

NATIONAL ORAL HEALTH SURVEY AMONG THE PUBLIC SCHOOL POPULATION IN THE PHILIPPINES 2006



in partnership with



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FOREWORD

It is a disturbing fact that oral health in the Philippines is widely neglected. Since oral diseases are considered non-life threatening, these have not been given sufficient attention. Nearly all children have experienced tooth decay and a majority of our children suffer from severe dental caries that cause toothache, infections, abscesses and swellings. This alarming incidence needs prompt attention and appropriate action.

This survey provides us with information to formulate policies and strategies that will promote oral health. It will also serve as the basis for the Philippines' action plan to the resolution of the Sixtieth World Health Assembly which urges all member states to adopt measures to ensure that oral health especially in children receives national attention.

Let me assure the public that the Department of Education will remain committed to its responsibility to provide health care for public school children by enlisting the help of our teachers and school health personnel in promoting oral hygiene. Our schools will serve as a venue for health promotion. Daily school based fluoride tooth brushing will become a regular activity in the Philippine school system to become the model for other countries in taking appropriate action to reduce high levels of untreated dental caries.

I extend my earnest thanks to InWent, Germany, the WHO Collaborative Center Jena, Germany and the College of Public Health in UP Manila for their support to the Health and Nutrition Center of our Department.

I commend all the researchers in this survey for their focus and commitment in coming up with a valuable tool that will help us promote the general well being of our school children.



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1. Summary

The NOHS 2006 has been carried out by the Department of Education from November 2005 to February 2006 and was technically supported by the Center for International Migration and Development, Germany, WHO Collaborative Center in Jena, Germany and the Department of Public Health of the University of the Philippines. The survey was financially supported by InWent - Capacity Building International, Germany, Ivoclarvivadent, Liechtenstein and Palatinit, Germany.

The purpose of this survey was to gather information on the oral health status of the 12 million public elementary school population in the Philippines, which represent 92% of the nation's children. Besides oral health, additional information was gathered on prevailing general health conditions like nutritional status and selected socio-demographic information.

Information was collected to find out the prevalence of children suffering from toothache and determining thereby an urgent treatment need. The survey will provide key decision makers with the information needed to formulate policies for the implementation of preventive strategies and improvement of the oral health care delivery system.

The objective of the survey was to give information on:

- Prevalence and severity of dental caries and periodontal disease in 6 and 12-year-old children in the Philippines
- Observing future trends in oral health
- Evaluation of current oral health strategies
- Differences in oral health between rural and urban areas
- Gender differences in oral health
- Prevalence of children suffering pain and discomfort
- Appropriateness of existing oral health care services
- Treatment need for emergency, preventive, curative and restorative treatment
- Estimation of resources, in terms of material and human resources, needed for establishment of different Oral Health Care strategies

The study is a population-representative study of two age groups according to WHO index age groups, 6-year-olds and 12-year-olds. At the age of six, the primary teeth start to exfoliate and the history of dental experience during preschool childhood time can be seen. At the age of 12 years, most children would have lost all their primary teeth and the full set of permanent teeth (except for the wisdom teeth) would have grown in.

In each of the 17 regions in the Philippines, two rural and two urban schools were randomly selected. In each of these schools, thirty 6(+/-1)-year-old Grade I students and thirty 12(+/-1)-year-old Grade VI students were then randomly selected from the teachers' records books. 2,030 six-year old students and 2,022 twelve-year old students attending the 68 schools participated in the study.

This summary is limited to the main findings. Detailed data on all researched fields according to regions and rural urban distribution is available in the comprehensive report.

Restriction concerning the generalizability of the study is the limitation to schools with 60 and more children enrolled in Grade 1 and Grade 6 respectively, no peace and order problems and with accessibility of not more than one hour by local transport from the highway. Children attending small and remote rural schools and/or schools located in politically unstable areas are not presented in the study.

The study comprises of a clinical examination and a sociological survey. The total number of children who participated in the survey was 4,052. Five teams, each composed of trained and calibrated DepEd dentists and trained recorders travelled around the country and carried out the fieldwork.



Examiner checking child's fingernails

Teachers gave information on the subjects' name, sex, age, number of siblings, number of days the subjects were absent during the recent school year. School nurses measured the height and weight of all subjects according to the Instructions on "How to use the Revised Nutritional Status Report Forms" (NSRF) and the International Growth Tables.

For the 6-year-old age group, the mean age was 6.6 years and the mean number of siblings was 3.5. Body Mass Index (BMI) was not recorded in this age group. For the 12-year-old group, the mean age was 11.8 years and the mean number of siblings was 4.1. The mean BMI was 16.6 and 28% of all 12-year-olds presented a BMI categorized as below normal, with a significant difference between boys and girls, 31% and 24% respectively.

All children were orally examined for their dentition status using the WHO criteria for Oral Health Surveys, Basic Methods (1997), scoring caries prevalence and experience on surface level, dentinogenic infection, periodontal diseases and fluorosis and trauma.

Dental caries and resulting oral infections are the most widely spread diseases in the Philippines and sadly, it is socially accepted and neglected. Nearly all children are affected. Dental caries is not life-threatening but has huge impact on the well-being and the physical and mental development, on school attendance and performance and will anchor huge proportions of the population in poverty.



Severe dental decay in primary dentition



Severe dental decay in permanent teeth

For the 6-year-old age group, prevalence of dental caries was 97%, with a mean number of Decayed, Missed or Filled permanent teeth (DMFT) of 0.7 and a mean dmft of 8.4 for the primary dentition. Each child had on average 3.4 teeth where the caries process had already reached the pulp causing complications like swelling and pain, difficulties in eating, sleeping, concentrating on learning, 20% of the 6-year-old children reported to have a problem in their mouths at the moment they were questioned.

For the 12-year-old age group, caries prevalence was 82% and the mean number of teeth with caries experience was 2.9 DMFT. On average, one out of these three decayed teeth developed caries progression into the pulp with resulting difficulties. Sixteen percent of the 12-year-old children reported to have a problem in their mouth at the time of questioning.

The care index for both age group was 0%, meaning that Filipino children have not received restorative care (fillings). This index is the indicator for dental service provision and highlights that the public health system has very limited resources and cannot cope with the high disease level and treatment needs in the traditional curative way.

The influence of fluoride concentration in drinking water and its role in caries prevention have been firmly established through 70 years of intensive research worldwide. According to WHO, the optimal fluoride concentration in drinking water is between 0.5ppm and 1.0 ppm. Water samples were taken at each survey location. Out of 131 water samples, 126 samples presented a fluoride concentration, categorized as below optimal. (>0.5 ppm), four samples were categorized as optimal (0.5ppm – 1.0ppm) and one sample presented a fluoride concentration of 1.2ppm, which is slightly above optimal. None of the samples were above 2ppm, which would require the use of other source of drinking water for children below six years of age.

The prevalence of mild, moderate and severe fluorosis was very low with 0.6% for 6-year-olds and 1.6% for 12-year-olds. These results are in line with the low concentration of fluoride in drinking water at the survey locations.

Looking at gingival health, only 26% of all 12-year-old subjects examined presented sound gums, 74% of the children had bleeding gums and/or calculus which is caused by lack of oral hygiene habits, specifically lack of regular tooth brushing.

Oral health and general health are strongly related to each other. Children with severe dental decay (caries progression into the pulp) have significantly lower Body Mass Index (BMI) and the proportion of children suffering pain is 2.5 times higher in this group of children compared to children without severe dental decay. These figures support the statement that oral health has a huge impact on the development of children and their quality of life. This fact has been underestimated and needs urgent attention.



Weight and height measurement to calculate the BMI

Looking at trends in oral health in the Philippines, no improvement during the last decade could be observed. Comparing the 1998 national oral health survey with the recent one, the reduction in prevalence and caries experience seen in the recent survey has to be attributed to changed examination criteria and how these criteria were used. This statement is supported by double examination of 242 children using both methods by original examiners of the respective surveys. This finding highlights the need for consistent methodology and for keeping with the same examiners who had been participating in the previous survey. Only by ensuring such course of action, trends in oral health can be calculated and strategies can be evaluated.

Recommendations:

Every effort must be made to stem the tide of dental decay and gum disease amongst the children in the Philippines, since such problems have a detrimental effect on the quality of life, the general health, and the academic performance of the children. Decision makers should develop policies and strategies to improve oral health based on the recommendations of the 2007 Beijing Declaration :

Prevention of tooth decay by using fluoride is the most realistic way of reducing the burden of tooth decay in populations.

Governmental institutions promoting oral health and general health, the medical and dental professions, the educational system (e.g. health promotion in schools) and industry should take action to ensure that populations know the benefits of regular use of fluoride toothpaste and that fluoride toothpaste is made accessible and affordable.

Exposure to appropriate fluoride, in particular through fluoride toothpaste, will improve quality of life and enhance the achievement of the Millennium Development Goals by reducing the high dental disease that burdens an entire populations, especially children.”¹

Schools are the appropriate place to institutionalize healthy habits. According to pilot studies carried out in the Philippines, implementation of school-based daily fluoride tooth brushing will reduce new dental caries by 40%. Taking into account the lessons learned concerning the limited effects of health education in spite of huge efforts made by DepEd and DOH in the last decades, emphasis should be given to the unwavering implementation of fluoride tooth brushing as a daily routine in all day care centers and schools in the entire country. Toothbrushes and fluoride toothpastes should be provided for use in schools, so that all children, regardless of their family background will benefit from this cost-effective evidence-based preventive measure.



Daily fluoride toothbrushing is key to better oral health

2. Background

The Philippines, like many other developing countries, has reorganized the health care system with a focus on decentralization. As part of the re-engineering of the Department of Health (DOH), the Bureau for Dental Health Services was abolished and oral health was integrated into the Maternal and Child Health Cluster. The national government is tasked to develop policies and guidelines for local government units and the implementation of these policies at the grassroots level is the responsibility of the local health boards. Oral health is not seen as a priority. The limited available resources are spent on life threatening diseases.

Dental services are offered by the private dentists in urban areas but huge majority of the population cannot afford their services. According to different sources of information, the dental workforce consists of about 8,500 to 17,500 dentists^{2,3,4} but only 1,750 dentists are employed in the public health care system. It is estimated that 77% of the population has never, in their life, been to a dentist despite a huge treatment need.⁵

The Department of Health and its Local Government Units have the mandate for the health of the population. The Department of Social Welfare and Development, as well as the local health offices, takes care of the pre-school children, adolescents and adults, while the Department of Education's Health and Nutrition Center (HNC) takes care of public school children. Ninety-two percent of the 13 million elementary school pupils are enrolled in the public elementary schools.

At the national level, the HNC of the DepED is in charge of setting standards and policies on school health and nutrition programs and projects. At the regional level, the Health and Nutrition Unit (HNU) is headed by the Medical Officer, with the Regional Supervising Dentist, Nutritionist-Dietitians I and II as staff. The region is in charge of monitoring and evaluating the programs and projects that are implemented by the Health and Nutrition Section (HNS) staff in the division.

There are a total of 17 regional offices in the country. At the division level, the HNS is directly involved in the implementation of health and nutrition programs and projects. Each division is composed of a medical officer, dentists, nurses, and dental aides. Presently, the department has a total of 186 divisions.

The HNC has a total workforce of 150 Medical Officers, 617 dentists, 3,254 nurses and 587 dental aides.

On the average, one dentist is responsible for the oral health of 22,300 students. Salaries of the dentists are provided by the National Government but funds for supplies and consumables are not available. The annual budget for school health per child per year is less than 2 Pesos (~0.04 US\$) and this money is mostly spent on financing staff workshops and on transportation of doctors, dentists and nurses to visit the schools for mass screening but hardly any budget is available for delivery of services.

Funding for necessary medical and dental supplies has to be requested from the divisions' maintenance operating and other expenses (MOOE) and from various donors such as the industry, churches, civic clubs such as Rotary and Lions Clubs, banks and NGOs.

3. Purpose of the Survey

The purpose of this survey was to gather information on the oral health status of the public elementary school population in the Philippines. Additional information was also gathered on the prevailing general health conditions like nutritional status as well as selected socio-demographic data in order to identify risk factors .

Information was collected to determine the prevalence of children suffering from toothache and identify an urgent treatment need. The survey will provide key decision makers with information needed to formulate policies for implementation of preventive strategies and improvement of the oral health care delivery system.

Unfortunately, the current survey results cannot be compared with the previous surveys to determine trends in oral health in the Philippines due to the changes made in the WHO examination criteria for caries assessment.⁶

The objectives of the current survey are to give information on:

- prevalence and severity of dental caries and periodontal disease in 6 and 12-year-old children in the Philippines;
- observing future trends in oral health;
- evaluation of current oral health strategies;
- differences in oral health between rural and urban areas;
- gender differences in oral health;
- prevalence of children suffering from pain and discomfort;
- appropriateness of existing oral health care services;
- need for emergency, preventive, curative and restorative treatment;

- estimation of resources in terms of material and manpower needed to establish different Oral Health Care strategies;

4. Sampling

In each region, the selection of schools were based on its location - urban and rural. Two urban and two rural schools were selected and a total of 68 schools nationwide participated in the survey.

The study employed a modified, stratified cluster sampling design. The schools served as the clusters and were classified according to region and urban-rural barangay classification of the National Statistics Office. Each stratum was a combination of the region and urban-rural classification. Within each stratum, a sample of schools was obtained. Within each school selected, a sample of students was drawn.

Selection of Schools

Schools with a pupil enrolment of 60 and over in Grade I and Grade VI classes as well as its accessibility and security were included in the list of school sampling. Two schools per region were drawn based on the above selection criteria. Schools which were more than one hour travel time from the main road using public transportation were excluded to minimize the travel expenses.

Selection of students

In each selected school, the enrolment lists of Grade I and Grade VI were taken and all children who were not within the selected age groups (5-7 and 11-13) were excluded from the list. Sampling of pupils was done either by systematic sampling in big schools or at simple random sampling in small schools.

The sample size calculation was based on the estimated caries prevalence of 80%, a desired precision of 3% was targeted, the confidence level was chosen at 95% and the design effect due to cluster sampling is 1.5. Based on these specification the sample size required is 60 for each school type (urban-rural) and each grade level (Grade I and Grade VI) per region.

The study has the following limitations. Students living in rural areas more than one hour travel from the main road and/or areas with peace and order problems or visiting schools with low enrolment rate were not represented in the sample due to feasibility, safety and practical considerations. While the urban population is well represented, the rural is not.

Reliability and reproducibility of data

The survey was conducted from November 2005 to February 2006. All selected schools were visited, however some visits were postponed due to heavy rains and typhoons.

To ensure consistent clinical judgements, all 10 examiners underwent three days of training. In order to ensure that all examiners have a uniform understanding of the criteria used and that different examiners come to same examination results, it is needed to calibrate each examiner by comparing his/her results with those of an experienced examiner, who is seen as the gold standard. The inter-examiner kappa values were in a range of 0.78 to and 0.92, which can be classified as good.

In order to ensure that each examiner can examine consistently, intra-examiner kappa values were estimated by re-examining on average every 15th student. Intra-examiner reproducibility was in the range between 0.80 and 0.97.

5. Materials and Methods

Methods of data collection

Every selected school was visited by one of the survey teams for one day. According to the sampling procedure in each region, two (2) rural and two (2) urban schools had been randomly chosen. In each of these schools, thirty randomly selected 5 to 7-year-old Grade I and thirty 11 to 13-year-old Grade VI students were included in the study.

Teachers gave information on the subject's name, sex, age, number of siblings, number of days absent during the recent school year. Teachers and school nurses also measured the height and weight of all subjects according to the Instructions on How to Use the Revised Nutritional Status Report Forms (NSRF) and the International Growth Tables.

All children were orally examined for their dentition status using WHO criteria for Oral Health Surveys, Basic Methods (1997), scoring caries prevalence and severity on surface level, periodontal diseases and fluorosis, trauma, prevalence and experience of dentinogenic infection.

Hygiene indicators were likewise used like the presence of head lice All subjects were questioned concerning recent oral problems and TV availability at home.

Examination conditions:

All oral examinations of the schoolchildren were carried out in the school courtyard under optimal natural light or in well-lighted classrooms or covered areas inside the school which the school could offer in case of rain.

Prior to examination, the children brushed their teeth. Students were in supine position on a bench or table and examined by a dental examiner wearing a pair of gloves and mask under natural sunlight. The teeth were examined with lighted mouth mirrors (Mirrorlite, Kudos, Hongkong) and cotton pellets held by cotton pliers to dry the teeth. A CPI probe was used gently to detect and confirm visual evidence of caries. A trained assistant recorded the findings on a standardized form.

Infection control

All instruments were cleaned with soap and water, disinfected in 2% glutaraldehyde for 20 minutes and then rinsed in clean water before towel drying. To conserve materials, latex gloves were not routinely discarded after each examination but a 70% isopropyl alcohol rub was used to wash the gloves in between examinations.

Instruments and materials required for the study

The following instruments and materials were used to conduct the study:

Lighted mirrors	Gloves
CPI probes	Masks
Cotton pliers (tweezers)	Cotton rolls
Wash basins or kidney trays	Cotton pellets
2% glutaraldehyde	Towels
70% isopropyl alcohol	

Each team of examiners received a trolley which contains the needed instruments and materials.

Fluoride concentration of drinking water

The fluoride concentration of the drinking water in each selected school was determined. Water sample was taken from the source which majority of children of the respective schools were using for drinking purpose. In some locations, up to three water samples were collected. Clean polyethylene film containers were filled with water, closed and clearly labelled using the school number and the source of water samples.

The water samples were then sent to the Research Centre of the Department of Education and stored under air-conditioned temperature. After completion of data gathering, the water samples were sent for analysis to WHO Collaborative Centre in Jena, Germany. Before analysis, the samples were stored at 4° C in a closed glass vessel and the plastic containers were additionally closed by parafilm “M”® to prevent further evaporation.

6. Data processing and analyzing

All assessment forms were copied and the originals were sent by courier service to the Oral Health Research Centre in Cagayan de Oro, Region X at the end of each day. The copied forms were left with each DepED division office for their own reference.

The data was encoded using the SPSS software and were analyzed by the WHO CC in Jena Germany and distributed among the research team in the Philippines.

In compliance with protocol, the data was sent to the Department of Biostatistics and College of Public Health of the University of the Philippines for scrutiny.

The report is a participative work by the Department of Education, Department of Biostatistics, College of Public Health, University of the Philippines, WHO Collaborative Centre at the Friedrich Schiller University of Jena, Germany and the WHO Collaborative Centre in Nijmegen, the Netherlands.

The data were presented either as mean values or proportions of the sample having specific oral or general health condition, or giving a specific answer when interviewed.

7. Results

7.1. Description of the study groups:

The group of 6-year-olds consisted of 2,030 children with a mean age of 6.6 (+- 0.5). The gender distribution showed 48.3% were boys and 51.7% were girls. The mean number of siblings was 3.5 (+-2.0). (Refer to Table 1)

The group of 12-year-olds consisted of 2,022 students with a mean age of 11.8 (+- 0.7). The gender distribution showed 48.6% were boys and 51.4% were girls. The mean number of siblings was 4.1 (+-2.3)

7.1.1. Socio-economic background

Information on family size and TV ownership was assessed to gather information on differences in economic status and living conditions. No question was asked regarding family income and occupation of parents because previous surveys among elementary students have shown difficulties concerning the reliability of assessing parents' occupation by questioning the children.

7.1.1.1. Number of siblings

Differences among the regions was observed. Students in Region V had the highest number of siblings nationwide.

Table 1 - Mean number of siblings according to age groups and regions

Region	6-year-olds			12-year-olds		
	Rural	Urban	Region	Rural	Urban	Region
I	3.2	2.4	2.8	3.4	3.4	3.4
II	3.1	3.5	3.3	3.7	3.7	3.7
III	3.0	3.5	3.3	3.1	3.0	3.0
IV-A	3.5	3.7	3.6	3.6	4.1	3.8
IV-B	4.3	3.7	4.0	5.4	3.6	4.5
V	4.4	4.6	4.5	5.4	5.9	5.6
VI	3.4	3.6	3.5	4.1	4.1	4.1
VII	3.3	3.7	3.5	3.6	4.9	4.2
VIII	3.3	3.4	3.3	4.9	3.4	4.2
IX	3.1	4.2	3.7	4.9	4.2	4.6
X	3.3	3.4	3.3	3.9	3.4	3.7

Region	6-year-olds			12-year-olds		
	Rural	Urban	Region	Rural	Urban	Region
XI	3.2	3.6	3.4	4.2	4.2	4.2
XII	3.4	3.6	3.5	4.4	5.1	4.7
CARAGA	4.2	1.7	2.9	5.0	2.1	3.5
CAR	2.9	2.8	2.8	3.3	3.2	3.3
NCR	3.6	3.6	3.6	4.0	4.1	4.0
ARMM	4.1	4.9	4.5	5.4	5.4	5.4
National	3.5 (+/- 2.0)	3.5 (+/- 2.1)	3.5 (+/- 2.0)	4.2 (+/- 2.2)	4.0 (+/- 2.2)	4.1 (+/- 2.2)

7.1.1.2. TV ownership

All children were questioned if they have TV at home. Huge differences in TV ownership were noted between the regions. While 9 out of 10 children have TV at home in NCR, only 4 out of 10 children have in ARMM.

TV availability was used due to the perception that TV availability has a huge influence on the lifestyle of people as a result of exposure to information or advertisements (e.g. toothpaste and junk food). It will also give valuable information on their socio-economic status and the availability of local infrastructure. It is assumed that TV availability could be an indicator of lifestyle related differences in oral health.

The analysis showed no positive relation of TV availability with oral health but instead with the number of siblings. Children who reported to have TV at home have on average one sibling less than their peers without TV at home. TV ownership as an indicator of socio-economic status showed a statistically significant positive relation to family size.

Table 2 - Prevalence of TV availability at home according to age groups and regions

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
I	78.3	93.3	85.8	83.1	93.3	88.2
II	68.9	74.6	71.8	79.3	80.0	79.7
III	83.3	90.0	86.7	83.3	95.0	89.2
IV-A	91.7	76.7	84.2	90.0	88.3	89.2
IV-B	20.0	65.5	42.4	21.7	78.0	49.6
V	58.3	63.3	60.8	61.7	51.7	56.7
VI	65.0	86.7	75.8	69.5	93.3	81.5

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
VII	78.3	69.5	73.9	79.7	70.0	74.8
VIII	49.2	76.7	63.0	63.3	77.2	70.1
IX	44.8	72.4	58.6	25.0	86.2	55.1
X	80.7	80.0	80.3	81.4	90.0	85.7
XI	81.7	76.7	79.2	95.0	83.3	89.2
XII	68.3	46.7	57.5	68.3	51.7	60.0
CARAGA	62.7	64.4	63.6	61.4	76.7	69.2
CAR	85.0	61.7	73.3	96.7	81.0	89.0
NCR	80.0	94.9	87.4	91.4	95.0	93.2
ARMM	60.0	15.0	37.5	68.9	15.0	42.1
National level	68.0	71.1	69.6	71.7	76.8	74.2

7.1.2. Number of teeth

In the 6-year-old age group, the mean number of permanent teeth present was 7.8 and the mean number of primary teeth was 14.7 while in the 12-year-old age group, the mean number of permanent teeth was 25.8 and in average, the 12-year-olds had 0.5 primary teeth in their mouth.

Table 3 - Mean number of deciduous teeth and permanent teeth according to age group, location and region

Region		6-year-olds		12-year-olds	
		Primary teeth	Permanent teeth	Primary teeth	Permanent teeth
		Mean	Mean	Mean	Mean
I	Rural	14.8	7.9	0.9	25.2
	Urban	15.0	7.5	0.5	25.7
	Regional	14.9	7.7	0.7	25.4
II	Rural	15.9	6.9	0.7	25.9
	Urban	15.3	7.1	0.4	26.2
	Regional	15.6	7.0	0.5	26.1
III	Rural	15.2	7.4	0.5	25.9
	Urban	14.9	7.6	0.3	26.6
	Regional	15.1	7.5	0.4	26.3
IV-A	Rural	14.2	8.1	0.6	25.9

Region		6-year-olds		12-year-olds	
		Primary teeth	Permanent teeth	Primary teeth	Permanent teeth
	Urban	15.1	7.3	0.4	26.2
	Regional	14.6	7.7	0.5	26.0
IV-B	Rural	15.5	7.1	0.5	26.2
	Urban	14.7	7.7	0.8	25.4
	Regional	15.1	7.4	0.6	25.8
V	Rural	14.6	8.0	0.4	26.3
	Urban	14.5	8.3	0.1	27.3
	Regional	14.5	8.1	0.2	26.8
VI	Rural	14.6	8.2	0.5	26.3
	Urban	13.9	8.7	0.3	26.6
	Regional	14.3	8.4	0.4	26.5
VII	Rural	14.1	8.4	0.5	25.8
	Urban	14.6	8.1	0.4	26.7
	Regional	14.3	8.3	0.4	26.2
VIII	Rural	14.5	8.2	0.6	26.3
	Urban	14.5	8.4	0.4	25.7
	Regional	14.5	8.3	0.5	26.0
IX	Rural	15.5	7.3	0.7	26.1
	Urban	14.1	9.0	0.4	26.3
	Regional	14.8	8.2	0.5	26.2
X	Rural	14.0	7.9	0.5	26.2
	Urban	14.0	8.5	0.4	26.4
	Regional	14.0	8.2	0.5	26.3
XI	Rural	15.1	7.1	0.9	23.9
	Urban	14.6	7.4	0.4	24.2
	Regional	14.9	7.3	0.7	24.1
XII	Rural	14.2	7.4	0.7	24.2
	Urban	14.1	7.1	0.6	24.6
	Regional	14.2	7.2	0.6	24.4
CARAGA	Rural	14.8	8.3	0.6	26.1
	Urban	14.1	8.6	0.7	25.8
	Regional	14.4	8.5	0.6	25.9
CAR	Rural	14.8	7.5	0.7	24.6
	Urban	15.4	7.3	0.3	26.1
	Regional	15.1	7.4	0.5	25.3

Region		6-year-olds		12-year-olds	
		Primary teeth	Permanent teeth	Primary teeth	Permanent teeth
NCR	Rural	15.1	7.2	0.2	26.6
	Urban	14.9	8.1	0.2	26.5
	Regional	15.0	7.7	0.2	26.6
ARMM	Rural	14.2	7.0	0.5	24.6
	Urban	14.5	6.5	0.4	25.2
	Regional	14.3	6.8	0.5	24.9
National	Rural	14.8 SD	7.6	0.6	25.6
	Urban	14.6 SD	7.8	0.4	26.0
	National	14.7 (+/-3.3)	7.7 (+/-3.3)	0.5 (+/-1.3)	25.8 (+/-2.7)

7.2. Dental Caries

7.2.1. Caries prevalence

Caries prevalence indicates the percentage of the population affected by dental caries regardless of the number of teeth affected, whether in primary and / or in permanent dentition (Table 4).

6-year-old age group

The prevalence of dental caries in the 6-year-old age group is 97.1% with a slight variation between 97.5% prevalence in rural areas compared to 96.7% in urban areas.

While nearly all children suffer from dental caries (prevalence of dental caries > 99%) in 4 regions (I, II, CARAGA, ARMM), 10.1% of children are caries-free in region VII.

With respect to gender differences, girls have slightly higher caries prevalence than boys with 97.2% to 96.9% respectively.

12-year-old age group

The prevalence of dental caries in 12-year-olds is 82.4% on the national level with little variation between rural (84.1%) and urban areas (80.8%). The highest prevalence was found in region XI (89.2%) and the lowest in region VII (74.8%)

Caries prevalence restricted to the permanent dentition among the 12-year-olds is 78.4%

Table 4 - Caries prevalence in percent according to age group, location and region

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
I	100.0	100.0	100.0	71.2	83.3	77.3
II	100.0	98.4	99.2	75.9	80.0	78.0
III	98.3	96.7	97.5	80.0	80.0	80.0
IV-A	100.0	93.3	96.7	85.0	71.7	78.3
IV-B	96.7	100.0	98.3	75.0	76.7	75.8
V	98.3	95.0	96.7	81.4	71.7	76.5
VI	93.3	86.4	89.9	86.4	63.3	74.8
VII	93.2	98.3	95.8	86.7	86.0	86.3

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
VIII	93.1	96.6	94.8	80.0	81.0	80.5
IX	96.5	100.0	98.3	91.5	85.0	88.2
X	100.0	95.0	97.5	86.7	91.7	89.2
XI	100.0	95.0	97.5	90.0	83.3	86.7
XII	98.3	100.0	99.2	86.0	90.0	88.0
CARAGA	95.0	98.3	96.6	81.7	79.7	80.7
CAR	100.0	96.7	98.3	90.0	81.0	85.6
NCR	96.7	93.2	95.0	91.4	83.3	87.3
ARMM	98.3	100.0	99.2	90.2	86.7	88.4
National	97.5	96.7	97.1	84.1	80.8	82.4

7.2.2. Caries experience (DMFT, DMFS)

The DMFT index is used to measure the mean caries experience per child. The index is composed of a D-component indicating the number of teeth with a visible cavity, the M-component counting teeth that have been removed due to caries and the F-component, indicating teeth that have been restored with a filling. The DMFT gives the figures for the permanent teeth, while the dmft is used for the primary dentition.

More detailed information on the severity of tooth decay is obtainable using the index on surface level. The DMFS gives the mean number of Decayed, Missed or Filled surfaces per child of the respective group. While dmfs index is used for the primary dentition, and DMFS index for the permanent teeth.

Six-year-old children have a mixed dentition, meaning they have primary teeth as well as permanent teeth in their oral cavity. For this age group, caries experience is presented for primary as well as for permanent dentition. Since most of the 12-year-olds have their full set of teeth and majority do not even have any primary teeth left, caries experience is presented only for the permanent teeth, no tables have been presented for the primary teeth for this age group.

Caries experience on toothlevel in the 6-year-old age group (DMFT/dmft)

For the primary dentition, the mean number of decayed, missed, and filled teeth (dmft) score of the 2,030 children was high with 8.4 on national level. Slight variation between rural (8.6) compared to 8.3 in urban areas. A decayed component of eight, made up almost all of the score. Primary teeth missing due to caries contributed 0.4 to the index, while the filled component was 0.0 (Table 5).

For the permanent dentition, the mean number of Decayed, Missed and Filled teeth (DMFT) score is 0.7 with a slight variation between 0.6 in rural areas and 0.7 in urban areas. The score is completely made up by the D-component indicating that all caries in the newly erupted permanent teeth is left untreated in this age group (Table 5). Tooth-group related distribution revealed that the decay was totally concentrated in the 6-year-olds' molars.

Huge variation between the regions could be observed with highest caries experience in region XII with 1.1 DMFT and 9.6 dmft compared to the lowest with 0.3 DMFT and 6.7 dmft in Region VII.

Caries experience on surface level in 6-year-old agegroup (DMFS/dmfs)

Looking in more detail on surface level, caries experience in primary dentition showed that in national average 28.2 surfaces per child have experienced dental caries. There is a little variation between rural and urban of 28.4 dmfs and 27.9 dmfs respectively. Almost all of the score is made up by the d-component with 26.2 ds, indicating that nearly all caries is left untreated. The missing component contributes 1.9 to the dmfs index which means that 6.7 of caries has been treated by extractions. Restorative care was not performed.

Caries experience on surface level in the permanent dentition showed that the national average is 1.1 decayed or missing or filled surface per child was counted There is no difference in rural and urban areas. All of the score is made up by the D-component with 1.1 DS. Lowest caries levels with 0.7 DMFS were observed in Regions III, VI and VII while more than double mean DMFS was observed in Region XII (1.5 DMFS), NCR (1.6DMFS) and Region X (1.8 DMFS).

Toothgroup related distribution of caries experience in 6-year-olds

Toothgroup related distribution of caries experience highlights the concentration of the disease in primary molars, where 70% of the caries burden is located (19.8 dmfs of 28.2 dmfs), while only 19% is to be found in the front teeth. (5.2 dmfs of 28.2 dmfs)

For the newly erupted permanent teeth the whole caries burden is concentrated on the permanent first molars.

Caries experience on tooth level in 12-year-olds (DMFT)

The caries experience of the sample is presented in the table below. The mean DMFT on national level is 2.9. No difference is observed between rural and urban areas (Table 8)

While girls present a mean DMFT of 3.0, boys present slightly lower DMFT of 2.8. The mean DMFT is highest in Region XI with a DMFT of 4.0 and lowest in Region VII with 1.9 DMFT.

Caries experience on surface level in 12-year-olds (DMFS)

A more detailed picture of the caries severity can be obtained by looking at caries experience on surface level. The relationship between a DMFT of 2.9 and a DMFS of 7.7 indicates the severity of the tooth decay. Each tooth with caries present an average of 2.7 surfaces involved. Huge differences being observed between the different regions. While children in NCR have a mean DMFS of 11.4 the caries experience of children in Region VII is less than 5.2 (Table 8).

Looking at the distribution of the single components, the decayed component of the index made up 86.4% of the score (6.6 DS). Surfaces missing due to caries are low with 0.9 MS (11.6%), while the mean number of filled surfaces is even lower with 0.15 FS (1.9%). The distribution of the single components of the DMFS index revealed the difficulty of the oral health care delivery system to cope with the disease level. Less than 2% of decayed surfaces have been restored with restorations.

Toothgroup related distribution of caries experience in 12-year-olds

Tooth-group related distribution of caries experience done on surface level highlighted the predominant role of the first molar in caries experience. (Table 9) presents 70% of the caries experience is found in the molars (5.4 DMFS) followed by 19% of caries experience in the incisors (1.4 DMFS) and 11% in premolars (0.8 DMFS) (Table 9).

Table 5 - Caries experience on toothlevel (Mean DMFT/dmft) in 6-year-olds

Region		dmft				DMFT			
		dt	mt	ft	dmft	DT	MT	FT	DMFT
I	Rural	8.1	0.5	0.0	8.5/	0.6	0.0	0.0	0.6
	Urban	9.4	0.4	0.0	9.8	0.6	0.0	0.0	0.6
	Regional	8.7	0.4	0.0	9.2	0.6	0.0	0.0	0.6
II	Rural	9.8	0.3	0.0	10.1	0.6	0.0	0.0	0.6
	Urban	8.5	0.4	0.0	8.9	0.5	0.0	0.0	0.5
	Regional	9.2	0.3	0.0	9.5	0.6	0.0	0.0	0.6
III	Rural	8.7	0.4	0.0	9.1	0.3	0.0	0.1	0.4
	Urban	8.0	0.4	0.0	8.4	0.5	0.0	0.0	0.5
	Regional	8.3	0.4	0.0	8.7	0.4	0.0	0.0	0.4
IV-A	Rural	8.3	0.5	0.0	8.9	0.5	0.0	0.0	0.5
	Urban	7.3	0.4	0.0	7.7	0.5	0.0	0.0	0.5
	Regional	7.8	0.5	0.0	8.3	0.5	0.0	0.0	0.5
IV-B	Rural	7.4	0.7	0.0	8.1	0.8	0.0	0.0	0.8
	Urban	7.4	0.3	0.0	7.7	0.6	0.0	0.0	0.6
	Regional	7.4	0.5	0.0	7.9	0.7	0.0	0.0	0.7
V	Rural	7.7	0.3	0.0	8.1	0.5	0.0	0.0	0.5
	Urban	7.7	0.3	0.0	8.0	0.6	0.0	0.0	0.6
	Regional	7.7	0.3	0.0	8.0	0.6	0.0	0.0	0.6
VI	Rural	7.7	0.1	0.0	7.9	0.5	0.0	0.0	0.5
	Urban	6.7	0.2	0.0	6.9	0.3	0.0	0.0	0.3
	Regional	7.2	0.2	0.0	7.4	0.4	0.0	0.0	0.4
VII	Rural	6.7	0.2	0.0	6.9	0.5	0.0	0.0	0.5
	Urban	6.3	0.3	0.0	6.6	0.2	0.0	0.0	0.2
	Regional	6.5	0.3	0.0	6.7	0.3	0.0	0.0	0.3
VIII	Rural	8.1	0.2	0.0	8.2	0.6	0.0	0.0	0.6
	Urban	9.2	0.4	0.0	9.6	1.0	0.0	0.0	1.0
	Regional	8.6	0.3	0.0	8.9	0.8	0.0	0.0	0.8
IX	Rural	7.5	0.3	0.0	7.8	0.8	0.0	0.0	0.8
	Urban	6.8	0.6	0.0	7.3	0.9	0.0	0.0	0.9
	Regional	7.1	0.4	0.0	7.5	0.8	0.0	0.0	0.8
X	Rural	7.0	1.1	0.0	8.1	0.4	0.2	0.0	0.6
	Urban	7.2	0.7	0.0	7.9	1.2	0.1	0.0	1.2
	Regional	7.1	0.9	0.0	8.0	0.8	0.1	0.0	0.9
XI	Rural	9.2	0.3	0.0	9.4	0.6	0.0	0.0	0.7

Region		dmft				DMFT			
		dt	mt	ft	dmft	DT	MT	FT	DMFT
	Urban	8.3	0.5	0.0	8.8	0.9	0.0	0.0	0.9
	Regional	8.8	0.4	0.0	9.1	0.7	0.0	0.0	0.8
XII	Rural	9.7	0.4	0.0	10.0	1.1	0.0	0.0	1.1
	Urban	8.8	0.4	0.0	9.2	1.1	0.0	0.0	1.1
	Regional	9.2	0.4	0.0	9.6	1.1	0.0	0.0	1.1
CARAGA	Rural	8.4	0.6	0.0	8.9	1.0	0.0	0.0	1.0
	Urban	8.1	0.7	0.0	8.8	0.6	0.0	0.1	0.7
	Regional	8.2	0.6	0.0	8.9	0.8	0.0	0.1	0.9
CAR	Rural	8.2	0.3	0.0	8.5	0.4	0.0	0.0	0.4
	Urban	8.9	0.4	0.0	9.4	0.5	0.0	0.0	0.5
	Regional	8.6	0.4	0.0	9.0	0.4	0.0	0.0	0.4
NCR	Rural	8.5	0.2	0.0	8.7	0.8	0.0	0.0	0.8
	Urban	7.1	0.2	0.0	7.3	0.8	0.0	0.0	0.8
	Regional	7.8	0.2	0.0	8.0	0.8	0.0	0.0	0.8
ARMM	Rural	7.9	0.5	0.0	8.4	0.6	0.0	0.0	0.6
	Urban	8.8	0.4	0.0	9.2	0.7	0.0	0.0	0.7
	Regional	8.4	0.4	0.0	8.8	0.6	0.0	0.0	0.6
National level	Rural	8.2	0.4	0.0	8.6	0.6	0.0	0.0	0.6
	Urban	7.9	0.4	0.0	8.3	0.7	0.0	0.0	0.7
	National	8.0 (+/- 4.1)	0.4 (+/- 0.1)	0.0 (+/- 0.1)	8.4 (+/- 4.3)	0.6 (+/- 1.1)	0.0 (+/- 0.1)	0.0 (+/- 0.1)	0.7 (+/- 1.1)
Female									0.7 (+/- 1.1)
Male									0.6 (+/- 1.1)

Table 6 - Mean number of decayed, filled and missing permanent teeth (DMFT) for 6 and 12-year-old students according to regions

Region		dmfs				DMFS			
		ds	ms	fs	dmfs	DS	MS	FS	DMFS
I	Rural	25.8	2.2	0.0	28.1	0.9	0.0	0.0	0.9
	Urban	32.0	1.9	0.0	33.9	0.8	0.0	0.0	0.8
	Regional	28.9	2.1	0.0	31.0	0.9	0.0	0.0	0.9
II	Rural	31.4	1.3	0.0	32.7	1.0	0.0	0.0	1.0
	Urban	26.9	2.0	0.0	28.9	0.9	0.0	0.0	0.9
	Regional	29.1	1.7	0.0	30.8	0.9	0.0	0.0	0.9
III	Rural	27.2	1.9	0.0	29.1	0.5	0.1	0.1	0.6
	Urban	26.7	1.8	0.0	28.6	0.8	0.0	0.0	0.8
	Regional	27.0	1.8	0.0	28.8	0.6	0.0	0.0	0.7
IV-A	Rural	30.3	2.4	0.0	32.7	0.7	0.0	0.0	0.7
	Urban	24.6	2.0	0.0	26.6	0.8	0.1	0.0	0.9
	Regional	27.5	2.2	0.0	29.6	0.8	0.0	0.0	0.8
IV-B	Rural	24.3	3.0	0.0	27.3	1.2	0.3	0.0	1.5
	Urban	26.1	1.4	0.0	27.5	0.6	0.0	0.0	0.6
	Regional	25.2	2.2	0.0	27.4	0.9	0.1	0.0	1.1
V	Rural	25.4	1.6	0.0	27.1	0.9	0.0	0.0	0.9
	Urban	27.2	1.5	0.0	28.7	1.3	0.0	0.0	1.3
	Regional	26.3	1.5	0.0	27.9	1.1	0.0	0.0	1.1
VI	Rural	25.8	0.6	0.0	26.4	1.0	0.0	0.0	1.0
	Urban	22.9	1.1	0.0	24.0	0.4	0.0	0.0	0.4
	Regional	24.3	0.9	0.0	25.2	0.7	0.0	0.0	0.7
VII	Rural	22.6	1.1	0.0	23.7	0.9	0.0	0.0	0.9
	Urban	19.5	1.5	0.0	21.0	0.5	0.0	0.0	0.5
	Regional	21.2	1.3	0.0	22.4	0.7	0.0	0.0	0.7
VIII	Rural	27.4	0.7	0.0	28.1	1.2	0.0	0.0	1.2
	Urban	27.3	2.1	0.0	29.4	1.3	0.0	0.0	1.3
	Regional	27.3	1.4	0.0	28.7	1.2	0.0	0.0	1.3
IX	Rural	23.4	1.2	0.0	24.6	1.1	0.0	0.0	1.1
	Urban	22.2	2.5	0.0	24.7	1.9	0.0	0.0	1.9
	Regional	22.8	1.8	0.0	24.6	1.5	0.0	0.0	1.5
X	Rural	19.1	5.3	0.0	24.4	0.9	0.8	0.0	1.7
	Urban	22.4	3.3	0.0	25.6	1.7	0.3	0.0	1.9
	Regional	20.7	4.3	0.0	25.0	1.3	0.5	0.0	1.8

Region		dmfs				DMFS			
		ds	ms	fs	dmfs	DS	MS	FS	DMFS
XI	Rural	29.0	1.2	0.0	30.2	1.3	0.1	0.0	1.4
	Urban	26.7	2.1	0.0	28.8	1.2	0.0	0.0	1.2
	Regional	27.8	1.7	0.0	29.5	1.3	0.0	0.0	1.3
XII	Rural	31.7	1.7	0.0	33.4	1.2	0.0	0.0	1.2
	Urban	27.7	2.1	0.0	29.8	1.8	0.0	0.0	1.8
	Regional	29.7	1.9	0.0	31.6	1.5	0.0	0.0	1.5
CARAGA	Rural	26.3	2.4	0.0	28.7	1.7	0.0	0.0	1.7
	Urban	25.0	3.2	0.0	28.1	1.0	0.0	0.5	1.5
	Regional	25.6	2.8	0.0	28.4	1.3	0.0	0.3	1.6
CAR	Rural	25.6	1.6	0.0	27.3	0.5	0.0	0.0	0.6
	Urban	27.9	2.1	0.0	30.1	0.8	0.0	0.0	0.8
	Regional	26.8	1.9	0.0	28.7	0.7	0.0	0.0	0.7
NCR	Rural	30.7	0.9	0.0	31.6	1.6	0.1	0.0	1.7
	Urban	26.4	0.9	0.0	27.3	1.6	0.0	0.0	1.6
	Regional	28.6	0.9	0.0	29.5	1.6	0.0	0.0	1.6
ARMM	Rural	25.4	2.5	0.0	27.9	0.7	0.2	0.0	0.9
	Urban	28.6	1.8	0.0	30.4	1.1	0.0	0.0	1.1
	Regional	27.0	2.1	0.0	29.1	0.9	0.1	0.0	1.0
National	Rural	26.6	1.9	0.0	28.5	1.0	0.1	0.0	1.1
	Urban	25.9	2.0	0.0	27.9	1.1	0.0	0.0	1.1
	National	26.2 (+/- 16.3)	1.9 (+/- 4.6)	0.0 (+/- 0.3)	28.2 (+/- 16.8)	1.0 (+/- 2.3)	0.1 (+/- 0.7)	0.0 (+/- 0.4)	1.1 (+/- 2.5)

Table 7 - Tooth group related distribution of the dmfs index in primary teeth of 6-year-old students

		Incisors	Canine-tooth	Primary molars	dmfs
National Level	Rural	5.4 (+/-5.9)	3.2 (+/-4.2)	19.9 (+/-10.9)	28.5 (+/-16.4)
	Urban	5.1 (+/-5.9)	3.1 (+/-4.2)	19.7 (+/-11.4)	27.9 (+/-17.2)
	National level	5.2 (+/-5.9)	3.1 (+/-4.2)	19.8 (+/-11.1)	28.2 (+/-16.8)

Table 8 - Caries experience on tooth and surface level in 12-year-old children according to location and region

Region		DMFT				DMFS			
		DT	MT	FT	DMFT	DS	MS	FS	DMFS
I	Rural	1.3	0.3	0.0	1.6	3.1	1.2	0.0	4.3
	Urban	2.5	0.2	0.2	2.9	6.5	0.9	0.2	7.7
	Regional	1.9	0.2	0.1	2.2	4.8	1.1	0.1	6.0
II	Rural	2.0	0.1	0.1	2.1	5.0	0.3	0.3	5.5
	Urban	2.4	0.1	0.0	2.6	6.1	0.7	0.0	6.8
	Regional	2.2	0.1	0.0	2.3	5.5	0.5	0.1	6.1
III	Rural	2.7	0.2	0.1	3.0	6.7	1.0	0.1	7.8
	Urban	2.2	0.1	0.0	2.3	6.7	0.5	0.0	7.2
	Regional	2.4	0.2	0.0	2.6	6.7	0.7	0.0	7.5
IV-A	Rural	2.5	0.3	0.2	2.9	7.0	1.2	0.8	8.9
	Urban	1.6	0.2	0.0	1.8	3.9	0.7	0.0	4.6
	Regional	2.1	0.2	0.1	2.3	5.4	1.0	0.4	6.8
IV-B	Rural	2.6	0.3	0.0	2.8	6.7	1.3	0.0	8.0
	Urban	2.1	0.4	0.0	2.5	6.0	2.1	0.0	8.1
	Regional	2.3	0.3	0.0	2.7	6.4	1.7	0.0	8.0
V	Rural	1.9	0.2	0.0	2.1	5.2	1.0	0.1	6.2
	Urban	2.7	0.1	0.0	2.8	6.1	0.7	0.0	6.7
	Regional	2.3	0.2	0.0	2.5	5.6	0.8	0.0	6.5
VI	Rural	2.0	0.1	0.0	2.1	4.9	0.4	0.0	5.3
	Urban	1.9	0.2	0.1	2.2	4.5	0.8	0.3	5.6
	Regional	2.0	0.1	0.0	2.1	4.7	0.6	0.1	5.5
VII	Rural	2.2	0.2	0.1	2.5	5.9	1.2	0.1	7.2
	Urban	1.2	0.1	0.0	1.3	2.7	0.6	0.1	3.3
	Regional	1.7	0.2	0.0	1.9	4.3	0.9	0.1	5.2
VIII	Rural	3.4	0.1	0.0	3.5	9.9	0.3	0.0	10.1
	Urban	3.5	0.3	0.1	3.9	8.7	1.5	0.3	10.5
	Regional	3.5	0.2	0.0	3.7	9.3	0.9	0.2	10.3
IX	Rural	3.1	0.1	0.0	3.2	7.1	0.3	0.0	7.4
	Urban	3.2	0.2	0.0	3.5	8.2	1.1	0.0	9.3
	Regional	3.2	0.1	0.0	3.3	7.6	0.7	0.0	8.3

Region		DMFT				DMFS			
		DT	MT	FT	DMFT	DS	MS	FS	DMFS
X	Rural	2.9	0.2	0.1	3.1	7.0	1.1	0.1	8.2
	Urban	3.6	0.4	0.0	3.9	7.6	1.9	0.0	9.5
	Regional	3.2	0.3	0.0	3.5	7.3	1.5	0.1	8.9
XI	Rural	4.2	0.2	0.0	4.4	10.3	0.9	0.0	11.2
	Urban	3.4	0.3	0.0	3.6	7.9	1.2	0.0	9.1
	Regional	3.8	0.2	0.0	4.0	9.1	1.1	0.0	10.1
XII	Rural	2.8	0.2	0.0	3.0	6.6	0.8	0.1	7.4
	Urban	3.2	0.2	0.0	3.3	6.6	0.9	0.0	7.5
	Regional	3.0	0.2	0.0	3.1	6.6	0.8	0.0	7.4
CARAGA	Rural	3.0	0.1	0.1	3.2	7.5	0.4	0.5	8.4
	Urban	3.1	0.2	0.1	3.4	7.2	0.9	0.3	8.4
	Regional	3.0	0.1	0.1	3.3	7.3	0.7	0.4	8.4
CAR	Rural	2.2	0.3	0.2	2.7	5.0	1.7	0.5	7.2
	Urban	2.8	0.2	0.1	3.0	6.8	0.8	0.2	7.7
	Regional	2.5	0.3	0.1	2.9	5.9	1.2	0.3	7.4
NCR	Rural	3.9	0.2	0.2	4.3	10.6	1.1	1.0	12.6
	Urban	3.1	0.3	0.1	3.4	8.6	1.3	0.3	10.3
	Regional	3.5	0.3	0.1	3.9	9.6	1.2	0.6	11.4
ARMM	Rural	2.5	0.1	0.0	2.6	5.5	0.5	0.0	6.0
	Urban	2.9	0.2	0.0	3.1	6.9	0.8	0.1	7.8
	Regional	2.7	0.1	0.0	2.8	6.2	0.6	0.1	6.8
National	Rural	2.7	0.2	0.1	2.9	6.7	0.9	0.2	7.7
	Urban	2.7	0.2	0.0	2.9	6.5	1.0	0.1	7.6
	National	2.7 (+/-2.9)	0.2 (+/-1.0)	0.0 (+/-0.3)	2.9 (2.9)	6.6 (+/-8.0)	0.8 (+/-2.5)	0.2 (+/-1.1)	7.7 (+/-8.6)
Female				3.0 (+/-3.0)					
Male				2.8 (+/-2.9)					

Table 9 - Tooth-group related distribution of the DMFT / DMFS in 12-year-olds

Location	DMFT					DMFS				
	Incisor	Canine	Premolar	1st Molar	2nd Molar	Incisor	Canine	Premolar	1st Molar	2nd Molar
Rural	0.7	0.0	0.3	1.6	0.2	1.4	0.1	0.9	5.1	0.4
Urban	0.7	0.0	0.3	1.6	0.3	1.5	0.0	0.8	5.0	0.3
National	0.7 (1.4)	0.0 (1.2)	0.3 (0.7)	1.6 (1.3)	0.2 (0.6)	1.4 (3.3)	0.0 (0.3)	0.8 (2.1)	5.1 (5.3)	0.3 (1.1)

7.2.3. Significant Caries Index (SIC Index)

The SIC index is the mean DMFT of one third of the study population with the highest DMFT scores. The purpose of the SIC index is to bring attention to those children in each population who suffer from the highest caries burden.

6-year-old age group

The SIC index of the group of 6-year-old children is 1.9 with a variation of 1.8 in rural areas compared to 1.9 in urban areas.

Six out of the 17 regions present SIC values higher than 2 DMFT. (VIII, IX, X, XII, CARAGA, NCR), while Region VII presents the lowest SIC index with 1 DMFT.

12-year-old age group

The SIC index on national level was 6.1 with slight variation between the rural SIC index of 6.0 and the urban SIC index of 6.3. Huge variations between the 17 regions are observed. The highest SIC index of 8.2 is found for region XI compared to 4.4 in region VII

Table 10 - SIC index of 6 and 12-year-old children according to location and region

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
I	1.7	1.7	1.7	3.55	6.05	4.93
II	1.9	1.5	1.7	4.74	5.5	5.13
III	1.2	1.5	1.3	6.3	4.6	5.48
IV-A	1.4	1.5	1.4	6.15	3.85	5.1
IV-B	2.2	1.5	1.9	5.6	5.35	5.48
V	1.5	1.8	1.6	4.7	5.9	5.35
VI	1.6	0.8	1.2	4.05	5.2	4.63
VII	1.4	0.7	1.0	5.05	3.2	4.35
VIII	1.7	2.6	2.1	7.1	8.11	7.59
IX	2.1	2.3	2.2	6.2	7.47	6.82
X	1.8	3.0	2.5	5.8	8.4	7.18
XI	1.8	2.0	1.9	8.95	7.4	8.2
XII	2.4	2.7	2.5	5.6	6.9	6.33
CARAGA	2.5	1.9	2.2	6.53	6.8	6.67
CAR	1.2	1.5	1.3	5.75	5.89	5.87
NCR	2.1	2.0	2.0	8.68	7.3	8
ARMM	1.7	2.0	1.9	5.05	6.2	5.68
National	1.8	1.9	1.9 (+/-1.1)	5.98	6.26	6.12 (+/-2.8)

7.2.4. Prevalence of odontogenic infection

The prevalence of odontogenic infection gives information on the proportion of children who suffer from at least one tooth with caries which has progressed into the pulp. Caries with pulpal involvement was diagnosed if the open pulp chamber was visible with the naked eye. No x-rays were taken, no probing into the pulp chamber was performed.

Table 11- Prevalence in percent of 6 and 12-year-old children with odontogenic infection according to location and region.

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
I	95	88	91.7	33.9	43.3	38.7
II	87	93	90.3	36.2	61.7	49.2
III	90	87	88.3	50.0	66.7	58.3
IV-A	73	87	80.0	51.7	28.3	40.0
IV-B	83	77	80.0	30.0	51.7	40.8
V	80	83	81.7	39.0	35.0	37.0
VI	64	81	73.1	57.6	33.3	45.4
VII	90	88.1	89.1	65.0	52.6	59.0
VIII	81	75.9	78.4	56.7	53.4	55.1
IX	83	78.9	81.2	61.0	60.0	60.5
X	82	96.7	89.2	68.3	56.7	62.5
XI	85	88.3	86.7	58.3	40.0	49.2
XII	84.7	86.4	85.6	49.1	50.0	49.6
CARAGA	82.8	71.7	77.1	51.7	35.6	43.7
CAR	85.0	93.3	89.2	35.0	53.4	44.1
NCR	89.8	91.7	90.8	63.8	55.0	59.3
ARMM	86.7	88.3	87.5	50.8	55.0	52.9
National			85% (+36%)			56% (+50%)

7.2.5. PUFA/ pufa levels

PUFA / pufa index

The PUFA / pufa index gives information on the severity of tooth decay. The index is a subgroup of the D-component of the DMFT index and indicates decayed teeth with at least clearly visible involvement of the pulp, and the extent of the following dentinogenic infection and its spreading to other structures like bone and soft tissues. The index further details the "D" (decayed). PUFA/pufa indicates non-vital teeth with chronic infection, which could inflame in periods of low resistance. This condition indicates teeth which may cause pain and suffering and indicate an urgent need for treatment.

6-year-old age group

The number of teeth with at least one pulp involvement in primary dentition is high with a mean PUFA of 3.4 on national level. The single components revealed that the mean per child is 2.9 p (mean number of teeth with pulp involvement), 0.3 u (mean number of teeth with traumatic ulceration, mostly caused by dislocated root fragments), 0.1 f (mean number of teeth with fistula) and 0.1a (mean number of teeth, which caused an abscess) (Table 12).

The mean PUFA in permanent dentition of the 6-year-old group is 0.14 with a variation of 0.11 in rural areas and 0.16 in urban areas. The score of 0.14 was made up completely by the P component, which means that no involvement of the soft tissues is observed in permanent dentition (no ulceration, fistula or abscess are observed). This indicates that on average, 14 children out of 100 children have one permanent tooth with pulp involvement.

12-year-old age group

The mean PUFA on national level is 1.0, meaning that on average, each 12-year-old student presented one tooth with at least pulp involvement (Table 13). The distribution of the single components revealed that the P component is 0.8, while the other components of PUFA, U (traumatic ulceration caused by dislocated root fragments), F (fistula) and A (abscess), which could be summarized as soft tissue lesions made up 0.2 of the index.

The mean of 0.1 A (abscess) indicates that one out of 10 students is suffering from an dentoalveolar abscess. PUFA is significantly correlated with DMFT / DMFS values as well as with children's self reported problems in the oral cavity. The use of this index allows the estimation of the urgent treatment need among the students and is useful for future service delivery planning.

There were huge differences in PUFA values between regions with a 1.5 PUFA in region XI and a PUFA of 0.7 in region I, IVa, V, VI, VII.

The PUFA in the primary teeth among the 12-year-old, revealed a mean of 0.2. This indicates that 40% of the remaining primary teeth, predominantly deciduous molars, presented at least pulp involvement.

Table 12 - Mean PUFA/pufa in 6-year-old children according to location and region

Region		6-year-olds									
		p	u	f	a	pufa	P	U	F	A	PUFA
I	Rural	2.7	0.1	0.4	0.1	3.3	0.2	0.0	0.0	0.0	0.2
	Urban	3.5	0.1	0.3	0.1	4.1	0.2	0.0	0.0	0.0	0.2
	Regional	3.1	0.1	0.4	0.1	3.7	0.2	0.0	0.0	0.0	0.2
II	Rural	3.7	0.1	0.2	0.0	4.0	0.1	0.0	0.0	0.0	0.2
	Urban	3.1	0.2	0.3	0.1	3.6	0.1	0.0	0.0	0.0	0.1
	Regional	3.4	0.1	0.2	0.1	3.8	0.1	0.0	0.0	0.0	0.2
III	Rural	3.0	0.1	0.4	0.1	3.6	0.0	0.0	0.0	0.0	0.1
	Urban	3.5	0.2	0.4	0.1	4.2	0.2	0.0	0.0	0.1	0.2
	Regional	3.2	0.1	0.4	0.1	3.9	0.1	0.0	0.0	0.0	0.1
IV-A	Rural	2.8	0.1	0.1	0.0	3.1	0.0	0.0	0.0	0.0	0.0
	Urban	2.4	0.1	0.1	0.1	2.6	0.1	0.0	0.0	0.0	0.1
	Regional	2.6	0.1	0.1	0.0	2.8	0.0	0.0	0.0	0.0	0.0
IV-B	Rural	2.3	0.1	0.1	0.1	2.5	0.1	0.0	0.0	0.0	0.1
	Urban	2.4	0.3	0.1	0.0	2.8	0.0	0.0	0.0	0.0	0.0
	Regional	2.3	0.2	0.1	0.0	2.6	0.0	0.0	0.0	0.0	0.0
V	Rural	2.3	0.2	0.0	0.0	2.5	0.1	0.0	0.0	0.0	0.1
	Urban	2.1	0.6	0.1	0.0	2.8	0.1	0.0	0.0	0.0	0.1
	Regional	2.2	0.4	0.0	0.0	2.7	0.1	0.0	0.0	0.0	0.1
VI	Rural	2.9	0.1	0.0	0.0	3.0	0.1	0.0	0.0	0.0	0.1
	Urban	2.4	0.2	0.0	0.1	2.6	0.0	0.0	0.0	0.0	0.1
	Regional	2.7	0.1	0.0	0.0	2.8	0.1	0.0	0.0	0.0	0.1
VII	Rural	2.8	0.2	0.1	0.0	3.2	0.1	0.0	0.0	0.0	0.1
	Urban	2.1	0.0	0.0	0.0	2.2	0.1	0.0	0.0	0.0	0.1
	Regional	2.5	0.1	0.1	0.0	2.7	0.1	0.0	0.0	0.0	0.1
VIII	Rural	3.4	0.3	0.1	0.1	3.8	0.2	0.0	0.0	0.0	0.2
	Urban	2.8	0.2	0.0	0.0	3.0	0.3	0.0	0.0	0.0	0.3
	Regional	3.1	0.3	0.0	0.1	3.4	0.2	0.0	0.0	0.0	0.2
IX	Rural	1.6	1.2	0.1	0.1	2.9	0.1	0.0	0.0	0.0	0.1
	Urban	1.7	1.2	0.0	0.0	2.9	0.3	0.1	0.0	0.0	0.4
	Regional	1.7	1.2	0.0	0.1	2.9	0.2	0.0	0.0	0.0	0.3
X	Rural	1.6	0.3	0.0	0.0	2.0	0.3	0.1	0.0	0.0	0.4
	Urban	2.3	0.6	0.0	0.1	3.0	0.3	0.0	0.0	0.0	0.3
	Regional	2.0	0.4	0.0	0.1	2.5	0.3	0.0	0.0	0.0	0.3
XI	Rural	4.4	0.0	0.2	0.2	4.7	0.2	0.0	0.0	0.0	0.2

		6-year-olds									
Region		p	u	f	a	pufa	P	U	F	A	PUFA
	Urban	3.7	0.1	0.2	0.1	4.1	0.2	0.0	0.0	0.0	0.2
	Regional	4.1	0.1	0.2	0.1	4.4	0.2	0.0	0.0	0.0	0.2
XII	Rural	4.9	0.1	0.1	0.1	5.2	0.1	0.0	0.0	0.0	0.1
	Urban	4.0	0.0	0.1	0.0	4.0	0.2	0.0	0.0	0.0	0.3
	Regional	4.4	0.1	0.1	0.0	4.6	0.2	0.0	0.0	0.0	0.2
CARAGA	Rural	1.9	1.3	0.0	0.0	3.2	0.1	0.0	0.0	0.0	0.2
	Urban	2.1	1.1	0.0	0.0	3.2	0.1	0.0	0.0	0.0	0.1
	Regional	2.0	1.2	0.0	0.0	3.2	0.1	0.0	0.0	0.0	0.1
CAR	Rural	3.2	0.1	0.3	0.2	3.6	0.0	0.0	0.0	0.0	0.0
	Urban	3.1	0.1	0.3	0.0	3.5	0.1	0.0	0.0	0.0	0.1
	Regional	3.1	0.1	0.3	0.1	3.6	0.1	0.0	0.0	0.0	0.1
NCR	Rural	3.2	0.2	0.0	0.0	3.4	0.2	0.0	0.0	0.0	0.2
	Urban	3.0	0.2	0.0	0.0	3.3	0.2	0.0	0.0	0.0	0.2
	Regional	3.1	0.2	0.0	0.0	3.3	0.2	0.0	0.0	0.0	0.2
ARMM	Rural	3.8	0.1	0.1	0.0	4.0	0.1	0.0	0.0	0.0	0.1
	Urban	4.5	0.0	0.1	0.1	4.7	0.2	0.0	0.0	0.0	0.2
	Regional	4.1	0.0	0.1	0.1	4.3	0.1	0.0	0.0	0.0	0.1
National	Rural	3.0	0.3	0.1	0.1	3.4	0.1	0.0	0.0	0.0	0.1
	Urban	2.9	0.3	0.1	0.1	3.3	0.2	0.0	0.0	0.0	0.2
	National	2.9 (+/- 2.4)	0.3 (+/- 1.0)	0.1 (+/- 0.4)	0.1 (+/- 0.3)	3.4 (+/- 2.6)	0.1 (+/- 1.0)	0.0 (+/- 0.1)	0.0 (+/- 0.0)	0.0 (+/- 0.1)	0.1 (+/- 1.0)

Table 13 - Mean PUFA/pufa in 12-year-old children according to location and region

		12-year-olds									
Region		p	u	f	a	pufa	P	U	F	A	PUFA
I	Rural	0.1	0.0	0.1	0.0	0.2	0.4	0.0	0.1	0.0	0.5
	Urban	0.1	0.0	0.0	0.0	0.1	0.7	0.0	0.1	0.2	1.0
	Regional	0.1	0.0	0.0	0.0	0.1	0.5	0.0	0.1	0.1	0.7
II	Rural	0.2	0.0	0.0	0.0	0.3	0.5	0.0	0.1	0.1	0.7
	Urban	0.1	0.0	0.0	0.0	0.1	1.0	0.0	0.0	0.1	1.1
	Regional	0.2	0.0	0.0	0.0	0.2	0.8	0.0	0.1	0.1	0.9
III	Rural	0.2	0.0	0.0	0.0	0.2	0.7	0.0	0.2	0.1	1.0
	Urban	0.2	0.0	0.0	0.0	0.2	1.1	0.0	0.2	0.2	1.4
	Regional	0.2	0.0	0.0	0.0	0.2	0.9	0.0	0.2	0.1	1.2

		12-year-olds									
Region		p	u	f	a	pufa	P	U	F	A	PUFA
IV-A	Rural	0.1	0.0	0.0	0.0	0.2	0.9	0.0	0.1	0.0	1.0
	Urban	0.1	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.4
	Regional	0.1	0.0	0.0	0.0	0.1	0.6	0.0	0.1	0.0	0.7
IV-B	Rural	0.1	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.9
	Urban	0.3	0.1	0.0	0.0	0.3	0.6	0.0	0.1	0.0	0.7
	Regional	0.2	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.8
V	Rural	0.1	0.1	0.0	0.0	0.2	0.5	0.0	0.1	0.0	0.6
	Urban	0.1	0.0	0.0	0.0	0.1	0.7	0.0	0.1	0.0	0.8
	Regional	0.1	0.1	0.0	0.0	0.1	0.6	0.0	0.1	0.0	0.7
VI	Rural	0.1	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.7
	Urban	0.1	0.0	0.0	0.0	0.1	0.6	0.1	0.0	0.0	0.7
	Regional	0.1	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0	0.7
VII	Rural	0.1	0.1	0.0	0.0	0.2	0.8	0.0	0.1	0.0	1.0
	Urban	0.1	0.1	0.0	0.0	0.1	0.4	0.1	0.0	0.0	0.5
	Regional	0.1	0.1	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.7
VIII	Rural	0.0	0.0	0.0	0.0	0.1	1.3	0.1	0.1	0.1	1.6
	Urban	0.1	0.1	0.0	0.0	0.2	1.0	0.1	0.0	0.0	1.1
	Regional	0.1	0.0	0.0	0.0	0.1	1.2	0.1	0.0	0.0	1.3
IX	Rural	0.1	0.0	0.0	0.0	0.1	0.8	0.2	0.0	0.1	1.1
	Urban	0.1	0.1	0.0	0.0	0.1	0.8	0.3	0.0	0.1	1.2
	Regional	0.1	0.0	0.0	0.0	0.1	0.8	0.3	0.0	0.1	1.1
X	Rural	0.1	0.0	0.0	0.0	0.1	0.9	0.2	0.0	0.1	1.2
	Urban	0.0	0.0	0.0	0.0	0.1	0.9	0.3	0.0	0.1	1.2
	Regional	0.1	0.0	0.0	0.0	0.1	0.9	0.3	0.0	0.1	1.2
XI	Rural	0.5	0.0	0.0	0.0	0.5	1.6	0.0	0.1	0.1	1.8
	Urban	0.3	0.0	0.0	0.0	0.3	1.1	0.0	0.1	0.0	1.3
	Regional	0.4	0.0	0.0	0.0	0.4	1.4	0.0	0.1	0.0	1.5
XII	Rural	0.4	0.0	0.0	0.0	0.5	1.1	0.0	0.0	0.0	1.1
	Urban	0.2	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.1	0.8
	Regional	0.3	0.0	0.0	0.0	0.3	0.9	0.0	0.0	0.0	0.9
CARAGA	Rural	0.1	0.1	0.0	0.0	0.2	0.7	0.1	0.0	0.0	0.9
	Urban	0.2	0.0	0.0	0.0	0.2	0.8	0.2	0.0	0.0	1.0
	Regional	0.1	0.0	0.0	0.0	0.2	0.8	0.2	0.0	0.0	0.9
CAR	Rural	0.2	0.0	0.0	0.0	0.2	0.6	0.0	0.1	0.0	0.7
	Urban	0.1	0.0	0.0	0.0	0.1	0.8	0.0	0.2	0.1	1.1
	Regional	0.1	0.0	0.0	0.0	0.2	0.7	0.0	0.1	0.0	1.2

		12-year-olds									
Region		p	u	f	a	pufa	P	U	F	A	PUFA
NCR	Rural	0.2	0.0	0.0	0.0	0.2	1.3	0.1	0.0	0.0	1.4
	Urban	0.1	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.1	1.2
	Regional	0.1	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.0	1.3
ARMM	Rural	0.3	0.0	0.0	0.0	0.3	0.8	0.0	0.1	0.0	0.9
	Urban	0.2	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.1	1.2
	Regional	0.3	0.0	0.0	0.0	0.3	0.9	0.0	0.0	0.1	1.0
National	Rural	0.2	0.0	0.0	0.0	0.2	0.8	0.1	0.1	0.0	1.0
	Urban	0.1	0.0	0.0	0.0	0.2	0.8	0.1	0.1	0.1	1.0
	National	0.2 (+/- 0.6)	0.0 (+/- 0.2)	0.0 (+/- 1.1)	0.0 (+/- 0.0)	0.2 (+/- 0.6)	0.8 (+/- 1.2)	0.1 (+/- 0.3)	0.1 (+/- 0.3)	0.1 (+/- 0.2)	0.1 (+/- 1.3)

7.3. Dental Trauma

Dental trauma is only measured in the permanent teeth. It is defined as tooth loss structure due to trauma, which is in most cases to be found in the front teeth. Prevalence as well as severity of trauma is assessed by scoring discoloration due to trauma, enamel fracture, enamel and dentin fracture and dental fracture with pulp exposure. The prevalence of trauma gives information on social behaviour, safety of the environment and exposure to contact sports and / or violence.

6-year-old age group

Prevalence of dental trauma in 6-year-old students is low nationwide with 1.1% of children affected. The prevalence in rural areas is lower with 0.9 compared to 1.4 in urban areas.

Half of the traumatized teeth (15 teeth) were scored trauma restricted to enamel, while 14 teeth (46.6%) were diagnosed as traumatized due to discoloration. Only one tooth had fracture with dentin involvement. There were no teeth with open pulp due to trauma.

12-year-old age group

The prevalence of dental trauma in 12-year-old students is 7.8% nationwide. Fractures restricted to enamel constituted the majority of trauma (66%). Sixteen percent (37 teeth among 2,022 children) of the dental trauma is detected by discoloration, which indicated a previous trauma. Nationwide, 18 teeth were scored with dentin fractures and nine teeth with an open pulp due to trauma. There were differences between the regions, with the lowest prevalence of 4.1 in ARMM and a prevalence of 15.3 in NCR

Table 14 - Prevalence in percent of dental trauma in 6 and 12-year-old children according to location and region

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
I	3.3	1.7	2.5	8.5	10.0	9.2
II	-	-	-	1.7	1.7	1.7
III	3.3	5.0	4.2	13.3	6.7	10.0
IV-A	-	1.7	0.8	13.3	8.3	10.8
IV-B	1.7	-	0.8	8.3	5.1	6.7
V	1.7	6.7	4.2	10.0	23.3	16.7
VI	-	1.7	0.8	10.2	5.0	7.6

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
VII	-	-	-	6.8	10.0	8.4
VIII	-	-	-	6.7	-	3.4
IX	-	1.7	0.9	8.3	12.1	10.2
X	1.8	1.7	1.7	5.1	8.3	6.7
XI	-	-	-	6.7	11.7	9.2
XII	1.7	-	0.8	10.0	-	5.0
CARAGA	-	-	-	1.8	-	0.9
CAR	-	-	-	5.0	6.9	5.9
NCR	1.7	3.4	2.5	15.5	15.0	15.3
ARMM	-	-	-	1.6	6.7	4.1
National Level	0.9	1.4	1.1	7.8	7.7	7.8

Table 15 - Cases of dental trauma in 6 and 12-year-old Filipino children related to severity scores on national level

Severity score	6-year-olds			12-year-olds		
	Rural	Urban	National	Rural	Urban	National
Discoloration due to trauma	2	12	14	20	17	37
Enamel fracture	9	6	15	64	81	145
Enamel and dentin fracture	0	1	1	9	9	18
Dental fracture with pulp exposure	0	0	0	6	3	9

7.4. Dental Fluorosis

Dental Fluorosis is a disorder of enamel development caused by ingestion of high amounts of fluoride during the time when teeth are developing in the bone. The disorder is dose-dependent and the clinical appearance is dependent on the age of the child during time of consumption. Fluorosis, varying from white frosty opaque horizontal lines to white-chalky mottling or more diffuse areas of opaque or even brownish discoloration and stained pitting is scored using Deans Community Index of Dental Fluorosis. The decision for scoring is made on the two most severely affected teeth. The examiners used a chart with pictures on the side as a guide in decision making. The results are presented in Table 17.

At each spot, water samples were also collected for determination of the fluoride concentration in the drinking water for any possible correlation to prevalence of fluorosis, caries prevalence and experience. Results of the fluoride concentration in drinking water are presented in Table 18.

6-year-old age group

The national average experience of fluorosis is very low with only 0.6 in the 6-year-old group. Out of 2,030 children, 14 children were reported to show signs of fluorosis. Seven children were diagnosed as mild, six children with moderate fluorosis, and only one child is diagnosed to have severe fluorosis. These findings are in line with the low fluoride concentrations from the water samples gathered in each of the surveyed schools.

12-year-old age group

The prevalence of dental fluorosis on national level in 12-year-old age group is 1.6 nationwide. It is important to highlight that majority of cases is mild, while only 12 cases nationwide were diagnosed as moderate and four as severe. Three out of the four nationwide discovered severe cases of fluorosis were found in Region X.

This outcome, again, is in line with the results of the analysis of water samples for fluoride concentration, which were taken from each location where the survey was carried out. None of the water samples presented a concentration which is classified as high according to WHO standards (Reference)

Table 16 - Cases of 6-year-olds and 12-year-old Filipino children with dental fluorosis according to region and severity scores

Region	6-year-olds				12-year-olds			
	mild	moderate	severe	Total	mild	moderate	severe	Total
I	--	--	--	--	--	--	--	--
II	--	--	--	--	--	--	--	--
III	--	--	--	--	1	--	--	1
IV-A	--	--	--	--	2	1	--	3
IV-B	1	3	--	4	1	--	--	1
V	4	2	--	6	2	4	--	6
VI	-	--	--	--	--	1	--	1
VII	--	--	--	--	--	--	--	--
VIII	--	--	--	--	--	--	--	--
IX	--	--	--	--	3	1	--	4
X	--	--	--	--	2	--	3	5
XI	--	--	--	--	--	--	--	--
XII	--	--	--	--	--	--	--	--
CARAGA	--	--	1	1	--	--	--	--
CAR	--	--	--	--	--	--	--	--
NCR	2	1	--	3	1	3	1	5
ARMM	--	--	--	--	6	2	--	8
National	--	--	--	--	--	--	--	--
No of cases	7	6	1	14	18	12	4	34
prevalence	0.3	0.3	0.0	0.6	0.9	0.6	0.2	1.6

* Empty cell indicates no case found

7.5. Fluoride concentration in drinking water of the selected areas

The influence of fluoride concentration in drinking water and its role in caries prevention has been firmly established through 70 years of intensive research worldwide. In order to understand the caries epidemiological situation of the country and to draw any possible correlation between caries prevalence and caries experience and fluoride concentration in drinking water, samples were taken from each spot surveyed and analyzed using standardized methods for fluoride determination (ion sensitive probe). Each school sent between 1 to 4 samples, depending on the number of main water sources majority of the students were using for drinking purposes.

Out of 131 water samples, 130 samples present concentrations between 0.04 ppm and 0.6 ppm. Only one sample is found above this level. Highest level presenting 1.2 ppm fluoride is found in New Isabela, Division of Sultan Kudarat in Region XII. None of the children in this school where the water sample came from presented any fluorosis. Lowest levels of 0.04 ppm fluoride in water is found in the tap water of Baguio Central School in Baguio, CAR.

Taking into account that 0.7 ppm is seen as the optimal fluoride concentration in drinking water in subtropical climate according to WHO Standard (3), it can be stated that all but one water samples represent fluoride concentrations which are categorized as below optimal, with respect to caries prevention.

Table 17 - Fluoride Concentration in Water Samples Collected During National Oral Health Survey in the Randomly Selected Schools

	School	District	Division	Class	Range (Fluoride Concentration in Water in ppm)	Mean In ppm
Region 1						
01	Cagayan CS	Caoayan	Ilocos Sur	U	0.12 0.11 0.04	0.09
02	Malassiqui CS	Malassiqui	Pangasinan I	U	0.13	0.13
03	Cupang ES	Sto. Tomas	La Union	R	0.44 0.3	0.37

	School	District	Division	Class	Range	Mean
04	Payas ES	Sta. Barbara	Pangasinan I	R	0.32	0.32
Region II						
05	Dupax del Sur CS	Dupax del Sur	Nueva Viscaya	U	0.02 0.28	0.15
06	La Paz ES	Cabatuan East	Isabela	R	0.28 0.28	0.28
07	Cabagan Science CS	Cabagan	Isabela	U	0.19 0.12	0.16
08	Casibarag ES	Cabagan	Isabela	R	0.19 0.12	0.16
Region III						
09	Pura Comm. ES	Pura	Tarlac	R	0.27 0.2	0.24
10	Rizal CS	Rizal	Nueva Ecija	U		
11	San Agustin ES	Magalang	Pampanga	R	0.2 0.2	0.2
12	Tabing Bakod ES	Sta. Maria	Bulacan	U	0.38 0.3	0.34
Region IVA						
13	San Isidro ES	Taytay	Rizal	R	0.19 0.04	0.12
14	Tayabas West CS III	Tayabas	Quezon	U	0.09	0.09
15	San Vicente ES	Angono	Rizal	R	0.26 0.26	0.26
16	Ibaan CS	Ibaan	Batangas	U	0.24 0.4	0.32
Region V						
17	Mayon ES	Tabaco West	Tabaco City	U	0.09 0.11	0.1
18	Lower Bonmga	Bacacay West	Albay	R	0.33 0.3	0.32
19	Alcala ES	Danaga N.	Albay	R	0.4 0.38	0.39
20	Malawag ES	Naso	Camarines Sur	U	0.2 0.26 0.09	0.18

	School	District	Division	Class	Range	Mean
Region VI						
21	Bago City ES	Bago City II	Bago City	U	0.6 0.28 0.6 0.35	0.46
22	Ibajay CES	Ibajay I	Aklan	U	0.27 0.11	0.19
23	Lousina ES	Bago City IV	Bago City	R	0.14	0.14
24	Daan Banwa ES	Victorias II	Negros Occ.	R	0.19 0.17 0.18	0.18
Region VII						
25	Dagohoy Central ES	Dagohoy	Bohol	U	0.12 0.15	0.14
26	Minglanilla Central ES	Minglanilla I	Cebu	U	0.46	0.46
27	North City ES	Dumaguete City North	Dumaguete City	R	0.3 0.33	0.32
28	Talibon Central ES	Talibon I	Bohol	R	0.24 0.35	0.30
Region VIII						
29	Tanauan I CS	Tanauan I	Leyte	U	0.03 0.07 0.06	0.05
30	Albuyog South CS	Albuyog south	Leyte	U	0.07 0.09	0.08
31	Alegria ES	San Isidro	Northern Samar	R	0.37 0.37	0.37
32	Palale ES	Mac Arthur	Leyte	R	0.1 0.14	0.12
Region IX						
33	Dalangin ES	Titay	Zamboanga, Sibugay	R	0.05	0.05
36	Zamboanga West CS	Zamboanga Central	Zamboanga	U	0.07 0.07	0.07
Region X						
37	Kimaya ES	Jasaan	Misamis Oriental	R	0.09 0.08	0.09

	School	District	Division	Class	Range	Mean
38	North I CES	Iligan City North I	Iligan City	U	0.05 0.05 0.08 0.09	0.07
39	Catadman ES	Ozamis City District II	Ozamis City	R	0.05 0.07	0.06
40	Oroquieta CS I	Oroquieta City	Oroquieta City	U	0.05 0.55	0.3
Region XI						
41	Matina Aplaya ES	Matina	Davao City	U	0.1	0.1
42	T. Awad Echeveria ES	Buhangin	Davao City	R	0.07 0.15	0.11
43	Sulop CES	Sulop	Davao del Sur	U	0.18 0.15	0.17
44	Leon A. Garcia Sr. ES	Talomo	Davao City	R	0.09	0.09
Region XII						
45	Keytodac CS	Lebak Central	Sultan Kudarat	U	0.16 0.21 0.2	0.19
46	San Felipe ES	Tantangan	South Cotabato	R	0.2 0.2	0.2
47	New Isabela CES	Tacurong West	Sultan Kudarat	U	0.4 1.2 0.22 0.14	0.49
48	Patindeguen ES	Midsayap Central	North Cotabato	R	0.09 0.07	0.08
Region CARAGA - 13						
49	Kalok –an ES	Magallanes	Agusan del Norte	R	0.09 0.06	0.09
50	Talacogon CES	Talacogon	Agusan del Sur	U	0.12 0.13 0.14	0.13
Region IV B – 14						
54	New Ibajay	El Nido	Palawan	R	0.6	0.55

	School	District	Division	Class	Range	Mean
	ES				0.5	
56	Santa Cruz South CS	Sta. Cruz South	Marinduque	U	0.23 0.39	0.31
Region CAR – 15						
57	Penarrubia CS	Penarrubia	Abra	U	0.17 0.18	0.18
58	Dona Nicasia Puyat ES	Mabini	Baguio City	R	0.14 0.11	0.13
59	Baguio CS	Baguio Central	Baguio City	U	0.07 0.04	0.06
60	Camp 6 ES	Tuba	Benguet	R	0.05	0.05
Region NCR - 16						
61	Culiat ES		Quezon City	U	0.08 0.07	0.08
62	San Lorenzo Ruiz ES		Pasig City	U	0.08 0.08	0.08
63	Bagumbayan ES		Malabon	R	0.07 0.06	0.07
64	Panghulo ES I		Valenzuela	R	0.07 0.11	0.09
Region ARMM - 17						
65	Sandakan ES	Sultan Kudarat I	Maguindanao	R	0.17 0.17	0.17
66	Ramcor	Paglat	Maguindanao	U	0.27	0.27
67	Kauran ES	Poona- Bayabao	Lanao del Sur I	R	0.1 0.13 0.13	0.12
68	Tongsinah CES	East Tugaya	Lanao del Sur II	U	0.06 0.03	0.05

7.6. Oral health impact on general health and quality of life

7.6.1. Nutritional Status / Body Mass Index and their relation to Oral Health

Nutritional status

BMI

The weight and height of the 12-year-old children were measured for Body Mass Index in order to obtain information on the nutritional status of the children. One school had to be excluded due to a wrongly calibrated weighing scale.

The mean BMI on national level is 16.6 with a variation between 15.8 in Region IV B and 17.8 in Region III.

Using the cut off points of the ISR, which is used by the Dep Ed and DOH in the Philippines, 72% of the children showed a normal body constitution. Of the 12-year-old children, 27% belonged to the category below normal, interestingly higher percentage in boys (31%) than in girls (24%). This difference in percentage is statistically significant. Of the total sample, 1% belonged to the category above normal.

Table 18 - Mean BMI in 12-year-old Filipino children according to location and region

Region	12-year-olds		
	Rural	Urban	Regional
I	16.0	17.4	16.7
II	16.8	16.7	16.8
III	17.5	18.1	17.8
IV-A	16.8	16.6	16.7
IV-B	15.3	16.4	15.8
V	15.8	17.0	16.4
VI	16.5	17.1	16.8
VII	16.8	17.1	16.9
VIII	16.5	16.4	16.5
IX	15.8	16.0	15.9
X	16.6	16.9	16.7
XI	16.7	16.3	16.5
XII	15.6	16.7	16.1
CARAGA	15.6	16.6	16.1

	12-year-olds		
Region	Rural	Urban	Regional
CAR	16.7	16.9	16.8
NCR	16.6	17.2	16.9
ARMM	16.9	16.0	16.5
National	16.4 (+/-2.4)	16.8 (+/-3.0)	16.6 (+/-2.7)

Table 19 - BMI grouping of 12-year-old Filipino children according to location and region

	12-year-olds			
Region	BMI Grouping	Rural	Urban	Regional
I	Below Normal	37.3%	13.3%	25.2%
	Above Normal	0.0%	1.7%	0.8%
II	Below Normal	13.8%	26.7%	20.3%
	Above Normal	1.7%	3.3%	2.5%
III	Below Normal	10.0%	8.3%	9.2%
	Above Normal	1.7%	5.0%	3.3%
IV-A	Below Normal	25.0%	26.7%	25.8%
	Above Normal	1.7%	0.0%	0.8%
IV-B	Below Normal	45.0%	32.2%	38.7%
	Above Normal	0.0%	0.0%	0.0%
V	Below Normal	43.3%	20.0%	31.7%
	Above Normal	0.0%	0.0%	0.0%
VI	Below Normal	27.1%	25.0%	26.1%
	Above Normal			

	12-year-olds			
Region	BMI Grouping	Rural	Urban	Regional
	Above Normal	0.0%	0.0%	0.0%
VII	Below Normal	22.0%	31.7%	26.9%
	Above Normal	0.0%	1.7%	0.8%
VIII	Below Normal	27.1%	33.3%	29.1%
	Above Normal	1.7%	0.0%	1.2%
IX	Below Normal	30.0%	44.8%	37.3%
	Above Normal	0.0%	1.7%	0.8%
X	Below Normal	26.3%	36.7%	31.6%
	Above Normal	3.5%	3.3%	3.4%
XI	Below Normal	21.7%	28.3%	25.0%
	Above Normal	1.7%	3.3%	2.5%
XII	Below Normal	41.7%	16.7%	29.2%
	Above Normal	0.0%	0.0%	0.0%
CARAGA	Below Normal	38.6%	26.7%	32.5%
	Above Normal	0.0%	0.0%	0.0%
CAR	Below Normal	21.7%	15.5%	18.6%
	Above Normal	1.7%	0.0%	0.8%
NCR	Below	26.8%	28.3%	27.6%

Region	12-year-olds			
	BMI Grouping	Rural	Urban	Regional
	Normal			
	Above Normal	0.0%	1.7%	0.9%
ARMM	Below Normal	27.9%	32.2%	30.0%
	Above Normal	1.6%	0.0%	0.8%
National	Below Normal	28.6%	26.0%	27.3%
	Above Normal	0.9%	1.3%	1.1%

Table 20 - BMI grouping of 12-year-old Filipino children according to gender distribution

Gender		National
Male	Below normal	31%
Female	Below normal	24%

7.7. BMI groupings and dentinogenic infections

Table 22 presents the comparison of the mean BMI by dentinogenic infection. It is observed that children with dentinogenic infection have lower mean BMI values compared to children without infection. This provides some evidence on the relationship of general health (nutrition) and oral health.

Table 21 - Comparison of mean BMI by dentinogenic infections

Presence of dentinogenic infections	Mean BMI	SD	N
With dentinogenic infection	16.3	2.7	1127
Without dentinogenic infections	17.0	2.6	895

* $p = 0.000$

7.8. Hygiene deficiency related diseases

Prevalence of lice

The hair of all students was examined for the prevalence of lice in order to measure hygiene deficiency-related poverty diseases. Prevalence of lice provides information about the living conditions. Access to water and sanitation facilities are seen as essential for substantial improvement in general and oral health..

31.1% of all examined students suffer from lice which indicates the poor hygiene status of Filipino students.

Huge differences were observed between the regions with nearly half of the students (47.1%) in Region VII suffer from these parasites, while only 10.9% of the students in NCR revealed lice in their hair.

Table 22 - Prevalence of lice in the hair of 6 and 12-year-old Filipino children according to location and region

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
I	33.3	45.0	39.2	37.3	33.3	35.3
II	39.3	28.6	33.9	34.5	30.0	32.2
III	43.3	36.7	40.0	25.0	43.3	34.2
IV-A	33.3	11.7	22.5	38.3	15.0	26.7
IV-B	21.7	22.4	22.0	11.7	20.3	16.0
V	46.7	28.3	37.5	38.3	53.3	45.8
VI	38.3	16.7	27.5	33.9	28.3	31.1
VII	36.7	57.6	47.1	52.5	63.3	58.0
VIII	42.4	38.3	40.3	40.0	45.6	42.7
IX	34.5	37.9	36.2	35.0	34.5	34.7
X	31.6	26.7	29.1	25.4	16.7	21.0
XI	26.7	18.3	22.5	21.7	18.3	20.0
XII	35.0	25.0	30.0	35.0	16.7	25.8
CARAGA	16.9	28.8	22.9	24.6	35.0	29.9
CAR	35.0	20.0	27.5	36.7	37.9	37.3
NCR	10.0	11.9	10.9	6.9	15.0	11.0
ARMM	40.0	38.3	39.2	26.2	28.3	27.3
National level	33.2	28.9	31.1	30.8	31.4	31.1

7.9. Self reported problems in the oral cavity

To measure the impact of oral health on the quality of life of the children, several pre-tests were performed in order to formulate the adequate questions to get reliable answers with respect to whether the children have pain, if their sleep and learning are affected, the frequency and duration of pain and discomfort. The pre-test resulted in several changes and simplifications. One reliable and unique understandable question was : *“Do you have any problems in your mouth at the moment?”*

6-year-old children

Nationwide, 20.7% of the six years old children answered with “yes”. Huge variations between the regions were observed with three regions (IVB, V, NCR,) showing percentages lower than 10.0%. All of these regions were examined by the same team, which may indicate some examiner bias. Highest percentage of self-reported problem was reported in the CARAGA region, with 46.6% of the first graders reported to have problems in their mouth.

12-year-old children

Nationwide 16.4% of 12-year-old children reported to have a problem in their mouth during the time of interview. This high percentage of children reflects the impact of oral health on children’s well-being and is in line with statements in the DepEd reports that toothache is the main reason for being absent from school.

Three regions show low prevalences. These regions have been examined by the same examiners, which may indicate some examiner bias during questioning, or not leaving enough time for children to answer.

Table 23 - Prevalence in percent of 6 and 12-year-old Filipino children with self-reported oral problems

Region	6-year-olds			12-year-olds		
	Rural	Urban	Regional	Rural	Urban	Regional
I	40.0	18.3	29.2	15.3	16.7	16.0
II	29.5	17.5	23.4	17.2	21.7	19.5
III	15.0	36.7	25.8	15.0	33.3	24.2
IV-A	16.7	8.3	12.5	6.7	3.3	5.0
IV-B	5.0	5.2	5.1	1.7	1.7	1.7
V	6.7	5.0	5.8	3.3	1.7	2.5
VI	38.3	18.3	28.3	27.1	20.0	23.5
VII	31.7	20.3	26.1	15.3	28.3	21.8
VIII	16.9	15.0	16.0	30.0	17.5	23.9
IX	36.2	36.2	36.2	21.7	25.9	23.7
X	24.6	28.3	26.5	23.7	13.3	18.5
XI	13.3	10.0	11.7	15.0	31.7	23.3
XII	16.7	11.7	14.2	10.0	20.0	15.0
CARAGA	59.3	33.9	46.6	19.3	20.0	19.7
CAR	31.7	23.3	27.5	10.0	19.0	14.4
NCR	5.0	10.2	7.6	17.2	6.7	11.9
ARMM	10.0	10.0	10.0	11.5	15.0	13.2
National level	23.3	18.1	20.7	15.2	17.4	16.3

7.10. Self-reported dental problem and oral health

The mean DMFT/dmft, DMFS/ dmfs and PUFA/ pufa values were compared among self-reporters and non-reporters and are presented in Tables 25 and 26 respectively for children ages 6 years old and 12 years old. Children with self-reported dental problems were found to have significantly higher mean DMFT/ dmft, DMFS/dmfs and PUFA/pufa scores, than non-reporters.

Table 24. Comparison of oral health status of 6-year-old school children by self-reported dental problems

Oral Health indicators	Yes with a self-reported dental problem			No self-reported dental problem			p value 2 tailed	95 % Confidence Interval		Remark
	N	Mean	SD	N	Mean	SD		lower	higher	
dmft	420	9.0	3.99	1610	8.3	4.19	0	0.23	0.23	s
DMFT	420	0.8	1.18	1610	0.6	1.04	0.05	0.00	0.25	s
pufa	420	3.7	2.52	1610	3.3	2.57	0	0.17	0.72	s
PUFA	420	0.2	0.63	1610	0.1	0.49	0	0.03	0.14	s
dmfs	420	29.9	16.31	1610	27.7	16.9	0.01	0.15	4.02	s
DMFS	420	1.4	3.08	1610	1.0	2.29	0.01	0.79	0.70	s

Table 25. Comparison of oral health status among 12-years-old by self-reported dental problems

Oral Health Indicator	Yes with self reported dental problem			No self reported dental problem			P value	95% CI difference		Remark
	N	Mean	S.D	N	Mean	S.D		Lower	Upper	
PUFA	330	1.5	1.5	1692	0.9	1.21	0	0.48	0.82	S
DMFT	330	4.0	3.4	1692	2.7	2.79	0	0.95	1.74	S
DMFS	330	10.5	9.64	1692	7.1	8.24	0	2.29	4.52	S

8. International comparison with respect to dental caries

Dental caries is a disease affecting people all over the world. There is no caries-free population worldwide. A huge change in caries trends is observed in the last twenty years. While prevalence and severity was high in Western countries three decades ago, the implementation of preventive measures, mainly the widespread use of fluoride toothpaste, has shown dramatic reductions in dental caries in recent years. The same trend is not being

observed in developing countries and in disadvantaged communities all over the world. Caries levels remain high. Majority of people in low income countries do not benefit from exposure to optimal levels of fluoride.

For comparison worldwide, the DMFT index for 12-year-olds was used. Comparison between surveys carried out in different countries had to be done with caution. WHO examination methods and tools have been changed in 1998 which makes any comparison difficult. Local conditions, like fluoride concentration in drinking water, nutritional habits, exposure to preventive measures, oral health care system including human and financial resources have a huge impact on the disease level. The distribution of the D, M, and F component of the DMFT index gives information on the oral health care delivery system. However, it is needed and important to present the Philippine figures in the context of international figures. DMFT figures presented here were taken from “WHO Oral Health Country / Area Profile Programme” which gives information on Oral Health condition and oral health workforce globally.

Caries prevalence and experience of 12-year-old children according to WHO Data bank.

Table 26. Prevalence ratio of other health indicators with self reported dental problems among 12-years-old children.

Country	Year	Caries Prevalence in %	DT	MT	FT	Mean DMFT
Philippines **	2006	82.2	2.7	0.2	0.0	2.9
Asian Countries						
Malaysia	1997-2000	55.1	0.5	0.1	1.1	1.6
Indonesia	1995	76.9	1.68	0.42	0.10	2.21
Thailand**	2000-01	57.3	1.14	0.07	0.43	1.64
Nepal**	2004	25.6	0.42	0.01	0.03	0.45
Bangladesh	2000	46.4	0.9	0.01	0.04	1.00
Sri Lanka	1994-95	53.2	1.20	0.10	0.20	1.40
Japan	1999	n.a.	0.7	0.0	1.8	2.4
China	1995 – 96	45.8	0.91	0.01	0.11	1.03
European Countries						
Germany ⁷ (**)	2005	29.2	0.2	0.0	0.5	0.7
UK(**)	2002	53.7	n.a.	n.a.	n.a.	1.5

** Use of ball end probe

9. Oral Health Trends in the Philippines with special respect to the most common oral diseases: caries and periodontal disease

Dental caries

Looking at trends in oral health and comparing the results of the 12-year-olds of the 1998 survey with the results in 2006 National Oral Health Survey, a reduction in caries experience of 37% can be assessed. Due to changed WHO examination methods such a comparison cannot be drawn. In order to estimate the impact of the changed examination methods, two hundred and forty two 12-year-old children were examined by two different examiners, each of them being a calibrated examiner either in the 1998 or in the 2006 survey. The results of this double examination showed a difference of 30% with a confidence interval of 24% to 37%. This result clearly reflect that the reduction of dental caries is to be explained by the methodology. No conclusion can be drawn that oral health status is improving in the Philippines.

Periodontal disease

Periodontal disease was only recorded for the group of 12-year-olds. Examination methods had not changed and results of previous surveys can be compared with the recent one. It is important to notice that prevalence as well as severity have increased between 1998 and 2006.

While in the 1998 survey 33.1% of all examined 12-year-olds presented healthy gums, in 2006 only 26% of the 12-year-olds were healthy in all sextants. Comparing the severity of periodontal disease as measured by the mean number of sextants per subject affected by periodontal conditions, the trend is the same.

While in the 1998 survey the mean number of healthy sextants was 4.4, the recent survey presented a mean number of healthy sextants of 3.6 per examined student.

General Recommendation

Despite the fact that measures to control oral diseases are available, there has not been an improvement in oral health among children for the last decades.

In order to address this sad reality, the Department of Education has confirmed to advocate that twice a day toothbrushing with fluoride toothpaste is necessary for healthy teeth and improvement of quality of life for Filipino children.

Healthy habit forming activities like daily fluoride toothbrushing and daily handwashing with soap are to be carried out in all public elementary schools in the country. These measures are the appropriate action to reorient health services towards affordable preventive measures and will lead towards health and education related to the Millenium Development Goals

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