Trends in emergency department visits for non-traumatic dental conditions in Ontario from 2006 to 2014

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ABSTRACT

OBJECTIVE: In Canada, non-traumatic dental conditions (NTDCs) presenting in emergency departments (EDs) are dealt with by non-dental professionals who are generally not equipped to deal with such emergencies, resulting in an inefficient usage of heath care resources. This study aimed to assess the burden of ED visits for NTDCs in Ontario by observing trends from 2006 to 2014.

METHODS: Aggregate data for Ontario were obtained from the Canadian Institute for Health Information's National Ambulatory Care Reporting System. Data were examined for the whole of Ontario and stratified by 14 Local Health Integration Networks. Descriptive analysis was conducted for both number of people and number of visits, stratified by sex and age groups (0–5, 6–18, 19–64, and 65+ years). Numbers were also examined by neighbourhood stratifications, including urban/rural, income quintile and immigrant tercile.

RESULTS: Over the study period, an upward trend of visiting EDs for NTDCs was observed. Approximately 403 628 people in Ontario made 482 565 visits over the period of nine years. On average, 341 per 100 000 people, per year, visited. Young children, people living in neighbourhoods with lower income and higher immigrant concentration, and people living in the rural regions, visited EDs more for NTDCs during 2006–2014.

CONCLUSION: The upward and inequitable trends of utilization of EDs for NTDCs reinforce recognition of the important need for both universal and targeted approaches for primary prevention of dental conditions. To enhance equitable access to dental care, policy advocacy is required for publicly funding essential and emergency dental services for all.

KEY WORDS: Dental care; emergency service; hospital; health status disparities

La traduction du résumé se trouve à la fin de l'article.

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Emergency department (ED) visits for non-traumatic dental conditions (NTDC) continue to attract advocacy and policy attention in Canada.[1,2] Generally, ED visits for NTDC are viewed as an inefficient and costly way of dealing with such dental problems, which are most often basic in nature and best treated in office-based ambulatory dental settings.[3–6] In fact, ED visits for NTDC are now viewed as a consequence of poor access to dental care and are used in some jurisdictions as an indicator in this regard.[6]

National-level data in the United States suggest that, over a 10-year period, ED visits for NTDC increased and at a faster rate than for all ED visits combined.[7] Yet, in Canada, most studies on ED visits for NTDC present data for only one or two years;[4,5] only one has presented trend data, but it was limited to homeless adults over a four-year period in one Ontario municipality.[3] Trend data are important, as they give researchers and policy-makers the ability to explore patterns in a given outcome, and allow for hypothesis formulation on potential environmental exposures and their effects on such trends.

Further, though most studies on ED visits for NTDC in Canada quantify the burden, they do not report on the predictors of such visits either at the individual or area-based level.[4,5] What is known has relied on data on self-reported ED visits for NTDC in Canada, and suggests that cost barriers to dental care, oral pain, and bed days due to dental problems are predictors of such visits.[8,9]

As a result of the above, this study aims to assess trends in ED visits for NTDCs in Ontario from 2006 to 2014, and to explore socio-demographic and geographic predictors of such visits.

METHODS

Data aggregated at the region level (14 Local Health Integration Networks, or LHINs) for ED visits in Ontario for NTDCs related to the hard tissues of teeth (described below) were obtained from the Canadian Institute for Health Information's (CIHI) National Ambulatory Care Reporting System (NACRS). Population-based data (as these included everyone from the existing administrative data and not just a representative sample) were available from fiscal year 2006/2007 to 2014/2015. Data included both the number of people who made visits to EDs and the number of visits they made.

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Cells with four or fewer observations were suppressed to avoid identification.

Based on the census year 2006 (as long forms were not mandatory in 2011), postal codes of individuals were used to assign dissemination areas (DA), which in turn were linked to neighbourhood characteristics: urban/rural setting, income, and proportion of immigrants. Details are as follows: *1) Neighbourhood urban/rural:* Census metropolitan area (CMA) or census agglomeration (CA) of ≥10 000 residents is considered urban and of <10 000 is considered rural; *2) Neighbourhood income quintile:* CMAs/CAs are divided into income quintiles ranked 1 to 5 (poorest, poorer, average, richer and richest) according to the percentage of their population below the low-income cut-off, where low-income refers to a total family income in the year preceding the Census that is below that year's Statistics Canada low-income cut-off, which varies according to family size and CMA/CA size; and *3) Neighbourhood immigrant tercile:* the DAs are divided into three approximately equal-sized groups based on percentage of immigrants: with the highest, the middle and the lowest tercile corresponding to immigrant proportions of 63%, 37% and 10% respectively.[10]

In NACRS, there are two relevant variables: the presenting complaint list (data element 136) and the ED discharge diagnosis (data element 137).[11] The presenting complaint list includes self-reported reasons and symptoms for seeking medical care, and the ED discharge diagnosis shortlist (CED-DxS) includes diagnoses in common terms, which are mapped to ICD-10-CA codes.[11] We included cases for which the discharge diagnoses (ICD-10-CA code) confirm a non-traumatic dental condition related to the hard tissues of teeth, such as dental caries (K02.9), periapical abscess without sinus (K04.7), and tooth ache (K08.87). Conditions related to soft tissues of the oral cavity, such as ulceration or stomatitis of gum, tongue and/or cheek mucosa, or involving salivary glands, were not included since physicians can also treat these oral conditions. As the purpose of this research is to assess the burden on the health care system due to dental diseases that can solely be resolved by dental professionals, any oral condition which can be handled by other health professionals was excluded. People with mild or moderate intellectual and developmental disabilities (IDDs)[12] are generally at an increased risk of dental disease due to co-morbidities, dietary practices, behavioural challenges, and the potential need for extra attention in oral hygiene maintenance (e.g., tooth brushing); though these individuals can be treated successfully in the general practice setting, ED visits are not necessarily preventable for them, and therefore they were excluded from analysis.[13,14] Given the above, if the discharge summary included ICD codes related to dental trauma, oral soft tissues or developmental disability, those cases were excluded from the analysis.

Descriptive analysis was performed. Data were examined for the whole of Ontario and stratified by LHINs. Both number of people and number of visits made by those people (some people visit multiple times), stratified by sex and age groups (0–5, 6–18, 19–64, and 65+ years), were tabulated for nine consecutive years. Rates were calculated by dividing the number of people visiting the ED in each fiscal year by the projected population based on Statistics Canada estimates for that fiscal year.[15] Kendall's tau, a non-parametric test, was utilized to conduct a time trend analysis of visits over the nine-year time period.[16] We also examined both number of people and number of visits stratified by neighbourhood characteristics; however, rates could not be calculated for income quintiles and immigrant terciles because of neighbourhood migration creating uncertainty in available population denominators.

RESULTS

From 2006 to 2014, on average, 53 618 visits were made each year to EDs in Ontario for NTDCs by approximately 44 848 people. Over the nine-year period of observation, this totals approximately 482 565 visits made by 403 628 people.

In terms of rates, each year approximately 341/100 000 people visited EDs for NTDCs. Stratified by sex, each year approximately 24 106 men (413/100 000) and 20 742 women (351/100 000) visited EDs for NTDCs (Table 1). By age, each year children aged 0–5 years was the age group that visited EDs for NTDCs the most at an average of 718 per 100 000, and people aged 65+ visited the least at 394 per 100 000 (Table 1). Among the 14 LHINs, rates were highest in the North East region, at an average of 882 per 100 000 people per year, and lowest in the Mississauga Halton region, at 148 per 100 000 people per year (Table 2).

Over the nine-year period of observation, there was an approximately 10% increase in overall rate of people visiting EDs for NTDCs (from 359/100 000 in 2006 to 399/100 000 in 2014). As per the Kendal tau correlation test, significant positive trends (figure not presented) in overall rates ($r = 0.72$, $p = 0.0091$) and for both men ($r = 0.75$, $p = 0.0064$) and women ($r = 0.78$, $p = 0.0049$) individually, were observed from 2006 to 2014.

By neighbourhood income quintile, on average, the number of visits made to EDs each year for NTDCs was 2.3 times higher among those living in the lowest neighbourhood income quintile (approximate average 15 856 visits per year) compared to those living in the highest (approximate average 6840 visits per year) (Figure 1). By neighbourhood immigrant tercile, people living in the tercile with the highest immigrant concentration (approximate

Table 1. Nine-year trends of rate of people per 100 000 visiting EDs for NTDCs, stratified by sex and age groups

Age groups (years)	2006		2007		2008		2009		2010		2011		2012		2013		2014	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
0–5	646	742	643	734	653	787	631	796	645	757	708	800	660	766	665	793	691	797
6–18	214	236	222	251	242	266	245	271	235	265	258	285	250	278	257	289	275	289
19–64	299	363	319	380	326	386	317	386	326	395	336	399	336	401	334	396	346	399
65+	167	206	176	224	182	219	173	215	174	222	178	218	171	228	171	218	182	216
Overall	332	387	340	397	351	414	342	417	345	410	370	425	354	418	357	424	373	425

Table 2. Nine-year trends of rate of people per 100 000 visiting EDs for NTDCs, stratified by LHINs

Region	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mississauga Halton	152	137	136	144	147	153	151	149	148
Central	135	139	144	140	149	153	156	161	164
Toronto Central	164	169	173	180	188	199	201	185	187
Central West	165	167	170	172	175	190	198	189	191
Central East	299	310	322	303	313	313	307	306	316
Waterloo Wellington	262	291	277	304	298	316	311	306	324
Hamilton Niagara Haldimand Brant	336	352	353	327	329	322	339	333	341
Champlain	327	338	321	321	321	365	334	350	356
South West	461	502	525	513	509	528	524	508	543
Erie St. Clair	580	613	634	615	614	623	585	576	580
North Simcoe Muskoka	480	541	519	500	533	541	549	621	608
South East	503	543	573	597	616	630	620	614	626
North West	707	780	801	872	938	930	931	910	897
North East	733	747	884	903	877	918	939	953	984

Note: LHINs are arranged from the least to the highest rates, based on 2014 results.

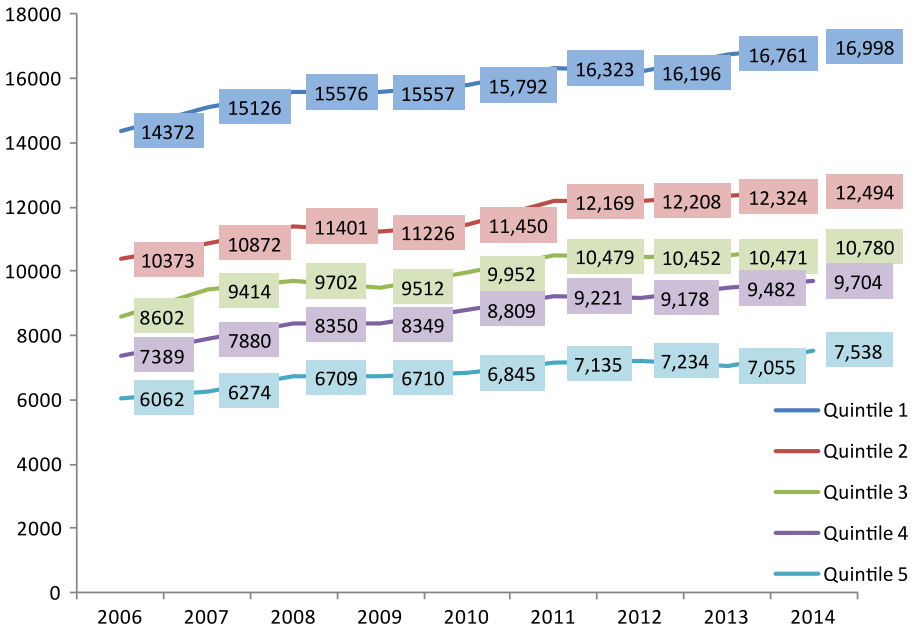

Figure 1. Nine-year trends of number of visits made to EDs for NTDCs, stratified by neighbourhood income quintile. * Kendal tau correlations: Quintile 1 (poorest): $r = 0.89$, $p = 0.0012$; Quintile 2 (poorer): $r = 0.94$, $p = 0.0006$; Quintile 3 (middle): $r = 0.83$, $p = 0.0025$; Quintile 4 (richer): $r = 0.89$, $p = 0.0012$; Quintile 5 (richest): $r = 0.89$, $p = 0.0012$.

average 39 759 visits per year) visited approximately nine times more often as those living in neighbourhoods in the tercile with the lowest immigrant concentration (approximate average 4429 visits per year) (Figure 2). By rural/urban stratification, people in rural regions visited EDs for NTDCs almost twice (approximate average 600 people per 100 000 per year) as often as people in urban regions (approximate average 313 people per 100 000 per year) (Figure 3). In terms of trends, the number of visits to EDs for NTDCs consistently increased among all quintiles, terciles and regions, and each trend was statistically significant based on Kendal tau results (correlation and p values are presented in respective figures).

DISCUSSION

We set out to examine trends over time (2006–2014) in ED visits for NTDCs in Ontario, overall and stratified by age, sex, region, and area-level socio-demographic condition (urban/rural, income quintile, and immigrant status). Before this work, only two studies had been completed, which showed the burden on Ontario's health care system due to NTDCs for the years 2003–2006 and 2006–2007.[4,5] Our analysis builds on this research by considering an updated and longer period of observation time.

Our most notable finding is a steady, statistically significant increase in ED visits for NTDCs during this time frame. EDs are an expensive and inefficient option for addressing dental concerns, which would be better addressed in the dental system by dental professionals.[17] However, access to dental care, being inequitable in the Canadian society, can be a possible explanation of these findings. Among OECD countries, Canada fares poorly – including ranking below the United States – in terms of public financing of dental services.[18] In Canada, only approximately 5% of dental care

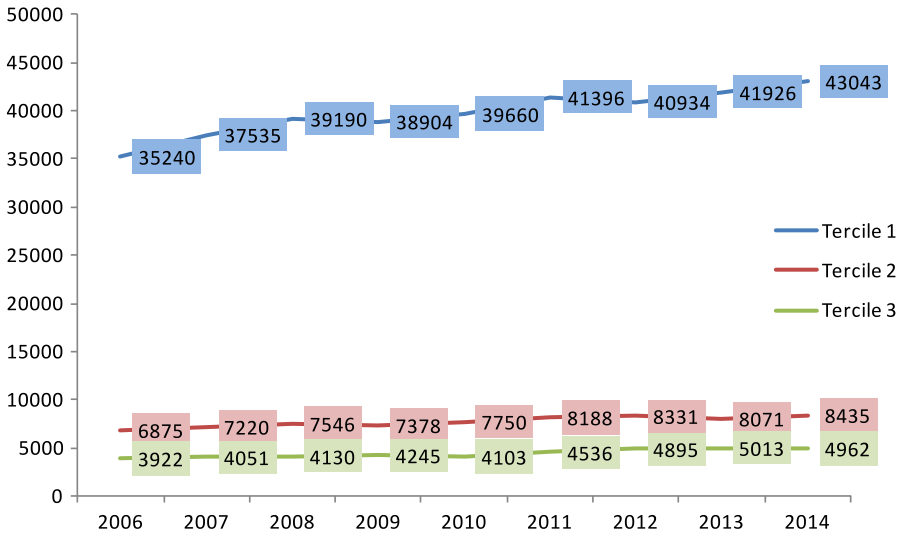

Figure 2. Nine-year trends of number of visits made to EDs for NTDCs, stratified by immigrant tercile. * Kendal tau correlations: Tercile 1: $r = 0.89$, $p = 0.0012$; Tercile 2: $r = 0.83$, $p = 0.0025$; and Tercile 3: $r = 0.83$, $p = 0.0025$.

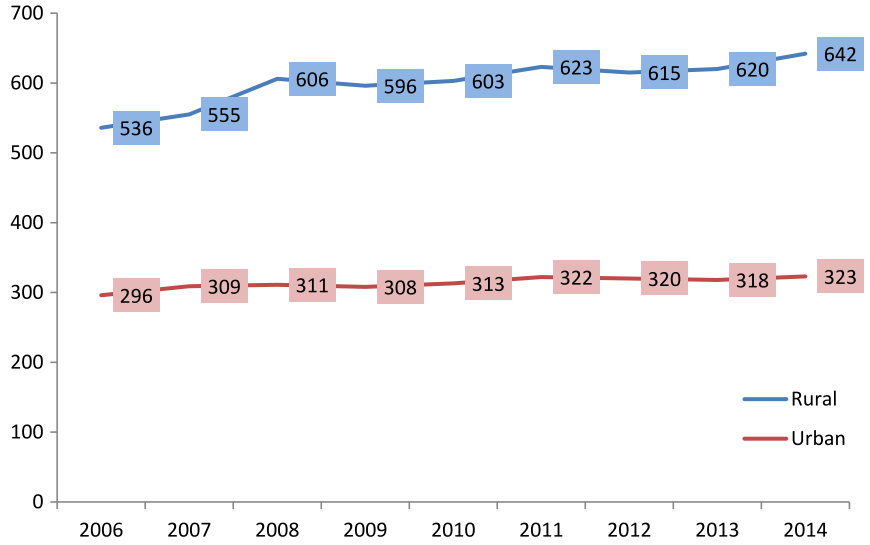

Figure 3. Nine-year trends of rate of visits per 100 000 people made to EDs for NTDCs, stratified by region: rural/urban. * Kendal tau correlations: rural: $r = 0.89$, $p = 0.012$; urban: $r = 0.89$, $p = 0.025$.

is publicly funded, with jurisdictional variations; provincially, Ontario ranks last, at 1.5%.[19] In this context of limited funding for dental care, our findings speak to a growing burden of health care costs attributed to dental problems.

We also observed large and, in some cases, dramatic discrepancies in ED visits for NTDCs by age and area-level socio-economic indicators. The highest rate of visits was observed in the 0–5 year age group, which is disheartening considering the largely preventable nature of NTDCs and the potential consequences of some NTDCs during childhood for later well-being.[20,21] Though we were not able to compute rates for the area-level stratified analyses, the absolute numbers point to dramatic inequities by neighbourhood income and particularly by immigrant concentrations. Our results corroborate findings of a recent study, where Calvasina et al. showed high unmet dental needs among immigrants in Canada due to low income and lack of dental insurance.[22] We also expect covariation between immigrant and income indicators in our data, but this analysis was not feasible as data obtained were aggregated.

The observation that trends have worsened significantly over time in all groups and are consistently inequitable indicates an important need for both universal and targeted approaches to primary prevention of dental conditions. To enhance equitable access to dental care, policy advocacy is required for publicly funding essential and emergency dental services for all.

Our study has strengths and limitations. The absence of individual-level data on socio-economic circumstances means that misclassification is possible. Due to uncertain denominators,

we were unable to compute rates for the stratified analyses with income and immigrant concentrations. Strengths include the ability to access data from the full target population and the high degree of accuracy with which ED visits for NTDCs could be identified.

In terms of future research, similar analyses in other provinces, using consistent methods, would be extremely informative in terms of gauging burden across the country. As a follow-up step, future research should examine: whether rates of ED visits for NTDC vary according to variation in public funding; and changes in rates in response to changes in funding circumstances for dental services. Such analyses would embody a crucial shift in this line of research from the important task of quantifying the extent of the problem, to thinking through potential policy solutions.

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RÉSUMÉ

OBJECTIF : Au Canada, les visites aux services d'urgence pour faire traiter des problèmes dentaires non traumatiques (PDNT) ne sont pas prises en charge par des professionnels dentaires; le personnel n'est généralement pas équipé pour composer avec ce type d'urgences, ce qui entraîne une mauvaise utilisation des ressources de soins de santé. Notre étude visait à évaluer le fardeau des visites aux urgences pour faire traiter des PDNT en Ontario en observant les tendances de 2006 à 2014.

MÉTHODE : Nos données agrégées pour l'Ontario proviennent du Système national d'information sur les soins ambulatoires de l'Institut canadien d'information sur la santé. Nous les avons examinées pour l'ensemble de l'Ontario et stratifiées selon 14 réseaux locaux d'intégration des services de santé. Nous avons effectué l'analyse descriptive du nombre de personnes et du nombre de visites, stratifiés par sexe et par groupe d'âge (0–5 ans, 6–18 ans, 19–64 ans et 65 ans et plus). Nous avons aussi examiné les chiffres stratifiés par quartier : quartiers urbains ou ruraux, quintile de revenu des quartiers et tercile d'immigrants des quartiers.

RÉSULTATS : Au cours de la période de l'étude, nous avons observé un mouvement de hausse dans les visites aux urgences pour faire traiter des PDNT. Environ 403 628 personnes en Ontario ont fait 482 565 visites aux urgences sur une période de neuf ans. Il y a eu en moyenne 341 visites pour 100 000 habitants par année. Les jeunes enfants, les résidents des quartiers à faible revenu et à forte concentration d'immigrants et les résidents des zones rurales ont davantage visité les urgences pour faire traiter des PDNT entre 2006 et 2014.

CONCLUSION : La hausse et le caractère inégal des tendances à recourir aux services d'urgence pour faire traiter des PDNT soulignent l'importance d'universaliser et de cibler les stratégies de prévention primaire des problèmes dentaires. Pour rendre l'accès aux soins dentaires plus équitable, il est nécessaire de promulguer des politiques de financement public universel des soins dentaires essentiels et urgents.

MOTS CLÉS : soins dentaires; service hospitalier d'urgences; disparités de l'état de santé