



MANUAL

SCHOOL-BASED FLUORIDE MOUTH RINSING (FMR) PROGRAMME

**Oral Health Programme
Ministry of Health Malaysia
2023**



**FOREWORD BY
THE PRINCIPAL DIRECTOR OF ORAL HEALTH
MINISTRY OF HEALTH MALAYSIA**

Dental caries is one of the most prevalent oral diseases affecting majority of world population, including school children, during their life course. It shares many common risk factors, social and commercial determinants with non-communicable diseases.

Oral health status of school children in Malaysia has shown marked improvement over the last four decades which attributed to the success implementation of comprehensive school incremental dental care and community water fluoridation. Nevertheless, oral health disparities persist among the school children, both demographically and geographically, especially in states with suboptimal fluoride exposure and poor coverage of community water fluoridation.

School setting has been recognized as a favourable environment for the promotion of oral health education and caries preventive programmes. It is evident that school-based fluoride mouth rinsing (FMR) programme is an effective, feasible and low-cost measure to prevent and reduce dental caries among school children. It is recommended in low-fluoride communities with moderate to high level of caries rates. It also has shown that school children who took part in this programme were protected on all types of tooth surfaces. In long term, FMR has a positive effect on tooth status.

This manual, Edition 2023, serves as a resource for oral health personnel involved in FMR training, implementation, monitoring, and evaluation, as well as research. It also features revised versions of data collection forms which are user's friendly based on the feedbacks from the active FMR advocates and practitioners. It should serve as a guide to all oral health professionals nationwide in conducting FMR systematically. That is our fervent hope that this population strategy programme, could be carried out effectively as means of prevention and control of dental caries, especially to those at the highest risk.

I would like to express my sincere gratitude to the committee members for their commendable efforts in producing this manual. Well done!

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ACKNOWLEDGEMENT

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MANUAL FOR A SCHOOL-BASED FLUORIDE MOUTH RINSING (FMR) PROGRAMME

1. INTRODUCTION

This manual provides guidance on the implementation, monitoring and evaluation of the school-based fluoride mouth rinsing (FMR) programme for primary schoolchildren. It is a complementary document to the Guidelines on Oral Healthcare for Schoolchildren in Malaysia¹. Extensive literature review is also provided for referral in this manual. FMR is a recognized intervention of controlling and preventing dental caries among school children, particularly in fluoride-deficient/non-fluoridated areas.

FMR is a community-based dental caries preventive programme which shall be carried out by school community such as school teachers to ensure it is sustainable. Involvement of community/school teachers is essential/vital in ensuring the success of this programme.

2. OBJECTIVES

2.1 General Objective

To establish a standardised, comprehensive and systematic school-based FMR programme as part of the Oral Healthcare for Schoolchildren residing in fluoride-deficient/non-fluoridated areas.

2.2 Specific Objectives

- To implement school-based FMR programme at identified primary schools.
- To increase the proportion/number of primary schoolchildren in fluoride-deficient/non-fluoridated areas participating in FMR Programme annually
- To determine the prevalence of dental caries among 12-year-old primary schoolchildren after the implementation of FMR Programme.

3. TARGET POPULATION

FMR programme will focus on primary schoolchildren in areas with low or without access to fluoridated water supply. The programme shall be carried out at the identified primary schools.

4. ROLES AND RESPONSIBILITIES

4.1 Oral Health Personnel

- i. To train and update all dental officers and dental therapists on relevant subjects which include:
 - Current knowledge on FMR programme (e.g. indications for FMR, identification of high-risk communities, FMR procedures)
 - Data collection and reporting
 - Monitoring and evaluation
- ii. To conduct training session on the FMR programme for **ALL** school teachers at the selected schools on yearly basis.
- iii. To prepare sodium fluoride powder packs and distribute it to the selected schools.
- iv. To provide instruments and materials to the selected schools.
- v. To conduct rinsing practice session at the beginning of the programme and ensure schoolchildren are able to perform rinsing accordingly (refer 5.2.3).
- vi. To monitor implementation of FMR at the selected schools through 3 monthly visit and retrain school teachers when necessary.
- vii. To report FMR programme conducted at district, state and national levels.
- viii. To conduct evaluation of the FMR programme.

4.2 School Personnel

Commitment and cooperation from school personnel are essential to ensure smooth and successful implementation of the programme. Task to be carried out by school personnel are as listed below (refer **Appendix 1**):

- i. To organize FMR activity for identified classes by personnel in charge
- ii. To prepare 0.2% sodium fluoride solution (refer 5.2.5) on the same day as the rinsing activity and distribute it using smaller container to each class
- iii. To conduct FMR activity:
 - on weekly basis for 35 weeks during the school calendar.
 - at least 1 hour before recess.
 - conduct rinsing activity in class (refer 5.2.6).
- iv. To record attendance of school children participated in rinsing activity on weekly basis.

5. IMPLEMENTATION

FMR programme at the selected high-risk schools **MUST** begin with all Year 1 primary school children.

FMR shall be carried out by cohort of Year 1 primary school children for six (6) years (the duration of primary school education) on weekly basis, for 35 weeks during the school calendar to achieve its effectiveness in reducing dental caries incidence among high risk primary school children.

Appendix 2 shows the flow chart of School-Based Fluoride Mouth Rinsing (FMR) Programme.

5.1. Identification of High-Risk Primary Schools

- i. The State Deputy Director of Health (Oral Health)/District Dental Officer and Officer in-charge shall identify high-risk primary schools annually based on criteria as follow (refer **Appendix 3**):
 - Located at *low fluoridated/non-fluoridated area, **and**
 - *Penilaian Risiko Sekolah (PERSiS)* criteria¹
**places with suboptimal fluoride exposure (<0.4ppm)*
- ii. Engage the District Education Office (*Pejabat Pendidikan Daerah*, PPD) in the school's selection.
- iii. Submit the list of selected schools to Oral Health Programme and share it with the Ministry of Education for approval/ further action.

5.2 Fluoride Mouth Rinsing (FMR) Procedure

Following WHO recommendations ², the weekly rinse regime using 0.2% sodium fluoride (NaF) solution shall be deployed.

5.2.1 Consent

A signed informed consent must be secured from the parent/guardian of the child; refer to 'Pengurusan Kebenaran Rawatan Pergigian, Kementerian Kesihatan Malaysia'³. (Refer **Appendix 4**)

5.2.2 Medical/Dental/Social History

A thorough medical history, including known allergies, shall be obtained prior to participation in FMR programme. Children with a known history of renal disease and fluorosis shall be excluded.

5.2.3 Rinsing Practice Session

The following procedure would be adopted by oral health personnel to ensure that the children can expectorate fully:

- i. Give each child 10 ml of plain water
- ii. Ask the children to rinse with the plain water for one minute
- iii. Ask the children to spit out the rinse into a plastic measuring cup
- iv. The expectorate of each child is measured using the plastic measuring cup
- v. If the expectorate exceeds 10 ml, the child will participate in the programme
- vi. If the expectorate is less than 10 ml, another attempt is made.
- vii. If any child faces the problem of rinsing 10 ml of water due to the size of mouth (because of physical or age factor), the child can be allowed to rinse less water (5 – 7 ml). This is to make sure that all children will get the benefit of this programme.
- viii. In the event that the child continues to be unable to expectorate fully after four (4) attempts (even after given less amount of water), the child will be excluded from the programme.

5.2.4 Instruments and Materials

Instruments and materials to be used for this programme are as **Appendix 5**. District Dental Office are responsible to prepare and provide the instruments and materials for FMR activity. The instruments and materials should be handed over to the schools by oral health personnel in charge of the programme.

5.2.5 Storage, Packing and Preparation

i. Storage of supplies

Sodium fluoride powder should be kept in a locked, dry storage area where extremes of hot and cold can be avoided. Other supplies such as plastic containers, measuring cups and mugs, should be stored in a clean and dry place ⁴.

ii. Packing of sodium fluoride powder

- A sensitive digital weighing scale, should be used to weigh sodium fluoride powder based on number of school children involve in FMR programme (refer **Appendix 6**).
- Personnel involved should use disposable latex gloves, disposable plastic aprons and face masks when weighing the sodium fluoride.
- Each packet of sodium fluoride should be labelled and sealed.
- All packets of sodium fluoride should be kept in a closed container, in a locked dry storage area.

iii. Preparation of Sodium Fluoride Solution

- A fresh solution of neutral 0.2% sodium fluoride is prepared by mixing a pack of sodium fluoride with distill/reverse osmosis (RO) water in a plastic container based on the calculation given (refer **Appendix 6**).
- Packed sodium fluoride and distill/reverse osmosis (RO) water will be provided by oral health personnel.
- The mixture is shaken until all the powder has dissolved.
- 0.2% sodium fluoride solution should be transferred to smaller containers for ease of handling during FMR activity.
- The solution should be prepared on the same day the FMR procedure conducted.

5.2.6 Rinsing Procedure

It is recommended to conduct this procedure in classroom setting to optimize time for rinsing activity. FMR should be done at least one (1) hour prior to recess time.

The following procedure would be adopted ⁶:

- i. 10ml (or 5-7ml as indicated to specific school children) of 0.2% sodium fluoride solution is dispensed into a disposable cup of each child.
- ii. The school personnel will announce when to start and stop the rinsing process (1-minute rinsing duration).
- iii. Each child would then rinse for one minute after which the solution is expectorate/spit back into the disposable cup.

- iv. Instruct the child to wipe their mouth with tissue/paper towel and then put it into the used disposable cup in order to absorb the excess solution and discard it into the trash.
- v. Dispose any used tissue/ paper towel and disposable cup into a provided plastic and tie to ensure proper disposal at the end of rinsing activity.
- vi. Advise the children **not** to eat, drink and rinse with water for the next 30 minutes.
- vii. Record attendances of all children participating in the programme using FMR 1 format (**Appendix 7**) on weekly basis.

Note:

- i. This weekly rinsing activity should be carried out throughout the school year, except during school holiday. If the fluoride rinsing day fall on public holiday or an occasional holiday, then the children should rinse on another day of the same week and do not skip any FMR scheduled day.
- ii. For maximum benefit, each child should rinse at least 35 times per year.
- iii. In the event of accidental swallowing of the fluoride solution, immediately, give a child some milk to drink. The milk would combine with the sodium fluoride solution and will reduce the unpleasant side-effects due to accidental ingestion. (For details of fluoride over dosage refer to **Appendix 11**^{7, 8})
- iv. Any remaining solution should be discarded to avoid accidental consumption of the sodium fluoride solution.

6. MONITORING AND EVALUATION

A state coordinator shall be appointed by the respective State Deputy Director of Health (Oral Health) to monitor and evaluate the outcome of the programme at state and district levels. Implementation of the FMR activities at school should be monitored closely by the oral health personnel 3 monthly through school visit, to ensure FMR activity is conducted on weekly basis and abide to the procedure as outlined.

Reporting of FMR activity by oral health personnel and school personnel should be done on weekly and annually basis. Data shall be collected manually using the following formats:

6.1 Monitoring

i. Reporting by oral health personnel/school teachers

- Oral health personnel/school teachers shall record attendances of all school children participating in the programme using FMR 1 (**Appendix 7**) on weekly basis.
- Oral health personnel would compile the oral health status of participating school children by cohort in FMR 2 (**Appendix 8**) and FMR 3 (**Appendix 9**) annually.
- Oral health personnel will record basic information in FMR 4 (**Appendix 10**)
- The Oral health personnel would then submit FMR 3 (**Appendix 9**) and FMR 4 (**Appendix 10**) to the respective District FMR coordinator annually.

ii. Reporting to the State

The respective District FMR Coordinator shall compile FMR 3 and FMR 4 from the respective schools and submit the formats to the District Dental Officer for verification before submitting to the State FMR Coordinator.

iii. Reporting to Oral Health Programme, MOH

The State FMR Coordinator shall compile FMR 3 and FMR 4 format from the respective districts and submit the compilation to the State Deputy Director of Health (Oral Health) for verification prior to submission to the Oral Health Programme, MOH annually.

Table 1

A Summary on Levels of Reporting

Level	Originator	Receiver	Frequency	Format Used	Appendix
1.	Dental Officer/ Dental Therapist/ Dental Surgery Assistant/ School Teacher	-	Weekly	FMR 1	7
	Dental Officer/ Dental Therapist	-	Annually	FMR 2	8
		District/Divisional FMR Coordinator	Annually	FMR 3 & 4	9 & 10

Level	Originator	Receiver	Frequency	Format Used	Appendix
2.	District/ Divisional FMR Coordinator	District/Divisional Dental Officer	Annually	FMR 3 & 4	9 & 10
3.	District/ Divisional Dental Officer	State FMR Coordinator	Annually	FMR 3 & 4	9 & 10
4.	State Deputy Director of Health (Oral Health)	Oral Health Programme Ministry of Health	Annually	FMR 3 & 4	9 & 10

6.2 Evaluation

Evaluation of the FMR programme shall be carried out regularly at district and state levels. Performance indicators to be used for evaluation will include process indicators and outcome measures.

6.2.1 Evaluation of Process indicators.

The indicators to be used are as follows:

i. Percentage of schools in areas with low/without fluoridated water supply participating in FMR

Formula:

$$\frac{\text{Total no. of schools with high risk status in area with low/without fluoridated water supply participating in FMR (Appendix 3 Column f)}}{\text{Total no. of schools with high risk status in area with low/without fluoridated water supply (Appendix 3 Column d)}} \times 100$$

ii. Percentage of schoolchildren of high risk schools participating in FMR

Formula:

$$\frac{\text{Number of schoolchildren participating in FMR (FMR 4 Total Column k)}}{\text{Total number of new attendees of schoolchildren (FMR 4 Total Column d)}} \times 100$$

6.2.2 Evaluation of outcome measures.

Outcome indicators to be used are as follows:

- i. **Percentage of 12-year-old schoolchildren who are caries free of the same cohort.**

Formula:

$$\frac{\text{Total no. of 12-year-old schoolchildren who are caries free of the same cohort (FMR 3 Total Column 'ai')}}{\text{Total number of new attendees among 12-year-old schoolchildren of the same cohort. (FMR 3 Total Column 'ai')}} \times 100$$

- ii. **Mean DMFX of 12-year-old schoolchildren of the same cohort**

Formula:

$$\frac{\text{Total number of DMFX among 12-year-old schoolchildren in schools participated in FMR (FMR 3 Total Column 'aj')}}{\text{Total number of new attendees among 12-year-old schoolchildren of the same cohort (FMR 3 Total Column 'ai')}} \times 100$$

7. RESEARCH

Research activities can be carried out during implementation of this programme at state and district levels with proper research protocols. The findings of local studies can be used for future amendment or update of this FMR manual. Suggested studies are as follows :

- Study of the frequency of rinsing
- Study of concentration of sodium fluoride

8. CONCLUSIONS

Improving oral health status of primary schoolchildren in Malaysia continues to be one of the MOH main priority. This major community-based strategy aims to improve the oral health and well-being of schoolchildren in Malaysia, and thereby enhancing their quality of life. This manual will facilitate the standardisation and systematic implementation of school-based FMR programme.

The weekly sodium fluoride mouth rinses would benefit the children in caries reduction. It is hoped that the schoolchildren will remain caries free throughout their school years, particularly in areas with low/without fluoridated water supply. FMR programme shall be combined with other preventive activities (e.g. fluoride varnish and fissure sealant) to further reduce the level of caries for maximum impact.

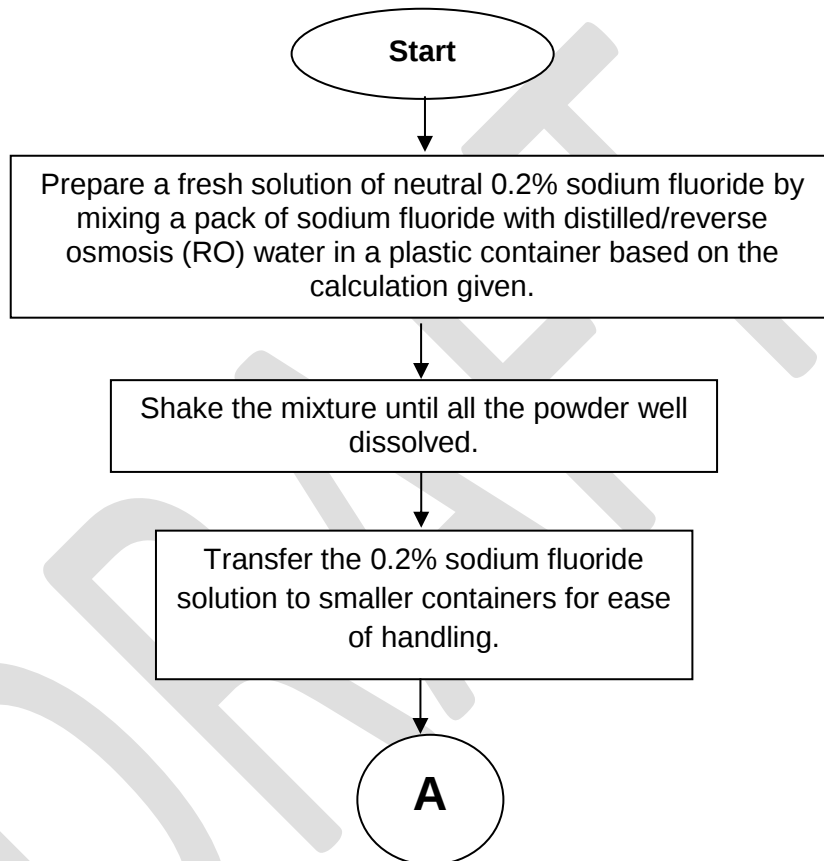
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Appendix 1

Flow Chart of Fluoride Mouth Rinsing (FMR) Implementation by School Personnel

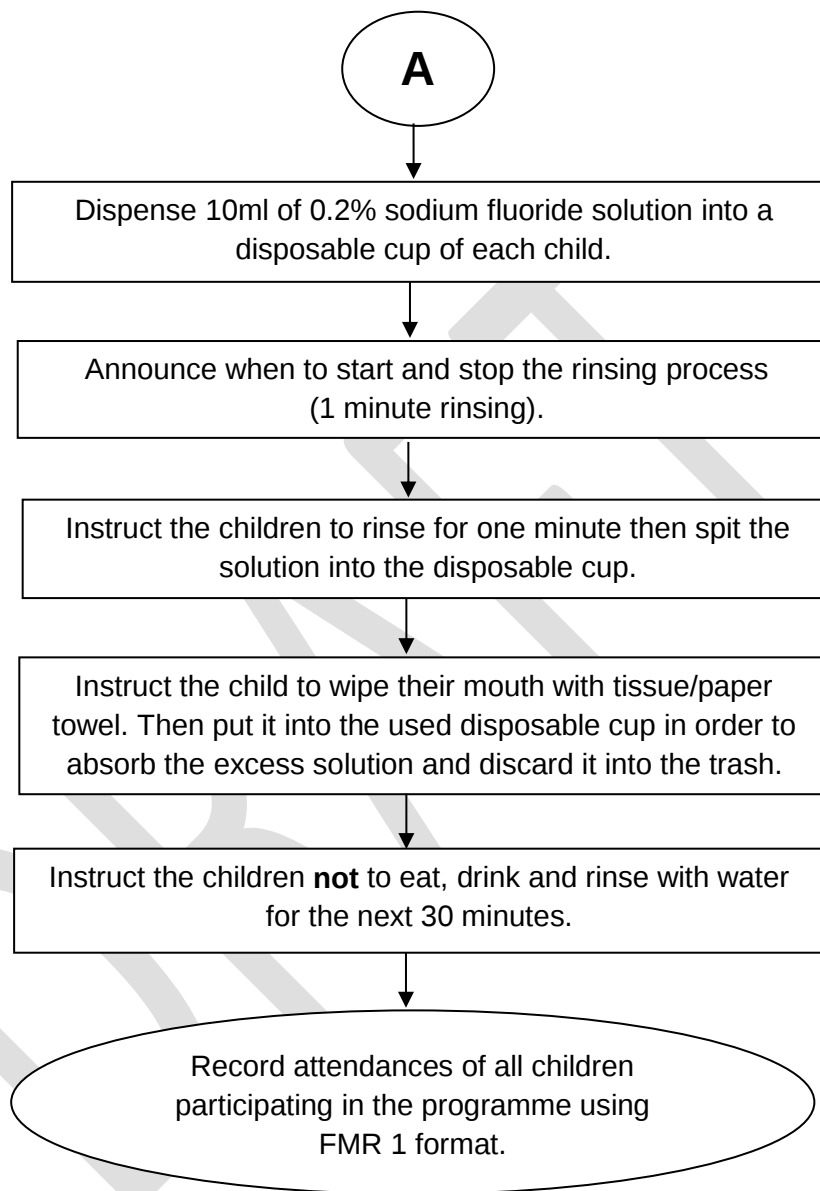
a) Preparation of 0.2% sodium fluoride solution



Appendix 1

Flow Chart of FMR Implementation by School Personnel (cont.)

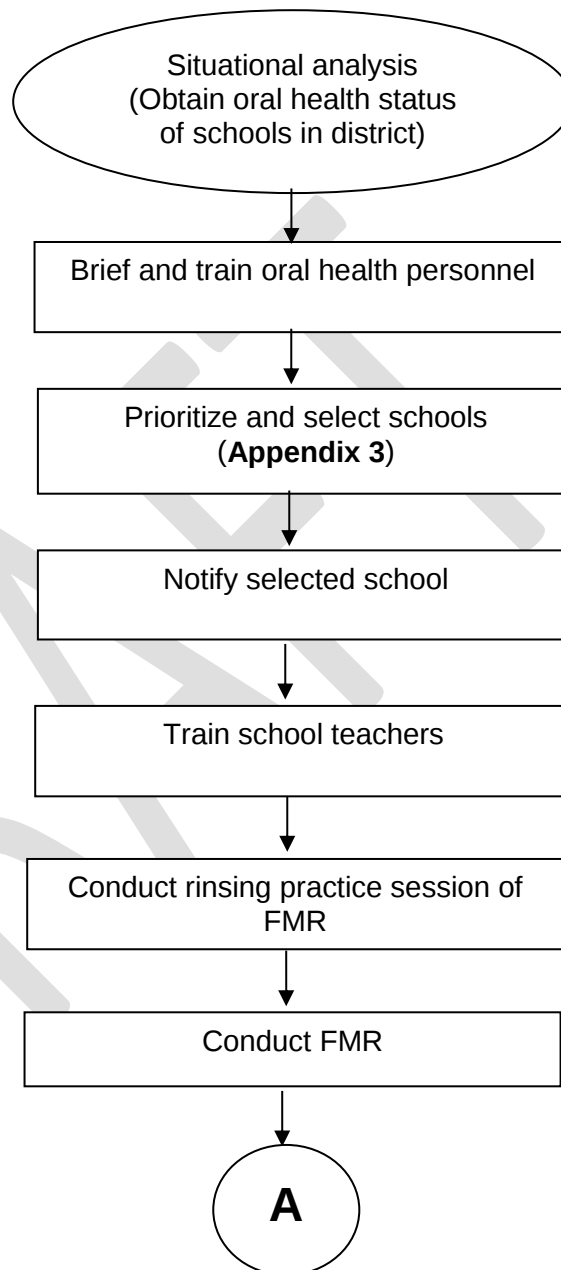
b) Rinsing Procedure



Appendix 2

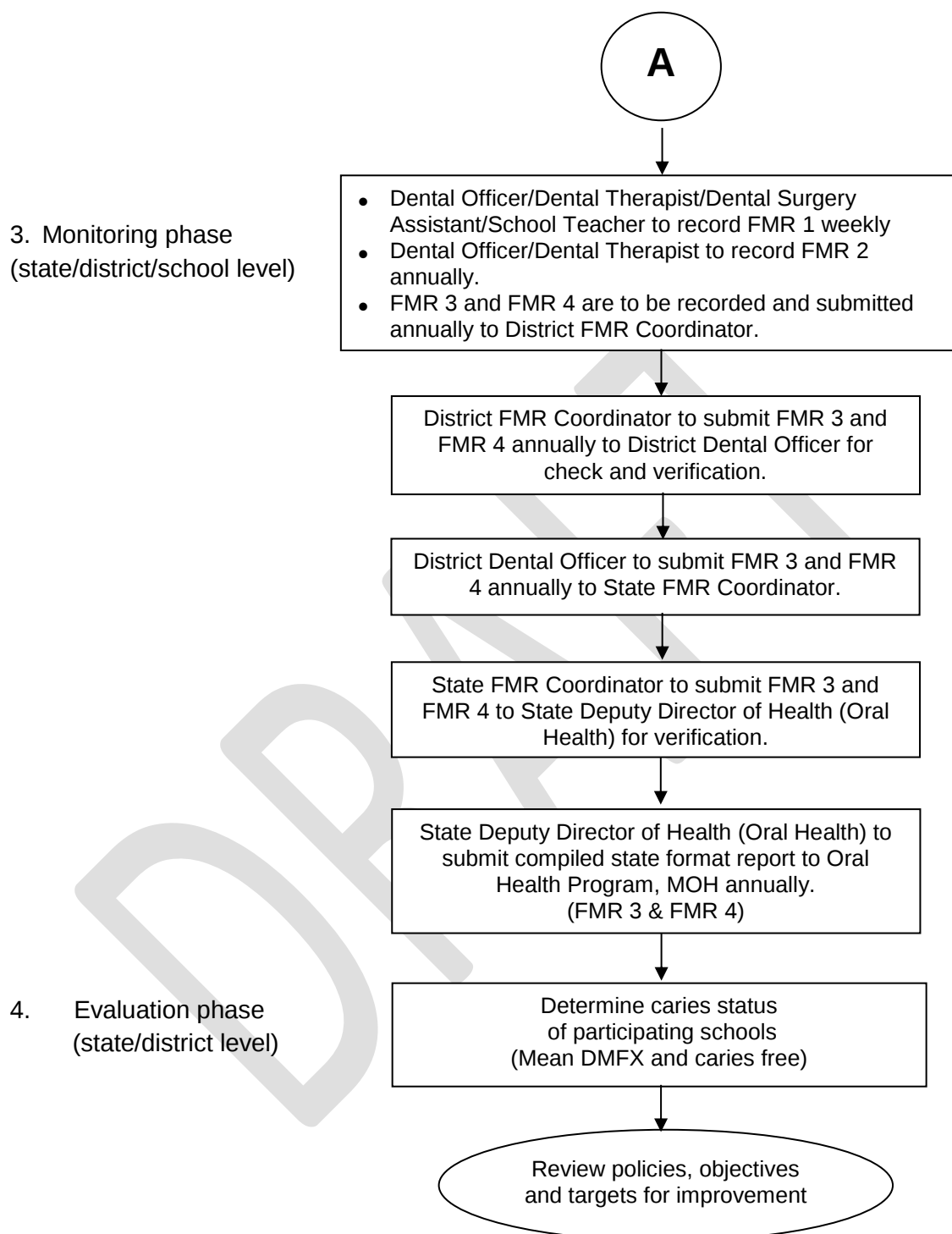
Flow chart of School-Based Fluoride Mouth Rinsing (FMR) Programme

1. Planning Phase (state/district level)



2. Implementation phase (district/school level)

Appendix 2



Appendix 3

PROGRAM FMR DI SEKOLAH
ANALISIS SITUASI SEKOLAH BERISIKO TINGGI BAGI PELAKSANAAN PROGRAM FMR

Nama Klinik Pergigian/Daerah :

Tahun :

No	*Nama Sekolah Rendah Yang Berisiko Tinggi di Daerah (PERSiS)	Enrolmen	Kawasan Rendah/Tanpa Bekalan Air Berfluorida		Sekolah Terpilih Untuk Program FMR	
			Ya	Tidak	Ya	Tidak
a	b	c	d	e	f	g
Jumlah						

Jumlah sekolah yang berisiko tinggi di daerah (Jumlah a):

Jumlah sekolah yang berisiko tinggi di kawasan rendah/tanpa bekalan air berfluorida (Jumlah d):

Jumlah sekolah yang terpilih untuk pelaksanaan program FMR (Jumlah f):

Disediakan oleh:

Nama:

Jawatan :

Disemak oleh:

Nama:

Jawatan :

Diluluskan oleh :

Nama:

Jawatan :

Appendix 4

PENJELASAN RAWATAN PERGIGIAN YANG DIJALANKAN DI BAWAH PERKHIDMATAN PERGIGIAN SEKOLAH/PRA SEKOLAH/TODDLER KEMENTERIAN KESIHATAN MALAYSIA

Kepada ibubapa/penjaga,

Sukacita dimaklumkan bahawa Kementerian Kesihatan Malaysia (KKM) menyediakan perkhidmatan pemeriksaan pergigian bagi murid sekolah mengikut Seksyen 65 Akta Pendidikan 1996* dan memberi rawatan sekiranya didapati perlu.

Tempoh sah akuan kebenaran rawatan adalah sepanjang persekolahan dari prasekolah, sekolah rendah hingga sekolah menengah.

Tempoh sah akuan kebenaran rawatan pergigian toddler adalah di sepanjang tempoh rawatan.

Sehubungan itu, sila lengkapkan **Bahagian A dan B** untuk tindakan rawatan susulan.

Bahagian A - Maklumat kesihatan anak/anak di bawah jagaan

Bahagian B - Kebenaran untuk rawatan pergigian

Rawatan yang disediakan	Penerangan bagi rawatan	Akibat jika tidak dirawat	Risiko rawatan yang mungkin berlaku
Rawatan pencegahan klinikal • Sealan fisur • Sapuan Fluorida • Kumuran Berfluorida	Sealan fisur / Sapuan Fluorida disapu pada permukaan gigi untuk mencegah kerosakan gigi. Sapuan fluorida untuk toddler perlu diaplikasi sekurang-kurangnya 4 kali sapuan dalam tempoh 6 bulan sekali. Murid-murid akan berkumur dengan larutan fluorida selama satu (1) minit dan meludahkan kembali ke dalam cawan kertas. Aktiviti ini dijalankan setiap minggu persekolahan dan akan sentiasa diawasi.	• Gigi mudah rosak (berlubang/kaviti)	Pada amnya tiada risiko yang boleh memberi kesan kesihatan yang serius. Kemungkinan berlaku alahan kepada bahan tetapi ini jarang berlaku. Bagi sapuan fluorida mungkin terdapat perubahan warna sementara pada permukaan gigi dan juga ada sedikit rasa dari sapuan tersebut.
Tampalan gigi	Menutup lubang /kaviti di gigi.	• Sakit gigi • Gusi bengkak dan bernanah • Gigi mungkin terpaksa dicabut	Pada amnya tiada risiko yang boleh memberi kesan kesihatan yang serius. Kemungkinan berlaku alahan kepada bahan tetapi ini jarang berlaku.
Penskaleran	Membersihkan gigi daripada plak dan karang gigi yang tidak dapat dikeluarkan dengan memberus gigi.	• Mulut berbau • Gusi merah dan bengkak • Gusi mudah berdarah dan bernanah • Gigi boleh menjadi longgar dan mungkin terpaksa dicabut	• Gigi mungkin menjadi sensitif kepada minuman dan makanan sejuk dan panas untuk tempoh masa yang singkat. • Sedikit pendarahan di sekitar gusi yang dirawat. • Ketidakselesaan sementara.
Cabutan gigi susu yang longgar	Gigi susu dicabut dengan bus setempat topikal dan menggunakan peralatan pergigian.	• Gigi boleh tertanggal / tertelan • Gigi tersedut ke saluran pernafasan • Tidak boleh makan dengan sempurna • Gusi bengkak dan bernanah	Pada amnya tiada risiko yang boleh memberi kesan kesihatan yang serius. Kemungkinan berlaku alahan kepada bahan tetapi ini jarang berlaku.
Cabutan gigi kekal/ gigi susu yang tidak longgar (Kebenaran tambahan diperlukan)	Gigi dicabut dengan bus setempat dan menggunakan peralatan pergigian.	• Sakit gigi • Gusi bengkak dan bernanah • Jangkitan merebak • Demam	• Kesan suntikan o Rasa kebas berpanjangan o Alahan kepada ubat bus • Kesan cabutan o Pendarahan berpanjangan (lebih 1 jam) o Bengkak dan sakit di kawasan cabutan

* Seksyen 65 Akta Pendidikan 1996 (Akta 550):

1) Menteri hendaklah, setakat yang munasabah dan praktik berbuat sedemikian, mengadakan pemeriksaan perubatan dan pergigian pada lat tempoh yang sesuai ke atas murid institusi pendidikan kerajaan atau bantuan kerajaan.

(2) Seseorang pegawai yang diberikuasa bagi maksud itu oleh Menteri boleh menghendaki ibu bapa atau penjaga murid institusi pendidikan kerajaan atau bantuan kerajaan menyebabkan murid itu menjalani pemeriksaan perubatan atau pergigian.

Appendix 4

PGKebenaran/Sekolah/Pra Sekolah/Toddler/Pin 2019

**KEBENARAN UNTUK RAWATAN PERGIGIAN
PERKHIDMATAN PERGIGIAN SEKOLAH/PRA SEKOLAH/TODDLER
KEMENTERIAN KESIHATAN MALAYSIA**

BAHAGIAN A - MAKLUMAT KESIHATAN MURID/PRA SEKOLAH/TODDLER

Anak saya, pernah / sedang menghidap penyakit/ keadaan/ komplikasi berikut :

(Sila bulatkan yang berkenaan)

Masalah berkaitan darah	: Ya / Tidak	Penyakit jantung	: Ya / Tidak
Kecacatan mental	: Ya / Tidak	Penyakit sawan	: Ya / Tidak
Alahan	: Ya / Tidak	Darah tinggi	: Ya / Tidak
Kencing manis	: Ya / Tidak	Masalah buah pinggang	: Ya / Tidak
Lelah/Asma	: Ya / Tidak		
Pendarahan berlanjutan selepas cabutan gigi	: Ya / Tidak		
Pengambilan ubat-ubatan	: Ya / Tidak		

Sila nyatakan :

Lain-lain :

BAHAGIAN B - KEBENARAN UNTUK RAWATAN PERKHIDMATAN PERGIGIAN SEKOLAH/ PRA SEKOLAH/TODDLER

Saya, dengan ini

(Nama Ibu/bapa/penjaga)

memberi / tidak memberi* kebenaran supaya anak saya / anak di bawah jagaan saya*

.....No.Surat Beranak/No.MyKid/MyKad/Pasport.....

(Nama murid)

(Murid)

menerima rawatan pergigian di bawah program Perkhidmatan Pergigian Sekolah dan Pra sekolah sepanjang tempoh persekolahan/Toddler di sepanjang tempoh rawatan.

Saya telah diberi penjelasan dan memahami penerangan berkaitan rawatan yang akan dijalankan.

Ibu/bapa/penjaga

Saksi

Tandatangan:

Nama:

No. MyKad/Pasport*:

Tarikh:

Tandatangan:

Nama:

No. MyKad/Pasport*:

Tarikh:

* Potong mana yang tidak berkenaan

Appendix 5

Table 2: Instruments and Materials (Basic Requirements per School)

	Item	Quantity Needed	Item Received
1.	Packed of sodium fluoride powder	Based on number of schoolchildren involve. (Refer Appendix 6)	
2.	Plastic container (for mixing)	1 per school	
3.	Small plastic container	1 per class	
4.	10ml dispensing cup/syringe	1 per class	
5.	Distilled/RO water	Based on number of schoolchildren involve. (Refer Appendix 6)	
6.	Disposable cup	1 per child/week	
7.	Tissues/Paper towel	1 per child/week	
8.	Plastic for disposable of cups/ tissues/ paper towels	1 per class/week	
9.	Gloves	1 box per school	
10.	Recording format (FMR 1)	1 per class	

Appendix 6

Table 3: Measurement of Sodium Fluoride Powder and Distilled Water Needed Based on Number of Schoolchildren

No. of Schoolchildren	Weight of Sodium Fluoride Powder (g)	Volume of Distilled Water (ml)	Volume of Distilled Water (L)
50	1.0	500	0.5
100	2.0	1000	1.0
150	3.0	1500	1.5
200	4.0	2000	2.0
250	5.0	2500	2.5
300	6.0	3000	3.0
350	7.0	3500	3.5
400	8.0	4000	4.0
450	9.0	4500	4.5
500	10.0	5000	5.0

NEGERI	:	
DAERAH/BAHAGIAN/KAWASAN	:	
NAMA SEKOLAH	:	
NAMA KELAS	:	
TAHUN SEMASA	:	
KOHORT (TAHUN MULA KUMURAN)	:	

[illegible]

1. Tanda "I" untuk rekod kedatangan murid yang mengambil bahagian dalam aktiviti kumuran.
2. Murid sekolah yang tidak mendapat kebenaran daripada ibu bapa/penjaga untuk terlibat dalam program FMR adalah tidak perlu dimasukkan ke dalam FMR 1.
3. Murid yang berpindah masuk daripada sekolah yang **tidak menjalankan FMR** adalah **tidak perlu dimasukkan** ke dalam FMR 1.
4. Murid yang berpindah masuk daripada sekolah yang menjalankan FMR, boleh meneruskan kohort FMR di sekolah yang baharu (nama dimasukkan mengikut kohort tahun pelaksanaan).

Appendix 8
(FMR 2)

FMR 2 Pind. 1/2022

PROGRAM FMR DI SEKOLAH
LAPORAN STATUS KESIHATAN PERGIGIAN MURID MENGIKUT KOHORT

NEGERI : _____
 DAERAH/BAHAGIAN/KAWASAN : _____
 NAMA SEKOLAH : _____
 KOHORT (TAHUN MULA KUMURAN) : _____

Bil	Nama Murid	Tahun 1				Tahun 2				Tahun 3				Tahun 4				Tahun 5				Tahun 6				Catatan
		Kohort (Ya/Tidak)	Jumlah DMFX	Bebas Karies (Ya = 1, Tidak = 0)	Jumlah Kumuran	Kohort (Ya/Tidak)	Jumlah DMFX	Bebas Karies (Ya = 1, Tidak = 0)	Jumlah Kumuran	Kohort (Ya/Tidak)	Jumlah DMFX	Bebas Karies (Ya = 1, Tidak = 0)	Jumlah Kumuran	Kohort (Ya/Tidak)	Jumlah DMFX	Bebas Karies (Ya = 1, Tidak = 0)	Jumlah Kumuran	Kohort (Ya/Tidak)	Jumlah DMFX	Bebas Karies (Ya = 1, Tidak = 0)	Jumlah Kumuran	Kohort (Ya/Tidak)	Jumlah DMFX	Bebas Karies (Ya = 1, Tidak = 0)	Jumlah Kumuran	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
1																										
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
15																										
JUMLAH																										
PURATA KUMURAN																										

Nota: 1. FMR 2 ialah sambungan FMR 1 dengan maklumat status kesihatan pergigian murid sekolah (PG307). Sila pastikan satu borang FMR 2 digunakan untuk setiap kohort.

2. Data Murid yang tidak lengkap di Borang FMR 2 tidak akan dimasukkan ke Borang FMR 3.

Contoh: a. Murid sekolah yang tidak mendapat kebenaran daripada ibu bapa/penjaga untuk meneruskan program FMR.

b. Murid sekolah yang berpindah ke sekolah lain.

Appendix 9 (FMR 3)

FMR 3 Pind. 1/2022

PROGRAM FMR DI SEKOLAH LAPORAN STATUS KESIHATAN PERGIGIAN SEKOLAH MENGIKUT KOHORT

NEGERI :
DAERAH/BAHAGIAN/KAWASAN :
KOHORT (TAHUN MULA KUMURAN) :

Bil	Nama Sekolah	Tahun 1								Tahun 2				Tahun 3				Tahun 4				Tahun 5				Tahun 6				Catatan										
		Enrolmen	Kedatangan Baru (PG201)	Kedatangan Baru FMR (FMR 4)	Jumlah DMFX	Mean DMFX (%)	Jumlah Bebas Karies	% Bebas Karies (%)	Purata Kumuran	Kedatangan Baru FMR (FMR 4)	Jumlah DMFX	Mean DMFX (%)	Jumlah Bebas Karies	% Bebas Karies (%)	Purata Kumuran	Kedatangan Baru FMR (FMR 4)	Jumlah DMFX	Mean DMFX (%)	Jumlah Bebas Karies	% Bebas Karies (%)	Purata Kumuran	Kedatangan Baru FMR (FMR 4)	Jumlah DMFX	Mean DMFX (%)	Jumlah Bebas Karies	% Bebas Karies (%)	Purata Kumuran													
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	ab	ac	ad	ae	af	ag	ah	ai	aj	ak	al	am	an	ao
1																																								
2																																								
3																																								
4																																								
5																																								
6																																								
7																																								
8																																								
9																																								
10																																								
JUMLAH																																								

Borang FMR 3 adalah diisi berdasarkan kohort (tahun mula kumuran)

Appendix 10 (FMR 4)

FMR 4 Pind. 1/2022

PROGRAM FMR DI SEKOLAH LAPORAN LIPUTAN TAHUN SEMASA

NEGERI :
 DAERAH/BAHAGIAN/KAWASAN :
 TAHUN :

Bil	Nama Sekolah	Enrolmen	Kedatangan Baru (PG201)	Kedatangan Baru FMR							Catatan
				Tahun 1	Tahun 2	Tahun 3	Tahun 4	Tahun 5	Tahun 6	Jumlah (Tahun 1 - Tahun 6)	
a	b	c	d	e	f	g	h	i	j	k	l
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
JUMLAH											

Jumlah kedatangan baru FMR tahun semasa (Jumlah k) :

Jumlah kedatangan baru PG201 tahun semasa (Jumlah d) :

Peratus murid sekolah terlibat dalam program FMR (Jumlah k/Jumlah d x 100) :

FLUORIDE OVER-DOSAGE

The effect of fluoride over-dosage is nausea, vomiting, hypersalivation, abdominal pain and diarrhea¹⁻³. A first step in any case of suspected fluoride over-dosage is to obtain a history in order to estimate the amount swallowed. If the amount is estimated to be less than 5mg/kg body weight transfer to hospital is unnecessary but milk should be given in order to slow down the absorption of fluoride in the stomach into the bloodstream. The Probably Toxic Dose (PTD) has been set at 5mgF/kg body weight^{1, 2, 4}. The PTD is defined as the minimum dose that could cause toxic signs and symptoms and requires immediate treatment and hospitalization¹⁻⁴.

SODIUM FLUORIDE SOLUTION FOR FMR PROGRAMME

The amount of fluoride present in 10ml of 0.2% sodium fluoride (NaF) solution is 9.0mgF⁵. In the case of accidental ingestion of a 10ml of 0.2% NaF solution by a 6 – 8 year old child (estimated body weight of 23kg), the amount of fluoride per kg body weight will be 9.0mgF/23kg i.e. 0.4mgF/kg body weight. Hence, in case of accidental ingestion of a 10ml of 0.2% NaF solution, the amount of fluoride per kg body weight is only 0.4mgF as compared to the Probably Toxic Dose of 5mgF/kg body weight. However, as a precaution, we would still recommend that a cup of milk be given to the child in case of accidental swallowing of the 10ml in 0.2% NaF solution for FMR so as to minimize any untoward side-effects.

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LITERATURE REVIEW ON FLUORIDE MOUTH RINSING (FMR) PROGRAMME

Fluoride mouth rinsing (FMR) using a verified concentration of sodium fluoride solution on daily, weekly or fortnightly basis is an important low-cost dental public health strategy to reduce and control dental caries recommended by the World Health Organization.¹ The effectiveness of FMR lies on the ability of fluoride in enhancing the remineralization process, in which low levels of fluoride enables the tooth crystal surface to be more resistant to acid attacks that causing dental caries.² The FMR programme has shown resurgence in recent years due to the increasing disparities of oral health among school children.³

The FMR is recommended in communities at low fluoridated areas with moderate to high caries activities. It is not recommended in communities from optimally fluoridated areas and is contraindicated in children below 6 years. This is due to the concern of fluoride ingestion, which may lead to dental fluorosis. Nevertheless, the retained amount of diluted fluoride solution under correct use would not result in dental fluorosis for pre-school aged children.⁴ The Japanese FMR guidelines recommend two distinct regimens: (1) for children aged 4-6 in preschool facilities and kindergartens: daily rinsing with 5ml of 0.05% sodium fluoride solution; and (2) for children in elementary and junior high schools: weekly rinsing with 7 to 10ml of 0.9% sodium fluoride solution. The duration of rinsing should be more than 30 seconds, aiming for 1 minute.⁵

Over the past six decades, there have been many reports and studies conducted in various locations globally on the effectiveness of FMR in preventing and controlling dental caries among school children as summarized in the **Table 4** below.

Furthermore, the cost to implement FMR programme is generally low. According to the study conducted in Japan, the implementation cost was approximately USD\$0.20 per child annually.⁶ In the US, based on the survey conducted by the Association of State and Territorial Dental Directors (ASTDD), the cost for FMR programme ranged from USD\$0.54 to \$2.54 per child annually.⁷ The cost professionally applied fluoride varnish was estimated at USD\$12.85 per child annually.⁸

Table 4: Overview of studies evaluating effectiveness of FMR 1965-2021

	Authors & Year	Location	Main Findings
1	Torell and Ericsson (1965) ⁹	Sweden	Daily use of 0.05% sodium fluoride mouth rinse resulted in reduction of new caries development by half, while FMR conducted fortnightly led to reduction of caries level by one-third.
2	Rugg-Gunn <i>et al.</i> (1973) ¹⁰	UK	The use of 0.05% sodium fluoride daily resulted in difference of 3.7 DMFS between the test and control groups, which was 37% reduction over the trial of three years.
3	Ripa <i>et al.</i> (1983) ¹¹	New York	An FMR programme using 0.2% neutral sodium fluoride among the first to sixth grade children resulted in reduction of DMFT and DMFS by 45.3% and 47.4% respectively over five years. The younger the children enrolled the FMR program and the longer they took part, the greater were the benefits accumulated.
4	Horowitz <i>et al.</i> (1984) ¹²	US	Based on the findings on an eight-year evaluation of FMR programme, its preventive effects were more profound as the duration of participation increased.
5	Klein <i>et al.</i> (1985) ¹³	US	The FMR programme resulted in limited reduction of dental caries, especially for children under fluoridated areas. Its benefits were more profound for children from the high-risk schools.
6	Tsutsui (1988) ¹⁴	Japan	There was 74% difference in oral health status of high school children who participated in FMR programme (underwent a daily rinsing since 4 years old at preschools and elementary schools and a weekly rinsing since 12 years old at junior high schools) and children from other high schools not taking part in any FMR.
7	Kishi and Kobayashi (1992) ¹⁵	Japan	Japanese adults at the age of 20 who took part in FMR programme (underwent a daily rinsing of 0.05% sodium FMR at age 4 to 11, and a weekly rinsing of 0.2% sodium FMR between at 12 to 14) demonstrated significantly lower caries than those not taking part in the program (difference of mean DMFS ranging from 56% to 71%).
8	Wei and Yiu (1993) ¹⁶	Unspecified	The FMR programme resulted in reduction of caries by about 30% and is a safe and effective measure to control tooth decay in children and adolescents.
9	Louw <i>et al.</i> (1995) ¹⁷	Boland, South Africa	The fortnightly rinsing with 0.2% sodium fluoride among school children under daily tooth brushing program did not result in any additional benefit.
10	Chikte <i>et al.</i> (1996) ¹⁸	Johannesburg, South Africa	The unsupervised weekly FMR using 10ml of 0.2% sodium fluoride resulted in significant differences of mean decayed scores over three years period with reduction of about 15%.
11	Yamaguchi <i>et al.</i> (1997) ¹⁹	Japan	School children who underwent the FMR programme continuously showed significantly lower DMFT and DMFS indices compared those who did not undergo the FMR programme continuously.
12	Ohara <i>et al.</i> (2000) ²⁰	Japan	The FMR programme has demonstrated a positive anti-caries effect in which the reduction rate of DMFS for occlusal caries of lower first molars was 17.3% for those commenced the programme at 6 years old; and 38.7% for those commenced the programme at 5 years old.
13	Twetman <i>et al.</i> (2004) ²¹	Systematic Review	An FMR programme may produce an anti-caries effect in children in areas with limited fluoride exposure. The review was uncertain of its additional effect on children using fluoride toothpaste daily.
14	Pieterse <i>et al.</i> (2006) ²²	Woudenberg, the Netherlands	FMR is the most determining factor for status of teeth independent of other variables. School children who were not under FMR programme were four times more likely to suffer from dental caries compared to those who were under the programme for at least three years.
15	Levin <i>et al.</i> (2009) ²³	Edinburgh	A supervised FMR programme can be targeted at deprived area children effectively via school-based initiatives and resulted in overall reduction of D ₃ MFT.
16	Chen <i>et al.</i> (2010) ²⁴	Selangau District, Sibu Division, Sarawak, Malaysia	School-based FMR programme using 0.2% sodium fluoride on weekly basis was effective in preventing dental caries and should be carried out in fluoride-deficient areas.

Table 4: Overview of studies evaluating effectiveness of FMR 1965-2021 (continued)

	Authors & Year	Location	Main Findings
17	Siran <i>et al.</i> (2010) ²⁵	Sandakan Division, Malaysia	A decrease in caries prevalence in a cohort of children of 3 years after the implementation of a weekly FMR programme.
18	Neko-Uwagawa <i>et al.</i> (2011) ²	Japan	The caries preventive effects of FMR programme from the nursery school to junior high school can sustain into adulthood for those above 20 years old.
19	Divaris <i>et al.</i> (2012) ³	North Carolina, US	The overall caries-preventive effect for FMR was weak. There were greater preventive benefits of FMR among children from high-risk schools than those from low-risk schools. However, the finding was not statistically different.
20	Yagi (2013) ²⁶	Japan	The FMR was indicated as the statistically significant variable among the sixth graders. The study recommended to commence the FMR for children below 6 years old.
21	Marinho <i>et al.</i> (2016) ²⁷	Systematic Review	Based on a meta-analysis of 35 trials involving 15,305 participants which demonstrated reduction of DMFT by 27% (95% CI: 23%, 30%), it can be concluded that regular FMR among children and adolescents under supervision is associated with a high magnitude in decrease of dental caries in permanent teeth.
22	Matsuyama <i>et al.</i> (2016) ²⁸	Japan	School-based FMR programme conducted in school children of all socioeconomic status has association with lower DMFT.
23	Mohd Zaid <i>et al.</i> (2017) ²⁹	Pasir Mas District, Kelantan	Little beneficial effects in caries experience reduction among schoolchildren who took part in the FMR programme.
24	Wong <i>et al.</i> (2022) ³⁰	Sandakan Division, Sabah, Malaysia	A study reported slower increase of caries experience (mean DMFT and mean DMFS) among 6-year-old school children of cohort 2012 participating in FMR program for duration of six years compared to those who did not.
25	Yonezawa and Yagi (2022) ⁵	Japan	Taking part in an FMR programme at least during primary school emerged as a predictor for the reduction of caries prevalence in permanent in adults.

Nevertheless, taking part in FMR at least during elementary school is unlikely to be the most important measure for caries reduction among adults. The reason is that FMR may only be associated with its anti-caries effect at the time of programme. Instead, it is the continuous exposure to fluoride in the subject's entire life via use of fluoride toothpaste with proper tooth-brushing as personal health practice, water fluoridation as public health measure if feasible, and other measures of fluoride delivery for caries prevention that matters.⁵

Caries prevention and control strategies should be determined via joint actions at community, professional and individual level. The planning and implementation approach of such strategies should be evidence based. School-based programme have high potential in conferring positive dental public health impacts if appropriate population groups are targeted. In views of current situation of changing population demographics, oral health status trends and caries risk factors, more studies to review the effectiveness and evaluate economic efficiency of these programs are indicated.³

In conclusion, FMR programme is an effective and safe dental public health measure to prevent and control dental caries in school children especially those from high-risk groups. Its effectiveness can be increased if commence from young age (pre-school) and conducted for longer duration. Hence, this dental public health population-based strategy is highly recommended to be implemented to improve oral health status of school children when indicated.

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