



Patented
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Review Board

Conseil d'examen
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brevetés



CHARTBOOK


National Prescription Drug Utilization Information System

NPDUIS

The market for prescription oral solid opioids, 2010 to 2017

Canada and the United States

Canada 



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PMPRB Reporting

About the PMPRB

The Patented Medicine Prices Review Board (PMPRB) is a respected public agency that makes a unique and valued contribution to sustainable spending on pharmaceuticals in Canada by:

- providing stakeholders with price, cost, and utilization information to help them make timely and knowledgeable pricing, purchasing and reimbursement decisions; and
- acting as an effective check on the prices of patented medicines through the responsible and efficient use of its consumer protection powers.

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NPDUIS operates independently of the regulatory activities of the Board of the PMPRB. The research priorities, data, statements and opinions expressed or reflected in NPDUIS reports do not represent the position of the PMPRB with respect to any regulatory matter. NPDUIS reports do not contain information that is confidential or privileged under sections 87 and 88 of the Patent Act, and the mention of a medicine in a NPDUIS report is not and should not be understood as an admission or denial that the medicine is subject to filings under sections 80, 81 or 82 of the Patent Act or that its price is or is not excessive under section 85 of the Patent Act.

The NPDUIS Initiative

The National Prescription Drug Utilization Information System (NPDUIS) is a research initiative established by federal, provincial, and territorial Ministers of Health in September 2001. It is a partnership between the PMPRB and the Canadian Institute for Health Information (CIHI).

Pursuant to section 90 of the Patent Act, the PMPRB has the mandate to generate analysis that provides policy makers and public drug plan managers with critical information and intelligence on price, utilization, and cost trends so that Canada's health care system has more comprehensive and accurate information on how drugs are being used, and on sources of cost pressures.

The specific research priorities and methodologies are established with the guidance of the NPDUIS Advisory Committee and reflect the priorities of the participating jurisdictions, as identified in the NPDUIS [Research Agenda](#).



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Introduction

Regulatory amendments regarding tramadol

- Health Canada put forward a proposal in June 2018 to add tramadol to Schedule I of the Controlled Drugs and Substances Act (CDSA) and the Schedule to the Narcotic Control Regulations (NCR).
- This is intended to help prevent diversion and protect Canadians from the health risks of unauthorized tramadol use, while maintaining its availability for legitimate medical and scientific use.
- More details on the proposed regulatory amendments are available at:
<https://www.canada.ca/en/health-canada/programs/consultation-amendments-tramadol.html>

Purpose of this analysis

To provide an overview of the market for prescription opioids in Canada and the United States to inform discussions on the impact of the proposed regulatory changes.

Limitations

This analysis of prescription opioids covers only one aspect of a multifaceted health issue. The high-level statistics presented here are generally limited to the market for prescription oral solid opioids and the results do not capture the use of other formulations or the use of illegally obtained opioids in Canada and the US. While this reporting is designed to inform policies promoting safer opioid consumption, an analysis of the broader issues related to the opioid crisis such as opioid use disorders, the implications of opioid poisoning, and the illicit use of opioids, falls outside the scope of this study.

Data Sources

The findings presented in this study are based on the analysis of a number of databases. The results pertaining to the Canadian national retail and hospital markets are based on data captured in the **IQVIA MIDAS™ Database (all rights reserved)**.

The **NPDUIS Database from the Canadian Institute for Health Information (CIHI)**, consisting of public plan data from every province (except Quebec) as well as the Yukon and NIHB, was used in the analyses of the public drug plan market, while the **IQVIA Private Pay Direct Plan Database** was used in the analyses of the private drug plan market. **CIHI** private plan data for British Columbia was used in one analysis.

The **IQVIA Payer Insights Database** provided information on the market breakdown by public, private, and out-of-pocket markets.

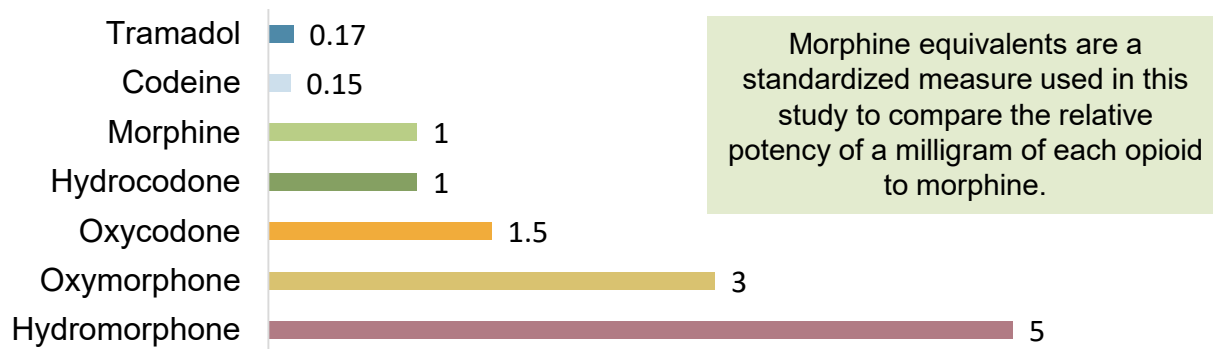
For more information on these data sources, see the Source Materials document on the [Analytical Studies](#) page of the PMPRB website.

Although based in part on data provided under license by IQVIA's MIDAS™ and Payer Insights databases and by the Canadian Institute for Health Information (CIHI), statements, findings, conclusions, views, and opinions expressed in this report are exclusively those of the PMPRB and are not attributable to IQVIA or CIHI.

Methods

This study focuses on the Canadian and US markets for the oral solid formulations of the prescription opioids listed below, including combination products containing the target medicines. For some analyses, oral solid formulations could not be isolated from the rest of the data, and thus, the results include all forms of each opioid. Physical units are a count of individual pills, tablets, caplets, etc. regardless of strength or formulation. Fully synthetic opioids such as fentanyl or methadone were not included in the analyses.

The following is the list of opioids included in this study, along with their respective morphine equivalents (MEQ):



Morphine equivalents are based on the [Canadian Guideline for Safe and Effective Use of Opioids for Chronic Non-Cancer Pain, 2010](#); [CMAJ Guideline for opioid therapy and chronic noncancer pain \(tramadol only\)](#); [US Centers for Medicare & Medicaid Services Opioid Oral Morphine Milligram Equivalent \(MME\) Conversion Factors \(oxymorphone only\)](#)



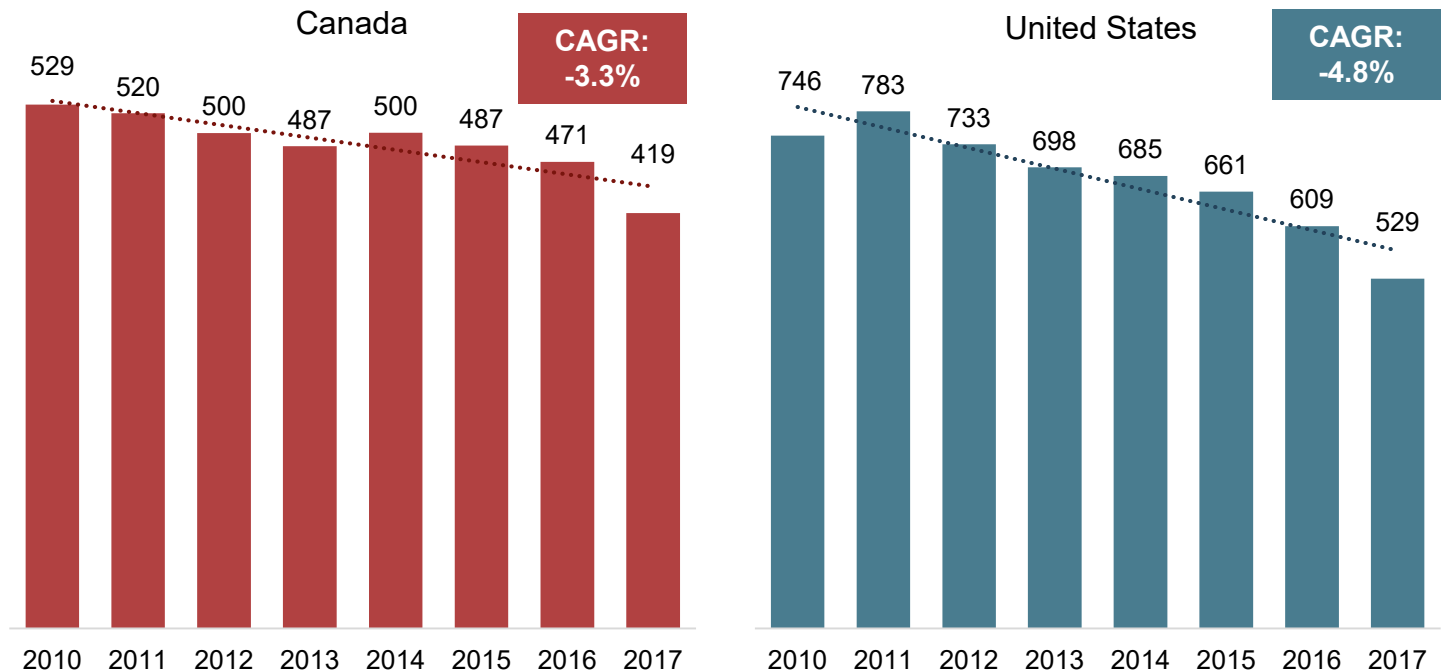
National opioid markets

Canada and the United States

Per capita opioid consumption is lower in Canada than in the US, and has been declining in both countries in recent years

In 2017, enough oral solid opioids were prescribed to provide every Canadian with the equivalent of over 1 mg of morphine per day. The 419 MEQ per capita in 2017 represents an annual decline of 3.3% from the 529 MEQ per capita in 2010.

▶ **FIGURE 1.1** Morphine equivalents sold per capita, oral solid opioids, Canada and the US, 2010 to 2017



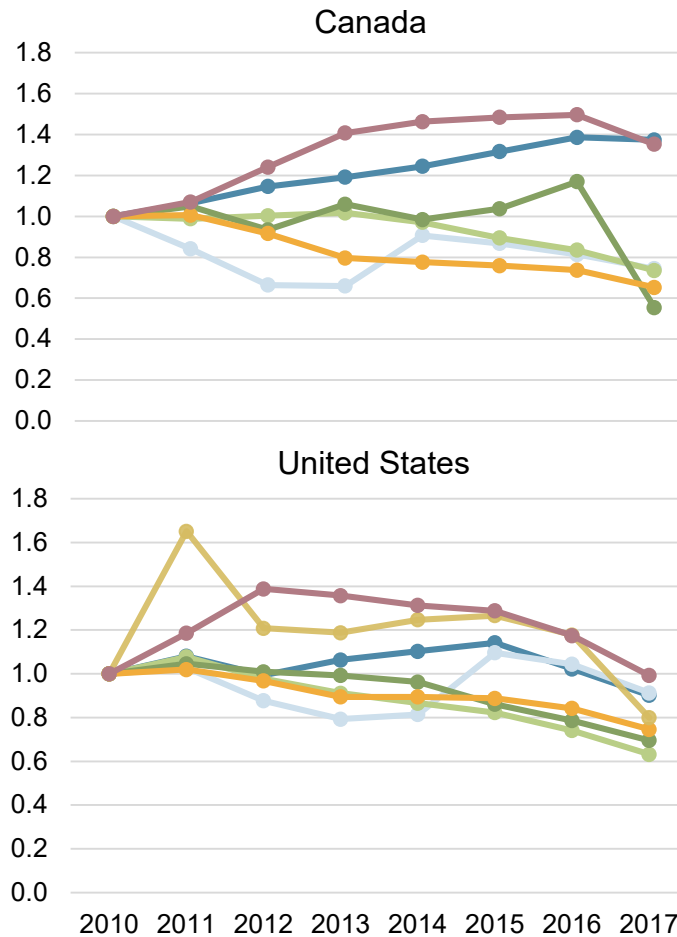
CAGR: compound annual growth rate, 2010 to 2017.

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

While the use of most prescription opioids is declining in Canada and the US, tramadol and hydromorphone use in Canada is on the rise

As measured by MEQ sold, the use of tramadol and hydromorphone in Canada grew at a compounded annual rate of greater than 4% from 2010 to 2017.

FIGURE 1.2 Number of morphine equivalents indexed to 2010, oral solid opioids, Canada and the US, 2010 to 2017



Opioid	Total MEQ (billions)		MEQ index 2017	CAGR 2010–2017
	2010	2017		
Tramadol	0.73	1.01	1.37	4.6%
Codeine	2.84	2.12	0.74	-4.1%
Morphine	2.64	1.94	0.74	-4.3%
Hydrocodone	<0.01	<0.01	0.55	-8.1%
Oxycodone	7.97	5.20	0.65	-5.9%
Hydromorphone	3.78	5.12	1.35	4.4%

Opioid	Total MEQ (billions)		MEQ index 2017	CAGR 2010–2017
	2010	2017		
Tramadol	25.04	22.58	0.90	-1.5%
Codeine	3.08	2.81	0.91	-1.3%
Morphine	27.74	17.53	0.63	-6.4%
Hydrocodone	59.19	41.14	0.70	-5.1%
Oxycodone	105.34	78.55	0.75	-4.1%
Oxymorphone	4.61	3.68	0.80	-3.1%
Hydromorphone	5.78	5.74	0.99	-0.1%

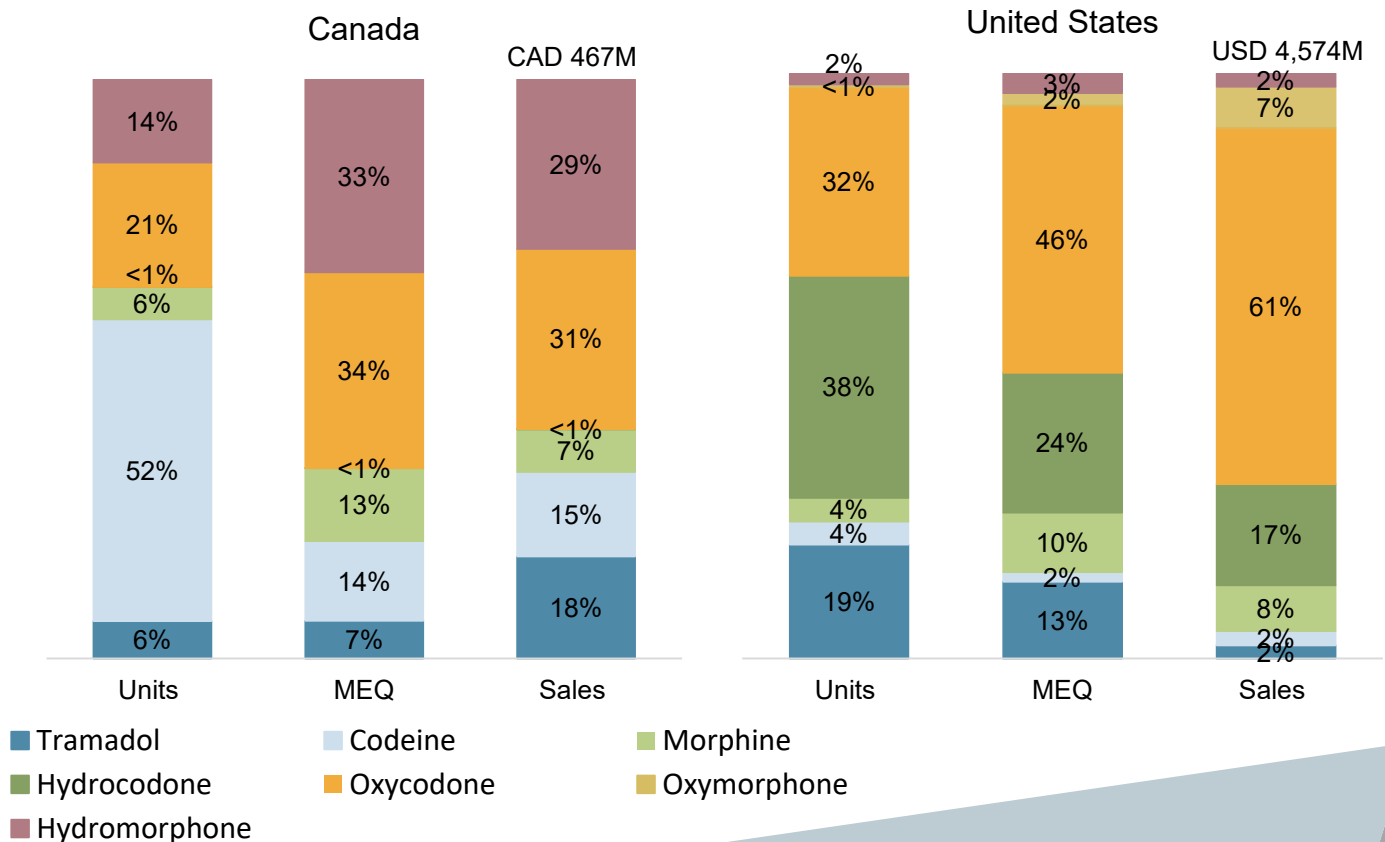
CAGR: compound annual growth rate.

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

Tramadol, one of the least potent opioids, captures a relatively low share of opioid units and MEQ in Canada compared to the US; hydromorphone, the most potent opioid, accounts for a much more important share in Canada than it does in the US

Oxycodone and hydromorphone accounted for most of the prescription opioid use (67% of all MEQ) and the majority of sales (60%) in Canada in 2017. In the US, oxycodone had the greatest use (46% of all MEQ), while the more potent hydromorphone accounted for only a minimal share.

▶ **FIGURE 1.3** Market distribution by units, morphine equivalents, and sales, oral solid opioids, Canada and the US, 2017

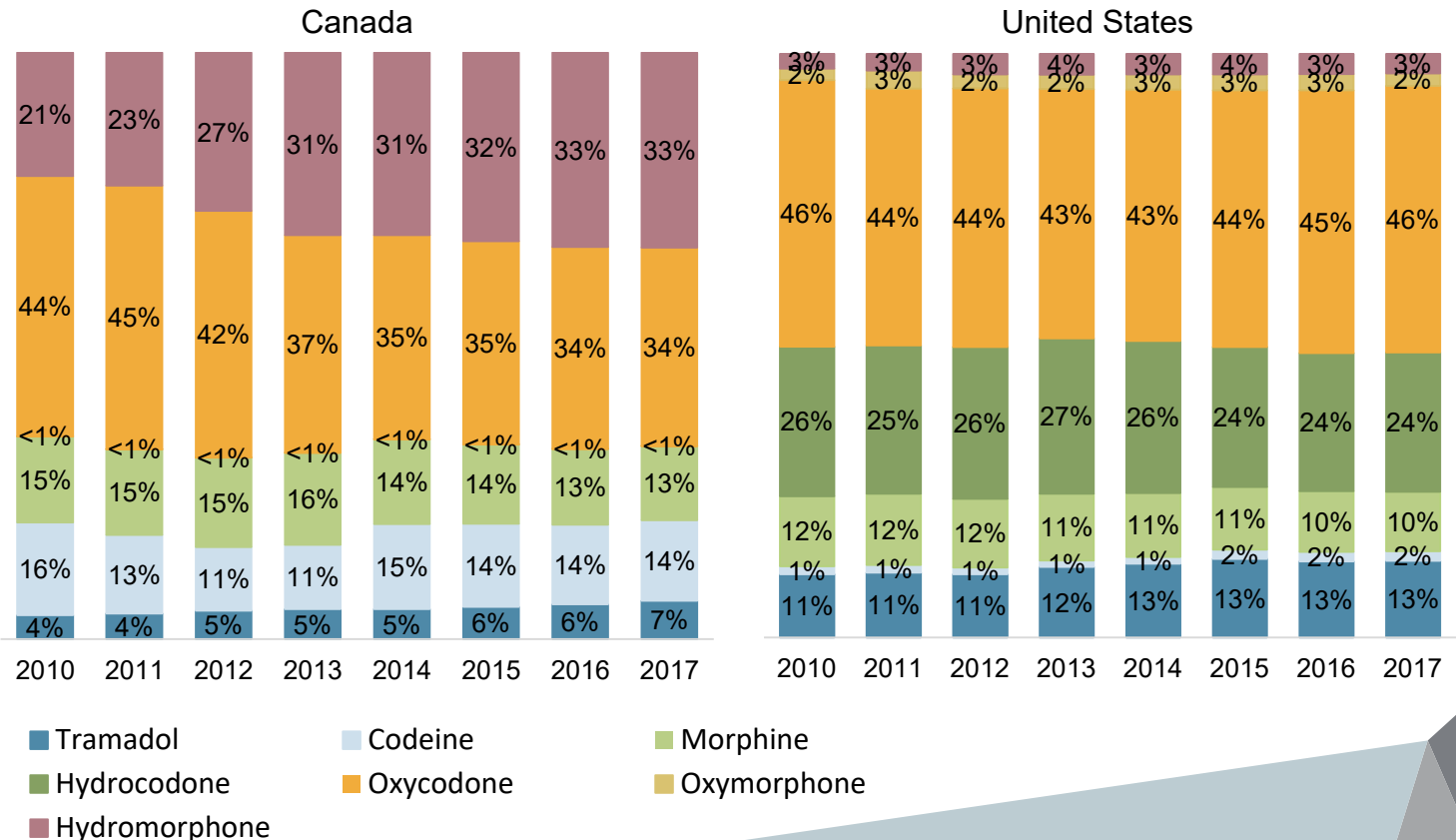


Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2017. All rights reserved.

The increase in the use of hydromorphone and tramadol in Canada since 2010 has resulted in them capturing a growing share of the opioid market, as the use of other opioids declines

Hydromorphone's market share in terms of MEQ increased from 21% to 33% between 2010 and 2017, while tramadol's share has nearly doubled from 4% to 7% over the same period. Figures A1 and A2 in the Appendix provide similar information in terms of units and sales, respectively.

FIGURE 1.4 Distribution of morphine equivalents by oral solid opioid, Canada and the US, 2010 to 2017



Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

Important disparities exist between the prices of opioids in Canada and in the US

The average prices per milligram of codeine, morphine, and oxycodone were markedly lower in Canada than in the US in 2017, while the price of hydromorphone was higher. Despite generic availability, the price of tramadol was over 12 times higher in Canada than in the US.

FIGURE 1.5 Price per milligram of oral solid opioids, Canada and the US, 2017

Opioid	Price per milligram (CAD)		Canadian price difference
	Canada	United States	
Tramadol	\$0.0139	\$0.0010	1277%
Codeine	\$0.0058	\$0.0079	-26%
Morphine	\$0.0176	\$0.0265	-33%
Hydrocodone*	\$0.2284	\$0.0249	817%
Oxycodone	\$0.0419	\$0.0691	-39%
Oxymorphone	NA	\$0.3404	NA
Hydromorphone	\$0.1333	\$0.1173	14%

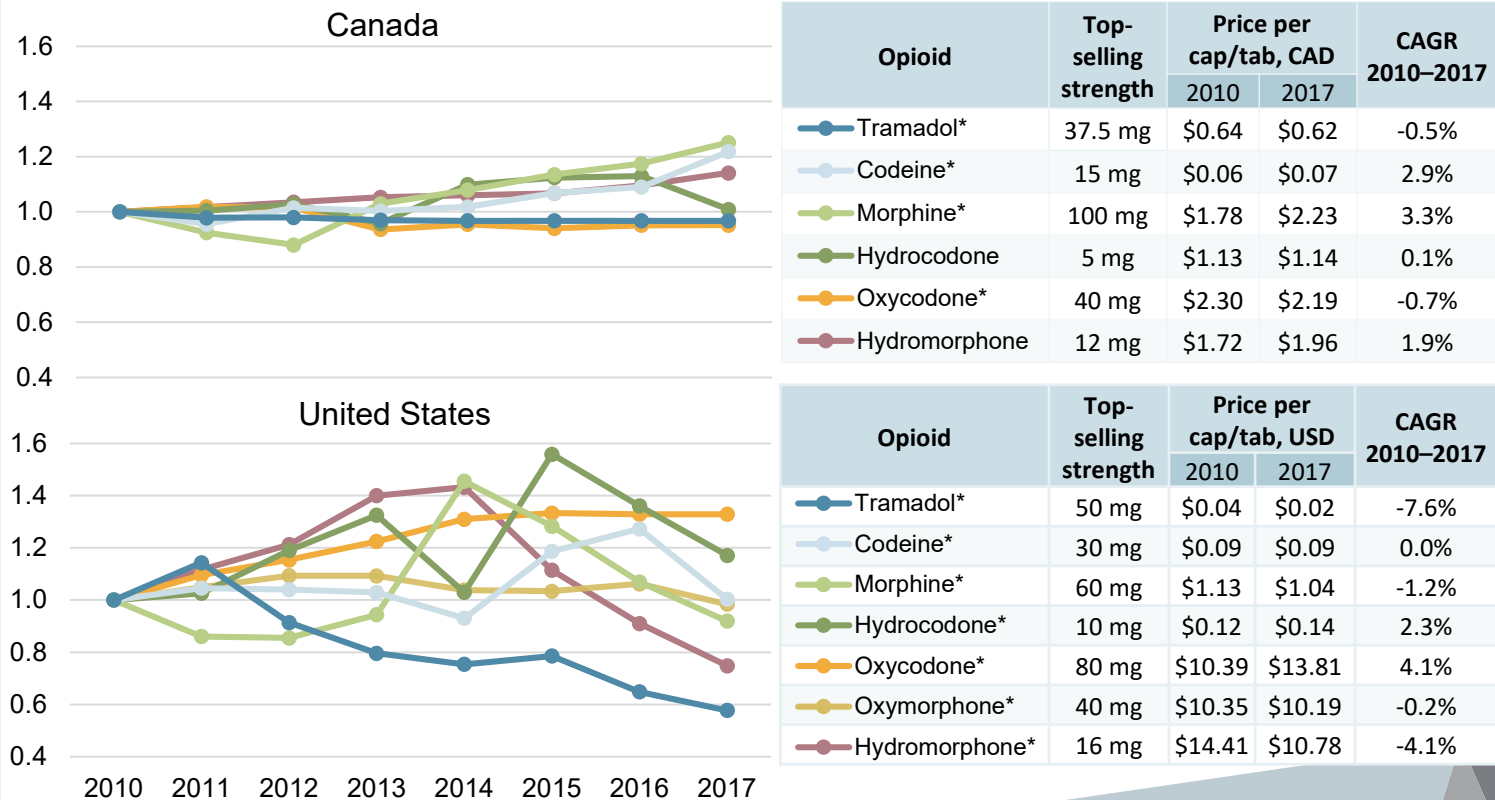
* Oral solid hydrocodone use in Canada is minimal and only covered by private plans.

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2017. All rights reserved.

Prices for the highest-selling strengths of opioids have been on the rise in Canada, with the exceptions of tramadol and oxycodone

Canadian prices of the highest-selling strengths of codeine and morphine increased the most since 2010, with a compound annual growth rate (CAGR) of around 3%. There was greater price variability in the US, with tramadol showing a steep decline in recent years. Generic versions were available for all opioids in the US, and for most in Canada.

FIGURE 1.6 Price indexed to 2010 for highest-selling strengths of oral solid opioids, Canada and the US, 2010 to 2017



CAGR: compound annual growth rate.

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

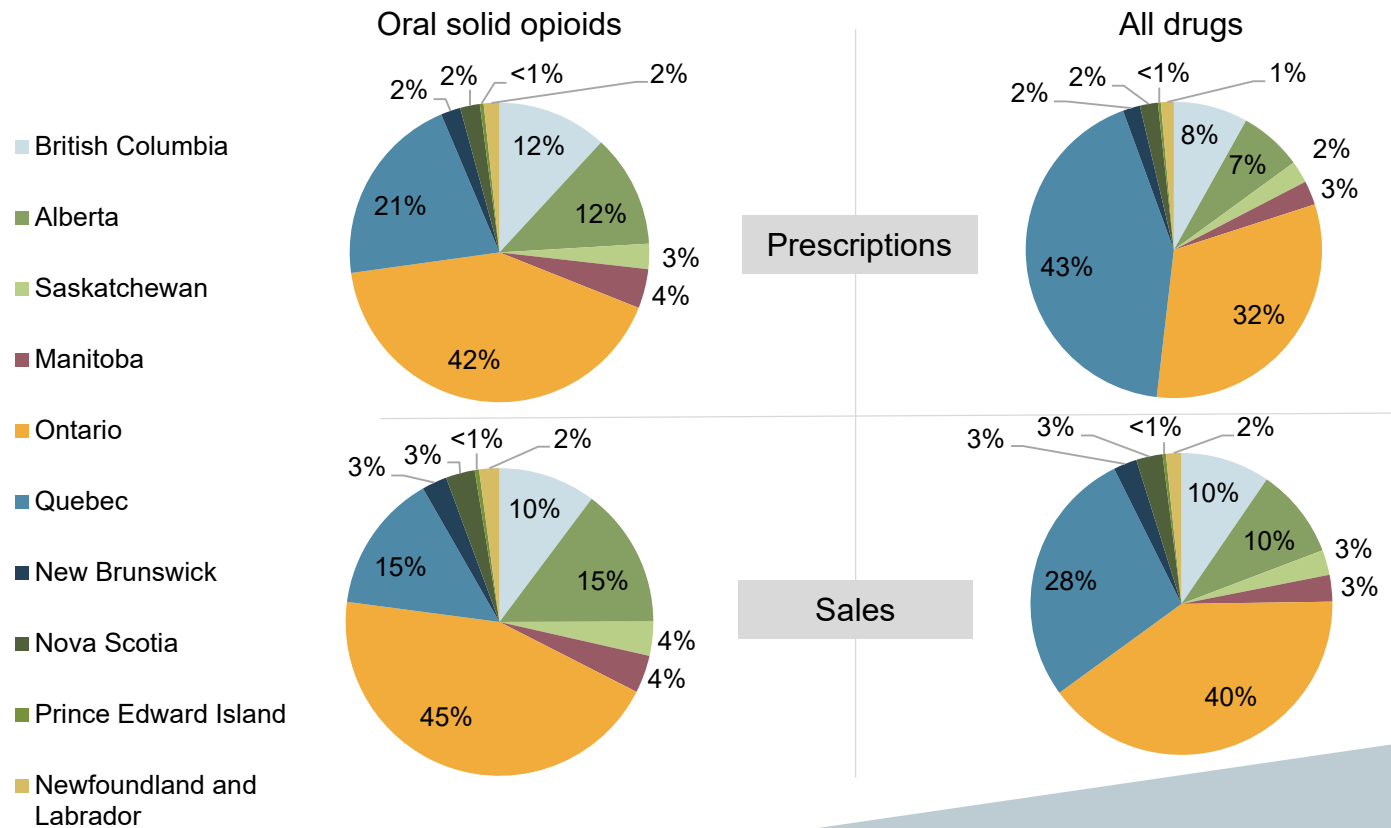


Canadian provincial and payer markets

Quebec accounts for a much smaller share of national prescriptions and sales of oral solid opioids than it does for prescription drugs in general, resulting in a proportionally higher share of the opioid market for most other provinces

Quebec accounted for 21% of national opioid prescriptions in 2017, whereas Ontario had double that share (42%) and British Columbia and Alberta each had 12%.

▶ **FIGURE 2.1** Distribution of retail prescriptions and sales by province, oral solid opioids versus all drugs, 2017

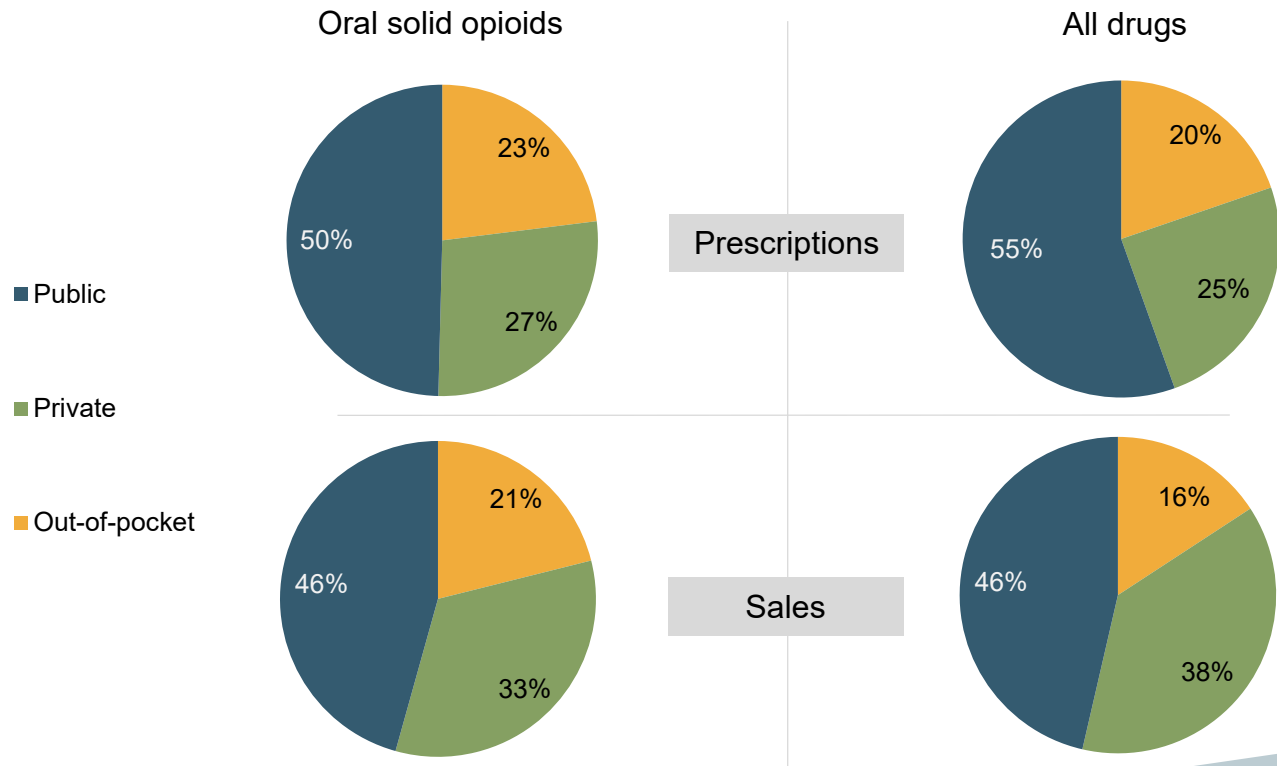


Data source: IQVIA Payer Insight Database, 2017. Includes retail sales in public, private, and out-of-pocket markets.

Canadian private and out-of-pocket payers' use of oral solid opioids is proportionally greater than their use of all drugs in terms of prescription volume

In 2017, half of the prescriptions for opioids were paid for by private and out-of-pocket payers, at 27% and 23%, respectively.

FIGURE 2.2 Share of retail prescriptions and sales by payer, oral solid opioids versus all drugs, 2017

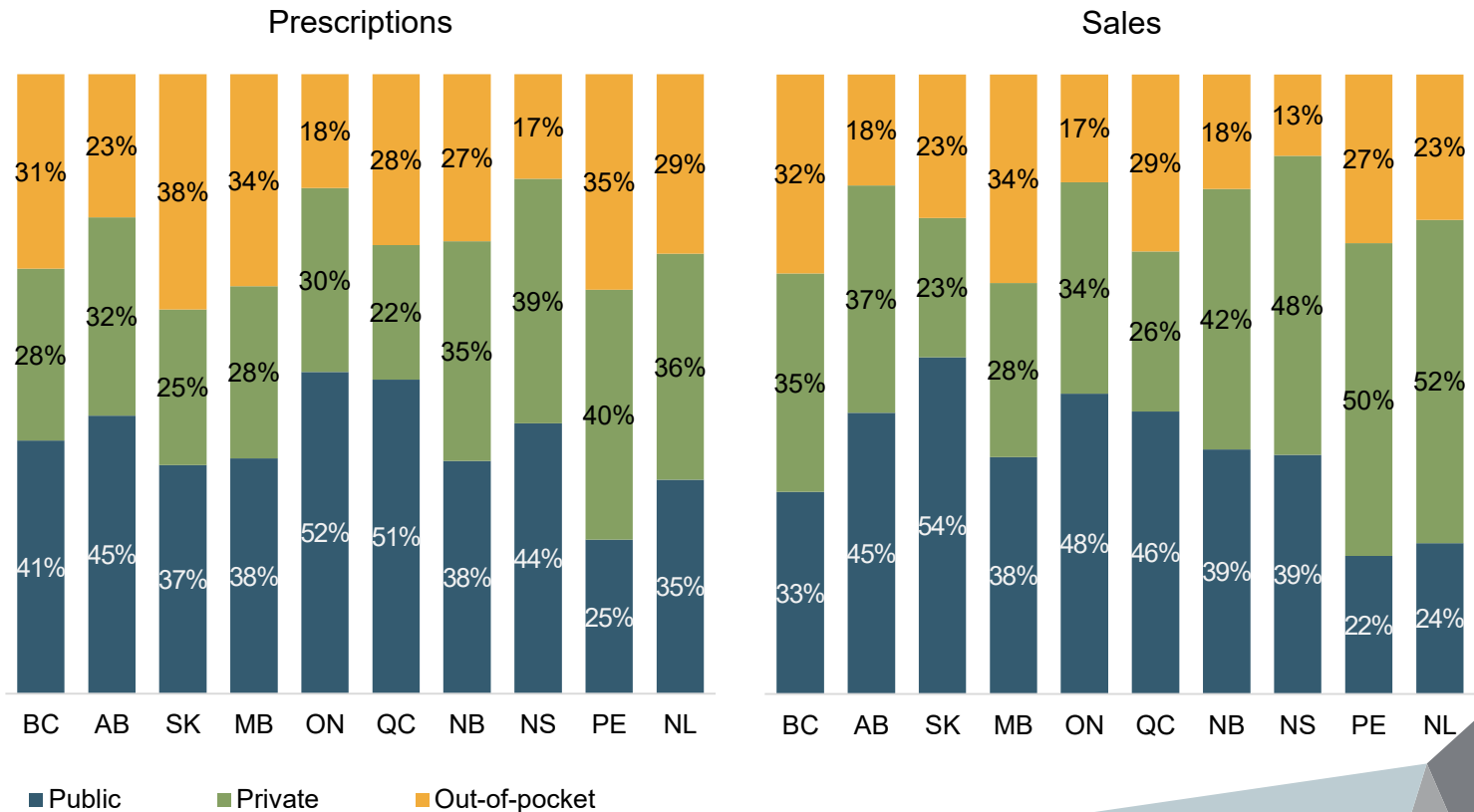


Data source: IQVIA Payer Insight Database, 2017. Includes retail sales in public, private, and out-of-pocket markets.

The majority of retail prescriptions for oral solid opioids are paid by private and out-of-pocket payers in almost all provinces

Ontario and Quebec were the only provinces where public plans were the first payer for the majority of retail prescriptions, at 52% and 51%, respectively.

FIGURE 2.3 Share of retail prescriptions and sales by payer*, oral solid opioids, 2017



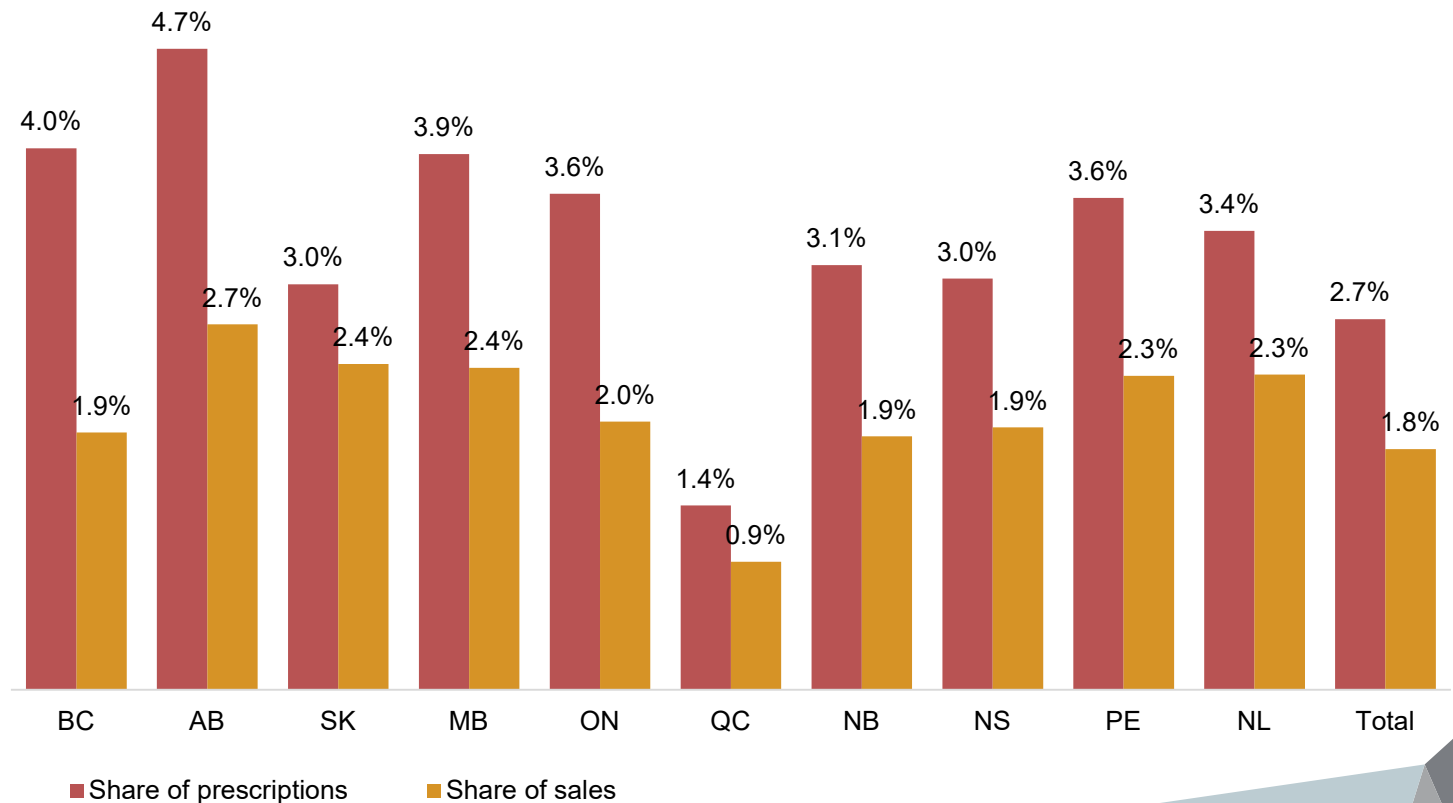
* NIHB prescriptions not included.

Data source: IQVIA Payer Insight Database, 2017. Includes retail sales in public, private, and out-of-pocket markets.

Quebec has the lowest proportion of prescription opioids use in terms of retail prescriptions and sales, while Alberta has the highest

As a percentage of all drugs, retail prescriptions and sales for oral solid opioids in Quebec were less than half the levels observed in any other province in 2017.

▶ FIGURE 2.4 Oral solid opioids share of total retail prescriptions and sales, 2017



Data source: IQVIA Payer Insight Database, 2017. Includes retail sales in public, private, and out-of-pocket markets.

Opioids account for a sizable share of prescriptions and drug costs, and have a higher share in private than in public plans

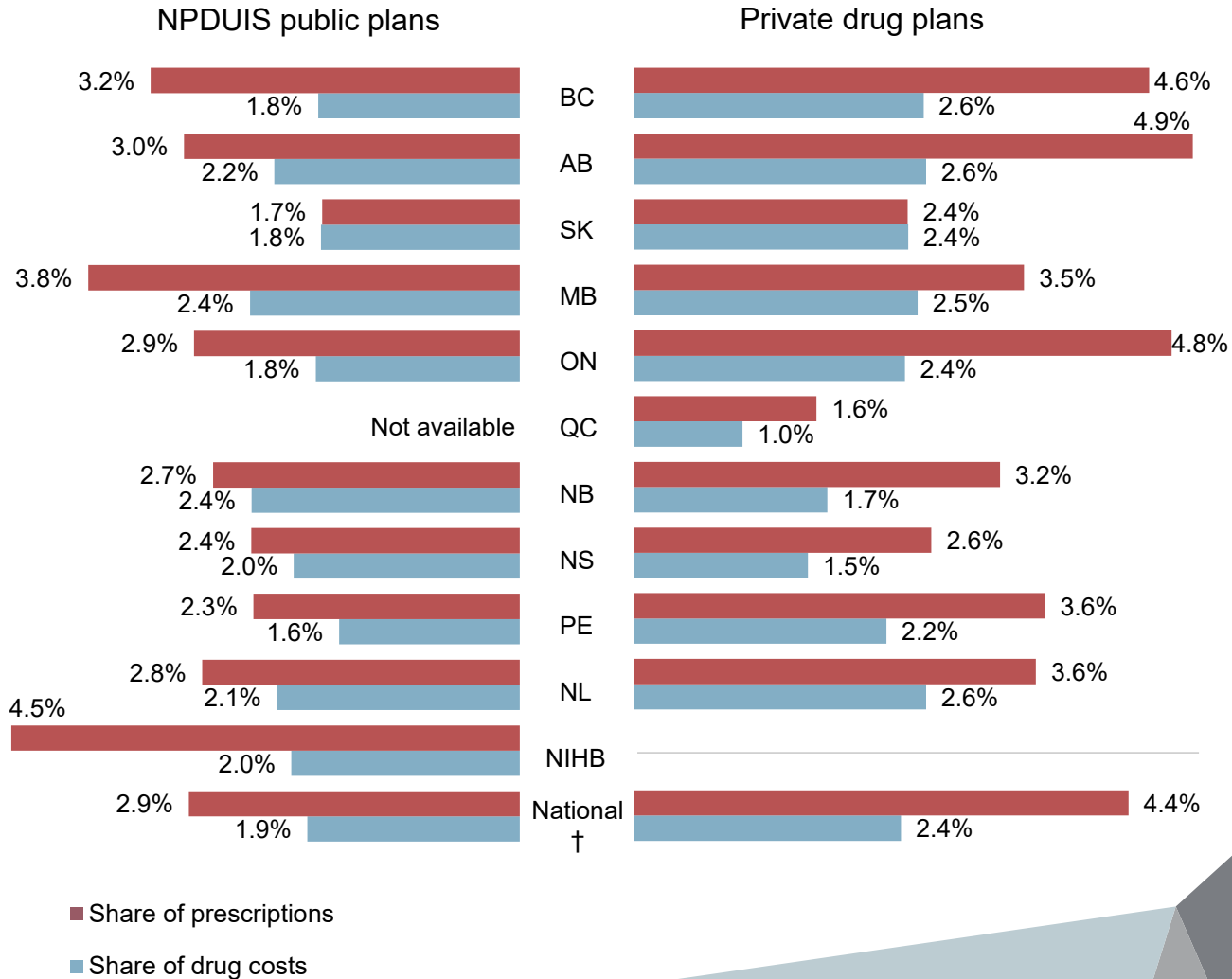
The share of opioid prescriptions was 4.4% in private plans and 2.9% in public plans in 2017.

* Includes drug cost and markup. Dispensing costs are excluded.

† Includes only the jurisdictions with both public and private data; NIHB (public only) and Quebec (private only) are excluded for these results.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2017; IQVIA Private Pay Direct Drug Plan Database, 2017.

FIGURE 2.5 Oral solid opioids share of total drug costs* and prescriptions, NPDUIS public plans and private plans, 2017



The number of prescriptions for hydromorphone has tripled in public plans since 2010, and nearly doubled in private plans

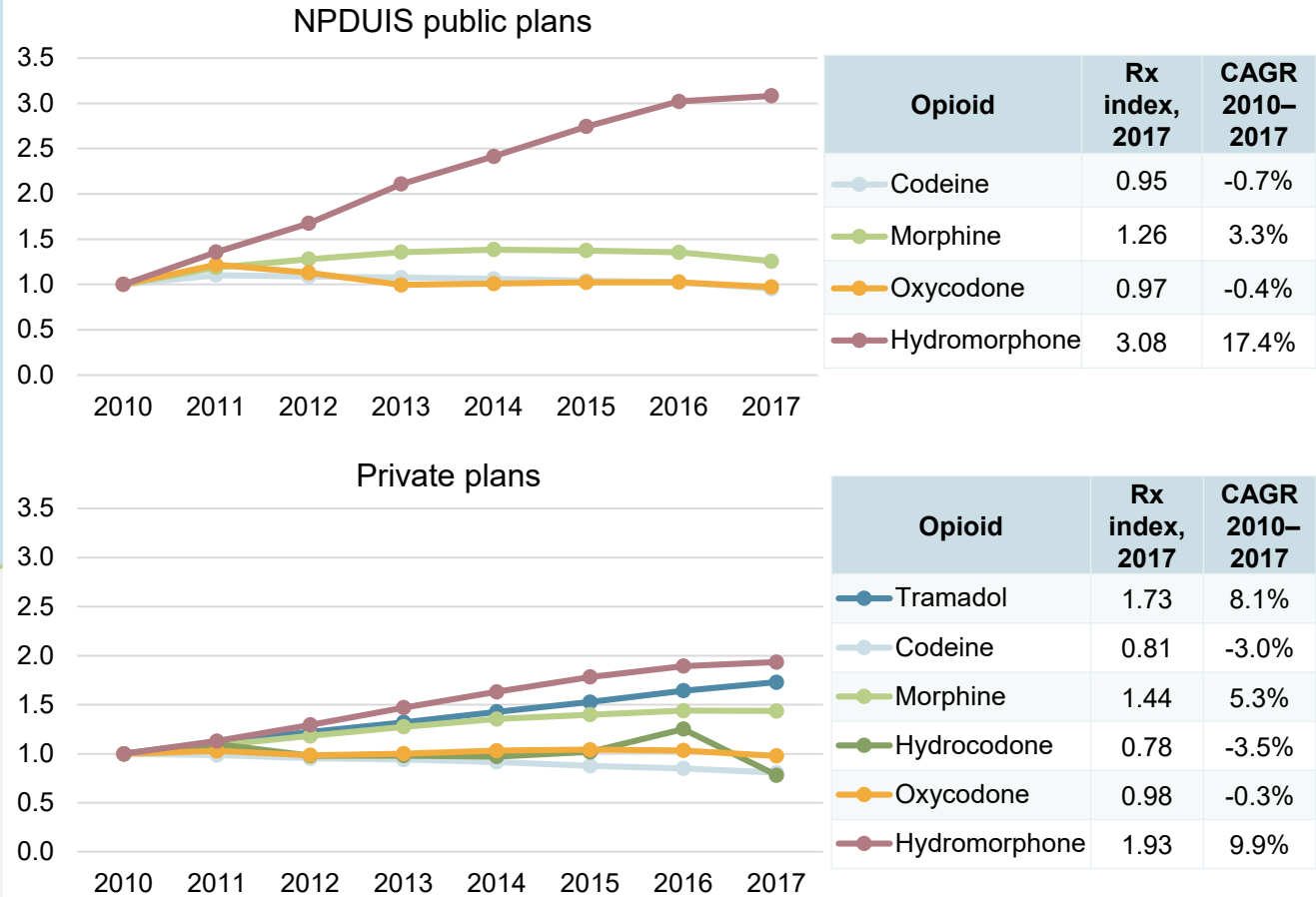
Tramadol and morphine prescriptions in private plans have also been on the rise.

Note: Public plans did not cover any oral solid hydrocodone between 2010 and 2017. Tramadol data in public plans is not reportable due to confidentiality requirements for small values.

CAGR: compound annual growth rate.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2010 to 2017; IQVIA Private Pay Direct Drug Plan Database, 2010 to 2017.

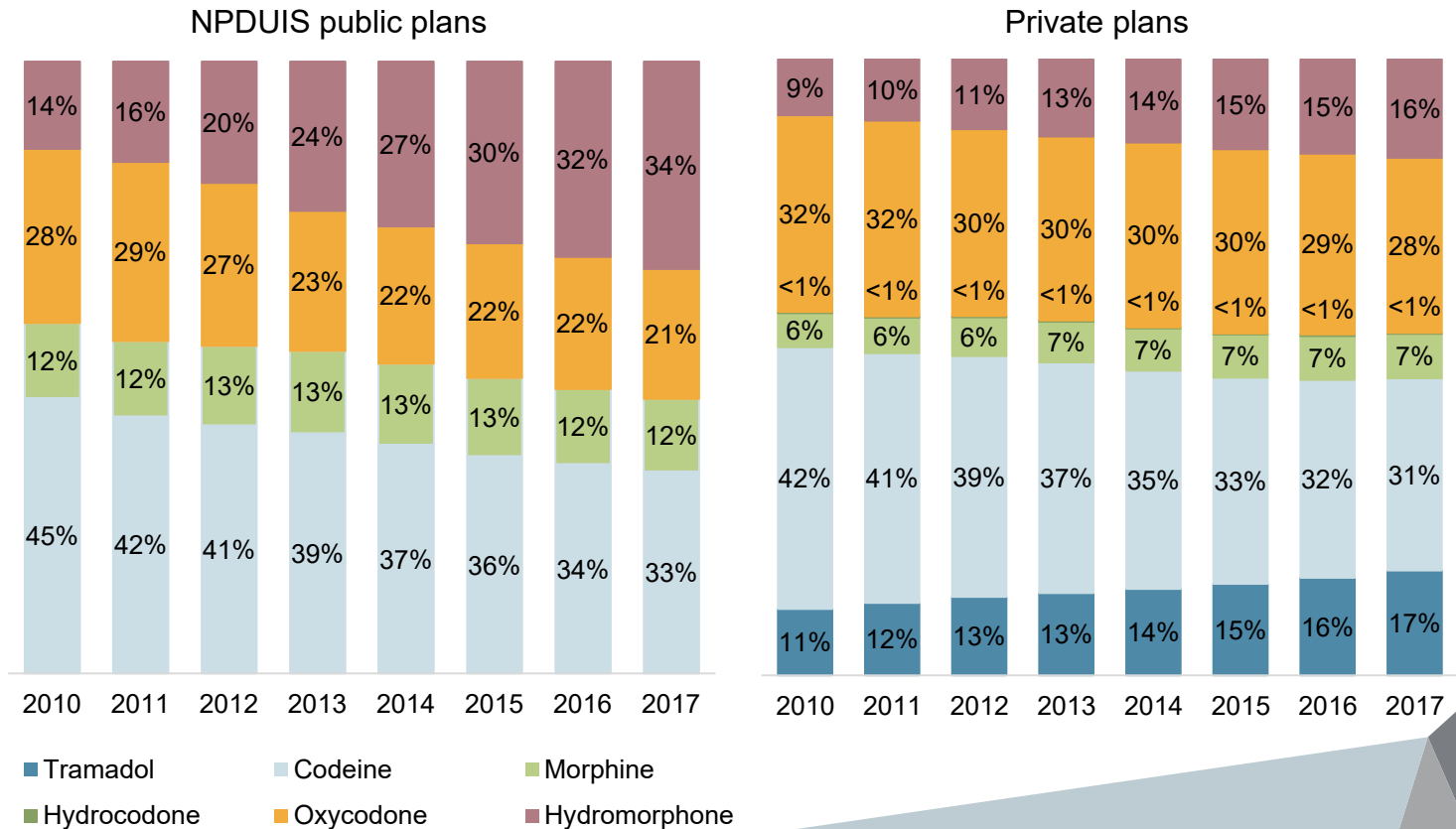
FIGURE 2.6 Number of prescriptions indexed to 2010, oral solid opioids, NPDUIS public plans and private plans, 2010 to 2017



Hydromorphone now captures one third of the public drug plan prescription market as its use has increased markedly in recent years

In private plans, the use of hydromorphone and tramadol grew steadily from 2010 to 2017, though codeine and oxycodone remained the market leaders. Figures A3 and A4 in the Appendix provide similar information in terms of units and drug costs, respectively.

FIGURE 2.7 Distribution of prescriptions by oral solid opioid, NPDUIS public plans and private plans, 2010 to 2017



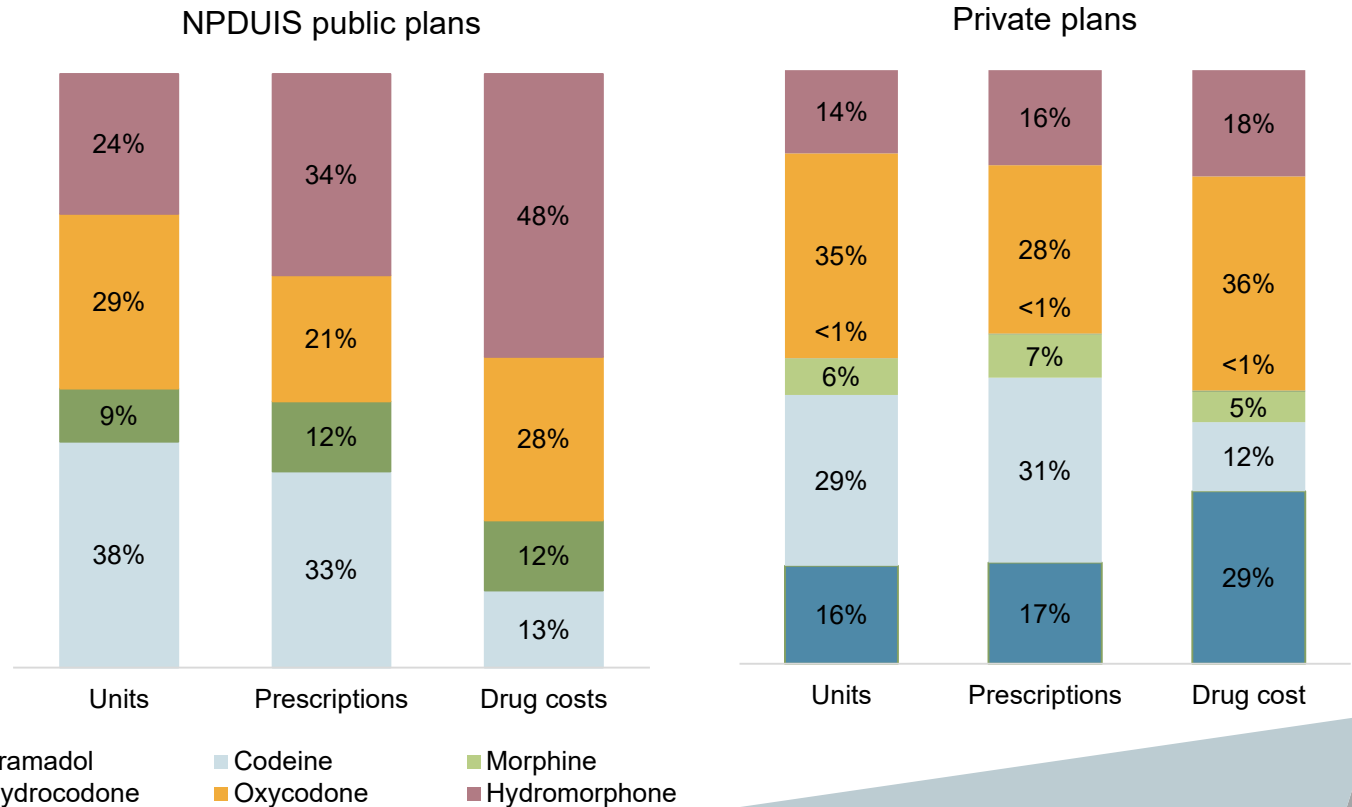
Note: Public plans did not cover any oral solid hydrocodone between 2010 and 2017. Tramadol data in public plans is not reportable due to confidentiality requirements for small values.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2010 to 2017; IQVIA Private Pay Direct Drug Plan Database, 2010 to 2017.

Due to its strong prescription growth in public plans, hydromorphone now accounts for the largest share of prescriptions and drug costs

In private plans, oxycodone was still the leader in terms of drug cost followed by tramadol, while codeine was the most prescribed opioid.

FIGURE 2.8 Market distribution by units, prescriptions, and drug costs*, oral solid opioids, NPDUIS public plans and private plans, 2017



Note: Public plans did not cover any oral solid hydrocodone between 2010 and 2017. Tramadol data in public plans is not reportable due to confidentiality requirements for small values.

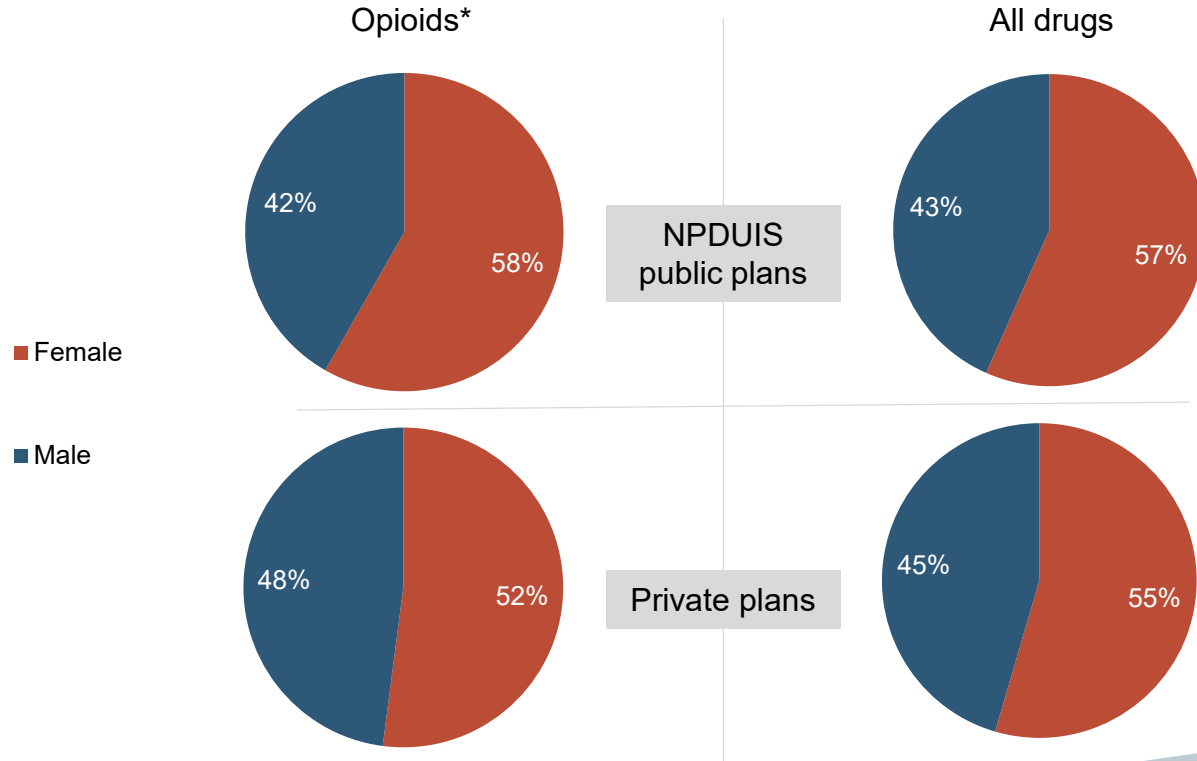
* Includes drug cost and markup. Dispensing costs are excluded.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2017; IQVIA Private Pay Direct Drug Plan Database, 2017.

Women account for over half of the opioid use in both public and private plans, similar to the patterns observed for all prescription drugs

No meaningful differences were observed in the distributions of opioids by gender.

FIGURE 2.9 Number of prescriptions by gender, opioids* versus all drugs, NPDUIS public plans and private drug plans†, 2017



* Results based on the NPDUIS public plans data pertain to oral solid opioids, while those based on private plan data include non-oral solid formulations.

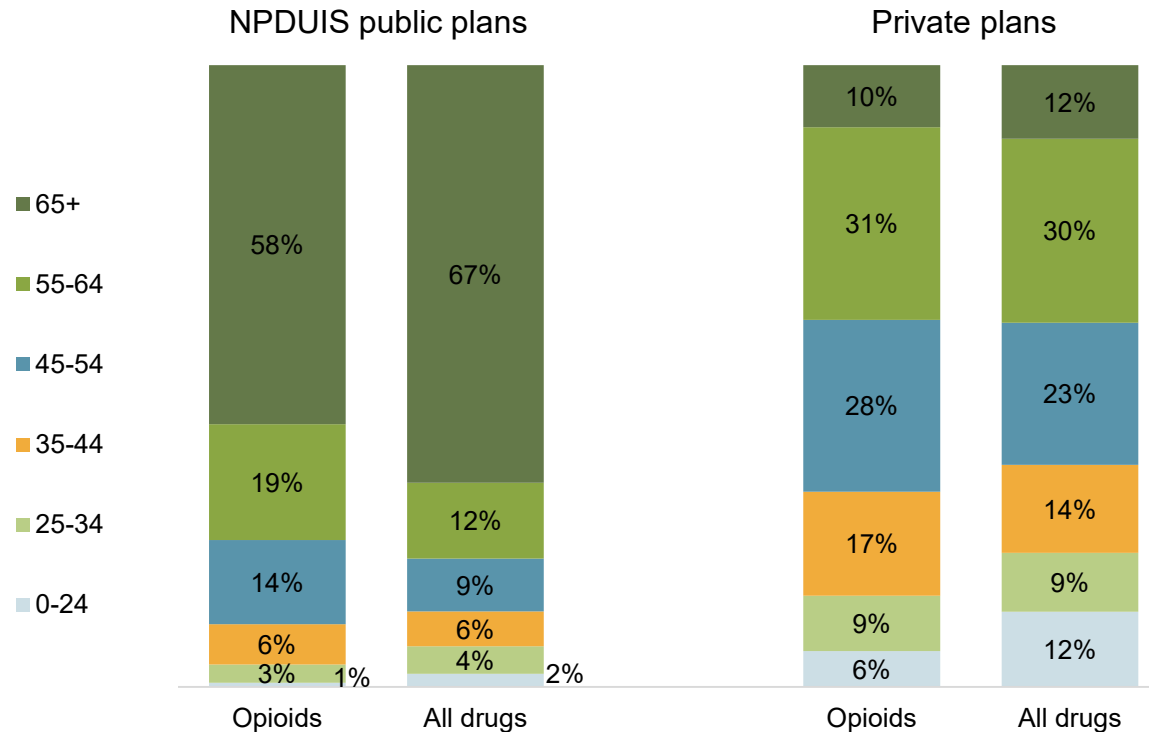
† Includes only the jurisdictions with both public and private data; data for NIHB and Quebec are not captured in these results.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2017; IQVIA Private Pay Direct Drug Plan Database, 2017.

Beneficiaries aged 65+, who make up the largest demographic group in public plans, account for the majority of oral solid opioid prescriptions, but proportionately less than their share of all drug prescriptions

The data for private plans, which was not limited to oral solid forms, demonstrates a greater alignment between the shares of opioid prescriptions by age group and the shares for all drugs.

FIGURE 2.10 Opioid* prescriptions by age demographic, NPDUIS public plans and private drug plans†, 2017



* The results based on the NPDUIS public plans data pertain to oral solid opioids, while those based on private plan data include non-oral solid formulations.

† Includes only the jurisdictions with both public and private data; NIHB (public only) and Quebec (private only) are excluded for these results.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2017; IQVIA Private Pay Direct Drug Plan Database, 2017.

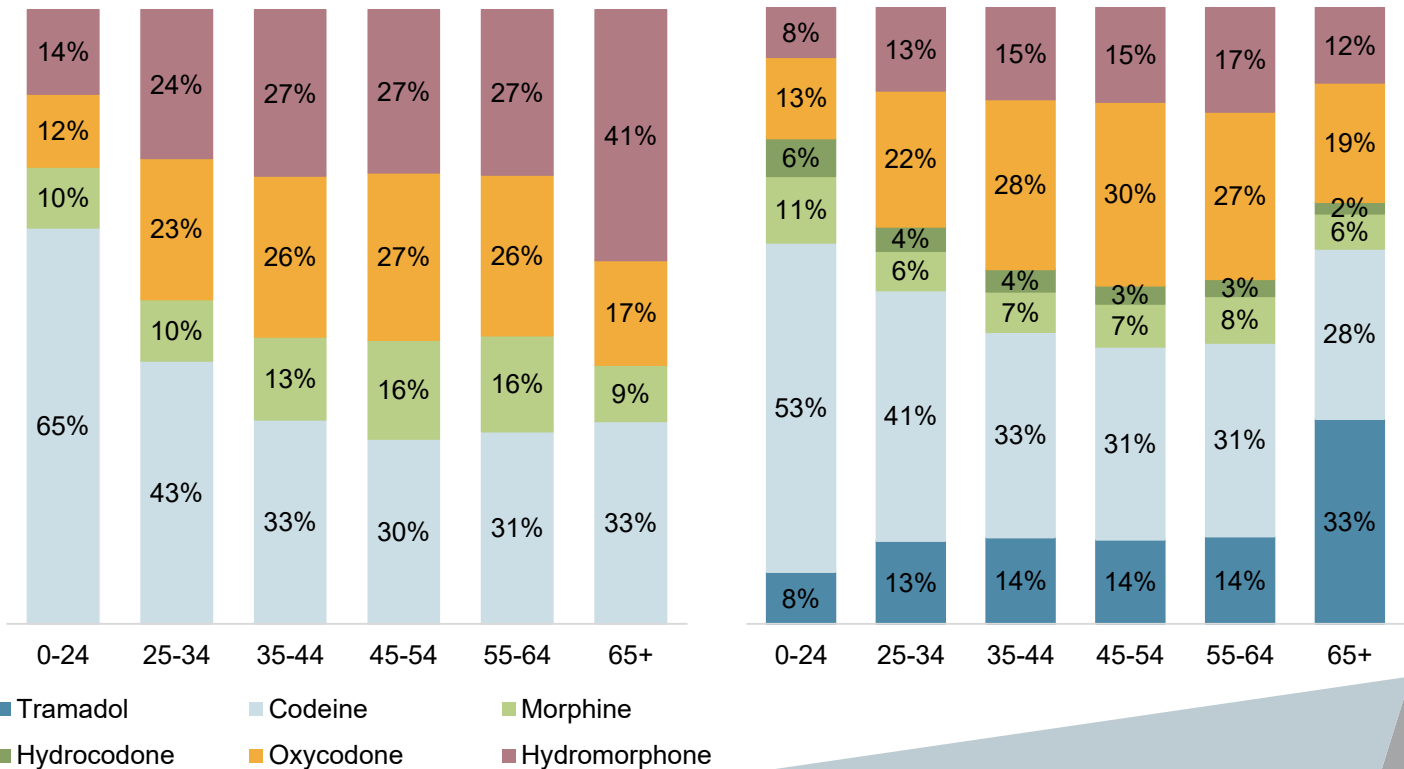
Hydromorphone is the most commonly used opioid by seniors in public plans, and its share of use across almost all age groups was higher in public than in private plans. Tramadol is the most utilized opioid by the senior population in private plans, and its share of use is sizable across all age groups

Hydromorphone made up 41% of oral solid opioid prescriptions for patients 65+ in public plans. In private plans, tramadol was more commonly used by seniors than codeine, accounting for 33% of all opioid prescriptions, including those in non-oral solid form.

FIGURE 2.11 Opioid* prescription distribution by age bands, NPDUIS public plans and private plans, 2017

NPDUIS public plans

Private plans



Note: Public plans did not cover any oral solid hydrocodone between 2010 and 2017. Tramadol data in public plans is not reportable due to confidentiality requirements for small values.

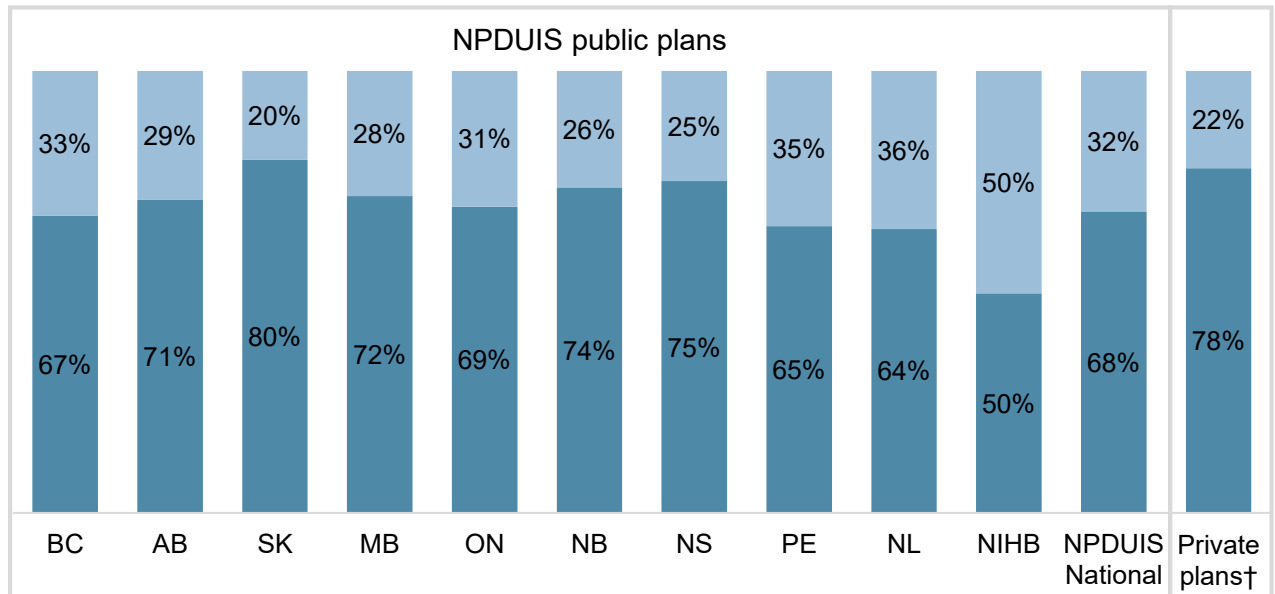
* The results based on the NPDUIS public plans data pertain to oral solid opioids, while those based on private plan data include non-oral solid formulations.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2017; IQVIA Private Pay Direct Drug Plan Database, 2017.

While results vary across plans, on average, the dispensing costs for opioids represent nearly one third of prescription costs in public plans and less than a quarter in private plans

Jurisdictional variations in the dispensing cost share of total prescription costs may be due to a number of factors, including demographic and disease profiles, as well as the quantity dispensed with each prescription.

FIGURE 2.12 Drug cost* and dispensing cost share of total prescription cost for oral solid opioids, NPDUIS public plans and private plans, 2017



■ Dispensing costs	\$9.6M	\$6.9M	\$1.7M	\$3.3M	\$41.0M	\$1.7M	\$1.3M	\$0.3M	\$1.4M	\$10.2M	\$77.3M
■ Drug costs	\$19.7M	\$16.6M	\$6.7M	\$8.3M	\$92.6M	\$4.8M	\$3.9M	\$0.5M	\$2.5M	\$10.1M	\$165.7M

* Includes drug cost and markup.

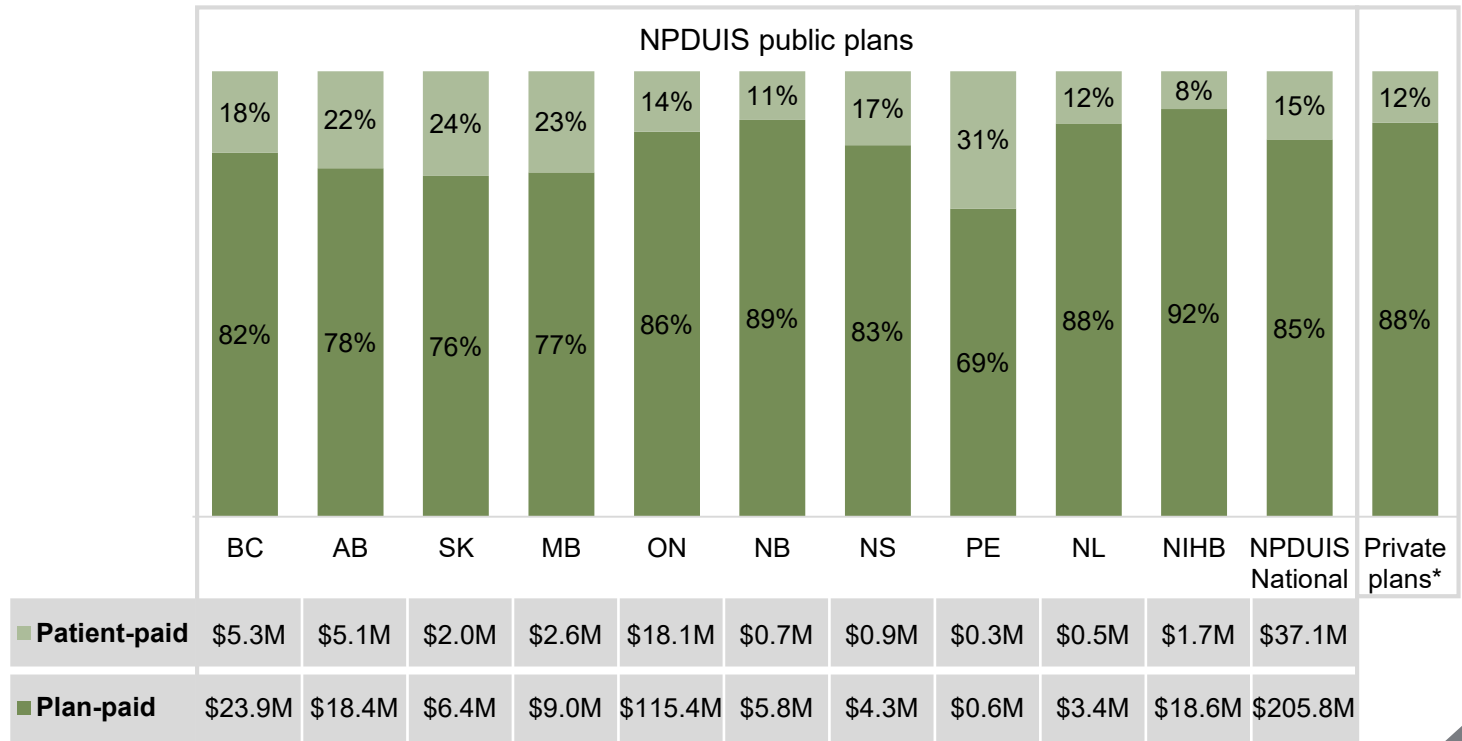
† Private plan average excludes Quebec for comparison purposes.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2017; IQVIA Private Pay Direct Drug Plan Database, 2017.

Drug plans pay for the majority of prescription costs related to oral solid opioids, though the plan-paid share varies among jurisdictions

Public plan beneficiaries paid an average of 15% of the total prescription costs for oral solid opioids in 2017, compared to 12% for private plan beneficiaries. Variations across jurisdictions may be due to plan designs and reimbursement policies, as well as the demographic and disease profiles of the beneficiary populations.

FIGURE 2.13 Patient-paid and plan-paid share of total prescription cost, oral solid opioids, NPDUIS public plans and private plans, 2017



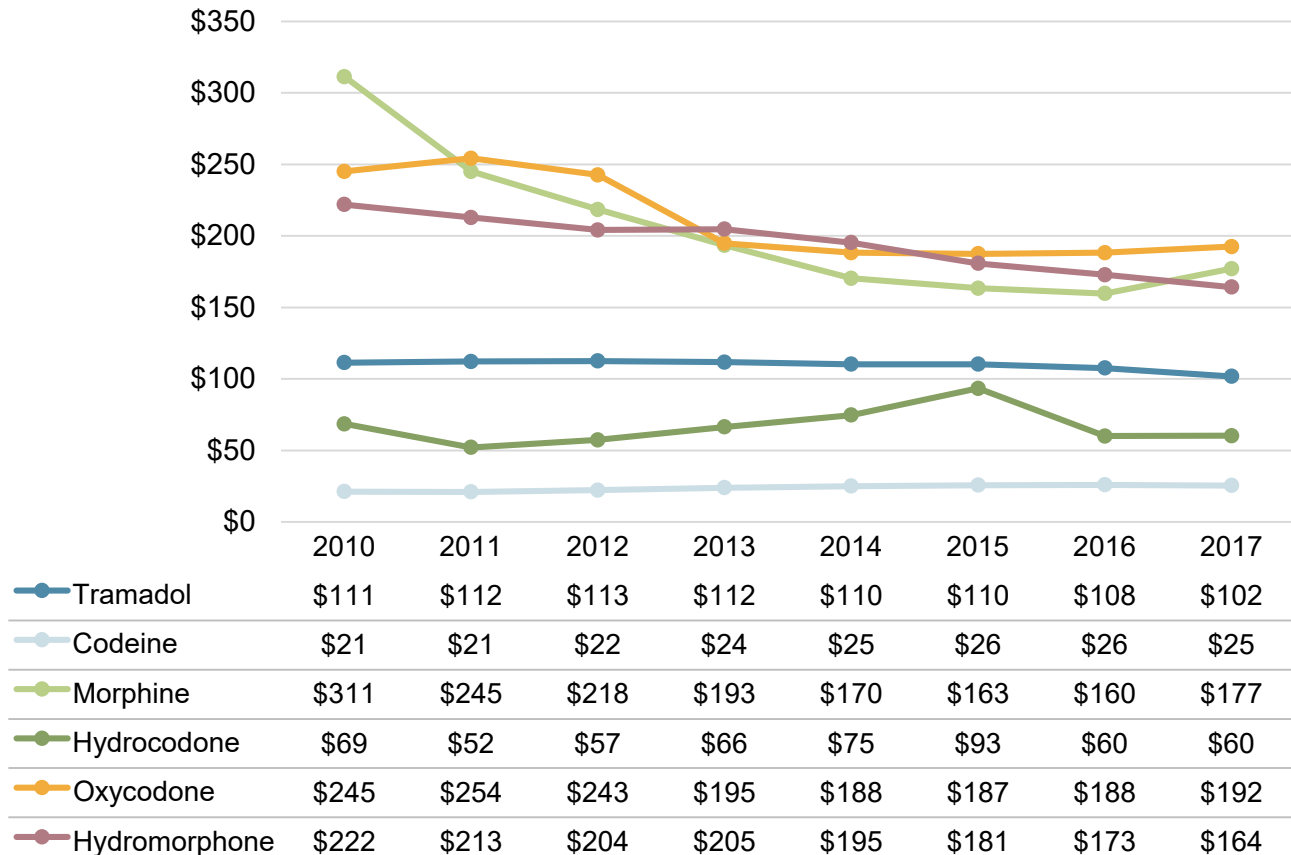
* Private plan average excludes Quebec for comparison purposes.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2017; IQVIA Private Pay Direct Drug Plan Database, 2017.

In British Columbia, the average annual drug cost per patient has declined for most opioids

An analysis of public and private plan data shows that the strongest opioids had the largest per-patient cost decreases from 2010 to 2017: -26% for hydromorphone; -21% for oxycodone; and -43% for morphine. Tramadol also had a decrease of -9%, while codeine had an increase of 20%.

FIGURE 2.14 Average opioid* drug cost per patient, British Columbia public and private plans, 2010 to 2017



* Results include both oral solid and non-oral solid formulations.

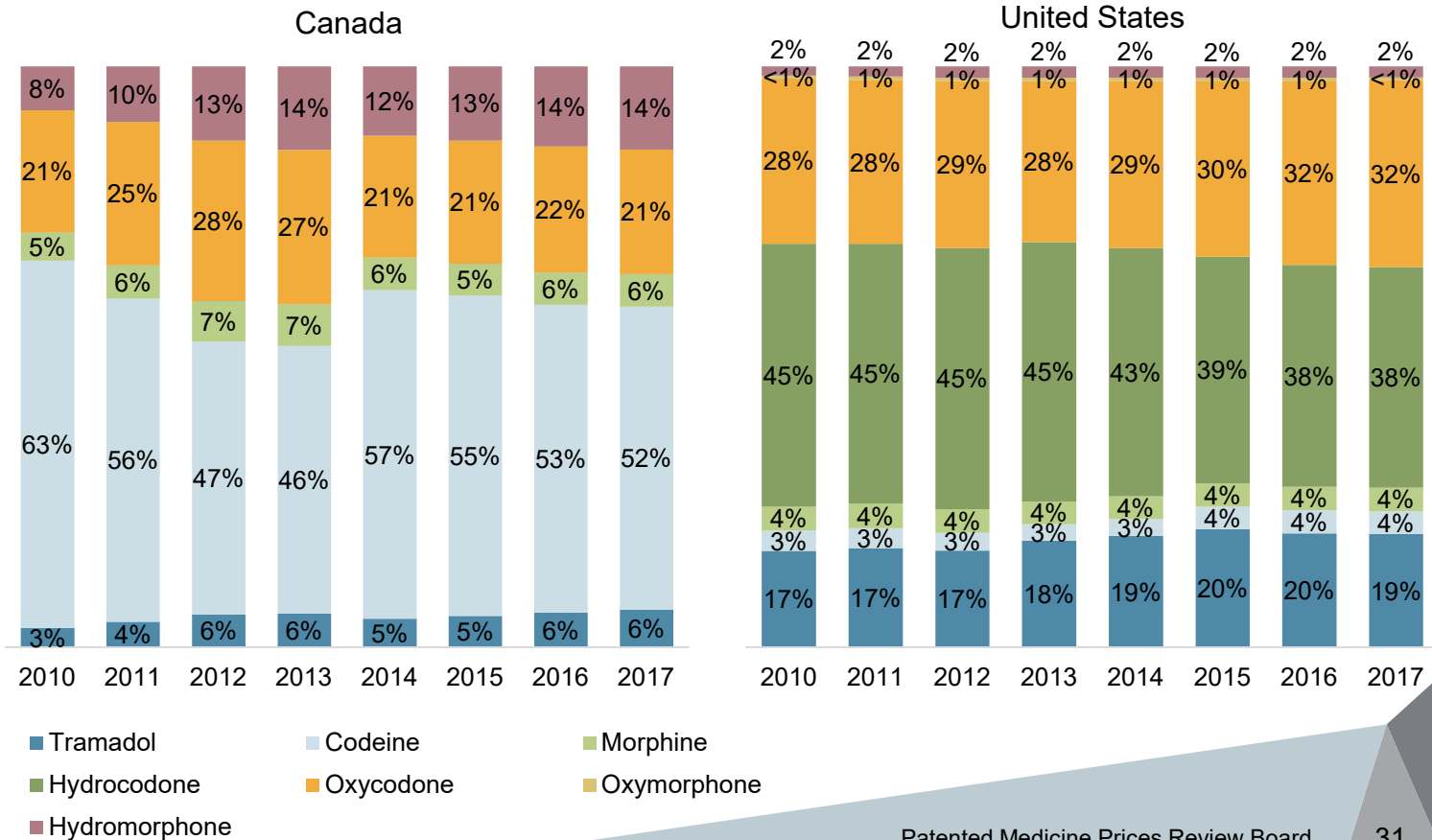
Data source: Canadian Institute for Health Information, 2010 to 2017.



Appendix



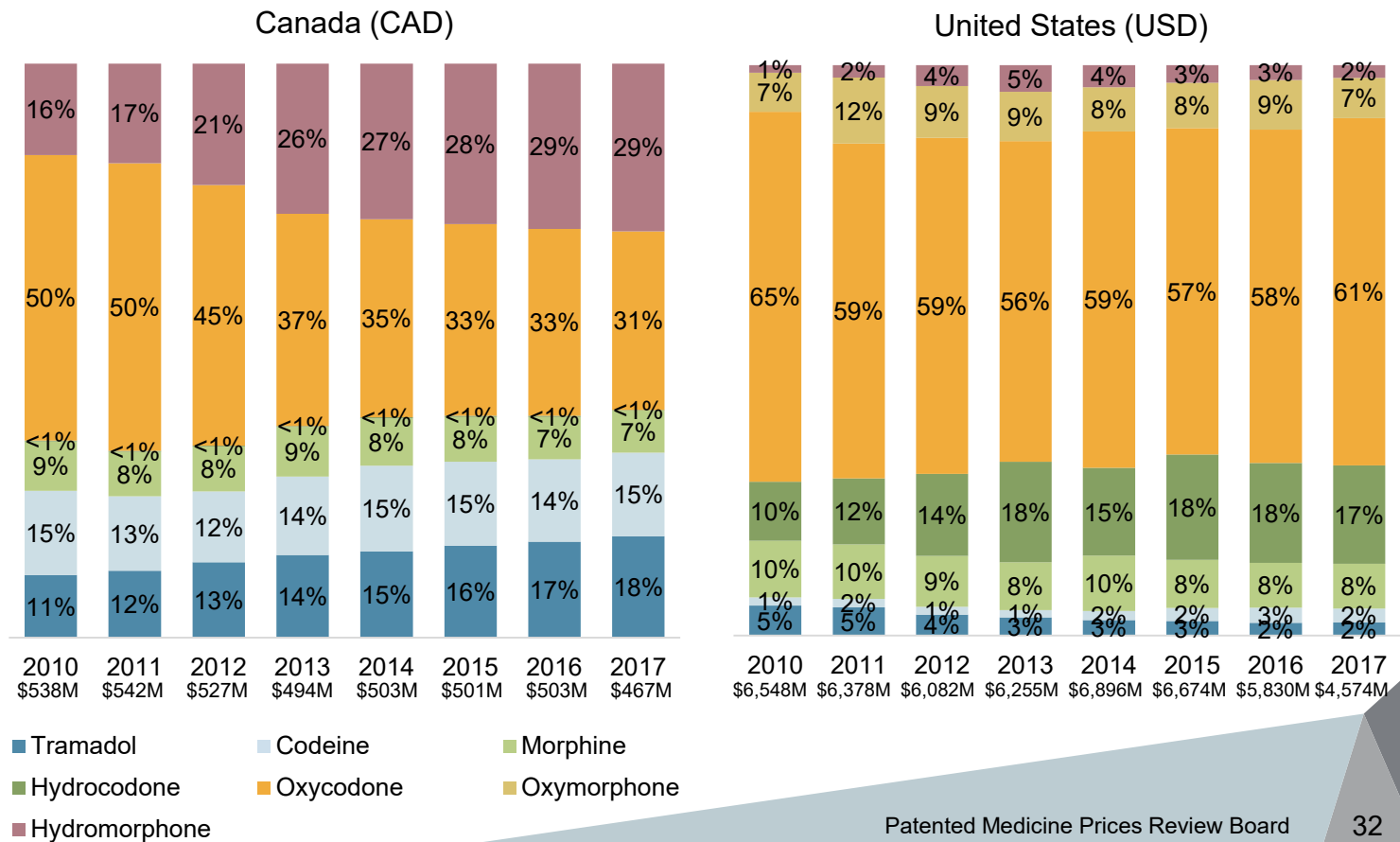
FIGURE A1 Market distribution by units, oral solid opioids, Canada and the US, 2010 to 2017



Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.



FIGURE A2 Distribution of sales by oral solid opioid, Canada and the US, 2010 to 2017



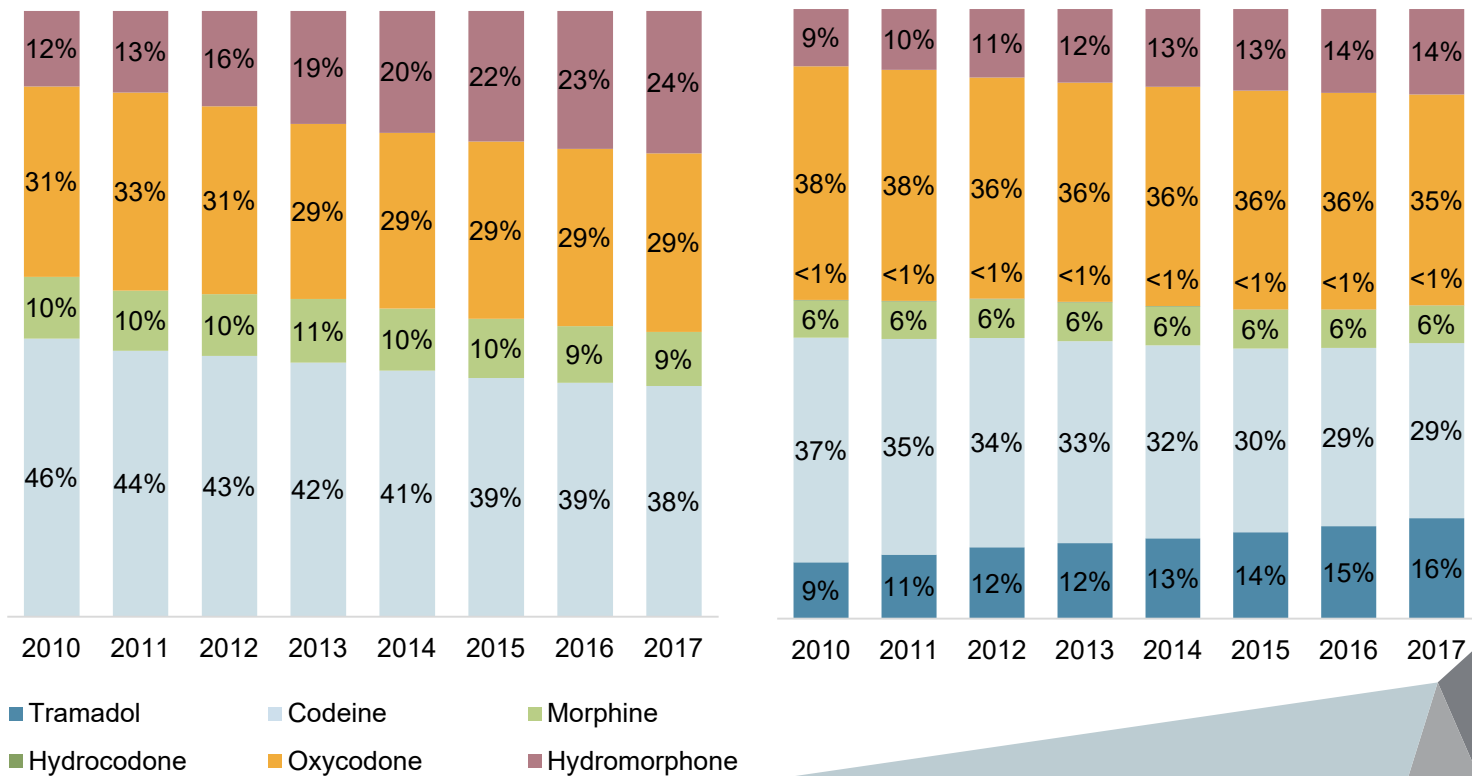
Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.



FIGURE A3 Distribution of units by oral solid opioid, NPDUIS public plans and private plans, 2010 to 2017

NPDUIS public plans

Private plans



Note: Public plans did not cover any oral solid hydrocodone between 2010 and 2017. Tramadol data in public plans is not reportable due to confidentiality requirements for small values.

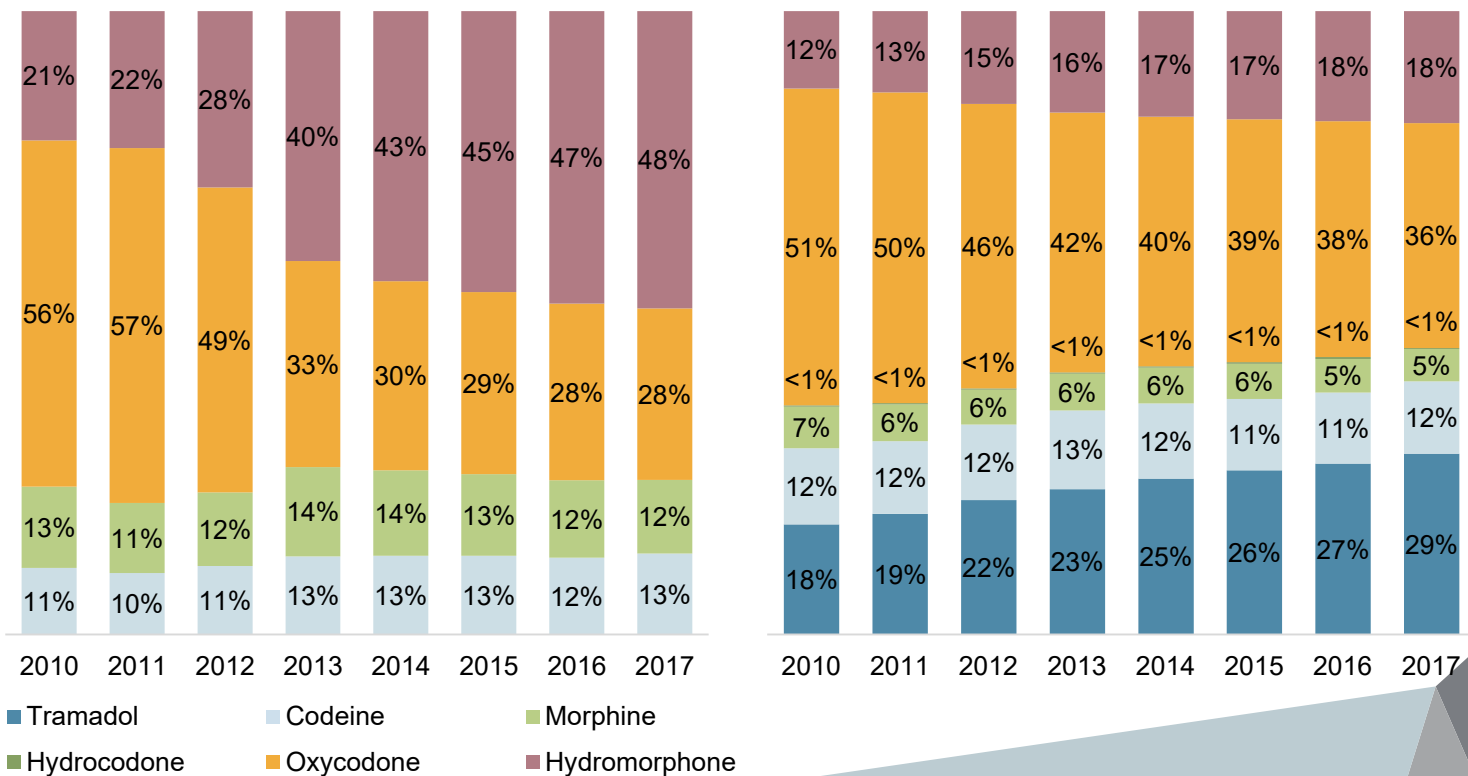
Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2010 to 2017; IQVIA Private Pay Direct Drug Plan Database, 2010 to 2017.



FIGURE A4 Share of costs by oral solid opioid*, NPDUIS public plans and private plans, 2010 to 2017

NPDUIS public plans

Private plans



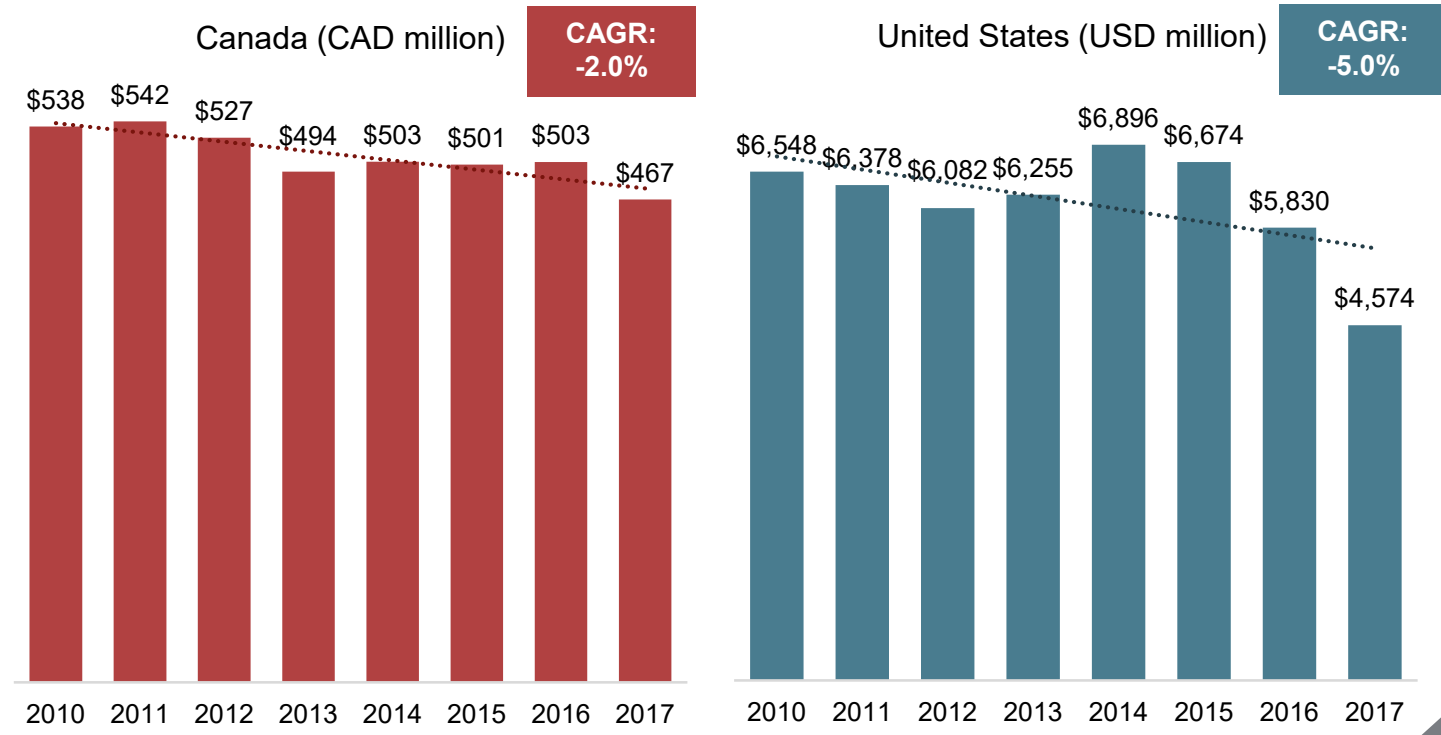
Note: Public plans did not cover any oral solid hydrocodone between 2010 and 2017. Tramadol data in public plans is not reportable due to confidentiality requirements for small values.

* Includes drug cost and markup. Dispensing costs excluded.

Data source: National Prescription Drug Utilization Information System Database, Canadian Institute for Health Information, 2010 to 2017; IQVIA Private Pay Direct Drug Plan Database, 2010 to 2017.



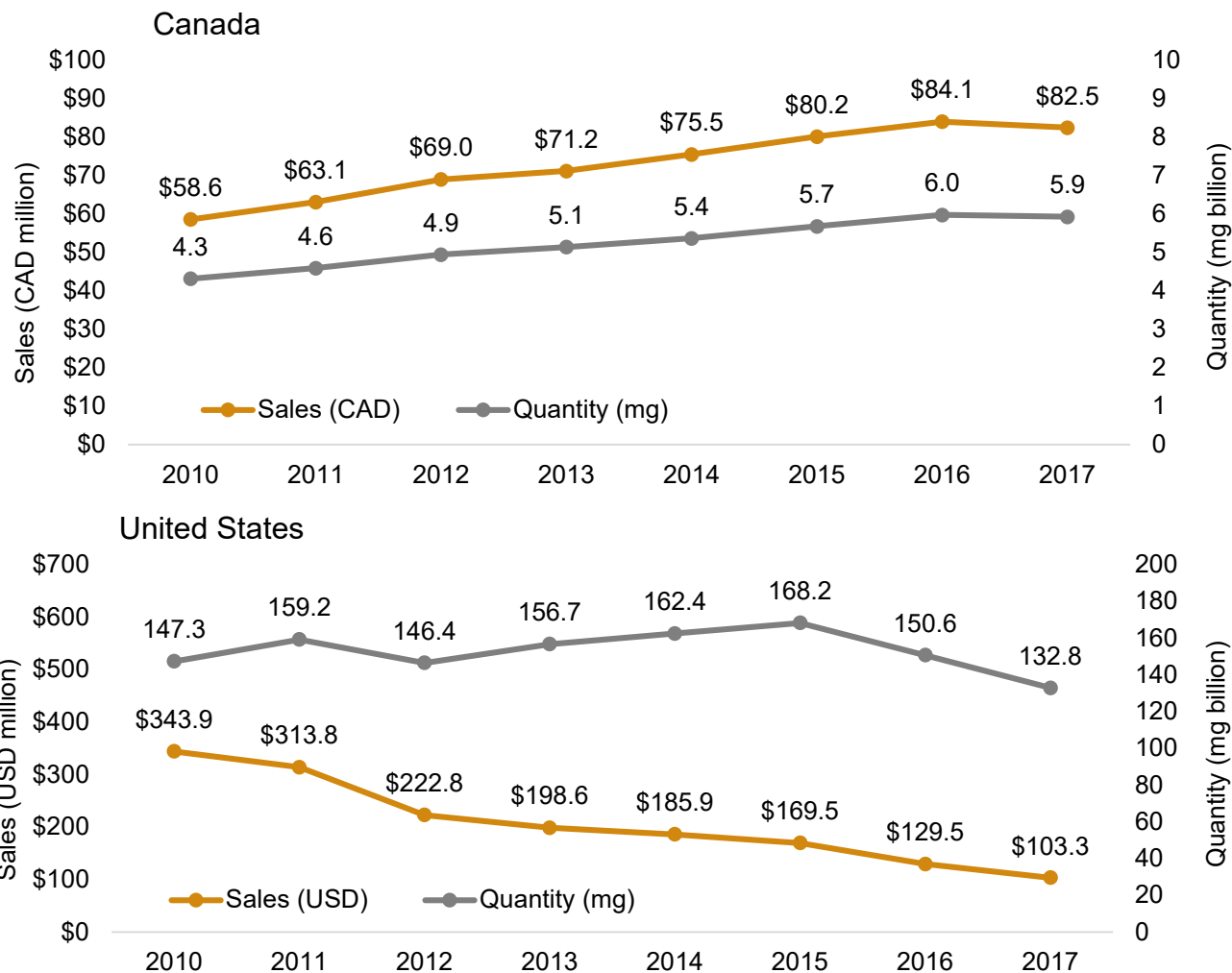
FIGURE A5 Total sales, oral solid opioids, Canada and the US, 2010 to 2017



CAGR: compound annual growth rate, 2010 to 2017.

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

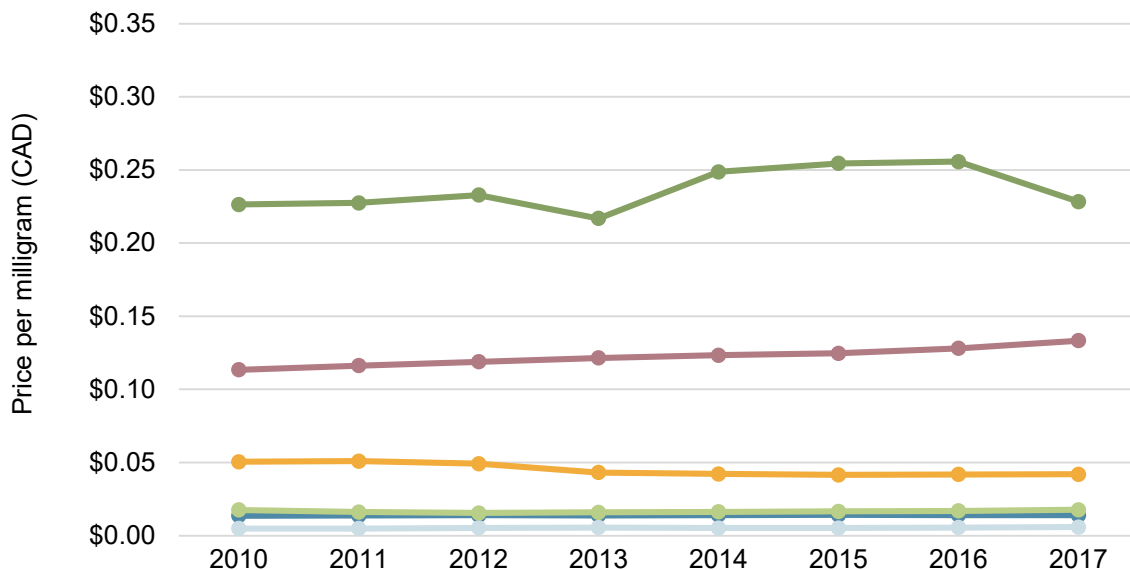
FIGURE A6 Tramadol sales by absolute amount and number of milligrams, Canada and the US, 2010 to 2017



Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.



FIGURE A7 Average price per milligram, oral solid opioids, Canada, 2010 to 2017

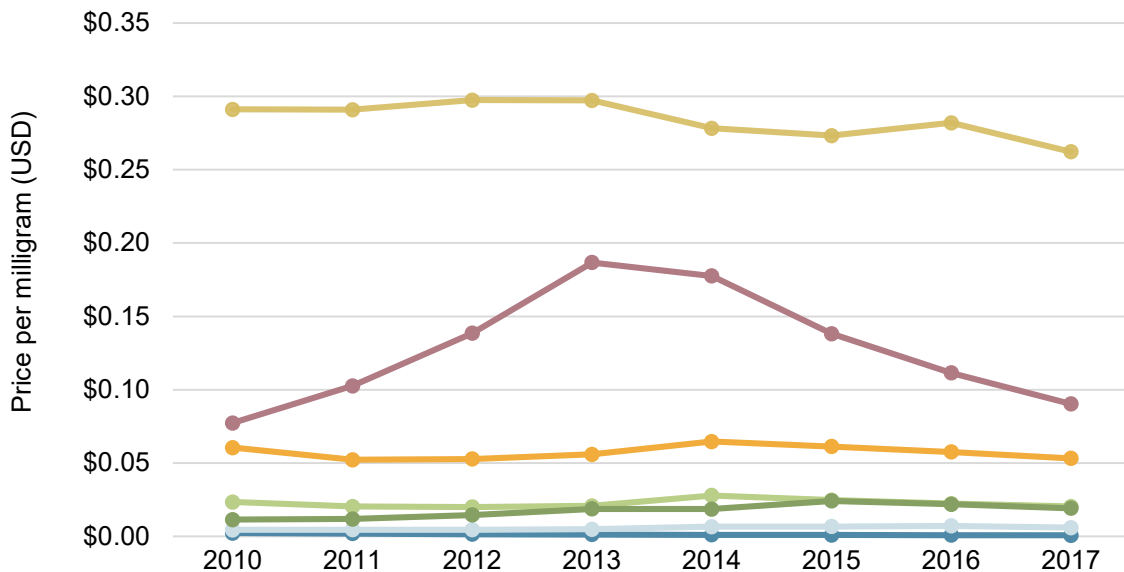


	2010	2011	2012	2013	2014	2015	2016	2017
Tramadol	0.0136	0.0138	0.0140	0.0139	0.0141	0.0141	0.0141	0.0139
Codeine	0.0049	0.0049	0.0053	0.0056	0.0052	0.0052	0.0055	0.0058
Morphine	0.0175	0.0162	0.0155	0.0159	0.0163	0.0166	0.0169	0.0176
Hydrocodone	0.2264	0.2275	0.2328	0.2169	0.2487	0.2545	0.2556	0.2284
Oxycodone	0.0505	0.0510	0.0491	0.0431	0.0422	0.0415	0.0418	0.0419
Hydromorphone	0.1134	0.1162	0.1188	0.1215	0.1233	0.1247	0.1280	0.1333

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.



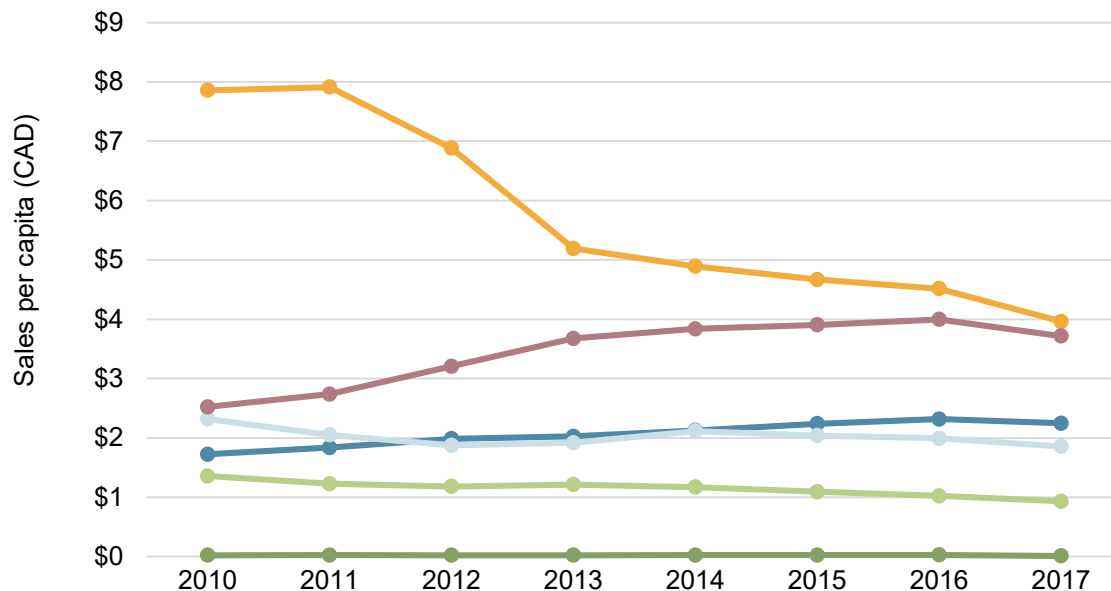
FIGURE A8 Average price per milligram, oral solid opioids, US, 2010 to 2017



Tramadol	0.0023	0.0020	0.0015	0.0013	0.0011	0.0010	0.0009	0.0008
Codeine	0.0045	0.0046	0.0046	0.0049	0.0066	0.0067	0.0072	0.0060
Morphine	0.0235	0.0204	0.0200	0.0208	0.0279	0.0247	0.0223	0.0204
Hydrocodone	0.0114	0.0119	0.0146	0.0187	0.0186	0.0242	0.0219	0.0192
Oxycodone	0.0605	0.0523	0.0527	0.0559	0.0647	0.0613	0.0576	0.0532
Oxymorphone	0.2911	0.2908	0.2974	0.2972	0.2782	0.2732	0.2819	0.2622
Hydromorphone	0.0773	0.1026	0.1385	0.1867	0.1775	0.1382	0.1115	0.0903

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

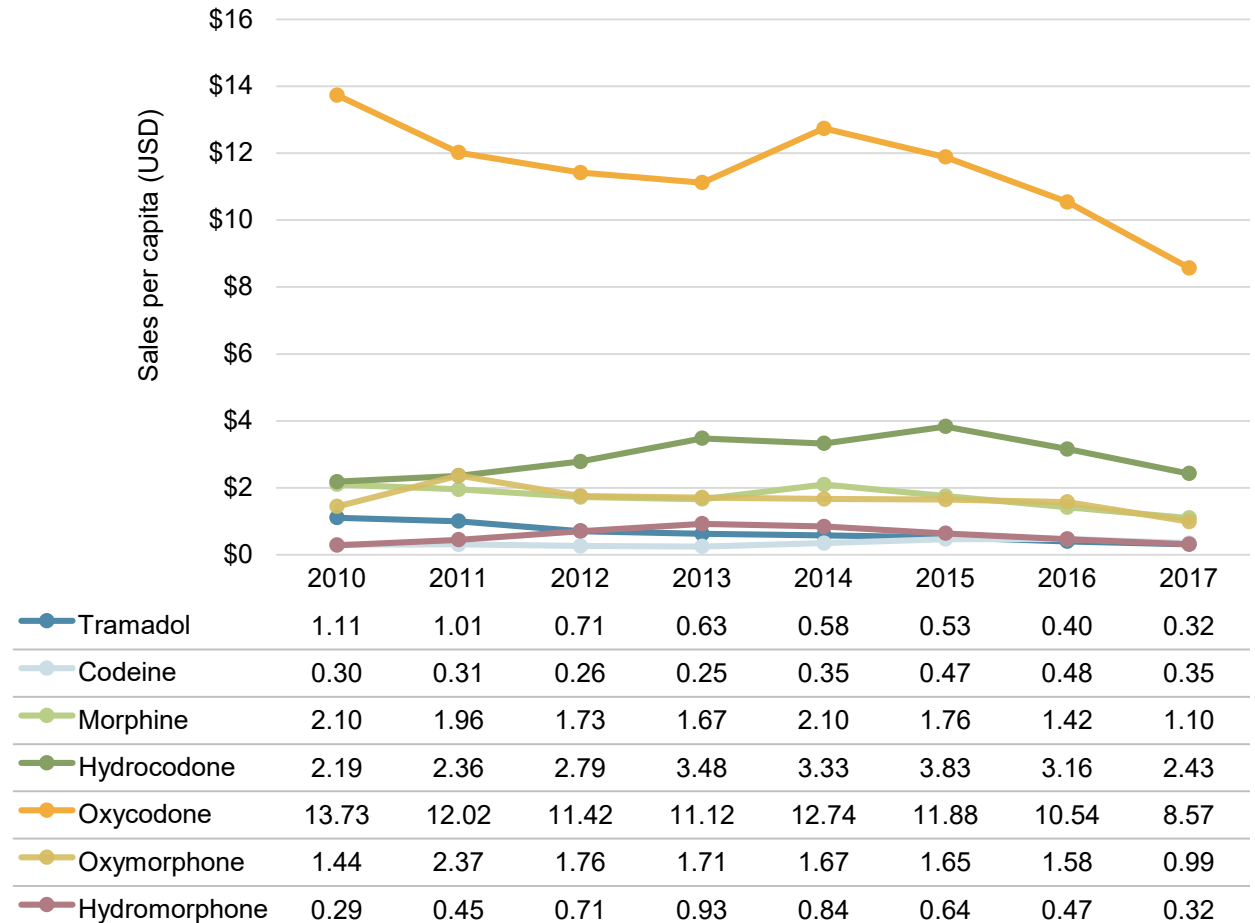
FIGURE A9 Per capita sales by oral solid opioid, Canada, 2010 to 2017



	2010	2011	2012	2013	2014	2015	2016	2017
Tramadol	1.72	1.84	1.99	2.03	2.13	2.24	2.32	2.25
Codeine	2.32	2.05	1.87	1.92	2.12	2.04	1.99	1.86
Morphine	1.36	1.23	1.18	1.21	1.17	1.09	1.02	0.93
Hydrocodone	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.01
Oxycodone	7.86	7.91	6.88	5.19	4.89	4.67	4.52	3.96
Hydromorphone	2.52	2.74	3.21	3.68	3.84	3.90	4.00	3.72

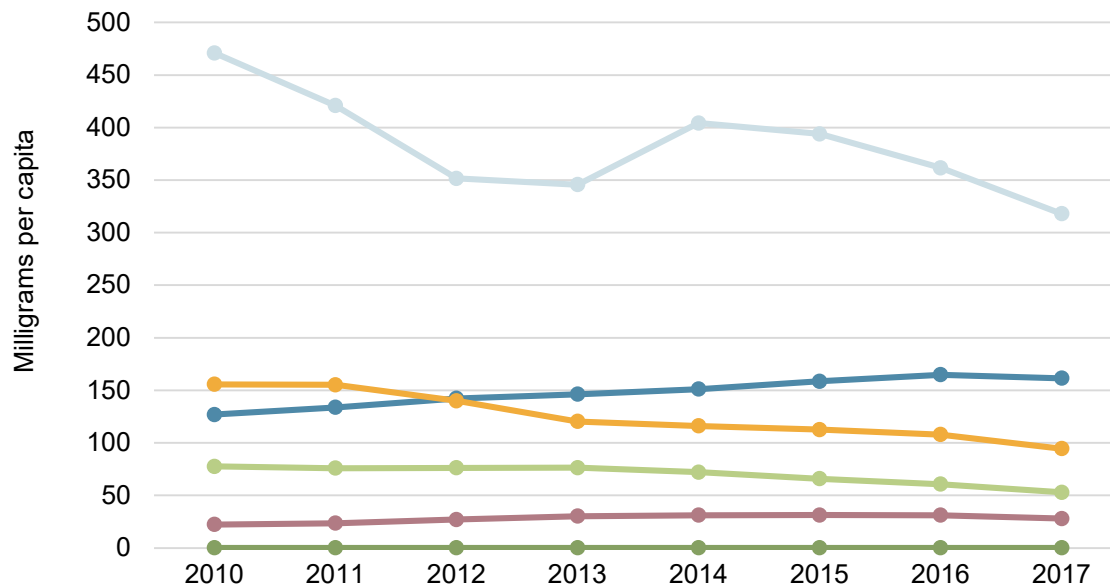
Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

FIGURE A10 Per capita sales by oral solid opioid, US, 2010 to 2017



Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

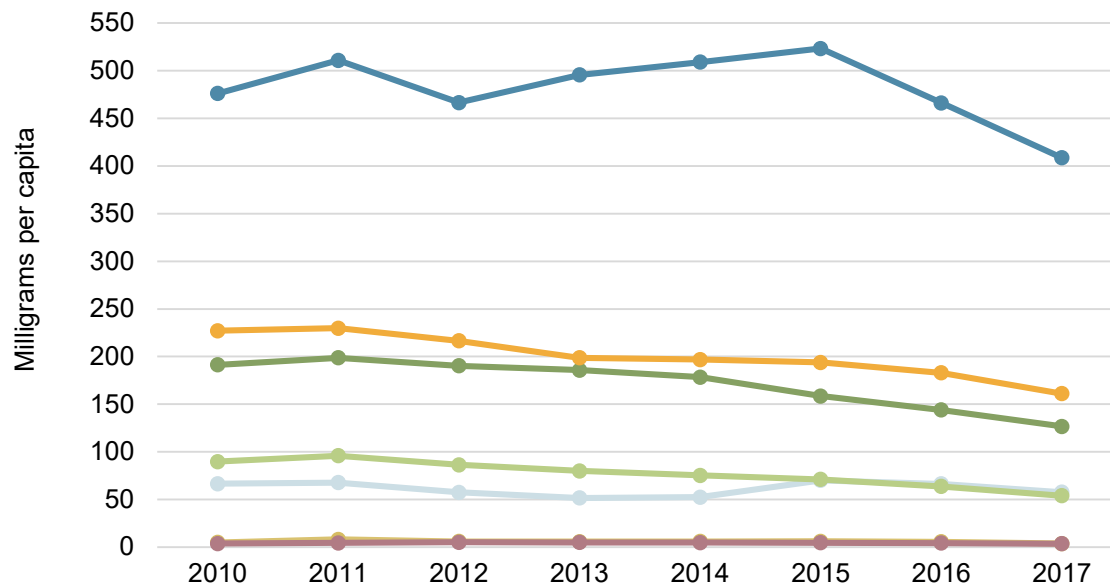
FIGURE A11 Per capita milligrams sold by oral solid opioid, Canada, 2010 to 2017



	2010	2011	2012	2013	2014	2015	2016	2017
Tramadol	126.88	133.70	142.25	146.24	151.13	158.49	164.87	161.47
Codeine	470.98	420.92	351.58	345.70	404.23	393.85	361.67	317.94
Morphine	77.55	75.87	76.13	76.32	72.07	65.83	60.69	52.85
Hydrocodone	0.10	0.11	0.10	0.11	0.10	0.10	0.11	0.05
Oxycodone	155.73	155.24	140.04	120.35	116.04	112.55	107.93	94.44
Hydromorphone	22.25	23.58	27.00	30.27	31.13	31.33	31.22	27.87

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.

FIGURE A12 Per capita milligrams sold by oral solid opioid, US, 2010 to 2017



	2010	2011	2012	2013	2014	2015	2016	2017
Tramadol	476.19	510.89	466.56	495.61	509.03	523.31	466.15	408.60
Codeine	66.48	67.79	57.46	51.57	52.48	70.13	66.41	57.74
Morphine	89.68	95.92	86.35	79.97	75.25	71.03	63.64	53.93
Hydrocodone	191.34	198.68	190.39	185.86	178.47	158.55	144.00	126.59
Oxycodone	227.02	229.80	216.48	198.74	196.86	193.93	182.93	161.13
Oxymorphone	4.96	8.14	5.91	5.77	6.00	6.05	5.59	3.78
Hydromorphone	3.74	4.40	5.12	4.97	4.76	4.64	4.21	3.53

Data source: IQVIA MIDAS™ Database, prescription retail and hospital markets, 2010 to 2017. All rights reserved.



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