Ministry of Health, Drug Abuse Prevention and Rehabilitation of Cayman Islands, B.W.I.

Pan American Health Organization Regional Oral Health Program, Washington D.C.

Cayman Islands Oral Health Survey 2009

Training of Examiners, Calibration and Survey Design
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Background

The Cayman Islands are a British territory of three islands, Grand Cayman, Little Cayman and Cayman Brac, located in the western Caribbean sea approximately 320 kilometers North West of Jamaica.

The total territory extends approximately 230 kilometers; Grand Cayman is the largest island with an area of about 200 square kilometers. Cayman Brac and Little Cayman are located about 130 km east of Grand Cayman and have areas of 36 km^2 and 26 km^2 respectively. In 1994 the population was estimated at 31,567; in 1997 at 39,000; in 2007 at 54,000. In 2007 Caymanian born residents accounted for 60% of the population and the remaining 40% immigrants from various countries.

In 1999 approximately half of the population of Cayman Islands resides in George Town, 20% in West Bay and about 15% in Bodden town. In Cayman Brac about 5% followed by East Bay and North side with 3.5 and 2.7% respectively. The least populated area is Little Cayman with less than 1%. In 1999 the population 15 years of age and younger was 7,600; those between 15 and 65 years of age were approximately 29,156 and 65 years of age and older 2,264.

Education

State schools are operated by the Department of Education Services; all Caymanian children are entitled to free primary and secondary education. Various private schools function in Cayman Islands supported by private foundations or religious organizations. A university college functions in Georgetown on Grand Cayman and Cayman Brac. There is also a private college that offers Associate's, Bachelors, and post-graduate degree programs. A medical school and a veterinary medicine school function as part of St Matthew University in Grand Cayman. At the present time there is no dental school functioning in Cayman Islands.

Health Care Services

A board range of Medical services are available on Grand Cayman with two fully equipped hospitals, numerous clinics and many private specialist and general practitioners. We also attract a wealth of visiting specialists and this includes government and private health services authority. For example, there are currently 44 registered dentists on the Island .This includes four visiting oral surgeons, four orthodontists (3 visiting) one visiting periodontist and one visiting Endodontist. Only 9 of the dentists work for the Health Services Authority. There are currently fourteen registered dental hygienists three of whom work for the Health Service Authority.

The Health Service Authority is a statutory authority which now runs many of the health services which were previously directly under government and referred to as the government

services .This includes the Dental Service. They are responsible for two hospitals and the district health centers as well as range of tertiary care.

The main dental clinic is located at the Cayman Island hospital and is administrative hub for the services throughout the Islands .This center contains seven dental clinics a dental lab and the administrative offices. There are dental clinics in West Bay and Bodden Town health centers, Faith Hospital on the Brac and on Little Cayman. Currently an arrangement exists for leasing a five surgery dental practice in Georgetown the capital of the Cayman Islands. The center for the school services is Bodden Town health center and there are six dental clinics in the government schools and a Dental Caravan which rotates around the schools that do not have a dental clinic. There is a dental clinic located at the prison.

The school service is funded directly by the government and is free for children up to and including high school .The government employees and indigents are provided dental treatment though a national insurance system which is free at delivery for items covered under the scheme . Nongovernment employees are fee paying and the fees are set by the government. At present dental staff can provide a full range of services which will eventually include implants.

Specialist services are provided by a monthly visiting oral surgeon at the main clinic. There is a referral system to access local specialists for Orthodontics, Periodontics and Endodontics.

At present the staff complement includes a Chief Dental Officer and 9 dentists,9 dental surgery assistants , three dental hygienists 2 dental laboratory technicians, 5 dental therapists a dental administrator and four dental administrative staff.

Oral Health Status

Data from 1989-1990 reported to the WHO Global data Bank indicated a mean DMF-T of 4.6 for 12 year-olds which fell in the severe category. Oral health was included as one of the priorities for the Ministry of Health program for the population of Cayman Islands. Dental health services were provided by at George Town hospital, Faith hospital in Cayman Brac, prison and two high schools. A dental mobile van is used to service all primary schools. An oral health survey conducted in 1995 indicated that 4-5 and 6-7 year-old children had a dmf-t of 1.96 (SD 2.94) and 1.86 (SD2.49) respectively in the temporary dentition; children 12 years of age had a DMF-T index of 1.70 (SD 2.29). However, severity increase was observed in 15 year-olds with a DMF-T of 3.56 (SD 3.66) and more evident on adults with a DMFT of 12.98 (SD 5.71) in young adults 35-44 and 17.25 (SD 7.35) in persons 65 years of age and over. These results indicated that although there was significant improvement of oral health status in young children, further improvement was necessary as the population increased in age. Interestingly, studying the DMFT components, the highest percentage in 12 year olds was decayed, in 15 year-olds and young adults filled and in elderly adults was missing teeth. This distribution would confirm the need for additional life time prevention strategies; the increment of filled teeth in youth and

young adults would reflect curative treatment being provided; in the elder population the large percentage of missing teeth would indicate loss before a priority for oral health was established in the islands.

The survey in 1995 included assessment of periodontal conditions as regards to bleeding on probing, presence of supra or sub-gingival calculus, presence of shallow or deep pockets as determined using the WHO probe specifically designed for this purpose. Bleeding on probing was more evident in the age group 35 to 44 years of age and less evident in the elder population group; the same observation was applicable to presence of shallow or deep pockets. This would seem to confirm the lack of regular dental visits in the middle age group.

Fluorosis was considered not to be a public health concerned in 1995 based on the percentage of individuals affected. No body was found to be affected with severe fluorosis and only 3% of participants were scored as having questionable, very mild, mild or moderate fluorosis.

There has been a school fluoride program throughout the 1980s and 1990's. Initially rinses, then gels were used in school programs, moving to fluoride tablet distribution in the schools in the mid 1990. This together with the health education and improved dental awareness in the community had helped to reduce our dmft levels from high levels 4.5 in the 1980s to1.70 in the 1995 survey.
In 1999 we carried out a study on 12 year old to monitor the dmf levels of 12 year old and follow up the developmental defects of enamel. The dmf had fallen from 1.70 to 0.91. In this survey 6.8% of children had symmetrical, diffuse defects of enamel which can be classified as fluorosis. More children in private schools rather than in government schools were found with these defects. This was mild or very mild fluorosis. This seemed to indicate an increase from 3% in the 1995 survey.

In 1999 the Public Health department reduced its recommended doses of fluoride in line with recommendations in the United States and the United Kingdom.

At present we continue health education in the schools with toothbrushes instruction. Fluoride tablets are recommended for the high risk patients.

Treatment urgency was recorded in all subjects, based on the need for routine dental care and the presence of pain and/or evident infection. Slightly over 50% of the participants did not need any dental curative treatment ad approximately one third needed routine dental care. The largest percentage (38.8) was located in Cayman Brac followed by Cayman Brac, West Bay, Bodden Town and George Town with private schools. An additional category of treatment urgency was given to individuals who were in need of treatment for periodontal reasons; persons from two locations were identified, George Town and West Bay.

The World Health Organization (WHO) recognizes that basic oral health surveys are not designed to collect data about etiological factors affecting disease distribution and severity, or about clinical effectiveness of different prevention or curative procedures, but the information

collected can be used to monitor aspects of the effectiveness of oral care services. Further, basic oral health surveys can be used to assess overall prevalence of oral diseases affecting the population and variations in disease level and severity in subpopulation groups. Surveys need to be conducted on a regular basis, approximately every five years in order to be able to monitor changes in disease patterns and plan or re-plan strategies conducive to improvement and maintenance of oral health.

Survey design

Taking into consideration that the purpose of basic oral health surveys is to provide an estimation of the present oral health status of the population, the World Health Organization developed a series of guidelines on practical and economic sample design and survey planning for the most common oral diseases that is different from traditional sample designs. The sampling method was designated as the "Pathfinder" method which essentially is a stratified cluster sampling technique, which aims to include the most important population sub groups likely to have different disease levels. A standard number of subjects and inclusion of sufficient examination sites to cover all important subgroups of the population is recommended so as to be able to examine population groups with different degrees of severity. Information of disease severity by island or district was not available in 1995; considering that approximately 50% of the population lived in George Town, two clusters of each age group were estimated that would be needed to be examined in this district; public and private schools were included with the assumption that children attending private schools would belong to families with a higher socioeconomic status and thus could have different health status. Adults were volunteers randomly selected without consideration of their income. The survey design essentially followed the WHO "Pathfinder" structure and included residents from George Town, West Bay, Bodden Town and Cayman Brac.

Age groups included were 5, 6-7, 12, 15 in the children group and 35-44 and 65 and over in the adults group. Initial design contemplated one cluster of 35 individuals per age group per location yielding a subtotal of 210 subjects per location or 1,050 for the entire territory.

Table 1 depicts estimates sample per location and Table 2 actual subject examined per age and location in the 1995 survey.

Table 1

Region	Age 5	Age 6-7	Age 12	Age 15	Age 35-44	Age 65 and over	Totals per region
George Town[1]	35	35	35	35	35	35	210
George Town[2]	35	35	35	35	35	35	210
West Bay[3]	35	35	35	35	35	35	210
Bodden Town[4]	35	35	35	35	35	35	210
Cayman Brac[5]	35	35	35	35	35	35	210

Total number of children	175	175	175	175			700
Total number of adults					175	175	350
Total persons							1050

[1]Children from public schools
[2]Children from private schools
[3]Children from primary schools, George Hicks and John Grey
[4]Children from primary schools, George Hicks and John Grey
[5]Children from public schools

Table 2

Region	Age 4-5	Age 6-7	Age 12	Age 15-16	Age 35-44	Age 65 and over	Totals by Region
George Town'	44	45	42	36	79	49	295
George Town"	35	34	26	40	0	0	135
West Bay	43	37	34	39	35	28	216
Bodden Town	46	42	32	26	29	17	202
Cayman Brac	25	34	20	27	37	35	178
N.Side East End	0	1	0	0	1	0	2
Total	193	193	154	178	181	129	1028*

'Public schools
" Private schools
*4 missing observations

As can be deducted from Table 2, the total number of subjects was close to 98%; however in some schools more children than the estimated cluster of 35 were examined and in Cayman Brac the 4-5 and the 12 year old clusters did not reach the estimated size. Also, one child and one adult living in the area of North Side East end were examined. As regards to adults, in George Town twice as many contemplated to be included were examined and in Bodden Town only half of the contemplated number was actually examined. While these variations did not precisely fit the proposed sampling scheme, it was felt that all data should be considered in the analysis.

It is acknowledged that the WHO "Pathfinder" method is suitable for obtaining information on the overall prevalence of disease affecting the population and variations in disease level. Adult participation was merely volunteer and subject selection although was not preselected for the examinations was merely casual and it was difficult to coordinate. For the oral health survey in 2009 in agreement with Cayman Islands health care officials, it was decided to attempt obtaining lists from major employers of young adults and CINICO, the national insurance

company that covers medical and dental care for civil servants, seaman, indigents and those that need basic insurance cover. It is intended that this would give a more realistic picture of oral health conditions of the average person in this age group living in the territory. Most persons over 65 years of age in Cayman Islands belong to the Seafarer organization and this would facilitate obtaining lists for selecting a sample from this age group.

Survey sampling

Age groups to be included in the oral health survey 2009 were those recommended by the World Health Organization.

Index ages and age groups

The following ages and age groups are recommended: 5 years for primary teeth and 12, 15, 33-44 and 65-74 years for permanent teeth.

- **5 years.** This age is of interest in relation to levels of caries in the primary dentition which may exhibit changes over a shorter time span than the permanent dentition at other index ages. In some countries 5 years is also the age at which children begin primary school.

- **12 years.** This age is especially important as it is generally the age at which children leave primary school, and therefore in many countries, is the last age at which a reliable sample may be obtained easily through the school system. Also, it is likely at this age that all permanent teeth, except third molars, will have erupted. For these reasons, 12 years has been chosen as the global monitoring age for caries for international comparisons and monitoring of disease trends.

- **15 years.** At this age the permanent teeth have been exposed to the oral environment for 3-9 years. The assessment of caries prevalence is therefore often more meaningful than at 12 years of age. This age is also important for the assessment of periodontal disease indicators in adolescents.

- **33-44 years (mean = 40 years).** This age group is the standard monitoring group for health conditions of adults. The full effect of dental caries, the level of severe periodontal involvement, and the general effects of care provided can be monitored using data for this age group. Sampling adult subjects is often difficult.

- **65-74 years (mean = 70 years).** This age group has become more important with the changes in age distribution and increases in span that are now occurring in all countries. Data for this group are needed both for planning appropriate care for the elderly and for monitoring the overall effects of oral care services in a population.

Lists of schools enrolling children from the corresponding index ages and age groups were

obtained from the Department of Education in order to utilize an equal probability selection method with probability proportional to size. Table 3 summarizes the information provided about school enrolment by age and location.

Table 3
Cayman Islands Oral Health Survey 2009
Schools enrolling children 5, 12 and 15 years of age

School	Grade	Classification	District	Age 5	Age 12	Age 15	Code
George Hicks	High Lower	Public	George Town	0	272	0	9
John Grey	High Upper	Public	George Town	0	0	354	10
Lighthouse	Special education	Public	George Town	5	3	7	11
North Side	Primary	Public	North Side	5	0	0	8
East End	Primary	Public	East End	16	0	0	7
Bodden Town	Primary	Public	Bodden Town	29	0	0	6
Savannah	Primary	Public	Bodden Town	31	0	0	5
George Town	Primary	Public	George Town	34	0	0	2
Red Bay	Primary	Public	George Town	52	0	0	4
Prospect	Primary	Public	George Town	53	0	0	3
John A. Cumber	Primary	Public	West Bay	85	0	0	1
Wesleyan Christian	Primary and High	Private	West Bay	9	13	4	21
Grace Christian	Primary and High	Private	West Bay	12	5	3	22
Truth for Youth	Primary	Private	George Town	15	1	0	25
Montessory by the Sea	Primary	Private	George Town	17	1	0	29
Cayman Academy	Primary and High	Private	George Town	21	6	6	24
Triple C	Primary and High	Private	George Town	21	25	24	27
First Baptist Christian	Primary and High	Private	George Town	22	15	0	28
Cayman International	Primary and High	Private	George Town	39	16	13	23
St. Ignatius Prep and High	Primary and High	Private	George Town	44	50	46	26
Cayman Prep and High	Primary and High	Private	George Town	65	41	60	30
Cayman Brac High	High all grades	Public	Cayman Brac	0	22	25	14
West End primary	Primary	Public	Cayman Brac	7	0	0	12
Creek Primary	Primary	Public	Cayman Brac	7	0	0	13
Total				604	470	542	

Sampling of examination sites was contemplated to be conducted at random; thus, considering Cayman Brac location, characteristics, and health services available a probability of 1 was assigned to ensure that children and adults would be included in the survey.

The remaining schools by age were grouped in two major classifications public and private.

Selection of children 5 years of age

In the 5 years group, there were a total of 310 children in public and 265 in private schools; 14 children 5 years of age attended school in Cayman Brac. The recommended minimum cluster size in pathfinder surveys is 25 persons when caries severity is low. According to the 1995 survey, caries was low in 5 year olds; considering that the main groups established were public and private schools essentially all located within a small territory, attempts were made to form clusters with a minimum of 20 children and conducting examinations at various school sites proportionally to the number of attending children in each major group. With this arrangement, in public schools four examination sites including 20 children at each location were selected; this corresponds to approximately 25% of enrolled children. In the private group, three schools were selected including 22 children at each location. The selection method was probability proportional to size which includes a random selection of examination sites. One of the schools selected only had 17 eligible children but was included in the survey sampling. Even though children living in Cayman Brac amount only to 14, all children will be examined.

Selection of children 12 years of age

A similar arrangement to that of 5 year-olds was made for schools enrolling children of 12 years of age. Schools were arranged in public and private and selection conducted with a probability proportional to size method. There were 275 children enrolled in public and 173 children in private schools. For maintaining the proportion of children to be examined, 70 children would need to be examined in public schools and 45 in private schools. There were only two public schools, George Hicks with 272 and Lighthouse with 3 children enrolled. Both schools were included in the design but all clusters selected resulted being children attending George Hicks school. For private schools, two schools were selected Triple C examining 25 children and St Ignatius examining 20 children. In Cayman Brac, all 22 children 12 years of age will be examined.

Selection of children 15 years of age

Children fifteen years of age attend two public schools, John Gray High with 354 and Lighthouse with 7 for a total of 361. Private schools enroll 156 children in Grand Cayman. Cayman Brac public school enrolls 25 students. The two public schools in the main territory were arranged and the selection process conducted; the resulting number for public schools to be examined was 92 and all children are enrolled at John Gray High-upper school. Two private schools, Triple C and Cayman prep and high were selected; forty children (40) children would be examined, 20 at Triple C and 20 at Cayman prep and high; however, when a school is selected and only a few

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children are not included in the proposed sample scheme, ethical guidelines recommend to examine all children in the school class; in Triple C the total children 15 years of age were 24, therefore, al 24 children need to be examined; consequently, 44 children 15 years of age will be examined in private schools. In Cayman Brac public school, there are 25 15 year-old children enrolled; all children need to be examined.

Table 4 summarizes schools selected and number of children to be examined in each institution.

Table 4
Estimated sample per age and location

5 Years

School	Grade	Classification	Location	Number
Savannah	Primary	Public	Bodden Town	20
Red Bay	Primary	Public	George Town	20
Prospect	Primary	Public	George Town	20
John A Cumber	Primary	Public	West Bay	20
Montessory by the Sea	Primary	Private	George Town	17
Cayman International	Primary and high	Private	George Town	22
Cayman Prep and High	Primary and high	Private	George Town	22
West End	Primary	Public	Cayman Brac	7
Creek	Primary	Public	Cayman Brac	7
Total				**155**

12 Years

School	Grade	Classification	Location	Number
George Hicks	High-lower	Public	George Town	70
Triple C	Primary and high	Private	George Town	25
St Ignatius Prep and High	Primary and high	Private	George Town	20
Cayman Brac High	High all grades	Public	Cayman Brac	22
Total				137

15 Years

School	Grade	Classification	Location	Number
George Hicks	High-lower	Public	George Town	92
Triple C	Primary and high	Private	George Town	24
St Ignatius Prep and High	Primary and high	Private	George Town	20
Cayman Brac High	High all grades	Public	Cayman Brac	25
Total				161

Selection of young adults 33 to 44 years

Lists of individuals employed by government and large non-government organizations were obtained. Government employees totaled 2,960 individuals; CUC listed 59; Health Service Authority 258; Seafarer 18; Water authority 19; Fosters food chain 177; Faith hospital in George Town 26 and Faith Hospital in Cayman Brac 28; all listings included both genders within the age of 33 to 44 years of age totaling 3,545 persons. Twelve groups of twenty-five persons each were contemplated adequate to be examined in Grand Cayman. With this arrangement it was contemplated to examine approximately 7% of listed adults. Equal probability proportional to size selection method was used to identify the organizations from which clusters of individuals were to be selected. Once organizations were identified, individuals to be examined were selected by systematic method. In Cayman Brac, the proportion used in the main territory was not maintained because it would mean to examine only 2 persons which would not result in valid data; therefore all 28 persons will be examined which would also satisfy ethical considerations. Table 5 depicts organizations selected and the number of individuals in each institution.

Table 5

Adults 33-44 years

Organization	Type	Location	Clusters	Number of individuals
Foster food chain	Private	Grand Cayman	1	25
HSA	Public	Grand Cayman	1	25
Government insurance	Public	Grand Cayman	7	175
Government insurance	Public	Grand Cayman	1	22
Faith Hopspital Cayman Brac	Public	Cayman Brac	1	28
Water Authority	Private	Grand Cayman	1	9
CUC	Private	Grand Cayman	1	25
Total				300

Individual selection within an organization was conducted by systematic sampling, due to the randomness of the system; the last group to be selected from the government list resulted in

22 persons instead of 25 as in the other clusters selected from the same list.

Selection of adults 65 to 74 years

Lists from two organizations including individuals 65-74 years of age representing both genders were available. Seafarer organizations listed 481 and Foster food chain supermarket chain listed 17 persons. Based on the higher severity of dental caries found in this age group, it was estimated to examine approximately 20% of individuals; systematic sampling method was used for selecting individuals at random from Seafarer. If the same proportionality would have been used for FOSTERS FOOD CHAIN, it would have resulted in examining 4 persons; for ethical reasons it was recommended to examine all 17 eligible persons at the supermarket chain. Table 6 summarizes the distribution and number.

Table 6

Adults 65-74 years

Organization	Type	Location	Clusters	Number of individuals
Seafarer	Private	Grand Cayman	4	96
	Private	Grand Cayman	1	17
Total				113

Reliability and validity of data

The World Health Organization acknowledges that although examiners may differ in their assessments of the oral health status of individuals, they should be in close agreement in assessing the status of population groups. Therefore, it is recommended that prior to undertaking a survey, it is essential that all participating examiners be trained to make consistent clinical judgments.

Two reasons have been identified for variability of clinical scoring:

- The difficulty in scoring the different levels of oral diseases, particularly dental caries and periodontal diseases.
- Physical and psychological factors, such as fatigue, fluctuations in interest in the study, and variations in visual acuity and tactile sense. All these affect the judgment of examiners from time to time and to different degrees.

The objectives of standardization and calibration are:

- To ensure uniform interpretation, understanding and application by all examiners of the codes and criteria for the various diseases and conditions to be observed and recorded.
- To ensure that each examiner can examine consistently.

Training and calibration of examiners

Six dentists serving at the Health Service Authority clinics in Cayman Islands were assigned to conduct examinations on the survey; each were assigned recorders who were either dental nurses, dental auxiliaries or dental assistants also employed by the Health Service Authority.

Examiners and recorders attended a theoretical session in which the rationale for conducting the survey was restated. A review of World Health Organization criteria and codes from the 4th edition 1997 and recommended modifications made by the WHO Global Oral health program was thoroughly explained. Examiners and recorders have hard copies available for studying and familiarizing themselves with criteria and codes to be used during examinations. It was suggested to have a copy of the data collection instrument available during examinations procedures for consulting. The Consultant utilized photographs of actual cases depicting periodontal conditions, dental caries, restorations without decay and with decay, missing teeth due to caries, missing teeth extracted for other reason, pit a fissure sealants and enamel fluorosis and instructed on the codes to be used for recording each condition. It was emphasized that in children only bleeding is recorded and no pocket depth is attempted to be measured. The Chief Dental Officer, examiners and recorders were also advised that lesions caused by erosion will be recorded and the code of s will be used for temporary dentition and S for permanent dentition.

Considering that the WHO Basic Survey Methods booklet is undergoing revision, the WHO Global Oral Health program recommends that intraoral mucosa be examined during survey examinations to record possible existence of lesions that may be associated with systemic disease. The difficulty in calibration examiners for this purpose is acknowledged because of difficulties in identifying individuals with and without all lesions that could possibly be found. In view of such difficulty, the calibrator made a review of a classification of oral manifestations of systemic disease and presented a series of photographs of actual cases to review lesions appearance and to alert examiners about the possible occurrence and how to record such findings on the data collection instrument. Emphasis was made on the intimate relationship of oral health and general health and vice versa.

A new recommendation from the WHO Global Oral Health Program is to advice countries on the need to administer questionnaires to subjects participating in the survey for the purpose of obtaining information on risk factors that can account for oral and systemic diseases. A simplified version was designed for children and a more comprehensive questionnaire for adults; examiners and recorders and administrative personnel were made aware of this recommendation from WHO and recommended administering these questionnaires to the individuals selected for the survey.

The clinical exercise started with a demonstration of examination and recording procedures in a subject 15 years of age. Immediately after, all examiners and the calibrator proceeded to examine a group of six children and five adults. Inter examiner consistency is summarized in Table 7 and Table 8 respectively.

Table 7
Cayman Islands Oral Health Survey 2009
Calibration of examiners
Initial assessment of consistency

Children

Examiner	Status		CPI		Fluorosis		Tx Urgency	
	%	K	%	K	%	K	%	K
01	97.62	0.96	74.31	0.32	83.33	0.72	66.67	0.33
02	96.43	0.95	79.17	0.53	83.33	0.60	50.0	-0.125
03	98.56	0.97	57.58	0.38	83.33	0.72	33.33	-0.04
04	97.01	0.95	73.53	0.24	*	*	33.33	-0.20
05	95.10	0.92	69.44	0.26	66.67	0.48	50.0	0.28
06	96.43	0.95	76.19	0.38	60.00	0.44	0.0	-0.136

*Consistency of Fluorosis scores for examiner 04 could not be calculated because of absence of entry in the corresponding field in 2 data collection instruments.
There was good consistency on assessment of status and very low on assigning treatment urgency. Three examiners reached good agreement; one examiner failed to record the corresponding score and thus percentage of agreement and Kappa statistics could not be calculated. Bleeding scores in children were not as consistent and Kappa statistics was below acceptable levels.

Table 8
Initial assessment of consistency

Adults' First evaluation

Ex*	Status		Root		Fluorosis		Tx Urgency		CPI		Pocket		Loss of Attachment	
	%	K	%	K	%	K	%	K	%	K	%	K	%	K
01	90.00	0.84	93.6	0.79	100	1.0	80.00	0.00	75.71	0.49	87.86	0.70	82.0	0.57
02	82.14	0.71	86.4	0.52	100	1.0	60.00	-0.11	76.43	0.46	80.71	0.52	66.0	0.44
03	85.71	0.78	93.6	0.79	100	1.0	40.00	-0.25	80.00	0.57	86.43	0.66	84.0	0.56
04	82.86	0.72	92.9	0.77	100	1.0	60.00	-0.11	67.86	0.41	85.00	0.63	94.0	0.86
05	72.62	0.62	86.4	0.65	100	1.0	66.67	0.00	70.24	0.50	77.38	0.57	93.3	0.87
06	80.71	0.70	93.6	0.79	100	1.0	40.00	-0.15	72.14	0.43	90.0	0.74	78.0	0.58

*Ex = Examiner

There was good consistency on assessing crown and root status; treatment urgency improved considerably although Kappa statistics was not at an acceptable level. It is possible that because of the relatively few subjects examined, any variation in scoring considerably affects Kappa values. There were no fluorosis scores on adults other than 0 therefore there was 100% agreement and Kappa = 1. However, when fluorosis was present as it was in children, variability on scoring degrees of severity was evident. Assessment of periodontal conditions was good. Emphasis was made on the need to review criteria in order to improve overall consistency.

A second clinical exercise was programmed and all examiners and the calibrator proceeded to examine and record clinical findings. Five children and three adults were able to be examined.

Table 9 and Table 10 summarize percentage of agreement and corrected Kappa statistics.

Table 9
Second assessment of consistency

Children

Examiner	Status		CPI		Fluorosis		Tx Urgency	
	%	K	%	K	%	K	%	K
01	98.20	0.97	87.5	0.18	50.0	0.33	50.0	0.00
02	94.00	0.91	89.3	-0.05	66.67	0.40	33.00	0.0
03	94.00	0.90	92.9	-0.03	33.33	0.14	66.6	0.4
04	95.24	0.91	85.71	-0.06	66.67	0.50	66.67	0.0
05	90.48	0.83	83.9	-0.05	33.33	0.14	33.33	-0.2
06	91.67	0.86	85.71	-0.006	33.33	0.14	33.33	-0.2

There was very good consistency in assessing crown status in children. Bleeding scores were acceptable; however, due to few subjects examined, any variability in scoring negatively affects Kappa values. Variability in scoring various degrees of severity of enamel fluorosis; it was recommended to review criteria and study photographs with various degrees of affectation to ensure that the correct score will be assessed during examinations. Consistency on assessing treatment urgency remains a concern; the Chief Dental Officer and the examiners were reminded to review the criteria and conduct a small exercise and compare results of codes assigned to a given subject. If variability would remain, the recommendation was to drop the variable from the survey to avoid reporting a degree of urgency that would not coincide with reality.

Table10

Adults Second evaluation

Ex*	Status		CPI		Fluorosis		Tx Urgency		Root		Pocket		Loss of Attachment	
	%	K	%	K	%	K	%	K	%	K	%	K	%	K
01	84.52	0.63	76.19	0.63	100	1	0	0	89.29	0.79	83.33	0.72	80.0	0.65
02	89.3	0.84	66.1	0.49	100	1	0	0	94.64	0.85	78.6	0.56	80.0	0
03	85.54	0.80	88.1	0.81	100	1	33.3	0.25	96.43	0.93	84.52	0.74	80.0	0.63
04	90.48	0.87	80.95	0.70	100	1	33.3	0.25	96.43	0.93	91.67	0.86	90.0	0.80
05	84.52	0.79	80.95	0.70	100	1	33.3	0.25	92.86	0.86	80.95	0.68	83.3	0.67
06	90.48	0.87	80.95	0.70	100	1	66.7	0.50	98.8	0.98	84.52	0.73	63.3	0.43

The following are conclusions reached after calculating results of examinations:

1. Pocket assessment was good but needs improvement.
2. Treatment urgency remains a concern for children and adults
3. Even though in some variables examiners attained a satisfactory percentage of agreement, the corrected Kappa statistics is low; this is likely due to the relatively few subjects examined; any difference or variation in scoring would directly and largely affect the Kappa value.

4. Recommend conducting an in-house exercise to review criteria and codes especially on variables where Kappa values were not satisfactory.
5. Recommend conducting a small pilot study before starting actual survey, reexamining subjects and comparing entries.
6. Considering that variability in scoring enamel fluorosis was observed, it was recommended to have on hand when conducting the survey, photographs with examples of enamel fluorosis with various degrees of severity. The calibrator facilitated several examples in electronic format. The Chief dental officer will have the photographs printed so that each team can consult during examination procedures to assess the correct fluorosis score.
7. Explore the possibility of validating entries. "An experienced epidemiologist may be appointed to act as validator for the survey team. The validator should examine at least 25 subjects who have already been examined by each member of the survey team." (WHO).

At the present time the WHO Global Oral Health Programme has one form for recording clinical conditions in children and adults; use of a single form caused some confusion on examiners and recorders especially for not recording variables that only apply to adults. The Consultant agreed to prepare a short version of the clinical data collection instrument for use exclusively in recording clinical information of children. Copies of data collection instruments and questionnaires to be used in the survey are appended at the end of this report.