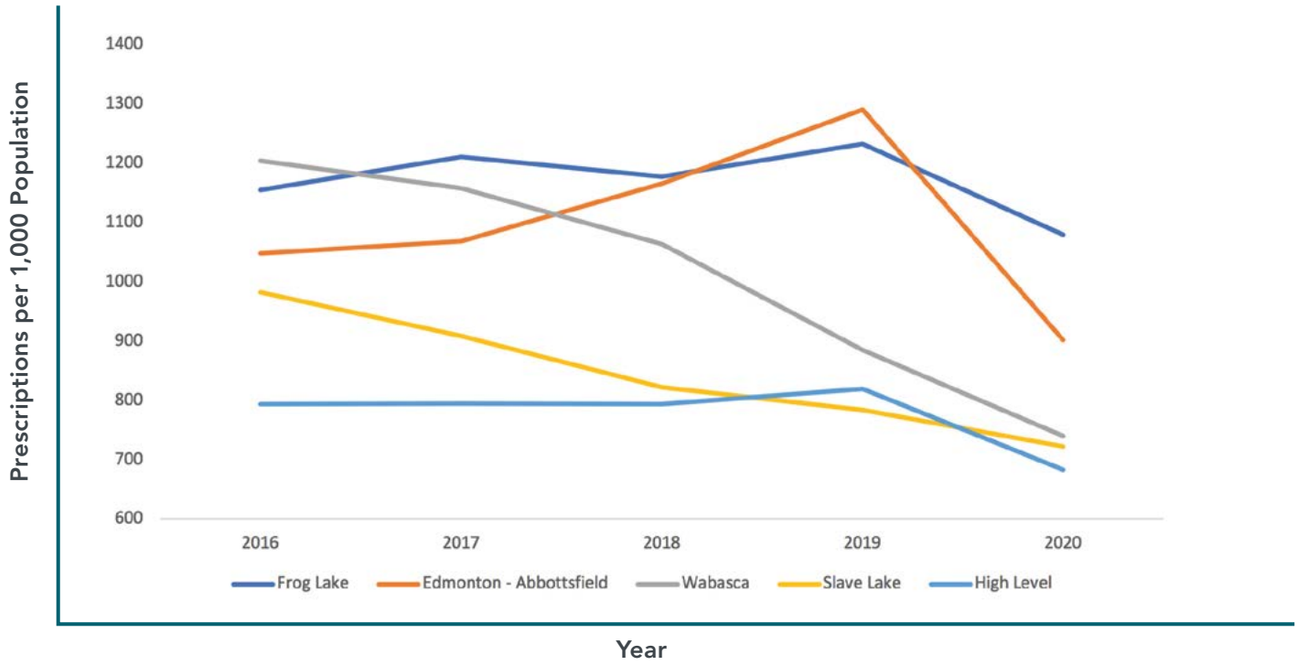
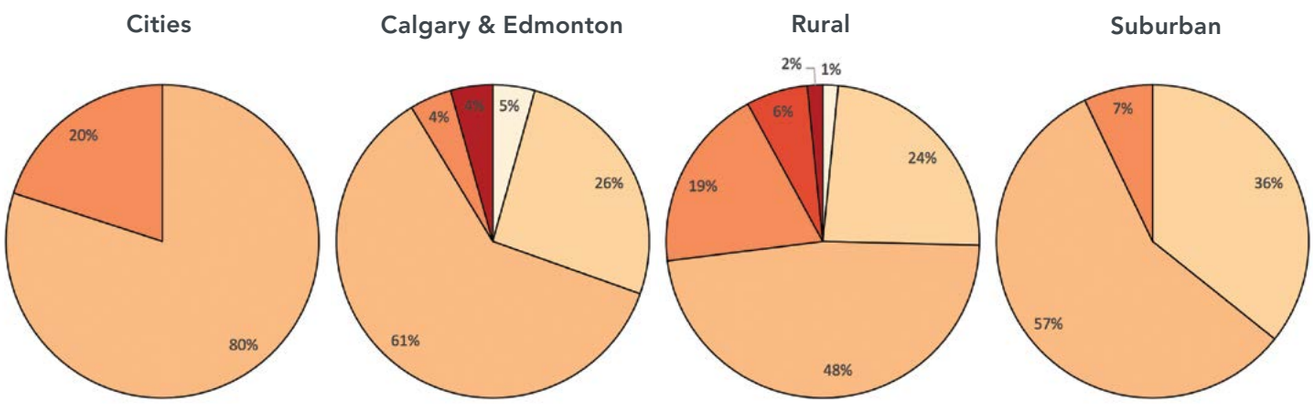


Figure 18c. Prescriptions per 1,000 Population Trends for the Top Five PhLAGs, 2016-2020



There was a dramatic reduction in the number of antibiotic prescriptions in 2020, especially after the COVID-19 restrictions. The areas with the highest consumption also dropped, sometimes even more dramatically. Edmonton-Abbottsfield dropped sufficiently to exchange the the top category with Frog Lake. Ponoka was part of the top-five in 2016 and the drop in consumption eliminated it from this group and was replaced by High Level.

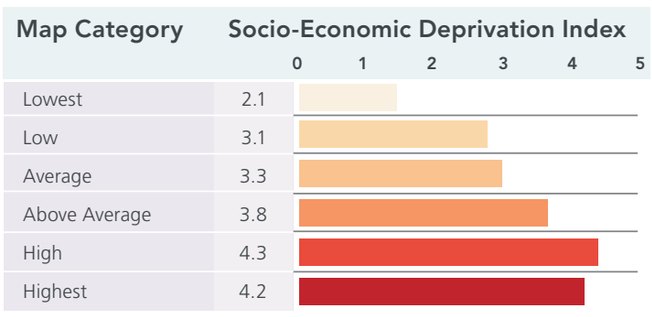
Figure 18d. Urban/Rural Distribution of Prescriptions per 1,000 Population by Category, 2020



Pie charts show the proportions of Pharmacy Local Aggregated Geographies corresponding to each of the mapped categories for each urban/rural category. Comparing the size of the slice for a category (i.e. Lowest) across all four charts provides its context for its urban/rural association. The colours in the sections represent the categories shown in the legend on the opposing page.

Suburban areas report the lowest rates. Rural areas and Calgary & Edmonton PhLAGs show variations of prescription rates. The lowest rates were observed in Calgary and in Banff.

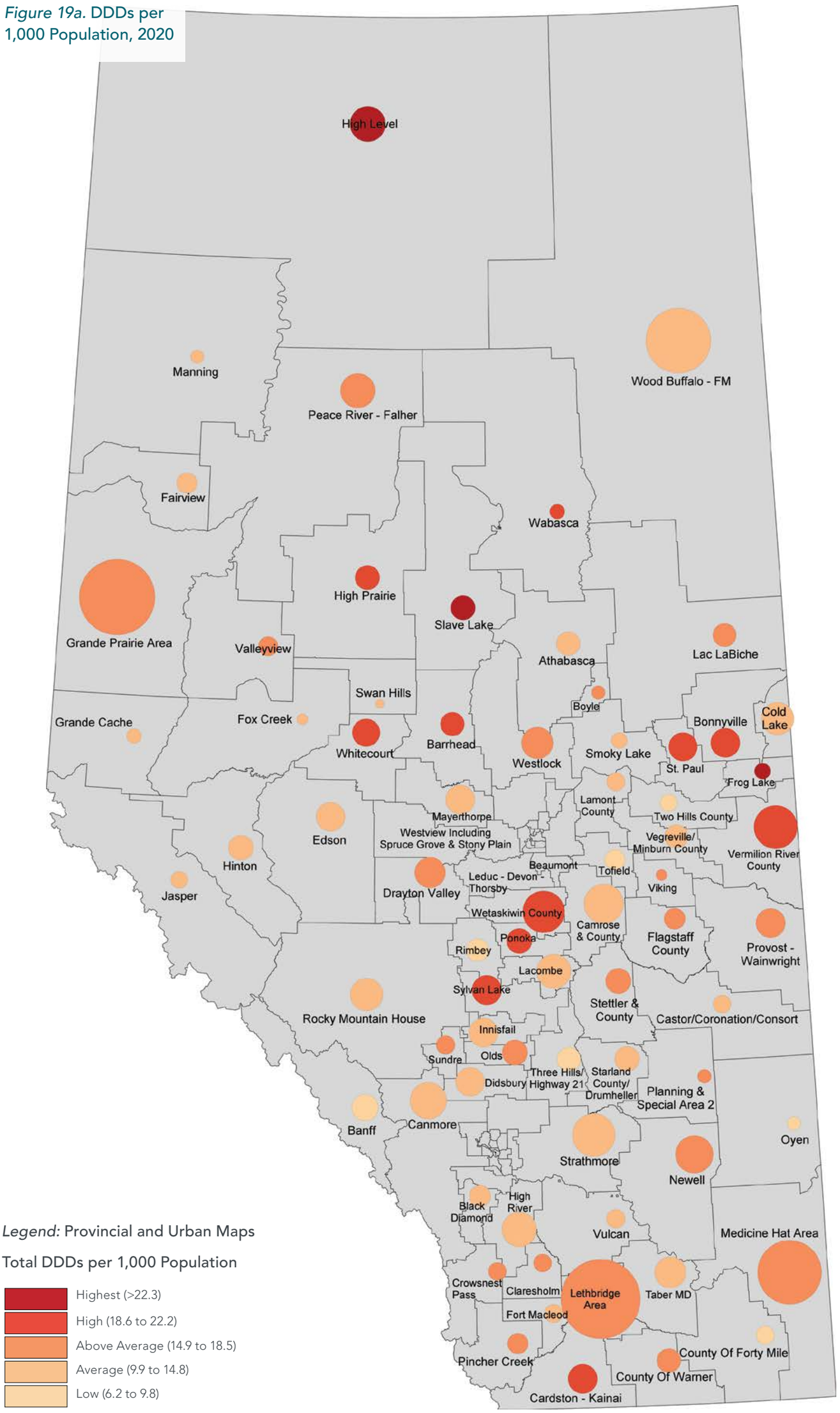
Figure 18e. Prescriptions per 1,000 Population Mapping Categories and Socio-Economic Categories, 2020



This graphic compares the legend categories that appear on the opposing page against the Socio-Economic Deprivation Index. Each bar corresponds to one of the mapping categories and uses consistent colour and labels as the legend, map, and other graphics. The length of the bar shows the calculated score for all the PhLAGs (geographic areas) within each of the corresponding categories.

Figure 18e shows a clear association between socio-economic status and prescriptions. The lowest rates of prescriptions per 1,000 population are observed in areas with low deprivation index scores and the highest rates in areas with the highest scores. The areas with the lowest rates have very low deprivation index scores.

Figure 19a. DDDs per 1,000 Population, 2020

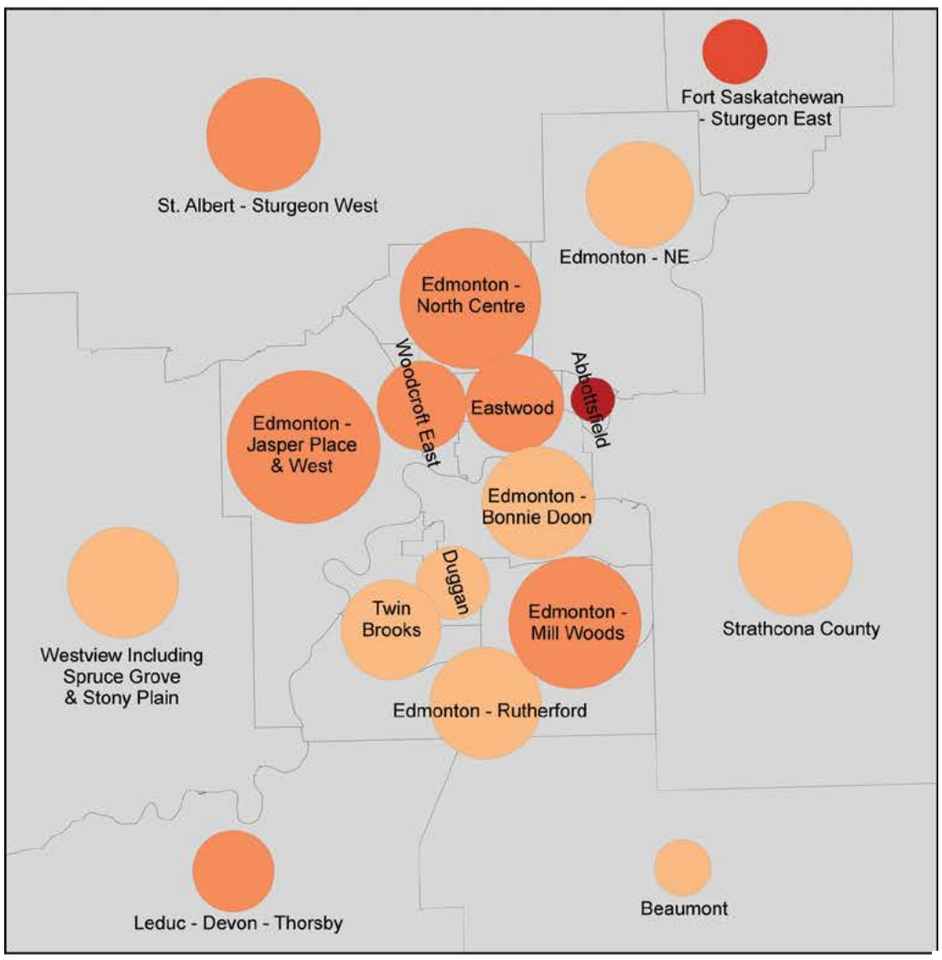


Legend: Provincial and Urban Maps

Total DDDs per 1,000 Population

- Highest (>22.3)
- High (18.6 to 22.2)
- Above Average (14.9 to 18.5)
- Average (9.9 to 14.8)
- Low (6.2 to 9.8)

Edmonton



Calgary

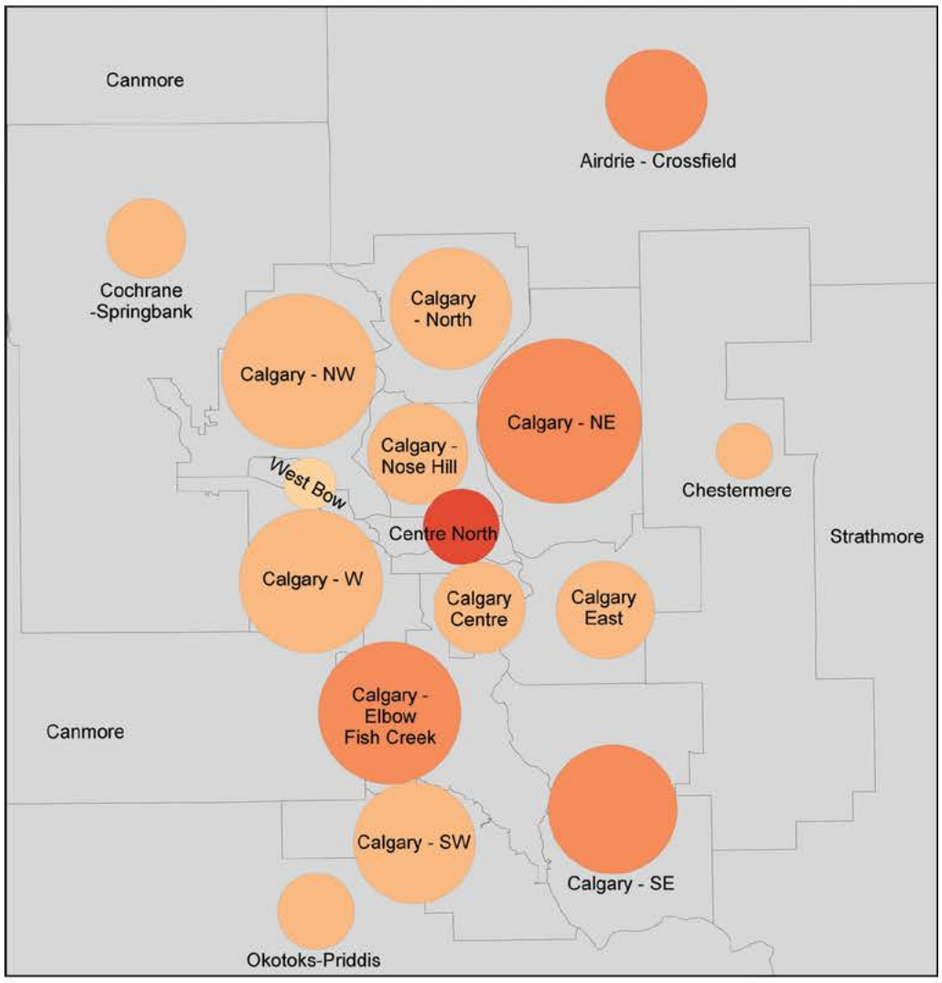


Figure 19b. DDDs per 1,000 Population, 2020

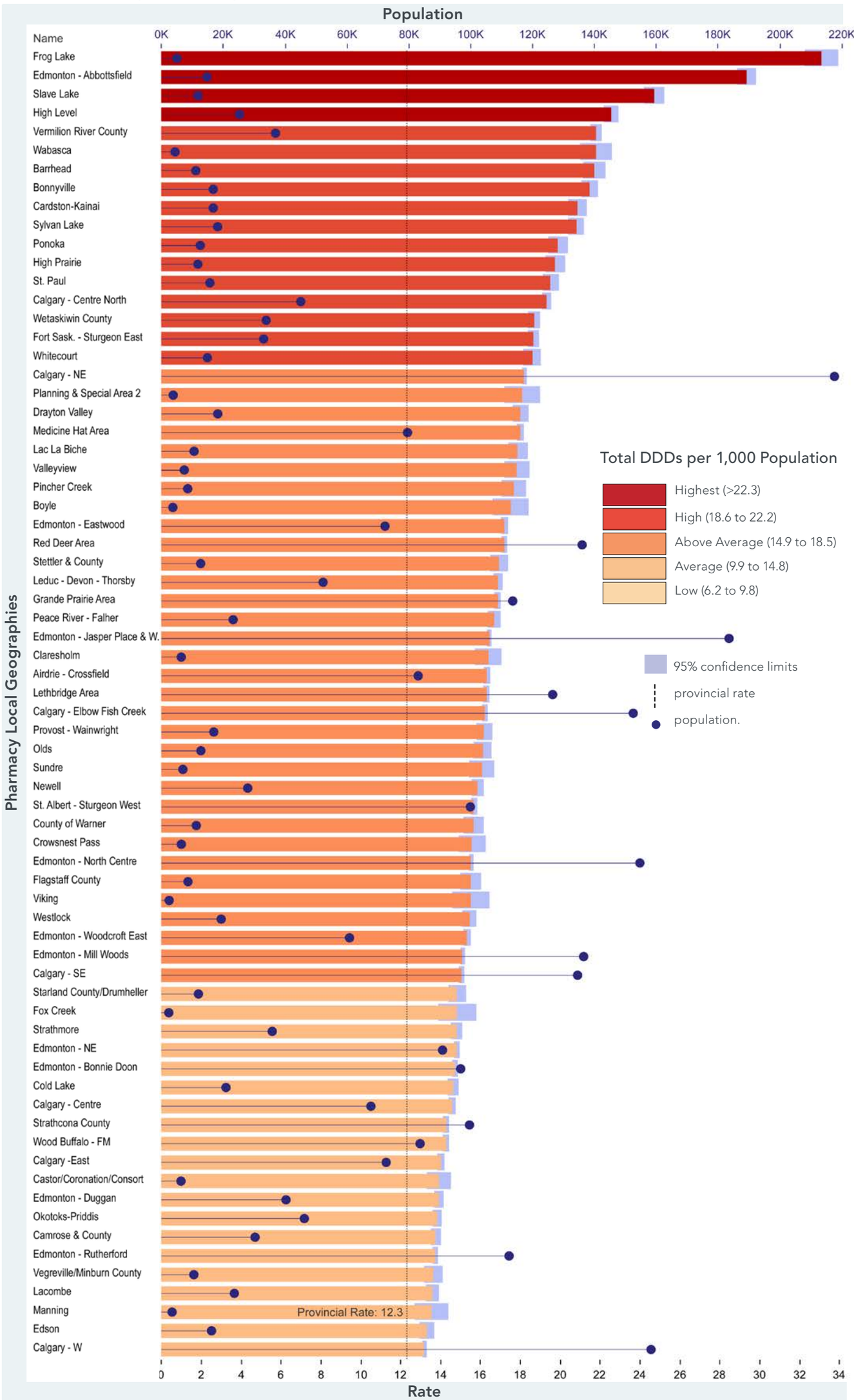
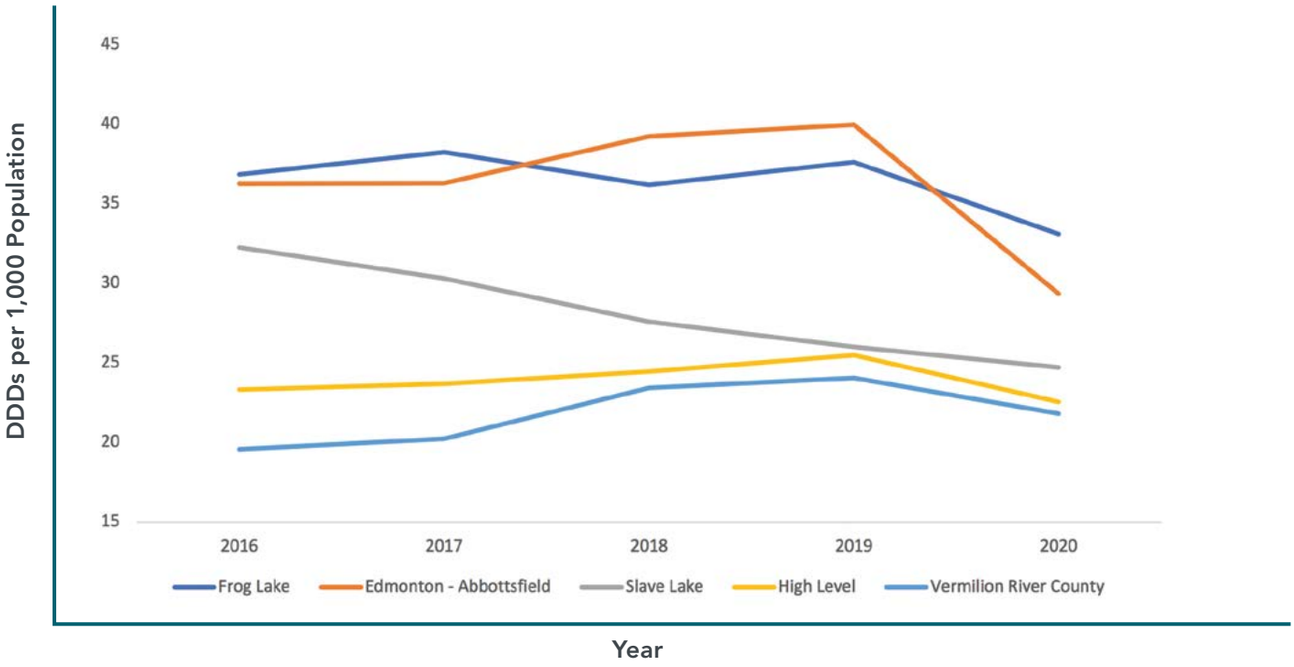
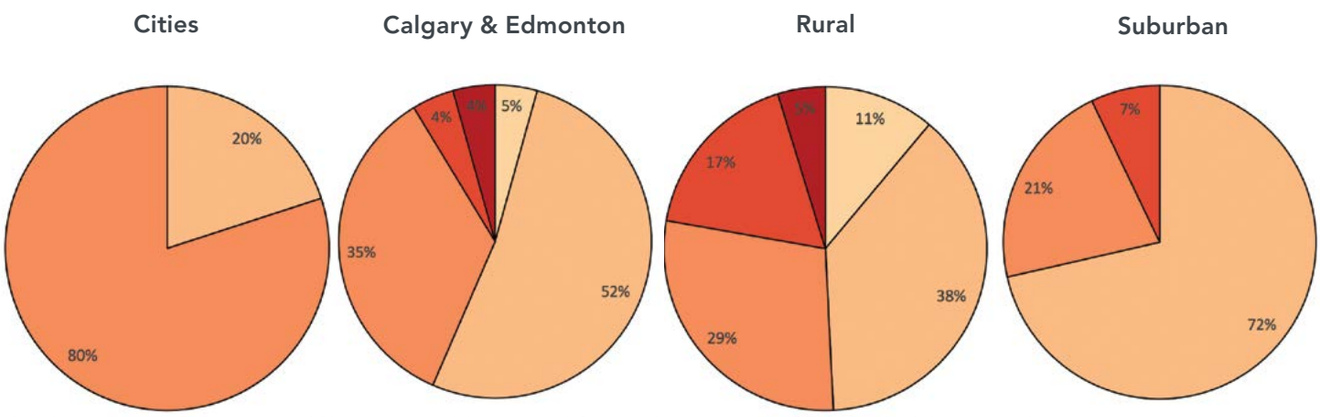


Figure 19c. DDDs per 1,000 Population Trends for the Top Five PhLAGs, 2016-2020



There was a dramatic reduction in antibiotic DDDs consumed per 1,000 population in 2020, especially after the COVID-19 restrictions. The areas with the highest consumption also dropped, sometimes even more dramatically. Edmonton-Abbottsfield and Frog Lake have exchanged the top position several times in the last five years. Ponoka and Wabasca were part of the top-five group in 2016 and reduced DDDs to eliminate them from the top-five in 2020. High Level and Vermilion River County are now part of the top-5 group.

Figure 19d. Urban/Rural Distribution of DDDs per 1,000 Population by Category, 2020

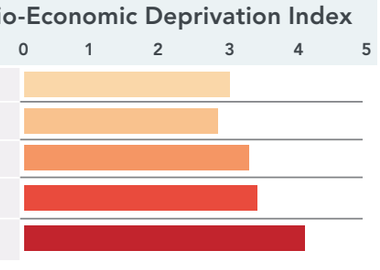


Pie charts show the proportions of Pharmacy Local Aggregated Geographies corresponding to each of the mapped categories for each urban/rural category. Comparing the size of the slice for a category (i.e. Lowest) across all four charts provides its context for its urban/rural association. The colours in the sections represent the categories shown in the legend on the opposing page.

Suburban areas report the lowest rates, followed by cities. Rural areas and Calgary & Edmonton PhLAGs show variations of prescription rates. The PhLAG with the lowest rate was in Calgary.

Figure 19e. DDDs Mapping Categories and Socio-Economic Categories, 2020

Map Category	Socio-Economic Deprivation Index
Low	3.3
Average	3.1
Above Average	3.5
High	3.5
Highest	4.1



This graphic compares the legend categories that appear on the opposing page against the Socio-Economic Deprivation Index. Each bar corresponds to one of the mapping categories and uses consistent colour and labels as the legend, map, and other graphics. The length of the bar shows the calculated score for all the PhLAGs (geographic areas) within each of the corresponding categories.

Figure 19e shows a slight association between socio-economic status and DDDs. The highest rates of DDDs are observed in areas with high deprivation index scores. The patterns were not as strong for other categories.

Appendices

Appendix A. ATC Code, Prescriptions, Dispenses, Patients, Prescribers and Pharmacies by Antibiotic, 2020

Main Ingredient	ATC Code	Prescriptions	Dispenses	Patients	Prescribers	Pharmacies
AMOX-CLAV	J01CR02	158,492	163,285	133,713	10,120	1,561
AMOXICILLIN	J01CA04	459,380	466,512	376,232	11,190	1,582
AMOXICILLIN - CLARITHROMYCIN	A02BD07	1,860	1,896	1,779	644	532
AMPICILLIN	J01CA01	347	361	310	216	210
ATOVAQUONE	P01AX06	589	1,814	335	239	235
AZITHROMYCIN	J01FA10	148,604	162,957	130,448	8,521	1,558
CEFADROXIL	J01DB05	2,372	2,763	1,818	373	363
CEFIXIME	J01DD08	67,046	68,348	56,165	6,652	1,477
CEFPROZIL	J01DC10	6,154	6,242	5,501	688	813
CEFUROXIME	J01DC02	12,414	12,808	10,777	2,617	1,209
CEPHALEXIN	J01DB01	227,875	234,107	185,546	11,048	1,573
CIPROFLOXACIN	J01MA02	130,879	135,707	103,815	9,431	1,548
CLARITHROMYCIN	J01FA09	45,602	46,127	41,245	5,250	1,490
CLINDAMYCIN	J01FF01	73,965	75,501	59,941	6,570	1,515
CLOXACILLIN	J01CF02	11,530	11,879	9,902	2,327	1,214
DAPSONE	J04BA02	1,411	3,504	681	604	466
DOXYCYCLINE	J01AA02	103,599	127,508	82,035	8,265	1,560
DOXYCYCLINE	A01AB22	443	841	347	57	239
ERYTHROMYCIN	J01FA01	2,871	3,513	2,295	916	842
ETHAMBUTOL	J04AK02	385	1,024	157	63	60
FIDAXOMICIN	A07AA12	112	118	81	67	67
FOSFOMYCIN	J01XX01	21,271	23,477	17,708	3,988	1,369
GREPAFLOXACIN	J01MA11	16	23	1	2	1
LEVOFLOXACIN	J01MA12	22,891	23,819	18,836	4,937	1,420
LINEZOLID	J01XX08	190	257	142	106	94
METRONIDAZOLE	P01AB01	91,418	93,779	77,093	8,463	1,546
METRONIDAZOLE	J01XD01	7	7	7	5	6
MINOCYCLINE	J01AA08	35,921	57,011	24,265	4,807	1,472
MOXIFLOXACIN	J01MA14	7,047	7,425	5,981	1,339	1,087
NITROFURANTOIN	J01XE01	139,081	150,987	109,825	8,452	1,550
NORFLOXACIN	J01MA06	1,421	2,104	1,049	516	445
PAROMOMYCIN	A07AA06	31	31	30	25	27
PENICILLIN	J01CE02	47,816	49,703	42,503	4,926	1,468
PYRAZINAMIDE	J04AK01	6	9	5	2	1
RIFABUTIN	J04AB04	102	221	69	51	53
RIFAMPIN	J04AB02	980	1,717	618	376	347
RIFAXIMIN	A07AA11	3,214	9,697	1,645	1,166	748
SMX-TMP	J01EE01	68,313	102,252	50,236	8,326	1,532
SPIRAMYCIN	J01FA02	4	4	4	1	3
TETRACYCLINE	J01AA07	4,509	6,258	3,517	1,831	1,058
TRIMETHOPRIM	J01EA01	1,401	3,440	819	512	476
VANCOMYCIN	A07AA09	3,695	4,339	2,329	1,875	827

Appendix B. Graph and Map Legend

Example section of the graph showing individual Pharmacy Local Aggregated Geography (PhLAG) rates with 95% confidence intervals.

Grey bar represents the 95% confidence limits.

Dashed blue line represents average provincial rate.

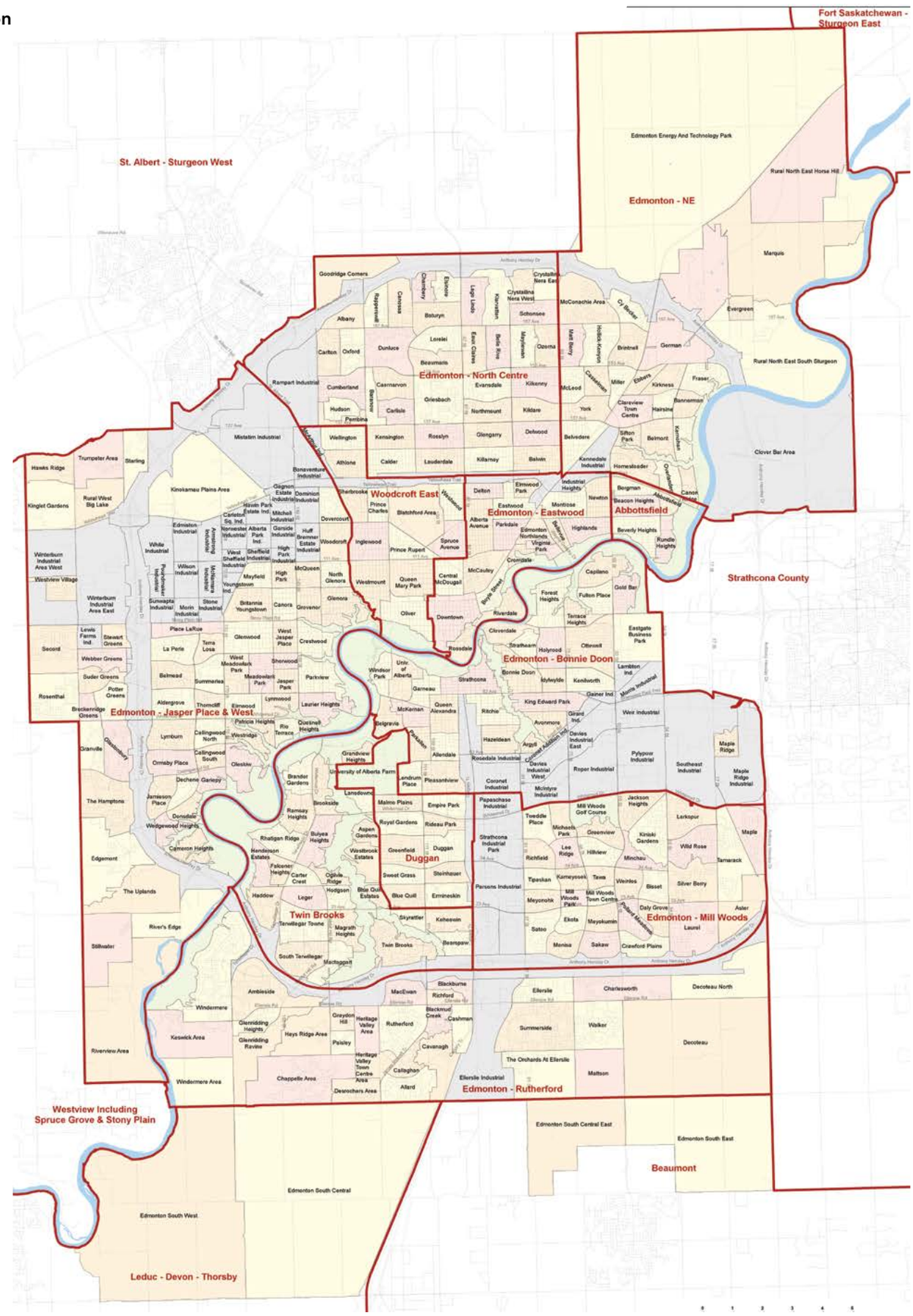
Length of bar represents observed rate.

Bar colour in graph/map corresponds to rate ratio category.

Highest
High
Above Average
Average
Low
Lowest

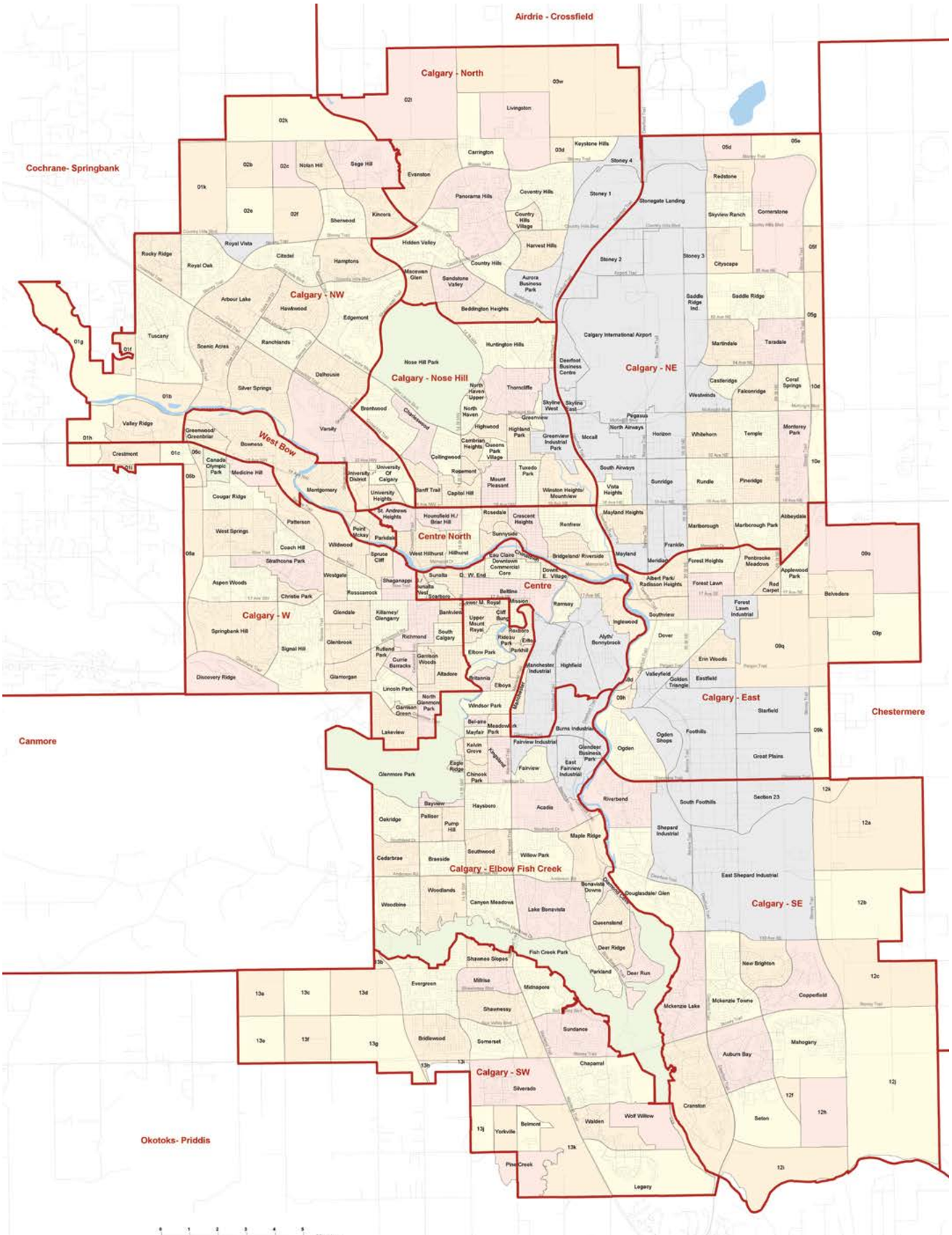
Appendix C. Neighbourhood/PhLAG Maps of Edmonton and Calgary (next page)

Edmonton



Grey neighbourhoods are industrial, while green zones are park areas. Other colours (yellow, orange, pink) are used to highlight neighbourhood boundaries and represent no other information.

Calgary



Grey neighbourhoods are industrial, while green zones are park areas. Other colours (yellow, orange, pink) are used to highlight neighbourhood boundaries and represent no other information.

Appendix D. Rates for all Measures

PhLAG Name	Urban/ Rural	Antibiotics Patients	Antibiotics Prescriptions	Antibiotics DDDs
Grande Prairie Area	CITIES	286.5	483.0	16.9
Lethbridge Area		263.0	443.3	16.3
Medicine Hat Area		301.3	529.8	18.0
Red Deer Area		289.2	493.8	17.2
Wood Buffalo - FM		261.3	450.4	14.3
Calgary - Centre	CALGARY & EDMONTON	257.2	393.6	14.6
Calgary - Centre North		335.1	493.8	19.3
Calgary - East		240.4	397.7	14.0
Calgary - Elbow Fish Creek		275.0	431.5	16.2
Calgary - NE		318.6	527.8	18.2
Calgary - North		215.7	329.4	11.6
Calgary - Nose Hill		212.7	317.3	11.7
Calgary - NW		223.8	340.5	12.9
Calgary - SE		253.4	419.0	15.0
Calgary - SW		221.9	340.2	12.6
Calgary - W		223.5	345.9	13.2
Calgary - West Bow		123.4	183.4	7.6
Edmonton - Abbottsfield		525.4	902.2	29.4
Edmonton - Bonnie Doon		241.8	374.2	14.7
Edmonton - Duggan		266.5	389.5	13.9
Edmonton - Eastwood		288.7	498.1	17.7
Edmonton - Jasper Place & West		279.0	460.7	16.2
Edmonton - Mill Woods		290.5	458.5	15.1
Edmonton - NE		267.9	422.4	14.8
Edmonton - North Centre		280.0	456.2	15.5
Edmonton - Rutherford		261.6	388.8	13.7
Edmonton - Twin Brooks		224.6	335.6	11.7
Edmonton - Woodcroft East		275.8	429.7	15.3
Athabasca	RURAL	243.2	415.5	12.8
Banff		133.2	201.4	7.5
Barrhead		356.0	587.4	21.7
Bonnyville		362.5	642.5	21.5
Boyle		289.5	518.4	17.5
Camrose & County		257.5	414.7	13.8
Cardston-Kainai		324.0	585.6	20.9
Castor/Coronation/Consort		247.6	426.3	13.9
Claresholm		261.6	417.4	16.4
Cold Lake		305.7	515.8	14.6
County Of Forty Mile		177.1	290.2	9.1
County of Warner		251.1	425.4	15.6
Crowsnest Pass		249.6	411.0	15.6
Didsbury		190.3	327.4	12.0
Drayton Valley		313.6	538.9	18.0
Edson		227.5	400.0	13.3
Fairview		221.1	378.6	12.5
Flagstaff County		297.6	482.2	15.5
Fort Macleod		207.9	331.6	12.9
Fox Creek		291.3	452.7	14.8
Frog Lake		554.2	1079.9	33.1
Grande Cache		205.1	343.0	10.8
High Level		351.5	683.0	22.6
High Prairie		345.4	666.8	19.7
Hinton		195.1	312.8	10.7
Innisfail		194.8	315.3	10.9
Jasper		210.8	320.5	11.6
Lac La Biche		324.8	547.5	17.9
Lacombe		228.2	367.5	13.6
Lamont County		190.0	306.5	10.2
Manning		233.8	382.9	13.5
Mayerthorpe		173.6	277.1	9.9
Newell		257.1	448.8	15.9
Olds		292.5	466.3	16.1
Oyen		177.6	283.8	9.2
Peace River - Falher		283.3	490.9	16.7
Pincher Creek		279.2	478.7	17.7
Planning & Special Area 2		302.9	503.4	18.1
Ponoka		339.7	592.7	19.9
Provost - Wainwright		263.4	440.0	16.2
Rimbey		182.7	289.0	9.6
Rocky Mountain House		227.4	391.6	13.1
Slave Lake		407.7	722.1	24.7
Smoky Lake		277.1	454.9	12.3
St. Paul		354.3	629.9	19.5
Starland County/Drumheller		282.1	482.2	14.8
Stettler & County		305.8	517.1	16.9
Sundre		275.1	447.8	16.1
Swan Hills		243.5	446.8	12.5
Sylvan Lake		345.3	577.7	20.8
Taber MD		218.2	355.3	12.6
Three Hills/Highway 21		181.0	287.7	9.0
Tofield		201.6	340.9	9.8
Two Hills County		174.6	274.4	8.8
Valleyview		294.6	521.5	17.8
Vegreville/Minburn County		253.1	398.6	13.6
Vermilion River County		359.6	642.3	21.8
Viking		321.9	492.1	15.5
Vulcan		191.4	336.2	12.9
Wabasca		395.2	739.7	21.8
Westlock		270.3	454.9	15.4
Wetaskiwin County		304.8	581.1	18.7
Whitecourt		319.6	560.4	18.6
Airdrie - Crossfield	SUBURBAN	277.8	448.3	16.3
Beaumont		189.1	299.0	10.4
Black Diamond		204.3	335.3	11.8
Canmore		185.0	286.2	9.9
Chestermere		227.7	357.7	11.8
Cochrane - Springbank		182.5	290.1	10.0
Fort Saskatchewan - Sturgeon East		338.2	550.6	18.6
High River		196.3	317.3	10.8
Leduc - Devon - Thorsby		306.4	490.8	16.9
Okotoks - Priddis		235.9	375.4	13.8
St. Albert - Sturgeon West		273.3	438.7	15.7
Strathcona County		253.7	397.3	14.3
Strathmore		238.2	420.3	14.8
Westview Inc. S Grove S Plain		222.0	365.8	12.8