

Redirecting public oral health fluoride varnish intervention to low socio-economic status children in Alberta

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ABSTRACT

SETTING: Dental decay is most prevalent among low socio-economic status (SES) groups where cost limits access to dental care. To address inequities in oral health outcomes, Alberta Health Services (AHS) Oral Health Action Plan encompasses a population health approach that redirects fluoride varnish (FV) applications to low SES children. Using low SES measures to establish the eligibility criteria is fundamental to the delivery of FV applications to the target population.

INTERVENTION: A series of four FV applications over two years is directed to children age 12–35 months and two applications per year to children in Kindergarten and grades 1 and 2, using low SES measures for eligibility criteria. The provincial objective for children receiving the first FV application is 10%–20% of the population age. Additional objectives are set for rates of subsequent FV applications for each population group.

OUTCOMES: From 2015 to 2016, the rate of first FV applications for eligible target populations is below the provincial objective for children age 12–35 months (5%) and within the objective for children in Kindergarten and grades 1 and 2 (16%). Rates of subsequent FV applications in the school setting are being met.

IMPLICATIONS: Encompassing a population health approach to deliver standardized fluoride varnish applications to low SES children better targets inequities in oral health outcomes in Alberta. Challenges of redirecting the FV intervention include creating the eligibility criteria and engaging the target population, particularly for the preschool population. Achieving population objectives are challenged by unequal distribution of resources across the province.

KEY WORDS: Fluorides; topical; socio-economic factors; community health planning; health equity; child health services

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Dental caries is most prevalent among low socio-economic status (SES) groups of the population where cost limits access to dental care.¹ Implementing interventions that target socio-economic factors is necessary to address the inequities in access to oral health services for vulnerable populations.¹ Providing early access to preventive services to children in low-income families is critical to achieving and maintaining good oral health throughout life.

To better assure equitable access to health services, the province of Alberta, Canada instituted a major health system reorganization in 2008 that integrated nine former health regions and three health agencies into a single health authority. This new health authority, named Alberta Health Services (AHS), consists of five geographic zones that are responsible for providing health care to four million Albertans. To align with the strategic direction of AHS, a Provincial Oral Health Office (POHO) and an inaugural Oral Health Action Plan (OHAP) were developed in 2010. The plan is implemented within a cost-neutral framework that acknowledges individual zone capacity. Under the leadership of a provincial dental public health officer and a team of 2 part-time public health dentists and 3.5 full-time equivalent (FTE) dental hygienists, POHO monitors and responds to Albertans' oral health needs. The OHAP document is a turning point for AHS public oral health as it encompasses a paradigm shift towards a population health

approach across the entire province. The plan focuses upstream on access to preventive oral health care for economically challenged Albertans.

One of the key preventive oral health initiatives outlined in OHAP is a fluoride varnish (FV) intervention that targets eligible children throughout the province as identified by socio-economic indicators, as opposed to disease indicators and individual behaviour. The Government of Canada First Nations Inuit Health Branch offers a similar intervention to Indigenous children on reserve land. Fluoride varnish application is an evidence-informed preventive dental practice that reduces tooth decay by 37% and 43% in both the primary and permanent dentitions respectively.² The Duraflor FV brand is used for its slow release of fluoride for up to six months, thereby supporting the application in six-month intervals.³ Its availability in a single-dose unit supports good infection prevention and control practices and resolves issues related to fluoride gradients in multidose vials. In addition, FV has

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advantages over other modes of fluoride delivery because it is easy to apply, acceptable to patients, safe, and inexpensive.³

POHO provides FV intervention standards that outline: specific target populations at risk; locations for delivery; roles and responsibilities of oral health professionals; frequency of application; and data collection and reporting processes. To support zone operations to achieve and maintain OHAP standards, POHO delivers staff training and education, develops implementation resources, and provides ongoing consultation to zones. The five geographic zones of AHS manage 58 FTE oral health professionals, including Registered Dental Assistants and Registered Dental Hygienists, in the delivery of FV intervention for preschool and school-age children, dental sealants for school-age children and oral health training for care providers of older adults.

INTERVENTION

The FV intervention uses a directed-population approach to target preschool and school-age populations identified by low socio-economic indicators that focus on income and education. A combination of direct and indirect measures for low SES establishes the eligibility criteria for the FV intervention. Proof of eligibility is not required for participation.

In the preschool population, the identified eligibility criteria facilitates self-referral by families, referrals from health professionals, and identification of community groups engaged with the target population. The eligibility criteria are promoted through brochures (Figure 1), posters, and Alberta-wide web and telephone sources. Zones develop additional promotional activities to meet the needs of their target population and support intervention uptake.

In the school-age population, a material deprivation mapping index for Alberta (Figure 2)⁴ is used to identify schools eligible for the FV intervention. This index, as developed by Pampalon et al.⁵ and applied to Alberta, uses income and education indicators to provide a comparative measure of deprivation for a population in defined areas. Schools in the most deprived areas are identified as target populations. Since school populations may not be representative of the deprivation area, subjective knowledge of student socio-economic status provides additional information in selecting target schools. Schools are identified as the target population rather than individual students in the school.

Registered Dental Assistants and Registered Dental Hygienists provide FV applications following evidence-informed implementation standards. An application requires minimal equipment, including a mouth mirror/tongue depressor, a light source and two chairs. Exclusion criteria for FV application include children with a history of an allergy to colophony and children diagnosed with asthma who do not have their rescue medication, for example, a short-acting bronchodilator, at time of application. If asthma medication is required, it is administered by the parent/legal guardian or self-administered, based on the capability of the child.

Preschool children age 12–35 months identified as low SES are eligible for two FV applications per year over a two-year period. School children in Kindergarten and grades 1 and 2 attending schools identified as low SES are eligible for two FV applications per school year. Preschool FV applications are delivered at community health centres and other community venues, such as libraries,

Who's eligible?

Your 12 to 35 month old child is eligible for Alberta Health Services' fluoride applications if:

A. Your family is already enrolled in the Alberta Child Health Benefit (ACHB).

OR

B. Your household take-home income is no more than these amounts:

Household Size	Family Income
Single parent with 1 child	\$39,035
Single parent with 2 children	\$46,515
Single parent with 3 children	\$54,488
Single parent with 4 children	\$62,936
Couple with 1 child	\$46,856
Couple with 2 children	\$54,951
Couple with 3 children	\$62,391
Couple with 4 children	\$70,398

Single parents or couples with 5 or more children add \$7,460 for each child to the income limit for 4 children.

OR

C. **At least 2 of these** describe your family:

- Someone in your family has had a cavity in the last 2 years
- You get a subsidy for other government services (e.g., daycare)
- You're a single parent
- You've been in Canada for less than 3 years
- Either you or your partner did not finish high school
- Your children are Indigenous.

Figure 1. Preschool FV intervention eligibility criteria

daycares and parent centres. For the preschool intervention, the parent/legal guardian provides direct consent and is present to hold their child during the FV application. Parents of children in Kindergarten and grades 1 and 2 in target schools receive a descriptive notice of the FV intervention and a consent form via the school. Consents must be signed and returned for the student to receive the FV intervention. School FV applications are delivered in schools during school hours with minimal time away from class.

The provincial objective for children receiving the first FV application is 10%–20% of the population age 12–35 months and 5–7 years.⁶ This objective range primarily reflects the number of zone oral health professionals available to deliver the FV applications. AHS Zones follow the OHAP standard for reporting on the FV intervention. It is noted that rates of subsequent FV applications, particularly in the preschool population, decline



Pampalon Material and Social Deprivation Index

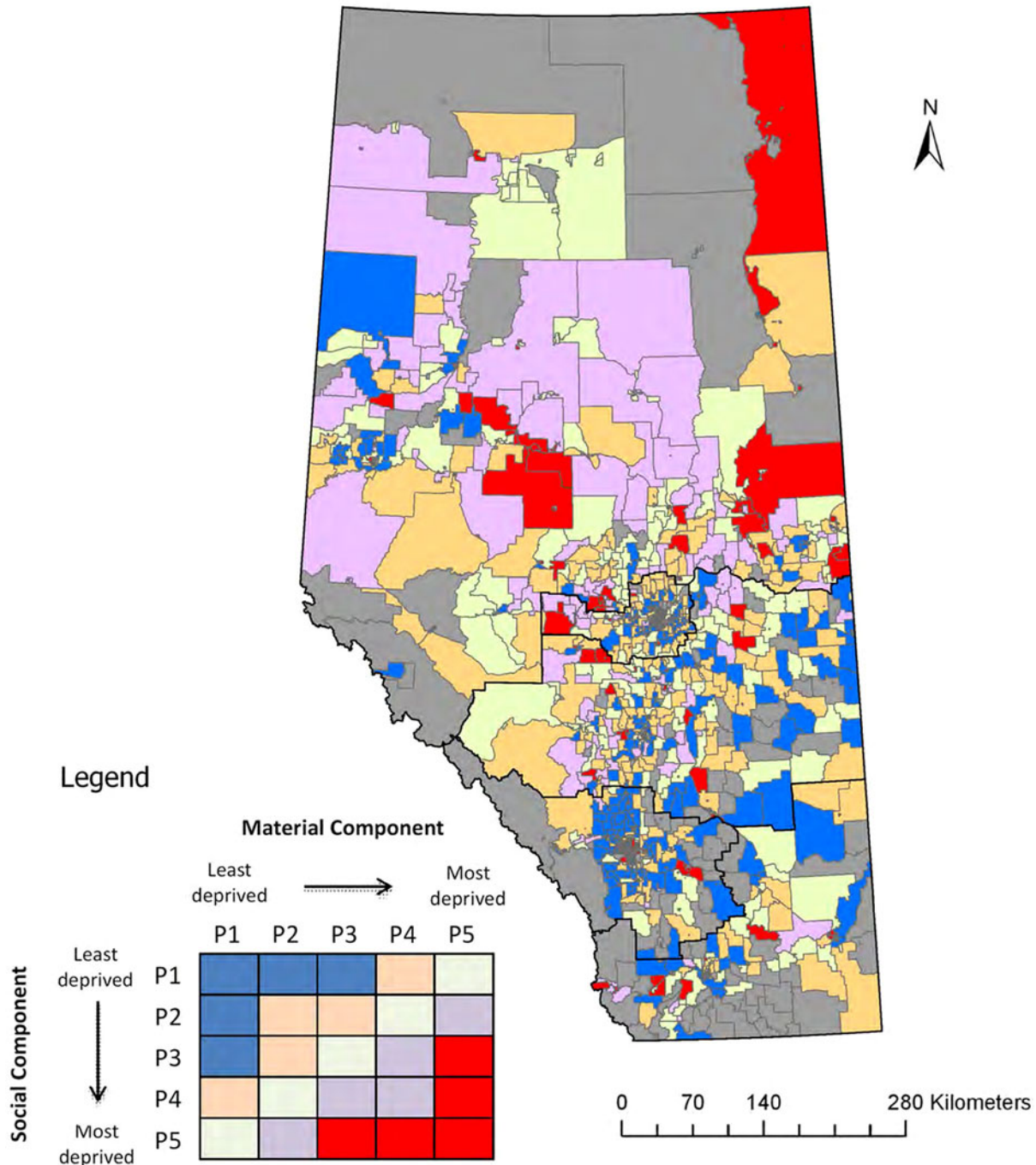


Figure 2. AHS Material Deprivation Mapping Index for Alberta

(Figure 3). Consequently, preschool objectives for rates of children receiving the second, third and fourth FV applications are set at 55%–75%, 30%–50% and 20%–40% of the initial applications respectively.⁶ For school children, the objective for rates of second FV applications in a given year is set at 80%–100% of the initial FV applications.⁶ Due to the nature of a school setting approach, the range for rates of second FV applications is set higher than that of the preschool population. Descriptive analysis of the FV application data was conducted in two time periods: April 2015

to March 2016 for the preschool population and September 2015 to June 2016 for the school population.

OUTCOMES

Following evidence-informed standards, the five zones of AHS deliver FV applications. In the fiscal year studied (2015–2016), a preschool population of 5710 children age 12–35 months from low SES families received a first FV application (Figure 3). This number represents 5% of all Alberta children in this age range.⁷ In the same time

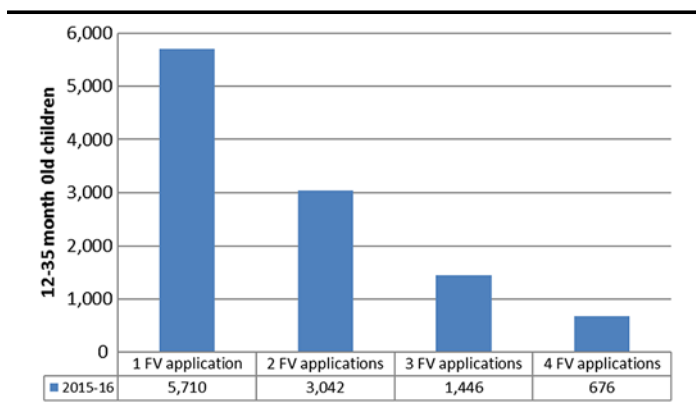


Figure 3. First, second, third and fourth FV applications for children 12–35 months in 2015–2016

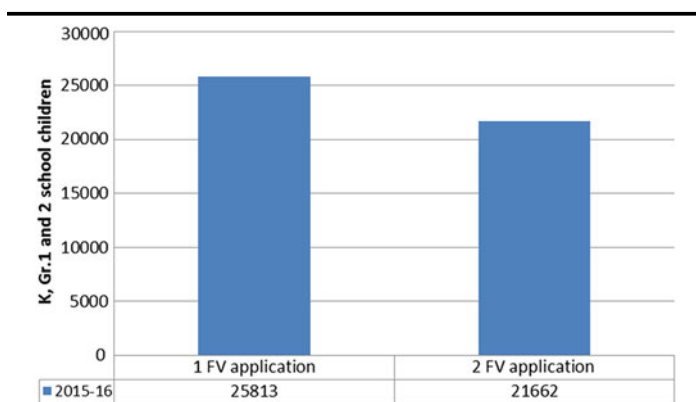


Figure 4. Consent, first and second FV applications for children in Kindergarten and grades 1 and 2 in 2015–2016

period, 3042 children (53%) who received a first FV application subsequently received a second FV application (Figure 3). Of the children who had received first and second FV applications in the previous 12-month reporting period, 1446 (28%) received a third application and 676 (13%) received a fourth application (Figure 3). These annual statistics reveal that the rate of first FV applications is below the population objective of 10%–20% as outlined in OHAP. As anticipated, there is a demonstrated decline in the subsequent rates of the second, third and fourth FV applications. The reasons for this decline are unknown at this time. Evaluation of client satisfaction and intervention processes are needed to clarify reasons for the declining rates and inform strategies for improvement.

In the 2015–2016 school year, 47 110 consent forms were distributed and 26 817 valid consents were received, representing a 57% return rate for Kindergarten and grades 1 and 2 from low SES target schools. Of these students with consent, 25 813 (96%) received a first FV application (Figure 4), representing 16% of all the Alberta population in Kindergarten and grades 1 and 2.⁷ In the same time period, 21 662 (84%) of these students received a second FV application (Figure 4). These annual statistics reveal that the rate of first FV applications for school-age children is within the population objective of 10%–20% outlined in OHAP. The rate of second FV applications is also within the population objective of 80%–100%.

IMPLICATIONS

Provincially, the five geographic zones of AHS deliver a standardized FV intervention as outlined by POHO in OHAP that targets children on the basis of their socio-economic status. This redirection towards a population health approach in providing a necessary preventive intervention moves public oral health towards improving access to oral health care for vulnerable Albertans. The following is a discussion of the implications related to redirecting the FV intervention to low SES Albertan children.

Creating the eligibility criteria

The construct of eligibility based on socio-economic measures to better target inequities in oral health outcomes contrasts with the former eligibility practices in health regions. Past practices included using an individual high-risk approach that utilized clinical risk factors and behaviours to identify children eligible for the FV application. AHS use of deprivation mapping helps to identify eligible school populations and facilitate an FV intervention based on socio-economic measures. A significant challenge in the preschool intervention is translating socio-economic measures into a practical set of criteria for determining eligibility. To better reach our target population, a self-referral tool was created that offers the parent a number of choices for eligibility that include income and other indirect measures of SES. These indirect measures are useful for low-income families who are employed irregularly, unsure of their annual income, or do not file income tax. The eligibility criteria are also useful for health professionals and community group leaders to promote the FV intervention to potentially eligible populations they work with.

Proof of eligibility is not required for participation in the FV intervention. As a result, it is difficult to confirm the SES status of the target population when such client data are not collected. To support meeting the low-income population target objective, POHO conducts ongoing evaluation of the use of the standard eligibility criteria. Implementing the FV intervention in alignment with these standards increases confidence in the FV application being delivered to the target population.

Engaging the target population

When comparing the FV intervention outcomes for the preschool and school populations, there are higher rates of applications to the school age population. School partners provide an opportunity to use a congregate settings approach to positively impact the uptake and completion of the FV intervention and better meet the population outcomes for this age group. Established relationships between schools and AHS public health services facilitate building oral health school partnerships. Deprivation mapping identifies the most deprived areas and helps locate schools serving low SES populations. All students in Kindergarten and grades 1 and 2 attending these schools are eligible for the FV intervention. This population approach is more efficient and avoids having to identify eligible students on an individual basis, that could in turn create privacy issues and social stigmatization. As champions for student oral health, schools are essential to the success of the FV intervention. They allocate space and class time to deliver FV applications to overcome barriers of transportation and time lost at

work and school for appointments. Moreover, schools provide valuable support through their understanding of student needs. This helps with administrative activities such as distributing and collecting consents, identifying need for translation services and addressing student special needs.

Preschool outcomes do not yet meet the provincial objective for uptake of the FV intervention. Similar to using a congregate settings approach in schools, the preschool FV intervention emphasizes delivery to low SES community groups to address issues of affordability, accessibility and acceptability. In reality, this congregate settings approach in the preschool population has challenges. Children age 12–35 months do not typically congregate in locations with their parents present. While public health well-child clinics could be a valuable venue for providing the FV intervention, the limited number of oral health professionals to be available at these clinics precludes this option. Deprivation mapping helps identify geographic areas where eligible population resides but does not identify eligible community groups. Once eligible community groups are engaged, there is improved access to the FV intervention. However, this benefit is lost if there are no new members of eligible age entering the group. Providing the FV intervention in community settings varies across the province and depends on the skills of oral health professionals to build partnerships. To improve access to community groups, a number of zones engage community health promotion facilitators to build oral health professional skills in partnership development.

The most common strategy for uptake in the preschool FV intervention is through use of media, including brochures and posters that outline the eligibility criteria for self-referral to community clinics. Public health nurses are important partners as they use this media to promote the FV intervention to parents as they participate in other public health interventions such as vaccinations. This promotion strategy can have a significant impact on uptake. A concern expressed by some health professionals is that the eligibility criteria overtly identifies families as being low SES and therefore inhibits them from participating in the FV intervention. This is more evident in smaller communities where clients are less anonymous due to familiarity among community members. These impressions by health professionals and their impact on the intervention have not been investigated, nonetheless they point to the need to provide support to oral health professionals working with low-income clients. To support low SES family participation, some zones offer the FV intervention in select congregate group settings or low SES districts versus relying on individual self-referral.

The overall goal and evidence for effectiveness supports preschool children receiving all four FV applications. As with the rate of the FV applications, the target objective of the full completion of all FV applications for a given child was not met. In a congregate settings approach for preschool children, the opportunity to complete the four applications is lost when participants choose to leave the group. Due to resources required to implement a provincial recall system, such a system is not available at this time. Rather the emphasis is on the client connecting with the oral health care provider for additional FV applications. A wallet card similar to an immunization card used in well-child clinics indicates applications received and time period

for next application. The familiarity of this tracking card concept used in immunization supports its adoption by oral health professionals and parents in the preschool FV intervention. However, its use still needs to be evaluated to determine whether it contributes to an increased completion of the FV intervention. An electronic client record for public oral health is currently under construction and should be implemented provincially within the next 2–3 years. This electronic client record system has the capacity to recall clients and improve the completion of the FV intervention.

Deviating from the standard age population

POHO recognizes that zones may need the ability to respond to local needs in order to deliver the FV applications to the target population. An example may include delivering preschool FV applications to a congregate group that includes members who are not within the standard target age. Or another example is delivering services to remote school populations, where FV applications are delivered to all children in a low SES school, even those students outside the standard grades. The opportunity to engage a congregate group, or time to travel to a distant target school, substantiate the delivery of FV applications outside the standard. However, the decision to deliver FV applications outside the target age population diverts scarce resources away from the target population and challenges equitable access to FV applications. Resource allocation for standard and non-standard age populations is tracked to better understand zone resource capacity. To ensure that application rates represent the standard age populations, applications to non-standard age groups are not included in reaching population objectives.

Unequal distribution of oral health professionals

Currently there is an unequal distribution of oral health professionals on a per-population basis across the five geographic zones. This necessitates POHO setting a range for the provincial population objectives that acknowledges varying zone capacity. Achievement of provincial population objectives is undermined by staffing changes, loss of oral health professional positions, and a growing population. Ongoing acknowledgement and discussions with senior AHS management regarding oral health staffing is needed to advocate for equitable access to the FV intervention.

Ongoing evaluation is needed

Redirecting the FV intervention to low-income SES children is realized through the shared vision and leadership of POHO and the commitment of zones to its implementation. Moving forward, POHO identifies there is still work to be done toward integrating a population health approach. This involves exploring how knowledge, skills and systems impede and assist adaptation to the population health approach. Continued support to understand the impact of this approach on interactions with target populations and the delivery of the FV intervention is necessary. From a target population perspective, factors that act as barriers to the uptake and completion of the intervention, as well as the value families place on the FV intervention, need to be better understood. Ongoing evaluation of the structure, processes and outcomes of the FV intervention is needed to better target inequities in oral health outcomes.

REFERENCES

1. Canadian Academy of Health Sciences. *Improving Access to Oral Health Care for Vulnerable People Living in Canada*, 2014. Available at: http://www.cahs-acss.ca/wp-content/uploads/2014/09/Access_to_Oral_Care_FINAL_REPORT_EN.pdf (Accessed January 19, 2016).
2. Marinho VCC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev* 2013;(7):CD002279. doi: 10.1002/14651858.CD002279.pub2.
3. Azarpazhooh A, Main P. Fluoride varnish in the prevention of dental caries in children and adolescents: A systematic review. *J Can Dent Assoc* 2008; 74(1):73–79. PMID: 18298889.
4. Ngom R. *Alberta Health Services Public Health Surveillance and Infrastructure Insight Issue #5. Equity Measurement in Public Health in Alberta: The Contribution of the Pampalon Social and Material Deprivation Index*, 2017. Available at: <http://insite.albertahealthservices.ca/assets/phsi/tms-phsi-insight-newletter-2017-03.pdf> (Accessed March 31, 2017).
5. Pampalon R, Hamel D, Gamache P, Raymond G. A deprivation index for health planning in Canada. *Chronic Dis Can* 2009;29(4):178–91. PMID: 19804682.
6. Alberta Health Services Provincial Oral Health Office. *Oral Health Action Plan 2016*. Edmonton, AB: Alberta Health Services, 2016.
7. Alberta Health Surveillance & Assessment Branch. *Interactive Health Data Application – Population Objectives 2013*. Edmonton, AB: Alberta Health, 2013.

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RÉSUMÉ

CONTEXTE : La carie dentaire est répandue parmi les groupes à faible statut socioéconomique (FSÉ) alors que les coûts limitent l'accès aux soins dentaires. Afin de répondre aux inégalités dans les soins dentaires, l'Alberta

Health Services (AHS) et son plan d'action de santé orale offre une approche en soins de santé qui redirige l'application de vernis fluoré (VF) aux enfants à faible statut socioéconomique. L'utilisation des mesures FSÉ afin d'établir les critères d'admissibilité est fondamentale à la prestation des applications de VF à la population cible.

INTERVENTION : Une série de quatre applications sur deux ans pour les enfants âgés de 12 à 35 mois par enfant au préscolaire, en 1^{ère} et en 2^{ème} année, en utilisant les critères d'admissibilité. L'objectif provincial pour les enfants récipiendaires de la première application de VF est de 10 % à 20 % de la population. Des objectifs supplémentaires seront ajoutés pour les applications de VF pour chacun des groupes de la population.

RÉSULTATS : De 2015 à 2016, le taux de premières applications de VF est en deçà de l'objectif provincial pour les enfants âgés de 12 à 35 mois (5 %) et au sein de l'objectif pour les enfants au préscolaire et en 1^{ère} et 2^{ème} années (16 %). Les taux d'application subséquentes dans le milieu scolaire sont conformes aux objectifs.

INCIDENCES : L'approche englobant la santé de la population afin de réaliser la prestation de VF aux enfants FSÉ est mieux adaptée à traiter les inégalités des résultats de la santé orale en Alberta. Les défis que comporte la redirection des interventions VF comprennent l'établissement des critères d'admissibilité et l'engagement de la population cible, en particulier, pour les enfants d'âge préscolaire. La distribution inégales des ressources à travers la province est un défi de taille pour la réalisation de ces objectifs.

MOTS CLÉS : fluorides; topique; facteurs socioéconomiques; planification de la santé communautaire; l'équité en santé; soins de santé pour les enfants.