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Epidemiologic Study of Dental Health Status Among Primary School Children in Selected Mountain, Plain, and Coastal Areas

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ABSTRACT

This study compares dental health status among primary school children in selected mountain, plain and coastal areas according to an epidemiologic approach. In order to understand whether there are differences in the oral health status of primary school children living in different residential areas, the survey was performed in April 1978, July 1978 and July 1979 in 21 primary schools of eight counties with 9,198 children from 1st grade to 5th grade as subjects. A random sampling was made and the dental caries, gingival health and oral hygiene condition were all recorded.

The results are as follows:

1. The percentage of children without caries in the mountain, plain and coastal areas are 7.7, 11.7, 32.7% respectively and there are no definite differences between males and females.

2. The prevalence of dental caries in permanent teeth of the three areas are 2.00, 1.88, 1.64 respectively for each child and increase by grade.

3. Dental caries experience and mortality rates of first permanent molars in the three areas are 81.1, 81.6, 73.0% respectively, and in each area, the caries attack rate on first permanent molar in females is a little lower than in males.

4. The filling ratios of the permanent teeth are 2.1, 5.9, 2.1% respectively in the mountain, plain and coastal areas. In the plain and mountain areas, the percentage in males is higher than that in females, but, in the coastal area, the percentage in females is higher than that in males.

5. The oral hygiene condition of the examinees in the plain area is the best one among the three areas, and the condition in the females is better than that of the males.

6. The average percentage of the deep caries on the decayed permanent teeth in the three areas is 16.9%.

Key words: Dental Health Status, Epidemiologic Study.

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This study compares the dental health status of primary school children in some selected mountain, plain and coastal areas using an epidemiologic approach. The residential area, the socioeconomic condition, the education, eating habits, the availability of dental care centers, and the structure of the population, are all considered to be factors influencing the oral health status of the children.

There are many reports about dental careis, but those authors didn't compare the data according to the different residential areas. The scope of their research was divided between the rural areas and urban areas. In order to understand whether there are differences in the oral health status among primary school children living in the different residential areas, the survey was performed in Pinghsi, Shyrfen, Guashan, Dongshyh, Sanher, Nanyea, Liandong, Jingtorng, and Chingtarn primary schools including in the mountain area. In the coastal area, Shihmen, Chihshan, Laomei, Yeeleou, Dahperng and Jongjeau primary schools are selected. And in the plain area, we examined the children of Howpuu, Chingshoei, Diingpuu, Hsintien, Shaluen and Jongshan primary schools. There are 21 primary schools in all. (Fig. 1)

There is only one dentist in Pinghsi, Juifang, Chihshan and Tucheng. In Hsintien, there are seven dentists, while in Panchiao, there are 24 dentists. In Shihmen and Wanli, there is no dentist at all. Thus, most of the

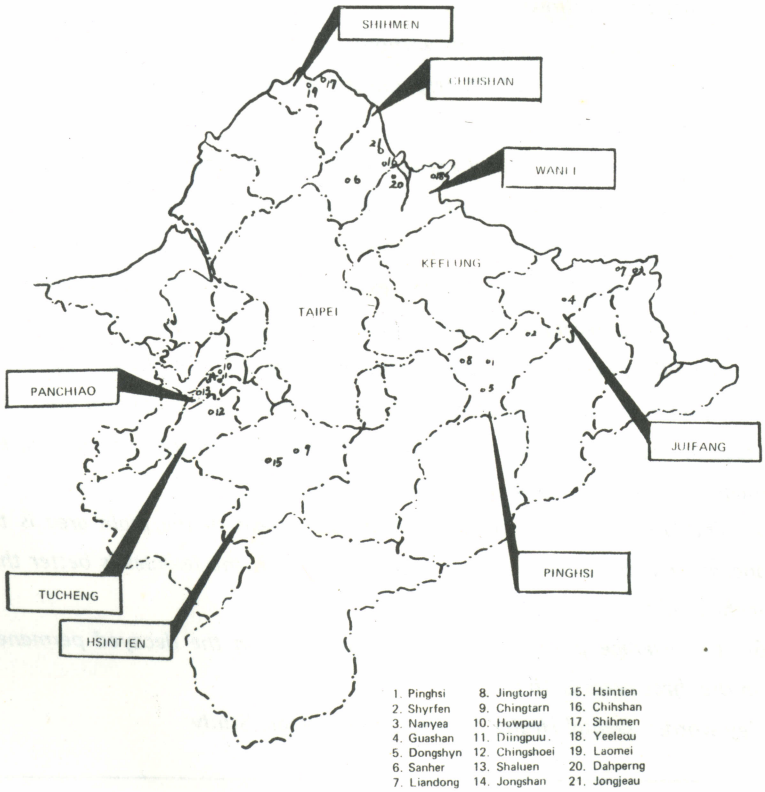

Fig. 1. Map of Taipei County

primary school children in the three areas do not receive proper dental care, and furthermore, they do not have sufficient knowledge about dental care.

MATERIALS AND METHODS

This survey was carried out in April 1978, July 1978 and July 1979 with the cooperation of the Dental Association of Taipei County and Bureau of Education of the Taipei County.

Before the field survey began, thirty senior dental students of the Taipei Medical College were trained by reviewing all criteria for dental examination. Three teaching assistants also participated in this study. A random sampling was made at the 21 primary schools in Taipei County including: Pinghsi, Hsintien, Juifang, Panchiao, Tucheng, Chihshan, Shihmen, Wanli. (Fig. 1) From the 1st grade to the 5th grade, 9,198 children were examined, 4,566 boys and 4,632 girls. In the mountain area, 2,445 children were examined, 1,213 boys and 1,232 girls. In the plain area, 4,298 children were examined, 2,104 boys and 2,194 girls. In the coastal area, 2,455 children were examined, 1,249 boys and 1,206 girls. (Table 1)

Table 1. Number of Persons Examined in 21 Primary Schools in the Mountain, Plain and Coastal Areas by Grade and Sex

Area	Name of Schools	Grade	Sex		Total
			Male	Female	
Mountain	Pinghsi, Shyrfen, Nanyea, Guashan, Dongshyh, Sanher, Liandong, Jingtorng, Chingtarn	1	242	242	484
		2	216	210	426
		3	256	265	521
		4	259	294	553
		5	240	221	461
		Total	1,213	1,232	2,445
Plain	Howpuu, Diingpuu, Chingshoei, Shaluen, Jongshan, Hsintien	1	485	469	954
		2	297	352	649
		3	392	355	747
		4	562	651	1,213
		5	368	367	735
		Total	2,104	2,194	4,298
Coastal	Chihshan, Shihmen, Yeeleou, Laomei, Dahperng, Jongjeau	1	209	200	409
		2	208	201	409
		3	445	378	823
		4	220	240	460
		5	167	187	354
		Total	1,249	1,206	2,455
Total			4,566	4,632	9,198

The examination was done by utilizing plane mouth mirror and No. 5 double end explorers under natural light. Each examination team consisted of two members, an examiner and a recorder. Because we did not have enough time and budget, and due to the impracticability of using the equipment in all situations, we examined the dental caries only by mouth mirror and sharp-ended explorer instead of making a roentgenographic examination.

The survey form was a modification of the WHO basic form. The dental caries, the gingival health condition and the oral hygiene condition were all recorded. In dental caries, lesions were considered to be carious if: (1) the explorer can penetrate inside the cavity which is located in a pit or fissure or on a free smooth tooth surface, (2) the tooth has a detectably softened floor, undermined enamel, or a softened wall. Defects such as white or chalky spots, discolored or rough spots, stained pits or fissures in the enamel that catch the explorer but do not have a detectably softened floor, undermined enamel, or softening of the walls are not to be counted as caries, in the absence of other positive criteria. Filled teeth with primary or secondary decay are also coded as Decayed (D). Permanent teeth missing due to caries are coded as Missing (M). Teeth are considered to be filled without decay whenever one or more permanent restorations are present and there are no secondary caries or other areas of the teeth with primary caries. A tooth with a crown placed because of previous decay is recorded in this category, excluding the tooth that is crowned for reasons other than decay, eg. trauma or as a bridge abutment. Thus, a permanent filling was coded as "F".

Gingival condition was evaluated on the criteria of degree of inflammation: none, mild and moderate. The lower anterior six teeth were examined, and the labial surface of these teeth was selected. No gingivitis means without any abnormality on gingival surface including free gingiva, papillary gingiva and attached gingiva. There is no swelling, no bleeding tendency, no color change, no ulceration and no change in contour of the gingiva. Mild gingivitis means that only gingiva around two or fewer teeth is inflammed. In Moderate gingivitis, the gingiva around more than two teeth is inflammed.

Oral hygiene condition was estimated on the criteria of calculus and food debris as 0, 1, 2, 3, score for buccal surface of $\frac{6\ 1\ \ 6}{\ \ \ 1}$ and lingual surface of $\overline{6\ 1\ 6}$. Oral hygiene index (OHI) is modified Green & Vermillion's method, including the debris index (DI) and calculus index (CI). The score of debris index which is estimated by surface area covered by debris is as follows:

0 - no debris or stain

1 - not more than 1/3 covered by debris or extrinsic stain

2 - more than 1/3 but not more than 2/3

3 - more than 2/3

The score of calculus index is estimated by surface area covered by calculus is as follows:

0 - no calculus

1 - supragingival calculus not more than 1/3 of exposed surface

2 - supragingival calculus more than 1/3 but not more than 2/3 of exposed surface, light subgingival calculus.

3 - supragingival calculus more than 2/3, sub-

gingival calculus seems like a heavy band

The oral hygiene condition can be estimated according to the calculus index and debris index.

RESULTS

1. **Percentage of children without caries**

Table 2 shows a comparison of the percentage of caries free from all teeth in mouth of these three areas children according to grade and sex. There are no definite differences between sexes. The average differences between males and females are few, the total rate is 16.8% for the male and 15.7% for the female. However, there are many differences among the three areas. In the coastal area, 32.7% of the school children are caries free, while in the mountain area and plain area, only 7.7% and 11.7% respectively are caries free.

In Matsu[1], 30.6% of the school children have caries in deciduous teeth and only 8% in permanent teeth. So, the percentage of the children with caries free experience is 69.4% in deciduous teeth and 92% in permanent teeth. In Penghu[2], the percentage of the caries free children is 54% in the urban area and 86% in the rural area. In Taipei[3], 62% of the children have one or more dental caries in the permanent teeth. The data in Matsu, Penghu and Taipei is much higher than the data in this study. Because these previous studies only surveyed permanent teeth or deciduous teeth respectively, while this study combines both permanent and deciduous teeth.

2. **Dental caries experience in children**

The prevalence of dental caries in permanent teeth of the three areas are shown in Table 3. The DMF index increases by grade and the average of DMF index is 2.00 in the mountain area, 1.88 in the plain area and 1.64 in the coastal area. The overall average DMF index in females is higher than that in males ($P<0.001$). It is 1.08 in 1st graders and 1.55, 2.04, 2.09, 2.46 in 2nd, 3rd, 4th and 5th graders. Compared with Matsu[1], Taipei[3], Saisiat tribe[4], Taipei and Chung-Ho[5] area, the rates seems high.

3. **Dental caries experience and mortality of first permanent molars**

Among the permanent teeth, the first permanent molar comes out almost first in dentition. Consequently, the first permanent molar suffers the highest mortality. Of the 17,057 caries which attacked permanent teeth in 9,198 examinees, 79.3% were the first permanent molars. The dental caries experience and mortality rates of the first permanent molars are shown in Table 4.

In the decayed permanent teeth, the percentage of the first permanent molars is 81.1%, 81.4% and 73.0% respectively in the mountain, plain and coastal areas ($P<0.01$). The percentage in the coastal area is the lowest one. In each area, the caries attack rate of first permanent molar in females is a little lower than in males ($P>0.05$). Among the lower grade students, only the first permanent molars and a few anterior teeth have erupted. According the Table 4, in decayed teeth of 1st grade students, 85.7% comes from the first permanent molar. The percentage of the decayed first permanent molar among the 5th grade students decreases

Table 2. The Percentage of Caries Free Children Distributed by Sex and Grade among Mountain, Plain and Coastal Areas (%)

Grade	Mountain area			Plain area			Coastal area			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
1	7.4	8.3	7.8	3.5	4.5	4.0	50.2	41.5	46.0	15.0	13.6	14.3
2	5.1	3.3	4.2	23.2	16.8	19.7	32.2	38.8	35.4	20.4	18.9	19.6
3	5.1	6.4	5.8	9.4	10.1	9.8	28.1	24.9	26.6	16.0	14.7	15.4
4	9.3	8.8	9.0	11.2	12.7	12.0	34.5	27.9	31.1	15.6	14.8	15.2
5	10.4	12.7	11.5	17.9	14.2	16.1	30.5	30.0	30.2	18.3	17.5	17.9
Total	7.5	8.0	7.7	12.0	11.4	11.7	34.0	31.3	32.7	16.8	15.7	16.2

M = Male F = Female T = Total

Table 3. Prevalence of Dental Caries (DMF) in School Children among Three Areas by Grade and Sex

Area	Grade	D			M			F			DMF		
		M	F	T	M	F	T	M	F	T	M	F	T
Mountain	1	1.16	1.41	1.28	0.02	0.02	0.02	0	0	0	1.18	1.43	1.30
	2	1.63	1.58	1.61	0.01	0.02	0.02	0.03	0.03	0.03	1.67	1.63	1.66
	3	1.88	2.15	2.01	0.01	0.02	0.01	0.04	0.02	0.03	1.93	2.19	2.05
	4	2.02	2.40	2.22	0.02	0.03	0.02	0.10	0.05	0.07	2.14	2.48	2.31
	5	2.40	2.66	2.52	0.03	0.06	0.04	0.04	0.09	0.07	2.47	2.81	2.63
	Total	1.82	2.06	1.94	0.02	0.03	0.02	0.04	0.04	0.04	1.88	2.13	2.00
Plain	1	0.78	1.05	0.92	0.01	0	0.01	0.01	0.03	0.02	0.80	1.08	0.95
	2	1.45	1.61	1.54	0.00	0.02	0.01	0.11	0.05	0.08	1.56	1.68	1.63
	3	2.02	2.29	2.15	0.01	0.01	0.01	0.06	0.16	0.11	2.09	2.46	2.27
	4	1.83	2.16	2.01	0.03	0.03	0.03	0.12	0.09	0.10	1.98	2.28	2.14
	5	1.98	2.48	2.23	0.03	0.04	0.04	0.27	0.27	0.27	2.28	2.79	2.54
	Total	1.60	1.91	1.76	0.02	0.02	0.02	0.11	0.11	0.10	1.73	2.04	1.88
Coastal	1	1.08	1.14	1.11	0.02	0.02	0.02	0	0.03	0.01	1.10	1.19	1.14
	2	1.31	1.22	1.27	0.05	0.02	0.04	0	0.03	0.01	1.36	1.27	1.32
	3	1.57	1.92	1.73	0.04	0.05	0.05	0.04	0.06	0.05	1.65	2.03	1.83
	4	1.54	1.75	1.64	0.02	0.04	0.03	0.04	0.02	0.03	1.60	1.81	1.70
	5	1.75	2.19	1.98	0.04	0.06	0.05	0.04	0.07	0.05	1.83	2.22	2.08
	Total	1.46	1.68	1.57	0.04	0.04	0.04	0.03	0.04	0.03	1.53	1.76	1.64

M = Male F = Female T = Total

Table 4. Dental Caries Experience and Mortality Rates of 1st Permanent Molars in Three Area Children by Grade and Sex

Area	Grade	No. examined			No. of DMF			No. of carious 1st molar			Percentage		
		M	F	T	M	F	T	M	F	T	M	F	T
Mountain	1	242	242	484	287	346	633	242	291	533	84.3	84.1	84.2
	2	216	210	426	363	343	706	301	321	622	82.9	93.6	88.1
	3	256	265	521	493	578	1,071	446	505	951	90.5	87.4	88.8
	4	259	294	553	554	729	1,283	449	577	1,026	81.1	79.2	80.0
	5	240	221	461	593	620	1,213	424	423	847	71.5	68.2	69.8
	Total	1,213	1,232	2,445	2,290	2,616	4,906	1,862	2,117	3,979	81.3	80.9	81.1
Plain	1	485	469	954	394	506	900	378	463	841	95.9	91.5	93.4
	2	297	352	649	466	594	1,060	389	565	954	83.7	95.1	90.0
	3	392	355	747	819	876	1,695	670	691	1,361	81.8	78.9	80.2
	4	562	651	1,213	1,110	1,484	2,594	883	1,157	2,040	79.5	78.0	78.6
	5	368	367	735	843	1,024	1,867	649	758	1,407	77.0	74.0	75.4
	Total	2,104	2,194	4,298	3,632	4,484	8,116	2,969	3,634	6,603	81.7	81.5	81.6
Coastal	1	209	200	409	229	237	466	165	174	339	72.1	73.4	72.7
	2	208	201	409	283	257	408	208	200	408	73.5	79.7	75.6
	3	445	378	823	736	767	1,503	553	557	1,110	75.1	72.6	73.8
	4	220	240	460	350	436	786	277	334	611	79.1	76.6	77.7
	5	167	187	354	306	434	740	218	260	478	71.2	59.9	64.6
	Total	1,249	1,206	2,455	1,904	2,131	4,035	1,421	1,525	2,946	74.6	71.6	73.0
Total	1	936	911	1,847	910	1,089	1,999	785	928	1,713	86.3	85.2	85.7
	2	721	763	1,484	1,112	1,194	2,306	898	1,086	1,984	80.8	91.3	86.0
	3	1,093	998	2,091	2,048	2,221	4,269	1,669	1,753	3,422	81.5	78.9	80.2
	4	1,041	1,185	2,226	2,014	2,649	4,663	1,609	2,068	3,677	77.8	78.1	78.8
	5	775	775	1,550	1,742	2,078	3,820	1,291	1,441	2,732	74.1	69.3	71.5
	Total	4,566	4,632	9,198	7,826	9,231	17,057	6,252	7,276	13,528	79.9	78.8	79.3

M = Male F = Female T = Total

when the other permanent teeth come out.

4. Percentage of first permanent molar caries vs. estimated first permanent molars

In all examiness, it is estimated that there are 34,633 first permanent molars, and that 13,528 teeth had been attacked by dental caries. The percentage of decay is 39.1% (Table 5). Comparing the three areas, the percentage in coastal area is the lowest one ($P<0.005$), only 30.5% in males and 33.0% in females. In each area, the percentage in females is higher than males ($P<0.01$, $P<0.01$, $P<0.05$).

5. The percentage of deep caries in permanent teeth

Deep caries means dental caries involing pulp tissue or fracture of all crown portion to residual root. The percentage of deep caries in decayed permanent teeth is 15.6%

Table 5. Percentage of 1st Permanent Molar Caries to Estimated 1st Permanent Molar by Grade and Sex

Area	Grade	No. of estimated 1st molar			No. of carious 1st molar			Percentage		
		M	F	T	M	F	T	M	F	T
Mountain	1	680	737	1,417	242	291	533	35.6	39.5	37.6
	2	839	840	1,679	301	321	622	35.9	38.2	37.0
	3	1,024	1,060	2,084	446	505	951	43.6	47.6	45.6
	4	1,036	1,176	2,212	449	577	1,026	43.3	49.1	46.4
	5	960	884	1,844	424	423	847	44.2	47.9	45.9
	Total	4,539	4,697	9,236	1,862	2,117	3,979	41.0	45.1	43.1
Plain	1	1,358	1,407	2,765	378	463	841	27.8	32.9	30.4
	2	1,158	1,408	2,566	389	565	954	33.6	40.1	37.2
	3	1,568	1,420	2,988	670	691	1,361	42.7	48.7	45.1
	4	2,248	2,604	4,852	883	1,157	2,040	39.3	44.4	42.0
	5	1,472	1,468	2,940	649	758	1,407	44.1	51.6	47.8
	Total	7,814	8,307	16,121	2,969	3,634	6,603	38.0	43.7	41.0
Coastal	1	585	600	1,185	165	174	339	28.2	29	28.6
	2	811	804	1,615	208	200	408	25.6	24.9	25.3
	3	1,708	1,512	3,220	553	557	1,110	32.4	36.8	34.5
	4	880	960	1,840	277	334	611	31.5	34.8	33.2
	5	668	748	1,416	218	260	478	32.6	34.8	33.8
	Total	4,652	4,624	9,276	1,421	1,525	2,946	30.5	33.0	31.6
Total	1	2,623	2,744	5,367	785	928	1,713	29.9	33.8	31.9
	2	2,808	3,052	5,860	898	1,086	1,984	32.0	35.6	33.8
	3	4,300	3,992	8,292	1,669	1,753	3,422	38.8	43.9	41.3
	4	4,164	4,740	8,904	1,609	2,068	3,677	38.6	43.6	41.3
	5	3,100	3,100	6,200	1,291	1,441	2,732	41.6	46.5	44.1
	Total	17,005	17,628	34,633	6,252	7,276	13,528	36.8	41.3	39.1

M = Male F = Female Total = Total

in the plain area, 19.1% in the coastal area, and 17.3% in the mountain area (see Table 6).

Generally, the percentage of deep caries in decayed permanent teeth among the higher grades is higher than that of the lower grades. The percentage in the mountain and coastal area, is slightly higher in females than that in males, but not in the plain area. The total average in males is 16.6% and it is 17.2% in females.

6. Filling ratio of decayed permanent teeth

In the mountain area, the filling ratio for the 1st graders is zero and the average for every student is 2.1%. This is a very low percentage. In the coastal area, the average is 2.1%. However, the filling ratio of the decayed permanent teeth is higher in the plain area. In Table 7, it can be seen that this ratio is 5.9% in the plain area, the highest of the three areas ($P<0.005$).

Of all 17,057 decayed permanent teeth, there are only 665 teeth that had been filled. The filling ratio is 3.9%.

Table 6. The Percentage of Deep Caries in Permanent Teeth among Three Areas by Grade and Sex

Grade	Mountain area			Plain area			Coastal area			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
1	12.8	6.4	9.3	7.9	12.2	10.3	12.0	9.2	10.6	10.5	9.7	10.1
2	9.1	12.6	10.8	13.4	17.5	15.7	8.8	17.5	12.9	10.8	16.1	13.5
3	15.2	18.1	16.8	14.2	13.1	13.6	20.8	21.7	21.2	16.8	17.4	17.1
4	20.4	22.5	21.6	16.3	13.9	15.0	21.0	21.9	21.5	18.3	17.6	17.9
5	22.4	20.4	21.4	21.2	20.9	21.0	21.5	23.2	22.5	21.7	21.2	21.5
Total	17.0	17.6	17.3	15.6	15.6	15.6	18.1	20.1	19.1	16.6	17.2	16.9

M = Male F = Female T = Total

Table 7. Filling Ratio of Permanent Decayed Teeth among Three Area by Grade and Sex (%)

Grade	Mountain area			Plain area			Coastal area			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
1	0	0	0	1.8	2.6	2.2	0	2.1	1.1	0.8	1.6	1.2
2	1.9	1.7	1.8	7.1	3.0	4.8	0	2.3	1.1	3.6	2.5	3.0
3	2.2	0.9	1.5	3.1	6.5	4.8	2.6	3.0	2.8	2.7	3.8	3.3
4	4.7	2.0	3.2	5.8	4.0	4.8	2.3	1.1	1.6	4.9	3.0	3.8
5	1.8	3.2	2.6	12.0	9.8	10.8	2.0	3.0	2.6	6.8	6.4	6.7
Total	2.4	1.8	2.1	6.4	5.5	5.9	1.7	2.4	2.1	4.1	3.7	3.9

M = Male F = Female T = Total

Table 8. Oral Hygiene Index among Three Areas by Grade and Sex

Grade	Mountain area			Plain area			Coastal area			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
1	5.20	4.14	4.67	4.18	4.06	4.11	5.57	4.97	5.26	4.75	4.27	5.52
2	4.96	4.93	4.95	4.81	4.07	4.41	5.66	5.33	5.50	5.10	3.23	4.14
3	5.56	4.08	4.81	4.20	3.47	3.85	6.21	5.54	5.90	5.34	4.76	5.06
4	4.68	4.28	4.47	4.81	4.07	4.41	5.29	5.10	5.20	4.88	4.33	4.59
5	5.62	5.60	5.61	4.64	4.83	4.73	5.62	5.72	5.67	5.15	5.26	5.21
Total	5.21	4.56	4.88	4.52	4.09	4.30	5.77	5.35	5.56	5.04	4.54	4.79

M = Male F = Female T = Total

Table 9. Gingivitis Percentage among Three Areas by Grade and Sex (%)

Area	Grade	None		Mild		Moderate	
		M	F	M	F	M	F
Mountain	1	48.1	54.9	41.8	37.6	10.1	7.5
	2	44	38.5	47.5	51.0	8.5	10.6
	3	43.4	49.4	45.5	40.2	11.2	10.4
	4	47.7	45.4	40.6	41.4	11.7	13.2
	5	33.3	48.8	49.8	40.2	16.9	11.0
	Total	43.3	47.5	44.9	41.9	11.8	10.6
Plain	1	40.4	41.4	52.2	50.7	7.4	7.9
	2	49.1	44.5	40.4	44.2	10.5	11.2
	3	45.3	48.4	46.7	46.9	8.0	4.8
	4	38.1	50.2	52.0	41.6	9.9	8.2
	5	44.0	46.7	41.1	42.4	14.9	10.9
	Total	42.5	46.7	47.6	44.6	9.9	8.7
Coastal	1	45.3	60.1	41.9	31.9	12.8	8.0
	2	43.7	44.3	43.2	42.7	13.1	13.0
	3	46.8	54.6	37.8	38.9	15.4	6.6
	4	46.9	52.2	44.4	37.3	8.7	10
	5	50.6	53.8	34.0	29.7	15.4	16.5
	Total	46.5	53.2	40.1	36.7	13.4	10.2
Total	1	47.3	48.8	42.6	43.4	10.1	7.8
	2	46.0	42.7	43.3	45.8	10.6	11.5
	3	45.4	51.1	42.5	41.8	12.1	7.1
	4	42.6	49.4	47.3	40.7	10.1	9.9
	5	41.9	49.2	42.4	38.4	15.7	12.4
	Total	44.7	48.4	43.7	42.0	11.6	9.6

M = Male F = Female

7. Oral hygiene index

Table 8 is an oral hygiene index of the three areas. Oral hygiene in females is much better than that in males in all the three areas ($P<0.01$). The index in the plain area is the lowest among the three areas ($P<0.01$), 4.52 in males and 4.09 in females. The average is 4.30. OHI in the other two areas is 4.88 in the mountain area and 5.56 in the coastal area.

8. Gingivitis

The gingivitis percentage is shown in Table 9. In the coastal area, the percentage of moderate gingivitis is 13.4% in males and 10.2% in females. The average is 11.8%.

In the plain area, it is 9.9% in males and 8.7% in females, which is lower than those of the students in the coastal area ($P<0.05$). In general, the percentage of moderate gingivitis in females is slightly lower than in males. In other words, the gingival condition in females is better than that in males ($P>0.05$, $P>0.05$, $P<0.05$).

DISCUSSION

The results of this dental survey of the three areas in the Taipei County indicate that the prevalence of the dental caries on the permanent teeth among the primary school children is high. For the children from the 1st grade to the 5th grade, the DMF rate is between 0.95 to 2.63 (Table 5). And, generally speaking, it seems higher than that in the others (not including the urban area of Taipei) when we compare the data with those from the other areas (see Table 10).

We can't find the relationship between age and the data in this study except DMF index. The means DMF index increases with the grades in all three areas and as same as the other studies[1,2,3,4,5,6,7]. The filling ratio of the permanent teeth is only 3.9%. The reasons for such a low filling ratio, we believe, are related to the inadequacy of the dental health education in the schools and society, the unsatisfactory economic condition of the students' families, and the absence of the dentists in the county. There are some dentists in the plain area, but in the other two area, there are almost no dentists. The survey reveals that the filling ratio in the plain area is higher than that in the

Table 10. Review of the Previous Studies on DMF Survey

Location	Authors	Survey Year	DMF
Taipei County	Hu	1978–1979	0.96–2.63
Matsu	Duh[1]	1961	0.02–0.41
Taipei (urban)	Hong, Wang[5]	1951–1954	0.90–4.56
Taipei (rural)	Hong, Wang[5]	1951–1954	0.36–1.96
Taipei City	Lin, Hong[3]	1961	0.51–2.32
Taipei City	Liu, Chu, Yau[6]	1970	0.95–1.86
Saisiat Tribe	Chang[4]	1966–1972	0.23–2.00
Chung Shin Village	Hsieh[7]	1971–1972	0.2 –1.7
Tsaotung	Hsieh[7]	1971–1972	0.1 –1.2
Penghu (rural)	Wang[2]	1963	0.04–0.4
Penghu (urban)	Wang[2]	1963	0 –1.6

other two areas.

The condition of permanent teeth of the students in the coastal area is better than which in the other two areas. It may due to their food pattern beside the coast area. The sea food is the most important, more calcium and phosphorus contain in the food, and it make the tooth structure strong. But the poor oral hygiene condition and absence of dental care make the percentage of deep caries high. We suggest that it is important to improve the education of oral hygiene in this area.

The food pattern, the education and the socioeconomic condition are the factors which influence the data in this study, but we didn't explore these interactive factors. I hope, it may be explored in the future studies.

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REFERENCES

1. Duh F. G.: Dental Caries among the Children of Matsu. J. Formosan Med. Assoc. 65(1); 56-64, 1966.
2. Wang S. Y.: Epidemiologic Study of Dental Caries in the Pescadores (Penghu) Taiwan. Chinese Med. J. 15; 224-231, 1968.
3. Lin C. C., Hong Y. C.: Dental Conditions among School Children of a Primary School in Taipei City. J. Formosan Med. Assoc. 61(8); 31-40, 1962.
4. Chang W.K.: Five Years Observation on the "Saisiat" Tribe Aboriginal Children in Taiwan. J. Formosan Med. Assoc. 70(4); 208-212, 1971.
5. Hong Y. C., Wang J. H.: Dental Conditions among School Children in Taipei and Chung-Ho. J. Formosan Med. Assoc. 59(1); 22-34, 1960.
6. Liu L. L., Chu K. K., Yau J. H.: Dental Health Survey in Taipei Primary School Chinese Med. J. 18; 196-205, 1971.
7. Chi-Chuan Hsieh: Dental Diseases among the children in Chung-Shin Village and Tsaotung. J. Formosan Med. Assoc. 71(8); 29-41, 1972.

山地、平原和濱海地區國小學生牙齒健康狀況之流行病學調查研究

胡雅萍

本報告就山地、平原和濱海三地區的國小學童之口腔健康狀況，作一流行病學的比較分析，目的在求瞭解不同社會經濟背景和生活環境下的學童，是否有口腔保健狀況上之不同。爲此，在民國 67年4月、7月和 68 年7月間，先後於台北縣八個鄉鎮的二十一所國小，以群體隨機抽樣方式，共檢查了一至五年級的學童計9,198名，其中男生有 4,566名，女生有 4,632名，主要檢查項目有牙齒和牙齦之健康狀況、口腔衞生狀況。主要之結果如後：

(1)被檢學童未曾罹患齲齒之百分率，在山地、平原和濱海地區分別爲 7.7 %、11.7 %和32.7 %，男女性別上並無顯著之差異。

(2)被檢學童恆齒罹患齲齒指數，在三區分別爲平均每人2.00 、 1.88和1.64顆，女性之指數高於男性，且隨年級增加而昇高。

(3)被檢學童永久第一大臼齒齲齒罹患率在三區分別爲 43.1 %、41.0 %和31.6 %，女性的齲齒罹患率較男性爲高，而其中第一大臼齒占所有齲蝕永久齒之比率在三區分別爲81.1 %、81.6 %和73.0 % 。

(4)被檢學童恆齒填補比在三區分別爲 2.1 %、 5.9 %和2.1 %在山地和平原區以男性較高，濱海區則恰相反。

(5)被檢學童之口腔衞生指數以平原區爲最好。

(6)被檢學童有恆齒齲蝕而導致嚴重齲齒或殘根者，佔全部恆齒齲齒之16.9 %。

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