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COMPREHENSIVE DENTAL CARE IN CANADA: THE CHOICE BETWEEN DENTICAID AND DENTICARE

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SUMMARY

Canada's universal health-care system does not include dental care, which presents problems for both low- and middle-income families. According to the latest Statistics Canada data, out-of-pocket dental expenses are increasing steadily. Lower-income workers struggle with a disproportionate share of these costs, leading one in 4.5 Canadians to avoid visits to the dentist. With dental care becoming increasingly unaffordable and private insurance harder to obtain, it's time for Canada to consider bringing dental services into the public health system.

Policy solutions have tended to fluctuate between a fill-in-the-gaps approach or comprehensive restructuring of dental care. This paper examines two new options: universal first-dollar coverage or denticare, and public dental insurance for all those without it or denticaid. Denticare would cover dental treatment with the same eligibility for public health insurance under the medicare system. Denticaid would only provide this to children under 12 and those lacking private insurance.

Both denticare and denticaid would lower overall health-care costs, as improved oral hygiene would reduce rates of chronic and serious diseases. Integrating dentistry into the public health system would lead to increased patient contact, more efficient early screening and referrals.

Direct clinical costs are estimated through micro-costing of expected annual dental services used. Indirect administrative costs are estimated through average costing based on existing per-patient administrative costs in the Canadian health-care system. Co-payments for both options are based on five

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household income brackets with the lowest bracket being exempt and the highest paying the maximum rate. The co-payment for advanced procedures would be 50 per cent and 20 per cent for all other services. Everyone over age 17 would have to pay an annual premium to be enrolled in the public plan; the lowest income brackets would be exempt and the highest would pay the maximum of $400. In denticare, public employees would no longer receive workplace dental benefits on the private market, while those same benefits would make them ineligible for denticaid.

National clinical costs for a hypothetical denticare program in 2019, including administrative costs, are estimated at $27.50 billion ($737.09 per capita) with an upper estimate of $38.40 billion ($1,029.18 per capita) and a low estimate of $15.50 billion ($415.46 per capita). In all three scenarios, premiums paid by eligible individuals would generate $8.93 billion in annual revenues. After factoring in premiums, co-payments and the replacement of existing dental expenditures, the program's net cost would be $6.01 billion in 2019, with an upper estimate of $15.09 billion and a lower estimate of negative $3.82 billion.

Denticaid's costs, including administrative costs, would be $15.09 billion ($404.49 per capita) in 2019, with a high scenario of $21.32 billion ($571.34 per capita) and a low scenario of $8.39 billion ($224.98 per capita). Denticaid's premiums would generate less revenue to offset costs. The program's net costs are estimated at $$7.47 billion in 2019, with a high estimate of $12.85 billion and a low estimate of $1.79 billion.

There are additional challenges to consider, including dental office staffing levels in rural areas, dentists' operating costs and orthodontic treatments. But none of this should prevent Canada from committing to a denticare program, which out-performs denticaid in terms of efficiency. Both federal and provincial governments would need to be involved in the necessary modifications to the *Canada Health Act*, with decisions on premiums and co-pays left to individual provinces. After those offsets, the remaining tax-based costs would be a relatively small increase in Canada's public health spending and millions of Canadians would get access to good oral health.

1. INTRODUCTION

Canada's universal health-care system currently does not extend to outpatient prescription medications, dental care, outpatient physiotherapy, ambulance services or prescription eyeglasses (Government of Canada 2017). In the speech from the throne to Parliament following the 2019 federal election, Prime Minister Justin Trudeau committed to implementing a national pharmacare program and exploring ways to integrate dental care into the public health system (Government of Canada 2019). Among the many unknowns for public dental care are: who will be covered publicly, what procedures will be covered publicly and how much it would cost in public expenditures?

This paper offers federal and provincial policy-makers a deep dive into the current issues surrounding oral health access and affordability in Canada, current policy on oral health and potential options for comprehensive public dental care. Program administrative costs and cost-sharing mechanisms are also explored in this paper. Program clinical costs are calculated separately in an accompanying technical paper and analyzed in this paper in terms of both the combined gross program cost and the net total cost after cost-sharing and other offsets are factored in.

2. DENTAL CARE AFFORDABILITY AND THE HISTORY OF ORAL HEALTH POLICY IN CANADA

Access to dental care is not just a problem for Canada's lowest socioeconomic population. Middle-income earners have endured the highest increase in out-of-pocket costs and the lowest levels of insurance coverage for dental care (Ramraj et al. 2013). In 2009, the average household spent $384 a year on dental care plus $640 in private insurance premiums (Sanmartin et al. 2014, 16–17). By 2018, Statistics Canada estimates that the average annual household out-of-pocket dental spending has risen to $430, ranging up to roughly $600 depending on household income level (Statistics Canada 2019a). Previous research has shown that lower income Canadians shoulder a disproportionate amount of out-of-pocket dental costs compared to the affluent (Law et al. 2013; Locker et al. 2011; Sanmartin et al. 2014). According to the 2018 Canadian Community Health Survey, 64.6 per cent of Canadians have insurance for dental care, which is down from 68 per cent previously noted during the last oral health component of the Canadian Health Measures Survey in 2009 (Health Canada 2010; Statistics Canada 2019f). Avoidance of the dentist due to cost has also risen from 17 per cent (one in six Canadians) in 2009 to 22.4 per cent (one in 4.5 Canadians) in 2018 (Health Canada 2010; Statistics Canada 2019f). As dental care becomes more unaffordable and private insurance becomes harder to obtain, Canada must consider bringing dental services into the public health system.

Conceptualizing a system of oral health care is not a new pursuit. Canadian experts have presented numerous reports and proposals for either a provincial or nationwide dental program. Experts have long held that preventive dental efforts are worthwhile public investments (Davis 1952, 172–3). The most long-standing recommendation has been water fluoridation to strengthen against tooth decay (Foulkes 1973, IV–C–19–11; Hall 1964, 37), a policy which is still being debated across Canadian municipalities. When

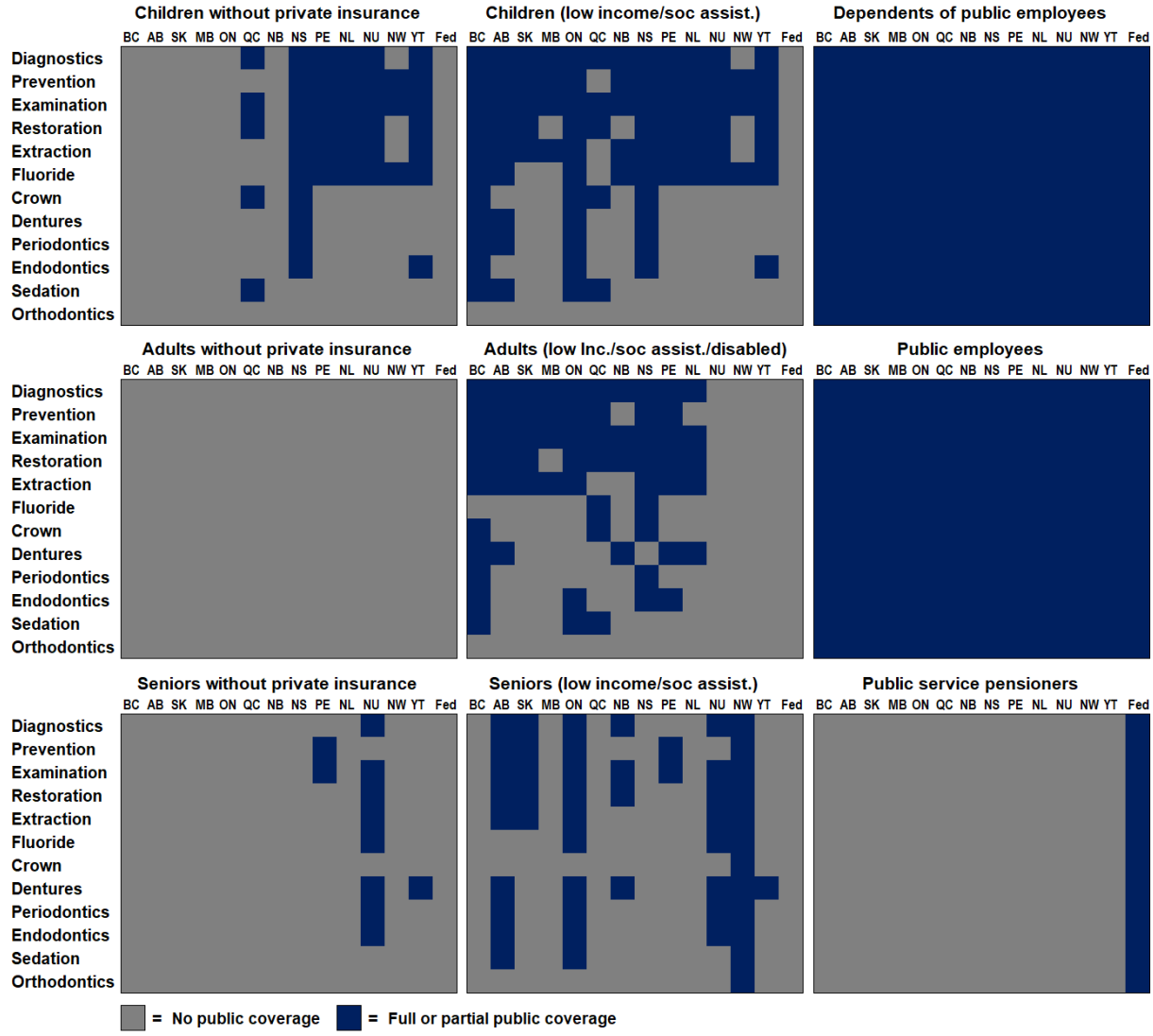
Canada's public health system was in its infancy, policy-makers deliberated on the choice of whether to include dentistry in the basket of publicly insured health services, or to provide limited coverage to select vulnerable demographics such as children and social welfare recipients.

As early as 1952, there were calls for public coverage of dental services for children and welfare recipients (Davis 1952, 173). The chief reluctance to recommending universal dental coverage, most notably in the Royal Commission on Health Services, was the concern that there were not enough dental professionals to meet the anticipated rise in demand (Hall 1964, 35). By the time of the Romanow Commission's report (2000, 93), the number of dental professionals per 100,000 of the population had shown higher growth than Canadian physicians. Despite growth in the Canadian dental workforce, neither the provincial nor federal level of government has pursued making dental care a part of Canadian medicare.

The debate about what the appropriate policy fix is tends to be dichotomous between either a fill-in-the gaps approach or a restructuring of dental care into a universal public system. Canadian provinces have implemented the former approach by crafting small-scale public subsidies or community dental clinics for vulnerable populations. These programs tend to focus on a limited suite of preventative dental services (Figure 1) but the funding for these public programs still only accounts for roughly six per cent of total dental expenditures across the country. This approach has still failed to fill the gaps, with no provinces offering a safety net program for working-age individuals without private dental insurance, and many provinces offering little to no coverage for low-income seniors.

FIGURE 1: PUBLIC DENTAL CARE COVERAGE AND INSURANCE SCHEMES FOR TARGETED DEMOGRAPHICS ACROSS ALL ORDERS OF GOVERNMENT[1]

(Alberta Dental Service Corporation 2015, 2017a-c; British Columbia 2020; Ontario 2018, 2019, 2020; Manitoba n.d.; New Brunswick 2012, n.d.; Newfoundland and Labrador 2018, n.d.; Northwest Territories 2019, n.d.; Nova Scotia 2019; Nunavut n.d.; Prince Edward Island 2020; Quebec 2017; Saskatchewan n.d.; Yukon 2015, 2017)



2.1. OPTIONS FOR COMPREHENSIVE PUBLIC DENTAL CARE.

This paper examined two new policy options as potential provincial-federal partnerships for the future of oral health care. The first option would be to provide universal first-dollar dental coverage, otherwise referred to as denticare. The second option would be

1 Nova Scotia's adult dental program only extends to those with a diagnosed disability. Alberta's dental program for low-income adults is separate from its dental program for disabled individuals. The federal government also provides dental coverage for veterans, Status First Nations, Inuit, and refugees. Both federal and provincial governments provide some dental services for incarcerated individuals (Canadian Dental Association n.d.; Shaw and Farmer 2015).

to publicly provide dental insurance for all individuals without private dental coverage. This is a comprehensive fill-in-the-gaps approach referred to in this paper as denticaid. Coverage of both programs was designed to be as comprehensive as possible in comparison to dental benefits offered on the private insurance market in Canada rather than the limited scope of Canada's current public health dentistry programming.

Table 1 summarizes each program's characteristics. Denticare would provide first-dollar coverage of comprehensive dental treatment with the same eligibility for public health insurance under the Canadian medicare system. Denticaid would only provide this benefit to children below age 12 and individuals without any private dental insurance coverage. Coverage in both programs was crafted to incorporate elements of co-payment that were equitably tied to an individual's household income and structured to preference access to preventive dental care and restorative care. Advanced procedures with typically more cosmetic value than health improvement outcomes contained greater degrees of cost-sharing to discourage frivolous use.

TABLE 1: SUMMARY OF PUBLIC DENTAL INSURANCE SCHEMES COSTED WITH JAN. 1, 2019 AS THE DATE OF IMPLEMENTATION

	Denticare	**Denticaid**
Eligibility	Any of the following: Canadian citizens, permanent residents, non-permanent residents intent on residing in Canada a minimum of 12 months and possessing Canada entry documentation, refugees coming to Canada for resettlement	Any of the following* who do not possess any dental insurance through a private provider: Canadian citizens, permanent residents, non-permanent residents intent on residing in Canada a minimum of 12 months and possessing Canada entry documentation, refugees coming to Canada for resettlement *All children below age 12 are eligible regardless of parents' private insurance status
Basic Procedure Coverage	Examinations (six-month maximum frequency for recall exams) Diagnostic procedures Restorations Periodontics Endodontics Sedation for advanced procedures	Examinations (six-month maximum frequency for recall exams) Diagnostic procedures Restorations Periodontics Endodontics Sedation for advanced procedures
Advanced Procedure Coverage	Prosthodontics (crowns, bridges, dentures) Orthodontics for malocclusions above a 3.0 IOTN[2] scale	Prosthodontics (crowns, bridges, dentures) Orthodontics for malocclusions above a 3.0 IOTN scale
Income-Tiered Premiums	Maximum $400 per year per individual above the age of 18 ($33.34 per month) Premium exemption for those below $39,999 annual income	Maximum $400 per year per individual above the age of 18 ($33.34 per month) Premium exemption for those below $39,999 annual income
Income-Tiered Co-payment	Maximum 20% co-payment for basic procedures Maximum 50% co-payment for advanced procedures Applies to all age groups	Maximum 20% co-payment for basic procedures Maximum 50% co-payment for advanced procedures Applies to all age groups

2 Based on the Index of Orthodontic Treatment Need (IOTN) criteria used by the United Kingdom's National Health Service orthodontic treatment program (NHS England 2015).

3. COSTING METHODS

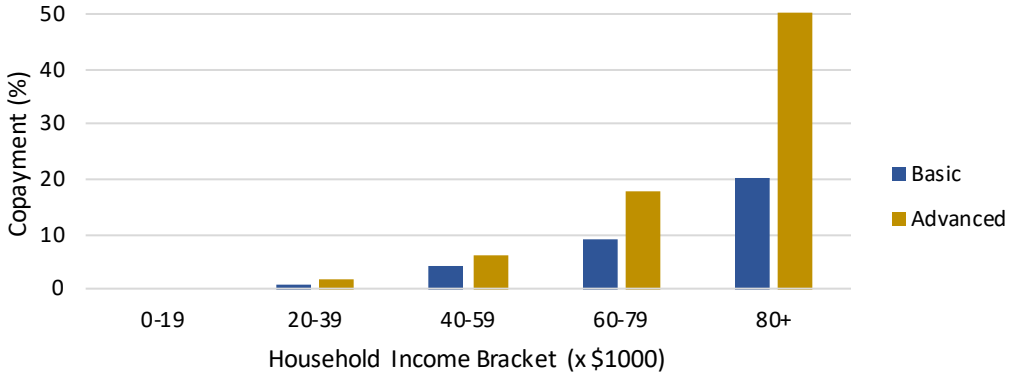
The direct clinical costs of both denticaid and denticare were estimated through a micro-costing of the expected annual dental services used. Indirect administrative costs were estimated through an average-costing based on existing per-patient administrative costs across the Canadian health-care system. As uncertainty accompanied some variables in the micro-costing, a sensitivity analysis was performed which generated three potential cost scenarios for each policy option. A high-cost scenario saw all uncertain variables set to their maximum value and a low-cost scenario saw all uncertain variables set to their minimum.

The micro-costing model crafted for denticare and denticaid was developed using secondary population data on dental use and insurance coverage patterns. A summation formula developed by the Grattan Institute to cost universal dental care (Duckett, Cowgill and Swerissen 2019, 66–77) was modified to be compatible with Statistics Canada data. Unit costs were gathered from the suggested fee guides of various dental associations across Canada. Where dental association fee guides were unavailable, Health Canada's non-insured health benefits (NIHB) dental benefits grid for general practitioners was used. The detailed methodology behind the micro-costing methods of this paper is reported in an accompanying technical paper, "Starting from Scratch: A Micro-Costing Analysis for Public Dental Care in Canada."

3.1. COSTING CO-PAYMENTS

Co-payments on dental services were costed for both the denticare and denticaid options. Co-payment was tiered based on the five household income brackets used throughout this study. The lowest bracket (no income to $19,999) would be exempt from co-payment while the highest bracket ($80,000 and above) would pay the maximum co-payment rate. The remaining brackets would see co-payment rates rise exponentially up to the maximum (Figure 2). Procedures rendered to all age-groups were subjected to income-tiered co-pay. The maximum co-payment rate for advanced procedures (dentures, crowns/bridges and orthodontics) would be 50 per cent, and the rest would be 20 per cent. This is based on private-sector observations by the Canadian Dental Association (2019b).

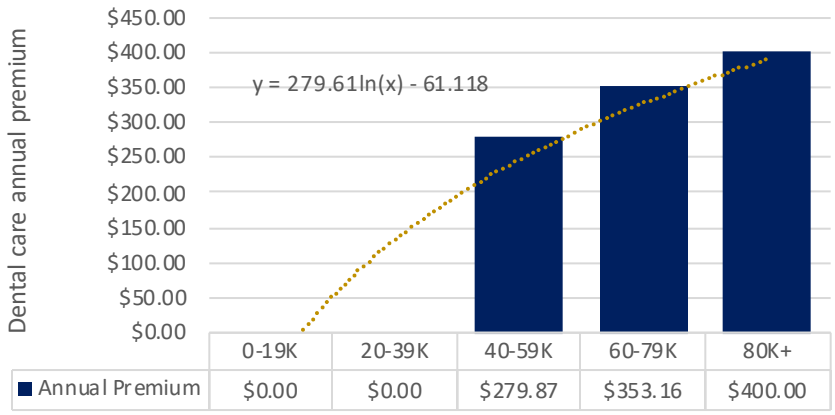
FIGURE 2: PROPOSED EXPONENTIAL TIERING OF CO-PAYMENT FOR BASIC AND MAJOR DENTAL PROCEDURES.



3.2. COSTING PREMIUMS

Tiered premiums were costed on an annual basis for both denticaid and denticare options. In both options, individuals above the age of 17 would be required to pay an annual premium to be enrolled in the public plan. The lowest two household income quintiles (no income to $39,999) would be exempt from premiums while the highest bracket, ($80,000 and above) would pay the maximum premium rate of $400 in the year 2019. The remaining brackets would see premium rates rise in a logarithmic scale from $0 up to the $400 maximum. The use of a logarithmic scale is based on British Columbia's former public health insurance premium rate structure (British Columbia 2018). The logarithmic scale also reflects Canada's average tax rate structure, which is how Quebec's pharmacare premiums are determined (Régie de l'assurance maladie Québec 2019). The annual premium amounts for each income demographic were multiplied by the number of individuals in each income demographic to yield the total annual premiums collected. The maximum annual premium was set at $400 per year (Figure 3), which is priced below an observed industry insurance rate for individual dental coverage (Pacific Blue Cross 2019). It is also below the average household out-of-pocket spending on dental care (Statistics Canada 2019a).

FIGURE 3: PROPOSED HOUSEHOLD INCOME-BASED ANNUAL PREMIUM RATE STRUCTURE



3.3. CALCULATING ADMINISTRATIVE COSTS

The administrative costs for each program were calculated by determining what percentage of each province's current total public health system costs is administrative. Using the Canadian Institute for Health Information's (CIHI) national health expenditure trends, Appendix Table A1 outlines each province's percentage of total public health costs dedicated to administration. These percentages were multiplied by each province's annual clinical costs for either denticare or denticaid to derive an estimate on the accompanying costs to administer each program.

3.4. CALCULATING COST OFFSETS IN CURRENT PUBLIC DENTAL SPENDING

A major offset to consider in the denticare option would be that public employees would no longer be provided workplace dental benefits on the private market. To estimate this, the average cost per employee in the federal public service was estimated from previous Treasury Board Secretariat expenditure reports. Using the federal government's 2019 public service population figure, the contribution cost per public servant was calculated and applied to the total number of public employees across Canada. Appendix Table A2 breaks down these calculations. The resulting $1,651 per federal employee estimate was found to be fairly consistent with available financial disclosures from Canadian municipalities and provinces (City of Calgary 2019; Service Alberta 2019). A rounded figure of $1,600 per employee was used to estimate total dental insurance expenditures across all Canadian public employees.

Since public employee dental plans are provided through private-sector insurance brokers, contributions to these plans by the government fall under private-sector dental spending. However, since these plans are paid through tax revenues, this study considered public employee dental plans as part of the total public-sector dental spending figure. Appendix Table A3 breaks down the current levels of dental spending across public and private sources of funds. In total, Canada was estimated to have spent over $7.3 billion in tax revenue in 2019 on existing public provisions for dental care. This was assumed to be replaced by the denticare option where all, including public employees, would be covered, but for the denticaid option public employees were assumed to be excluded, given that their employee benefits would make them ineligible.

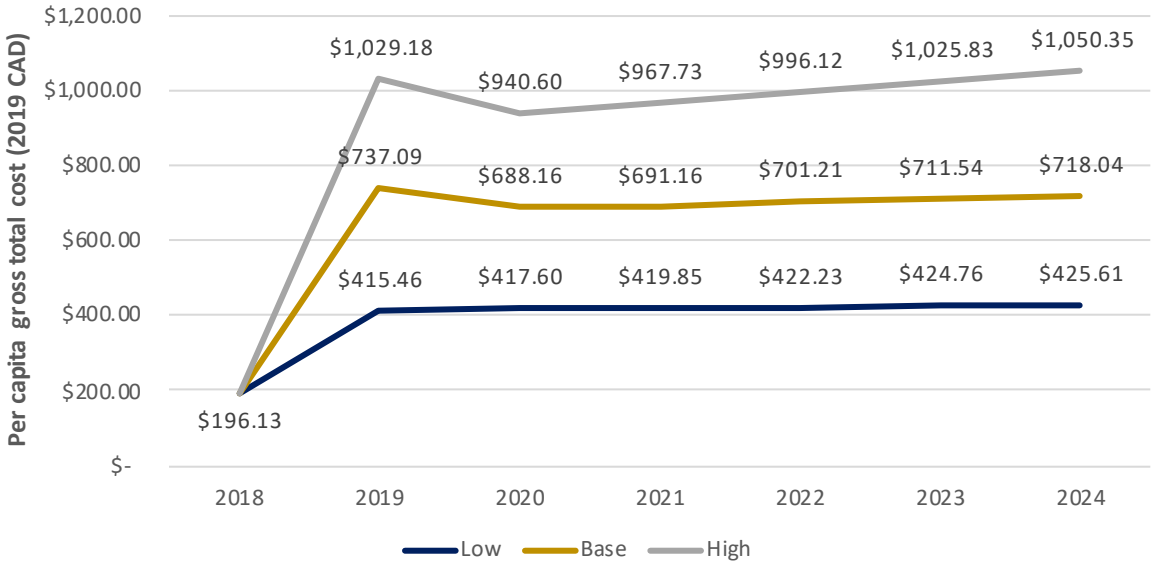
4. COSTING RESULTS

4.1. THE ESTIMATED COST OF DENTICARE

In the accompanying technical report,[3] the clinical cost of denticare across Canada was estimated to be $27.03 billion in 2019, with a high-cost scenario estimate of $37.74 billion and a low-cost estimate of $15.23 billion. With administrative expenses factored in, this would be $27.50 billion with an upper estimate of $38.40 billion and a lower estimate of $15.50 billion. In 2019, this would amount to $737.09 per capita, with an upper estimate of $1,029.18 and a lower estimate of $415.46. A key assumption in estimating costs for 2019, the year implementation would hypothetically occur, is that since around 16 per cent of Canadians have forgone prescribed dental treatments due to the cost (Statistics Canada 2009), there would be an initial backlog of dental treatments that would be demanded once the cost barrier was eliminated. In this model, increased use of more advanced treatments was modelled in the baseline and high-cost scenarios for 2019. When clinical costs were projected to 2024, baseline and high-cost estimates fell to varying degrees following 2019, and proceeded to incrementally increase as service costs and population levels across the country rose (Figure 4).

[3] See "Starting from Scratch: A Micro-Costing Analysis for Public Dental Care in Canada."

FIGURE 4: FIVE-YEAR COST PROJECTIONS FOR THE GROSS ANNUAL CLINICAL AND ADMINISTRATIVE COSTS PER CAPITA IN DENTICARE ACROSS CANADA



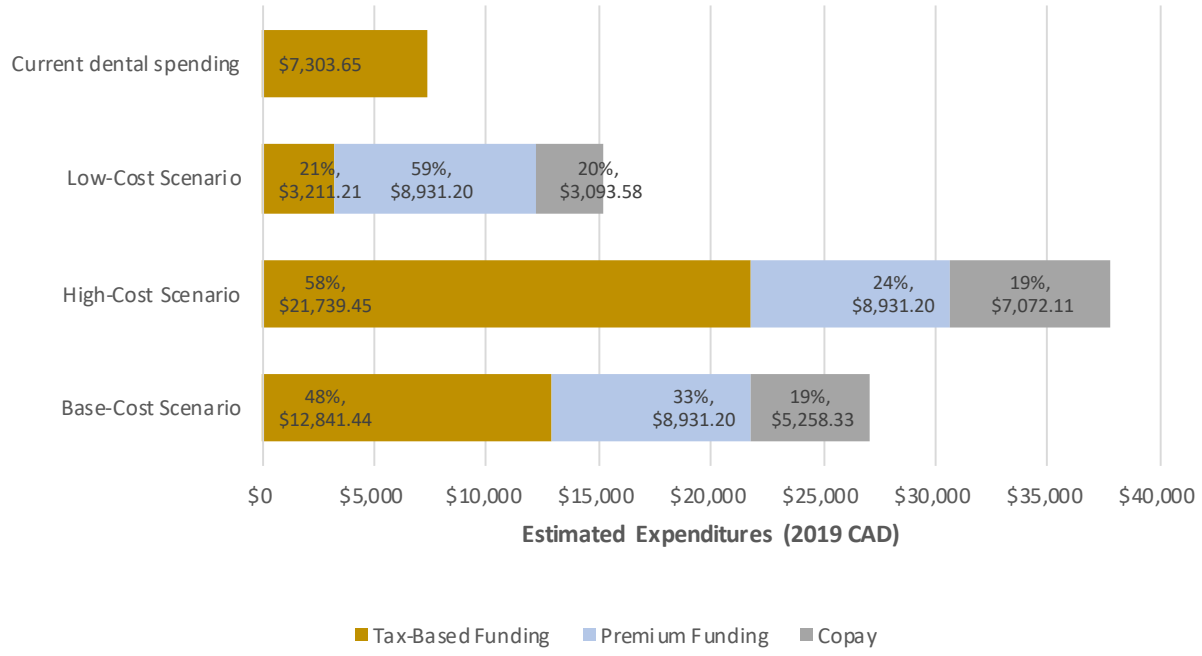
The denticare program contains several offsets to the gross total cost. Annual premiums levied against all eligible individuals aged 18 and above, earning $40,000 per year and above, would generate $8.93 billion in all three scenarios. Income-tiered co-payments would further offset dental service costs by $5.26 billion in the baseline scenario. Denticare would also replace current dental spending by the public sector in Canada. This includes public dental programs and private insurance offered to individuals by public employers, which is paid through tax revenue (Appendix Table A3). After co-payment, premium revenue and replacement of existing dental expenditures were considered, the program's net cost was estimated at $6.01 billion in 2019, with an upper estimate of $15.09 billion and a lower estimate of net negative $3.82 billion (Table 2). Any net costs would be paid through tax revenues, possibly cost-shared between the provincial and federal governments through increased funding to the Canada Health Transfer.

TABLE 2: COSTING RESULTS AND PUBLIC SPENDING IMPACT OF THE PROPOSED DENTICARE OPTION. RESULTS ARE REPORTED IN MILLIONS OF 2019 DOLLARS. NEGATIVE DOLLAR FIGURES DENOTE A NET DECREASE IN PUBLIC EXPENDITURES

	Baseline Cost Scenario ($ Millions)						High-Cost Scenario ($ Millions)						Low-Cost Scenario ($ Millions)					
	Gross Clinical Total	Admin Cost	Current Dental Spending	Premium Revenue	Co-pay	Net Change in Spending	Gross Clinical Total	Admin Cost	Current Dental Spending	Premium Revenue	Co-pay	Net Change in Spending	Gross Clinical Total	Admin Cost	Current Dental Spending	Premium Revenue	Co-pay	Net Change in Spending
Canada (Total)	$27,030.97	$473.04	$7,303.65	$8,931.20	$5,258.33	$6,010.83	$37,742.76	$660.50	$7,303.65	$8,931.20	$7,072.11	$15,096.30	$15,235.99	$266.63	$7,303.65	$8,931.20	$3,093.58	-$3,825.81
NFL	$339.29	$5.29	$125.29	$124.21	$68.67	$26.41	$471.05	$7.35	$125.29	$124.21	$93.40	$135.50	$187.06	$2.92	$125.29	$124.21	$39.36	-$98.88
PEI	$88.00	$1.60	$38.83	$34.50	$16.31	-$0.04	$122.54	$2.23	$38.83	$34.50	$22.19	$29.25	$49.01	$0.89	$38.83	$34.50	$9.44	-$32.87
NS	$547.86	$11.01	$206.87	$220.12	$104.15	$27.72	$764.44	$15.37	$206.87	$220.12	$141.81	$211.00	$300.42	$6.04	$206.87	$220.12	$59.65	-$180.19
NB	$460.45	$6.63	$165.89	$172.79	$75.03	$53.37	$642.70	$9.25	$165.89	$172.79	$98.48	$214.80	$252.89	$3.64	$165.89	$172.79	$47.91	-$130.07
QC	$5,857.43	$76.73	$1,758.38	$1,878.84	$1,001.43	$1,295.52	$8,256.16	$108.16	$1,758.38	$1,878.84	$1,369.89	$3,357.20	$3,281.22	$42.98	$1,758.38	$1,878.84	$589.82	-$902.84
ON	$11,310.92	$200.20	$2,689.50	$3,547.40	$2,198.01	$3,076.22	$15,785.62	$279.41	$2,689.50	$3,547.40	$2,998.85	$6,829.27	$6,442.13	$114.03	$2,689.50	$3,547.40	$1,291.59	-$972.33
MB	$839.37	$21.91	$300.02	$310.95	$157.71	$92.60	$1,169.47	$30.52	$300.02	$310.95	$214.15	$374.86	$490.70	$12.81	$300.02	$310.95	$94.49	-$201.95
SK	$1,484.18	$30.72	$266.42	$271.11	$309.53	$667.84	$2,062.56	$42.69	$266.42	$271.11	$419.78	$1,147.94	$826.44	$17.11	$266.42	$271.11	$180.09	$125.93
AB	$3,017.99	$39.23	$835.24	$1,118.66	$695.49	$407.84	$4,158.28	$54.06	$835.24	$1,118.66	$853.24	$1,405.20	$1,708.45	$22.21	$835.24	$1,118.66	$419.77	-$643.01
BC	$3,013.07	$68.10	$881.59	$1,224.96	$615.90	$358.72	$4,210.07	$95.15	$881.59	$1,224.96	$838.48	$1,360.18	$1,654.20	$37.38	$881.59	$1,224.96	$351.83	-$766.80
YK	$24.52	$0.87	$11.77	$9.02	$5.40	-$0.80	$33.78	$1.19	$11.77	$9.02	$7.31	$6.88	$15.37	$0.54	$11.77	$9.02	$3.32	-$8.20
NWT	$25.78	$1.41	$12.35	$9.96	$5.77	-$0.89	$35.59	$1.94	$12.35	$9.96	$7.82	$7.39	$15.13	$0.83	$12.35	$9.96	$3.40	-$9.75
NU	$22.10	$1.88	$11.51	$8.66	$4.94	-$1.13	$30.51	$2.60	$11.51	$8.66	$6.70	$6.23	$12.98	$1.11	$11.51	$8.66	$2.91	-$9.00

Cost offsets as a share of the gross total cost varied depending on scenario parameters. In all three scenarios, co-pay accounted for roughly 16 per cent of total program costs, while premium revenue was proportionately higher in the low-cost scenario and lower in the high-cost scenario. This is to be expected since the low-cost scenario represents low participation levels with constant premium contribution levels, and the high-cost scenario represents high participation levels with constant premium levels. Since co-payment is a calculated fraction of used-service costs, the distribution of public pay and out-of-pocket co-pay is consistent regardless of participation rate differences (Figure 5).

FIGURE 5: FUNDING SOURCES FOR THE PROPOSED DENTICARE PROGRAM AND CURRENT PUBLIC HEALTH DENTISTRY IN 2019



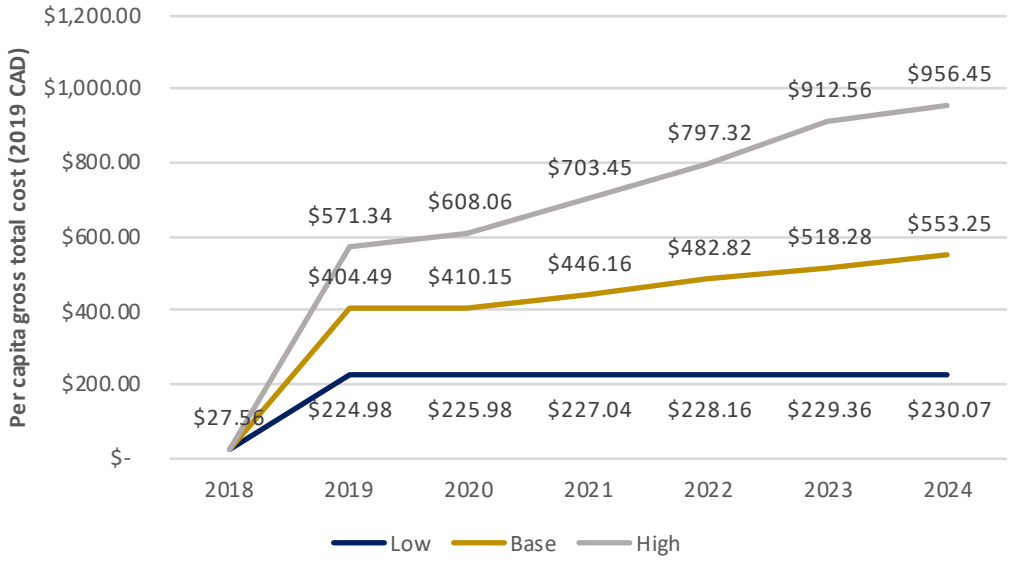
4.2. THE ESTIMATED COST OF DENTICAID

In the denticaid scheme, the clinical cost across Canada was estimated[4] to be $14.83 billion in 2019, with a high-cost scenario estimate of $20.95 billion and a low-cost estimate of $8.25 billion. With administrative expenses factored in, this would be $15.09 billion with an upper estimate of $21.32 billion and a lower estimate of $8.39 billion. In terms of per capita spending, this total program expense would amount to $404.49 in 2019, with an upper estimate of $571.34 and a lower estimate of $224.98. As with denticare, a momentary surge in dental treatment demand due to the backlog of previously unmet dental needs was assumed in baseline and high-cost scenarios for 2019.

4 See "Starting from Scratch: A Micro-Costing Analysis for Public Dental Care in Canada."

When clinical costs were projected from 2020 to 2024, costs in the high and baseline scenarios grew at higher incremental rates than observed in the denticare model (Figure 6). This is due to the assumption of private insurance crowd-out. The fact that total costs increased from 2019 to 2020 in the high-cost scenario only reflects a scenario of high crowd-out rate or individuals switching from private plans to the public denticaid plan. As such, while per capita costs were lower, for the baseline and high-cost scenario where crowd-out was anticipated, the rate of cost increase was higher than with denticare.

FIGURE 6: FIVE-YEAR COST PROJECTIONS FOR THE GROSS ANNUAL CLINICAL AND ADMINISTRATIVE COSTS PER CAPITA DENTICAID ACROSS CANADA



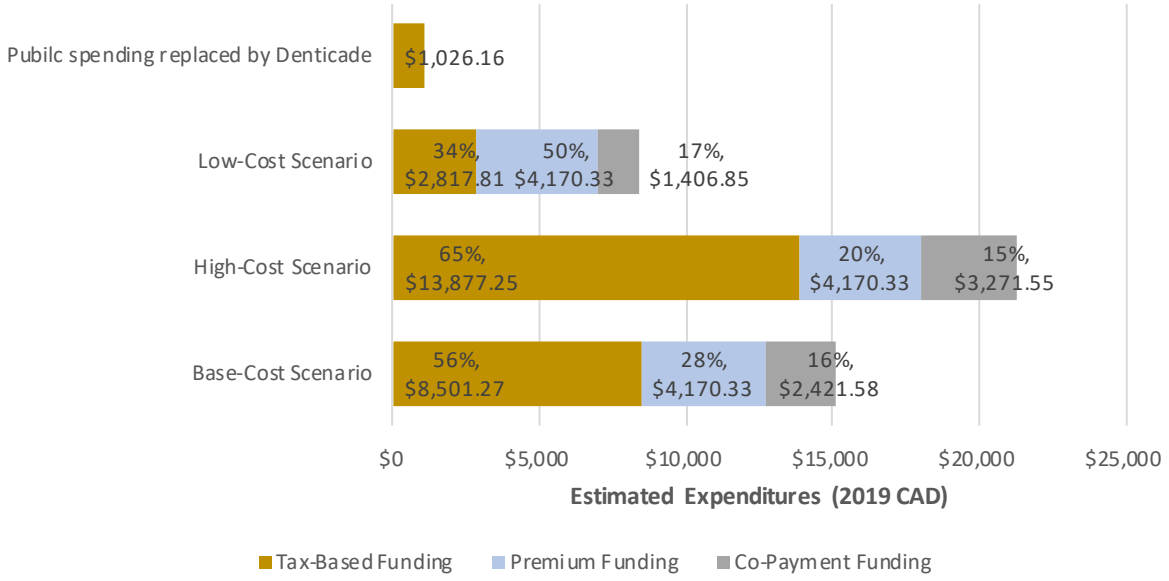
Denticaid also contains similar means of cost offsets, but to a lesser extent than denticare due to unique program parameters (Table 1). Annual premiums levied against all eligible individuals aged 18 and above, earning $40,000 per year and above, would generate only $4.17 billion in all three scenarios. Income-tiered co-payments would further offset the gross total cost by $2.42 billion in the baseline scenario. The denticaid program would also replace a limited amount of current public dental expenditures. Existing public dental programs were assumed to be replaced by denticaid, which amounts to a $1.02 billion offset. However, public employees who have insurance through private providers would not be eligible for denticaid. After co-payment, premium revenue and replacement of existing dental expenditures was considered, the net cost of the program was estimated at $7.47 billion in 2019, with an upper estimate of $12.85 billion and a lower estimate of $1.79 billion (Table 3), with net costs paid through tax revenues and ideally cost-shared between the provincial and federal governments

TABLE 3: COSTING RESULTS AND PUBLIC SPENDING IMPACT OF THE PROPOSED DENTICAID OPTION. RESULTS ARE REPORTED IN MILLIONS OF 2019 DOLLARS. NEGATIVE DOLLAR FIGURES DENOTE A NET DECREASE IN PUBLIC EXPENDITURES

	Baseline Cost Scenario ($ Millions)						High-Cost Scenario ($ Millions)						Low-Cost Scenario ($ Millions)					
	Gross Clinical Total	Admin Cost	Current Dental Spending	Co-Pay	Premium Revenue	Net Change in Spending	Gross Clinical Total	Admin Cost	Current Dental Spending	Co-Pay	Premium Revenue	Net Change in Spending	Gross Clinical Total	Admin Cost	Current Dental Spending	Co-Pay	Premium Revenue	Net Change in Spending
Canada (Total)	$14,833.59	$259.59	$1,026.16	$2,421.58	$4,170.33	$7,475.11	$20,952.46	$366.67	$1,026.16	$3,271.55	$4,170.33	$12,851.09	$8,250.60	$144.39	$1,026.16	$1,406.85	$4,170.33	$1,791.65
NFL	$140.93	$2.20	$14.41	$20.27	$38.83	$69.62	$199.14	$3.11	$14.41	$27.71	$38.83	$121.29	$78.48	$1.22	$14.41	$12.04	$38.83	$14.42
PEI	$34.22	$0.62	$4.27	$4.66	$10.43	$15.49	$48.51	$0.88	$4.27	$6.34	$10.43	$28.36	$18.38	$0.33	$4.27	$2.67	$10.43	$1.34
NS	$242.65	$4.88	$26.55	$33.02	$75.06	$112.90	$344.66	$6.93	$26.55	$45.22	$75.06	$204.76	$134.36	$2.70	$26.55	$19.59	$75.06	$15.85
NB	$179.45	$2.58	$21.25	$23.76	$52.44	$84.59	$255.23	$3.68	$21.25	$32.38	$52.44	$152.84	$95.37	$1.37	$21.25	$13.52	$52.44	$9.53
QC	$3,772.22	$49.42	$231.82	$540.11	$1,115.58	$1,934.14	$5,366.48	$70.30	$231.82	$739.34	$1,115.58	$3,350.04	$2,074.55	$27.18	$231.82	$319.23	$1,115.58	$435.11
ON	$7,039.82	$124.60	$397.18	$1,187.30	$2,072.76	$3,507.19	$9,905.74	$1,75.33	$397.18	$1,620.05	$2,072.76	$5,991.09	$3,940.99	$69.76	$397.18	$697.80	$2,072.76	$843.01
MB	$338.65	$8.84	$37.46	$45.68	$86.93	$177.42	$480.63	$12.54	$37.46	$62.12	$86.93	$306.67	$212.31	$5.54	$37.46	$30.22	$86.93	$63.24
SK	$790.58	$16.37	$32.18	$145.27	$72.94	$556.55	$1,110.99	$23.00	$32.18	$197.27	$72.94	$831.60	$439.62	$9.10	$32.18	$85.52	$72.94	$258.08
AB	$1,089.50	$14.16	$119.24	$235.11	$277.94	$471.38	$1,523.20	$19.80	$119.24	$286.76	$277.94	$859.06	$606.00	$7.88	$119.24	$119.79	$277.94	$96.91
BC	$1,161.65	$26.25	$138.39	$178.32	$352.28	$518.91	$1,656.80	$37.44	$138.39	$243.40	$352.28	$960.17	$625.12	$14.13	$138.39	$101.74	$352.28	$46.84
YK	$14.98	$0.53	$1.12	$2.87	$5.17	$6.35	$20.81	$0.73	$1.12	$3.88	$5.17	$11.37	$9.33	$0.33	$1.12	$1.79	$5.17	$1.58
NWT	$15.58	$0.85	$1.24	$2.63	$5.71	$6.85	$21.68	$1.18	$1.24	$3.57	$5.71	$12.35	$8.67	$0.47	$1.24	$1.45	$5.71	$0.75
NU	$13.35	$1.14	$1.05	$2.60	$4.25	$6.59	$18.58	$1.58	$1.05	$3.52	$4.25	$11.34	$7.43	$0.63	$1.05	$1.49	$4.25	$1.27

Compared with denticare, the net total cost of denticaid was lower in the high-cost scenario, but higher than denticare in the baseline and low-cost scenarios. Cost offsets as a share of the gross total cost showed similar patterns to denticare, but interestingly co-payment levels and premiums accounted for a lower share of total program expenses in all three scenarios. This is an expected difference since denticaid's premium and co-pay strictures mirror that of denticare with its exemptions from premiums and co-pays for lower income individuals. Denticaid is an insurance scheme for those not privately insured and low income is a confounder of being uninsured privately for dental care. If crowd-out occurs, individuals who previously had private insurance and who are more likely to be co-pay- and premium-eligible will join, and offsets as a share of total expenditures will grow over time (Figure 7).

FIGURE 7: FUNDING SOURCES FOR THE PROPOSED DENTICAID PROGRAM AND CURRENT PUBLIC HEALTH DENTISTRY IN 2019



5. DISCUSSION

5.1. MICRO-COSTING LIMITATIONS AND COVID-19 OUTBREAK DISRUPTIONS

This cost-estimation model was completed in the fourth quarter of 2019. At the time, there was no expectation that a global pandemic would occur when projecting costs five years post a hypothetical implementation date of Jan. 1, 2019. In reality, the COVID-19 pandemic started impacting Canadians in mid-January 2020. Among the public health measures implemented to contain the viral outbreak was the mandatory closure of dental practices in most provinces and territories. Only emergency dental visits were permitted. Therefore, the cost estimates in this paper do not account for COVID-19 and model three business-as-usual dental-use scenarios for the year 2020.

5.2. COST-REDUCTION CONSIDERATIONS

Considering that both programs would have a counteractive effect on cost-avoidance behaviour in the population, hospital costs resulting from such behaviour will also decrease. Previous studies have examined trends in emergency department visits for non-traumatic dental issues across several Canadian provinces. These issues would be preventable through regular contact with a dentist in the private sector, as opposed to traumatic dental issues which typically arise from unforeseen or unavoidable trauma. In 2017, Figueiredo et al. found that 1.2 per cent of emergency department visits in Alberta were for non-traumatic dental issues, while Brondani et al. (2017) found that around one per cent of emergency department (ED) visits in British Columbia were for non-traumatic dental issues. In 2011, Quiñonez et al. found that in Ontario, non-traumatic dental ED visits requiring hospitalization cost around $7,367 per patient.

Non-traumatic dental ED admissions cost the public health system millions annually and dental experts have deemed it an avoidable cost with better access to dental care. In Ontario, over 70,000 visits to physicians, 50,000 trips to emergency departments, and 13,000 hospital day surgeries are made each year for non-traumatic dental issues. This is estimated to cost Ontario taxpayers $29 million per year (Singhal, Quiñonez and Manson 2019). Oral Health Alliance estimates that in Ontario alone, every 9 minutes someone goes to an emergency department because of dental pain, while every 3 minutes someone visits their family doctor because of dental issues (Maund 2019). These figures represent the immediate cost reductions that improved access to the full suite of dental services could reduce.

There are also tangential cost reductions that society would gain from improved dental care access. In 2013, Hayes et al. found that the social cost of poor oral health, in terms of lost productivity, amounts to $1.143 billion per year across Canada. However, it is important to note that eliminating this entire cost is unlikely, since some of these lost hours are for routine preventive dental appointments. The introduction of more public dental coverage is intended to improve access to preventive dental care, which would mean lost time for preventive treatment would rise and lost time for advanced treatment needs would likely decrease.

Improved oral health from greater accessibility will also have spill-over savings in other areas of health care. Emerging research on the oral microbiome has uncovered relationships between oral health status and a growing list of chronic diseases. Some of the high-cost diseases include arthritis (Ceccarelli et al. 2017), glaucoma (Astafurov et al. 2014) and oral cancers (Gholizadeh et al. 2016), which have all been linked to the patient's oral health status. While the economic burden of each disease attributable to poor oral health has yet to be quantified, these emerging discoveries support the position that public investment in accessible dental care would save money throughout the health system.

5.3. ANTICIPATED POPULATION HEALTH AND AFFORDABILITY OUTCOMES

The population health perspective on oral health emphasizes the importance of prevention. Most public health dentistry programs across Canada only cover preventive

procedures and not the full suite of dental treatment. Municipalities have engaged in a long-standing debate about whether fluoridating the local water supply would be cost-effective in improving population oral health. While the debate is certainly necessary, it mostly focuses on children and childhood dental caries, and ignores the long-term oral health needs of adults and seniors. It begs the question of whether childhood interventions have long-run impacts or just delay the burden of oral health disease. Once the effectiveness of childhood oral health interventions runs its course, the public responsibility to ensure affordable and accessible dental care dissipates into discrete public health dentistry programming. Having a public dental care program where coverage spans all life stages without an inhibitive cost barrier would be a significant step toward a comprehensive population oral health strategy.

Making dentistry part of the public health system offers new prospects for population health. The Canadian Dental Association recommends routine visits to the dentist, while visits to a primary care physician for check-ups are recommended to be far less frequent (Krogsbøll, Jørgensen, Larsen and Gøtzsche 2012). If dentists were to be fully integrated into the public health system, this would create a new dynamic where patient contact with the health system is increased and the potential for more efficient early screening and referral is attained. By making dental care a part of medicare, Canadian dentistry can possess greater legitimacy as an essential health profession, than as a frill service outside the current *Canada Health Act* definition of "medically necessary."

Oral cancer is a critical example of why early detection and population health surveillance via dentistry is so important. Oral cancer is now one of the most common forms of cancer in Canada. In 2017, 4,700 Canadians were diagnosed and 26 per cent of those patients did not survive (Canadian Cancer Society 2019). Oral cancer is treatable if detected early on. Dentists are well trained in detection and will refer their patients to an oncologist (Canadian Dental Association 2019a). Currently, oral cancer is mostly being diagnosed in its later stages; 52.7 per cent of oral cancers were diagnosed in Canada at stage four. An exact link between dental care avoidance and the delayed diagnosis of oral cancer has yet to be determined. However, since many oral cancer risk factors (tobacco use, alcohol use, poor nutrition) are also seen in low-income individuals who typically forgo the dentist because of cost (Sankaranarayanan et al. 2015), it stands to reason that reducing the cost barrier to dentistry could have a significant positive impact on oral cancer detection and survival.

Canadians avoid seeing the dentist for many reasons. Yet out-of-pocket cost is consistently highlighted as a major factor in choosing to forgo a dental visit (Zangiabadi, Costanian and Tamim 2017). Canadian households could see a considerable decrease in total household health spending if more dental services were publicly covered. The question remains whether denticare or denticaid is the best way to go about lowering the economic burden of dental care and improving the overall patient experience.

It was previously held that since higher income persons are the biggest spenders on dental care that meant dental care was a luxury good, and therefore, public intervention would mostly subsidize the dental habits of the rich, not the dental habits of the poor (Evans and Williamson 1979, 120–122). This conclusion drastically misses the fact that dental spending is low for lower income individuals because they cannot afford treatment

and therefore avoid the dentist because of the cost. This does not mean the medical need for dental care is absent. More low-income individuals tend to visit the emergency department for avoidable dental issues than higher income individuals (Figueiredo, Fournier and Levin 2017). There is ample evidence to suggest that a universal public dental insurance scheme such as denticare would precipitate a transfer of wealth between social strata, since under the status quo, those who require dental care the most cannot afford it.

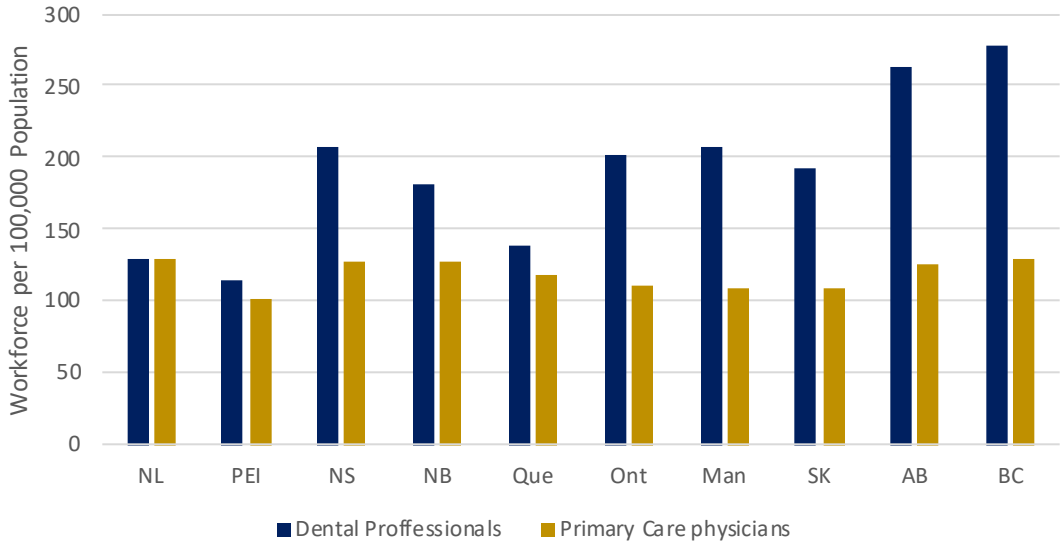
Public support for increased government involvement in dental care is high across Canada. A study by Quiñonez and Locker (2007) found that 83 per cent of Canadians believe that dental care should be part of medicare. None of these studies gave explicit details on how this form of universal dental coverage would be provided or if cost-sharing would be included. In 2018, a focus groups study at the University of Calgary found that public opinion tended to favour a universal dental care scheme over water fluoridation as a public health intervention. Respondents were, however, concerned about the feasibility and moral hazard that could accompany a program where dental care was free to everyone one (Lang 2018).

5.4. DENTAL WORKFORCE CONSIDERATION

For thorough policy analysis, supply-side considerations must be examined. While demand-side analysis is generally just patient considerations, the supply-side analysis considers the policy impact on dental professionals. As mentioned previously, one of the main concerns of the 1964 Royal Commission on Health Services regarding the possibility of a universal dental system was that Canada had very few dentists relative to physicians. Today, Canada has no shortage of dentists needed to meet that potential new patient influx. The supply of dentists in Canada has been steadily growing in all provinces (Canadian Institute for Health information 2019). Furthermore, while the dentists themselves are outnumbered by their family physician counterparts, dentists employ a much larger care team of hygienists, therapists and assistants (Canadian Dental Association 2019c). When the entire dental team per 100,000 residents is calculated for each province, the dental care workforce tends to eclipse the number of primary care physicians (Figure 8).

FIGURE 8: DENTAL PROFESSIONALS AND PRIMARY CARE PHYSICIANS PER 100,000 IN 2016

(Canadian Institute for Health Information 2018).



A key limitation of this study's costing was not being able to account for potential additional incentive costs to ensure sufficient staffing of dental professionals in rural communities. While the numbers show the dental workforce is significantly large relative to primary care in Canada, the rural and remote areas have fewer dental professionals than urban ones (Canadian Dental Association 2017) paralleling the long-standing challenges of rural staffing in much of Canadian primary health care (College of Family Physicians of Canada 2017). As family physicians in Canada have often been provided additional financial incentives to establish rural practices, if denticare or denticaid is to be universally accessible, such incentives may need to be considered in addition to the clinical cost estimates of this paper.

Across Canada, wait times for dentists are currently low (Canadian Dental Association. 2017). The previous concern that the dental workforce could not handle the influx of new patients from increased public coverage seems unfounded given how much larger the dental care team as a whole is compared to the country's supply of family physicians who already see patients in the universal health system. In 2009, a survey of 2,219 Canadian dentists explored supply-side perspectives on public dental care. Canadian dentists generally support public investment into preventive oral health strategies. Most dentists indicated that they could accommodate an influx of new patients generated from increased government programming (Quiñonez, Figueiredo and Locker 2009).

In that same 2009 dentist survey, when asked: "What bothers you about publicly financed dental care?" most dentists complained of the lower fees under public fee schedules, and the limited range of services covered. Roughly a third of Canadian dentists have purposely reduced the number of public insurance patients in their practice. This is concerning from a patient-care equity perspective, although it speaks to the business obstacles dentists face within the current suite of public health dentistry programs (Quiñonez, Figueiredo and Locker 2009).

When asked: "Who should be publicly insured?" the two policies under consideration by this report ranked in the bottom two. People without private insurance out-ranked universal coverage 15.7 per cent to 14.7 per cent. More popular responses were for specific socioeconomic demographics: underprivileged children, social assistance recipients, persons with disabilities, etc. A public-sector monopoly could be relatively unpopular due to existing discontentment over low fees and inadequate service coverage offered by the existing suite of public programs. Dentists' trust in the public sector's ability to sufficiently fund and administer comprehensive dental care appears to be quite low (Quiñonez, Figueiredo and Locker 2009).

5.5. COST-EFFECTIVENESS CONSIDERATIONS: THE ORTHODONTIC DEBATE

Orthodontics in this study was included for the treatment of malocclusions. Malocclusion is an umbrella term that refers to a set of growth and developmental anomalies that affect jaws and teeth resulting in variations in their position. People with various traits of malocclusion, such as anterior irregularities, maxillary overjet and anterior spacing, report less satisfaction with dental appearance, as well as masticatory performance (Ravaghi, Kavand and Farrahi 2015). At present, there are no generally accepted criteria for what should and should not be in the basket of orthodontic treatment in either private or public dental insurance. The Canadian Agency on Drugs and Technologies in Health also has no current recommendation on orthodontic coverage as the clinical effectiveness evidence is mixed (Clark and Ford 2017).

Of all dental treatment categories included in this micro-costing exercise (Table 4), most could be considered preventive in nature, and therefore a worthwhile expansion of the Canadian health system given recent calls for prioritizing prevention in primary care. The inclusion of orthodontics may be controversial, however. Orthodontic treatment is an example of a very high-cost treatment area where effectiveness varies depending on how it is measured. Several systematic reviews have found only modest to weak associations between malocclusion treatment via orthodontics and quality of life (Cozza et al. 2005; Janson et al. 2011; Liu, McGrath and Hägg 2009).

With orthodontics included in this study there was the theoretical possibility of supplier-induced demand for orthodontic treatment, and even overall dental services, but data from jurisdictions with robust public dental insurance programs do not support the assumption of moral hazard on the part of dentists treating public insurance patients (Tuominen and Eriksson 2011). In the absence of dentist-induced demand, there is still the expected behavioural effect of increase in the number of individuals demanding orthodontic treatments which may only provide marginal clinical value based on their oral health. A study analyzing claims from a public assistance program providing orthodontics in Indiana found that only a small minority of claims reimbursed were not of significant orthodontic treatment need (Dean, McDonald and Walker 2005). The risk of excessive demand for orthodontics in the public-sector plan appears minimal given previous research, but positive patient satisfaction outcomes are difficult to associate with most orthodontic treatments.

A qualitative study in Finland pointed out that paying attention to the dental appearance aspect is just as important to patient care satisfaction as is attention to pain and

masticatory irregularities (Svedström-Oristo et al. 2001). A study on child and adolescent patient perspectives found that malocclusion tends to have greater influence on emotional well-being compared to physical functions or social interaction (Spalj et al. 2010). According to Dean, McDonald and Walker (2005), it is generally accepted in public health dentistry that given social discrimination which patients with severe malocclusions often face, orthodontic treatment necessary for correction should be provided in a public health service.

For efficient stewardship of public funds, both public dental programs should be structured to emphasize preventive treatments over low-impact, high-cost procedures. To discourage this behaviour, policy-makers should consider measures like co-payment requirements set at a higher rate than for more medically necessary treatments, rather than immediately rejecting the notion of providing any orthodontic care altogether. This was incorporated into both denticare and denticaid programs. To further regulate the allocation of funds to orthodontics, public coverage should be focused on the treatment of moderate to severe malocclusions using a clearly defined clinical criterion that establishes whether a patient's case is eligible for reimbursement in the public system. The U.K.'s National Health Service has taken this approach and uses the Index of Orthodontic Treatment Need (IOTN) to assess eligibility for publicly funded orthodontics (NHS England 2015).

6. POLICY RECOMMENDATIONS

Given the differences in net total costs, this study recommends that in choosing between denticare and denticaid, Canada should commit to implementing a universal denticare program that integrates comprehensive dental care into the universal system of health care. Implementation of denticare carries considerable potential to improve oral health status equity and offset otherwise avoidable costs throughout the health system.

Denticare out-performs denticaid in terms of efficiency since all varying levels of dental risk are aggregated under one public insurance scheme where financial risk can be shifted to account for low-income, high-risk patients requiring more dental work than high-income, low-risk patients within the same denticare program. The pursuit of pooling resources under a national universal health system has long been endorsed by health economists, the World Bank and the World Health Organization as a means to achieving better population health, productivity and spending efficiencies (Mathauer et al. 2020; Smith and Witter 2004; World Health Organization 2010). This paper's cost analysis supports the position that strong pooling of all dental health risk is a worthwhile public policy pursuit.

While health care is the constitutional responsibility of the provincial/territorial governments, federal involvement in the provision of health services has expanded over the years (Forest and Martin 2018, 37–43). Ultimately, this is a policy proposal that necessitates a formal legislative commitment from both orders of government. The *Canada Health Act* is a crucial piece of federal legislation from which to drive denticare implementation. To implement denticare, the definition of insured health services in the *Canada Health Act* would need to be amended to define the basket of dental services

proposed in this report. This would drive provinces to expand their public health insurance plans to include dental care. The administration of public dental care would be conducted at the provincial level. Each province and territory would set up mandatory fee schedules with dental professionals for the services they would provide under denticare. The decision to levy premiums and co-pays, and to what degree, should be left up to the individual provinces, but rates should be progressively structured to ensure equitable access to dental services.

7. CONCLUSION

Comprehensive public dental care would eliminate the cost barrier to good oral health which millions of Canadians face each year, and thereby save millions in otherwise avoidable medical costs. As Canada recuperates from a profound infectious disease outbreak, oral health policy should remain on the government radar. With record unemployment levels and considerable economic contraction, private dental benefits will be challenging to attain. Unmet dental needs will likely rise post-COVID-19 due to the vast suspension of dental services throughout 2020.

This costing exercise has demonstrated that with both denticaid and denticare, through co-payments and premiums, the remaining tax-based cost of around $7 billion to $6 billion respectively, would be a relatively small increase in spending next to Canada's current $186 billion public spending on health care. There is simply no medical or economic reason for labelling dental care a frill service. Canadian health policy needs to recognize the growing volume of evidence that oral health is an integral part of one's overall health. With fewer Canadians being insured privately for dental care, and avoidance due to out-of-pocket cost on the rise, the case for integrating comprehensive dental services into the public health-care system cannot be ignored.

8. APPENDIX TABLES

TABLE A1: THE ADMINISTRATIVE COST OF PROVINCIAL/TERRITORIAL HEALTH CARE SYSTEMS AS A PERCENTAGE OF TOTAL PUBLIC-SECTOR HEALTH EXPENDITURES, USED TO ESTIMATE THE ADMINISTRATIVE COST OF DENTICARE AND DENTICAID

(Canadian Institute for Health Information 2019, Table D.3.1.1).

Jurisdiction	Total Public-Sector Health Expenditures (Millions 2019 C$)	Total Public-Sector Health Admin. Expenditures (Millions 2019 C$)	Percentage Spent on Admin.
Canada (Total)	186,332.2	3,260.8	1.75%
NL	3,293.2	51.4	1.56%
PEI	853.9	15.5	1.82%
NS	5,066.0	102.0	2.01%
NB	3,936.9	56.8	1.44%
QC	41,910.0	550.6	1.31%
ON	67,713.7	1,198.8	1.77%
MB	7,581.9	198.2	2.61%
SK	6,428.6	133.2	2.07%
AB	24,437.7	317.3	1.30%
BC	23,350.5	526.9	2.26%
YK	379.2	13.4	3.53%
NWT	683.9	37.3	5.46%
NU	696.7	59.4	8.52%

TABLE A2: PUBLIC EMPLOYEE DENTAL SPENDING CALCULATIONS

(Treasury Board of Canada Secretariat 2014, 2018, 2019)

	Calculation	Total
A	2013-14 Public Service Dental Care Plan Claims	$268,845,000
B	2013-14 Pensioners' Dental Services Plan Claim	$142,746,000
C	Total 2013 Dental Plan Expenditures (A+B = C)	$411,591,000
D	Total 2013 Employer Expenditures	$2,492,654,000
E	Percentage Spent on Dental Plan (C/D = E)	16.5%
F	Budgeted 2018-19 Employer Expenditures	$2,738,905,397
G	Estimated Total 2018-19 Dental Plan Expenditures (E * F = G)	$451,919,390.51
H	Canadian Federal Employees in 2019[5]	273,571
I	Estimated Dental Plan Spending per Employee (G/H =I)	$1,651.93

5

TABLE A3: CURRENT LEVELS OF DENTAL CARE SPENDING ($ MILLIONS) IN CANADA BY SECTOR

Jurisdiction	Public Health Dentistry Spending[6]	Public Employees (2019)[7]***	Dental Plan Contributions ($1,600/ Employee Estimate)	Total Public Dental Expenditures
Canada (National Total)	$1,026.16	3,923,433	6,277.49	7,303.65
NL	$14.41	69,300	$110.88	$125.29
PEI	$4.27	21,600	$34.56	$38.83
NS	$26.55	112,700	$180.32	$206.87
NB	$21.25	90,400	$144.64	$165.89
QC	$231.82	954,100	$1,526.56	$1,758.38
ON	$397.18	1,432,700	$2,292.32	$2,689.50
MB	$37.46	164,100	$262.56	$300.02
SK	$32.18	146,400	$234.24	$266.42

6 Provincial/territorial public health dentistry figures are estimated from a per capita figure of roughly $27.50 per provincial/territorial resident; however, it is not what the province/territory itself spends, but what the whole public sector is estimated to spend in that area (Canadian Institute for Health Information 2019).

7 Employee counts for provinces for November 2019 are reported by Statistics Canada Table: 14-10-0288-02 (formerly CANSIM 282-0089). Territory public employee counts are from 2018 reported by Statistics Canada Table: 14-10-0202-01 (formerly CANSIM 281-0024).

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