POSITION DOCUMENT

USE OF FLUORIDES IN MALAYSIA

Malaysian Dental Council

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Adopted by the
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ON USE OF FLUORIDES IN MALAYSIA

This document was updated by the Workgroup on Use of Fluorides established at the Oral Health Programme, Ministry of Health Malaysia and tabled and approved at the 136th Meeting of the Malaysian Dental Council on the 18 June 2021.

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Notes

Water fluoridation[1] is the treatment of community water supplies for the purpose of adjusting the concentration of the free fluoride ion to the optimum level for maximum caries prevention and minimal occurrence of dental fluorosis.

Fluoride supplements[1] are those products that seek to achieve a similar effect on the individual as fluoridation of the water supply. The term is generally limited to fluoride tablets and drops.

Additional sources of fluoride[1] is an all-encompassing term to include all sources of fluoride other than water fluoridation – fluoride drops, rinses, tablets, toothpastes, gels and fluoride in foods and beverages.

Dental fluorosis[1] is the staining or mottling of the teeth as a result of greater than optimal fluoride exposure while a child's teeth are developing.

Optimum fluoride level in Malaysia is 0.5 ppm since year 2005. This is a downward adjustment from the previous standard of 0.7 ppm adopted from 1972 – 2004.

The National Guidelines for Safe Drinking Water[2] – a document published by the Engineering Services Division of the Ministry of Health, the appointed secretariat for the monitoring for parameters. A range of 0.4 – 0.6 ppm fluoride is cited as the implementation range for water authorities in the document.

Preamble

Fluorides are found naturally throughout the world and are present to some extent in all food and water. In addition, fluorides are used as public health community measures to improve oral health worldwide. Fluoride therapy has been the cornerstone of caries-preventive strategies since the introduction of water fluoridation in the 1940s.

Nevertheless, the use of fluorides generates continuing debate, especially in terms of water fluoridation and its associated public health ethical issues[3]. Controversy relates to the 'trade-off' between potential benefits of fluorides in prevention and control of dental caries, and potential harm, defined as the risk of developing dental fluorosis during tooth formation (at the levels of fluorides used for oral health purposes). Of particular importance when considering this 'trade-off' is the use of fluorides in children.

In Malaysia, the water fluoridation programme was approved by the Cabinet Committee in 1972. However, due to the many fluoride modalities for caries prevention in use today, and an increasingly knowledgeable population, it is now incumbent on the dental profession to clarify its stand on the use of fluorides in Malaysia. Hence, this position document is aimed at all stakeholders in health and health-related activities with interests in fluoride use.

The dental profession considered many policy documents and position statements from several countries and organisations. Several factors are noted:

- the use of fluorides decreases dental caries but the ingestion of above-optimum amounts of fluoride can result in varying degrees of dental fluorosis

- water fluoridation has generated the most debate in terms of public health ethical issues but there is recognition that the assessment of technical evidence is not well suited to public consultation; a synopsis of arguments for decision-making should be made in context of the area/country[3]

- the dental caries situation in Malaysia assessed against the risk of dental fluorosis warrants continued support for water fluoridation as the preferred 'cornerstone' fluoride programme

- the primary mechanism of fluoride in preventing tooth decay is topical[4], and fluoridated water, although consumed, is also an effective topical fluoride delivery method, which, together with fluoride toothpaste impart cumulative benefit in the control of dental caries on a population level, and

- young children are considered a vulnerable group to dental fluorosis, with a higher potential for greater-than- optimum ingestion of fluoride from toothpaste and other alternative sources of fluoride; hence, all decision-making must take into account this relative potential for higher fluoride exposure in children.

Workgroup on Use of Fluorides
Oral Health Programme
Ministry of Health Malaysia

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POSITION DOCUMENT ON USE OF FLUORIDES

The appropriate use of fluorides in dentistry is one of the most successful preventive health measures in the history of healthcare and over decades of research has consistently demonstrated the safety and efficacy of fluorides in preventing dental caries. The scientific basis for the use of fluorides has been accepted by many professional organisations, scientific bodies, expert groups and government agencies. There is a considerable body of literature on the various fluoride alternatives that very recently, have produced several systematic reviews[5-20].

Overall Use of Fluorides in Malaysia

The dental profession, having the health and safety of the public as the prime concern

- strongly supports fluoridation of public water supplies at the optimum level of 0.5 ppm as the first-line preferred strategy for the prevention and control of dental caries

- recommends fluoride toothpaste use as an additional source of fluoride for further impact on reduction and control of dental caries incidence but with emphasis on supervised use of fluoride toothpaste in very young children

- that fluoride mouth rinses and the use of concentrated topical fluoride varnish or gels be supervised/be limited to applications by

dental professionals to limit the occurrence of greater-than-optimal exposure to fluorides

- recognises the use of silver diamine fluoride as another professionally applied topical fluoride but with caution of dark brown staining of caries lesions, as well as dark staining of soft tissue, skin, clothing and countertops if come in contact with the product.

- does not recommend the use of fluoride supplements, salt fluoridation or milk fluoridation given that there should only be one form of artificially-adjusted systemic source of fluorides[21], and that this is already existent in the form of the water fluoridation programme of the Ministry of Health Malaysia with about 73.1% of Malaysians in 2019 having access to fluoridated public water supplies at the recommended optimum level of 0.5 ppm[22].

The following statements on the various fluoride modalities further clarify the stand of the Malaysian dental profession on each fluoride modality.

Water Fluoridation

- Fluoridation of public water supplies is a safe, effective, economical, practical and socially equitable means for prevention and control of dental caries in all age groups, ethnicity, income or education levels.

- The addition of fluoride to public water supplies to the optimum level of 0.5 ppm should be undertaken only when there is insufficient natural fluoride content below that level.

- The public health benefits of water fluoridation far outweigh the possible occurrence of dental fluorosis at the fluoride concentrations recommended for the prevention of dental caries.

- Fluoride levels in water supplies, however, must be tightly monitored and adjusted to ensure consistency in concentrations and to minimise fluctuations.

- There is continued need for surveillance and research to determine the optimal fluoride concentration in water in Malaysia to provide dental caries protection while reducing the potential for dental fluorosis, given the availability of other sources of fluorides.

Fluoridated Toothpastes / Dentifrices

- While recognising that fluoridation of public water supplies is the main preferred method of fluoride delivery[23,24,25], fluoride toothpastes/dentifrices at the range of 1000-1500 ppm over-the counter (OTC) should be used for further reduction in dental caries incidence[23,24].

- Fluoride toothpastes should be used at least 2x daily but there must be supervised use in very young children[23,25].

- Children 4-6 years of age should only use a small amount (pea-sized or a smear) of toothpaste and should be supervised during brushing[23,24,26].

- Children 3 years of age and below should have their teeth brushed by an adult using only a smear of toothpaste[26].

- Any concentrated form of fluoride toothpaste higher than 1500 ppm[26] should

    - only be used on prescription by dental professionals;

    - be professionally supervised for individuals at high-risk to dental caries[23].

- Dentifrice containers and packaging should display the fluoride concentration, with specific indications for supervised use in children under the age of 6 years[24].

- Recommends fluoridated toothpaste for all[26,27].

Fluoride Mouth Rinses

- The use of fluoride mouth rinses at appropriate concentrations is an effective adjunct measure for the prevention and control of dental caries[23,28].

- Fluoride mouth rinses should be selectively used for the specific needs of individuals or groups of individuals assessed at-risk to dental caries by the dental professional[28].

- Fluoride mouth rinses are solutions containing between 0.05% (230 ppm) and 0.2% (900 ppm) sodium fluoride[29].

- Fluoride mouth rinses should not be administered in children below 6 years of age[23,28].

- Any concentrated forms of fluoride mouth rinses that are greater than 230 ppm and available OTC should only be used on prescription and supervision of a dental professional[27,28].

Professionally Applied Topical Fluoride

i) Topical Fluoride Varnishes, Gels or Foams

- Concentrated forms of topical fluorides such as fluoride varnishes, gels or foams should only be applied by dental professionals or the appropriate allied operating personnel[30-33].

- Fluoride varnishes, gels or foams should be limited to individuals who are professionally assessed as being 'at risk' to dental caries [30,34,35].

- Scientific evidence suggests 2 to 4 applications of Fluoride Varnish (22,600 ppm) a year for two consecutive years to be most effective in preventing or reducing caries in moderate to high risk individuals[30,34,36,37].

- The most common concentration in use contain 5% by weight Sodium fluoride (NaF) at Fluoride (Fl) concentration of 22600 ppm[30,31,34,36,38].

- Any other forms of topical fluoride gels or foams available OTC should only be used on prescription and supervision of a dental professional.

ii) Silver Diamine Fluoride (SDF)

- Topical silver diamine fluoride (SDF, 38%) is effective to arrest caries[39-43], treatment of dentine hypersensitivity and managing molar incisor hypomineralisation[44,45].

- In terms of concentration, the 38% SDF (44,800 ppm fluoride) is reported to have higher chance of arresting caries than the 12% SDF (14,150 ppm fluoride)[39,46].

- SDF might be used for people with dental caries in situations where traditional treatment approaches to caries management might not be possible or where access to care is limited[39,40,45,47].

- SDF can be used as part of a non-restorative control and a restorative-based options for carious lesions of non-symptomatic tooth (no signs of pulp involvement)[44,48,49,50].

- In terms of application frequency, increasing frequency application can increase caries arrest rate[51,52]. Evidence reported that one-time SDF application is effective in arresting caries lesions depending on the lesion size, lesion location and tooth location. Reapplication may be necessary to sustain caries rate [48,49,52,53].

- The undesirable effect of SDF is mainly due to dark/black staining of carious lesions [39-42,51]. Taking into consideration of low cost of the treatment, less invasive modality and the dental disease burden, the benefits of SDF application in the target populations outweigh its possible undesirable effects[39].

Addendum

The dental profession also makes the following statements on research into fluoride use and relevant issues of note.

τ Research Into Fluoride Use

The dental profession in making the above position statements, advocates and supports the need for continued research into the risks and benefits of fluoride use, with special mention for

- estimations of fluoride exposures from all sources relevant to determining the optimum fluoride level for public water supplies in Malaysia
- the possible impact of fluoride-reducing factors within the home such as the use of unfluoridated bottled water or various reverse osmosis water filtration devices
- levels of dental fluorosis against levels of dental caries
- levels of fluoride in dentifrices.

τ Role of Members of the Dental Team

The dental profession also makes the following recommendations on the role of members of the dental team.

- There must be continued monitoring of all peer-reviewed research and evidence related to fluoride use

- Dental personnel should be aware of the water fluoride content in their area, the information of which can be obtained from several sources[54]

- Dental professionals should, for the benefit of their patients, clearly understand,
    - the beneficial effects of fluoride in conjunction with the major risk factors for dental caries
    - the potential factors that may affect the quality of saliva and hence the caries levels e.g. smoking, substance abuse, effect of certain medications, certain medical conditions, ageing and radiation therapy
    - that diet with high frequency and prolonged ingestion of sugars and starch pose the highest risk to dental caries.

- Members of the dental team should give constant and consistent messages to parents of young children on the need to supervise the use of fluoridated toothpaste in their children.

- It is recommended that the fluoride content of bottled drinking water does not exceed 0.6 ppm[55] and that in natural mineral water does not exceed 1.5 ppm[56].

References

1. Adapted from the Australian Dental Association. Policy Statement 2.2.1. Community Oral Health Promotion: Fluoride Use, (Including ADA Guidelines for the Use of fluoride), 2019. Accessed at https://www.ada.org.au/Dental-Professionals/Policies/National-Oral-Health/2-2-1-Fluoride-Use/ADAPolicies_2-2-1_FluorideUse_V1.aspx 26 November 2020

2. Engineering Services Division, Ministry of Health Malaysia National Standard for Drinking Water Quality, 2000.

3. Nuffied Council on Bioethics. Public Health: ethical issues. Chapter 4. Case study – Fluoridation of water. Cambridge Publishers Ltd, 2007:121-39

4. Canadian Paediatric Society (CPS). Nutrition Committee. Position Statement: The use of fluoride in infants and children. Paediatrics Child Health 2002;7(8):569-72. Updated 2019.

5. University of York, NHS Centre for Reviews and Dissemination. McDonagh M et al. A systematic review of water fluoridation. York, NHS Centre for Reviews and Dissemination. University of York, 2000

6. Australian National Health and Medical Research Council. A systematic review of the efficacy and safety of fluoridation. Canberra, 2007.

7. Iheozor-Ejiofor Z, Worthington HV, Walsh T, O'Malley L, Clarkson JE, Macey R, Alam R, Tugwell P, Welch V, Glenny AM. Water fluoridation for the prevention of dental caries. Cochrane Database of Systematic Reviews 2015, Issue 6. Art. No.: CD010856. DOI: 10.1002/14651858.CD010856.pub2.

8. Marinho VCC, Higgins J, Logan S, Sheiham (deceased) A. Fluoride toothpastes for preventing dental caries in children and

adolescents. Cochrane Database of Systematic Reviews 2003, Issue 1. Art. No.: CD002278. DOI: 10.1002/14651858.CD002278.

9. Marinho VCC, Higgins JPT, Sheiham A, Logan S. Combinations of topical fluoride (toothpastes, mouthrinses, gels, varnishes) versus single topical fluoride for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: CD002781. DOI: 10.1002/14651858.CD002781.pub2.

10. Marinho VCC, Higgins JPT, Sheiham A, Logan S. One topical fluoride (toothpastes, or mouthrinses, or gels, or varnishes) versus another for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: CD002780. DOI: 10.1002/14651858.CD002780.pub2.

11. Wong MCM, Glenny AM, Tsang BWK, Lo ECM, Worthington HV, Marinho VCC. Topical fluoride as a cause of dental fluorosis in children. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007693. DOI: 10.1002/14651858.CD007693.pub2

12. Tubert-Jeannin S, Auclair C, Amsallem E, Tramini P, Gerbaud L, Ruffieux C, Schulte AG, Koch MJ, Rège-Walther M, Ismail A. Fluoride supplements (tablets, drops, lozenges or chewing gums) for preventing dental caries in children. Cochrane Database of Systematic Reviews 2011, Issue 12. Art. No.: CD007592. DOI: 10.1002/14651858.CD007592.pub2.

13. Marinho VCC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2013, Issue 7. Art. No.: CD002279. DOI: 10.1002/14651858.CD002279.pub2.

14. Marinho VCC, Worthington HV, Walsh T, Chong LY. Fluoride gels for preventing dental caries in children and adolescents. Cochrane

Database of Systematic Reviews 2015, Issue 6. Art. No.: CD002280. DOI: 10.1002/14651858.CD002280.pub2.

15. Yeung CA, Chong LY, Glenny AM. Fluoridated milk for preventing dental caries. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD003876. DOI: 10.1002/14651858.CD003876.pub4.

16. Marinho VCC, Chong LY, Worthington HV, Walsh T. Fluoride mouth rinses for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2016, Issue 7. Art. No.: CD002284. DOI: 10.1002/14651858.CD002284.pub2.

17. Takahashi R, Ota E, Hoshi K, Naito T, Toyoshima Y, Yuasa H, Mori R, Nango E. Fluoride supplementation (with tablets, drops, lozenges or chewing gum) in pregnant women for preventing dental caries in the primary teeth of their children. Cochrane Database of Systematic Reviews 2017, Issue 10. Art. No.: CD011850. DOI: 10.1002/14651858.CD011850.pub2.

18. Walsh T, Worthington HV, Glenny AM, Marinho VCC, Jeroncic A. Fluoride toothpastes of different concentrations for preventing dental caries. Cochrane Database of Systematic Reviews 2019, Issue 3. Art. No.: CD007868. DOI: 10.1002/14651858.CD007868.pub3.

19. Rosenblatt A, Stamford TC, Niederman R. Silver diamine fluoride: a caries "silver-fluoride bullet". Journal of Dental Research 2009;88(2):116-25.

20. Gao SS, Zhang S, Mei ML, Lo EC, Chu CH. Caries remineralisation and arresting effect in children by professionally applied fluoride treatment - a systematic review. BMC Oral Heatlh 2016;16:12.

21. Pan American Health Organisation. Promoting oral health: the use of salt fluoridation to prevent dental caries. *Scientific and Technical Publication No 615*. Washington D.C: PAHO, 2005

22. Oral Health Division, Ministry of Health Malaysia. Annual Report, 2019

23. Adapted from the Australian Dental Association Inc. Policy Statement. Community Oral Health Promotion: Fluoride Use, 2007. Accessed at http://www.ada.org.au/oralHealth/FLN/flinaust.aspx 20 May 2009

24. Canadian Paediatric Society (CPS). Nutrition Committee. The use of fluoride in infants and children. *Paediatrics & Child Health* 2002;7(8):569-72. Revised 2007

25. Australian National Health and Medical Research Council. A systematic review of the efficacy and safety of fluoridation. Canberra, 2007. Available at www.nhmrc.gov.au/publications/synopses/eh41syn.htm accessed on 20 May 2009

26. Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride toothpastes for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews* 2003, Issue 1. Art. No.: CD002278. DOI:10.1002/14651858.CD002278

27. Marinho VCC, Higgins JPT, Logan S, Sheiham A. Topical fluoride (toothpastes, mouth rinses, gels or varnishes) for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews* 2003, Issue 4. Art. No.: CD002782. DOI: 10.1002/14651858.CD002782

28. Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride mouth rinses for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews* 2003, Issue 3. Art. No.: CD002284. DOI: 10.1002/14651858.CD002284

29. Alliance for a Cavity-Free Future. Fluoride Mouth Rinse. The Alliance for a Cavity-Free Future, 2021. Accessed at

https://www.acffglobal.org/for-professionals/referencematerials/ fluoride -mouth-rinse/ 31 March 2020

30. American Academy of Pediatric Dentistry: The reference manual of Pediatric Dentistry Best practices: fluoride therapy latest revision 2018

31. Fluoride Varnish versus Foam: what Research Shows

32. J Godel: the use of fluorides in infants and children, Paediatr child Health 2002:7(8):569-72. Reaffirmed 2019

33. Weyant RJ, Tracy SL, Anselmo T, Beltran-Aguilar ED, et al. Topical Fluoride for Caries Prevention: Executive Summary of Updated Clinical Recommendations and Supporting Systematic Review. JADA 2013;144(11):1279-1291. 2013 American Dental Association

34. Alliance for a Cavity-Free Future. Fluoride Varnish. The Alliance for a Cavity-Free Future, 2021. Accessed at https://www.acffglobal.org/for-professionals/reference-materials /fluoride-varnish/ 31 March 2020

35. Australian Dental Association: Policy statement 2.2.1 community oral health promotion; Fluoride use

36. CADTH: Fluoride Varnishes for Dental Health: a review of the clinical effectiveness, cost effectiveness and guidelines 2016

37. Chou R, Cantor A, Zakher B, Mitchell JP, Pappas M. Prevention of Dental Caries in Children Younger Than 5 Years Old: systematic Review to Update the U.S. Preventive Services Task Force Recommendation. Evidence Synthesis No. 104. AHRQ Publication No. 12-05170-EF-1. Rockville, Md.: Agency for Healthcare Research and Quality ;2014.

38. National Maternal and Oral Health Resource Centre: Fluoride Varnish

39. Gao SS, Zhao IS, Hiraishi N, et al. Clinical Trials of Silver Diamine Fluoride in Arresting Caries among Children: A Systematic Review. *JDR Clinical & Translational Research*. 2016;1(3):201-210.

40. Seifo N, Cassie H, Radford JR, Innes NP. Silver diamine fluoride for managing carious lesions: an umbrella review. BMC Oral Health. 2019;19(1):145.

41. Oliveira BH, Rajendra A, Veitz-Keenan A, Niederman R. The effect of silver diamine fluoride in preventing caries in the primary dentition: a systematic review and meta-analysis. Caries Research. 2019;53(1):24–32.

42. Hendre AD, Taylor GW, Chavez EM, Hyde S. A systematic review of silver diamine fluoride: effectiveness and application in older adults. Gerodontology. 2017;34(4):411–9.

43. Crystal YO, Marghalani AA, Ureles SD, Wright JT, Sulyanto R, Divaris K, Fontana M, Graham L. Use of Silver Diamine Fluoride for Dental Caries Management in Children and Adolescents, Including Those with Special Health Care Needs. Pediatric Dentistry. 2017 ;39(5):135-145.

44. Seifo N, Robertson M, MacLean J, Blain K, Grosse S, Milne R, Seeballuck C, Innes N. The use of silver diamine fluoride (SDF) in dental practice. British Dental Journal. 2020 ;228(2):75-81.

45. Toumba KJ, Twetman S, Splieth C, Parnell C, Van Loveren C, Lygidakis NA. Guidelines on the use of fluoride for caries prevention in children: an updated EAPD policy document. European Archives of Paediatric Dentistry. 2019;20(6):507-16.

46. Tolba ZO, Hamza HS, Moheb DM, Hassanein HE, El Sayed HM. Effectiveness of two concentrations 12% versus 38% of silver diamine fluoride in arresting cavitated dentin caries among children: a systematic review. Egyptian Pediatric Association Gazette. 2019 Dec 1;67(1):1.

47. Do LG, Australian Research Centre for Population Oral Health. Guidelines for use of fluorides in Australia: update 2019. Australian Dental Journal. 2020;65(1):30-8.

48. American Academy of Pediatric Dentistry. Policy on the use of silver diamine fluoride for pediatric dental patients. Pediatric Dentistry. 2017;39(6):51-3.

49. Horst, JA., Ellenikiotis, H., Milgrom, PM. and UCSF Silver Caries Arrest Committee, 2016. UCSF protocol for caries arrest using silver diamine fluoride: rationale, indications, and consent. Journal of the California Dental Association. 2016;44(1):16-28.

50. Alvear Fa B, Jew JA, Wong A, Young D. Silver Modified Atraumatic Restorative Technique (SMART): an alternative caries prevention tool. Stomatology Edu Journal; 2016;3:18-24.

51. Duangthip D, Fung MHT, Wong MCM, Chu CH, and Lo ECM. Adverse effects of silver diamine fluoride treatment among preschool children. Journal of Dental Research: 2018; 97(4): 395-401.

52. Zhi QH, Lo EC, Lin HC.Randomized clinical trial on effectiveness of silver diamine fluoride and glass ionomer in arresting dentine caries in preschool children. Journal of Dentistry. 2012;40 (11): 962-967.

53. Fung MH, Duangthip D, Wong MC, Lo EC, Chu CH. Arresting dentine caries with different concentration and periodicity of silver diamine fluoride. JDR Clinical & Translational Research÷2016 ;1(2):143-52.

54. Engineering Services Division, Ministry of Health Malaysia.

55. Twenty-fifth Schedule [(subregulation 360B (3) and 360C (3) of P.U (A) 437/85 Food Regulations 1985] Standard for Packaged Drinking Water and Vended Water.

56. Twenty-sixth Schedule [(Subregulation 360A (7) of P.U (A) 437/85 Food Regulations 1985] Standard for Natural Mineral Water.

BIBLIOGRAPHY OF POLICY DOCUMENTS / POSITION STATEMENTS

1. American Academy of Paediatric Dentistry. Policy on Use of Fluoride. 2018. The Reference Manual of Paediatric Dentistry 2019-2020/pp 55-56. Available at https://www.aapd.org/research/oral-health-policies--recommendations/use-of-fluoride/

2. American Academy of Paediatric Dentistry Policy. Policy on the use of Silver Diamine Fluoride for Paediatric Dental Patients. Latest revision 2018. Accessed on 2.9.2020 at https://www.aapd.org/media/Policies_Guidelines/P_SilverDiamine.pdf

3. American Academy of Family Physicians. Fluoridation of Public Water Supplies. Position Statement. Accessed on 2.9.2020 at https://www.aafp.org/about/policies/all/fluoridation.html

4. American Public Health Association. Policy Statement Database. Community Water Fluoridation in the United States. Policy Date: 28.10.2008. Policy number:20087. Accessed on 2.9.2020 at https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/24/13/36/community-water-fluoridation-in-the-united-states

5. Australian Dental Association Inc. Policy Statement. Community Oral Health Promotion. Fluoride Use. Policy Statement 1.2.1. Adopted by Federal Council, November 15/16, 2001. Revised version adopted by Federal Council, November 11/12, 2004.

Amended by Federal Council, April 7/8, 2005. Revised version adopted by ADA Federal Council, November 15/16, 2007. Amended by ADA Federal Council, November 18/19, 2010. Amended by ADA Federal Council, April 12/13, 2012. Amended by ADA Federal Council, April 10/14, 2014. Amended by ADA Federal Council, November 13/14, 2014. Amended by ADA Federal Council, August 17/18, 2017.Editorially amended by Constitution & Policy Committee, October 5/6, 2017. Amended by ADA Federal Council, November 22/23,2018. Amended by ADA Federal Council, August 8/9, 2019. Accessed on 3.9.2020 at https://www.ada.org.au/Dental-Professionals/Policies/National-Oral-Health/2-2-1-Fluoride-Use/ADAPolicies_2-2-1_FluorideUse_V1

6. Australia Dental Association (Queensland Branch. Position Statement. Water Fluoridation in Queensland. Adopted by ADAQ Council, January 2015. Accessed on 3.9.2020 at https://www.ada.org.au/News-Media/News-and-Release/Latest-News/Water-Fluoridation-why-is-it-still-being-debated

7. British Medical Association. Fluoridation of water. 2 September 2013. Accessed on 3.9.2020 at http://webcache.googleusercontent.com/search?q=cache:lLh2w7elBz0J:researchbriefings.files.parliament.uk/documents/SN05689/SN05689.pdf+&cd=4&hl=en&ct=clnk&gl=my&client=safari

8. NHS Centre for Reviews and Dissemination. A Systematic Review of Public Water Fluoridation. October 2000. Accessed on 3.9.2020 at http://www.york.ac.uk/inst/crd/fluores.htm

9. FDI Policy Statement. Promoting Oral Health through Water Fluoridation. ADOPTED by the FDI General Assembly November, 2000 in Paris, France. REVISED September, 2014 in New Delhi, India. Accessed on 3.9.2020 at https://www.fdiworlddental.org/resources/policy-statements-

and-resolutions/promoting-oral-health-through-water-fluoridation

10. FDI Policy Statement. Promoting Oral Health Through Fluoride. ADOPTED by the FDI General Assembly November, 2000 in Paris, France. REVISED August, 2017 in Madrid, Spain. Accessed on 3.9.2020 at https://www.fdiworlddental.org/resources/policy-statements-and-resolutions/promoting-oral-health-through-fluoride

11. International Dental Journal. Mechanisms of silver diamine fluoride on arresting caries: a literature review. March 2019. Accessed on 3.9.2020 at https://www.fdiworlddental.org/news/20190305/mechanisms-of-silver-diamine-fluoride-on-arresting-caries-a-literature-review

12. FDI Policy Statement. Fluoride in Restorative Materials. ADOPTED by the FDI General Assembly September, 2003 in Sydney, Australia. REVISED September, 2009 in Singapore, Singapore. Accessed on 4.9.2020 at https://www.fdiworlddental.org/resources/policy-statements-and-resolutions/fluoride-in-restorative-materials

13. Canadian Paediatric Society (CPS). Paediatric Oral Health. July 2019. Accessed on 4.9.2020 at https://www.cps.ca/en/sections/oral-health

14. Canterbury District Health Board. Using Fluoride Tablets to make Fluoridated Water. March 2016. Accessed on 4.9.2020 at https://www.cph.co.nz/wp-content/uploads/hyg0058.pdf

15. Ministry of Health New Zealand. Review of the Benefits and Costs of Water Fluoridation in New Zealand. May 2016. Accessed on

4.9.2020 at https://www.health.govt.nz/publication/review-benefits-and-costs-water-fluoridation-new-zealand

16. Ministry of Health New Zealand. Fluoride and oral health. July 2018. Accessed on 4.9.2020 at https://www.health.govt.nz/our-work/preventative-health-wellness/fluoride-and-oral-health

17. The Royal Society of New Zealand. Health effects of water fluoridation: A review of the scientific evidence. August 2014. Accessed on 4.9.2020 at https://www.royalsociety.org.nz/assets/documents/Health-effects-of-water-fluoridation-Aug-2014-corrected-Jan-2015.pdf

18. Ministry of Health and Water New Zealand. Fluoridation of Drinking-Water Supplies in New Zealand. December 2014. Accessed on 5.9.2020 at https://www.waternz.org.nz/Folder?Action=View File&Folder_id=89&File=Code of Practice - Fluoridation of drinking-water supplies.pdf

19. Canadian Dental Association. Position on Use of Fluorides in Caries Prevention. March 2003. Revised on March 2012. Accessed on 5.9.2020 at https://www.cda-adc.ca/en/about/position_statements/fluoride/

20. Canadian Medical Association. Fluoridation. June 1977. Reviewed on March 2017. Accessed on 5.9.2020 at https://policybase.cma.ca/en/permalink/policy793

21. World Health Organization. Fluoride and Oral Health. January 2016. Accessed on 5.9.2020 at https://www.who.int/oral_health/publications/2016_fluoride_oral_health.pdf?ua=1

22. Colorado Department of Public Health And Environment. Colorado Water Fluoridation Guidelines. Operational & Administrative Guidelines. January 2019. Accessed on 5.9.2020 at https://www.colorado.gov/pacific/sites/default/files/PW_OH_CO_CWF_Guidelines_2019.pdf

23. U.S. Department of Health and Human Services Federal Panel. U.S. Public Health Service Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries. August 2015. Accessed on 5.9.2020 at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4547570/?report=classic

24. Public Health Reports. US National Library of Medicine. Surgeon General's Perspective on Community Water Fluoridation. August 2015. Accessed on 5.9.2020 at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4547574/?report=classic

25. Community Preventive Services Task Force. Oral Health: Preventing Dental Caries, Community Water Fluoridation. January 2017. Accessed on 6.9.2020 at https://www.thecommunityguide.org/sites/default/files/assets/Oral-Health-Caries-Community-Water-Fluoridation_3.pdf

26. International Association for Dental Research. Community Water Fluoridation. September 2019. Accessed on 6.9.2020 at https://www.iadr.org/aadr/fluoridation

27. National Library of Medicine. Economic evaluations in water-fluoridation: a scoping review. April 2020. Accessed on 6.9.2020 at https://pubmed.ncbi.nlm.nih.gov/32299417/

28. European Achieves of Paediatric Dentistry. Guidelines on the use of fluoride for caries prevention in children: an updated EAPD policy document. December 2019. Accessed on 6.9.2020 at https://pubmed.ncbi.nlm.nih.gov/31631242/

Appendix 2

SOME EXCERPTS FROM

POSITION / POLICY STATEMENTS ON USE OF FLUORIDE

FEDERATION DENTAIRE INTERNATIONALE (FDI) POLICY STATEMENT

https://www.fdiworlddental.org/resources/policy-statements-and-resolutions/

Promoting Oral Health through Water Fluoridation (September 2014)

'The public health benefits of water fluoridation in the prevention of dental decay far outweigh the possible occurrence of very mild/mild dental fluorosis. ……The FDI recommends a comprehensive preventive approach as the most appropriate method of reducing the heavy burden of dental decay worldwide and together with WHO supports the use of water fluoridation as an important public health measure.'

Promoting Oral Health through Fluoride (August 2017)

'FDI urges all countries to recognize that universal access to appropriate and judicious use of fluoride for maintaining oral health as part of the basic human right to health.'

WORLD HEALTH ORGANISATION

Petersen PE, Lennon MA. Effective use of fluorides for the prevention of dental caries in the 21st century: the WHO approach. *Community Dent Oral Epidemiol* 2004; 32: 319-321.

https://www.who.int/oral_health/events/

'Water fluoridation, where technically feasible and culturally acceptable, has substantial advantages [in public health] particularly for subgroups at high risk of caries.'

Global Consultation on Oral Health through Fluoride (November 2006)

'The burden of tooth decay affects children, adults and the elderly, disrupts life and causes considerable pain, suffering economic hardship. Much of the disease still remains untreated, particularly in low and middle-income populations. Prevention by using fluoride is the only realistic way of reducing this burden in populations. …… Recognising the magnitude of the problem, and in order to achieve this the experts convened by the WHO, FDI and IADR urge governments to take several actions.'

CENTERS FOR DISEASE CONTROL AND PREVENTION

https://www.cdc.gov/fluoridation/index.html

Community Water Fluoridation (January 2020)

'Because of its contribution to the large decline in cavities in the United States since the 1960s, CDC named community water fluoridation one of 10 great public health achievements of the 20th century. …… Community water fluoridation is the most efficient and cost-effective way to deliver fluoride to everyone in a community, regardless of their age, income, or education.'

AMERICAN DENTAL ASSOCIATION

https://www.ada.org/en/public-programs/advocating-for-the-public/fluoride-and-fluoridation/ada-fluoridation-policy

ADA Fluoridation Policy (May 2017)

'The American Dental Association unreservedly endorses the fluoridation of community water supplies as safe, effective and necessary in preventing tooth decay. This support has been the association's position since policy was first adopted in 1950.'

AMERICAN MEDICAL ASSOCIATION

https://policysearch.ama-assn.org/policyfinder/detail/fluoride/

Public Health: Water Fluoridation (2011)

'The AMA urges state health departments to consider the value of requiring statewide fluoridation (preferably a comprehensive program of fluoridation of all public water supplies, where these are fluoride deficient), and to initiate such action as deemed appropriate. ……supports the 2011 proposed fluoridation standards as promulgated by the US Department of Health and Human Services and the Environmental Protection Agency.'

AUSTRALIAN DENTAL ASSOCIATION

https://www.ada.org.au/Dental-Professionals/Policies/National-Oral-Health/2-2-1-Fluoride-Use/ADAPolicies_2-2-1_FluorideUse_V1

Community Oral Health Promotion: Fluoride Use (November 2020)

'Fluoridation of community water supplies is preferred as a safe and effective means of reducing the prevalence of dental caries in all age groups and should be implemented and maintained in those communities where there is an insufficient natural fluoride content for this purpose.'

AUSTRALIAN GOVERNMENT: NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL

https://www.nhmrc.gov.au/about-us/publications/2017-public-statement

Water Fluoridation and Human Health in Australia (2017)

'There is reliable evidence that community water fluoridation helps to prevent tooth decay. …… There is no reliable evidence of an association between community water fluoridation at current Australian levels [0.6 to 1.1 mg/L] and any health problems. …… Fluoridated water is the primary source of fluoride exposure and helps reduce tooth decay for all, at all stages of life.'

BRITISH DENTAL ASSOCIATION

https://www.bda.org/

Policy Statement (2008)

'The addition of fluoride into water supplies in certain areas could dramatically reduce the levels of tooth decay and give children a decent start of life. That is why the British Dental Association, along with many other leading healthcare organisations, supports targeted water fluoridation.'

BRITISH MEDICAL ASSOCIATION

https://www.bma.org.uk/

Fluoridation of Water (January 2010)

'The British Medical Association remains committed to the fluoridation of mains water supplies, after appropriate public consultation, on the grounds of effectiveness, safety and equity. …… The British Medical Association believes that local authorities should be more proactive in helping to reduce the dental inequalities that exist across social groups in the United Kingdom.'

BRITISH SOCIETY OF PAEDIATRIC DENTISTRY

https://www.bspd.co.uk/Portals/0/BSPD%20Fluoridation%20Updated%20Position%20Statement%202019.pdf

Water Fluoridation – A Position Statement (June 2019)

'The British Society of Paediatric Dentistry supports the fluoridation of public water supplies in communities where the burden of dental decay is severe enough to warrant this public health measure and fluoridation is technically feasible.'

CANADIAN ASSOCIATION OF PUBLIC HEALTH DENTISTRY

https://www.caphd.ca/sites/default/files/CAPHD_CWF_PositionStatement_EN_Sep_2014/

Position Statement on Community Water Fluoridation (September 2014)

'The Canadian Association of Public Health Dentistry endorses community water fluoridation as an important public health measure to prevent dental caries (tooth decay) in a population. It is safe, effective, ethical, legal, reduces oral health disparities and is cost-effective.'

CANADIAN DENTAL ASSOCIATION

https://www.cda-adc.ca/en/about/position_statements/fluoride/

CDA Position on Use of Fluorides in Caries Prevention (March 2012)

'The Canadian Dental Association supports the appropriate use of fluorides in dentistry as one of the most successful preventive health measures in the history of health care. …… CDA supports fluoridation of municipal drinking water as a safe, effective and economical means of preventing dental caries in all age groups. Fluoride levels in the water supplies should be monitored and adjusted to ensure consistency in concentrations and avoid fluctuations. …… CDA recognizes and supports the use of

fluoridated toothpastes and mouth rinses in the prevention of dental caries. …… CDA recognizes and supports the professional topical applications of fluoride gels, foams and varnishes in the prevention of dental caries for individuals at risk.'

CANADIAN PAEDIATRIC SOCIETY

https://www.cps.ca/en/documents/position/fluoride-use/

Position Statement: The Use of Fluoride in Infants and Children (February 2019)

'Fluoride should continue to be added to municipal water supplies where natural concentrations are less than 0.3 ppm. A suitable trade-off between dental caries and fluorosis occurs around 0.7 ppm.'

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH

https://www.iadr.org/IADR/About-Us/Policy-Statements/

Policy Statement: Fluoridation of Water Supplies (1999)

'The International Association for Dental Research (IADR), ...fully endorses and strongly recommends the practice of water fluoridation for improving the oral health of nations.'

AMERICAN ASSOCIATION FOR DENTAL RESEARCH

https://www.iadr.org/aadr/fluoridation

Policy Statement: Community Water Fluoridation (2018)

'American Association for Dental Research supports community water fluoridation as a safe and effective, evidence-based intervention for the prevention of dental caries.'

NATIONAL CANCER INSTITUTE

https://www.cancer.gov/about-cancer/causes-prevention/risk/myths/fluoridated-water-fact-sheet/

Can Fluoridated Water Cause Cancer? (May 2017)

'The possible relationship between fluoridated water and cancer has been debated for years. …… Studies to date have produced "no credible evidence" of an association between fluoridated drinking water and an increased risk for cancer.'

NATIONAL INSTITUTE OF DENTAL AND CRANIOFACIAL RESEARCH

http://www.f-take.com/nidcr-statement.htm

Statement on Water Fluoridation (August 2020)

'The National Institute of Dental and Craniofacial Research (NIDCR) continues to support water fluoridation as a safe and effective method of preventing tooth decay in people of all ages. One significant advantage of water fluoridation is that anyone, regardless of socioeconomic level, can enjoy its benefits during their daily lives – at work, school and play – simply by drinking fluoridated water or beverages prepared with fluoridated water.'

UNITED STATES PUBLIC HEALTH SERVICE

US Department of Health and Human Services Federal Panel on Community Water Fluoridation. US Public Health Service Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries. *Public Health Reports* 2015; 130(4): 318-331.

'Community water fluoridation remains an effective public health strategy for delivering fluoride to prevent tooth decay and is the most feasible and cost-effective strategy for reaching entire communities.'

Excerpt from Chapter 7: Case Study: Fluoridation of Water[1]. Nuffield Bioethics. Public Health: Ethical Issues

7.48 …Water fluoridation has the potential to contribute to three central goals of the stewardship model: first, the principle of reducing health inequalities between different regional and socio-economic groups; secondly, the possibility of reducing ill health through environmental measures; and thirdly, concern for the health of children, who constitute a vulnerable group.

7.49 …. the acceptability of any policy involving the water supply should be considered in relation to the balance of risks and benefits, the potential of alternatives, and, where there are harms, to the role of consent..

7.50 Regarding consent, it is clear that an approach requiring individual consent is not feasible in practice. …We suggest the adoption of local decision-making procedures that take into account the context in each area in which a decision is to be taken.

7.51 … Policy makers and the public need to have access to clear and accurate information, and uncertainties and the strength or weakness of the evidence should be explicitly recognised.....'.

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[1] **Nuffield Council on Bioethics. Public health: ethical issues. Chapter 7. Case study: Fluoridation of water, Nov 2007: 121-39**

Excerpt from a Health Technology Assessment[2]

'Overall, this ethics analysis concludes that Community Water Fluoridation (CWF) is ethically justified because it effectively improves public oral health with few harms and side effects. It is also an impartial intervention because, within communities where it is available, it is provided to all households, irrespective of status or wealth. It has not been possible to arrive at any conclusions about the ethics of CWF cessation, because there is currently insufficient evidence about the effects of cessation. Even though there are strong ethical arguments in favour of CWF, it will remain ethically controversial because it is provided without the direct consent of those who receive the intervention. In the case of CWF, this can be ethically justified because the balance of its public health benefits outweigh its measured harms, and are significant enough to override the concerns related to individual choice'.

[2] **Community Water Fluoridation Programs: A Health Technology Assessment — Ethical Considerations. Ottawa: CADTH; 2019 Feb. (CADTH technology review; no.16).**

BENEFITS VERSUS RISK IN THE USE OF FLUORIDES: THE MALAYSIAN CONTEXT

Existing data in the country finds dental fluorosis at a level that is acceptable. In the current situation of persistent high caries experience, particularly among adults, such levels of dental fluorosis is an acceptable risk when weighted against the benefits that can be gained for caries prevention and control from water fluoridation and the concurrent use of fluoride toothpaste. The dental profession acknowledges that there needs to be greater vigilance on dental fluorosis in Malaysia. This position document takes note of the need for more research for estimations of fluoride exposures from all sources to determine the optimum fluoride level for public water supplies and to determine levels of dental fluorosis against levels of dental caries.

ORGANISATIONS THAT RECOGNISE THE PUBLIC HEALTH BENEFITS OF COMMUNITY WATER FLUORIDATION FOR PREVENTING DENTAL DECAY

Academy of Dentistry International

Academy of General Dentistry

Academy for Sports Dentistry

Alzheimer's Association

American Academy of Family Physicians

American Academy of Oral and Maxillofacial Pathology

American Academy of Pediatric Dentistry

American Academy of Pediatrics

American Academy of Periodontology

American Academy of Physician Assistants

American Association for Community Dental Programs

American Association for Dental Research

American Association for the Advancement of Science

American Association of Endodontists

American Association of Oral and Maxillofacial Surgeons

American Association of Orthodontists

American Association of Public Health Dentistry

American Association of Women Dentists

American Cancer Society

American College of Prosthodontists

American Council on Science and Health

American Dental Assistants Association

American Dental Association

American Dental Education Association

American Dental Hygienists' Association

American Dietetic Association

American Hospital Association

American Medical Association

American Nurses Association

American Osteopathic Association

American Public Health Association

American Society for Clinical Nutrition

American Society of Dentist Anesthesiologists

American Student Dental Association

American Water Works Association

America's Health Insurance Plans

Association of State and Territorial Dental Directors

Association of State and Territorial Health Officials

British Fluoridation Society

Canadian Dental Association

Canadian Dental Hygienists Association

Canadian Medical Association

Canadian Nurses Association

Canadian Paediatric Society

Canadian Public Health Association

Centers for Disease Control and Prevention (CDC)

Children's Dental Health Project

Council of State and Territorial Epidemiologists

Delta Dental Plans Association

Dental Trade Alliance

FDI World Dental Federation

Friends of NIDCR

Hispanic Dental Association

Institute of Medicine

International Association for Dental Research

National Association of County and City Health Officials

National Council Against Health Fraud

National Dental Assistants Association

National Dental Association

National Institute of Dental and Craniofacial Research (NIDCR)

Oral Health America

Public Health England

Public Health Law Research (Temple University)

Robert Wood Johnson Foundation

Royal Society of New Zealand

Society for Public Health Education

U.S. Public Health Service

World Health Organisation