

Antigua Oral Health Survey:2006

Final Report

Prepared by
George Legall, Ph.D

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The Antigua & Barbuda Oral-health Survey, 2006
Final Report
Executive Summary

Towards the end of 2006, an oral-health survey was conducted among students of primary and secondary schools in Antigua & Barbuda. The purpose of this study - which involved only clinical examinations as none of the children was interviewed - was twofold: First, it was in partial fulfillment of plans to continually monitor 1. the status of oral health and 2. identify determinants of oral-health of Antiguan and Barbudans. — Second, the data gathered were intended to help formulate policy and address problems.

Records showed that the most recent oral-health-related study prior to 2006 was a study conducted in the late 1980's to assess the feasibility of implementing a Fluoride rinse programme. As such, the present study was the first of its kind in Antigua & Barbuda in over twenty-five years. The information presented in this report was derived from data obtained from clinical examinations. While the report offers a description of the present oral-health status and, to a lesser extent, the burden of oral disease of children within the same age groups, it is unable to describe or compare changes in oral-health status since 1980, and does not attempt to since historical data or reports from previous studies could not be accessed.

Data obtained from clinical examinations showed that:

- 777 (50.6%) of the children were caries free. Of these 777 children, 223 (46.0%) were age 6; 405 (57.9%) were age 12, and 149 (42.5%) were age 15.
- 52.2% of the 6 year-olds had at least one primary tooth affected by decay; 35.9% of 12 year-olds, and 53.0% of 15 year-olds had at least one permanent tooth affected by decay.
- 6 year-olds had a mean of 2.45 decayed, missing (due to extraction) or filled temporary teeth (dft), and a mean of 0.06 decayed, missing or filled permanent Teeth (DMFT);

- The mean DMF scores for 12 year-olds (0.90) and 15 year-olds (1.92) were significantly lower than the World Health Organization (WHO)/World Dental Federation (FDI) recommended target of 3.0 for countries;
- 7.1% of 12 year-olds, and 19.4% of 15 year-olds had mean DMFT higher than 3.0;
- Significant Caries Index (SiC) of 2.51 at 12, and 4.83 at age 15 were both below the World Health Organization (WHO)/World Dental Federation (FDI) recommended maximum of 3DMF for countries;
- Dental decay varied by geography and age with no statistically significant differences between health districts with respect to the mean number of decayed teeth per child at age 12. However, both District II (mean = 4.33) and District III (mean = 4.00) had higher mean caries per child than the other districts at age 15;
- No statistically significant difference between boys and girls with respect to caries prevalence or severity was observed;
- Decayed teeth formed the largest component of dft+DMFT (94.0%) and DMFT at both age 12 and age 15 (84.4%);
- 96.7 % of dental caries remain untreated;
- 758 (49.4%) children had at least one treatment need;
- The three most commonly reported treatment needs of 6 year-olds were
1. One-surface restoration (75.23%); 2. multiple restorations (50.0%) and
3. extractions (19.5%);
- The 1st, 2nd and 3rd most reported treatment needs of 12 and 15 year-olds were, respectively: 1. One-surface restoration (77.3%);
2. multiple restorations (31.0%); and 3. fissure sealants (23.2%);
- Only one child needed crown treatment;
- 62 (8.2%) children needed prophylaxis;
- Treatment urgency was described as '*Advanced*' for 23.3% of those who needed to be treated, and as '*Low*' for 54.9%;
- 62.1% of 6 year-olds, 80.6% of 15 year-olds, and 46.7% of 12 and

15 year-olds combined had no evidence of dental flourosis; i.e., Tooth Surface Index of Flourosis (TSIF) = 0 for these groups;

- Observed flourosis levels were classified as '*Very Mild*' (1.2%); '*Mild*' (1.4%), '*Moderate*'(0.2%); and '*Questionable*' (4.7%).

The prevalence of dental caries among 6, 12 and 15 year-old children in Antigua and Barbuda is 49.4%. The study showed that 54.6% were affected by caries at age 6 with a mean dft +DMFT of 2.51 while prevalence and severity (percentage and mean DMFT) were 42.1% and 0.90 respectively at age 12, and 57.5% and 1.92 respectively at age 15. At the same time, 97.3% of dental caries remained untreated for a mean of 1.5 untreated teeth per child. Other key indicators of tooth condition and oral-health (SiC, DMF at age 12, etc) were well within suggested international norms.

Three of the findings should not escape the attention of the examiners.

They are :

- (1) 49.4% of the children had at least one decayed tooth. (See Table A6);
- (2) 97.3% of decayed teeth were not treated (Table A12);
- (3) 46.7% of children at ages 12 and 15 had no evidence of flourosis (TSIF = 0) (See Table A19).

These suggest the following recommendations:

1. review of the current distribution of the oral-health services available to children, and the extent to which the services are accessed. This would determine whether the services offered by the Ministry of Health are adequate to ensure timely diagnoses, treatment and the promotion of effective preventative measures.
2. measures should be implemented to address the current problem of untreated tooth decay. The short term objective of these measures should be to reduce the current percentage of unfilled teeth to the WHO/DFI percentage within a given time frame. A policy regarding when to fill should also be established in order to avoid unnecessary treatment.
3. programs designed to promote and encourage fluoride

use among children. This is important in light of the significant contribution of tooth decay to caries severity. Close attention must also be paid to the finding that 47% of the participants showed no evidence of fluorosis, especially in light of the established link between fluoride use and the prevention of decay. A short term measure could involve revisiting some of the recommendations of the 1980 fluoride use feasibility study with the aim of implementing them - if only in the short term. Other than that, some type of intervention should at least take place in the schools.

Seeing that it was the first of its kind in over fifteen years, one would have expected the national oral-health survey to seek to identify key determinants of oral-health status and to describe the extent to which these influence oral-health status. This would have required the dental staff to collect interview data in addition to clinical examinations. The information obtained would then facilitate policy formulation, health promotion, and activity planning. Failure to collect interview data was therefore the main limitation of the study, since without the information these data would have provided, it is difficult (though not necessarily impossible) to recommend specific interventions that would address deficiencies in knowledge, or attempt to change attitudes, or promote healthy practices by parents and children alike. This backdrop therefore provides the rationale for recommending

4. a survey of oral-health knowledge, attitude and practice among families is needed in order to explore possible associations with selected socio-economic factors.
- Information that may be sought could include
1. frequency of dental visits;
 2. teeth cleaning practice and habits;
 3. the use of fluoride dentifrice;
 4. the frequency of use of carcinogenic foods;
 5. patterns of consumption of non-carcinogenic foods;
 6. chewing ability and general health of teeth and gums;
 7. the highest level of education of parents; and
 8. household income.

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The Antigua & Barbuda Oral-health Survey: 2006 Final Report

1.0 Statement of the problem

The *Final Report on the Barbados Oral-health Survey* emphasizes that oral-health policy and programmes must be based on valid, accurate and up-to-date epidemiological information which is obtained from simultaneous clinical examinations and survey data (Leake, 2001). Apart from a study conducted in 1988 to assess the feasibility of implementing a fluoride rinse programme, there were no oral-health investigations of any segment of the population of Antigua and Barbuda between 1988 and 2006. As it is, oral-health surveys are conducted regularly in the developed countries, but with lesser frequency in the developing countries.

With the present study, Antigua & Barbuda has become the fourth CAREC (Caribbean Epidemiology Center) member country to have conducted at least one oral-health survey from 1990 and to 2006 inclusive. The other CAREC countries are Barbados (1995 & 2001), St. Lucia (2005), and Dominica (2006). The study in Barbados involved a nationally representative sample of 6, 12 and 15 year-olds, and was conducted to fulfill the Ministry of Health's mandate to continuously monitor oral-health status and its determinants among children, and to use that information to assist in forming policy to address the problems identified (Leake, 2001). However, while similar studies were conducted in the four CAREC countries, only in Barbados were interview data collected in addition to data from clinical examinations.

The results presented in this report describe the burden of illness among 6, 12 and 15-year olds in Antigua and Barbuda and should be useful for informing policy decisions for dental health services. There is no attempt to compare the results or findings of the studies from the other CAREC member countries, or from any other non-member country whether that country was within or outside of the Caribbean region, since doing so would have fallen outside the terms of reference of the study.

2.0 The Study

The Antigua and Barbuda oral-health survey (2006) was a cross-sectional study involving clinical examinations of a nationally representative sample of children at age 6, 12 and 15 years.

2.01 Background

In 1988 a pilot study was conducted in Antigua & Barbuda by Partners of America - an NGO from the USA - to determine the feasibility of implementing a Fluoride rinse programme. The sample was small and not quite representative of the national population. Based on recommendations made on the basis of the findings, a rinse programme was implemented in 1989. Even though it ended officially in 2001, the programme continued in Barbuda up to the end of 2006. Whether or not the programme was effective is unknown. However, the fact that no national oral-health surveys had been conducted in Antigua and Barbuda for over twenty years was a matter of greater concern to the Health Ministry, and provided sufficient justification for conducting the present study. Therefore, this study, though limited in scope, was able to provide useful information to guide future policy, and provide guidelines for follow-up research, or for extending surveys to other age groups.

2.02 Purpose of the study

The purpose of the study was to describe the oral-health status of 6 year-old, 12 year-old and 15 year-old children in Antigua & Barbuda, and to make necessary recommendations on the basis of the implications of the findings. The study did not include identification of probable determinants of observed oral-health condition.

2.03 Nature and scope of the study

The study was essentially an investigation of the oral-health status of children in three age groups. This type of investigation is conducted routinely in some countries but with

lesser frequency, and narrower scope in others due mainly to the lack of human and financial resources needed to implement the study. Standard oral-health studies include the collection of interview data and clinical examination of each participant. As it is, the present study did not collect interview data.

The study was limited to the combined 6, 12 and 15 year-old populations of Antigua and Barbuda, and even though it numbered 4,380, a survey was preferred to a census since it was clear from the outset that the latter would have been infeasible for a number of reasons including time, logistics, and money. The sample selected was large enough to estimate (with a 5% margin of error) the percentage of caries-free children in each age group in the population, and to ensure that clinical examinations which were scheduled to begin on November 20th 2007 would be completed on, or before December 7th 2006.

2.04 Validity and Reliability

While the findings of the study are applicable primarily to school children in Antigua and Barbuda, they could be extended to all children in the 3 age-groups in the country regardless of whether or not they attend school. Moreover, the fact that the clinical examinations were guided by WHO/FDI protocol for clinical oral investigations further contributed to the reliability of the study.

3.0 Materials and methods

The personnel, physical arrangements and material employed in the study are outlined below.

3.01 Personnel and physical arrangements

Communication letters

- Ministry of Education

The study would not have been possible without the consent of parents/guardians. The written approval needed was secured by the Ministry of Education. This is only one of

several examples of the strength of the collaboration between the Ministries of Health and Education throughout the duration of the study.

Personnel:

The technical and support staff was comprised of:

- Calibration trainer/ Survey Coordinator
- Examiners
- Recorders
- Bus driver

Physical Arrangements:

- Location: Schools

Within each health district, arrangements needed to be made for the use of the school facilities on the day of the examinations. The cooperation of the principal was essential to success in this regard.

3.02 Materials

The list of materials needed to conduct the examinations and record the data included:

- Oral-health Survey Forms with Codes (Appendix C1)
- Treatment Need Notification Forms (Appendix C2)
- Portable Dental Chairs for Patients, Operators Stools
- Mirrors
- Probes
- Dental Trays
- Garbage Bags
- 70% Alcohol
- Cotton wool rolls
- Gauze
- Sterilization Pouches
- Paper towels

- Masks
- Gloves
- Operator gowns
- Clipboards
- Pens
- Pencils
- Erasers
- Pencil Sharpeners
- Rubber Bands
- Staplers
- Staples
- File Folders
- Autoclave Bags
- Plastic Containers for used instruments
- 2% Gluteraldehyde

As was expected, the cost of acquiring these materials accounted for the largest portion of the survey budget.

3.03 Scheduling

- Number of visits per school
- Number of school visits per day

Depending on the number of children to be examined in a given school, multiple visits might or might not have been required. As such, the number of visits per school, and the days on which the visits would take place had to be time-tabled. In order to perform the examinations with minimum disruption to the day-to-day operation of the school, scheduling needed to be a joint effort of the school administration and the health ministry.

- **Transportation**

It was important that arrangements were made to transport personnel, equipment, records and other material to and from the schools, rather than relying on public transport or the personal arrangements of the members of the examination team. The number of vehicles, drivers and runs needed to complete the examinations at any given school depended on the number of visits, and the date (and time) of each visit.

3.04 Methods

The target population was 6, 12 and 15 year-old citizens and residents of Antigua and Barbuda. Since almost all of these children would be enrolled in school (pre-school to secondary), the sampled population consisted of all children attending pre-schools, primary schools and secondary schools in Antigua and Barbuda. For the purpose of sample selection and data collection, each of the 25 primary and secondary schools was classified according to the health district in which it was located instead of according to education zones. The main reason for doing so was that any policy to be adopted as a result of the study would have to be implemented by the Ministry of Health. Ministry of Education figures showed that in 2005 the total enrolment of 6, 12 and 15-year olds was 4,380. Since this was the most up-to-date figure available, it was used as an approximation of the school population in 2006.

3.05 Parental Consent

The Ministry of Education was responsible for obtaining parental consent. Data regarding the number of parents contacted, the number who gave consent, the number of refusals, and the number who did not return the consent form are unknown. Once consent was secured, the children to be examined were randomly selected. The sampled population was the set of children whose parents/guardians gave consent for their participation. Justification of the sample population is outlined in a subsequent section.

3.06 The Sample

The combined 6, 12 and 15 year-old population of Antigua and Barbuda numbered 4,380 at the time of the study, and was distributed by age and sex as shown below. Specifically 4,322 were from Antigua, and 58 were from Barbuda.

Statistical sample size derivation methods were used to determine the number of participants that should be selected from each age group in each district (See Tables B1 and B2 in Appendix B) and to determine the number of participants overall in order to achieve the required precision. Two sample size options, namely 1,137 or 1,342, were recommended. The choice of either sample size was expected to be an internal matter to be guided by a number of considerations; chief of which would be cost.

Population	6-year-olds	12-year-olds	15-year-olds	Total
Boys	751	1028	357	2136
Girls	714	976	554	2281
All	1465	2004	911	4380
% of population	33.4	45.8	20.8	100

Data source: Ministry of Health 2005

However, a series of steps were outlined for randomly selecting participants from among the children whose parents/guardians gave written consent. Strict adherence to these guidelines would ensure that a nationally representative sample was selected.

3.07 Representativeness of the sample.

Randomly selecting a group consisting of 6, 12 and 15 year-old school children in Antigua and Barbuda may not necessarily result in a representative sample of children in the same age groups in the country -- neither does selecting a random sample of children whose parents gave consent.

To justify the representativeness of the former sample, it was necessary (though not sufficient) to assume that the oral-health status of those not attending school (institutionalized, dropouts, school leavers, etc) did not differ significantly from that of attendees. There was no reason to believe that this assumption did not hold true.

Similarly, the claim that randomly selecting children whose parents/guardians consented would lead to a representative sample of school children in the three age groups could be upheld only if it could be assumed that the oral-health status of the children for whom consent was not received was not significantly unlike the oral-health status of those children for whom consent was given. Since no psycho-social evidence was found to the contrary, it was safe to conclude that the sample that would be selected eventually would be representative of the target population.

The combined strength of these two arguments was therefore the basis for concluding that the children selected constituted a nationally representative sample of 6, 12 and 15 year-olds in Antigua and Barbuda.

3.08 Survey instrument

The survey instrument consisted mainly of the standard equipment used in clinical examinations. Full details of amounts, types, functions and conditions are beyond the scope of this report. However, the brief listing provided in Section 3.02 underscores the amount of material that had to be used in collecting data. If the study were designed to collect interview data, the data collection instrument would have included a questionnaire.

3.09 Preparation for fieldwork

Standard examiner training, selection and preparation for conducting clinical examinations usually involve the preparation of a field manual. Potential examiners were to familiarize themselves with the contents of this manual, and were trained (usually over a two-day period) in its use. At the end of the training, each participant would examine

the same set of children twice in random order, and measure and report on a selected list of variables. Statistical methods would then be applied to the data to determine 1. the extent to which examiners agreed among themselves and 2. the consistency of the findings of the first to the second examination.

Finally, as a means of measuring examiner reliability, the performance of each examiner was compared to that of a 'gold standard' examiner for the same children. Examiners with the highest reliability scores were then selected to conduct the clinical examinations.

In addition, a series of training and calibration exercises were conducted by the Ministry of Health in preparation for the clinical examinations in order to ensure high data precision, minimal response bias, and subsequently highly accurate data.

4.0 Data collection

The examination team and other support personnel were comprised of 4 dentists, a hygienist (from the Ministry of Health in Antigua & Barbuda), 4 dental assistants from the public health sector, 2 dental assistants from the private sector, 6 examiners, and a quality control officer. Examinations were conducted at the various schools between November 20th and December 7th 2006.

4.01 Clinical examinations

On the day of examination, the equipment, instruments and materials were set up, and participants were asked to queue outside the examination room. Before entering the room, each participant was given an assessment form that indicated the participant's name, ID number, school code, age, ethnicity, date of clinical examination and home address. On entering the room, the information on the form was rechecked.

Examination data for each participant were recorded on a specially designed data entry form.

One of the benefits to the children who participated in the clinical examinations was that the parents/guardians of children who were not caries-free were sent a treatment-need notification form describing the nature of the child's problem, and were encouraged to consult a private dentist, or to visit a public facility to have their children treated.

A total of 1,554 children were examined. This figure represented a 15.8% increase over the larger of the two recommended sample size options. No reason was given for selecting a larger sample than was recommended.

4.02 Questionnaires

Unlike most oral-health surveys, the design of the present study did not include an interview component. As such, no questionnaires were administered. Reasons for not collecting interview data were not given.

4.03 Data management

Data were edited, coded and entered on a spreadsheet (using Microsoft Excel software) by data entry clerks in the Health Information Department prior to being sent to a statistician contracted by PAHO/CPC, Barbados for analysis. The database contained 1,554 individual records.

Further data editing by the consultant lead to the decision to exclude 19 records from the analysis. Each of these belonged to a child whose reported age did not match the inclusion criteria and the discrepancy could not be reconciled by the examination team. After discussion with the head of the study team, it was agreed that these records should not be included in the analysis. Therefore, data analysis was performed on the 1,535 usable records in the database.

5.0 Data analysis

SPSS (Statistical Package for the Social Sciences), Version 12 for Windows, Minitab 15, and EPI INFO 6 were used to facilitate data analysis. Microsoft EXCEL 2003 was used to produce graphs. Both descriptive and inferential statistical methods were used.

6.0 Results

The data analyzed were from a sample of size 1,535 rather than the 1,554 records submitted for analysis because of the exclusion of 19 (1.2%) records as mentioned previously in this report. As seen, the sample exceeded the larger of the two recommended sample sizes by 193 (14.4%), and thus affords greater precision of the estimator than either of the sample size options.

6.01 Demographics

Tables A1 to A5 show the demographic characteristics of the 1,535 children.

Table A1 gives the distribution by health district. The largest number ($n = 339$; 22.1%) was from District I and the smallest ($n = 47$; 3.1%) from District III.

Table A2 provides the number of participants by school. As shown, figures ranged from 4 (Bethesda School) to 162 (Ottos Composite).

According to Table A3, 53.4% of the participants were female and outnumbered boys.

Table A4 shows the age distribution of the participants. As shown, 12 year olds predominated, with 699 of the participants, or 45.5% of the total number of children. There were 485 children aged 6, and 351 children aged 15. This shows that the sample size target was achieved for each of the three groups (See Table B1 and Table B2 in Appendix B).

Table A5 shows that almost all the children ($n = 1508$; 98.2%) were of African heritage. The remaining 0.8% was divided among Caucasian, Indian and children of mixed ethnicity.

6.02 Age-specific clinical findings

Dental conditions in children become more common as they grow older. For this reason, age-specific findings – summarized in Tables A6 to A14 – will be used to highlight the following issues:

1. Prevalence and severity of periodontal conditions
2. Prevalence and severity of dental caries
3. Prevalence severity and geography
4. System response to treatment needs

6.03 Prevalence and severity of periodontal conditions

The prevalence and severity of periodontal conditions (gingivitis, calculus, pockets, etc.) could not be estimated since the relevant data were not recorded during the clinical examinations.

6.04 Prevalence and severity of dental caries

777 (50.6%) were healthy children. As seen from Figure I, these included 46.0% of the 6 year olds, 57.9% of 12 year olds, and 42.5% of the 15 year olds. The remaining 758 children had a mean of 3.3 teeth affected by caries per child.

Table A6 gives the percentage of participants with at least one decayed, missing or filled tooth. It reveals that 52.2% of 6 year olds, 35.9% of 12 year olds, and 53.0% of 15 year olds had at least one decayed permanent tooth.

The prevalence of selected teeth conditions is shown in Table A7. It shows that 18.2% of 15 year olds had at least one permanent tooth missing due to caries, and that 27.9% of 12 year olds, and 29.9% of 15 year old participants had non-cavitated lesions. 0.1% and 0% at age 12 and 15 respectively had at least one unerupted primary tooth, while 37.5% of participants at age 12 and 5.1% at age 15 had at least one unerupted permanent tooth.

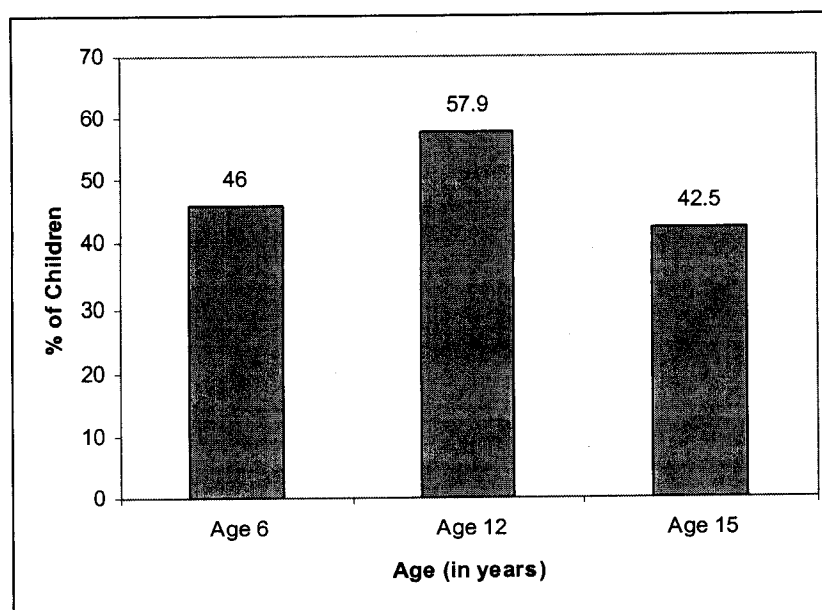


Figure AI: Percent of healthy children by age

Mean (and standard deviation) decayed, missing and filled teeth are given in Table A8. The mean of 2.51 for 6 year-olds dropped to 0.98 at 12 years and rose to 1.94 at age 15. Except for decayed teeth in 6 and 15 year-olds, the mean of each component was less than 1. As might be expected, the mean decayed, missing and filled primary teeth decreased with increasing age, whereas for permanent teeth they increased with increasing age.

The mean decayed, extracted or filled primary teeth (deft) and the mean decayed, missing or filled permanent teeth (DMF) is the standard measure of the severity of dental caries. It is common practice to report mean deft+DMFT for 6 year-old and mean DMF at both 12 and 15 years.

Table A9 gives mean deft+DMF at age 6 and mean DMF at age 12 and age 15. As seen the mean deft+DMF was 2.51 at 6 years, while mean DMF of 0.90 at 12 years rose to 1.92 at 15 years. The World Health Organization (WHO)/World Dental Federation (FDI) recommends that countries take steps to achieve a mean DMF score of 3 by 2000 (Bratthall, 2000). While mean scores prior to 2000 are unknown, it is clear that the target has been achieved for all age groups prior to 2006.

Table A9 also shows the contributions of decayed, missing and filled teeth to the mean. By far, decay was the largest single contributor to the caries scores within each of the age groups.

Table A10 shows the percentage of 12 and 15 year olds with DMFT scores of 0, from 1 to 3 inclusive and 4 and over (>3). As seen in the table, 60.9% and 43.0% of 12 and 15 year olds respectively had scores of 0 while 7.1% of the 12 year-olds had scores that exceeded 3. In addition, the percentage of children at age 15 with DMF scores above 3 was more than twice the percentage at age 12. The overall mean DMF score for 12 and 15 year-olds was 1.23

Figure AII shows the frequency distribution of DMF scores at age 12 and 15. The graph shows that a little over 60% of 12 year olds, and between 40% and 45% of 15 year olds were caries free (See Table A6). The graph also suggests a skewed distribution of caries scores with more or less a similar pattern within each group. This pattern is typical for countries. The graph shows the DMF the percentage of children at age 15 was always higher than at age 12 for all DMF scores except 0. However the difference was not always statistically significant.

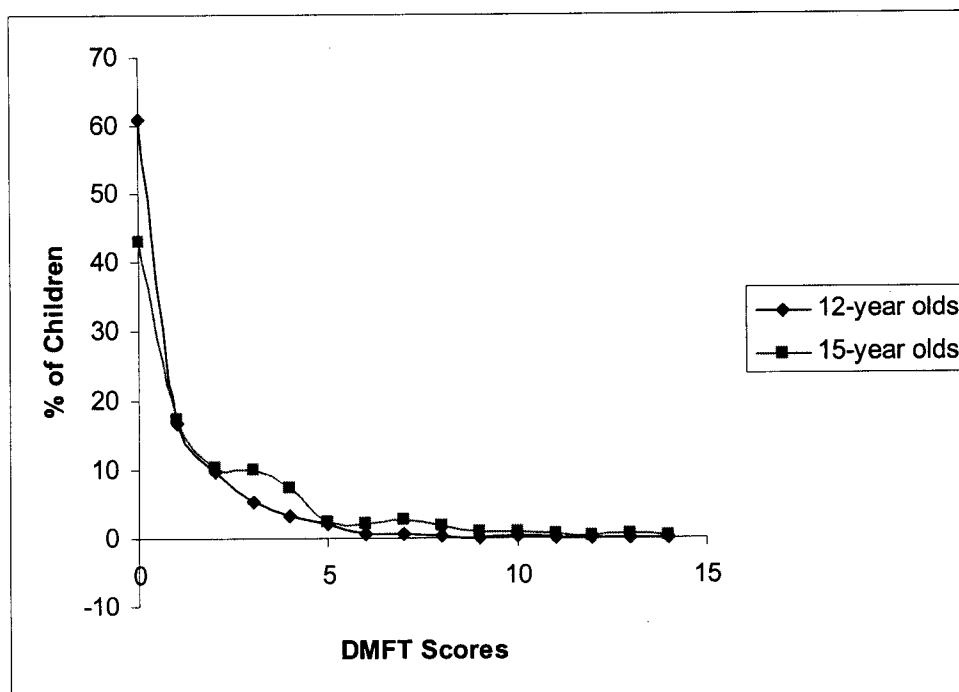


Figure AII: DMF Scores at age 12 and 15

Another common measure of the severity of caries used by countries is the Significant Caries Index (SiC). The one third of the population with the highest caries score is selected, and the mean DMFT for this subgroup is calculated. This value constitutes the SiC Index. It is never calculated for 6 year-olds. The WHO recommended target SiC Index for countries is one that is less than 3 DMF by 2015 (Bratthall, 2000). These are shown in Box I which reveals that the target was achieved for both groups. The target at age 12 was ($3 \times 0.9 = 2.70$) and at age 15 it was ($3 \times 1.92 = 5.76$).

Box I: SIC Index for 12 and 15 year-olds

	Age 12	Age 15	Both
SIC: Index	2.51	4.83	3.35

6.05 Dental decay by geography and age

Table A11 shows the distribution of participants by age and geography. It shows that while the 485 children at age 6, and the 699 at age 12 in the sample were well distributed

between districts, the sample of 15 year olds were predominantly from Districts I, IV, VII, VIII and IX. Moreover, none of the 15 year olds was from Districts II or III, while four were from District V, and one 15 year old was from District VI. While the two districts with no 15 year-old in the sample corresponded to those in which there were no secondary schools, the reason for the small number of 15 year-old from Districts V and VI is unknown. Consequently, comparisons of means at age 15 between districts cannot include Districts II, III and VI.

Figure III shows the percentage of children in each district that were caries free. They ranged from 34.0% (District III) to 65.1% (District II) with less than 50% in 4 out of the 9 districts. This suggests that dental decay differed between counties.

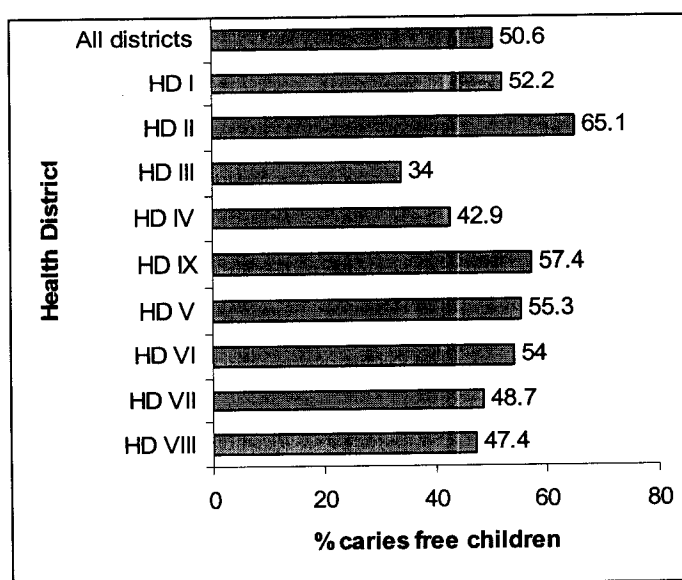


Figure III: Percent of caries-free children by district

Table A12 displays mean between-districts caries severity scores at each age. At age 6, mean df +DMF scores ranged from 1.74 (District IX) to 3.30 (District III) but did not differ significantly ($p = 0.459$).

Mean DMF scores among districts at age 12 ranged from 0.38 (District V) to 1.90 (District III) with a mean less than 1 in 7 (77.8%) of the 9 districts. Districts III and IV

with means of 1.90 and 1.26 respectively were the only districts with means above 1.0. Their means did not differ significantly from each other ($p = 0.077$), but each differed from at least one of the seven other means. More specifically, District II had a higher mean than the other 7 while the mean of District IV was only higher than those of Districts II, V and VI.

Mean at age 15 exceed 3.0 in District IV (3.18) and was lowest in District IX (0.86) - which was the only district with a mean score under 1. Means differed between the 5 districts for which comparisons were applicable ($p = 0.000$). Specifically, District IV had a higher mean than each of the other districts except District V. None of the other means differed significantly.

As seen in the table, within each district where means at 12 and 15 years could be compared, the mean of the latter was always greater than the former although all differences were not statistically significant.

6.06 Evidence of treatment

Tables A13 and A14 combine to reveal the extent to which the need for treatment of periodontal disease exceeds the actual treatment. Table A13 shows that only 25 of the 758 children (a mere 3.3%) with tooth decay received treatment, while according to Table A14, only 63 out of a total of 2,309 carious teeth (or 2.7%) were treated (The mean number of untreated decayed teeth per child was 1.5). The WHO recommendation for countries is that filled teeth should be at least 80% of total DMF.

Table A15 examines how the treatment system seems to be coping with the needs within, and between the 9 districts by showing filled teeth as a percentage of the DMF score. As expected, the percentages were very low with no statistically significant differences between districts.

6.07 Sealants and Restorations

Sealants were reported to be present for 22 (2.9%) children with carious teeth. Of these 22 children, there was one child at age 6, ten at age 12, and eleven at age 15. However, the type(s) of sealant(s) were not identified.

7.0 Treatment needs

Treatment needs are shown in Table A16. The denominator of the percentages for the various needs is the number of children with caries. However, the percentages do not add to one hundred because some children had multiple needs.

The table shows that the percentage of 6 year-olds in need of fissure sealants was significantly lower than the corresponding percentage of 12 and 15 year-olds. The percentages were 5.6% for 6 year olds, 31.0% for 12 year olds, and 34.7% for 15 year olds.

One-surface restoration was by far the greatest single treatment need within each of the age groups, and overall. Specifically, 75.2% of the 6 year-olds, 75.5% of the 12 year olds, and 81.7% of the 15 year-olds required this treatment.

50.0% needed multiple restorations at age 6, 17.3% at age 12 and 24.0% at age 15.

Only one child (age 6) needed crown treatment.

Table A17 gives the ranking of the treatment needs listed in Table A16. One-surface restoration ranked first in each age group. Second place was shared between multiple restorations (at age 6), and fissure sealants at age 12 and 15. With 19.5% in need, extractions ranked third behind one-surface restoration. In addition, multiple restorations ranked fourth behind one-surface restorations, fissure sealants and multiple restorations, with 15.3% for 6 year-olds and 25.7% for both 12 and 15 year-olds. Therefore, the data clearly indicates that the highest treatment priority should be one-surface restoration.

Pulp care was recommended for 8.0% of 6 year-olds, 8.8% of 12 year-olds, and 14.4% of 15 year-olds.

7.01 Treatment urgency

Table A18 describes the urgency with which treatment is needed among the three age groups. The percentage of children with low treatment urgency is far greater than the percentage with high or advanced urgency. With such a small percentage of teeth filled, it is surprising that 46.9% of 6 year-olds, 62.6% of 12 year-olds, and 50.4% of 15 year-olds had their treatment needs classified as low priority.

8.0 Flourosis

Table A19 gives the flourosis status by age (excluding 6 year-olds). 28.2% of 12 year-olds and 6.3% of 15 year-olds were also excluded. No reasons were given for the exclusions. The table show that the teeth of 62.1% and 80.6% of 12 and 15 year-olds respectively showed no evidence of flourosis (Tooth Surface Index of Flourosis (TSIF) = 0). Observed flourosis levels were described as very mild (1.2%), mild (1.4%), moderate (0.2%) and questionable (4.7%). Since flouride has been found to have substantial benefits in the prevention of tooth decay the substantial decay component of mean dft + DMFT and mean DMFT of the children is well explained for the most part.

9.0 Summary, conclusions and recommendations

The 2006 Antigua and Barbuda oral health study was designed to determinant the oral health status of children in the country and to use the findings to inform policy and action with respect to promoting maintaining oral health. As with most studies of its kind the sample was restricted to a nationally representative sample of 6, 12 and 15 year-year olds. The objectives of the study were achieved in that it was able to document successfully, and in reasonable detail, the status of oral health within the three age groups after a lengthy period in which no national examinations were conducted. The result of the study conducted between November 20, 2006 and December 7, 2006 showed that

- 777 (50.6%) of the children were caries free. Of these 777 children,

223 (46.0%) were age 6; 405 (57.9%) were age 12, and 149 (42.5%) were age 15.

- 52.2% of the 6 year-olds had at least one primary tooth affected by decay; 35.9% of 12 year-olds, and 53.0% of 15 year-olds had at least one permanent tooth affected by decay.
- 6 year-olds had a mean of 2.45 decayed, missing (due to extraction) or filled temporary teeth (dft), and a mean of 0.06 decayed, missing or filled permanent Teeth (DMFT);
- The mean DMF scores for 12 year-olds (0.90) and 15 year-olds (1.92) were significantly lower than the World Health Organization (WHO)/World Dental Federation (FDI) recommended target of 3.0 for countries;
- 7.1% of 12 year-olds, and 19.4% of 15 year-olds had mean DMFT higher than 3.0;
- Significant Caries Index (SiC) of 2.51 at 12, and 4.83 at age 15 were both below the World Health Organization (WHO)/World Dental Federation (FDI) recommended maximum of 3DMF for countries;
- Dental decay varied by geography and age with no statistically significant differences between health districts with respect to the mean number of decayed teeth per child at age 12. However, both District II (mean = 4.33) and District III (mean = 4.00) had higher mean caries per child than the other districts at age 15;
- No statistically significant difference between boys and girls with respect to caries prevalence or severity was observed;
- Decayed teeth formed the largest component of dft+DMFT (94.0%) and DMFT at both age 12 and age 15 (84.4%);
- 96.7 % of dental caries remain untreated;
- 758 (49.4%) children had at least one treatment need;
- The three most commonly reported treatment needs of 6 year-olds were 1. One-surface restoration (75.23%); 2. multiple restorations (50.0%) and 3. extractions (19.5%);
- The 1st, 2nd and 3rd most reported treatment needs of 12 and

- 15 year-olds were, respectively: 1. One-surface restoration (77.3%);
2. multiple restorations (31.0%); and 3. fissure sealants (23.2%);
- Only one child needed crown treatment;
 - 62 (8.2%) children needed prophylaxis;
 - Treatment urgency was described as '*Advanced*' for 23.3% of those who needed to be treated, and as '*Low*' for 54.9%;
 - 62.1% of 6 year-olds, 80.6% of 15 year-olds, and 46.7% of 12 and 15 year-olds combined had no evidence of dental flourosis; i.e., Tooth Surface Index of Flourosis (TSIF) = 0 for these groups;
 - Observed flourosis levels were classified as '*Very Mild*' (1.2%); *Mild* (1.4%), '*Moderate*'(0.2%); and '*Questionable*' (4.7%).

The prevalence of dental caries among 6, 12 and 15 year-old children in Antigua and Barbuda is 49.4%. The study showed that 54.6% were affected by caries at age 6 with a mean dft +DMFT of 2.51, while prevalence and severity (percentage and mean DMFT) were 42.1% and 0.90 respectively at age 12, and 57.5% and 1.92 respectively at age 15. At the same time, 97.3% of dental caries remained untreated for a mean of 1.5 untreated teeth per child. Other key indicators of tooth condition and oral-health (SiC, DMF at age 12, etc) were well within suggested international norms.

Three of the findings should not escape the attention of the examiners.

These are :

- (1) 49.4% of the children had at least one decayed tooth. (See Table A6);
- (2) 97.3% of decayed teeth were not treated (Table A12);
- (3) 46.7% of children at ages 12 and 15 had no evidence of flourosis (TSIF = 0) (See Table A19).

These suggest the following recommendations:

1. review of the current distribution of the oral-health services available to children, and the extent to which the services are accessed. This would determine whether the services offered by the Ministry of Health are adequate to ensure timely diagnoses, treatment and the promotion of effective

preventative measures.

2. measures implemented to address the current problem of untreated tooth decay. The short term objective of these measures should be to reduce the current percentage of unfilled teeth to the WHO/DFI percentage within a given time frame. A policy regarding when to fill should also be established in order to avoid unnecessary treatment.

3. programs designed to promote and encourage fluoride use among children.

This is important in light of the significant contribution of tooth decay to caries severity. Close attention must also be paid to the finding that 47% of the participants showed no evidence of fluorosis, especially in light of the established link between fluoride use and the prevention of decay. One possible measure could be a review of the recommendations of the 1980 fluoride use feasibility study with the goal of implementing those that can be viewed as useful short term measures to address the problem of lack of evidence of fluoride use.

10.0 Study limitation

Seeing that it was the first of its kind in over fifteen years, one would have expected the national oral-health survey to seek to identify key determinants of oral-health status and to describe the extent to which these influence oral-health status. This would have required the dental staff to collect interview data in addition to clinical examinations. The information obtained would then facilitate policy formulation, health promotion, and activity planning. Failure to collect interview data was therefore the main limitation of the study, since without the information these data would have provided, it is difficult (though not necessarily impossible) to recommend specific interventions that would address deficiencies in knowledge, or attempt to change attitudes, or promote healthy practices by parents and children alike. This backdrop therefore provides the rationale for recommending

4. a survey of oral-health knowledge, attitude and practice among families, and the exploration of possible associations with selected socio-economic factors. Information that may be sought could include 1. frequency of dental visits;

2. teeth cleaning practice and habits; 3. the use of fluoride dentifrice;
4. frequency of use of carcinogenic foods; 5. patterns of consumption of
non-carcinogenic foods; 6. chewing ability and general health of teeth and
gums, 7. the highest level of education of parents and 8. household income.

References

Bratthall, D., et al Int Dent J. 2000 Dec;50(6):378-84

Leake JL. Final report on the Barbados Oral Health Survey, February/March 2001. Toronto, Canada. Faculty of Dentistry/Centre for International Health, Faculty of Medicine; University of Toronto. February 2002.

<http://www.whocollab.od.mah.se/expl/sic.html>

APPENDIX A

Antigua & Barbuda Oral Health Survey, 2006

Tables and Figures

Table A1: Distribution of Sample by Health District

Health District (HD)	n	%
HD I	339	22.1
HD II	186	12.1
HD III	47	3.1
HD IV	315	20.5
HD V	85	5.5
HD VI	50	3.3
HD VII	312	20.3
HD VIII	133	8.7
HD IX	68	4.4
All Districts	1535	100.0

Table A2: Distribution of Sample by School

School	n	%
Greenbay Junior Secondary	85	5.5
Urlings School	29	1.9
Bolands School	41	2.7
St Mary's School	10	.7
Jennings School	108	7.0
Bendal's Junior Secondary	80	5.2
Jennings Secondary	44	2.9
Glanville's School	34	2.2
All Saints Secondary	162	10.6
Irene B. Williams Swetes School	44	2.9
Liberta Primary	71	4.6
Ottos Comprehensive	172	11.2
Potters Primary	47	3.1
Five Islands School	68	4.4
Pares Secondary	75	4.9
Bethesda School	4	.3
J T Ambrose School	47	3.1
John Hughes Primary	15	1.0
Princess Margaret School	115	7.5
Mary E. Piggot School	76	5.0
T. N. Kirnon School	49	3.2
Villa School	71	4.6
Holy Trinity School	39	2.5
Sir Mc. Chesney George Secondary	29	1.9
Pares Primary	20	1.3
Total	1535	100.0

Table A3: Number of Boys and Girls

Sex	n	%
Boys	712	46.4
Girls	823	53.6
Total	1535	100.0

Table A4: Age of Children (in years)

Age	n	%
6	485	31.6
12	699	45.5
15	351	22.9
Total	1535	100.0

Table A5: Ethnicity of Children

Ethnicity	n	%
African	1508	98.2
Mixed	24	1.6
Indian	2	.1
White (Caucasian)	1	.1
Total	1535	100.0

Table A6: Percent of children with at least one decayed, missing or filled tooth

	<u>Age 6 (n = 485)</u>	<u>Age 12 (n = 699)</u>	<u>Age 15 (n = 351)</u>
Primary teeth	52.2	-	-
Permanent teeth	3.9	35.9	53.0
All teeth	53.2	35.9	53.0

Table A7: Prevalence (%) of Selected Teeth Conditions by Age of Child

Teeth condition	Age of Child			
	6	12	15	Overall
Decayed (Primary)	52.2	5.2	1.1	19.1
Decayed (Permanent)	3.9	35.9	53.0	29.7
Filled (Primary)	2.1	0.0	0.0	0.7
Filled (Permanent)	0.0	2.4	3.7	2.0
Missing due to caries (Primary)	6.4	0.1	0.0	2.1
Missing due to caries (Permanent)	0.2	7.7	18.2	7.8
Missing for other reasons (Primary)	2.7	0.1	0.0	0.9
Missing for other reasons (Permanent)	0.2	1.3	2.3	1.2
Non-cavitated lesion	11.8	27.9	29.9	23.3
Sealant present (Permanent)	0.2	1.4	3.1	1.4
Trauma (Primary)	1.2	0.0	0.0	0.4
Trauma (Permanent)	0.0	5.2	6.8	4.0
Unerupted (Primary)	0.2	0.1	0.0	0.1
Unerupted (Permanent)	99.2	37.5	5.1	49.6

Table A8: Mean (std dev) decayed, missing and filled teeth by age

Tooth Condition	Age 6	Age 12	Age 15
Decayed (Primary)	2.31 (3.245)	0.08 (0.394)	0.02 (0.206)
Missing (Primary)	0.10 (0.469)	0.0 (0.076)	0.0 (0.0)
Filled (Primary)	0.04 (0.367)	0.0 (0.0)	0.0 (0.0)
Decayed (Permanent)	0.05 (0.304)	0.76 (1.375)	1.62 (2.422)
Missing (Permanent)	0.01 (0.136)	0.10 (0.405)	0.25 (0.606)
Filled (Permanent)	0.0 (0.0)	0.04 (0.246)	0.05 (0.321)
ALL TEETH			
Decayed	2.36 (2.566)	0.84 (1.119)	1.64 (1.716)
Missing	0.11 (0.415)	0.10 (0.329)	0.25 (0.466)
Filled	0.04 (0.786)	0.04 (0.621)	0.05 (1.130)
Overall Mean	2.51 (2.823)	0.98 (1.192)	1.94 (2.364)

Standard deviations are shown in brackets

Table A9: Mean decayed, missing and filled deciduous and permanent teeth (unweighted) by age

Number of children	Age 6 n = 485	Age 12 n = 699	Age 15 n = 351
<u>Deciduous teeth</u>			
decayed	2.31 (3.245) ¹	-	-
extracted	0.10 (0.469)	-	-
filled	0.04 (0.367)	-	-
Total deft	2.45 (3.306)	-	-
<u>Permanent teeth</u>			
Decayed	0.05 (0.304)	0.76 (1.375)	1.62 (2.422)
Missing	0.01 (0.136)	0.10 (0.405)	0.25 (0.606)
Filled	0.00 (0.000)	0.04 (0.720)	0.05 (0.321)
Total DMFT	0.06 (0.334)	0.90 (1.591)	1.92 (2.675)
Total (deft+DMFT)	2.51 (3.306)		

() figures in brackets are the standard deviations

Table A10: Percentage distribution of DMF scores

DMF Score	Age of Child (years)	
	12	15
0	60.9	43.0
1 – 3	31.9	37.7
>3	7.1	19.4

Mean DMF Score = 1.23 (std dev. 2.043)

Table A11: Age by District distribution of participants

District	Age of child			Total
	6	12	15	
HDI	108	122	109	339
HDII	50	136	0	186
HDIII	27	20	0	47
HDIV	102	121	92	315
HDV	55	26	4	85
HDVI	14	35	1	50
HDVII	93	130	89	312
HDVIII	17	74	42	133
HDIX	19	35	14	68
All districts	485	699	351	1535

Table A12: Mean df and DMF scores by district and age

District	Age 6	Age 12	Age 15	12 & 15
HD I	2.21 (3.165)	0.91 (1.606)	1.45 (1.883)	1.16 (1.759)
HD II	2.12 (3.147)	0.49 (1.075)	NA --	0.49 (1.075)
HD III	3.30 (3.760)	1.90 (2.469)	NA --	1.90 (2.469)
HD IV	2.72 (3.758)	1.26 (1.828)	3.18 (3.765)	2.09 (2.982)
HD V	1.76 (2.659)	0.38 (0.852)	1.25 (1.500)	0.50 (0.974)
HD VI	2.64 (3.225)	0.57 (0.884)	0.0 --	0.56 (0.877)
HD VII	2.27 (2.909)	0.98 (1.545)	1.43 (2.033)	1.16 (1.769)
HD VIII	3.18 (3.746)	0.95 (1.442)	1.79 (2.343)	1.25 (1.855)
HD IX	1.74 (2.941)	0.80 (1.471)	0.86 (1.292)	0.82 (1.409)
All districts	2.36 (3.249)	0.89 (1.530)	1.91 (2.675)	1.23 (2.043)

NA: Not applicable. No 15 year-olds selected from district

Table A13: Number of children with decayed and filled teeth by age

Tooth Condition	Age 6	Age 12	Age 15	All ages
Decayed				
Primary	253	36	4	
Permanent	19	251	186	
All decayed	272	287	190	749
Filled				
Primary	6	0	0	
Permanent	0	10	9	
All filled	6	10	9	25

Table A14: Number of decayed, missing and filled teeth by age

		Tooth Condition			
Age	n	Decayed	Missing due to caries	Missing For other reasons	Filled
6	272	1148	34	22	11
12	287	585	54	5	41
15	190	576	70	9	11
All ages	749	2309	158	36	63

Table A15: Filled teeth as a percentage of DMF and df by health district

Health District	Age 6	Age 12	Age 15	Ages 12 & 15
District I	2.0	3.6	3.8	3.7
District II	1.5	5.9	0.0	3.0
District III	2.2	0.0	0.0	0.0
District IV	1.8	2.6	0.3	1.5
District V	3.0	0.0	0.0	0.0
District VI	0.0	10.0	0.0	5.0
District VII	2.4	3.9	7.1	5.5
District VIII	1.8	7.1	2.6	4.8
District IX	0.0	3.6	8.3	6.0
Overall	1.8	4.0	2.8	3.4

Table 16: Treatment needs diagnosis by age

Treatment Need Diagnosis	% of children*			
	Age 6	Age 12	Age 15	All ages
No need for treatment	44.7	47.9	37.0	44.4
Prophylaxis	5.0	7.5	6.4	6.3
Fissure Sealant	5.7	31.0	34.7	23.2
One surface restoration	75.2	75.5	81.7	77.0
Multiple restorations	50.0	17.3	26.2	31.0
Crown	0.4	0.0	0.0	0.1
Pulp care and Post-treatment	8.0	8.8	14.4	10.0
Extraction	19.5	15.3	25.7	19.5
Restoration (fracture/trauma)	0.8	3.7	4.5	2.9

* Denominator is the number of children with caries (n = 758)

Table A17: Treatment need ranking by age

Treatment Need	Treatment Rank			
	Age 6	Age 12	Age 15	All ages
Fissure sealant	5	2	2	3
One surface restoration	1	1	1	1
Multiple restorations	2	3	3	2
Crown	7	7	7	7
Pulp care and post treatment	4	5	5	5
Extraction	3	4	4	4
Restoration (fracture/trauma)	6	6	6	6

Table A18: Treatment urgency by age (% children in need)

Treatment Urgency	Age			Overall
	6	12	15	
Low	49.6	62.6	50.5	54.9
High	9.5	7.1	19.3	11.2
Advanced	31.3	17.7	20.8	23.2
No response	4.6	5.1	3.0	4.4

Table A19: Fluorosis status by age

Evidence of Fluorosis	% of children			
	Age 6	Age 12	Age 15	All ages
No flouorosis	0.0	62.1	80.6	46.7
Very mild	0.0	1.3	2.6	1.2
Mild	0.0	2.0	2.0	1.4
Moderate	0.0	0.3	0.3	0.2
Questionable	0.0	6.2	8.3	4.7
Excluded	100.0	28.2	6.3	45.9

APPENDIX B

Proposed Sampling Plan

Antigua & Barbuda Oral Health Survey 2006

1. Sample Size Determination

A. Overall Sample Size: Two Schemes

For purposes of the oral survey a sample size 1271 school children is recommended for Antigua together with all 58 school children (a census) in Barbuda. The sample size for Antigua will make it possible to estimate the percentage of caries free children within 5% and with 95% confidence From now on it will be referred to as Plan A.

The sample distribution for Plan A is shown below by age group.

Table B1: Sample size distribution (Plan A)

<u>Age</u>	<u>Proposed sample size</u>
6	425
12	582
15	264
<hr/>	
Total	1271

Alternately a sample of size 1342 would enable the estimation of the percent of children who are caries free within 3%. This is referred to as Plan B.

However the addition cost in terms of time, money and logistics, may be the determining factor with respect to which plan would be implemented. If it is determined that the cost of selecting and administering Plan A would not be significantly greater than that of implementing Plan B then the latter size should be selected since it offers the greater precision. Note that cost relates to money, time and logistics.

Table B2: Sample size distribution (Plan B)

<u>Age</u>	<u>Proposed sample size</u>
6	449
12	614
15	279
Total	1342

B. Sampling Proportions by Age

In order to ensure the sample mirrors the population with respect to age and sex, it is recommended sub-sampling should be in proportion to age and district. Hence for example the sample of 6-year-olds should reflect an overall **male: female** ratio of **1:1**. Similar figures for the samples of 12 and 15-year-olds will be **1.1:1** and **1:1.6** respectively. The number of males and females to be selected in each age category is shown below for both selection schemes, and is based on the following reported population values by age on gender obtained from the statistical office:

Table B3: Reported number of 6-, 12- and 15-year old school children in Antigua & Barbuda.

Sex	6-year-olds	12-year-olds	15-year-olds	Total
Males	751	1028	357	2136
Females	714	976	554	2281
Total	1465	2004	911	4380

Table B4: Proposed sub-samples by age group and gender of children in the sample

Sample Size	Age	Males	Females	Total
1271	6	213	213	426
	12	318	264	582
	15	102	162	264
	Overall	633	639	1272
1342	6	225	225	450
	12	322	292	614
	15	107	172	279
	Overall	654	689	1343

C. Sample Distribution by Sex, Age and Zone

Since the sample is to be representative of the 6, 12-year-old population of Antigua it must mirror the zone distribution. This requirement calls for selection by zone as shown below. The sample of 15-year olds will be distributed in proportion to the school population.

Tables 5 – 7 give the sample allocation for schools under Plan A. The total sample size is 1272 distributed by age group as follows:

6 year olds: 426 12 year olds: 582 15 year olds: 264

This total sample size exceeds by 1 child the sample of size 1271 given in Table 1. This is due to rounding error.

1. Sample Allocation of 6 year olds (Plan A)

Total number of 6 year olds = 426

The allocation in Table 5 is by *Zone, Sex* and *Type of School*

TableB5: Sample allocation of 6 year-old school children in Antigua & Barbuda

Zone	School Type	Male	Female	Total
I	Public	40	40	80
	Private	15	15	30
	Overall	55	55	110
II	Public	13	13	26
	Private	39	40	79
	Overall	52	53	105
III	Public	24	24	48
	Private	26	26	52
	Overall	50	50	100
IV	Public	33	33	66
	Private	23	22	45
	Overall	56	55	111
Total		213	213	426

2. Sample Allocation of 12 year olds (Plan A)

Total number of 12year olds in the sample = 582

The allocation in Table 6 is by ***Zone, Sex*** and ***Type of School***

Table B6: Sample allocation of 12-year old school children in Antigua & Barbuda

Zone	School Type	Male	Female	Total
I	Public	45	45	90
	Private	16	16	32
	Overall	61	61	122
II	Public	19	19	38
	Private	39	39	78
	Overall	58	58	116
III	Public	41	42	83
	Private	24	24	48
	Overall	65	66	131
IV	Public	42	43	85
	Private	11	11	22
	Overall	53	54	107
Secondary		53	53	106
Total		290	292	582

2. Sample Allocation of 15 year olds (Plan A)

Total number of 15 year olds in the sample = 264

The allocation in Table 7 is by *Zone, Sex and Type of School (and name)*

Table B7: Sample allocation of 15-year old school children in Antigua & Barbuda

School		Boys	Girls	Total
Public	All Saints Secondary	6	25	31
	Antigua Grammar	24	0	24
	Antigua Girls' High	0	32	32
	Clare Hall Secondary	11	14	25
	Jennings Secondary	4	8	12
	Otto's Comprehensive	12	24	36
	Pares Secondary	7	10	17
	Princess Margaret	13	19	32
	Sir McChesney George	1	2	3
Overall		78	134	212
Private	Baptist Academy	1	1	2
	Christ the King High	0	13	13
	Christian Faith Academy	0	0	0
	Island Academy	3	4	7
	Seventh-day Adventist	7	10	17
	St Joseph Academy	12	0	12
	Premier Secondary	1	0	1
	Sea View Academy	0	0	0
Overall		24	28	52

If the total number of 15 year olds in any school is less than 10 it is advisable to examine all 15-year olds rather than the amount the sampling plan calls for. In this case this recommendation would apply to the following schools:

School	No of 15 year olds	Sample Allocation	Recommendation
Sir McChesney George	9	3	Select all 9
Baptist Academy	8	2	Examine all 8
Premier Secondary	4	1	Examine all 4
Sea View Academy	1	1	Examine child

In the event it may be costly to examine so few children in one school the suggestion is that the sample size allocated to these schools should be added to the other schools.

To select the sample of 1271 take the following steps:

1. Positive consents are essential to the effective selection of the sample. Hence within each district and for each age group make separate combined listing of positive consents received for males and females. The listing should be sorted alphabetically.
2. Select a systematic sample of the required number of male and female students from each district.

Alternately you may use similar selection methods as was used for the St Lucia and Dominica samples.

Summary

The sampling plan presented calls for the selection of a sample of 1271 boys and girls. An alternative plan (to select 1342 children) was explored but allocations were not pursued.

Sampling is to be done by zone and school.

A systematic sample is proposed. However a simple random sample may be used.

A list of students whose parents/guardians have signed consent forms must be formed prior to selecting the students to participate.

APPENDIX C

Oral Health Survey Data Entry Form

Antigua & Barbuda
Ministry of Health
Oral Health Survey Data Entry Form

Name _____

ID No.	Date:	Address:	
Gender:	Age:	E/Origin	School Code:
Examiner:	Recorder:	Original:	Duplicate:

Dental Fluorosis

Permanent Dentition						Score
13	12	11	21	22	23	

- 0- Normal
 5- Questionable
 1- Very mild
 2- Mild
 3- Moderate
 4- Severe
- 8- excluded (crown, restoration or ortho bracket)
 9- not recorded (unerupted tooth)

Diagnostic Criteria

Temp	Perm	Status
A	0	Sound
N	U	Non-cavitated lesion
B	1	Decayed
C	2	Filled
D	3	Missing due to caries
E	4	Missing(other reasons)
F	6	Sealant present
H	7	Bridge Abutment
	8	Implant present
	9	Unerupted tooth
K	T	Trauma
L	X	Excluded

Diagnostic Criteria and Treatment Needs

	55	54	53	52	51	61	62	63	64	65				
crown	17	16	15	14	13	12	11	21	22	23	24	25	26	27
treatment														
crown														
treatment														
	47	46	45	44	43	42	41	31	32	33	34	35	36	37
	85	84	83	82	81	71	72	73	74	75				

TREATMENT NEED (tooth – based)

CODE	DIAGNOSTIC CRITERIA
0	No need for treatment
F	Fissure sealant
1	One surface restoration
2	Two or three surface crown OR multiple restorations in combination
3	Crown
4	Veneer or laminate
5	Pulp care and post treatment
6	Extraction
7	Restoration (Fracture/Trauma)

Treatment Urgency: _____

Code	Criteria
0	No treatment needed
1	Prophylaxis
2	Low Urgency (superficial restorations)
3	Advanced Urgency (deep restorations, 5+ teeth affected)
4	High Urgency (pain and/or infection)

APPENDIX D

ORAL HEALTH TREATMENT NEED NOTIFICATION

ANTIGUA & BARBUDA
MINISTRY OF HEALTH
ORAL HEALTH TREATMENT NEED NOTIFICATION

DATE:

Dear Parent/Guardian,

This is to advise that

.....

Requires ☐ *fillings* ☐ *extractions* ☐ *professional cleaning* ☐ *preventive care*
 ☐ *other*

☐ requires urgent dental treatment

☐ requires a new tooth brush.

Please schedule an appointment with the government dental clinic or, if you prefer, with a dentist of your choice.