



Lebanese University



World Health Organisation

## **ORAL HEALTH PROGRAMME IN LEBANON**

**TECHNICAL ASSISTANCE PROVIDED FOR DEVELOPMENT  
OF BASELINE STUDIES FOR SALT FLUORIDATION**

### **Final Report On Data Collection**

**M. DOUMIT** Lebanese University - School of Dentistry  
Expert WHO for Oral Health  
**B. DOUGHAN** Lebanese University - School of Dentistry  
**R. BAEZ** University of Texas Health Science Center  
at San-Antonio USA

**Would like to convey their deep thanks to all those who  
contributed to the success of these studies namely the  
Ministry of Public Health, the World Health Organisation  
and the Lebanese University**

**August 2004**

Contents	Page
Background	2
1. Water samples	3
2. Technique for collection of samples	4
3. Result of determination of fluoride in community water supplies	6
4. Survey on dental caries and fluorosis	15
5. Renal fluoride excretion by children 3-5 years of age	35
6. Fluoride exposure	40
7. Discussion	60
8. Conclusions	62
9. Recommendations	62
10. References	64
WHO Oral Health assessment form	65
Form for recording individual micturition data	66
Recording form for collection of urinary samples	67
WHO Collaborating Ctr-use of dentifrices and fluoride supplements data form	68
Arabic translation of dentifrices and fluoride supplements data collection form	70

## **Background**

The results of the first National Oral Health Survey in Lebanon conducted in 1994 showed a high prevalence of dental caries in all age groups.

The dental caries prevalence expressed as the percentage of persons affected by dental caries was 93 and 96% respectively for the 12 and 15 - year - old children. The mean number of the Decayed, Missing and Filled Teeth (DMFT index) at 12 years of age was 5.7. According to the WHO scale for prevalence, Lebanon is classified at the “high” level (WHO, May 1993). This index is higher than the goal set by the World Health Organization (by year 2000) where the mean DMFT should not exceed 3 (WHO, 1987, 1993).

No signs of fluorosis were observed in the surveyed Lebanese regions for this first study. In addition, fluoride concentration in drinking water in Lebanon was reported in a previous study done by Doumit in 1989 as very low.

National Oral Health Plan was elaborated in 1995. The recommendations insisted on the development of a broad strategy for the implementation of preventive measures at the national level, and to encourage fluoridation as a policy either in water or in any other vehicle.

The magnitude and intensity of dental health problems should encourage the introduction of a mass preventive program. Reduction in dental caries was remarkable in countries where there were public health programs, particularly systemic fluoride supplementation.

Since water fluoridation is not a feasible approach in Lebanon, salt fluoridation can offer an effective alternative in these circumstances. Salt fluoridation has repeatedly been demonstrated to produce 50 to 60% reduction in dental caries. These results are similar to the results obtained by water fluoridation. The use of salt as the vehicle for fluoride seems to be the most appropriate alternative for Lebanon especially after the recent iodization of salt that has been effectively carried out.

Fluoride can be found in nature, water, food, soil, air, dentifrice and dental products. All these sources might contribute to produce an excessive exposure to fluoride. It is known that any method that utilizes systemic fluoride for the prevention of dental caries might produce a very mild or a mild fluorosis (hypoplastic lesions on enamel of teeth)

## **Important information for the collection of water samples for determination of fluoride<sup>3</sup>**

### **1 Water samples**

These data relates to identification and location of the water sources and are required for obvious reasons.

#### **1.1 Sequential number**

This information is of vital importance for follow-up or in case of need for verification of the sample.

The sequence number can be assigned according to the geographical zone taking into account the different physiographic zones of the country.

#### **1.2 Source name**

Equally indispensable for identifying the origin of the water sample, to be able to do later tracking and/or collect additional water samples in case of discrepancies.

#### **1.3 Location**

It is important to obtain the name of the district, city, and community, to permit location of origin of the water source,

#### **1.4 Zone**

If it is urban, periurban or rural

#### **1.5 Coverage**

It is important to record coverage to determine the approximate number of inhabitants that benefit from this source. Some sources supply water to various communities.

#### **1.6 Soil**

The type of soil where the source is located can influence the amount of fluoride in the water, consequently, the type of soil (rocky, clay, sandy, volcanic, etc.) should be identified.

#### **1.7 Altitude above sea level**

It is recommended to register the altitude of the communities, because individual metabolism (retention and excretion of fluoride) varies depending on the altitude above sea level of the area where the person lives.

#### **1.8 Reservoir systems**

The material used in the reservoir systems could influence the concentration of fluoride.

The material of the collection tanks (concrete, clay, aluminum, and fiberglass or clay fiber) needs to be recorded. Equally important is to record the type (soil, clay, copper, galvanized steel, etc.) of viaduct (piping) used to transport the water, since fluoride could complex with several of these elements. For this reason, water samples should be collected at the source and selected delivery sites, i.e., on the people's place of residence.

### 1.9 Temperature

The environmental temperature is important because the range recommended for optimal concentration of fluoride in a given population vary according to the ambient temperature. People drink larger quantities of water in hot climates.

### 1.10 Type of sources

There may be several types of sources for the same community. The concentration also varies from source to source. For this reason, it is very important to specify the type of source (river, lake, creek, well, spring etc.).

### 1.11 Date

It is very important to register for identification purposes of the baseline study. The concentration of fluoride in water may vary depending on the time of the year as influenced by rainy or dry season.

### 1.12 Name of responsible party

This is the person responsible of collecting the samples and recording all the indispensable data.

## 2 Technique for collection of water samples:

- 2.1 Plastic bottles having 125 ml or plastic cylinders of 50 ml.
- 2.2 Wash the recipient 3 or 4 times with the same water that is to be collected.
- 2.3 Leave the water running up to the edge of the recipient
- 2.4 After the sample is taken, close the bottle tightly.
- 2.5 Immediately, identify the bottle with a pre-made label. This label should have the necessary information to determine its origin, number, and name of source, geographical location, date and name of responsible party.
- 2.6 The samples should be placed in a suitable container for transportation to the analysis site.



All samples were transferred to the Central Public Health Laboratory where all tests were conducted using specific fluoride ion electrode in combination with electronic meters (Orion electrode 9609BN and meter model 290A). Theoretical aspects of meters and electrodes functioning were thoroughly discussed. Demonstrations and practical exercises were also conducted to familiarize personnel with methodology, calibration procedures and fluoride determination methods using this equipment. The following operating instructions as well as verification of correct electrode and meter functioning were summarized and made available in typed form.

### **3 Results of determination of fluoride in community water supplies**

Complete information on each water sample was not available at the time of collection and therefore was not recorded. The sample origin by region, department, and source with its corresponding identification code were recorded. The concentration of fluoride in milligrams per liter is detailed on the following pages.

**Table 2**

<b>Serial code</b>	<b>Region</b>	<b>Department name</b>	<b>Source</b>	<b>mg/F</b>
089	Beirut	Beirut	Tarik El Jdida	0.12
090	Beirut	Beirut	Ashrafieh	0.12
091	Beirut	Beirut	Tallet El Khayyat	0.18
092	Beirut	Beirut	Borj Abi haydar	0.12
093	Beirut	Beirut	Tarik El Jdida	0.10
147	Bekaa	Bekaa/Hermel	Bir Talia	0.17
148	Bekaa	Bekaa/Hermel	Bir Douress	0.16
149	Bekaa	Bekaa/Hermel	Lougouh and Bagel	0.13
150	Bekaa	Bekaa/Hermel	Ras-El-Ain	0.04
151	Bekaa	Bekaa/Hermel	Ras-El-Ain	0.14
152	Bekaa	Bekaa/Hermel	El Sayar 2	0.14
153	Bekaa	Bekaa/Hermel	El-Sayar 1	0.17
154	Bekaa	Bekaa/Hermel	El-Basatine	0.15
155	Bekaa	Bekaa/Hermel	El-Shraouneh	0.15
156	Bekaa	Bekaa/Hermel	Bir Zboud	0.13
157	Bekaa	Bekaa/Hermel	Dair El Ahmar	0.13
158	Bekaa	Bekaa/Hermel	Bir Qaa	0.28
159	Bekaa	Bekaa/Hermel	Bir Shaat	0.18
160	Bekaa	Bekaa/Hermel	Bir Shaghour	0.19
161	Bekaa	Bekaa/Hermel	Gaouzeh well	0.20
162	Bekaa	Bekaa/Hermel	Ras Baalbek 1	0.19
163	Bekaa	Bekaa/Hermel	Ras Baalbek 2	0.13
164	Bekaa	Bekaa/Hermel	El Yamouneh	0.08
165	Bekaa	Bekaa/Hermel	El-Yamouneh	0.08
166	Bekaa	Bekaa/Hermel	Bir El-Khoder	0.20
167	Bekaa	Bekaa/Hermel	Ras El-Mal	0.12
168	Bekaa	Bekaa/Hermel	El Fakeha	0.15
169	Bekaa	Bekaa/Hermel	El Fouar	0.16
170	Bekaa	Bekaa/Hermel	Majdaloun	0.10
171	Bekaa	Bekaa/Hermel	Sabat and Delieh	0.17
172	Bekaa	Bekaa/Hermel	Bir El-Ain	0.12
174	Bekaa	Bekaa/Hermel	El Shaeb well	0.26
175	Bekaa	Bekaa/Hermel	Laboueh well	0.25
130	Bekaa	Shamseen	Haosh El Harimi	0.16
131	Bekaa	Shamseen	Bir Ghaze	0.11



132	Bekaa	Shamseen	Bir Jeb Janine	0.15
133	Bekaa	Shamseen	Bir Lala	0.28
134	Bekaa	Shamseen	Bir Baaloul	0.16
135	Bekaa	Shamseen	Bir Karo'un	0.20
136	Bekaa	Shamseen	Bir Majdel Balhis	0.05
137	Bekaa	Shamseen	Bir Heloue	0.05
138	Bekaa	Shamseen	Bir Sohmor	0.11
139	Bekaa	Shamseen	Bir Yohmor	0.11
140	Bekaa	Shamseen	Bir Qalia	0.15
141	Bekaa	Shamseen	Bir Ain Teen	0.16
142	Bekaa	Shamseen	Bir Bakka	0.54
143	Bekaa	Shamseen	Bir Karm El Lose	0.09
144	Bekaa	Shamseen	Soultan Yakoub	0.10
145	Bekaa	Shamseen	Bir Loussi	0.10
146	Bekaa	Shamseen	Shamseen	0.11
108	Bekaa	Zahleh	Tel znoub	0.02
109	Bekaa	Zahleh	Ras Ain	0.12
110	Bekaa	Zahleh	Ain Zabadah	0.09
111	Bekaa	Zahleh	Lyce / well	0.02
112	Bekaa	Zahleh	Zahle station	0.03
113	Bekaa	Zahleh	Horsh El Omara	0.08
114	Bekaa	Zahleh	Kaa El Rim	0.00
115	Bekaa	Zahleh	Bhousha spring	0.12
116	Bekaa	Zahleh	Mashgara / well	0.10
117	Bekaa	Zahleh	Qob Elias/ Sin El ajouz	0.12
118	Bekaa	Zahleh	Ain Abed	0.01
119	Bekaa	Zahleh	Aimit	0.24
120	Bekaa	Zahleh	Jdita well	0.11
121	Bekaa	Zahleh	Rayak / well	0.01
122	Bekaa	Zahleh	Karak / well	0.00
123	Bekaa	Zahleh	Amik	0.02
124	Bekaa	Zahleh	Saghbin / spring	0.00
125	Bekaa	Zahleh	Saghbin / well	0.02
126	Bekaa	Zahleh	Bir zone, industrial	0.03
127	Bekaa	Zahleh	Kherbit / fanar	0.00
128	Bekaa	Zahleh	Yahfoufa	0.10
129	Bekaa	Zahleh	Zouatini	0.11

210	Mount Lebanon	Barouk	Kaa Spring/Safa	0.12
211	Mount Lebanon	Barouk	Mresti Well	0.07
212	Mount Lebanon	Barouk	Maasir Well	0.07
213	Mount Lebanon	Barouk	Btarhin Well	0.18
214	Mount Lebanon	Barouk	Zaararie Well	0.18
215	Mount Lebanon	Barouk	Gharite Well	0.12
216	Mount Lebanon	Barouk	Pebiye Well	0.40
217	Mount Lebanon	Barouk	Barja Well	0.31
218	Mount Lebanon	Barouk	Rmeile Well	0.38
219	Mount Lebanon	Barouk	Mgheirieh Well	0.30
220	Mount Lebanon	Barouk	Ketermaya Well	0.28
221	Mount Lebanon	Barouk	Barja Well	0.31
222	Mount Lebanon	Barouk	Majdaloun Well	0.30
223	Mount Lebanon	Barouk	Maiboud Well	0.41
224	Mount Lebanon	Barouk	Wardanieh Well	0.41
225	Mount Lebanon	Barouk	Barja Well	0.32
226	Mount Lebanon	Barouk	Joun Well	0.39
227	Mount Lebanon	Barouk	Dalhoun Well	0.26
228	Mount Lebanon	Barouk	Sibline Well	2.40
229	Mount Lebanon	Barouk	Raayan Spring/Safa	0.12
230	Mount Lebanon	Barouk	Deir E1 Kamar	0.19
231	Mount Lebanon	Barouk	Ain El JouzJAin Dara	0.20
232	Mount Lebanon	Barouk	Ain El Maased/Beiteddine	0.19
233	Mount Lebanon	Barouk	Kafra Well	0.09
234	Mount Lebanon	Barouk	Mersted Spring/Moukhtara	0.20
235	Mount Lebanon	Barouk	Baasir Well	0.83
236	Mount Lebanon	Barouk	Baaklin Well	0.33
237	Mount Lebanon	Barouk	Deir El Kamar	0.18
238	Mount Lebanon	Barouk	Mresti Spring	0.14
239	Mount Lebanon	Barouk	Kafra Well	0.09
240	Mount Lebanon	Barouk	Kafra Well	0.07
241	Mount Lebanon	Barouk	Barouk Spring	0.07
242	Mount Lebanon	Barouk	Hasroum Well	0.11
243	Mount Lebanon	Barouk	Ain El Hawer Well	0.72
244	Mount Lebanon	Barouk	Daraya Well	0.13

245	Mount Lebanon	Barouk	Mresti Well	0.07
246	Mount Lebanon	Barouk	Jadra Well	0.33
273	Mount Lebanon	Barouk	Sibline Well	2.50
274	Mount Lebanon	Barouk	Sibline reservoir	2.40
270	Mount Lebanon	Damour	Damour	0.20
209	Mount Lebanon	Jbeil	Ibrahim River	0.07
199	Mount Lebanon	Kesrwan	Nabeh Al Babous/Akoura	0.07
200	Mount Lebanon	Kesrwan	Zouk Mosbeh	0.18
201	Mount Lebanon	Kesrwan	Nabeh Afqa	0.11
202	Mount Lebanon	Kesrwan	Nabeh Jeita	0.08
203	Mount Lebanon	Kesrwan	Zouk Mosbeh	0.20
204	Mount Lebanon	Kesrwan	MahataT TekrirJbeil	0.09
205	Mount Lebanon	Kesrwan	Nabeh Jeita	0.09
206	Mount Lebanon	Kesrwan	Intalias	0.10
207	Mount Lebanon	Kesrwan	Intalias	0.08
208	Mount Lebanon	Kesrwan	Ajaltoun / Asal Spring	0.05
271	Mount Lebanon	Meshref	Meshref	0.16
269	Mount Lebanon	Naameh	Naameh	0.20
176	North	Akkar	Kenia well	0.19
177	North	Akkar	Kfartoun well	0.19
178	North	Akkar	Sahleh	0.19
179	North	Akkar	Machtahassan	0.19
180	North	Akkar	Machtahammoud	0.19
181	North	Akkar	Shadra Al-Madrassa	0.19
182	North	Akkar	Shadra Al-Saha	0.23
183	North	Akkar	Kobayat	0.23
184	North	Akkar	Kobayat	0.23
185	North	Akkar	Kobayat	0.20
186	North	Akkar	Kobayat	0.22
187	North	Akkar	Tal Abbas	0.17
188	North	Akkar	Sheikh Mohammad	0.10
189	North	Akkar	Ain Yacoub	0.12
190	North	Akkar	Ain Bizbina	0.10
191	North	Akkar	Al Oyoun	0.12
192	North	Akkar	Al Joumeh	0.12
193	North	Akkar	Rahbeh	0.15

194	North	Akkar	Mechmech	0.15
195	North	Akkar	Wata Mechmech	0.13
196	North	Akkar	Menieh well	0.31
197	North	Akkar	Markabta well	0.34
198	North	Akkar	Deir Amar well	0.60
272	North	Arz	Ainata Arz	0.06
267	North	Becharri	Mar Semaan	0.02
247	North	Denieh	Seer	0.04
248	North	Denieh	Kam	0.06
249	North	Denieh	Sukar	0.00
250	North	Denieh	Katten	0.14
251	North	Denieh	Kfarhabo	0.12
268	North	Ehden	Mar Sarkis	0.01
094	North	Koura	Al Jarda/Kosba	0.14
095	North	Koura	Bishmizzine/Kfarhazir	0.12
096	North	Koura	Ain Kash/Kfarhazir	0.38
097	North	Koura	Bishmizzine	0.42
098	North	Koura	Bttram	0.45
099	North	Koura	Bishmizzine/Amyoun	0.28
100	North	Koura	Iskandar spring/Bziza	0.32
101	North	Koura	Masafi Kosba	0.15
102	North	Koura	Ajed breen	0.15
103	North	Koura	Btourateej stream	0.20
104	North	Koura	Nakhle	0.23
105	North	Koura	Mar Youssef stream/Dahr El Ain	0.54
106	North	Koura	Bakash stream	0.55
107	North	Koura	Ras Maska	0.55
264	North	Tannourine	Rahwa	0.01
265	North	Tannourine	Houb	0.04
266	North	Tannourine	Dalleh	0.05
252	North	Tripoli/Abu Samra	Hallab	0.30
253	North	Tripoli/Abu Samra	Khazzan El Ali	0.36
254	North	Tripoli/Abu Samra	Saadoun	0.58
259	North	Tripoli/Kobba	Bir Zahr El Marjeh	0.02
260	North	Tripolir/Kobba	Solfanieh	0.05
261	North	Tripoli/Kobba	Khazan El Ali	0.05

262	North	Tripoli/Kobba	Bir Kansa	0.02
263	North	Tripoli/Kobba	Rashaana	0.05
255	North	Zghorta	Rasheen	0.01
256	North	Zghorta	Bir El Kadi	0.07
257	North	Zghorta	Majdalia	0.02
258	North	Zghorta	Anoun	0.01
035	South	Nabeh Attasseh	Majdelioun	0.35
036	South	Nabeh Attasseh	Majdelioun	0.30
037	South	Nabeh Attasseh	Haret Saida	0.34
038	South	Nabeh Attasseh	Mya & Mya	0.28
044	South	Nabeh Attasseh	Harouf	0.35
045	South	Nabeh Attasseh	Nabatieh	0.29
046	South	Nabeh Attasseh	Nabatieh	0.18
047	South	Nabeh Attasseh	Nabatieh	0.29
048	South	Nabeh Attasseh	Adshit	0.30
049	South	Nabeh Attasseh	Abba	0.30
050	South	Nabeh Attasseh	Nabatieh	0.32
051	South	Nabeh Attasseh	Sharkieh	0.30
052	South	Nabeh Attasseh	Ksaibeh	0.33
053	South	Nabeh Attasseh	Ansar	0.41
054	South	Nabeh Attasseh	Nabatieh	0.30
055	South	Nabeh Attasseh	Nabatieh	0.34
056	South	Nabeh Attasseh	Mjeidel	0.33
057	South	Nabeh Attasseh	Ain Delb	0.35
058	South	Nabeh Attasseh	Kanarit	0.48
059	South	Nabeh Attasseh	Ankoun	0.17
060	South	Nabeh Attasseh	Krayeh	0.45
061	South	Nabeh Attasseh	Ain El Mir	0.17
062	South	Nabeh Attasseh	Kfarhata	0.14
063	South	Nabeh Attasseh	Tanbourit	0.34
064	South	Nabeh Attasseh	Dyr El-Zahrani	0.26
065	South	Nabeh Attasseh	Ghassania	0.47
066	South	Nabeh Attasseh	Maghdousha	0.55
067	South	Nabeh Attasseh	Kawtariet El-Siyad	0.26
068	South	Nabeh Attasseh	Marwanieh	0.40
069	South	Nabeh Attasseh	Ghazieh	0.38
070	South	Nabeh Attasseh	Khartoum	0.50

071	South	Nabeh Attasseh	Bablieh	0.55
072	South	Nabeh Attasseh	Maamrieh	0.37
073	South	Nabeh Attasseh	Najarieh	0.35
074	South	Nabeh Attasseh	Kaakayiet El Snoubar	0.45
075	South	Nabeh Attasseh	Ansarieh	0.53
076	South	Nabeh Attasseh	Nmeirieh	0.25
077	South	Nabeh Attasseh	Zrarieh	0.37
078	South	Nabeh Attasseh	Jarjough	0.19
079	South	Nabeh Attasseh	Khrayeb	0.37
080	South	Nabeh Attasseh	Zefta	0.94
081	South	Nabeh Attasseh	Saroub	0.35
082	South	Nabeh Attasseh	Arzia	0.30
083	South	Nabeh Attasseh	Kawtariet El-riz	0.38
084	South	Nabeh Attasseh	Tefahta	0.18
039	South	Saida	Fawar	0.25
040	South	Saida	Fawar	0.31
041	South	Saida	Fawar	0.27
042	South	Saida	Saray	0.30
043	South	Saida	Villat	0.25
001	South	Tyre	Yater	0.29
002	South	Tyre	Ras El-Ein	0.16
003	South	Tyre	Ras El-Ein	0.15
004	South	Tyre	Ras El-Ein	0.14
005	South	Tyre	Ras El-Ein	0.14
006	South	Tyre	Rashidieh	0.23
007	South	Tyre	Shaitich	0.15
008	South	Tyre	Mansourieh	0.16
009	South	Tyre	Qulaila	0.15
010	South	Tyre	Debaal	0.14
011	South	Tyre	Qana	0.12
012	South	Tyre	Qana	0.26
013	South	Tyre	Batolai	0.14
014	South	Tyre	Barish	0.13
015	South	Tyre	Zbdine	0.15
016	South	Tyre	Terdiba	0.25
017	South	Tyre	Tacra	0.24
018	South	Tyre	Ma'ahsouk	0.14

019	South	Tyre	Shbriha	0.14
020	South	Tyre	Qadmous	0.24
021	South	Tyre	Qasmia	0.12
022	South	Tyre	Qasmia	0.13
023	South	Tyre	Burglia	0.13
024	South	Tyre	Burglia	0.14
025	South	Tyre	Burg shamli	0.26
026	South	Tyre	Bazorieh	0.14
027	South	Tyre	Burglieh	0.10
028	South	Tyre	Bedias	0.24
029	South	Tyre	Halousieh	0.22
030	South	Tyre	Terfelsieh	0.22
031	South	Tyre	Demisa	0.11
032	South	Tyre	Derqila	0.10
085	South		Wadi Jeilo F1	0.29
086	South		Wadi Jeilo F2	0.28
087	South		Nabeh Saha	0.30
088	South		Kafeour	0.38

## 4 Survey on dental caries and fluorosis

Survey design in 1994<sup>6</sup> used a multistage cluster sampling. Due to lack of population register at that time, the country was divided into six regions and a representative significant sample from distinctive subgroups with relative proportion of individuals from each stratum adjusted when necessary. Considering the expected similarity of the population as relates to prevalence and severity of dental caries and following WHO recommendations, sample size of the subgroups was decided at 100 individuals with a total of 3000 individuals. The number of children 6, 12 and 15 years of age selected was 338, 648 and 609 respectively yielding a total of 1595.

Results of the national oral health survey indicated high prevalence of dental caries in all age groups included in the survey. Mean decayed, missing and filled teeth (DMFT) at each of the age groups were 5.72 at 12 years, 8.09 at 15 years, 14.68 at 35-44 and 24.31 at 65-74 years. At that time, prevalence of dental caries in Lebanon was considered the highest among Mediterranean countries; reasons accounting for the severity had been discussed in the position paper prepared by Dr. I.M. Abdel Rahim in 1999.

Occurrence of dental fluorosis was only reported in the region of Bekaa. Two persons out of 68 persons examined there were reported as having very mild fluorosis.

The design for the baseline study on dental caries and fluorosis in 2000 included three age groups of children: six to eight to be able to observe dentitions status in the mixed dentition, 12 years for observing conditions on the permanent dentition and being the global monitoring age for international comparisons and 15 years for observing status on permanent teeth that have been in the mouth for 3-9 years, thus being highly significant for assessment of dental caries prevalence.

### 4.1 Sampling:

Enrollment lists of children 6-8, 12 and 15 years of age in public, private and private non-profit schools in each of the sub-regions of the country were obtained from the Ministry of Education. The following table summarizes school enrollment by age, school type, by sub-region and region for academic year 1999-2000.



Table 3

Region	Sub-region	Type	6-8 years	12 years	15 years
1	Beirut	Public	2547	5404	6318
1	Beirut	Private non-profit	3155	491	6
1	Beirut	Private Paying	14202	13465	11641
2	Jbeil	Public	459	1152	1726
2	Jbeil	Private non-profit	39	13	1
2	Jbeil	Private Paying	2570	2057	1404
2	Kesrwan	Public	4581	1237	2117
2	Kesrwan	Private non-profit	564	98	3
2	Kesrwan	Private Paying	6538	5981	4606
2	El Metn Nord	Public	1014	2510	5023
2	El Metn Nord	Private non-profit	1557	286	2
2	El Metn Nord	Private Paying	12261	12313	10108
2	Baabda	Public	37971	8186	7631
2	Baabda	Private non-profit	5716	1398	24
2	Baabda	Private Paying	17133	14061	9368
2	Alie	Public	1979	2753	2881
2	Alie	Private non-profit	702	253	4
2	Alie	Private Paying	6330	5376	2872
2	Al Chouf	Public	2432	3577	3743
2	Al Chouf	Private non-profit	142	3	0
2	Al Chouf	Private Paying	4384	3363	1803
3	Tripoli	Public	8261	9562	6887
3	Tripoli	Private non-profit	2804	1120	28
3	Tripoli	Private Paying	7134	4947	3888
3	Tripoli/Mineh	Public	3348	3388	2211
3	Tripoli/Mineh	Private non-profit	332	87	3
3	Tripoli/Mineh	Private Paying	1570	893	376
3	Akkar	Public	7938	9113	6430
3	Akkar	Private non-profit	2923	851	34
3	Akkar	Private Paying	6026	3977	1357
3	Zghorta	Public	1289	1461	1443
3	Zghorta	Private non-profit	690	168	5
3	Zghorta	Private Paying	1934	1866	1227
3	Alkoura	Public	879	1210	1265
3	Alkoura	Private non-profit	269	47	0
3	Alkoura	Private Paying	2346	2451	1783
3	Bchary	Public	90	200	297
3	Bchary	Private non-profit	207	45	0
3	Bchary	Private Paying	305	283	161
3	Al Batroun	Public	523	779	901
3	Al Batroun	Private non-profit	171	45	6
3	Al Batroun	Private Paying	998	934	619
6	Zahle	Public	2202	3513	3824

6	Zahle	Private non-profit	1941	766	30
6	Zahle	Private Paying	5939	4928	2883
6	Al Hermel	Public	581	816	989
6	Al Hermel	Private non-profit	597	289	18
6	Al Hermel	Private Paying	578	352	144
6	Baalbek	Public	28931	4264	5463
6	Baalbek	Private non-profit	4770	1659	91
6	Baalbek	Private Paying	3554	4293	2727
6	West Bekaa	Public	1618	2119	2545
6	West Bekaa	Private non-profit	1107	331	8
6	West Bekaa	Private Paying	1756	1704	857
6	Rachaya	Public	821	1141	1253
6	Rachaya	Private non-profit	213	25	0
6	Rachaya	Private Paying	530	514	211
4	Saida	Public	39291	5531	4667
4	Saida	Private non-profit	2080	482	13
4	Saida	Private Paying	6663	4353	2943
4	Jezzine	Public	186	277	488
4	Jezzine	Private non-profit	237	24	0
4	Jezzine	Private Paying	150	310	120
5	Al Nabatieh	Public	2946	3734	3281
5	Al Nabatieh	Private non-profit	1510	256	3
5	Al Nabatieh	Private Paying	3280	2205	719
6	Hasbaya	Public	433	588	64
6	Hasbaya	Private non-profit	409	88	4
6	Hasbaya	Private Paying	154	318	160
6	Marjaioun	Public	437	866	724
6	Marjaioun	Private non-profit	487	117	8
6	Marjaioun	Private Paying	924	828	456
4	Tyre	Public	4240	5779	4913
4	Tyre	Private non-profit	1516	423	11
4	Tyre	Private Paying	4787	3202	1647
6	Bint Jbeil	Public	1303	2135	1267
6	Bint Jbeil	Private non-profit	1324	105	5
6	Bint Jbeil	Private Paying	632	562	304
<b>Totals</b>			<b>204742</b>	<b>186302</b>	<b>143636</b>

The sampling for the oral health survey was multistrata and used probability proportional to size to select examination sites at each stratum<sup>7</sup>.

The school population was used as the sampling frame for the survey. It should be noted that some schools enrolled less than 30 children in an age group. Only those enrolling 30 or more were included. Some schools are listed in more than one stratum because they had enrolled children in more than one age group. Schools in

each stratum were arranged and listed in ascending order according to the number of children and the cumulative totals calculated. Based on the availability of resources it was decided to sample sixteen schools in each stratum. Sampling intervals were calculated and applied to a random start number to select schools. This process selected schools according to size, i.e. schools with a large number of children had a higher probability of being selected. Schools in each region were randomly selected. Thirty children in each stratum at each school were selected at random with an approximate equal number of females and males.

## 4.2 School sites selected in each region:

**Table 4**  
**Salt fluoridation programme Lebanon 2000**

Sub-regions selected for survey on dental caries and fluorosis by age

6-8 years old	School	12 years old	School	15 years old	School
Al Chouf	Public	Akkar	Private Paying	Akkar	Public
Alie	Private Paying	Akkar	Public	Al Chouf	Public
Baabda	Private non-profit	Al Nabatieh	Public	Al Hermel	Public
Baabda	Private Paying	Alie	Public	Alie	Private Paying
Baalbek	Private non-profit	Baabda	Private Paying	Baabda	Private Paying
Baalbek	Public	Baabda	Public	Baabda	Public
West Bekaa	Private Paying	West Bekaa	Public	Beirut	Private Paying
Beirut	Private Paying	Beirut	Private Paying	Beirut	Private Paying
El Metn Nord	Private Paying	Beirut	Private Paying	Beirut	Public
Jbeil	Public	Beirut	Public	El Metn North	Private Paying
Saida	Private Paying	El Metn North	Private Paying	El Metn North	Public
Saida	Public	Kesrwan	Public	Kesrwan	Private Paying
Tripoli	Private Paying	Saida	Private Paying	Kesrwan	Public
Tripoli	Public	Tripoli	Private Paying	Saida	Private Paying
Tipoli / Mineh	Public	Tyre	Public	Tyre	Public
Zghorta	Public	Zahle	Private non-profit	Zghorta	Public

**Table 5**

Each location was assigned a unique identification number as follows:

Region	Region	Town	Town Number
1	Beirut	Beirut	1
2	Mount Lebanon	Al Chouf	2
2	Mount Lebanon	Alie	3
2	Mount Lebanon	Baabda	4
2	Mount Lebanon	El Metn North	5
2	Mount Lebanon	Jbeil	6
2	Mount Lebanon	Kesrwan	7
3	North Lebanon	Akkar	8
3	North Lebanon	Tripoli	9
3	North Lebanon	Tripoli / Mineh	10
3	North Lebanon	Zghorta	11
4	South Lebanon	Saida	12
4	South Lebanon	Tyre	13
5	Al Nabatieh	Al Nabatieh	14
6	Bekaa	Al Hermel	15
6	Bekaa	Baalbek	16
6	Bekaa	West Bekaa	17
6	Bekaa	Zahle	18

**Table 6**  
**Lebanon survey on dental caries and fluorosis 2000**

Enrollment sample size and Actual No. of Children Examined by Strata

Age Groups	Enrollment 1999-2000	Number of schools	Group size	Estimated sample	Actual No. examined
6-8	204742	16	30	480	480
12	186302	16	30	480	480
15	143636	16	30	480	480
Total	534680	48	90	1440	1440

**Table 7**  
**Demographics of Lebanon survey on dental caries and fluorosis 2002**

*A. Sample distribution by country of birth and location type*

Country	Urban	Periurban	Rural	Total
Lebanon	784	547	60	1391
Syria	6	6		12
Palestine	2	2		4
Other	15	15	2	32
Total	807	570	62	1439

*B. Sample distribution by country of birth and sex*

Country	Female	Male	Total
Lebanon	691	702	1393*
Syria	5	7	12
Palestine	1	2	3
Other	11	21	32
Total	708	732	1440*

\*Includes seven children 16 years old and 1 child 6-8 with no data on country of birth

*C. Sample distribution by declared region of residence, sex and age*

		1	2	3	4	5	6	7
Sex	Age	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Al Nabatieh	Bekaa	Total
Female	6-8	14	88	60	27		83	227
	12	37	73	42	30	15	43	240
	15	42	111	31	30		26	240
	Subtotal	93	272	133	87	15	107	707
Male	6-8	18	89	62	31		50	250
	12	44	87	43	35	13	17	239
	15	52	125	26	30		4	237
	Subtotal	114	301	131	96	13	71	726
		207	573	264	183	28	178	1433*

\*Seven children 16 years old excluded.

#### D. Sample distribution by age and school location

Town number	Town	Region	Age			Total
			6-8	12	15	
			6-8	12	15	Total
1	Beirut	1	30	89	90	209
2	Al Chouf	2	29	0	31	60
3	Alie	2	31	30	31	92
4	Baabda	2	60	62	59	181
5	El Metn North	2	31	30	60	121
6	Jbeil	2	30	0	0	30
7	Kesrwan	2	0	27	60	87
8	Akkar	3	1	60	29	90
9	Tripoli	3	59	30	1	90
10	Tripoli / Mineh	3	30	0	0	30
11	Zghorta	3	29	0	27	56
12	Saida	4	59	31	28	118
13	Tyre	4	0	30	30	60
14	Al Nabatieh	5	1	29	1	31
15	Al Hermel	6	1	1	30	32
16	Baalbek	6	59	0	0	59
17	West Bekaa	6	27	30	0	57
18	Zahle	6	0	30	0	30
Total			477	479	477	1433

#### Calibration of examiners

Prospective examiners were calibrated following WHO guidelines<sup>8,9</sup>. The purpose of the calibration exercise was to ensure uniform interpretation, understanding and application of the criteria for the various diseases and conditions to be observed and recorded, to ensure that each examiner could examine consistently to a standard, and to minimize variations between different examiners. Groups of children 6-8, 12 and 15 years of age were examined following WHO criteria<sup>8</sup>. Dental fluorosis was assessed by observing the six upper permanent anterior teeth for being more esthetically important, following recommendations made by the PAHO oral health programme. Data from each participating subject was entered into a form (copy enclosed) adapted from the WHO Oral Health Assessment form published in 1997.

The following Table summarizes the results obtained for percentage agreement and corrected Kappa statistics.

**Table 8**  
**Baseline study on dental caries and fluorosis - Lebanon, April-May, 2000**

Calibration of the Examiners

Examiner	Tooth Status		Treatment		Fluorosis Exercise 1		Fluorosis Exercise 2	
	% Agreement	Corrected Kappa	% Agreement	Corrected Kappa	% Agreement	Corrected Kappa	% Agreement	Corrected Kappa
2	84.40	0.77	66.84	0.40	75.0	0.69	80.0	0.75
3	84.28	0.75	80.7	0.48	68.3	0.61	71.2	0.65
4	85.75	0.79	73.8	0.45	75.0	0.69	85.0	0.80
5	92.86	0.90	81.5	0.58	63.3	0.54	80.0	0.74

Results of the calibration exercise indicated satisfactory agreement for tooth status; however, results on assessing dental treatment needs indicated a need for revising the criteria. The results on assessing dental fluorosis also indicated that there was a need to observe additional cases of fluorosis with various degrees of severity. This was a difficult task considering that fluorosis was not known to be a frequent finding in the country. To improve familiarity of examiners with fluorosis, several color photographs of children with various degrees of fluorosis severity were projected. Initially, examiners were encouraged to discuss individual scoring of each case according to Dean's criteria<sup>8</sup>. Subsequent recording of examiner scores were used for determining percentage of agreement and corrected Kappa statistics. Satisfactory results were obtained after the second exercise on fluorosis as summarized in the last column of Table III.

Survey data management

Clinical examination findings were recorded in a WHO simplified data collection instrument (copy enclosed) and entered into a special software program for analysis using SPSS/SAS/SUDAAN statistical packages.

### Results on dental caries and fluorosis survey

The following tables summarize results of dental caries prevalence by sex and age, severity of dental caries in the primary and permanent dentition by sex and age, age specific relative contribution of DMFT components, age specific relative contribution of the DMFT elements among those with DMFT>0 by sex and age specific relative contribution of the dmft elements among those with dmft>0 by sex. Classification of dental caries severity according to the World Health Organization by age and by sex, dental treatment needs indicating the mean number of teeth requiring specific treatment, treatment urgency by age and sex, dental fluorosis by age, age specific dental fluorosis by region, age specific modified community fluorosis (CFI) index by region calculated using maximum scores and also calculated using the score of less affected from the two most severely affected.

**Table 9**  
**Oral Health Status in Lebanon 2000**

#### A. Dental caries prevalence by age

Age	Caries History Primary				Untreated Primary Teeth				Caries History Permanent				Untreated Permanent Teeth			
	No		Yes		No		Yes		No		Yes		No		Yes	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6-8	57	11.95	420	88.05	66	13.84	411	86.16	334	70.02	143	29.98	340	71.28	137	28
12	273	77.87	106	22.13	374	78.08	105	21.92	94	19.62	385	80.38	119	24.84	360	75
15	465	97.48	12	2.52	466	97.69	11	2.31	45	9.43	432	90.57	88	18.45	389	81
<b>All</b>	<b>895</b>	<b>62.46</b>	<b>538</b>	<b>37.54</b>	<b>906</b>	<b>63.22</b>	<b>527</b>	<b>36.78</b>	<b>473</b>	<b>33.01</b>	<b>960</b>	<b>66.99</b>	<b>547</b>	<b>38.17</b>	<b>886</b>	<b>61</b>

#### Dental caries prevalence by sex and age

##### B. Male

Age	Caries History Primary				Untreated Primary Teeth				Caries History Permanent				Untreated Permanent Teeth			
	No		Yes		No		Yes		No		Yes		No		Yes	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6-8	32	12.80	218	87.20	35	14.00	215	86.00	185	74.00	65	26.00	187	74.80	63	25
12	180	75.31	59	24.69	181	75.73	58	24.27	50	20.92	189	79.08	65	27.20	174	72
15	232	97.89	5	2.11	232	97.89	5	2.11	23	9.70	214	90.30	46	19.41	191	80
<b>All</b>	<b>444</b>	<b>61.16</b>	<b>282</b>	<b>38.84</b>	<b>448</b>	<b>61.71</b>	<b>278</b>	<b>38.29</b>	<b>258</b>	<b>35.54</b>	<b>468</b>	<b>64.46</b>	<b>298</b>	<b>41.05</b>	<b>428</b>	<b>58</b>



*C. Female*

Age	Caries History Primary				Untreated Primary				Caries History Permanent				Untreated Permanent Teeth			
	No		Yes		No		Yes		No		Yes		No		Yes	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6-8	25	11.01	202	88.99	31	13.66	196	86.34	149	65.64	78	34.36	153	67.40	74	32
12	193	80.42	47	19.58	193	80.42	47	19.58	44	18.33	196	81.67	54	22.50	186	77
15	233	97.08	7	2.92	234	97.50	6	2.50	22	9.17	218	90.83	42	17.50	198	82
<b>All</b>	<b>451</b>	<b>63.79</b>	<b>256</b>	<b>36.21</b>	<b>458</b>	<b>64.78</b>	<b>249</b>	<b>35.22</b>	<b>215</b>	<b>30.41</b>	<b>492</b>	<b>69.59</b>	<b>249</b>	<b>35.22</b>	<b>458</b>	<b>64</b>

**TABLE 10**

**Oral Health Status in Lebanon Dental Caries Severity**

*A. Primary Teeth by Age*

Age	Primary Decayed Teeth			Filled Primary			Missing / caries Primary			dmft Primary Dentition		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	477	4.76	0.15	477	0.11	0.03	477	0.19	0.03	477	5.15	0.16
12	479	0.44	0.05	479	0.00	0.00	479	0.00	0.00	479	0.45	0.05
15	477	0.04	0.01	477	0.00	0.00	477	0.00	0.00	477	0.04	0.01
<b>All</b>	<b>1433</b>	<b>1.74</b>	<b>0.08</b>	<b>1433</b>	<b>0.04</b>	<b>0.01</b>	<b>1433</b>	<b>0.08</b>	<b>0.01</b>	<b>1433</b>	<b>1.88</b>	<b>0.08</b>

**Primary Teeth by Sex and Age**

*B. Male*

Age	Primary Decayed Teeth			Filled Primary			Missing / caries Primary			dmft Primary Dentition		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	250	4.75	0.21	250	0.14	0.04	250	0.18	0.04	250	5.13	0.22
12	239	0.46	0.06	239	0.01	0.01	239	0.00	0.00	239	0.49	0.07
15	237	0.03	0.01	237	0.00	0.00	237	0.00	0.00	237	0.03	0.01
<b>All</b>	<b>726</b>	<b>1.79</b>	<b>0.11</b>	<b>726</b>	<b>0.05</b>	<b>0.02</b>	<b>726</b>	<b>0.06</b>	<b>0.01</b>	<b>726</b>	<b>1.94</b>	<b>0.12</b>

*C. Female*

Age	Primary Decayed Teeth			Filled Primary			Missing / caries Primary			dmft Primary Dentition		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	227	4.78	0.23	227	0.08	0.02	227	0.20	0.04	227	5.16	0.23
12	240	0.42	0.07	240	0.00	0.00	240	0.00	0.00	240	0.42	0.07
15	240	0.05	0.02	240	0.00	0.00	240	0.00	0.00	240	0.05	0.02
<b>All</b>	<b>707</b>	<b>1.69</b>	<b>0.11</b>	<b>707</b>	<b>0.03</b>	<b>0.01</b>	<b>707</b>	<b>0.07</b>	<b>0.01</b>	<b>707</b>	<b>1.82</b>	<b>0.12</b>

**Table 11**  
**Oral Health Status in Lebanon Dental Caries Severity**

*A. Permanent Teeth by Age*

Age	Primary Decayed Teeth			Filled Primary			Missing / caries Primary			dmft Primary Dentition		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	477	0.56	0.05	477	0.03	0.01	477	0.01	0.01	477	0.60	0.05
12	479	2.87	0.13	479	0.29	0.04	479	0.12	0.02	479	3.42	0.14
15	477	3.89	0.15	477	1.04	0.10	477	0.25	0.03	477	5.44	0.17
<b>All</b>	<b>1433</b>	<b>2.44</b>	<b>0.08</b>	<b>1433</b>	<b>0.45</b>	<b>0.04</b>	<b>1433</b>	<b>0.13</b>	<b>0.01</b>	<b>1433</b>	<b>3.15</b>	<b>0.09</b>

**Permanent Teeth by Sex and Age**

*B. Male*

Age	Primary Decayed Teeth			Filled Primary			Missing / caries Primary			dmft Primary Dentition		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	250	0.48	0.06	250	0.01	0.01	250	0.02	0.02	250	0.51	0.06
12	239	2.69	0.18	239	0.34	0.06	239	0.15	0.03	239	3.33	0.19
15	237	3.81	0.22	237	0.97	0.14	237	0.22	0.04	237	5.23	0.25
<b>All</b>	<b>726</b>	<b>2.29</b>	<b>0.11</b>	<b>726</b>	<b>0.43</b>	<b>0.05</b>	<b>726</b>	<b>0.13</b>	<b>0.02</b>	<b>726</b>	<b>2.98</b>	<b>0.13</b>

*B. Female*

Age	Primary Decayed Teeth			Filled Primary			Missing / caries Primary			dmft Primary Dentition		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	227	0.65	0.07	227	0.04	0.02	227	0.00	0.00	227	0.69	0.08
12	240	3.05	0.19	240	0.23	0.05	240	0.08	0.02	240	3.50	0.19
15	240	2.96	0.21	240	1.12	0.15	240	0.29	0.04	240	5.65	0.24
<b>All</b>	<b>707</b>	<b>2.59</b>	<b>0.11</b>	<b>707</b>	<b>0.47</b>	<b>0.06</b>	<b>707</b>	<b>0.13</b>	<b>0.02</b>	<b>707</b>	<b>3.33</b>	<b>0.13</b>

**Table 12**  
**Oral Health Status in Lebanon 2000**

Dental Caries - Age specific relative contribution of the DMFT elements among those with DMFT>0

*A. All*

Age	% Decayed in DMFT			% Missing in DMFT			% Filled in DMFT		
	N	%	Std. Error	N	%	Std. Error	N	%	Std. Error
6-8	143	94.43	1.84	143	1.96	1.13	143	3.61	1.49
12	385	86.92	1.38	385	3.50	0.64	385	9.57	1.27
15	432	77.65	1.56	432	4.52	0.63	432	17.83	1.51
<b>All</b>	<b>960</b>	<b>83.87</b>	<b>0.95</b>	<b>960</b>	<b>3.73</b>	<b>0.42</b>	<b>960</b>	<b>12.40</b>	<b>0.89</b>

Age specific relative contribution of the DMFT elements among those with DMFT>0 by sex

*B. Male*

Age	% Decayed in DMFT			% Missing in DMFT			% Filled in DMFT		
	N	%	Std. Error	N	%	Std. Error	N	%	Std. Error
6-8	65	93.90	2.73	65	4.31	2.46	65	1.79	1.27
12	189	83.89	2.09	189	4.15	0.92	189	11.96	1.98
15	214	78.92	2.24	214	3.96	0.91	214	17.11	2.15
<b>All</b>	<b>468</b>	<b>83.01</b>	<b>1.40</b>	<b>468</b>	<b>4.08</b>	<b>0.65</b>	<b>468</b>	<b>12.90</b>	<b>1.30</b>

*B. Female*

Age	% Decayed in DMFT			% Missing in DMFT			% Filled in DMFT		
	N	%	Std. Error	N	%	Std. Error	N	%	Std. Error
6-8	78	94.87	2.51	78	0.00	0.00	78	5.13	2.51
12	196	89.85	1.78	196	2.88	0.90	196	7.27	1.60
15	218	76.40	2.17	218	5.06	0.87	218	18.54	2.14
<b>All</b>	<b>492</b>	<b>84.68</b>	<b>1.30</b>	<b>492</b>	<b>3.39</b>	<b>0.53</b>	<b>492</b>	<b>11.93</b>	<b>1.24</b>

**Table 13**

Age specific relative contribution of the dmft elements among those with dmft>0

*A. All*

Age	% Decayed in DMFT			% Missing in DMFT			% Filled in DMFT		
	N	%	Std. Error	N	%	Std. Error	N	%	Std. Error
6-8	420	93.56	0.85	420	3.75	0.58	420	2.69	0.64
12	106	99.06	0.66	106	0	0	106	0.94	0.66
15	12	100.00	0	12	0	0	12	0	0
<b>All</b>	<b>538</b>	<b>94.79</b>	<b>0.68</b>	<b>538</b>	<b>2.93</b>	<b>0.46</b>	<b>538</b>	<b>2.29</b>	<b>0.52</b>

Age specific relative contribution of the DMFT elements among those with DMFT>0 by sex

*B. Male*

Age	% Decayed in DMFT			% Missing in DMFT			% Filled in DMFT		
	N	%	Std. Error	N	%	Std. Error	N	%	Std. Error
6-8	218	93.83	1.13	218	3.21	0.66	218	2.97	0.97
12	59	98.31	1.19	59	0	0	59	1.69	1.19
15	5	100.00	0	5	0	0	5	0	0
<b>All</b>	<b>282</b>	<b>94.87</b>	<b>0.92</b>	<b>282</b>	<b>2.48</b>	<b>0.52</b>	<b>282</b>	<b>2.65</b>	<b>0.79</b>

*B. Female*

Age	% Decayed in DMFT			% Missing in DMFT			% Filled in DMFT		
	N	%	Std. Error	N	%	Std. Error	N	%	Std. Error
6-8	202	93.27	1.28	202	4.34	0.98	202	2.39	0.84
12	47	100.00	0	47	0	0	47	0	0
15	7	100.00	0	7	0	0	7	0	0
<b>All</b>	<b>256</b>	<b>94.69</b>	<b>1.02</b>	<b>256</b>	<b>3.42</b>	<b>0.78</b>	<b>256</b>	<b>1.89</b>	<b>0.66</b>

**Table 14**  
**Oral Health Status in Lebanon 2000**  
**Dental Caries - WHO Severity by Age**

*C. Female*

Age	WHO Cut - offs Permanent Teeth								WHO Cut - offs Permanent Teeth							
	DMFT=0		1<=DMFT<=3		4<=DMFT<=6		DMFT>=7		DMFT=0		1<=DMFT<=3		4<=DMFT<=6		DMFT>=7	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6-8	334	70.02	124	26.00	19	3.98	0	0	57	11.95	96	20.13	162	33.96	162	
12	94	19.62	167	34.86	151	31.52	67	13.99	373	77.87	91	19.00	15	3.13	0	
15	45	9.43	117	24.53	145	30.40	170	35.64	465	97.48	12	2.52	0	0	0	
<b>All</b>	<b>473</b>	<b>33.01</b>	<b>408</b>	<b>28.47</b>	<b>315</b>	<b>21.98</b>	<b>237</b>	<b>16.54</b>	<b>895</b>	<b>62.46</b>	<b>199</b>	<b>13.89</b>	<b>177</b>	<b>12.35</b>	<b>162</b>	

## WHO Classification of dental caries severity by sex and age

### B. Male

Age	WHO Cut - offs Permanent Teeth								WHO Cut - offs Permanent Teeth							
	DMFT=0		1<=DMFT<=3		4<=DMFT<=6		DMFT>=7		DMFT=0		1<=DMFT<=3		4<=DMFT<=6		DMFT>=7	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6-8	185	74.00	58	23.20	7	2.80	0	0	32	12.80	49	19.60	81	32.40	88	35.2
12	50	20.92	85	35.56	71	29.71	33	13.81	180	75.31	51	21.34	8	3.35	0	0
15	23	9.70	67	28.27	68	28.69	79	33.33	232	97.89	5	2.1	0	0	0	0
<b>All</b>	<b>258</b>	<b>35.54</b>	<b>210</b>	<b>28.93</b>	<b>146</b>	<b>20.11</b>	<b>112</b>	<b>15.43</b>	<b>444</b>	<b>61.16</b>	<b>105</b>	<b>14.46</b>	<b>89</b>	<b>12.26</b>	<b>88</b>	<b>12.1</b>

### C. Female

Age	WHO Cut - offs Permanent Teeth								WHO Cut - offs Permanent Teeth							
	DMFT=0		1<=DMFT<=3		4<=DMFT<=6		DMFT>=7		DMFT=0		1<=DMFT<=3		4<=DMFT<=6		DMFT>=7	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6-8	149	65.64	66	29.07	12	5.29	0	0	25	11.01	47	20.70	81	35.68	74	32.6
12	44	18.33	82	34.17	80	33.33	34	14.17	193	80.42	40	16.67	7	2.92	0	0
15	22	9.17	50	20.83	77	32.08	91	37.92	233	97.08	7	2.92	0	0	0	0
<b>All</b>	<b>215</b>	<b>30.41</b>	<b>198</b>	<b>28.01</b>	<b>169</b>	<b>23.90</b>	<b>125</b>	<b>17.68</b>	<b>451</b>	<b>63.79</b>	<b>94</b>	<b>13.30</b>	<b>88</b>	<b>12.45</b>	<b>74</b>	<b>10.4</b>

**TABLE 15**

### Oral Health Status in Lebanon 2000 - Dental Caries Mean Number of Teeth Requiring Specific Treatment

Age	No Treatment needed			Preventive Treatment			Needed Sealant			Extraction		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	477	21.15	0.19	477	0.52	0.05	477	0.77	0.05	477	0.72	0.07
12	479	19.36	0.27	479	2.72	0.21	479	2.36	0.11	479	0.23	0.03
15	477	17.65	0.27	477	3.23	0.20	4177	2.68	0.11	477	0.08	0.02
<b>All</b>	<b>1433</b>	<b>19.39</b>	<b>0.15</b>	<b>1433</b>	<b>2.16</b>	<b>0.10</b>	<b>1433</b>	<b>1.94</b>	<b>0.06</b>	<b>1433</b>	<b>0.34</b>	<b>0.03</b>

Continued

Age	One Surface Amalgam			2 + Surface Amalgam			Crown			Veneer			Pulp Tx & restoration		
	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error	N	Mean	Std. Error
6-8	477	1.18	0.07	477	2.33	0.11	477	0.08	0.02	477	0	0	477	1.06	0.
12	479	1.90	0.09	479	0.96	0.06	479	0.22	0.03	479	0	0	479	0.15	0.
15	477	2.46	0.11	477	1.37	0.09	477	0.24	0.03	477	0	0	477	0.15	0.
<b>All</b>	<b>1433</b>	<b>1.85</b>	<b>0.05</b>	<b>1433</b>	<b>1.55</b>	<b>0.05</b>	<b>1433</b>	<b>0.18</b>	<b>0.02</b>	<b>1433</b>	<b>0</b>	<b>0</b>	<b>1433</b>	<b>0.45</b>	<b>0.</b>

**TABLE 16**  
**Oral Health Status in Lebanon 2000 - Dental Caries**

*A. Treatment Urgency by age*

Age	Urgency of Treatment needed									
	No need		Routine		Prompt		Urgent		Not recorded	
	N	%	N	%	N	%	N	%	N	%
6-8	52	10.90	36	7.55	283	59.33	105	22.01	1	0.21
12	49	10.23	115	24.01	244	50.94	69	14.41	2	0.42
15	51	10.69	87	18.24	274	57.44	65	13.63	0	0
<b>All</b>	<b>152</b>	<b>10.61</b>	<b>238</b>	<b>16.61</b>	<b>801</b>	<b>55.90</b>	<b>239</b>	<b>16.68</b>	<b>3</b>	<b>0.21</b>

**Treatment Urgency by sex and age**

*B. Male*

Age	Urgency of Treatment needed									
	No need		Routine		Prompt		Urgent		Not recorded	
	N	%	N	%	N	%	N	%	N	%
6-8	29	11.60	17	6.80	145	58.00	58	23.20	1	0.40
12	30	12.55	54	22.59	119	49.79	36	15.06	0	0
15	22	9.28	50	21.10	138	58.23	27	11.39	0	0
<b>All</b>	<b>81</b>	<b>11.16</b>	<b>121</b>	<b>16.67</b>	<b>402</b>	<b>55.37</b>	<b>121</b>	<b>16.67</b>	<b>1</b>	<b>0.14</b>

*C. Female*

Age	Urgency of Treatment needed.									
	No need		Routine		Prompt		Urgent		Not recorded	
	N	%	N	%	N	%	N	%	N	%
6-8	23	10.13	19	8.37	138	60.79	47	20.70	0	0
12	19	7.92	61	25.42	125	52.08	33	13.75	2	0.83
15	29	12.08	37	15.42	136	56.67	38	15.83	0	0
<b>All</b>	<b>71</b>	<b>10.04</b>	<b>117</b>	<b>16.55</b>	<b>399</b>	<b>56.44</b>	<b>118</b>	<b>16.69</b>	<b>2</b>	<b>0.28</b>

**TABLE 17**  
**Oral Health Status in Lebanon 2000**  
**Dental Fluorosis by age**

Age	Maximum Fluorosis Cuspid to Cuspid											
	No		Questionable		Very mild		Mild		Moderate		Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
6-8	231	88.8	23	8.85	3	1.15	3	1.15	0	0	0	0
12	414	87.5	13	2.75	17	3.59	18	3.81	10	2.11	1	0.21
15	413	88.1	19	4.05	16	3.41	15	3.20	3	0.64	3	0.64
<b>All</b>	<b>1058</b>	<b>88.0</b>	<b>55</b>	<b>4.58</b>	<b>36</b>	<b>3.0</b>	<b>36</b>	<b>3.0</b>	<b>13</b>	<b>1.08</b>	<b>4</b>	<b>0.33</b>

**TABLE 18**  
**Oral Health Status in Lebanon 2000**  
**Age Specific Dental fluorosis by age**

*A. 6-8 years*

Region	Maximum Fluorosis Cuspid to Cuspid											
	0 No		1 Questionable		2 Very mild		3 Mild		4 Moderate		5 Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
1 Beirut	16	94.12	1	5.88	0	0.00	0	0.00	0	0.00	0	0.00
2 Mount Lebanon	79	89.77	5	5.68	2	2.27	2	2.27	0	0.00	0	0.00
3 North Lebanon	59	96.72	1	1.64	1	1.64	0	0.00	0	0.00	0	0.00
4 South Lebanon	39	10.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5 Al Nabatieh									0	0.00	0	0.00
6 Bekaa	38	69.09	16	0.00	0	0.00	1	1.82	0	0.00	0	0.00
<b>All</b>	<b>231</b>	<b>88.85</b>	<b>23</b>	<b>1.15</b>	<b>3</b>	<b>1.15</b>	<b>3</b>	<b>1.15</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0.00</b>

### B. 12 years

Region	Maximum Fluorosis Cuspid to Cuspid											
	0 No		1 Questionable		2 Very mild		3 Mild		4 Moderate		5 Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
1 Beirut	61	76.25	7	8.75	6	7.50	2	2.50	3	3.75	1	1.25
2 Mount Lebanon	128	81.01	3	0.63	8	5.06	13	8.23	6	3.80	0	0.00
3 North Lebanon	82	96.47	2	0.42	1	1.18	0	0.00	0	0.00	0	0.00
4 South Lebanon	62	98.41	0	0.00	0	0.00	1	1.59	0	0.00	0	0.00
5 Al Nabatieh	28	100.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6 Bekaa	53	89.83	1	0.21	2	0.42	2	3.39	1	1.69	0	0.00
<b>All</b>	<b>414</b>	<b>87.53</b>	<b>13</b>	<b>2.75</b>	<b>17</b>	<b>3.59</b>	<b>18</b>	<b>3.81</b>	<b>10</b>	<b>2.11</b>	<b>1</b>	<b>0.21</b>

### C. 15 years

Region	Maximum Fluorosis Cuspid to Cuspid											
	0 No		1 Questionable		2 Very mild		3 Mild		4 Moderate		5 Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
1 Beirut	70	77.78	8	8.89	7	7.78	5	5.56	0	0.00	0	0.00
2 Mount Lebanon	208	88.89	5	2.14	7	2.99	8	3.42	3	1.28	3	1.28
3 North Lebanon	52	92.86	3	5.36	1	1.79	0	0.00	0	0.00	0	0.00
4 South Lebanon	59	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5 Al Nabatieh												
6 Bekaa	24	80.00	3	10.00	1	3.33	2	6.67	0	0.00	0	0.00
<b>All</b>	<b>413</b>	<b>88.06</b>	<b>19</b>	<b>4.05</b>	<b>16</b>	<b>3.41</b>	<b>15</b>	<b>3.20</b>	<b>3</b>	<b>0.64</b>	<b>3</b>	<b>0.64</b>



D. All ages

Region	Maximum Fluorosis Cuspid to Cuspid											
	0 No		1 Questionable		2 Very mild		3 Mild		4 Moderate		5 Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
1 Beirut	147	78.61	16	8.56	13	6.95	7	3.74	3	1.60	1	0.53
2 Mount Lebanon	415	86.46	13	2.71	17	3.54	23	4.79	9	1.88	3	0.63
3 North Lebanon	196	95.15	7	3.40	3	1.46	0	0.00	0	0.00	0	0.00
4 South Lebanon	161	99.38	0	0.00	0	0.00	1	0.62	0	0.00	0	0.00
5 Al Nabatieh	28	100	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6 Bekaa	116	79.45	20	13.70	4	2.74	5	3.42	1	0.68	0	0.00
<b>All</b>	<b>1063</b>	<b>87.92</b>	<b>56</b>	<b>4.63</b>	<b>37</b>	<b>3.06</b>	<b>36</b>	<b>2.98</b>	<b>13</b>	<b>1.08</b>	<b>4</b>	<b>0.33</b>

**TABLE 19**  
**Age Specific Modified Community Fluorosis (CFI) Index by Region**

All regions

Ages	Calculated using maximum scores												CFI
	0		1		2		3		4		5		
	N	Weight sum	N	Weight sum	N	Weight sum	N	Weight sum	N	Weight sum	N	Weight sum	
6-8	231	0	23	11.5	3	3	3	6	0	0	0	0	0.08
12	413	0	13	6.5	17	17	18	36	10	30	1	4	0.20
15	418	0	19	4.5	16	16	15	30	3	9	3	12	0.15
<b>All</b>	<b>1062</b>	<b>0</b>	<b>55</b>	<b>27.5</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>72</b>	<b>13</b>	<b>39</b>	<b>4</b>	<b>16</b>	<b>0.16</b>

Age	Calculated using maximum scores											
	1 Beirut		2 Mount Lebanon		3 North Lebanon		4 South Lebanon		5 Al Nabatieh		6 Bekaa	
	N	CFI	N	CFI	N	CFI	N	CFI	N	CFI	N	CFI
6-8	17	0.029	88	0.096	61	0.025	39	0.00	0	0.00	55	0.181
12	80	0.331	158	0.339	84	0.024	63	0.03	28	0.00	59	0.161
15	90	0.233	234	0.199	60	0.050	60	0.00	0	0.00	32	0.234
<b>All</b>	<b>187</b>	<b>0.257</b>	<b>480</b>	<b>0.006</b>	<b>205</b>	<b>0.032</b>	<b>162</b>	<b>0.12</b>	<b>28</b>	<b>0.00</b>	<b>146</b>	<b>0.185</b>

**TABLE 20**  
**Dean Index Cuspid to Cuspid**

All

Age	Calculated using the score of less affected from the two most severely affected											
	0 NO		1 Questionable		2 Very mild		3 Mild		4 Moderate		5 Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
6-8	111	88.1	12	9.52	2	1.59	1	0.79	0	0	0	0
12	210	89.4	4	1.70	5	2.13	9	3.83	7	2.98	0	0
15	204	87.6	10	4.29	8	3.43	7	3.00	3	1.29	1	0.43
<b>All</b>	<b>525</b>	<b>88.4</b>	<b>26</b>	<b>4.38</b>	<b>15</b>	<b>2.53</b>	<b>17</b>	<b>2.86</b>	<b>10</b>	<b>1.68</b>	<b>1</b>	<b>0.17</b>

**TABLE 21**  
**Dean Index Cuspid to Cuspid**  
**Age specific by region**

A. 6-8 years

Region	Calculated using the score of less affected from the two most severely affected											
	N	%	N	%	N	%	N	%	N	%	N	%
1 Beirut	16	94.12	1	5.88	0	0.00	0	0.00	0	0.00	0	0.00
2 Mount Lebanon	80	90.91	4	4.55	2	2.27	2	2.27	0	0.00	0	0.00
3 North Lebanon	59	96.72	1	1.64	1	1.64	0	0.00	0	0.00	0	0.00
4 South Lebanon	39	100.00	0	0.00	1	0.00	0	0.00	0	0.00	0	0.00
5 Al Nabatieh												
6 Bekaa	42	76.36	12	21.82	0	0.00	1	1.82	0	0.00	0	0.00
<b>All</b>	<b>236</b>	<b>90.77</b>	<b>18</b>	<b>6.92</b>	<b>3</b>	<b>1.15</b>	<b>3</b>	<b>1.15</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0.00</b>

### B. 12 years

Region	Calculated using the score of less affected from the two most severely affected											
	0 No		1 Questionable		2 Very mild		3 Mild		4 Moderate		5 Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
1 Beirut	65	81.25	3	3.75	6	7.50	2	2.5	4	5.00	0	0.00
2 Mount Lebanon	128	81.01	3	1.90	9	5.70	12	7.59	6	3.80	0	0.00
3 North Lebanon	83	97.65	1	1.18	1	1.18	0	0.00	0	0.00	0	0.00
4 South Lebanon	62	98.41	0	0.00	0	0.00	1	1.59	0	0.00	0	0.00
5 Al Nabatieh	28	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6 Bekaa	54	91.53	0	0.00	2	3.39	2	3.39	1	1.69	0	0.00
<b>All</b>	<b>420</b>	<b>88.79</b>	<b>7</b>	<b>1.48</b>	<b>18</b>	<b>3.81</b>	<b>17</b>	<b>3.59</b>	<b>111</b>	<b>2.33</b>	<b>0</b>	<b>0.00</b>

### C. 15 years

Region	Calculated using the score of less affected from the two most severely affected											
	0 No		1 Questionable		2 Very mild		3 Mild		4 Moderate		5 Severe	
	N	%	N	%	N	%	N	%	N	%	N	%
1 Beirut	73	81.11	6	6.67	6	6.67	5	5.56	0	0.00	0	0.00
2 Mount Lebanon	210	89.74	3	1.28	7	2.99	8	3.42	5	2.14	1	0.43
3 North Lebanon	52	92.86	3	5.36	1	1.79	0	0.00	0	0.00	0	0.00
4 South Lebanon	59	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5 Al Nabatieh												
6 Bekaa	25	83.33	2	6.67	1	3.33	2	6.67	0	0.00	0	0.00
<b>All</b>	<b>419</b>	<b>89.34</b>	<b>14</b>	<b>2.99</b>	<b>15</b>	<b>3.20</b>	<b>15</b>	<b>3.20</b>	<b>5</b>	<b>1.07</b>	<b>1</b>	<b>0.21</b>

## 5 Renal fluoride excretion by children 3-5 years of age

### 5.1 Introduction

The purpose of this study was to establish baseline information on total fluoride exposure by measuring the renal fluoride excretion by children 3-5 years of age prior to implementation of a salt fluoridation programme in the country. The World Health Organization<sup>10</sup> recommends conducting this study before the start of the programme including various age groups with special emphasis on children of 12 months to 4 or 5 years of age that includes the period of highest susceptibility to dental fluorosis. The study conducted in Lebanon included children 3-5 years thus, complying with the above recommendation.

### 5.2 Materials and methods

The initial intent for selecting children for the study was to include children that might be exposed to diverse sources of fluoride through food, environmental conditions, dental preventive measures provided by the dentist, or via supplemental fluoride prescribed by the physician or dentist, or by use of fluoridated dentifrice during toothbrushing. Considering that there are no special dietary or food practices in the various geographical regions of Lebanon and in the absence of information on exposure of children to various sources of fluoride, the sampling design contemplated selecting children 3-5 years of age attending kindergarten, preschools or schools using simple random selection or probability proportional to the enrollment in such educational institutions throughout the country. Absence of detailed information on children enrollment in all schools and in all regions predicted this method of selection. The number of children 3-5 years of age enrolled in public, private non-profit and private paying schools in twenty six towns in all regions was available. The following table summarizes the distribution of children 3-5 years of age by school type, town and region.

Town	Region	School Type	Number
Beirut	Beirut	Public	545
Beirut	Beirut	Private Non-profit	1087
Beirut	Beirut	Private Paying	7838
Jbeil	Mount Lebanon	Public	128
Jbeil	Mount Lebanon	Private Non-profit	141
Jbeil	Mount Lebanon	Private Paying	1137
Kesrwan	Mount Lebanon	Public	158
Kesrwan	Mount Lebanon	Private Non-profit	232
Kesrwan	Mount Lebanon	Private Paying	3687
El Metn North	Mount Lebanon	Public	239
El Metn North	Mount Lebanon	Private Non-profit	1013
El Metn North	Mount Lebanon	Private Paying	6541
Baabda	Mount Lebanon	Public	707
Baabda	Mount Lebanon	Private Non-profit	1891
Baabda	Mount Lebanon	Private Paying	7697

Alie	Mount Lebanon	Public	601
Alie	Mount Lebanon	Private Non-profit	227
Alie	Mount Lebanon	Private Paying	3173
Al Chouf	Mount Lebanon	Public	725
Al Chouf	Mount Lebanon	Private Non-profit	174
Al Chouf	Mount Lebanon	Private Paying	2296
Tripoli	North Lebanon	Public	1355
Tripoli	North Lebanon	Private Non-profit	1053
Tripoli	North Lebanon	Private Paying	3364
Tripoli / Mineh	North Lebanon	Public	944
Tripoli / Mineh	North Lebanon	Private Non-profit	171
Tripoli / Mineh	North Lebanon	Private Paying	503
Akkar	North Lebanon	Public	1631
Akkar	North Lebanon	Private Non-profit	687
Akkar	North Lebanon	Private Paying	2220
Zghorta	North Lebanon	Public	487
Zghorta	North Lebanon	Private Non-profit	299
Zghorta	North Lebanon	Private Paying	570
Alkoura	North Lebanon	Public	232
Alkoura	North Lebanon	Private Non-profit	127
Alkoura	North Lebanon	Private Paying	467
Bchary	North Lebanon	Public	45
Bchary	North Lebanon	Private Non-profit	92
Bchary	North Lebanon	Private Paying	118
Al Batroun	North Lebanon	Public	204
Al Batroun	North Lebanon	Private Non-profit	122
Al Batroun	North Lebanon	Private Paying	129
Zahle	Bekaa	Public	601
Zahle	Bekaa	Private Non-profit	652
Zahle	Bekaa	Private Paying	2383
Al Hermel	Bekaa	Public	165
Al Hermel	Bekaa	Private Non-profit	318
Al Hermel	Bekaa	Private Paying	237
Baalbek	Bekaa	Public	794
Baalbek	Bekaa	Private Non-profit	1431
Baalbek	Bekaa	Private Paying	1155
West Bekaa	Bekaa	Public	419
West Bekaa	Bekaa	Private Non-profit	318
West Bekaa	Bekaa	Private Paying	765
Rachaya	Bekaa	Public	51
Rachaya	Bekaa	Private Non-profit	87
Rachaya	Bekaa	Private Paying	84
Saida	South Lebanon	Public	1213
Saida	South Lebanon	Private Non-profit	773
Saida	South Lebanon	Private Paying	3334
Jezzine	South Lebanon	Public	74
Jezzine	South Lebanon	Private Non-profit	91
Jezzine	South Lebanon	Private Paying	73
Al Nabatieh	South Lebanon	Public	942
Al Nabatieh	South Lebanon	Private Non-profit	572
Al Nabatieh	South Lebanon	Private Paying	1841

Hasbaya	South Lebanon	Public	169
Hasbaya	South Lebanon	Private Non-profit	163
Hasbaya	South Lebanon	Private Paying	154
Marjaoun	South Lebanon	Public	113
Marjaoun	South Lebanon	Private Non-profit	196
Marjaoun	South Lebanon	Private Paying	376
Tyre	South Lebanon	Public	1194
Tyre	South Lebanon	Private Non-profit	337
Tyre	South Lebanon	Private Paying	2150
Bint Jbeil	South Lebanon	Public	392
Bint Jbeil	South Lebanon	Private Non-profit	567
Bint Jbeil	South Lebanon	Private Paying	379
Beirut	South Lebanon	Public	545
Total			14128

The recommended number of children for urinary fluoride excretion studies is 40-50 children to compensate for inevitable absences, non-compliance or incomplete samples. Selection could be by simple random sampling or by probability proportional to size. Although the number of children 3-5 years-old attending each of the three categories of schools in each town was at least forty-five, it was known that not all schools would have sufficient number of children to conform the necessary cluster. Having estimated similar exposure to fluoride in each and all regions, the first stage grouped the towns by region; then, the number of children in public, private-non-profit and private-paying schools in each town was arranged in ascending order. Forty children were to be selected from each region of five regions, twenty from each of two schools (public, private-non-profit or private-paying) selected using probability proportional to size method. Cumulative frequencies and sample intervals were calculated. The following table indicates the sample distribution of children by school type, town, and region.

**TABLE 23**  
**Renal fluoride excretion by children 3-5 years**  
**Lebanon May 2000**

Children selection by school type, town, and region

Town	Region code	Region	School type
Beirut	01	Beirut	Private Paying
Baabda	02	Mount Lebanon	Private Paying
Kesrwan	02	Mount Lebanon	Private Paying
Tripoli	03	North Lebanon	Private Paying
Tripoli	03	North Lebanon	Private Paying
Marjaioun	04	South Lebanon	Private Paying
Al Nabatieh	04	South Lebanon	Private Paying
Zahle	06	Bekaa	Public
Zahle	06	Bekaa	Private Paying

All baseline studies conducted in Lebanon were endorsed by Ministry of Health officials and comply with general requirements for protection of subjects. Local coordinators authorized by the Ministry of Health made the necessary protocolary arrangements with schools selected for the study. A short and clear note explaining the purpose of the study was prepared by the Consultant and translated into Arabic by local coordinators. The note also served to secure permission/consent for the children to participate. Simple random was used for selecting the final number of children needed to conform the cluster at each location.

Parents were also informed of activities to be conducted with instructions on how and when to initiate and finish collection of nocturnal urinary samples. Parents were also instructed that it would be necessary for them to provide demographic information on their child and indicate the type of food ingested by the child the day before and the day of sample collection. Additional information on use of products containing fluorides such as toothpaste, tablets, drops or topical fluorides was collected via questionnaire that was translated into Arabic.

### 5.3 *Training exercise and sample collection*

A theoretical exercise was conducted in Beirut. The background of the project and scientific rationale for conducting monitoring fluoride excretion study was explained to persons assisting with collection of urinary samples. The protocol to be followed as well as a step-by-step procedure for supervised collection and recording of urinary volume and micturition times was carefully explained. Examples of possible scenarios or special situations that might be encountered in the field were also given. The procedure for completion of labels accompanying the containers as well as for recording individual and summary data from each collection site were explained in detail. Practical exercises were conducted to familiarize assisting persons on all procedures.

Difficulties for 24-hour collection of samples were identified, thus the monitoring period selected for the study was 16-18-hours which is considered acceptable<sup>10</sup>. Due to regional holidays, urine samples could not be collected simultaneously in all schools the same days; this was not considered to affect the accuracy of data since collection of samples from each cluster of children would not be interrupted during the monitoring period.

The monitoring period was divided in three periods: nocturnal, morning and midday-afternoon. Urine samples were collected from individuals at each period, total volume per period was recorded, and an aliquot transferred into plastic tubes containing 0.03 grams of Thymol as preservative. Samples were refrigerated and then transported to the Public Health Central Laboratory where they were frozen for analysis within 45 days. Data from each child was entered into a form (enclosed) and the summary data from each location recorded in a larger form (adapted from the WHO Form No. 96391).



#### 5.4 Fluoride determination

Four milliliters of urine sample were placed in plastic tubes and a concentrated Total Ionic Strength Buffer (Orion TISAB III) added to all samples. Fluoride concentration in urine was determined using specific ion electrode (Orion model 9609BN) and electronic meters (Orion model 290A). Electrodes were calibrated using standard solutions with concentrations of 0.1; 0.5; 1.0 and 5.0 mg/lF.

Demographic data from each participant, corporal weight as well as data on urinary volume, excretion times and concentration of fluoride were recorded and entered in computerized programs for further analysis.

### 6 Fluoride exposure

Total fluoride exposure of the subjects participating in the study and the entire population is not well known. However, laboratory tests conducted on samples of drinking water supplies located in towns declared by parents of participating children as their place of residence indicated fluoride concentration to be below optimal levels. The only source of water having near-optimal concentration (0.58 mg/l F in Saadoun) is located in Tripoli in North Lebanon. However, it is unknown at this time whether children attending the private -paying-school in Tripoli use water from Saadoun.

Fluoride exposure via fluoridated toothpaste and fluoride supplements was studied according to the following protocol<sup>11</sup>.

Scientific evidence indicates that children under 5 years of age ingest dentifrice during toothbrushing procedures due to lack of complete swallowing control. Considering that the great majority of dentifrice products contain high concentrations of fluoride, there is a possibility of ingesting high concentrations of fluoride with the potential risk of developing dental fluorosis. Fasting, once ingested, fluoride contained in dentifrice is almost completely absorbed (Ekstrand & col., 1985). The amount of dentifrice ingested by children two to five years of age varies between 0.1 and 2 grams and a mean of 0.5 grams (Backer & col., 1974; Dowell, 1981; Erickson and Forsman, 1969). Burt B.A., *J Dent Res* 71 (5): 1228-37, May 1992. Simard P.L., Naccache H., Lachapelle D., and Brodeur J. M. *Clinical Pediatrics* 30 (11): 614-7, Nov. 1991. Beltran E., *Pediatric Dentistry*, 1988.

The use of dentifrice starts at an early age. Forty six percent of mothers interviewed reported that they initiated toothbrushing of their children at 12 months; this percentage increased to 78% in children 18 months old (Ophaug, 1990). In a similar study,

parents reported that 29% of children 17 months old and 55% of 3-year-old children brushed their teeth at least twice a day. Likewise, they reported that children swallowed most of the toothpaste during the toothbrushing procedure.

For these reasons, the recommendation is that children should use a very small amount of dentifrice no larger than a pea size under the supervision of an adult. (CMAJ. 1949 (12): 1787-93, Dec 15, 1995. Levy SM., Maurice TJ. Jakobsen JR. Pediatric Dentistry 14(6):388-91, Nov-Dec. 1992.

Fluoride supplements have been utilized in infant populations to compensate for fluoride deficiency in water for human consumption. A study determined that the use of fluoride supplements was a risk factor in the development of dental fluorosis when ingestion occurred during tooth formation (Aasanden & Pebbles, 1977, Archives of Oral Biology). In a more recent study, the risk of dental fluorosis was four times greater in children who ingested fluoride supplements than in those who did not (Pendry & Katz, Am J of Epidemiology, 1985). Considering that fluoridation programs satisfy the optimal levels of required systemic fluoride, use of supplemental fluoride is unnecessary.

For the above reasons, as part of fluoridation programmes, it is indispensable to quantify the use of dentifrice and fluoridated supplements by specific population groups. These results are indispensable for the planning and implementation of educational programs aiming to health professionals and parents to diminish the risk of dental fluorosis.

## 6.1 Objectives

- a) Determine the use of dentifrice and frequency by children 3-5 years of age.
- b) Identify dentifrice products most widely used.
- c) Collect and report the concentration of fluoride indicated on the containers, packaging or labels as indicated by the manufacturers.
- d) Estimate the percentage of children three to five years of age that ingest toothpaste during toothbrushing practices.
- e) Collect and report use of fluoride supplements (drops, tablets, reinforced vitamins, etc.).
- f) Determine the availability of fluoride supplements by prescription or over the counter.

## *6.2 Method*

The present study was observational, transversal, and ecological. Five towns located in diverse geographical location in each region were selected because sources of fluoride exposure might be different throughout the country. Dental fluorosis has not been reported in Lebanon as of frequent occurrence. Sporadic cases of children born in Syria and other countries have been observed. Parents of all children participating in the assessment of fluoride exposure indicated that these children had resided in the towns since birth. The children participating in this study also donated urine samples for determining fluoride excretion. The questionnaire (see addendum) included questions on utilization of dentifrice and fluoride supplements; frequency and age of use initiation. The questionnaire was applied by means of a personal interview conducted by previously trained persons

At the conclusion of the personal interview, the team of investigators collected information related to dentifrice and fluoride supplements that are available at the local market. Copies of the questionnaire used in English and the Arabic version are enclosed.

## Results of urinary fluoride excretion

**Table 24**  
**Urinary fluoride data, Lebanon by Region**

Urines obtained between 2 and 5 May, 2000

Region	South <sup>1</sup>	Beirut <sup>1</sup>	Bekaa <sup>1</sup>	North <sup>2</sup>	Mount Lebanon <sup>1</sup>
<b>Subjects</b>					
Number	36	18	30	34	37
Number of Successful collections	115	96	106	71	115
Mean age, years, (range)	4.1(3-5)	4.6(3-5)	4.2(3-5)	4.5(3-6)	3.8(3-5)
<b>Collection patterns, hours, within one 24-hours cycle</b>					
	Morn/aft/night <sup>1</sup>	Morn/aft/night <sup>1</sup>	Morn/aft/night <sup>1</sup>	Day/night <sup>2</sup>	Morn/aft/night <sup>1</sup>
Mean duration of Collection range	14.8(2.3-17.1)	18.6(9-26)	17.1(6-20)	16.2(13.4-18.8)	16.3(10-18)
<b>Fluoride concentration, ppm</b>					
Average	0.4	0.6	0.3	0.58	0.50
Standard deviation	0.2	0.1	0.2	0.29	0.30
Confidence limits (P=0.95)	0.324-0.433	0.57-0.66	0.238-0.373	0.478-0.681	0.40-0.62
Range	0.2-1.0	0.4-0.8	0.1-0.9	0.192-1.545	0.2-1.9
<b>Fluoride excretion per 24 hours, <math>\mu\text{g/h}</math></b>					
Average	7.1	10.4	4.9	6.3	6.3
Standard deviation	3.2	4.1	5.5	3.3	4.8
Confidence limits (P=0.95)	6.0-8.1	10.7-13.7	2.8-6.7	5.2-7.4	4.7-7.8
Range	3.1-17.84.3-21.7	1.1-21.7	1.1-30.4	2.1-13.5	1.2-21.5
<b>Fluoride excretion, g/24h</b>					
Average	170.7	249.1	118.7	151	152.3
Standard deviation	75.9	97.3	132.5	79.0	114.0
Confidence limits (P=0.95)	144-194	257-328	68-160	124-179	112-187
Range	74.4-426.5	103.7-820.0	25,3-728,9	51-324	07.7-516.5
<b>Urinary flow per 24h, ml/h</b>					
Average	18.7	18.1	15.9	11.8	12.4
Standard deviation	5.0	7.2	8.1	6.1	5.5
<b>Urinary flow, ml/24h</b>					
Average	449.6	435.6	380.6	283	298.2
Standard deviation	119.7	172.2	193.7	146	132.2

<sup>1</sup>Collections obtained in the morning, afternoon and at night

<sup>2</sup>Collections obtained during the day and at night

**Table 25**  
**Urinary fluoride data, Lebanon 2000**

Combined by patterns of collection

Collection Pattern	Morning/after noon/night <sup>1</sup>	Morning/after noon/night <sup>2</sup>	Morning/night <sup>3</sup>	Day/night <sup>4</sup>
<b>Subjects</b>				
Number	163	125	52	34
Number of successful collections	443	275	104	65
Mean age, years, (range)	4.2 (3-5)	4.2 (3-5)	4.4 (3-6)	4.5 (3-6)
<b>Collection patterns, hours, within one 24-hours cycle</b>				
	Morn/aft/night <sup>1</sup>	Morn/aft/night <sup>2</sup>	Morn/aft/night <sup>3</sup>	Day/night <sup>4</sup>
Mean duration of Collection range	16.1(2-20)	16.8(13-20)	16.1(8-20)	15.8(9-19)
<b>Fluoride concentration, ppm</b>				
Average	0.45	0.43	0.52	0.55
Standard deviation	0.27	0.27	0.25	0.24
Confidence limits (P=0.95)	0.41-0.52	0.38-0.48	0.46	0.44-0.62
Range	0.11-1.87	0.11-1.87	0.59	0.19-1.52
<b>Fluoride excretion per 24 hours, <math>\mu</math>g/h</b>				
Average	7.5	7.0	7.1	5.8
Standard deviation	4.7	4.7	4.4	3.1
Confidence limits (P=0.95)	6.7-8.3	6.1-7.8	5.9-8.4	4.7-6.9
Range	1.1-30.4	1.1-30.4	0.5-20.1	1.1-13.5
<b>Fluoride excretion, <math>\mu</math>g/24h</b>				
Average		178.4		140.0
Standard deviation		137.2		74
Confidence limits (P=0.95)		167-212		112.167
Range		23.1-1106.5		51-324
<b>Urinary flow per 24h, ml/h</b>				
Average	16.6	16.2	13.6	10.9
Standard deviation	7.1	7.1	6.8	4.6
<b>Urinary flow, ml/24h</b>				
Average	398.4	387	326.4	261
Standard deviation	107	170	163.2	107

<sup>1</sup>Subjects with complete and incomplete collections in the morning, afternoon and night

<sup>2</sup>Subjects with complete collections in the three periods, morning, afternoon and night

<sup>3</sup>Subjects with complete morning and night collections

<sup>4</sup>Subjects with complete collections day and night

The sampling for this study included forty children per region; however, several children did not provide complete collections or essential data from samples in corresponding periods were missing. For this reason the number of children in the summary tables do not add up to the original 200.

Table 24 illustrates results of renal fluoride excretion of children by region. The mean duration of collection ranged from 14.8 hours in the South to 18.6 in Beirut and 16 to 18 in the remaining regions. This duration is considered sufficient for extrapolating results to 24 hours. The average concentration of fluoride in urine from children from all regions was very low. Tests of statistical significance between regions were not deemed necessary; however, results clearly indicate that children from Bekaa region had a much lower fluoride excretion. Children from Beirut region had the highest excretion rate, followed by the South and closely by Mount Lebanon and the North regions.

Urinary fluoride excretion values obtained were also very low indicating that children from all the regions in Lebanon are not receiving an adequate supply of fluoride for protection against dental caries. Urinary fluoride excretion rates are affected by velocity of excretion, but could also reflect incomplete bladder voidings or missed collections during the study periods; however, in the present study, efforts were made to supervise all bladder voidings and collect all urine excreted. A large proportion of children included in the study donated urine over the three collection periods, with the exception of children from North Lebanon. These children are brought to school early in the morning and receive a meal at mid morning. This time was used as the end of Period A, but the time elapsed between the time children arrived at school and the time at which they break for this early lunch was rather short, consequently, none of these children, except for four, did need to urinate at this time. For this reason, 24-hour urinary fluoride excretion rates were calculated using a two period method as recommended in the WHO guidelines.

Table 25 illustrates results by combining all data into a single file (by country); this was done to establish possible differences that could be caused by inclusion of incomplete cases as well as to obtain an overall picture of urinary fluoride excretion by children 3-5 years without regard to the region where they live, but distinguishing complete from incomplete collections according to the collection patterns employed in the study. The first set of data depicts results from 163 children that donated incomplete and complete urine samples during morning, afternoon and night periods. The second column illustrates data from 125 children who donated complete samples in all three collection peri-

ods. The third set illustrates data from 52 children who donated urine during morning and night periods, and the last column reflects results of data from 34 children that donated urine in two periods, classified as day and night. Even though the results do not differentiate the region where children live, the results confirm that children from Lebanon have very low fluoride excretion rates regardless of the calculation method employed.

As noted earlier, the results on urinary fluoride excretion rates indicate that children from Lebanon are not receiving adequate fluoride exposure for protection against dental caries. The results of the survey on dental caries prevalence and severity confirm this assumption. Caries prevalence index in the primary dentition in 6-8 year old children is severe ( $dmf=5.15$ ); this means that the average child has 5.15 primary teeth decayed, missing or filled and 4.76 of these are decayed. In the permanent dentition, the average 12 year-old child had 3.42 teeth decayed, missing or filled, but this index drastically increased to 5.44 at 15 years of age.

As regards dental fluorosis, results indicate that its occurrence in Lebanon is negligible. The few cases observed were on children born outside the country. The urinary fluoride excretion study supports these findings. In addition, except for one source (Sibline well in Mount Lebanon), the great majority of community water supplies evaluated from all regions in Lebanon had below optimal concentrations of fluoride.

**TABLE 26**  
**Type of occupation of parents of children participating in the study by region and sex**

Region	Not declared		Labor		Technical		Professional		Total	
	Sex									
	Male	Female	Male	Female	Male	Female	Male	Female		
Beirut	22	18	-	-	-	-	-	-	40	
Mount Lebanon	2	2	2	3	4	5	17	5	40	
North Lebanon	1	2	6	7	3	5	5	6	35	
Bekaa	5	2	11	13	3	-	3	2	39	
South	-	-	10	11	7	9	3	-	40	
<b>Total</b>	<b>30</b>	<b>24</b>	<b>29</b>	<b>34</b>	<b>17</b>	<b>19</b>	<b>28</b>	<b>13</b>	<b>194</b>	

**TABLE 27**  
**Declared education attained by parents of children participating in the study by region and sex**

Region	Nod declared		Elementary		Secondary		College		Professional		Total
	Sex										
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Both
Beirut	22	18	-	-	-	-	-	-	-	-	40
Mount Lebanon	1	-	-	-	6	3	16	8	2	4	40
North Lebanon	-	-	4	5	6	9	4	5	1	1	35
Bekaa	2	1	7	5	13	9	-	-	-	2	39
South	-	2	6	10	11	8	2	-	1	-	40
<b>Total</b>	<b>25</b>	<b>21</b>	<b>17</b>	<b>20</b>	<b>36</b>	<b>29</b>	<b>22</b>	<b>13</b>	<b>4</b>	<b>7</b>	<b>194</b>



**TABLE 28**  
**Oral Hygiene habits of children 3-5 years of age by Region**  
**(N=183 answers)**

Questions	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
	Percent					
Child uses toothbrush	22.0	22.0	18.1	17.6	20.3	100.0
Child uses dentifrice	21.9	21.9	18.6	17.5	20.2	100.1

Information collected throughout the country indicates that there are at least 55 major Brands of Dentifrice products, but the total number including sub-products available amount to 121. These products are listed on Table 29.

**TABLE 29**  
**Dentifrice Products and Sub-Products available in Lebanon 2000**

Product	Sub-Product	Product	Sub-Product
		29. Macleans	
1. Aquafresh	1.1 Whitening	30. Mentadent	30.1 Sensitive
	1.2 Milk Teeth	31. Monoprix	31.1 Junior Fluor
	1.3 Fresh minty		31.2 Bi-Fluor Actif
2. Bactinyl		32. Natural White	32.1 Normal
3. Bioseptyl Enfant			32.2 Sensitive
4. Butler	4.1 Protect	33. Oligodent	33.1 Normal
	4.2 Children	34. Opalescence	
5. Clinomyn	5.1 Smokers	35. Oral B	35.1 Sensitive
6. Close up			
7. Colgate	7.1 My First	36. Ordial	36.1 Fluor
	7.2 Junior	37. Parodontax F	
	7.3 Cavity Protection	38. Parogencyl	38.1 Anti-age
	7.4 Ultra-Cavity	39. Perlax	
	7.5 B1Anti-Tartar	40. Phytodentyl	
	7.6 Chlorophylle	41. Planet Kid	
	7.7 Whitening	42. Planta-Pura	
	7.8 Fluoride Ultra	43. Popsy	
	7.9 Total	44. Rembrandt	44.1 Whitening F
	7.10 Anti-Tartar Control		44.2 Whitening Baking Soda
	7.11 Anti - Tartar Control		44.3 Dazzling White
8. Crest	8.1 Tartar Protection	45. Sanino	
	8.2 Cavity Protection	46. Sensodyne	46.1 Junior

	8.3 Complete		46.2 Barbie
	8.4 Extra Whitening		46.3 Junior Super Mario
9. Dentigard	9.1 Total Care		46.4 Fluoride
10. Dentisiblen			46.5 Tartar Control
11. Denivit			46.6 Total Care
12. Dentimint	12.1 Baking Soda		46.7 Total Control
	12.2 Fluor		46.8 Cool Blue
	12.3 Total Guard		46.9 Mint
13. Deomint			46.10 Whitening
14. Eggodont	14.1 Antiplaque		46.11 Fluoride Gel
	14.2 Fluor		47.12 Captain Majid
15. El-ce med	15.1 Brilliant Weiss		46.13 Sensitive
	15.2 Herbal		46.14 Children toothpaste
	15.3 Sensitive Plus		46.15 Baking Soda
	15.4 Enzyme Komplex	47. Silca	47.1 Blue Mint
16. Elgyfluor			47.2 Herb
17. Email Diamant	17.1 Special Fumeur	48. Signal 2	48.1 Sensitive
18. Emoform F			48.2 Cavity Fighter
19. Eucryl	19.1 Smokers	49. Siwak F	
20. Fluo-mix		50. Super White	
21. Fluocaril	21.1	51. Tau-marine	51.1 De-Plac
21. Fluocaril	21.1 Fluo-Kids (2-6 years)		51.2 Anti-Tartar
	21.2 Fluo-Kids (6-10 years)	52. Tesco	52.1 Total Care
	21.3 Fluo-Fluore 150		52.2 Whitening
	21.4 Fluo-Fluore 180	53. Theramed	53.1 Junior
	21.5 Fluo-Fluore 250		53.2 Normal
	21.6 Fluo-Fluore 1350		53.3 Complete Care
	21.7 Blancheur durable		53.4 Liquid
22. Fluofilm			53.5 Cool Mint
23. Foramen	23.1 Total Protection		53.6 Herbal
	23.2 Whitening		53.7 Eucalyptus
	23.3 Triple Action		53.8 Whitening
	23.4 Bi-Fluore	54. Topix 32	
	23-5 Anti-carie	55. Unknown	
	23.6 Junior		
24. Givafrice			
25. Hexifluor	25.1 Normal		
26. Homeo vit B+F	27.1 Super White		
27. Kolynos	27.2 Baking Soda		
	27.3 Kids		
28. Lacer			

**TABLE 30**  
**Use of brand by region**

Questions	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
Not Declared		2	3	8	3	16
1- Aquafresh		1		2	3	6
3- Bioseptyl Enfant			1			1
4- Butler			1			1
6- Close Up				2	2	4
7- Colgate		5	3	1	2	11
8- Crest		7	10	4	14	35
21- Fluocaril		13	2	1	1	17
27- Kolynos		2	4			6
28- Lacer			1			1
35- Oral B		5		2	1	8
46- Sensodyne		1	3	1		5
48- Signal 2			2	13	5	20
53- Theramed		1		2	1	4
55- Unknown	40	2	1	3	5	51
<b>Total</b>	<b>40</b>	<b>39</b>	<b>31</b>	<b>39</b>	<b>37</b>	<b>186</b>

From the responses it could be deduced that the most common brand of dentifrice was not identified by the respondents. Crest, Signal 2, and Fluocaril were the most common identified products. The remainder used various dentifrice brands in much lower frequency. It should be noted that parents of 16 children did not declare the dentifrice brand. It is also interesting that all children from Beirut region did not know the brand of dentifrice used.

Table 31 summarizes the manufacturers' stated concentration of fluoride and the availability of products and sub-products by region. Fluoride concentration ranges from 0.1 to 0.86%, but some merely state that product contains fluoride without indicating the percentage or ppm fluoride. The country of origin of dentifrices available in Lebanon is also indicated in this table.

**TABLE 31**  
**Dentifrices available in Lebanon by region with stated fluoride concentration and country of origin**

Product	Sub-Products	Composition	Brand	Country	Beirut	Mt Lebanon	North	South	Bekaa
Aquafresh	Whitening	Naf 0.243% 1110ppm	Beecham	UK	1	1	1	1	1
	Milk Teeth	Naf 1106% 500ppm			1	1	1		1
	Fresh'n minty	MFPNa 0.75%+Naf 0.01%			1	1	1	1	1
Bacinyl		Naf 0.1g	Lab F. Garcin	France	1	1			
Bioseptyl Enfant		MFPNa 0.8% 1055ppm	La Brosse & Dupont	France	1				
Butler	Protect	Naf 0.24% 950ppm	Butler Comp.	USA	1	1	1		1
	Children	Naf 0.188%			0	1		1	
Clinomyn	Smokers	MFPNa 0.75%	De Witt's	UK	1	1		1	
Close Up		MFPNa 0.83% 1000ppm	Bin Zagr Lever Ltd.	KSA Indonesia	1	1	1	1	1
Colgate	My First	Naf 400ppm	Colgate	Switzerland Belgium France Italy Poland EEC UK	1	1	1		
	Junior Super Star	MFPNa 1000ppm			1	1	1		
	Cavity Protection	Naf 0.1%+MFPNa 0.76% 1450ppm			1	1	1		1
	Ultra-Cavity	Naf 0.32%			1	1	1		1
	Anti-Tartar	Naf 0.243% 1100ppm			1	1	1		1
	Chlorophylle	MFPNa 0.76%			1	1	1		1
	Whitening	Naf 0.32% 1450ppm			1	1	1		1
	Fluoride Ultras	Naf 0.32% 1450ppm			1	1			
	Total	Naf 0.32% 1450ppm			1	1	1	1	1
	Tonigencyl	MFPNa 0.75%+Naf 0.1% 1450ppm			1	1	1		
	Anti-Tartar Control	Naf 0.24%			1	1	1		
Crest	Tartar Protection	Naf 0.15%	Procter & Gamble	USA - Germany	1	1	1		
	Cavity Protection	Naf 0.15%			1	1	1		1
	Complete	Naf 0.32% 1450ppm			1	1	1		1
	Extra Whitening	Naf 0.16%			1	1	1	1	1
Dentigard	Total Care	MFPNa 0.8%		UK	1	1	1		1
Dentisibien		MFPNa 189g 2500ppm		Spain	1	1		1	



Givafrice		MFPNa 0.85g	Norgine-Pharma	France	1	1	1	1	1	1
Hexifluor	Normal	MFPNa 0.8%+Naf 0.1%+ Fluorine 0.15%	Parke-Davis	France	1	1	1	1	1	1
Homeo vit B+F		MFPNa 1%		France	1	1	1	1	1	1
Kolyos	Super White	MFPNa 1500ppm		Brasil	1	1	1	1	1	1
	Baking Soda	MFPNa 1500ppm			1	1	1	1	1	1
	Kids	Naf 1100ppm			1	1	1	1	1	1
Lacer		MFPNa 1.9g 2500ppm	Lacer	Spain	1	1	1	1	1	1
Macleans		MFPNa 0.8%		UK	1	1	1	1	1	1
Mentadent	Sensitive	MFPNa 0.8%	Eilda-Gibbs	UK	1	1	1	1	1	1
Monoprix	Junior Fluor	Naf 0.22%	S.M.B.	France	1	1	1	1	1	1
	Bi-Fluor Actif	MFPNa 4.45%+Naf 0.2%			1	1	1	1	1	1
Natural White	Normal	MFPNa 0.8%	Beverly Hills & Hammersmith	USA-UK	1	1	1	1	1	1
	Sensitive	MFPNa 0.76%			1	1	1	1	1	1
Oligodent	Normal	Naf 0.115g+MFPNa 0.75g	Lab. Delta	France	1	1	1	1	1	1
Opalescence		Naf 0.115g+ F-0.15%			1	1	1	1	1	1
Oral B	Sensitive	Naf 0.225%	Gillette	Ireland England Netherlands	1	1	1	1	1	1
	Mint Flavour	Naf 0.22%			1	1	1	1	1	1
Ordial	Fluor	MFPNa 0.8%		Potugal	1	1	1	1	1	1
Parodontax F		Naf 0.31% 1400ppm	Stafford-Miller	Ireland	1	1	1	1	1	1
Parogencyl	Anti-age	MFPNa 0.76g+ Naf 0.11g 1500ppm	Synthelabo	France	1	1	1	1	1	1
Peritax		Naf 0.18%+MFPNa 0.5%		Italy	1	1	1	1	1	1
Phytodentyl		0.12% en Fluor +C15	France		1	1	1	1	1	1
Planet Kid		MFPNa	France		1	1	1	1	1	1
Planta-pura		MFPNa 0.75%	Valetudo	Italy	1	1	1	1	1	1
Popsy		MFPNa 0.8%		France	1	1	1	1	1	1
Rembrandt	Whitening F	MFPNa 0.76%		USA	1	1	1	1	1	1
	Whitening Baking Soda	Naf 0.15%			1	1	1	1	1	1
	Dazzling White	MFPNa 0.15%			1	1	1	1	1	1
Sanino		Naf 0.1% + MFPNa 0.75%		Turkey	1	1	1	1	1	1
Sensodyne	Junior	Naf 0.12% 500ppm	Stafford-Miller	UK France	1	1	1	1	1	1
	Barbie	0.24%			1	1	1	1	1	1



Tables 32-39 reflect other information obtained from parents of children of 3-5 years of age on toothbrushing habits, frequency, quantity of dentifrice used, toothbrushing under supervision, perceived purpose of toothpaste, and use of fluoride supplements.

**TABLE 32**  
**Number of Children in each age-group 1 to 5 years at which children started to brush their teeth by Region**

Age	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
1	No data	6	1	-	-	7
2	No data	17	14	10	6	47
3	No data	13	13	18	16	60
4	No data	2	5	3	10	20
5	No data	-	-	1	-	1
<b>Total</b>	<b>No data</b>	<b>38</b>	<b>33</b>	<b>24</b>	<b>26</b>	<b>121</b>

In Mount Lebanon six children started to brush their teeth at 1 year of age, but the majority was at 2 years of age and the remainder at 3 years. Only 2 children started at 4 years of age. North Lebanon children basically followed the same pattern with the majority starting at 2 years and most of the remainder at 3 years, although 5 stated at 4 years. In Bekaa children started to brush later, in fact only six children started at 2 years, but 16 started at 3 years and 10 at 4 years. Unfortunately, no data were available for children of Beirut region.

**TABLE 33**  
**Times per day that participating children brushed their teeth by Region**

Question	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
How many times a day brush their teeth?						
1		24	14	17	22	77
2	40	16	16	12	8	92
3			3	3	4	10
<b>Total</b>	<b>10</b>	<b>40</b>	<b>33</b>	<b>32</b>	<b>34</b>	<b>177</b>

Approximately half of the responding children brushed their teeth two times a day, but almost all remaining children brushed only once a day. Only ten children brushed three times a day. These variations in brushing times occurred in all regions except in Beirut region where interestingly, all children brushed two times a day.

A question was addressed to determine how much toothpaste was used by children, a pea size, a moderate amount, or whether they covered the entire surface of the toothbrush. Table 34 summarizes number of children in each category.



**TABLE 34**  
**Quantity of dentifrice for toothbrushing by children 3-5 years of age**  
**by Region**

How much toothpaste is used	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
Pea size		7	6	9	6	28
Too much	40	27	24	19	27	137
Excessive		6	4	4	3	17
<b>Total</b>	<b>40</b>	<b>40</b>	<b>34</b>	<b>32</b>	<b>36</b>	<b>182</b>

Results from this table indicate that only approximately 15% use the correct amount of dentifrice. The largest majority, 75% of the participating children used too much toothpaste and almost 10% use an excessive amount.

When parents were asked who places the dentifrice on the toothbrush, and whether children were supervised during toothbrushing practices, the following results were obtained.

**TABLE 35**  
**Reported placement of dentifrice on toothbrush and supervision of**  
**toothbrushing for children 3-5 years of age by Region**

Who Places toothpaste	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
Child	40	4	9	8	7	68
Adult		35	25	24	29	113
<b>Total</b>	<b>40</b>	<b>39</b>	<b>34</b>	<b>32</b>	<b>36</b>	<b>181</b>

This table indicates that approximately 38% of participating children place the toothpaste on their toothbrush, but on the large majority (62%), their parents place the toothpaste on the brush.. It is noted however, that in Beirut region, all children place the toothpaste on their toothbrush. Parents were also asked whether children brushed their teeth under supervision. Table 36 summarizes these results.

**TABLE 36**  
**Supervision of toothbrushing practice by Region**

Supervised	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
Yes		37	29	28	32	126
No	40	3	5	4		52
No answer			1	8	1	10
<b>Total</b>	<b>40</b>	<b>40</b>	<b>35</b>	<b>40</b>	<b>33</b>	<b>188</b>

Most children (67%) had supervision during toothbrushing practices; however, none of the children in Beirut region declared any supervision. These are interesting findings that may indicate that children in this region are at higher risk of ingesting toothpaste with large concentrations of fluoride.

In order to determine parents knowledge on the purpose of toothpaste, three questions were included in the questionnaire, whether toothpaste purpose was for preventing tooth decay, or for giving good breath or for cleanliness. Table 37 summarizes these responses by region.

**TABLE 37**  
**Purpose of toothpaste as indicated by parents by Region**

	Beirut	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
Prevent		20	12	7	11	50
Good breath		1	7	3	1	12
Cleanliness	40					40
Other		2	1			3
<b>Total</b>	<b>40</b>	<b>23</b>	<b>20</b>	<b>10</b>	<b>12</b>	<b>105</b>

Approximately half of the respondents indicated that toothpaste purpose was for prevention of dental caries; however, all respondents in Beirut region indicated that it was for cleanliness.

In order to obtain information on use of fluoride supplements by children participating in the study, parents were asked whether children had ever taken or were taking fluoride in the form of drops, tablets or reinforced vitamins. Other information on age at which children were exposed to these supplements was also requested, as well as where they had obtained these supplements, if by prescription or over the counter. Unfortunately, only few parents provided information and it was not complete. The following table summarizes the responses to whether children had taken or not fluoride supplements.

**TABLE 38**  
**Use of fluoride supplements by 3-5 year-old children in Lebanon by Region**

Bei		Mount L		North L		South L		Bel		Total
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
-	40	28	11	10	25	5	35	7	31	192

These results indicate that 50 children (26%) of one hundred ninety two ever had taken fluoride supplements. It is interesting to note that none of the children from Beirut region had ever taken fluoride supplements.

The following table summarizes the form of fluoride supplements that had been taken by children and also the number of children presently taking fluoride supplements.

**TABLE 39**  
**Form of fluoride supplement taken by 3-5 year-old**  
**children in Lebanon by Region**

Form	Mount Lebanon	North Lebanon	South Lebanon	Bekaa	Total
Drops	3		1	1	5
Tablets	20	7	4	3	34
Vitamins	1	2		2	5
Other		3			3
<b>Total</b>	<b>24</b>	<b>12</b>	<b>5</b>	<b>6</b>	<b>47*</b>

\*Three missing data

Only 19 children were presently taking supplements, thirteen in Mount Lebanon, three in North Lebanon, one in South Lebanon and two in Bekaa.

Information on age at which children started using fluoride supplements was limited. These data were only provided for eight children: one child in Mount Lebanon and one in North Lebanon started at one year of age. One child in Mount Lebanon, two in North Lebanon and one in South Lebanon started at age 2, and two children in Mount Lebanon and one in Bekaa started at age three. Data indicate that supplements are obtained by prescription by the Physician. Parents of eighteen children indicated that the children take supplements once a day, but four indicated that they took supplements twice a day. However no information was provided on the dose.

According to limited data from customs 5 fluoride supplement products are available in Lebanon. Quantities imported in 1998 and 1999 are only available for Zymafluor. A total of 36617 units of Zymafluor 0.25mg and 32860 for Zymafluor 1 mg were imported in 1999. Once salt fluoridation is implemented in Lebanon, no importation of fluoride supplements should be allowed into the country, since single source of systemic fluoride should be available to children to minimize the risk of occurrence of dental fluorosis.

**TABLE 40**  
**List of products stated to contain fluoride including fluoride supplements and some imported dentifrices**

Product	Concentration	Agent	Units (imported in 1998)	Units (imported in 1998)
Fluor a Day	0.5 mg	Unifa		
Fluor a Day	1.0 mg	Unifa		
Fluor a Day	6.66 mg/ml ou 1 mg/8 gouttes	Unifa		
Zymafluor	0.25 mg	Mersaco	28152	36617
Zymafluor	1 mg	Mersaco	22310	32860
Oro Naf	0.023% a partir de 0.05% Naf	Pharmacol		
Sensodyne F Gel	0.32% Naf	Pharmabel		
Parodontax F	0.31% = 1400ppm	Pharmabel		
Fluocaril 250	250 mg/100g= 2500 ppm	UPO		
Fluocaril 50	50 mg/100g= 500ppm	UPO		
Fluocaril Vit. E	150 mg/100g=1500 ppm	UPO		
Fluodontyl	1350 mg/100g= 135000 ppm	UPO		
Parogencyl anti-age	150 mg/100g= 1500 ppm	UPO		
Aquafresh	0.75% Monofluorophosphate+ 0.01% Naf	Fattal		
Signal	0.32% Naf	Fattal		
Crest	0.15 % Naf	Procter & Gambel		

## 7 Discussion

Dental caries history in the primary dentition is very high; 88% of children 6-8 years had caries history and 86% had untreated primary teeth. In the permanent dentition 80% of 12 year - olds had caries history and 75% had untreated permanent teeth. The situation is worse in the 15 - year - old children who had 90% caries history and 81% of untreated permanent teeth. Results obtained indicate that dental caries prevalence is lower than that existing in 1994. However in the primary dentition the mean dmf-t index remains very high (5.15). In the 12 year - olds the DMF-T in 1994 was 5.72 and 8.09 at 15 years compared to 3.42 and 5.44 respectively in 2000. The lower indices obtained in 2000 could be due to improvement of oral hygiene habits, but also to changes in examination criteria. Only obvious carious lesions are recorded according to the current WHO criteria and no sharp dental explorers are utilized for evidencing lesions. A periodontal probe is used to confirm visual evidence of caries. In spite of this theoretical reduction, current data indicates that the largest component of the dmf-t and DMF-T indices corresponds to decayed teeth in both dentitions. Severity of dental caries in both dentitions is also severe.

Over 50% of children in all ages required prompt dental treatment, 22% in the 6-8 year-old group and approximately 15% in the 12 and 15 year-olds required urgent treatment.

Dental fluorosis was negligible in 6-8 and 13 year - olds; in the 15 year-old group, 3 children were recorded as having moderate and 3 having severe fluorosis. However, it was reported that these children were born in other countries. The combined community fluorosis index is very low and does not constitute a public health problem in Lebanon.

Urinary fluoride concentration of children from all regions was very low, approximately half of that found in children of similar age that have optimal fluoride usage. Renal fluoride excretion by Lebanon children varies from region to region. The highest excretion rate observed was 10.4  $\mu\text{g/h}$  (249  $\mu\text{g}/24\text{h}$ ) in children from Beirut region, but compared to provisional WHO standards (179-290  $\text{mg}/24\text{h}$ ) correspond to a low fluoride intake. The lowest fluoride excretion rate observed was from children of Bekaa with 4.9 (118  $\mu\text{g}/24\text{h}$ ), that is well below the lowest standard for children of this age. Although renal fluoride excretion tests were conducted in children 3-5 years of age and caries prevalence assessment was conducted on children 6-8, 12 and 15, these results clearly indicate that 3-5 years-old Lebanese children are not receiving adequate supply of fluoride for protection against dental caries, and that by the time

these children reach the age of 6-8, 12 and 15, they would have caries indices as high and severe as observed in this survey for these age groups.

Analyzing regional results, it would be expected that children from Beirut region would have been exposed to either fluoridated toothpaste or fluoride supplements. Although the answers to the questionnaire indicate that none of Beirut children used supplemental fluoride, all participating children brushed their teeth twice a day, used moderate amount and placed the toothpaste themselves on the brush and brushed their teeth without adult supervision. These factors would lead to conclude that these young children swallowed a good amount of fluoridated toothpaste. In all other regions, the majority of parents placed the toothpaste on the brush and supervised children during toothbrushing.

It is known that education attained by parents is an influencing factor on children lifestyle, habits and oral health status. Unfortunately no data were provided on any of the children from Beirut region to correlate it to other study findings; in Mount Lebanon most parents attained college education and College in the remainder regions.

Responses indicate that parents of children from Mount Lebanon, North Lebanon, South Lebanon and Bekaa provided some fluoride supplements to their children. Although responses are limited, provision of fluoride supplements to the children seems to correlate with education attained by parents. The most commonly reported form of supplement was in tablets prescribed by the Physician. The remainder information obtained was limited and is considered insufficient to make a definite conclusion; however, it is clear that fluoride supplements are only used to a limited extent in Lebanon.

Toothpaste preference varied extensively from region to region with the exception of Beirut region, where surprisingly all children used a toothpaste but the brand was not identified. The distribution of preference in other regions identified Crest, Planet Kid, and Fluocaril in descending order.

## 8 Conclusions

- Caries prevalence in Lebanon children is high and severe.
- Dental fluorosis occurrence is negligible
- Fluoride concentration in urine of children is approximately one half of optimal levels.
- Renal fluoride excretion rates indicate insufficient fluoride exposure for protection against dental caries.
- A limited number of children have been exposed to fluoride supplements
- Fluoridated dentifrices are available and used by a limited number of children but not by children from all regions
- There is a need to continue and support programs that focus on improvement and maintenance of oral hygiene practices by school children
- There is a need to continue use of topical fluoride and school-based dental preventive measures for caries reduction.
- There is an evident need to implement a nationwide public health measure for prevention of dental caries, such as salt fluoridation.

## 9 Recommendations

1. Arrange for a meeting to present findings of baseline studies to the Minister of Health, Minister of Education and other national authorities and the private sector including dental society, academic representatives, the salt industry, the media, private organizations or foundations with interest on improving health of the population.
2. Arrange for meetings with salt industry representatives to assure collaboration, identify elements that might be necessary for initiating salt fluoridation process.
3. Coordinate contacts with salt industry equipment manufacturers to assure technical advice that might be needed for initiating and maintaining salt fluoridation process.
4. Considering the severity of dental caries, fluoride should be added to all salt for human ingestion.
5. Organize a national commission on salt fluoridation with representatives of government agencies (Ministry of Health, Public Health Laboratory, Ministry of

Commerce, Bureau of Standards), private sector (Salt industry, dental profession, private organizations) to assist on salt fluoridation program development, implementation and evaluation (quality control, epidemiological surveillance)

6. Establish an epidemiological surveillance system that should include essential components:

- Periodic monitoring of fluoride availability in community water supplies
- Continuous monitoring of fluoride concentration in salt at the processing plants and on samples obtained at stores in various regions of the country.
- Periodic monitoring of renal fluoride excretion by children (6 months and 24 months after initiation of fluoridation process, WHO 1999)
- Conduct periodic assessment of dental caries (7 years and 14 years after initiation of fluoridation process).

7. Develop and implement a national standard for fluoridated salt that shall include requirements for purity, moisture, particle size and content of fluoride at the currently recommended level of 200 to 250 mg of fluoride per kilogram of Salt.

8. Enact regulation or mandate to require that all salt imported or processed to be used for human ingestion shall comply with the Standard for Fluoridated Salt.

9. Ban import of fluoride supplements to assure that population is only receiving a single source of systemic fluoride.

10. Develop educational materials to emphasize benefits of fluoridated salt targeting primarily the community at large and health professionals.

11. Assist salt industry on development of technical expertise for maintaining quality assurance programs and for establishing occupational safety programs.



1. I.M. Abdel Rahim, A proposal for Salt fluoridation in Lebanon, Project document, prepared by WHO/Lebanon, WHO/EMRO May 1999.
2. Doumit A. Mounir, Intérêt de la Fluoration des eaux au Liban, Département des Publications de l'Université Libanaise, Beyrouth 1995
3. Baez Ramon J. Important information for collection of water samples for determination of fluoride. Registration form for collection of water samples for determining the concentration of fluoride. World Health Organization Collaborating Centre in oral Health University of Texas Health Science Center at San Antonio 1999.
4. Orion Research Inc. Laboratory Products Group, Fluoride electrodes 9409-9609 instruction manual Boston, MA 1999
5. Orion Research Incorporated. Advanced portable ISFJpHI meter 290A, instruction manual Boston, MA, 1999
6. Doughan B. and Doumit M. Oral Health in Lebanon, A Situation Analysis, Lebanese University/World Health Organization EMRO 1995
7. Snedecor G. W, Cochran W. G, Statistical Methods, 8<sup>h</sup> Ed. Iowa State University Press, Ames, Iowa 1985
8. World Health Organization Oral Health Surveys Basic Methods, 4<sup>th</sup> ed, Geneva 1997
9. Eklund A S, Moller I J, Leclercq M H, Calibration of examiners for oral epidemiological surveys, WHO, Geneva
10. Marthaler TM, ed. Monitoring of renal fluoride excretion in community preventive programmes on oral health. Geneva: World Health Organization; 1999
11. Baez RJ, Beltran-Aguilar E. World Health Organization Collaborating Centre in Oral Health University of Texas Health Science Center at San Antonio. Unpublished report, 1995.



### Form for recording individual micturition data

Name		Sex	Age	No.		
School			Date			
Micturition		1	2	3	4	5
Morning (Period A)	Time					
	Volume					
Noon (Period B)	Time					
	Volume					
Nocturnal (Period c)	Time					
	Volume					

**World Health Organization Collaborating Centre in Oral Health  
Recording Form for Collection of Urinary Samples**

School:						Mean Temperature:				Date:			
Locality Name:						Code:							
Children Data:						Period A (Morning)		Period B (Noon and Afternoon)		Period C (Afternoon and Evening)		Period D (Nocturnal)	
No	ID	Age	Sex	Weight		Start	End	Start	End	Start	End	Start	End
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								
					Vol.								
					Time								

**WORLD HEALTH ORGANIZATION COLLABORATING CENTER IN ORAL HEALTH**  
**Use of dentifrices and fluoride supplements by children 3-5 years of age**

Country \_\_\_\_\_ Town \_\_\_\_\_

Recorder \_\_\_\_\_ Survey date      day   month   year

**A. General Information**

1. Child name \_\_\_\_\_ 2. Date of birth      day   month   year

3. Age in years       4. Sex: 1= Male; 2= Female     

5. Occupation of the father or responsible family member  
 Labor 1     Technical 2     Professional 3

6. Level of education of mother.  
 None (1)     Elementary (2)     Secondary (3)     College (4)     Professional (5)

**B. Use of dentifrice**

7. Does (child name) use toothbrush?      Yes= 1     No = 2

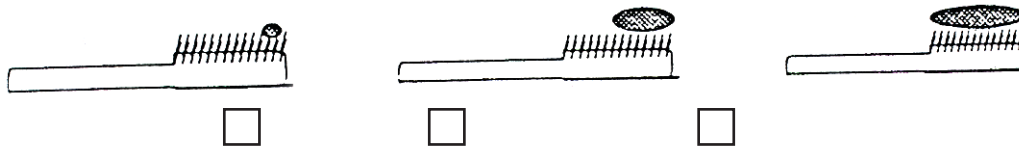
8. Does (child name) use toothpaste ?      Yes = 1     No = 2

9. Which toothpaste does (child name) use now? **(Include list)**

10. At what age, (child name) started to use toothpaste?

11. How many times per day does (child name) brush with toothpaste?

12. How much toothpaste does (child name) use each time?



13. Who places the toothpaste on the child's toothbrush

The child 1     The mother (or another relative) 2

14. Does the mother or an adult person supervise the child during toothbrushing?

yes 1     no 2

15. Do you usually buy one toothpaste for all the family or one different for the children?

Same 1     Different 2

16. Which is the main reason for preferring the toothpaste brand that you buy for your child?

17. Please tell us, what is the purpose of the toothpaste? *(Care should be taken not to influ-*

- 1. To prevent dental caries
- 2. To give good breathe
- 3. For cleanliness
- 4. Other

18. Has (child name) ever taken medicines with fluoride for preventing dental caries, like drops, tablets, or vitamins? Yes 1  No 2   
 drops 1  tablets 2  vitamins 3

19. Is (name of child) taking any of these at the present time? Yes 1  NO 2   
*If the answer is NO, finish the interview.*

20. At what age did (child name) start taking these medicines?   
 1 =drops 2=tablets 3=vitamins with fluoride

Prenatal		Postnatal-1(6mths)		Postnatal-2(1yr)		Postnatal 3(2yrs)	
Medicine-	How long*	Medicine	How long*	Medicine	How long*	Medicine	How long*
<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>

\*A period of use is considered to be 15 days or more.

21. Please tell us the brand that (child name) has used (include a list of the medicines that exist in the market)  
 drops 1  tablets 2  vitamins 3  do not remember 4

22. Who prescribe use of such medicines?  
 1. Dentist  2. Physician  3. Other

23. How many times a day does (child name) take these supplements?  
 1. Once   
 2. Twice   
 3. Three times   
 4. More than three times

24. Where do you buy these medicines?  
 1. Pharmacy/Drugstore   
 2. Dentist/Physician clinic   
 3. Other (Specify)

وزارة الصحة العامة - منظمة الصحة العالمية  
استخدام معاجين الأسنان وفوائد الفلور لدى الأطفال في سن ٣ الى ٥ سنوات

البلدة ..... المدينة.....  
الشهر السنة المسجل..... تاريخ المسح اليوم  
□□ □□ □□

معلومات عامة

الشهر السنة 1. اسم الطفل.....2. تاريخ الولادة اليوم  
□□ □□ □□

3. العمر □□ 4. الجنس: 1 = ذكر □ 2 = انثى □

5. مهنة الأب أو الفرد المسؤول في العائلة

1. عامل □ 2. تقني □ 3. محترف □

6. مستوى تعليم الأم:

1 مهني (5) 1 جامعي (4) 1 ثانوي (3) 1 ابتدائي (2) 1 غائب (1)

استخدام معجون الأسنان

1 كلا = 712. هل يستعمل الطفل فرشاة الأسنان؟ نعم = 1

1 كلا = 812. هل يستعمل الطفل معجون الأسنان؟ نعم = 1

9. ما هو نوع معجون الأسنان الذي يستعمله الطفل حالياً؟ .....

1011. في أي عمر بدأ الطفل باستعمال معجون الأسنان؟

111. كم مرة في النهار ينظف الطفل أسنانه بمعجون الأسنان؟ عدد المرات

12. ما هي كمية معجون الأسنان التي يستعملها الطفل كل مرة؟

13. من يضع معجون الأسنان على فرشاة الطفل؟

الأم ( أو قريب له ) 12 الطفل 1

14. هل تشرف الأم أو شخص كبير على الطفل فيما ينظف أسنانه؟

1 كلا 12 نعم 1

15. هل تبتاعون إجمالاً معجون أسنان للعائلة كلها أو واحداً مختلف لطفلكم؟

1 كلا 12 نعم 1

16. ما هو السبب الرئيسي الذي يجعلكم تفضلون نوعاً معين من معجون أسنان لأطفالكم دون سواه؟  
.....

17. هلا اخبرتنا ما هو الهدف من معجون الأسنان؟

1. تفادي التسوس
2. يعطي رائحة فم منعشة
3. لمزيد من النظافة
4. هدف آخر

سبق لطفلكم أن تناول أدوية تحتوي على الفلورايد لتجنب تسوس الأسنان مثل الأقراص أو الحبوب أو الفيتامينات؟  
18. هل

1. كلا 12 نعم
1. فيتامينات 13 حبوب 2 1 أقراص
1. كلا 1912. هل يتناول طفلكم أيّاً من هذه الأدوية حالياً؟ نعم 1  
إذا كان الجواب كلا, لا تكمل تعبئة هذه الإستمارة.
2011. في أي عمر بدأ طفلكم بتناول هذه الأدوية؟

11 = أقراص = 2 حبوب = 3 فيتامينات مع فلور  
قبل الولادة 1. بعد الولادة (6 أشهر) 2. بعد الولادة (سنة) 3. بعد الولادة (سنتان)

الدواء*	الفترة*	الدواء	الفترة*	الدواء	الفترة*	الدواء	الفترة*
1	11	1	11	1	11	1	11
1	11	1	11	1	11	11	1
1	11	1	11	1	11	11	1

\*المقصود بفترة الاستعمال 15 يوماً أو أكثر

21. هلا أطلعنا على أسم الدواء الذي تناوله طفلكم

22. من وصف هذه الأدوية؟ 1 لا أذكر 14 فيتامينات 13 حبوب 12 أقراص 1
1. 3. شخص آخر 1 2. الطبيب العام 1 1. طبيب الأسنان

23. كم مرّة في اليوم يتناول طفلكم هذه الأدوية؟

- 1 -1 مرة 1
- 2 -2 مرتان 1
- 3 -3 ثلاث مرات 1
- 4 -4 أكثر من ثلاث مرات 1

24. من أين تشترون هذه الأدوية؟

- 1 -1 الصيدلية 1
- 2 -2 طبيب الأسنان عيادة الطبيب 1
- 3 -3 مكان آخر حدد:..... 1

ترجمة الأنسة رنا نعمة  
طبع تريبولوجيك  
آب ٢٠٠٤