



AMERICAN UNIVERSITY OF BEIRUT

DISPARITIES IN ACCESS TO DENTAL CARE: A CROSS-  
SECTIONAL STUDY IN BEIRUT SECONDARY SCHOOL  
CHILDREN

by  
MOHANNAD NAWAF KHANDAKJI

A thesis  
submitted in partial fulfillment of the requirements  
for the degree of Master of Science in Epidemiology  
to the Department of Epidemiology and Population Health  
of the Faculty of Health Sciences  
at the American University of Beirut

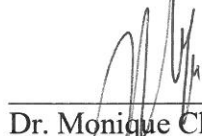
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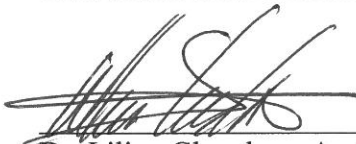
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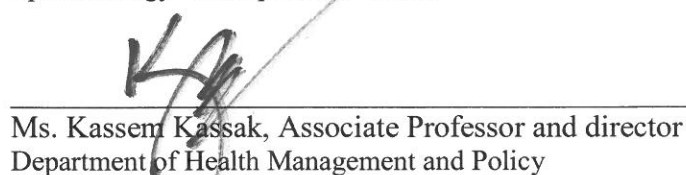
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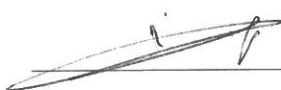
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## ACKNOWLEDGMENTS

**“No matter what accomplishments you make, somebody helped you”**

Althea Gibson

This dissertation is the culmination of many great minds and hard work. Therefore I owe my gratitude to all those people who have made this work possible and supported me as I maneuvered through its unfamiliar terrain.

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# AN ABSTRACT OF THE THESIS OF

Mohannad Nawaf Khandakji for Master of Science  
Major: Epidemiology

Title: Disparities in access to dental care: a cross-sectional study in Beirut secondary school children

## Introduction:

Disparities in the utilization of dental services among children have a particular epidemiological significance: dental decay is the most prevalent disease in childhood and dental care is the most prevalent unmet health need among children.

## Objective:

The aim of this study is to assess the disparities in the utilization of dental services and its determinants among secondary school children attending private (PVS) and public schools (PBS) in Beirut-Lebanon.

## Methods:

A comparative cross-sectional study of 948 secondary school adolescents aged 11-18 years attending public and private schools (514 PVS and 434 PBS) was conducted. Data were collected through self-administered structured questionnaires targeting parents and the adolescents, and through dental examination of the adolescents. Andersen healthcare utilization model was used to define the determinants of dental care utilization. The questionnaires included questions on child- and family predisposing characteristics (demographics and dental beliefs), enabling factors (economic indicators, dental insurance status, and awareness of affordable dental centers), perceived need (child perception of his/her oral health status) and utilization of dental services (12 months utilization of dental services, utilization of preventive services and utilization of curative services). The modified index for orthodontic treatment need (IOTN) and the score of Decayed, Missing and Filled teeth (DMFT) were measured through calibrated examiners. Bivariate and multivariable analyses were performed to explore the determinants of dental services utilization. Unadjusted and adjusted Odds Ratios and their 95 % Confidence interval were reported

## Results:

Public school students were 3 times more likely to have never been examined by a dentist compared to private schools students. The dental service utilization during the previous year was estimated to be 65% and it was significantly lower for PBS than PVS (52% and 75% respectively, p-value 0.0007). The majority of children in PBS visited the dentist for emergency care like dental caries (44%) or pain (32%). However, in PVS the majority of children went for checkup (40%) followed by caries (33%) and dental

cleaning (21%). The utilization of preventive care was significantly higher among PVS adolescents than PBS (51% and 32% respectively, p-value <0.0001). The most commonly reported reasons for not utilizing dental services in the past year were absence of need (70%) followed by treatment cost (37%). Private school type and perception of oral health importance showed a positive association with last year utilization (OR 1.6 and 2.4 respectively), while presence of decays was inversely associated with last year utilization (OR 0.6). Adolescent's dental need was negatively associated with utilization of preventive dental services and positively with curative services. Both school type and parental education predicted utilization of preventive services. Adjusting for other co-variates marital status was significantly associated with utilization of curative services (OR 3.5).

*Conclusion:*

This study demonstrates the presence of social disparities in dental care among adolescents in Beirut. Adolescents attending private schools in Beirut are more likely to utilize dental services in general and preventive services in particular. School type appears to explain both the use of preventive services and the overall yearly utilization independent of the effects of all other predisposing, enabling, or need factors. Predisposing characteristics play significant roles in predicting the use of preventive services, whereas individual need is a significant driver for the use of curative dental services. Short term recommendations could include community based preventive programs such as dental sealant and public school programs. Long term recommendation could include an oral health program addressed in the context of a comprehensive country wide prevention program, incorporated into the Non Communicable Disease Unit (NCDU) of the Ministry of Health.

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## ABBREVIATIONS

AAO	American Association of Orthodontists
CCS	Cooperative of Civil Servants
CDC	Centers for Disease Control and Prevention
CDS	Community Dental Services
CI	Confidence Interval
DALYs	Disability Adjusted Life Years
DMFT	Decayed, Missing and Filled Teeth
EMRO	Eastern Mediterranean Regional Office
IOTN	Index Of Orthodontic Treatment Need
ISF	Internal Security Forces
LDA	Lebanese Dental Association
MEHE	Ministry of Education and Higher Education
MEPS	Medical Expenditure Panel Survey
NCDU	Non Communicable Disease Unit
NGO	Non-Governmental Organization
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NSSF	National Social Security Fund
OR	Odds Ratio
PBS	Public School Sample
PVS	Private School Sample
SES	Socio Economic Status
UK	United Kingdom
US	United States
WHO	World Health Organization

*Dedicated to*

*the*

*Memory of My Late Father*

**Dr. Nawaf Wasfi Khandakji**

*For giving me the greatest gift anyone  
could give another, for believing in me  
He was, and always will be  
my role model*

*My Mother*

**Dr. Nahed Badee Dakouri**

*For her unconditional love and  
support in all my endeavors*

*My Brother Ammar*

*I would not be who I am today  
without his love and support*

*My Sister Reem*

*For being the best sister  
anyone could ask for*



# CHAPTER 1

## INTRODUCTION

### **1.1. Background**

In spite of improvements in medical care and public health prevention initiatives, health disparities remain a global issue. Elimination of health disparities was one of the main public health objectives of Healthy People 2010; a nationwide program set by the United States Department of Health and Human Services (US Department of Health and Human Services, 2000). This goal was expanded further in Healthy People 2020 to achieve health equity, eliminate disparities, and improve the health of all groups (US Department of Health and Human Services, 2012). These goals underscore continuous research findings indicating the persistence of disparities in health outcomes and health care access among individuals from various categories of socioeconomic status and ethnicity (US Department of Health and Human Services, 2000).

Oral health problems such as dental caries and periodontal disease are major public health issues with high prevalence and incidence in all regions of the world, affecting nearly 100% of the adult population in the majority of countries and exhibiting considerable disparities within and between countries (Marcenes et al., 2013; Petersen, 2003). The substantial impact of poor oral health on individuals and communities results from pain, suffering, impairment of function and reduced quality of life.

Dental caries, otherwise known as tooth decay, is a progressive disease that increases in prevalence and extent as children grow (US Department of Health and Human Services, 1995). Roughly, one fifth of preschoolers, half of second graders and almost two thirds of ninth graders have experienced tooth decay (one or more obvious cavities or fillings) (US Department of Health and Human Services, 1995). Internationally, the greatest burden of oral disease is on the underprivileged and unfortunate population groups (Petersen, 1990, 2005), reflecting distinct risk profiles across countries driven by their living conditions, lifestyles, environmental factors and the availability to benefit from preventive oral health care systems (Petersen, 1990, 2005). Poor children have been estimated to have 4.8 times more decayed teeth than children whose family income is three times greater than the poverty level (Edelstein, 2002). Moreover, poor and underprivileged children also experience more extensive destruction of their dentition when affected, higher rates of untreated disease, and a higher frequency of dental pain than do their more privileged peers (Edelstein, 2002; Petersen, 2003). This has recently been demonstrated in Beirut, with higher burden of dental disease found in children attending public schools than those attending private schools (Moukarzel, 2012).

Despite the high burden of oral disease, dental care has been recognized as the most prevalent unmet health need (Berk, Schur, & Cantor, 1995; Kelly, Binkley, Neace, & Gale, 2005; Simpson, Bloom, Cohen, & Parsons, 1997), 4 times more common than the unmet need for prescription drugs or prescription glasses (Bloom, Cohen, & Freeman, 2012). Similar to oral disease, disparities in dental care also increase with age, minority status, and lower levels of income (Edelstein, 2002; McGinnis & Lee, 1995). Therefore, children who

are disadvantaged by poverty face a double burden of both poor oral health as well as a lack of dental care.

Access to dental care services is a complex phenomenon that involves insurance coverage and affordability; availability and geographical accessibility of providers; appreciation of health services by parents, community, and culture; and perceived need for health services. It has been reported that children with no dental insurance were 3 times more likely to have an unmet dental need than others with either public or private insurance (Waldman, 1997). In contrast children from middle- and high-income families (versus poor or near-poor children) experienced twice as many preventive visits, including cleanings, fluoride treatments, or dental sealants (Edelstein, 2002). In many developing countries, the general population does not benefit from preventive oral health programs, leaving them to rely heavily on the services provided by the private sector (Petersen, 2003).

## **1.2. The Case of Lebanon**

The prevalence of dental caries in Lebanon is high. It has been estimated at 93% among 12 year olds and 96.8% among 15 year olds, with an overall DMFT index (The total number of Decayed, Missing and Filled Teeth) of 5.0 and 7.6 respectively (Doumit & Doughan, 2002). As a less developed country, Lebanon is expected to experience an increase in the incidence of dental caries in the near future because of a growing consumption of sugars coupled with inadequate exposure to preventive dental health measures (Petersen, 2003).

More recently, disparities in the burden of oral disease have been reported in research comparing the DMFT in elementary school children of public and private schools in Beirut, highlighting a DMFT index in public schools that was almost double that in private schools (Moukarzel, 2012). In a parallel study, the DMFT scores of these children were correlated with the utilization of dental services and parental willingness to invest in various dental insurance schemes (Karam, 2013). This same study reported disparities in the utilization of dental services, with students in private schools scoring nearly twice higher access than those in public schools (Karam, 2013). However, this association may even be an underestimation since all the participating public schools were approached solely through the NGO “Ajialouna” that offers free preventive dental measures for all enrolled children. The resulting increase in the probability of access to dental services among these children masks the actual disparity between children in private schools and those in public schools not benefiting from such services. It is worth noting that this NGO does not cover all public schools in Beirut and therefore provides such dental services to only a small percentage of children. Therefore, to build on the established inequities in younger ages (Karam, 2013; Moukarzel, 2012), this study aims to complement and support previous findings by assessing disparities in oral health among an older sample of children. In addition to an expected pattern of disparity between private and public schools, and given the established progression of dental disease with increasing age (Edelstein, 2002), the expected higher DMFT scores in older children attending secondary schools would suggest differing profiles of utilization of dental services and may necessitate different insurance strategies for their parents. The study also aims at assessing the determinants of

the utilization of dental services among children aged 12-17 years to allow for a more comprehensive understanding of the inequities in oral health that are being assessed by the ongoing research. This scheme shall provide a framework for strategies to address these inequalities.

## CHAPTER 2

### LITERATURE REVIEW

#### **2.1. Burden of Oral Health Problems**

##### ***2.1.1. Global***

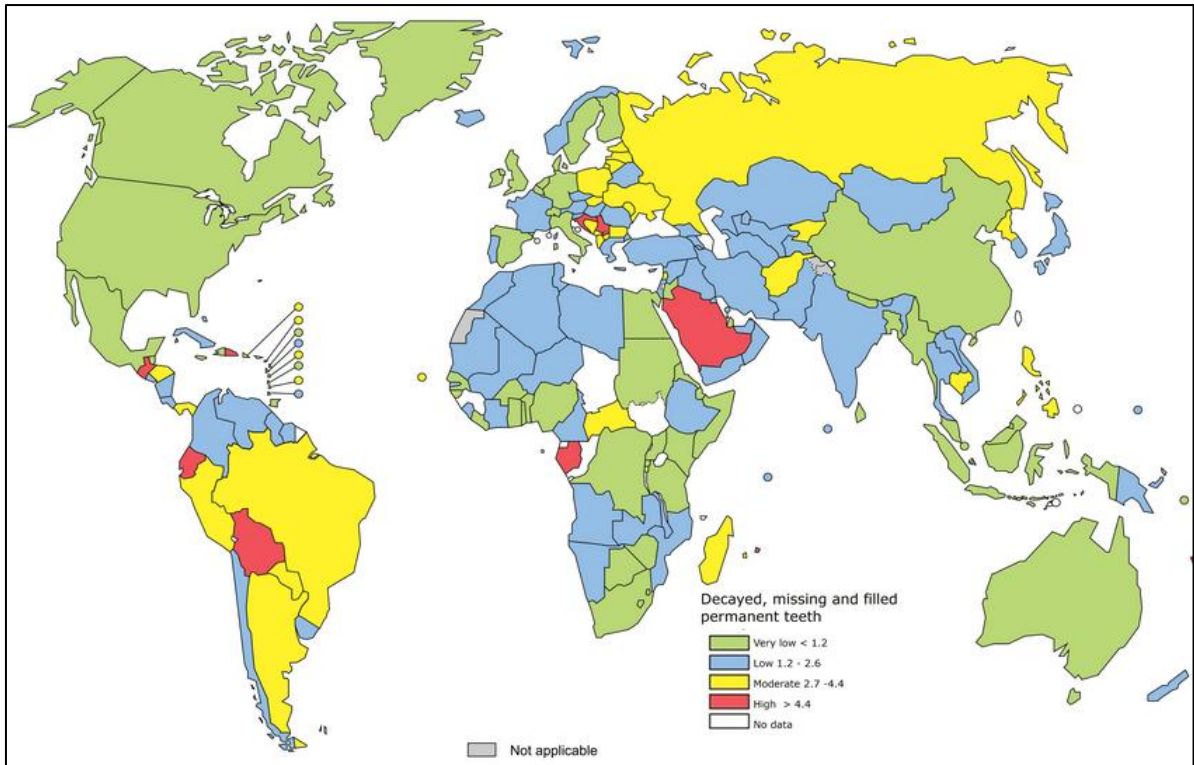
Despite the effect of dental health on the functional, psychological and social dimensions of an individual's overall health status (Gift & Atchison, 1995), oral health problems have been and are still an area of major public health concern all over the world and one of the most common health problems (Gulliford & Morgan, 2013; Health, Services, Prevention, & Promotion, 2012; McGinnis & Lee, 1995). Oral health problems collectively affected 3.9 billion people in 2010, and accounted for 15 million disability adjusted life-years (DALYs) globally for the same year. In fact DALYs due to oral conditions increased by 20.8% in 2010 compared with 1990 (Gulliford & Morgan, 2013), with the largest increases observed in Eastern (51.7%) and Central Sub-Saharan Africa (50.5%) and Oceania (47.4%) (Gulliford & Morgan, 2013). Although the Global Burden of Disease (GBD) approach might have underestimated the burden of oral conditions (Gulliford & Morgan, 2013), they all still ranked among the top 100 detailed causes of DALYs in 2010 (Gulliford & Morgan, 2013; Marcenes et al., 2013).

Dental caries, the leading form of oral disease (World Health Organization, 2009), affects 60 to 90% of children and nearly 100% of the adult population in the majority of

countries (Petersen, 2003). In fact untreated caries in *permanent teeth* was the most prevalent condition evaluated for the entire Global Burden of Disease (GBD) 2010 Study, with global prevalence of 35% for all ages combined. Dental caries is a progressive disease that increases with age. Findings of American national surveys showed that children 15–18 years of age have 3.5 times more decayed permanent teeth as do children aged 6–14 years (Edelstein, 2002). Data from the U.S Third National Health and Nutrition Examination Survey (NHANES III) revealed that an increasing disease burden is endured by a shrinking segment of the population, so that 80% of dental caries is confined among one quarter of children, of whom greater proportions are from lower socioeconomic classes (Kaste et al., 1996). Correspondingly, more recent studies also reported that the greatest burden of oral disease is on the underprivileged and unfortunate population groups (Edelstein, 2002; Petersen, 1990, 2003, 2005; Petersen & Ogawa, 2012).

The prevalence of dental caries worldwide is illustrated by the Decayed, Missing and Filled Teeth index (DMFT) in 12 year-olds around the globe (Figure 2.1.). The Global mean DMFT value for 12 year olds decreased from 2.43 in 1980 to 1.61 in 2004 (Bratthall, 2005; Leclercq, Barmes, & Sardo Infirri, 1987). However, from 2004 to 2011, the global mean DMFT increased from 1.61 to 1.67, which is about 4 percent (Natarajan, 2011). (Table 2.1.) In 2011, the mean DMFT among children ranged from 1.2 in Africa to 2.4 in the Americas and 1.95 in Europe (Natarajan, 2011). Nevertheless, it is noteworthy that the level of dental caries is increasing in developing countries, particularly in Africa due to the increase in sugar consumption and inadequate exposure to fluorides (Natarajan,

2011; Petersen, Bourgeois, Ogawa, Estupinan-Day, & Ndiaye, 2005). The WHO region specific weighted DMFT among 12-year-olds for the eastern Mediterranean Region (EMRO) was estimated to be 1.63 in 2011 (Natarajan, 2011), which is similar to the global DMFT score measure mentioned earlier. DMFT scores within EMRO differed between different countries; being high in Saudi Arabia and low in most of the EMRO countries like Jordan, Sudan, Egypt, and Djibouti (Natarajan, 2011) (Figure 2.1.).



**Figure 2.1.:** Dental caries levels (DMFT index) among 12-year-olds worldwide, December 2014. **Source:** The World Health Organization (WHO) Oral Health, Country/Area Profile Project (CAPP) database. At: <http://www.mah.se/CAPP/Country-Oral-Health-Profiles/According-to-Alphabetical/Global-carries-map-2013--2014/>. Accessed: August, 23 2015



WHO Regions	DMFT	
	2004 (Bratthall, 2005)	2011 (Natarajan, 2011)
Africa	1.15	1.19
Americas	2.76	2.35
Eastern Mediterranean	1.58	1.63
Europe	2.57	1.95
South-East Asia	1.12	1.87
Western Pacific	1.48	1.39
<b>Global</b>	<b>1.61</b>	<b>1.67</b>

**Table 2.1.:** WHO Region specific weighted DMFT among 12-year-olds. **Source:** The World Health Organization (WHO) Oral Health, Country/Area Profile Project (CAPP) database. At: <http://www.mah.se/CAPP/Country-Oral-Health-Profiles/According-to-Alphabetical/Global-DMFT-for-12-year-olds-2011/>. Accessed: August, 23 2015

### *2.1.2. Local*

In Lebanon the levels of dental caries are high with a DMFT score of 5.7 among 12 year olds, which is higher than in most of the countries in Africa, Europe or the Americas (Doumit & Doughan, 2002; Petersen, 2003). It has been estimated that 93% of 12 year olds and 96.8% of 15 year olds have experienced caries (Doumit & Doughan, 2002). In the same study the DMFT scores were higher in public schools compared to private schools, possibly reflecting disparities in the burden of oral disease. A more recent study done on preschool children in 2011 showed that 74.7% of subjects had at least one carious lesion (Chedid, Bourgeois, Kaloustian, Baba, & Pilipili, 2011), which is triple the 23% reported among American preschoolers (Dye, Thornton-Evans, Li, Lafolla, & Statistics, 2015; McGinnis & Lee, 1995). More recently, disparities in the burden of oral disease have been reported in a thesis dissertation comparing the DMFT in elementary

school children of public and private schools in Beirut, highlighting a DFMT of 7.3 in public schools that almost doubled an index of 3.5 in private schools (Moukarzel, 2012). Evidently, the literature corresponds on that the prevalence of dental decays in Lebanese children for both preschoolers and school children remains very high compared to other developed countries, especially when it comes to the lower socio-economic groups.

## **2.2. Utilization of oral health services**

### **2.2.1. Global**

The 1997 National Health Interview Survey (NHIS) reports revealed that almost 4.2 million American children were unable to get dental care (Simpson et al., 1997). Even a decade later, the 2011 NHIS reported a similar number of 4 million children aged 2–17 with unmet dental need resulting from the inability of their families to afford dental care (Bloom et al., 2012). This places dental care as the most prevalent unmet health need (Berk et al., 1995; Bloom et al., 2012; Kelly et al., 2005; Simpson et al., 1997); 3 times more common than unmet medical care need, and 4 times more common than the unmet need for prescription drugs or prescription glasses (Bloom et al., 2012; Simpson et al., 1997).

Dental care service utilization is vital for the enhancement and maintenance of general health; access to quality dental care has been reported to increase the quality and length of the healthy life of individuals (Philadelphia Health Management Corporation's, 2002). Access is not only measured by the supply of services, but also by their rate of

utilization (Gulliford & Morgan, 2013). As with oral health problems, numerous studies also have found that access to oral health care is associated with income (Edelstein & Chinn, 2009), race and ethnicity (Flores & Tomany-Korman, 2008), and insurance status and type (Pourat & Finocchio, 2010). In many developing countries, access to dental care is very limited as compared to developed countries (Petersen, 2003; Pizarro et al., 2009; Wall, Vujicic, & Nasseh, 2012).

The commonwealth fund 2013 international health policy survey of the general population consisted of phone interviews of a random sample of adults aged 18 and above in eleven different countries -Australia, Canada, France, Germany, Netherland, New Zealand, Norway, Sweden, Switzerland, United kingdom and United states- and revealed that more than 25% of adults in Australia, France, New Zealand, United Kingdom, and United States had not visited a dentist or received preventive care in the past two years. A high share of adults in the United States, New Zealand, and Australia (33%, 32%, and 29% respectively) had skipped dental care because of cost in the past year. Germany and Sweden had the best utilization patterns, where 90% of adults had visited the dentist within the last two years and merely one tenth of adults skipped dental care because of cost in the past year. Although one fourth of adults in the United Kingdom had not visited the dentist in last two years, only 6% of adults reported cost being a barrier for not utilizing dental services within last year (Osborn & Schoen, 2013). Data collected in the 2002 National Dental Telephone Interview Survey in Australia (NDTIS 2002) showed that the adult population of older ages, individuals with higher income and females were the most likely to have made a dental visit in the last year. Furthermore, only about half of the population

reported that their last visit to the dentist was for checkups rather than for dental troubles or dental pain (Harford, Ellershaw, & Stewart, 2004). Looking at the Middle Eastern region, published data regarding the utilization patterns of dental services are scarce. Few surveys among Jordanians revealed that the overwhelming majority of both adults and children visit the dentist irregularly, and mostly when they have problems or pain. The most recent study was done on 614 Jordanian adults and reported that 47% of participants have visited the dentist in the last 12 months, with restorative treatment and teeth extraction the most frequently sought services (Obeidat, Alsadi, & Taani, 2014). In the United Arab Emirates, a study among preschoolers aged 5 – 6 years showed that only 32% of the children went to the dentist in the past year, with the majority (78%) having visited the dentist due to an oral health problem rather than for a checkup (Hashim, Thomson, Ayers, Lewsey, & Awad, 2006). Another study done in Saudi Arabia among intermediate female school students in Riyadh reported that only 11% of students haven't been to the dentist within the last two years, and approximately three quarters of the students visited the dentist more than once during the last two years, albeit the nature of the sample and survey itself make their generalizability to be extremely limited to a very small proportion of the population -female students aged 12-15 years in the city of Riyadh- (Al Johara, 2010).

### ***2.2.2. Local***

In spite of the high burden of oral health problems in Lebanon, the utilization of dental care services remains low, with a reported 12.5% of the population in Beirut having visited the dentist during the last three months (Ammar, Mechbal, & Nandakumar,

2001). It is worth noting that the highest utilization rate was found in Mount Lebanon, where 22.7% of the sample population visited the dentist during the last three months, compared to 12% only in the South and 12.5% in Beirut, both of which were reported to have the lowest utilization rates among the 6 different governorates in Lebanon (Ammar et al., 2001). The national household expenditures and utilization survey in Lebanon shows that there do not appear to be inequities in access to medical health care, and interestingly lower income individuals have higher utilization rates than those in higher income groups. However, it is only with regard to dental care that inequities in access were observed (Ammar et al., 2001; Kronfol, 2006).

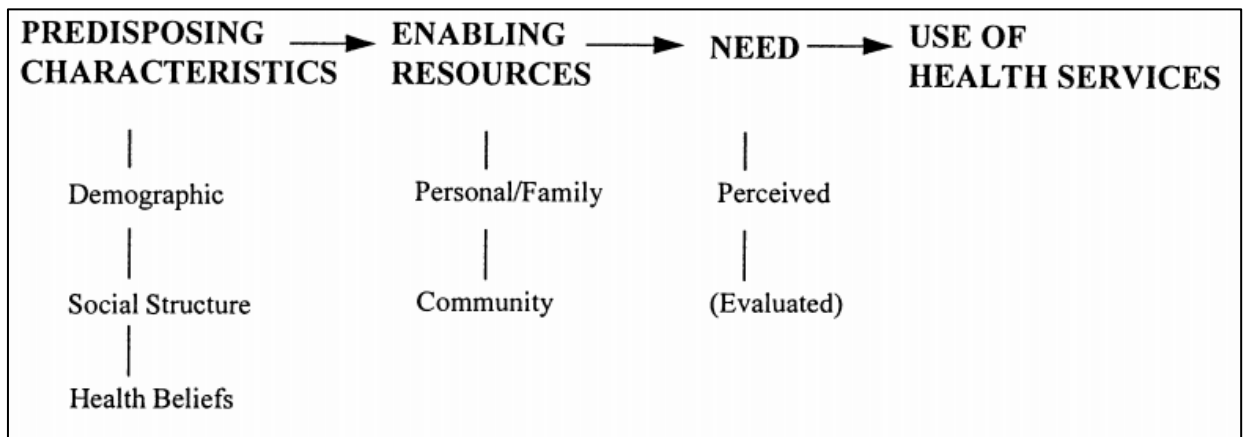
A more recent study done in Lebanon to assess the pattern of utilization of dental services among parents of primary school children (aged 6 to 11 years) reported that 73% of participants did visit the dentist during past year, however, the most common reasons for the dental visits reported by the parents were decays and acute pain (65.1%). The same study reported on the disparities in the utilization of dental services, with students of private schools scoring nearly twice higher access than those of public schools in Beirut (Karam, 2013).

### **2.3. Determinants of dental services utilization**

Access to dental care services is a complex phenomenon that involves multifaceted human behavior. Various theories have been proposed to explain this phenomenon. One of the most frequently used frameworks for analyzing the factors associated with the

utilization of healthcare services is the behavioral model of utilization developed by Andersen in 1968 (Figure 2). This three-stage model groups the determinants associated with the utilization of health services into different categories:

- 1- Predisposing factors
- 2- Enabling factors
- 3- Individual's need



**Figure 2.2:** Andersen's behavioral model (1960's)  
Adapted from: (R. M. Andersen, 1995)

It is noteworthy that the utilization of different health services would be explained by different contributions of these factors. For example, the utilization of hospital services addressing more serious problems might be explained mainly by need and demographic characteristics. On the other hand, dental service use would more likely be explained by social structure, beliefs, and enabling factors (R. M. Andersen, 1995).

### ***2.3.1. Predisposing factors***

There are several predisposing characteristics that contribute to the prediction of use. Those are divided into: demographic factors such gender and age, social structure like education, occupation, and ethnicity, and health beliefs. Health beliefs are the attitudes, values, and knowledge that people have towards health and its services. They actually provide one of the explanations of how social structure can influence enabling factors, perceived need and subsequent use.

Several studies examining predisposing predictors for dental care utilization have been conducted throughout the years (Baldani & Antunes, 2011; Gift & Newman, 1992; L. Liu, Zhang, Wu, & Cheng, 2015; Manski & Magder, 1998; Okada & Wan, 1979; Valencia et al., 2012; Wamala, Merlo, & Boström, 2006). Gift and Newman in 1992 reported on the use of dental services among American children, noting that black and Hispanic children utilized less dental services than white children and that those differences remained significant after controlling for income and education level of the responsible adult (Gift & Newman, 1992). Manski and Magder in 1998 analyzed 49,687 adult respondents from the 1989 NHIS and stated the same fact: that lower proportions of minority groups (blacks and Hispanics) reported visiting the dentist during the last year than did whites, even after controlling for other covariates (Manski & Magder, 1998). However, more recent national studies done on American children stated the achievement of near equality between different ethnic groups regarding dental service utilization and this was confirmed by using multivariable analyses adjusting for other factors associated with race (Flores & Lin, 2013; Isong et al., 2012). Manski and Magder reported that the adjusted odds for utilizing dental

services for women were 1.6 times those for men, and that the odds of seeking dental care for those with higher levels of education were 1.4 more than those with lower levels (Manski & Magder, 1998). Several other researchers have published similar findings showing that with higher educational level of the parents and/or being a female, the more they utilize dental care services (Kelly et al., 2005; L. Liu et al., 2015; Medina- Solis et al., 2008).

As explained earlier, health theories suggest that oral health belief should be associated with dental service utilization (R. M. Andersen, 1968, 1995; Chen & Land, 1986). In fact, it has been reported that individuals with favorable dental beliefs have fewer oral problems, better oral hygiene and more restorations (Broadbent, Thomson, & Poulton, 2006). Moreover, it has been reported that parents seeking dental care emphasized the importance of preventive care for their children as well as comprehensive esthetic care such as orthodontics. On the other hand, parents who do not utilize available dental services believe that their use could be restricted to emergency care such as toothache or caries (Kelly et al., 2005). This might be due to the perception that dental health is of less priority than general health.

### ***2.3.2. Enabling factors***

To utilize health services, both community and individual enabling resources must be present; health facilities and personnel must be accessible and people should have the means to get to those services. Income, insurance and a regular source of care are considered among those enabling factors. Additionally, some authors advocate social



relationships as an important enabling factor that should be added to this category (R. M. Andersen, 1995; Bass & Noelker, 1987; Counte & Glandon, 1991; Freedman, 1993; Miller & McFall, 1991).

Dental visits are largely dependent on the ability to pay. Visits tend to increase with increasing household income because dental care, particularly preventive care, is considered elective care by many (Millar & Locker, 1999). Several authors reported disparities in the access to dental care among different socio economic groups (Baldani & Antunes, 2011; Kelly et al., 2005; L. Liu et al., 2015; Obeidat et al., 2014; Okada & Wan, 1979; Wamala et al., 2006), with individuals from lower socioeconomic status utilizing less dental services, in particular preventive dental services (Baldani & Antunes, 2011; Brodeur, Benigeri, Olivier, & Payette, 1996; Edelstein, 2002; Millar & Locker, 1999; Murakami, Aida, Ohkubo, & Hashimoto, 2014). Actually, income and education were among the most strongly associated factors with dental services utilization (Brodeur et al., 1996; Edelstein, 2002; Millar & Locker, 1999; Murakami et al., 2014). A review of all data sources that represent the entire US population of children (*Third National Health and Nutrition Examination Survey (NHANES)*, *the 1993 National Health Interview Survey (NHIS)*, and *the 1996 Medical Expenditure Panel Survey (MEPS)*) in 2002 ascertained that children who are disadvantaged by poverty face a double burden of both poor oral health as well as a lack of dental care (Edelstein, 2002), and revealed that children with an annual family income between \$10 000 and \$20 000 had 10 times more unmet dental needs than did children from families whose annual income is greater than \$50 000 (Edelstein, 2002). Similarly, data from the national population health survey in

Sweden (Wamala et al., 2006), demonstrated that a low socioeconomic level is associated with poorer oral health and less utilization of dental care services among participants. Access to dental care explained 60% of the socioeconomic differences in oral health of the participants, and people with a severe socioeconomic disadvantage were 7-9 times more likely to refrain from seeking the required dental treatment (Wamala et al., 2006). Likewise, social disparities in the utilization of dental care have been reported in Lebanon (Karam, 2013; Kronfol, 2004). School type, income, and parents' educational level in particular were associated with service utilization of primary school children aged 6-11 years (Karam, 2013).

Dental insurance has been reported to affect the capability to secure dental care and the ability to affect the demand. The insured spend considerably more on dental services than the uninsured, which is due, in part, to the nature of the care received (Hay & Ricardo-Campbell, 1986; Mueller & Monheit, 1988). A study done on older Canadian adults found that the use of dental care was highly associated with dental insurance (Locker & Leake, 1993). As for children, it was reported that those with no dental insurance are 3 times more likely to have an unmet dental need than others with either public or private insurance (Waldman, 1997). In Lebanon, It has been reported that only 13% of primary school children are dentally insured, and that the lack of dental insurance is one of the major barriers for the utilization of dental services by those children (Karam, 2013).

### **2.3.3. *Individual's need***

The biological impairment that accounts for someone to actually seek help is represented by the evaluated component of need (R. Andersen, Kravits, & Anderson, 1975), which is a professional judgment of health status and the need for medical care. As a logical expectation, evaluated need will be more related to the type and amount of treatment that will be provided, which emphasizes the role of perceived need in understanding the care-seeking behavior and adherence to medical regimen. Dental care needs, therefore, are classified into normative or perceived needs. Both classifications are used in the literature, because each is related to dental service utilization in a different way, but the correlation between both types of needs has been reported to be as low as 0.34 (Vargas & Ronzio, 2002).

Higher rates of decayed and missing teeth have been associated with irregular dental visits (Tickle, Moulding, Milsom, & Blinkhorn, 2000; Tickle, Williams, Jenner, & Blinkhorn, 1999; Vargas & Ronzio, 2002). This association was revealed as a strong inverse relationship between the presence of dental caries (treated and untreated (DMFT)) and the pattern of utilizing primary dental services, even after adjusting for SES (Tickle et al., 2000). Therefore, children who visit the dentist regularly have lower experiences of oral health problems, in particular caries. Data from the third NHANES were analyzed to test this same association between need and utilization (Vargas & Ronzio, 2002) and revealed that the odds of visiting the dentist in the previous year for children with either normative (decayed teeth) or perceived dental needs were half as likely as children with no dental needs. Furthermore children with perceived needs or normative needs were

more likely to be episodic users of dental care (AOR = 2.13, AOR = 1.46, respectively) than children without the respective need (Vargas & Ronzio, 2002). As a result the authors concluded that dental need (perceived or normative) do not drive dental care use among children (Vargas & Ronzio, 2002). However, another study done on 12 years old Brazilian school children reported that children with dental caries and those who rated their oral health as “good/excellent” were more likely to have visited the dentist as compared to their counterparts (Piovesan, Antunes, Guedes, & Ardenghi, 2011). Therefore, in this study normative dental need (caries) was a predictor for dental service utilization, which contradicts the result of the third NHANES study mentioned earlier.

#### **2.4. Primary oral health care systems and dental insurance**

Treatment of oral disease is extremely costly; being the fourth most expensive disease to treat in most industrialized countries (Petersen, Bourgeois, Ogawa, Estupinan-Day, & Ndiaye, 2005). Traditional curative dental care is a significant economic burden for many industrialized countries where 5–10% of public health expenditure relates to oral health (Petersen et al., 2005; Widström & Eaton, 2003). In industrialized countries, most oral health care is provided by private dental practitioners to patients, with or without third-party payment schemes. Some countries, including those of Scandinavia and the United Kingdom, have organized public oral health care services particularly to children and disadvantaged population groups (Petersen et al., 2005). However, the paradigm in some countries has shifted over the years towards investing in specifically preventive oral care,

targeting services such as cleaning, fissure sealants and even community water fluoridation. This has resulted in positive trends in terms of reductions in the prevalence of oral disease (Griffin, Jones, & Tomar, 2001; Wang, Källestål, Petersen, & Arnadottir, 1998).

In most developing countries, resources are primarily allocated to emergency oral care and pain relief (Petersen et al., 2005). It has been estimated that more than 90% of dental caries remains untreated in Third World countries, and if treatment were available, the costs of traditional methods of restorative dentistry in children would exceed the total health care budget for children in the majority of low-income nations (Yee & Sheiham, 2002). The private sector has been growing rapidly in developing countries (Bailoor, Shrivastava, Handa, & Raghuvanshi, 2014; Yee & Sheiham, 2002). This private sector bridges most of the gaps between what governments offer and what people need. However, the cost of treatment is high and unaffordable to a large segment of the population (Bailoor et al., 2014; Petersen et al., 2005; Yee & Sheiham, 2002).

Unlike most western countries, specific dental insurance plans are not common in less developed countries (Bailoor et al., 2014; Karam, 2013; Yee & Sheiham, 2002). Dental health insurance in America is under the regulation of norms formulated by the members of the American Dental Association, with recent reports showing that almost 90% of American children and 80% of adults are insured (Wall et al., 2012). However, 54% and 65% are covered by private insurance respectively (Wall et al., 2012) . In Sweden, on the other hand, all school children have been protected by the dental care program under the supervision of the National Board of Health since 1938 (Anell, Glenngard, & Merkur,

2012). Moreover, in 1974, the Swedish dental insurance scheme made all dental services for children and youth up to 20 years free of charge, with adults benefiting from different insurance schemes providing treatment at reduced prices (Anell et al., 2012). After the introduction of the 1974 scheme, the proportions of adults utilizing dental services increased and trends of decreasing caries among children and adolescents were demonstrated (Österberg et al., 1998). Despite those improvements, socio-economic differences in the utilization of dental services among Swedish adults persisted (Hjern, Grindefjord, Sundberg, & Rosén, 2001; Österberg et al., 1998). Those social inequalities in oral health care use have been explained by the increase in user charges in the national Swedish dental insurance scheme in the last few decades (Hjern et al., 2001). The same authors even suggested a causal link between increasing charges and the increased oral problems and reduced oral treatments. In the United Kingdom (UK), dental care has been included under the National Health Services (NHS), which is mostly funded through taxation, since 1948, whereby free services are provided to children less than 18 years of age and to pregnant or nursing women (Biggs, 2012). They also provided additional Community Dental Services (CDS), a different insurance plan for special needs children and in locations where access to dental services is poor (Propper, 2000).

Both Sweden and the UK, as shown earlier, have universal welfare systems. This refers to services and benefits that are available to all, or to whole categories of people, as a right. It is noteworthy that universalism may be contrasted with selectivism; focusing on those people who are in most need and who typically cannot afford to pay (Buckmaster, 2009). Although it is hard to identify truly universal schemes across countries, some reports

have identified countries providing 100 per cent cover for the cost of dental health services: Austria, Mexico, Poland, Spain, and Turkey (Biggs, 2012). A small number of countries that seems to provide some level of subsidized dental benefits to the broader population were identified as countries with universal dental schemes as well: Denmark, Finland, Greece, Italy, Sweden, Germany and the United Kingdom (Biggs, 2012; Kravitz & Treasure, 2008).

Studies have shown that countries with direct dental funding and services to children tend to have lower rates of DMFT among 12 year olds. Several studies have reported associations between dental insurance and lower rates of extractions, lower rates of unmet need, better oral health, higher rates of utilization of dental care, higher rates of visiting for a check-up and regular dental visiting (Locker & Leake, 1993; Teusner, Anikeeva, & Brennan, 2014; Waldman, 1997). Insured patients faced less financial barriers in accessing dental care and more acceptance rates of treatment prescribed by their dentist (Stafford, Edenfield, Coulton, & Beiter, 2010; Teusner et al., 2014). It has been shown that the positive impact of dental insurance on the utilization of dental services was most pronounced among lower socioeconomic groups (Locker, Maggiras, & Quiñonez, 2011; Teusner et al., 2014) with greater reduction in the reporting of financial barriers among the same groups (Locker et al., 2011).

In Lebanon, the presence of public dental insurance coverage is lacking. There are four sources of governmental health insurance in Lebanon; the National Social Security Fund (NSSF), The Cooperative of Civil Servants (CCS), the Internal Security Forces (ISF),

and the Ministry of Health (MOH) (Kronfol, 2004). Only the ISF and CCS offer dental coverage. The ISF covers all the expenses of dental services for its members, 75% for spouses and children, and 50% for dependent parents, however, only 11% of the Lebanese population benefit from this type of insurance. The CCS health insurance covers 75% of dental treatment for the employees only, with reports showing that only around 8.8% of the Lebanese population are affiliated with this type of insurance (Kronfol, 2004). Subsequently, more than 80% of the Lebanese population does not benefit from any public dental insurance plans. A recent thesis research carried out in 2013 reported that more than 85% of primary school children in Beirut are not covered by any type of dental insurance, highlighting the fact that dental care in Lebanon is almost exclusively a domain of the private sector (Karam, 2013). This results in increased financial barriers to accessing dental care, stressing more the unfortunate populations.

## **2.5. Significance**

Data on the utilization of dental services in Lebanon are extremely scarce, with only one study carried out to assess the determinants of dental care (Karam, 2013). This particular study involved 316 elementary school children and reported disparities in utilization between private and public schools, albeit with certain limitations. The fact that the assessed population was limited to children aged 6 – 11 restricts findings to children in their mixed dentition stage – where the child has remaining primary “deciduous” teeth while new permanent teeth are emerging. This mixed dentition stage starts at the age of 6



years and continues till the age of 12 years, when the loss of the last primary teeth marks the start of the early permanent dentition stage. Accordingly, the assessment of the utilization patterns of older children, including those aged 12 years, is needed to fill the gap of evaluations in the Lebanese population. The importance of evaluating adolescents aged 12-17 years can be summarized in:

1. These children have fully permanent dentitions. Given the fact that most families would consider permanent teeth to be more important than primary teeth, different profiles of dental health service utilization are plausible and would suggest the need for different insurance strategies.
2. The age of 12 is the global monitoring age for oral health disease comparisons globally and across countries. Assessing the determinants of the utilization of dental services among those children will allow for a more comprehensive understanding and would provide a framework for policy makers to devise possible strategies to address the challenges to decreasing the burden of oral health.
3. The onset of adolescence is crucial, since it marks the transition from the mixed dentition to the fully permanent dentition, where new and different dental needs including planning of orthodontic treatment would emerge. This transition period needs to be accounted for in preventive dental treatments, simple interceptive orthodontics, and in insurance plans that that would address bot preventive and curative treatments.

## **2.6. Specific objectives**

The aim of this study is to assess the utilization pattern of dental services among secondary school children in Beirut and to investigate socio-economic disparities. The specific objectives included one primary and two secondary objectives.

### 1- Primary objective

- Compare the utilization of dental services by secondary school children between private and public schools.

### 2- Secondary objectives

- Assess the determinants of and possible barriers to utilization of dental services among secondary school children.
- Examine the willingness of the parents to invest in the minimal cost required for different types of proposed dental insurance planes.

## **2.7. Hypotheses:**

The utilization of dental services is expected to be lower:

1. In public schools than in private schools.
2. With greater financial barriers.
3. With lower parental perceptions of the importance of oral health and lower levels of awareness regarding the availability of affordable dental services.

## CHAPTER 3

### METHODOLOGY

#### **3.1. Introduction**

This study is a part of a larger cross sectional study that aimed at assessing oral health and utilization of its services among adolescent schoolchildren comparing both public and private schools in Beirut. The focus of this part of the study is on utilization patterns of dental services and their determinants among the same schoolchildren to allow for a more comprehensive understanding of the inequities in oral health problems, and filling the research gap in the Lebanese population. This chapter details the research methodology adopted, including sample selection and recruitment process, the procedure used in collecting the data, statistical procedures used to analyze the data, and ethical considerations in this research.

#### **3.2. Research design**

The lack of comprehensive recent data on the utilization of dental services in Lebanon warranted a descriptive study towards this topic. Keeping in mind the goals of this study, a descriptive and analytical research methodology was used to conduct a comparative cross sectional study of secondary school children (aged 12-18) in both public

and private schools in Beirut. Data were collected through an oral exam and self-administered structured questionnaires (surveys) targeting students and their parents. Comparing public and private schools was believed to be sufficient to capture the variability between different socio economic groups in Beirut, therefore having a better prospect in assessing disparities and determinants of utilization.

### **3.3. Sample selection**

As mentioned earlier, this research is a part of a larger study. Accordingly, the minimum sample size required for the study was calculated using an “A-priori Sample Size Calculator for Multiple Regression” with an anticipated effect size of 0.02, a statistical power of level of 0.8, 7 predictors of poor oral health (a main outcome of the study), and a probability level of 0.05 yielding a minimum total sample of 721 subjects, equally divided between public and private schools. Secondary private and public schools were sampled through non-probability sampling methods. Anticipating a low acceptance rate (Hanna et al., 2015), as many schools as possible were approached to participate in the study, particularly private schools to compensate for lower acceptance rates.

Private schools were included based on readiness to participate. Public schools, on the other hand, were approached through the Ministry of Education and Higher Education (MEHE) based on the recommendation of the Ministry, schools’ readiness to participate, and geographical location (within the vicinity of participating private schools). All the

students (grade 7 to 12) attending the schools that agreed to participate were planned to be approached for this study.

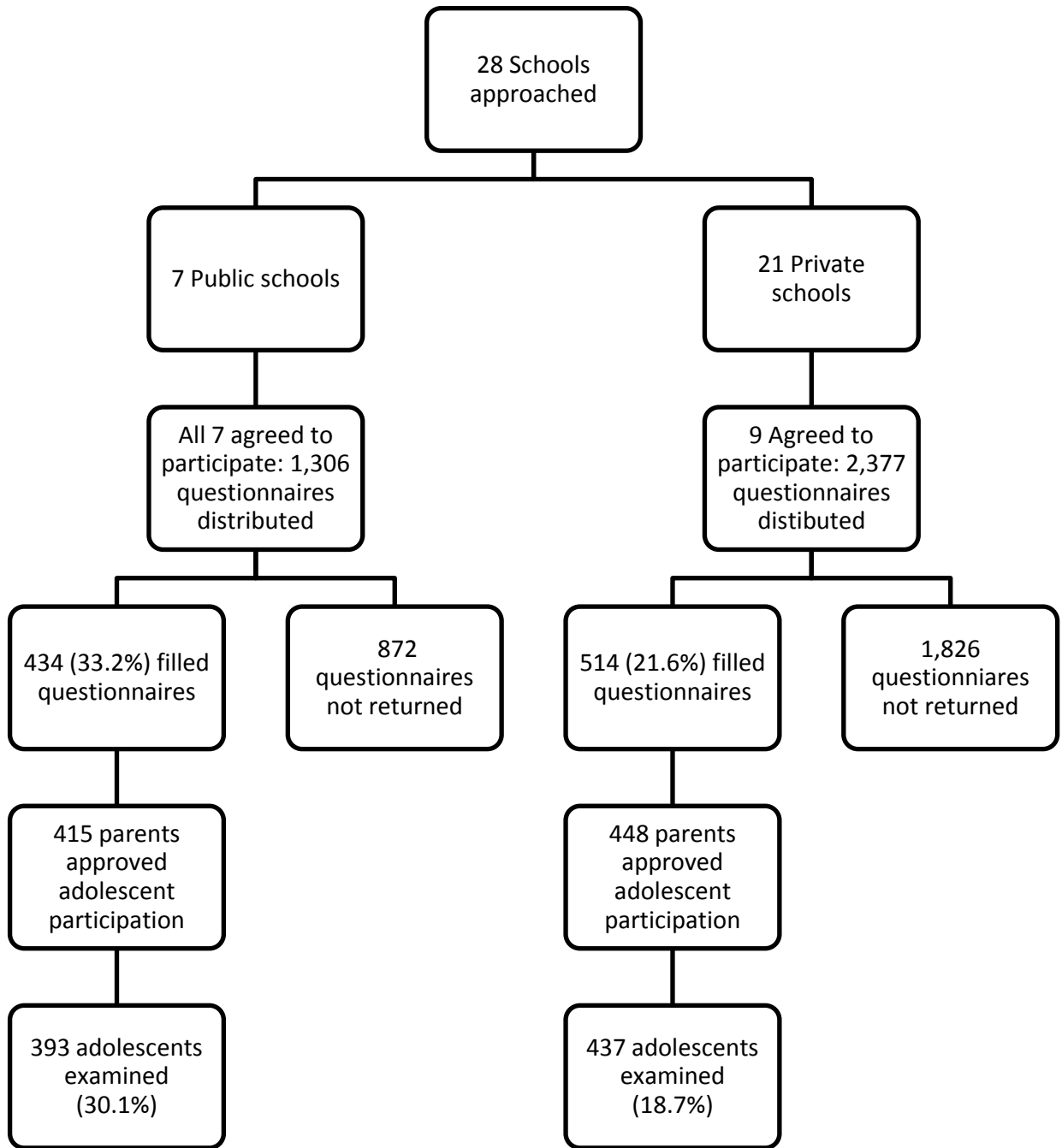
### **3.3.1. Public Schools:**

The recruitment of students attending public schools necessitated approval from the Ministry of Education and Higher Education (MEHE), which was secured as a written letter that was presented to the director of each approached public school. Following an initial phone call in which the study was briefly introduced to the appropriate person in charge, the opportunity to present further details to the school director was planned with the subordinate. Depending on school preference, the study's aims and detailed objectives and the specifics of the various levels of participation (parent, adolescent questionnaire, adolescent screening) were explained either during a personal meeting or in written form through email correspondence. All seven public schools that were approached agreed to participate. Therefore, a total of 1,306 adolescents and their parents were targeted for recruitment (**Figure 3.1**).

### **3.3.2. Private Schools:**

Private schools were approached similarly to public schools; however, no approval from MEHE was needed. Nine schools of 21 approached participated in the study with a total of 2,377 adolescents and parents targeted for participation (Figure 3.1). Nevertheless 3 out of the 9 schools limited our access to younger classes (grades 7 – 9) and refused the participation of older classes (grades 10-12), due to their busy academic

programs. This resulted in oversampling of younger classes in the private school sample. Out of the 12 schools that did not agree to participate, 11 refused to participate for number reasons such as the existence of yearly dental examinations at the schools, the interference of the study activity with school normal schedule and busy curriculum, or data collection coincided with the exam period. One school out of the 12 initially agreed to participate, however following the acceptance of questionnaires to be distributed, the school informed the researchers that the provided questionnaires had been lost and that the school was no longer prepared to invest time in the ongoing research.



**Figure 3.1:** Flow diagram illustrating the recruitment process of schools and the numbers of respondents at each level of the study.

### **3.4. Participants**

The total number of students approached was 3680, of which 948 parents/guardians agreed to participate, by returning the completed questionnaires (434 and 514 in public and private schools, respectively), resulting in an average response rate of 25.8% (33.2% and 21.6% in public and private schools, respectively). However, 9% of them did not agree for their child to be examined by the research team, and only 863 consented to have their child examined in the study. Some of those children were absent at the day of examination and others refused to participate when assent was sought, despite their parents approval. Consequently, the final sample of adolescents examined was 830 and consisted of 437 students attending private schools and 393 attending public schools (Figure 3.1.).

### **3.5. Data collection**

Data collection started in May, 2014 and ended in February, 2015. Data were collected from 3 sources: 2 self-administered questionnaires (one addressing the parents and the other addressing the adolescent) and child dental examination. However, variables for this part of the research (utilization of services) were mostly covered in the parental questionnaire.

The data collection procedures were conducted in two stages. The first stage was to distribute the questionnaires directed at the parents/guardians with attached consent form to all eligible students (Appendices I, II). After a sufficient time period the



researchers revisited the schools for the second stage of data collection, which include the oral examination and the adolescent questionnaire.

### **3.5.1. First stage:**

Once the contacted school agreed to participate, the three research investigators (one investigator for each part of the study) visited the participating schools and distributed the parent self-administered questionnaire, along with an attached parental consent form, to all the children aged 12-18 attending the schools. The students were requested to deliver the consent forms and questionnaires to their parents (or legal guardians), who, in turn, may consent to their own participation (filling out the parent questionnaire) and to their child's participation (child exam and / or child questionnaire). The consent form and the questionnaires were printed in Arabic, and were written in a straightforward and comprehensible manner. Few of the guardians were illiterate, therefore the questions were asked orally by their child. The questions in the parent questionnaire covered the following domains:

- Child basic information
- Socio-demographic indicators
- Economic indicators
- Current health insurance information (dental and medical)
- Utilization of dental services indicators
- Utilization of orthodontic services indicators
- Willingness to invest in dental insurance questions

- Other questions; covered domains related to the two other parts of this research

### **3.5.2. *Second stage:***

After an interval of one to two weeks, the research investigator revisited the schools and collected the filled out questionnaires from the children whose parents consented to participation. The dental examination (second visit) time and place were planned in coordination with the schools' administration to avoid interference with important school studies and/or activities. The questionnaires that were brought by the children were retained with the person responsible at the school in a sealed envelope in the office of the principal or assigned director for safe keeping, and were delivered to the research investigators later upon their visit. Following collection of all questionnaires in the second visit, only those children whose parents consented to the child exam and questionnaire were asked for their assent to participate themselves in the research. After acquiring assent, the students were examined and requested to fill out the student questionnaire.

## **3.6. Measures**

Several variables were used to describe and assess the main outcome: utilization of dental services. Other related variables were collected to describe the pattern of utilization of orthodontic services, and willingness to participate in different insurance strategies.

### ***3.6.1. Utilization of dental services***

There are many ways to measure dental service utilization. The majority of published national studies and research reports like the NHIS or NHANES studies estimated utilization based on individual's reporting "at least one dental visit in the past year"(Edelstein, 2002; Gift & Newman, 1992; Harford et al., 2004; L. Liu et al., 2015; Manski & Magder, 1998; Obeidat et al., 2014; Wall et al., 2012), which was stated to be the simplest measure of utilization and most commonly used (Wall et al., 2012). However, several variations in the recall intervals or different forms of the question have been reported in the literature (Al Johara, 2010; Ammar et al., 2001).

The parental questionnaire in our study included a question about the length of time since the last visit "When was the last visit to the dental clinic (< 3 months, 4-6 months, 7-12 months, > 12 months). Respondents who indicated "< 3 months", "4-6 months", or "7-12 months" were considered to have had dental visit within past year. Another question was the reason for the last dental service utilization: Regular checkup, preventive care (sealant, space maintainer, fluoride application) or dental treatment such as the treatment of a single tooth (extraction, fillings, root canal, crowns restorations) or treatment of malocclusions (orthodontics and dentofacial orthopedics orthopedics). Accordingly, respondents who indicated that the reason for their last visit was for "Regular checkup" or "preventive care" were considered to have had utilized prevention dental services, and others who indicated either dental or malocclusion treatments were considered to have had utilized curative dental services. Therefore three main measures were used to analyze utilization:

- Utilization of dental services in the past year (yes/no)
- Utilization of preventive dental services in the last appointment (yes/no)
- Utilization of curative dental services in the last appointment (yes/no)

To explore possible perceived barriers of utilization for those who did not utilize dental services within the last year, a question was asked about the reason for not visiting the dentist in the past year. The answer options were: No need, treatment cost, awareness of affordable dentist, access to dentist, and others.

### ***3.6.2. Utilization of orthodontic dental services***

Three different questions were asked to explore the orthodontic service utilization pattern among the sampled adolescents:

- Use of orthodontic services (yes/no)
- Age of the child at first orthodontics consultation.
- History of orthodontic treatment (past, current, never)

### ***3.6.3. Participation in dental insurance***

Another secondary objective of the study was to explore the willingness and readiness to participate in dental insurance. Several indicators were used to assess this particular issue:

- Parental willingness to invest a certain amount of money on dental insurance (100% - >500\$)

- Objection to visiting the dentist contracted with an insurance company (No/Yes)
- Parental willingness to participate in different insurance plans (plan A, B, or C).

The provided plans were adopted from a study conducted by Karam (2013) on younger children (6-11 years).

<b>Plan A Full coverage plan</b>	<b>Plan B Premium coverage plan</b>	<b>Plane C Basic coverage plan</b>
100% coverage for all dental procedures (preventive and restorative)	100% coverage for preventive dental procedures, and Co-payment for restorative dental procedures	100% coverage for preventive dental procedures, and Co-payment for restorative dental procedures
Orthodontics: Ceiling paid by Insurance Company: 1000-1500\$ (onetime benefit)	Orthodontics: Ceiling paid by Insurance Company: 500-1000\$ (onetime benefit)	No orthodontic benefits

**Table 3.1:** Different insurance strategies proposed in the study

#### **3.6.4. Independent variables:**

The independent variables included the determinants of dental care utilization. As described in the literature review and using Andersen’s Health Care Utilization model factors associated with the utilization of dental care can be categorized into three main categories; predisposing factors, enabling factors and actual need for dental services. The predisposing and enabling factors were collected through the parental questionnaires; however, the need was measured through both the dental examination and questionnaires. The independent variables included:

- Predisposing factors:

Age, gender, child's birth order, type of school of the children (public or private), marital status of the guardian and his / her educational level, and perception of the oral health status as reported by adolescent and by parent/guardian).

- Enabling factors:

Family monthly income It was categorized as follows (< 500,000 LL, 500,000 - 1000,000 LL, 1,000,000 – 3,000,000, > 3,000,000), the presence of regular income (Yes / No), the availability of dental insurance coverage (Yes / No), and the awareness of affordable dental centers (Yes / No).

- Individual's need:

Need was represented by the normative need (DMFT, Decayed teeth, and Orthodontic treatment need) and by the perceived need for dental care for both parental perceptions about their child oral health status and the child's perception of his/her oral health status.

The DMFT index is a continuous variable that measures the number of **D**ecayed teeth with untreated carious lesions, the number of **M**issing or extracted teeth, and the number of **F**illed **T**eeth.

The modified IOTN score was used to assess each examined subject's need for orthodontic treatment (Burden, Pine, & Burnside, 2001). It is a modified version of the Index of Orthodontic Treatment Need (IOTN) that has been extensively used

in epidemiological studies (Brook & Shaw, 1989). The modified IOTN score has two grades of either having a definitive need, or no definite need:

- No definite need for orthodontic treatment:  $1 < \text{IOTN score} \leq 3$
- Definite need for orthodontic treatment:  $\text{IOTN} > 3$  (grades 4 and 5)

### **3.7. Data entry and management**

The EpiData™ program version 3.1 was used for simple programmed data entry and data documentation. Three data structures were created in the program, one for each questionnaire (adolescent and parental/guardian) and one for the dental examination sheet. Serial numbers were created for each child and entered in their corresponding structures, which were linked afterwards through those serial numbers and saved under one final data base. In the final data base, data were de-identified by dropping all names and keeping only serial numbers.

The well-designed data structures with appropriate checks minimized data entry errors, therefore improved the data cleaning process. Furthermore frequency distributions were generated for all variables to assess data distribution and the presence of outliers. Certain variables were re-categorized when needed, to obtain power and allow more meaningful comparisons or associations.

### **3.8. Statistical analyses**

After the appropriate data cleaning and frequency distributions were carried out, three main levels of analysis were conducted on the sample; descriptive, bivariate, and multivariate analysis. Cluster effect was accounted for at the three levels of analysis. The cluster was the school

Descriptive statistics were generated for all dependent and independent variables by type of school, through simple logistic regressions adjusted for school cluster. Bivariate associations were assessed via the same simple regressions, owing to the nature of the dependent variable being a binary variable.

Multivariable logistic regression analysis was employed to model all the indicators measuring the outcome with the clinically and statistically significant covariates; the clustering at the school level was taken into consideration as mentioned earlier. All covariates associated with the outcome variables at a p-value less than 0.2 was included in the multivariate analysis. When closely related independent variables lead to poor final models due to problems such as collinearity or the absence of goodness of fit, decisions were made to keep the variable that was more clinically and statistically significant and contributed more to the model. Adjusted odds ratio (OR), 95% confidence intervals (CI), adjusted coefficients of association ( $\beta$ ) and P-values were reported for all variables included in the final models. P-values less than 0.05 considered statistically significant. Stata/SE™ data analysis and statistical software, version 11.1, was used to perform all statistical analyses.



### **3.9. Ethical considerations**

#### **3.9.1. *Respect for person***

A research proposal was submitted to the Institutional Board Review for approval, before initiation of the study. Respect for autonomy was ensured by obtaining a signed consent from the parents or guardians to ensure their willingness to participate in this study. The consent was written in clear simple language, including all the details of the present study and required the parent or guardian's signed consent on both the use of the information in the questionnaire and the participation of the adolescent in the study. It was clearly clarified that three separate signatures were required corresponding to three different levels of participation in the study; the parents were able to agree to any part separately, or to none. The contact information of the research members were placed in the first page, along with the consent form (Appendix I).

Consent forms were not the only measure required. To ensure further respect for persons, active assent was secured from all adolescents whose parents consented to their participation. The details of the study were explained orally to the adolescents and through written assent forms before enrolment in the study. Two different signatures were required from the participants; the adolescents had the complete autonomy to choose in which part of the study he or she would like to participate. They could pick to fill the child questionnaire, getting dental examination, both, or none. (Appendix II).

To ensure confidentiality, all dental examination sheets and questionnaires were coded using serial numbers as identifiers. All parental questionnaires that were returned

to the school before the second visit of the research team were asked to be kept in sealed envelopes with the person in charge at the school. In few schools the questionnaires were coded with serial number before sending them and no **names** were asked to be filled, however, even in schools where the parents or adolescents used their names it was only to ensure accurate linking between examination sheet and questionnaires for the same participant. All names were later dropped and only serial numbers were used as identifiers. In order to protect adolescent privacy, they were asked to fill the questionnaire on their own, and their dental examination was done for each adolescent at time, and away from his or her peers.

### ***3.9.2. Beneficence and Non-Maleficence***

This study poses minimal risk to the participants as the topic of oral health and its service utilizations is not perceived as a sensitive concept. All dental examination procedures performed were non-invasive, involving only oral screening, and did not produce any significant discomfort to the adolescent. The oral examination was done with sterile and disposable instruments, which were discarded following each single use. Any sharp disposable instruments were not disposed of in the schools; they were stored in a separate sealed container and collected at the end of each examination session. The sharp instruments were disposed of later following the school visit in designated sharps containers at the American University of Beirut Medical Center (AUBMC).

To ensure beneficence, an instructional brochure including the names of organizations providing affordable oral health and hygiene services was distributed to the

parents. Moreover, after the dental screening, recommendations concerning the child's oral health and dental treatment need were sent to the parents or legal guardian, along with another brochure including information contacts of nearby specialized dental centers with affordable treatment cost, in case the child was not followed by a private dentist. Children's questions about their dental health and dental care habits were answered to the best of the research team's knowledge, along with some motivational statements, to motivate the adolescent to attain better oral habits and increase their awareness regarding the importance of oral health.

Further beneficence will be pursued, as the findings of this study will be used to promote the need of equality of dental service access among all socioeconomic statuses, and provide framework for strategies to address these inequalities.

### **3.9.3. *Justice***

Given the fact that some private schools limited our access to certain grades and not others, all children in the grades where schools allowed us to reach had the same probability of being included in the study. Moreover, the dental examination in all school children was performed following the same examination protocol, with all adolescent questions and inquiries were answered to our best of knowledge to ensure justice.

## CHAPTER 4

### RESULTS

#### 4.1. Introduction

The results were generated from the parental and adolescent surveys, and from the dental examination sheets of adolescents attending private and public schools in Beirut. Cluster-adjusted univariate, bivariate and multivariate analyses were performed following the Andersen model of utilization to analyze the factors associated with utilization of oral health service. It is worth to note that the Andersen model was used for more meaningful conceptualization rather than testing the model itself.

In the univariate analyses, percent distribution of students by predisposing characteristics, enabling, and need factors were compared between private and public school samples (**Table 4.1-3**). Similarly, for the three outcome measures (dental and orthodontic service utilization, and dental insurance participation) percent distributions of students were compared between private and public schools (**Table 4.4-6**).

The bivariate analyses were carried out for the main outcome measure, utilization of dental services, in order to assess its determinants (**Table 4.7-9**). Further bivariate analyses were done for utilization of preventive (**Table 4.11-13**) and curative (**Table 4.15-17**) dental services separately. Multivariate analyses were performed on the three measures illustrating

the main outcome; dental services utilization in general (**Table 4.10**), and preventive and curative (**Table 4.14, 19**) service utilization separately.

## **4.2. Univariate analysis of explanatory variables**

The results are presented by the main categorize of the Andersen model; variables were reorganized into predisposing characteristics, enabling, and need factors. The univariate analyses were conducted comparing public and private schools while adjusting for cluster effect.

### ***4.2.1. Predisposing characteristics***

The total number of children included in this study was 948, and was almost equally distributed between the two types of schools; 54% in private and 46% in public schools. Their mean age was 14.7 years; but in the public school sample (PBS) age was significantly higher than in the private school sample (PVS) (**Table 4.1**). The average age of students was 15.4 years in BPS and 14.1 in PVS. Although this age difference was statistically significant, it's not clinically significant. The total sample was composed of 57% females and 43% males, with higher proportions of females in PBS (64%) compared to PVS (51%). However, the difference between them failed to reach statistical significance (p-value 0.503).

The predisposing characteristics of the guardians were assessed by their age, marital status, educational level and perceived oral health importance when compared to

general health. Neither respondent age nor marital status were significantly different between the two school types. The mean age of respondents was 44.2 years, and 92% of them were married. Higher proportion of the parents in the PVS had attained college education compared to the PBS (67% and 18% respectively, p-value 0.0004). Similarly, but to a lesser extent, significantly higher proportion of parents in PVS considered oral health equally important to general health; 79% in PVS and 63% in PBS (p-value .0001). It is worth to note that 18% of the total sample considered oral health as more important than general health

#### ***4.2.2. Enabling factors***

Income was significantly different between the two groups (public and private). Both overall family monthly income and having a regular income were higher in the PVS than in the PBS (p-value <0.0001 for both measures). Only 2% of the PBS had a family monthly income greater than 3,000,000 L.L compared to 43% in the PVS (**Table 4.2**).

Higher proportions of children in PVS are covered by health insurance than in PBS (85%, 73% respectively); however, the difference did not reach statistical significance. On the other hand dental insurance coverage was similar between the two groups; almost 15.5% of children in both schools are covered by dental insurance. Only 41% of the sample was aware of the presence of affordable dental care centers, and there was no significant association between the parent's awareness of these centers and the school type of their children.

#### **4.2.3. Individual's need**

Dental care needs were measured objectively by the means of normative needs (IOTN, DMFT and presence of decay) and subjectively using perceived needs (child and parental perception of the oral health status of the child). The normative need and the child perception of his / her oral health status were measured on the 830 examined children; however, the parental / guardian perception was collected on the 948 subjects (**Table 4.3**).

The mean DMFT index for the examined sample was  $4.9 \pm 3.5$ , significantly higher in public schools than in private schools (5.8 and 4.1 respectively, p-value 0.025). The disparity in DMFT index between the two groups appears primarily due to the number of decayed teeth present upon examination, with a 2.4 average of decayed teeth in PVS that almost doubled to 4.4 in PBS (p-value 0.039). It is noteworthy that among the 829 examined adolescents 2779 untreated decayed permanent teeth were identified. The majority of public school children (90%) had at least one untreated decayed tooth or more, and as anticipated it was significantly higher than the percentage in the private schools (67%, p-value 0.004). The proportion of adolescents in need for orthodontic treatment according to the modified IOTN index did not differ significantly between the PVS and the PBS (p-value 0.955), and the overall unmet need was estimated to be 15.3% in the total sample.

The perception of the adolescents oral health status, were reported by both the parents and the adolescents themselves. Overall, the parents reported better oral health

status for their children than the children themselves; 55% of the parents perceived their child oral health status to be good compared to 36% of the children who perceived the same. Both parental perception and the child perception were higher in PVS than in PBS (p-value 0.0121 and 0.0002 respectively), with 52% of parents and 42 % of the students perceiving their oral health to be good in private schools compared to 37% and 28 % in public schools respectively.

### **4.3. Univariate analysis of outcome variables**

Three different outcomes were assessed in this study; utilization of dental services (**Table 4.4**), utilization of orthodontic services (**Table 4.5**), and willingness to participate in dental insurance (**Table 4.6**).

#### ***4.3.1. Utilization of dental services***

Around 90% of adolescents have been to the dentist at least once in their life, differing significantly between PVS and PBS (p-value 0.0186). Whereas public school students are 3 times more likely to have never been examined by a dentist compared to private schools students (**Figure 4.1**). Among the 90% who have been to the dentist 26% had not seen a dentist for more than one year. The overall dental service utilization during the previous year was estimated to be 65% and it was significantly lower for PBS than PVS (52% and 75% respectively, p-value 0.0007). The majority of children in PBS visited the dentist for emergency care like dental caries (44%) or pain



(32%). However, in PVS the majority of children went for checkup (40%) followed by caries (33%) and dental cleaning (21%).

Depending on to the reasons reported for the last dental visit, utilization of dental services was segregated into preventive services and curative services (**Figure 4.2**). The utilization of preventive care was significantly higher among PVS adolescents than PBS (51% and 32% respectively, p-value <0.0001). In contrast, curative care was significantly lower among PVS adolescents than PBS (68% and 77% respectively, p-value 0.0246).

The most commonly reported reasons for not utilize dental services in the past year were absence of need (70%) followed by treatment cost (37%). Higher proportions in PBS than in PVS reported cost as a barrier (46% and 24% respectively, p-value <0.0001).

#### **4.3.2. Utilization of orthodontic service**

Forty five percent of the adolescents had benefited from an orthodontic consultation (**Figure 4.3**). The percentage of never been examined by an orthodontist was significantly higher in PBS than in private schools (67% and 45% respectively, p-value 0.036). The average age at first consultation of was 11.7 years; slightly higher in PBS compared to PVS (p-value 0.083). Moreover, the rate of receiving orthodontic treatment in the examined sample was significantly different between PBS and PVS (p-value 0.0003), where 27.7% of PVS compared to 13.5% of the PBS adolescents either had or were still undergoing orthodontic treatment.

#### ***4.3.3. Willingness to participate in dental insurance***

When parents were asked about their willingness to invest a certain amount of money on dental insurance 42% in the PBS group reported that they cannot afford, compared to 23% in the PVS group. Even for the parents who can afford investing in dental insurance; the majority chose the least amount of investment which is a 100\$ (34% in PVS and 41% in PBS). The willingness to invest in dental insurance was significantly associated with the type of school (p-value <0.0001); more parents were willing to invest more money in the PVS. Similarly, when parents were asked to choose from the three proposed insurance plans, 55% of the parents in the PBS and 25% in the PVS group could not afford any plan (p-value <0.0001). Interestingly plan B of 300\$ (100% coverage for preventive dental procedures, and Co-payment for restorative dental procedures; Orthodontics: Ceiling paid by Insurance Company: 500-1000\$) was the most commonly reported plan of choice among the parents who could afford participating in dental insurance in both school types. The majority of the parents (71% of total sample) did not have a problem to be checked by a dentist contracted with the insurance company but more parents had objections to visit a contracted dentist in the PVS (36%) than in the PBS (21%), difference which was statistically significant ( p-value 0.0018).

#### **4.4. Bivariate analysis of utilization of dental services**

To explore the determinants of the main outcomes, bivariate logistic regressions adjusting for cluster effect were conducted. Three different measures were selected to

assess the main outcome (utilization of dental services); last year utilization of dental services, last year utilization of preventive dental services, and last year utilization of curative dental services. Bivariate analyses were conducted to test the associations between different outcome measures and various predisposing characteristics, enabling factors and individuals need.

#### ***4.4.1. Last year utilization of dental services***

Bivariate associations were explored between adolescents predisposing characteristics, enabling factors, and individual's need with last year utilization of dental service as a binary outcome (**Tables 4.7-4.9**).

Looking at the predisposing characteristics; neither child age nor gender were associated with last year dental service utilization. Only two variables were significantly associated with last year utilization at the bivariate level; educational level of the respondents and perceived oral health importance (**Table 4.7**). The odds of using dental services for university or college graduates was twice as much as the odds among parents with lower educational levels (p-value 0.003). Similarly, parents with better oral health beliefs tend to utilize more dental services, the odds of dental services utilization for parents who perceive oral health as or more important than general health being 2.9 times those who perceive oral health to be less important than general health

Among the enabling resources (**Table 4.8**), family monthly income was the most significantly associated with dental service utilization (p-value 0.004). Children of

parents with monthly income more than > 1,000,000 LL utilize dental services 2.2 times those with family income < 1,000,000 LL. Likewise, awareness of the presence of affordable dental care centers was significantly associated with the utilization of dental care (p-value 0.021), where children of parents who are aware of affordable dental centers utilize more services (OR 1.6). Dental insurance was not significantly associated with utilization of dental services (p-value 0.740) and neither was having a regular family income (p-value 0.425).

As for the need factors, the association between the number of decayed teeth (as a continuous outcome) and last year utilization failed to reach statistical significant (p-value 0.060), however, the presence of decays (as a binary outcome) did (p-value <0.001), with the odds of utilizing dental services for adolescents with untreated decay was 0.6 times those without decays. Hence, adolescents in need for treatment utilize less dental services compared to adolescents who are caries free. Parental perception of their child's oral health and child perception of his/her oral health status were both significantly associated with utilization of dental services. The odds of utilizing dental services for children with parent's perception of their oral health status as good were 1.7 compared to their counterparts (p-value 0.047). Similarly, but with stronger association, the odds of utilizing dental services for adolescents with good perception of their oral health status were 2.5 compared to those perceived their oral health status as bad (p-value 0.021).

#### ***4.4.2. Utilization of preventive dental services***

For more thorough analysis of the care seeking behavior, bivariate associations were used to examine possible determinants for the utilization of preventive dental services separately from other types of services (**Tables 4.11-4.13**).

College education was the only predisposing factor significantly associated with the utilization of preventive services, the odds of using preventive dental services for parents who are university or college graduates being 2.2 times those among the parents with lower educational levels (p-value <0.001). None of the remaining predisposing factors showed any statistically significant associations with the utilization of preventive services.

Similarly, to last year utilization of dental services, the utilization of preventive services was associated with family income; parents with family income more than > 1,000,000 LL utilize preventive services 2.2 times those with family income < 1,000,000 LL (p-value <0.001). However, unlike last year dental service utilization awareness of the presence of affordable dental care centers was not significantly associated with the utilization of preventive dental care (p-value 0.021). Furthermore last year utilization of preventive dental services did not show a statistical significant association with dental insurance (p-value 0.450).

DMFT index was significantly associated with preventive services utilization (p-value <0.001), mainly due to the number of untreated decays neither missing teeth nor fillings showed any statistically significant associations with preventive care (p-value

0.451, 0.802 respectively), while the number of untreated decays did (p-value <0.001). The odds of utilizing dental services for adolescents with untreated decay were 0.36 times those without decays. Hence, adolescents free of caries utilize more preventive dental services compared to adolescents with caries. Similarly, to the last year dental service utilization, parental perception of their child oral health and the child perception of his oral health status were both significantly associated with utilization of preventive dental services. However, there was a stronger association with parental perception rather than with child perception. The odds of dental service utilization were 5.0 times as much for parents who perceive their child oral health status as good compared to parents with the perception of bad oral health status (p-value <0.001), and 3.3 times as much for adolescents with good perception compared to those with bad perception of their oral health status (p-value <0.001).

#### ***4.4.3. Utilization of curative dental services***

Similarly, to the utilization of preventive services, bivariate associations were explored between adolescents predisposing characteristics, enabling factors, and individual's need with the utilization of curative dental services as a binary outcome (**Tables 4.15- 4.17**).

College education was negatively associated with utilization of curative services (p-value <0.001), with the odds of using curative dental services for adolescents with parents who are university or college graduates was 0.56 times those with parents from lower educational levels. Hence the higher the educational level of the parents the less

they utilize dental services. Moreover marital status was significantly associated with the use of curative services, as adolescents in single parent families (widowed or divorced) tended to utilize curative dental services 2.2 times those with married parents.

Unlike the overall utilization of dental services or the use of preventive services, utilization of curative services was associated with family income in an inverse manner; children of parents with family income more than > 1,000,000 LL utilize curative services 0.52 times those with family income < 1,000,000 LL (p-value <0.001). Thus unfortunate groups utilize more curative services than others at the bivariate level. Awareness of affordable dental centers and dental insurance failed to reach statistical significance when associated with curative dental services

DMFT index and the presence of decays (as a continuous measure) were significantly associated with curative services utilization (p-value <0.001, OR 1.2 for both variables). Presence of decays as a binary variable was even more associated with curative services, where the adolescents with untreated decay utilize curative services twice the adolescents free of decays (p-value <0.001, OR 2.6) contrasting the association found with the other two dependent variables. Parental perception of their child's oral health and the child's perception of his / her oral health status were both significantly associated with the utilization of curative dental services in a similar way. The odds of dental services utilization were 0.13 times for children of parents perceiving a good status of their oral health compared to parents perceiving bad status (p-value <0.001), and 0.20 times for adolescents perceiving good oral health status compared to those perceiving bad

status (p-value <0.001). Therefore, adolescent with the perception of bad oral health status tend to utilize curative services more than others (average or good perception)

#### **4.5. Multivariable analysis of dental services utilization**

Multiple logistic regressions were used to generate adjusted effect estimates for the three selected outcomes; last year utilization of dental services (**Table 4.10**), utilization of preventive dental services (**Table 4.14**), and utilization of curative dental services (**Table 4.18**). One of the main purposes of conducting the multivariable analysis is to assess if the public and private schools disparities persist after controlling for the other co-variates. Therefore all variables that had a p-value equal or less than 0.2 in the bivariate analysis were included in the multivariate regressions analysis, adjusted for cluster effect of school. When the inclusion of closely related co-variates together in the multivariate analysis lead to poor final models due to problems such as collinearity or the absence of goodness of fit, decisions were made to keep the variable that was more significant and contributed more to the model. For the aforementioned reasons we had to choose either between parental perception or child perception of his oral health status. The decision was made to include the child perception as a measure of perceived need because it showed stronger associations with both main outcome and exposure. Child's perception of his/her oral health status was also considered comparable to the measured normative need (decayed teeth) both of which measured at the child level.



#### ***4.5.1. Last year utilization of dental services***

Out of all the independent variables evaluated at the bivariate level, 6 variables other than school type had a p-value equal to or less than 0.2 and were included in the multivariable analysis; educational level, importance of oral health, monthly income, awareness of the presence of affordable dental care centers, and child perception of oral health status (**Table 4.10**). However, child perception of oral health status could not be included in the final model because of collinearity with the presence of decay.

Three variables were statistically significantly associated with last year utilization of dental services in the final model: school type, oral health importance and presence of decay. School type remained a significant predictor of dental service utilization even after controlling for other predisposing characteristics, enabling factors, and individuals need (p-value 0.041). Adolescents in private schools tend to utilize more dental services compared to those in public schools with an OR of (1.6). Similarly, oral health importance as compared to general health showed a positive significant association with last year utilization. The odds of utilizing dental services for parents who perceive dental health as or more important than general health was 2.4 times those who perceive it's less important. Although the adjusted odds of utilizing dental services for parents with higher income > 1,000,000 LL were 1.6 times parents with lower income < 1,000,000 LL, the association failed to reach statistical significance (p-value 0.082). The presence of decays was inversely associated with last year utilization, adolescents with decays utilizing dental services less than others free of decays (p-value 0.017, OR 0.55).

#### ***4.5.2. Utilization of preventive dental services***

Four variables were incorporated into the final model predicting the use of preventive dental services (**Table 4.14**). All four variables; school type, college education, presence of decay, and child perception of oral health status were significantly associated with the preventive care use in the final model (p-value of the overall model <0.001).

The odds of utilizing preventive dental services for private school students were twice that of public school students, adjusting for other co-variates (p-value 0.037). Similarly, parents with college or university degrees have doubled the odds for their children to utilize preventive dental care than parents with lower levels of education (Adjusted OR 2.2, p-value 0.047). Moreover, adolescents with good perception of their oral health status utilize preventive services 3.3 times adolescents with bad perception, adjusting for other variables (p-value 0.024). The presence of decay was a protective factor against utilization of preventive services, as the adjusted odds of preventive services utilization for adolescents with decay was 0.50 times those without decay (p value 0.002).

#### ***4.5.3. Utilization of curative dental services***

Six independent variables were included in this multivariate analysis; school type, marital status, family monthly income, awareness of the presence of affordable dental care centers, child perception of his/her oral health status and the presence of untreated decay(s) (**Table 4.18**). The overall model significance was high (p-value <0.001), and

three variables remained significant while adjusting for other co-variates; marital status of the parents, presence of decay, and child perception of their oral health status.

Despite being significantly associated at the bivariate level, the main exposure variable (school type) was not significantly associated with utilization of curative services after adjusting for other co-variates (p-value 0.896). Marital status however, was the only predisposing characteristic significantly associated with the utilization of curative services (p-value 0.016), with the odds of curative service utilization by the child in a single parent families (widowed or divorced) being 2.2 times that for children living with both parents. Although two enabling factors were included in the multivariate regression analysis; family monthly income and awareness of affordable dental centers, neither were significantly associated with adolescent utilization of curative dental services in the final model (p-value 0.115, 0.065 respectively). Individual's need was the most significantly associated with curative service utilization, and in an opposite matter of previous associations of individual needs with the other outcome measures. Both the presence of decay and child perception of their own oral health status were significantly associated with curative services (p-value <0.001, <0.003 respectively). The odds of utilizing curative services for children with untreated decay was 2.6 times that among children without decay, and 3.7 times for children with bad oral health status perception compared to children with good perception.

## CHAPTER 5

### DISCUSSION

#### **5.1. Introduction**

Studies on oral health status and dental services utilization among children have a particular epidemiological significance: dental decay is the most prevalent disease in childhood (GBD, 2010; Petersen, 2003) and oral health services have been reported to be underutilized among children of all ages (Bloom et al., 2012; Kelly et al., 2005). Moreover, children's oral health and service utilization have been extensively demonstrated to follow a social gradient where disadvantaged families, in particular, face a twin burden of both poor oral health (DMFT and malocclusion) and reduced utilization of oral health services (Baldani & Antunes, 2011; Edelstein, 2002; Kelly et al., 2005). Previous studies in Lebanon have revealed elevated burdens of oral health among children with disparities between public and private school (Chedid et al., 2011; Doumit & Doughan, 2002; Moukarzel, 2012), but only one study was carried out among children 6-11 years of age to estimate the utilization of dental services and its possible determinants (Karam, 2013). Our study is the first in Lebanon to assess dental services utilization and its determinants among Lebanese adolescents (12-18 years). Additionally, what differentiates our study from already published investigations is that to the best of our knowledge; the utilization of preventive and curative dental services have never been investigated separately and

contrasted with the 12 months dental services among adolescents. To conduct our investigation on the disparities in dental service utilization among school children, this study was designed as a comparative cross-sectional study of adolescents (12 – 18 years of age) attending private and public schools in Beirut. Although both samples were recruited through non-probability sampling techniques, the relatively large sample size and the inclusion of various different schools (public and private) representing different levels of socio demographic and socioeconomic status enabled the researchers to reflect on the utilization of dental services among secondary school children in Beirut.

## **5.2. Utilization of dental services**

Despite the existence of extensive recommendations regarding dental care and follow up; one in ten adolescents had never been examined by a dentist. There was a significant difference in the 12 months utilization between public and private schools with a higher proportion of public adolescents having visited a dentist. No other studies assessing the utilization of dental services among Lebanese adolescents are available for comparisons. Only one recent study carried out on younger Lebanese children was identified (Karam, 2013). Although that study examined younger children (aged 6 – 11 years) they reported a 12 months utilization prevalence of 72.8%, a proportion that is higher than the 64.8% reported in our study. A possible explanation might be that all the participating public schools in that study were approached through an NGO offering some free dental procedures for the enrolled students therefore resulting in an increased

probability of services utilization among the public school sample. Supporting this observation is the fact that 63.4% of the public school children aged 6-11 years utilized dental services in the previous study compared to only 51.6% of adolescents in our study.

Within the Eastern Mediterranean region few studies have documented the utilization of dental health services (Al-Omiri, Al-Wahadni, & Saeed, 2006; Al Johara, 2010; Hashim et al., 2006; Karam, 2013; Obeidat et al., 2014). Moreover, utilization studies among schoolchildren, in particular, are extremely scarce. In an investigation of Jordanian schoolchildren conducted in the North of Jordan the prevalence of last year dental service utilization was reported to be 60%, similar to our reported proportions for Lebanese schoolchildren (Al-Omiri et al., 2006). Compared to global reports, our reported prevalence of 12 months dental services utilization may be considered relatively high and is even comparable to utilization rates in wealthier countries (**Figure 5.1**). National surveys have reported last year utilization prevalence rates of 77.0% for children aged 2 – 20 in the United States (Wall et al., 2012), 66.0% for children in Canada (Amin, Perez, & Nyachhyon, 2014), 37.3% among children below the age of 17 years in Catalonia (Pizarro et al., 2009), and 31.5% among 12 year old children in China (Zhu, Petersen, Wang, Bian, & Zhang, 2003).

Inequality in the utilization of dental services between the private and public schools in our study was clear. The proportions of adolescents who did not utilize any dental services in the past year doubled from private to public schools. It is noteworthy to report that both studies among Lebanese schoolchildren (this study and previous study

among younger children) similarly reported significant disparities in the utilization of dental services between students attending private and public schools. In agreement with the findings of other researchers, the majority of the adolescents in this study utilized dental services for curative rather than preventive reasons (Al-Omiri et al., 2006; Karam, 2013; L. Liu et al., 2015). Despite the fact that the most commonly reported reason for the last dental visit in the total sample was dental caries, dental checkup came second and it was the most commonly reported reason for dental services utilization in the PVS compared to third in the PBS.

Not perceiving a need was the most commonly reported reason for not utilizing dental services in the past year, in both types of school, followed by elevated treatment costs. Nevertheless, treatment cost was reported twice as commonly in the PBS compared to the PVS, likely reflecting socio-economic differences between the families of adolescents attending the two types of schools. Interestingly, however, cost and not the absence of need was reported to be the most common cause for not utilizing dental services in the younger school children in Beirut (Karam, 2013). One possible explanation may be related to the different stages of dental development exhibited by the two age groups. Younger children are in the mixed dentition stage marked by the eruption of permanent teeth and the loss of primary teeth, whereas the older adolescents examined in this study are in the early permanent dentition stage having, on average, lost their last primary tooth. Consequently, a child in his mixed dentition experiencing the process of replacement of primary teeth by the permanent dentition may appear to be at higher need for dental services than an adolescent with newly erupted permanent teeth that appear to be symptom-

free. The two distinguished stages of dental development can reflect on different perceptions of the need for dental care and subsequently affect patterns of dental services utilization.

### **5.3. Utilization of orthodontic services**

The utilization of orthodontic services was examined separately in this study. Early orthodontic checkup enables the detection of early signs of developing problems and the provision of relatively simple and inexpensive interceptive treatments at the optimal time (American Association of Orthodontists, 2013; Philip, 2011). The age of 12 years in particular, when major growth events are taking place, is a critical period in molding and establishing malocclusion (Proffit, Fields, & Moray, 1998). Therefore, a child passing the age of 12 without having had an orthodontic consultation often represents a lost opportunity (Brennan & Gianelly, 2000; Proffit et al., 1998). In spite of the importance of timely orthodontic screening, 67% of adolescents in the PBS and 45% in the PVS had never been examined by an orthodontist, demonstrating relatively high proportions in light of the examined adolescents' ages (12 to 18 years). Despite the American Association of Orthodontists (AAO) recommendation that a child's first visit to an orthodontic clinic should be no later than at the age of 7 years (American Association of Orthodontists, 2013), the mean age at first consultation for the examined adolescents was 11.7 years and ranged between 5 and 17 years. Hence, not only had more than half of the participating adolescents never been examined by an orthodontist, the adolescents who visited the orthodontist did so



on average 4.5 years later than recommended. Compared to the utilization of dental services, the utilization of orthodontic services falls behind and the two reported orthodontic indicators clearly illustrate the need for better access to orthodontic services among Lebanese adolescents.

#### **5.4. Determinants of dental services utilization**

Last year utilization is commonly chosen as an indicator for dental service utilization in published literature. However, in the present study we not only examined the 12 months dental service utilization but also assessed the utilization of preventive and curative services separately, comparing them to each other and to last year utilization of dental services. In consideration of Andersen model of utilization, it is worthy to note that although school type was strongly associated with both family income and educational level of the parents, we considered it as one of the predisposing characteristics rather than an enabling factor. This is because we wanted to separate the social and environmental effect of school type from the purely enabling economical effect in explaining the utilization of dental services.

##### ***5.4.1. Last year utilization of dental services***

Several predisposing characteristics examined in this study contributed to the prediction of last year dental service use. School type, college education, and perceived oral health importance were positively associated with last year utilization at the bivariate

level. These positive associations between the predisposing characteristics and dental service utilization are in agreement with what has been published in the literature (Baldani & Antunes, 2011; Edelstein, 2002; Kelly et al., 2005; L. Liu et al., 2015; Manski & Magder, 1998). However, after controlling for other co-variates, only school type and oral health importance remained positively associated with 12 months dental service utilization. In the previous study among younger Lebanese school children, school type also remained a significant predictor for utilization after adjusting for other co-variates but oral health importance did not (Karam, 2013).

Among the different enabling resources, we found that only family monthly income was a significant predictor of last year dental service utilization (at the bivariate level). This was anticipated as the income-related inequality in dental care is well established in the literature (Edelstein, 2002; Gift & Newman, 1992; L. Liu et al., 2015; Manski & Magder, 1998; Petersen, 1990). Interestingly, however, dental insurance was not significantly associated with the utilization of dental services, contrasting several reports in the literature (Lave, Keane, Lin, & Ricci, 2002; J. Liu, Probst, Martin, Wang, & Salinas, 2007; Locker et al., 2011; Millar & Locker, 1999; Stella, Bellamy, Schwalberg, & Drum, 2001). This might be explained by the deficiencies of public and private dental insurance plans in Lebanon, whereby dental insurance is mostly associated with specific governmental bodies as part of the general health insurance schemes that are provided for limited personnel and for limited dental procedures. Consequently, dental insurance in Lebanon cannot be considered as an enabling factor for service utilization in the same way it has been reported in the literature. Interestingly, when asked about willingness to

invest a certain amount of money on dental insurance almost one third of the responding parents reported that they cannot afford, not even 100\$ for the least proposed amount of investment. Even among those parents willing to invest in dental insurance, the majority still opted for the least possible amount of investment, which is a 100\$. Consequently, any future direction for dental insurance plans should take these results into consideration. The fact that more parents were willing to invest more money in the private schools, might suggest that more sophisticated dental insurance plans are not affordable by the unfortunate, and will increase the actual present disparity between the public and private schools.

Dental services have generally been considered to be discretionary services (R. M. Andersen, 1968, 1995; Reisine, 1987) in the sense that the utilization of such services is more likely to be explained by predisposing and enabling factors rather than need. This is evident in the literature in the form of contradicting results for the role of need but not for the roles of predisposing or enabling factors where the literature is in agreement on their role in the dental care seeking behavior (Arcury et al., 2012; Locker et al., 2011; Medina - Solis et al., 2008; Piovesan et al., 2011). This, in our opinion, is mostly related to differences in measuring the need. Not only did different studies measure different types of need (perceived or normative need); studies did not agree on the indicators for each type of need. For instance, some studies used DMFT (Karam, 2013; Reisine, 1987; Tickle et al., 2000) while others measured the presence of untreated decays as an indicator for normative need (Arcury et al., 2012; Vargas & Ronzio, 2002). It is more logical to use the presence of untreated decay as an indicator; since DMFT already

encompasses some met need (fillings and possible extractions) and therefore cannot reflect accurately the current need for dental services. Even in studies where the number of untreated decays was used as an indicator, some authors classified the need for dental services based on cutoff points based on the presence of a minimum number of untreated decays (Medina - Solis et al., 2008) while others considered the presence of any decay to be an indicator of need (Arcury et al., 2012; Piovesan et al., 2011; Vargas & Ronzio, 2002). We adopted the latter and considered that even if one decayed tooth was present the participant is in actual need for treatment. Our results confirmed that the presence of decay is more suitable in explaining dental services use than DMFT, since DMFT was not significantly associated with dental services utilization while the presence of decay was. Our results are in agreement with the literature reporting that individuals in need for treatment utilize less dental services compared to individuals with no or less need (Arcury et al., 2012; Reisine, 1987; Tickle et al., 2000; Vargas & Ronzio, 2002), which illustrates inequity in dental services utilization. However, it should be noted that our data is cross sectional in nature and that our measure of dental care utilization is an assessment of the previous year whereas our measure of dental need is an assessment of current need. Therefore, in parallel with studies assessing the determinants of dental caries, our results confirm that what we measured as individual need is probably the outcome of dental care utilization rather than the need for it (Hashim et al., 2006; Ismail, Sohn, Lim, & Willem, 2009; Moeller, Chen, & Manski, 2010). The same argument can apply to self-assessed dental need, where parental perceptions of their child's oral health status being good or the adolescent's perception of their own oral health status being good were both

associated with greater utilization of dental services compared to their counterparts at the bivariate level. As mentioned earlier, our explanation for this association is in the context of reverse causality (Moeller et al., 2010; Murakami et al., 2014).

#### ***5.4.2. Utilization of preventive dental services***

The controversies in the determinants of last year dental service utilization, in particular the role of individuals need in predicting the use of oral care services, forced us to believe that the 12 months dental service utilization cannot entirely describe the oral health care seeking behavior. This is because an individual's report of visiting the dentist in past year could either mean that he/she has visited the dentist for preventive practice or for an acute problem. Similarly, a report of not visiting the dentist can either mean poor preventive practice, the absence of an acute problem or limited access to dental care. For those reasons, we decided to examine the utilization of preventive and curative services separately.

Similarly, to the 12 months utilization, preventive service utilization was associated with school type, where private school students tend to utilize more preventive dental services than public school students even after controlling for other covariates. College education was the second predisposing factor significantly associated with the utilization of preventive services. This is in agreement with the literature and was anticipated since more educated parents are more likely to recognize the benefits of such preventive behavior on their child's oral health (Medina- Solis et al., 2008; Murakami et al., 2014; Newman & Gift, 1992; Stella et al., 2001).

After adjusting for other covariates, income was not associated with preventive dental services, revealing the greater importance of the predisposing characteristics over the enabling resources in explaining the use of preventive dental services. The importance of predisposing factors, like education, lies in their indirect effect on preventive care use, through modifying the perceived need for the use of these preventive services. Given that preventive services are related to noncritical situations (Maupomé, Borges, Ramírez, & Díez-de-Bonilla, 1999), the need for preventive services can be less apparent than for curative type of services. Therefore, the presence of untreated decays and the child's perception of his oral health status are more appropriate indicators of the need for curative types of dental services rather than for preventive services.

The reported associations between the presence of untreated decays and the perception of oral health status with preventive care ratify the probability that those variables are the outcome of preventive dental care rather than the cause for it. The presence of untreated decays was negatively associated with the utilization of preventive services. On the contrary, the self-assessed oral health status was positively associated with preventive services; those who assessed their oral health better were more likely to utilize preventive dental care than others, which is similar to the results of previous studies in Japan and the United States (Moeller et al., 2010; Murakami et al., 2014).

### *5.4.3. Utilization of curative dental services*

The predictors of curative services utilization differed considerably from the predictors of either 12 months dental services utilization or preventive services utilization. Interestingly, school type did not predict the utilization of curative services when controlling for other covariates; neither did university education nor family monthly income. In particular, when adjusting for the presence of untreated decays, school type failed to predict the utilization of curative services (Adjusted OR = 1). This suggests the indirect effect of school type through modifying the need (untreated caries) in predicting the utilization of curative services. Unexpectedly, being an adolescent with widowed or divorced parents was one of the strongest predictors for the utilization of curative services, even after controlling for other confounders. Children of widowed or divorced parents utilized curative dental services 3.5 times as much as children of married parents. To the best of our knowledge no other studies have assessed family status as a predictor for utilization of curative dental services. Research on the role of family marital status in larger samples is necessary before reaching final conclusions, since in our sample only 8 single parent families did not utilize curative services and 44 did.

As anticipated, the effect of the adolescent's need for dental care on the utilization of curative services was in a reverse way to what was observed in the preventive service utilization. Utilization of curative services was positively associated with the presence of decay and negatively associated with the perception of adolescent's oral health. As discussed earlier, self-assessed dental need (perceived need) is probably the outcome of dental care therefore explaining the negative association between utilization of curative

services and perceived oral health status. Hence, patients utilizing curative services perceive their children's oral health status to be inferior to what it should be. Remarkably, normative need was the most statistically significant predictor for curative services utilization, which contradicts the studies reporting that the use of dental service is more discretionary than other health services and more likely be explained by predisposing and enabling factors rather need (R. M. Andersen, 1968, 1995; Reisine, 1987). Actually, preventive dental services may fall under that category but curative dental services are reasonably more serious problems that seem to be primarily explained by need followed by predisposing characteristics.

#### ***5.4.4. Comparison between different types of utilization***

Predisposing characteristics were associated with both 12 months utilization and preventive services utilization. Our data analysis shows that there is a large difference in both preventive care and 12 months utilization between private and public school children. Even after controlling for parental education, family income and normative need, school type remained as one of the most significant predictors for both preventive care and 12 months utilization. Therefore, there must be other systematic differences that were not measured in this study, necessitating additional investigations in order to characterize these additional factors.

Education was a significant predictor of preventive care but not of curative care or 12 months utilization. This is a result of the effect of education on the level of perceived need, which, in turn affects utilization. Surprisingly, neither income nor dental insurance



were associated with any of the three different outcome measures, emphasizing the importance of predisposing and need factors rather than enabling resources in predicting oral health service use among Lebanese adolescents. Normative need (decay) was associated negatively with 12 months utilization and preventive care on one hand, and positively with curative care on the other. However, in our view, the need for preventive services is absolute in the sense that every individual is in need for preventive care. Consequently, need factors best predict utilization of curative services rather than preventive or 12 months dental services utilization.

Looking at the different determinants for each outcome measure, we can clearly observe the limitations of the 12 months utilization in explaining the use of dental services and reach a conclusion on the importance of segregating different types of dental services in epidemiological studies.

The rationale behind our method of analysis was to assess the presence of disparities in dental care between public and private schools while controlling for other variables. However, the analysis of this study may be approached in multiple ways, each answering a specific question. Given the persistent disparities associated with school type, the following step could be to include two final models, one for each school type, in order to explore the different determinants for private and public schools separately. Moreover, future research can be performed to test the Andersen model itself in the Lebanese dental context using pathway analysis.

## **5.5. Limitations**

The results of this investigation should be considered in light of their limitations. The interpretation of findings from this cross sectional study is complicated by the inherent limitations of cross sectional designs. This is primarily illustrated in the ambiguous temporality of certain variables, in particular those relating to individual's need. The survey assessed dental services utilization in the past year, whereas both normative and perceived needs were assessed at the time of the survey, it is difficult to determine whether the outcome followed the exposure or vice versa. Therefore some of the results could be due to reverse causality and probably represent the consequence of dental care rather than the need for it.

The fact that the study sample was recruited through non-probability sampling methods, along with the reduced response rates at the levels of private school recruitment and parent's approval for the adolescent examination; all limit the external validity of our findings. Although the available knowledge on the private schools that did not participate suggests that our sample does not represent the higher SES schools, it did not prevent the illustration of inequalities between private and public schools. Consequently, the results of this study could even be an underestimation of greater underlying inequalities between public and private schools. It is worth to note, that the characteristics of the examined adolescents were similar to the non-examined children with respect to age and gender, which further reduce the selection bias.

Other inherent limitations of the study are related to the self-administered questionnaires and the inevitable information bias associated with them. Various forms of information bias can be encountered; recall bias - especially in the dental services utilization questions regarding time and reason of the last dental visit, reporting bias in sensitive questions like socio-economic questions, and possible misinterpretation of some questions. Another limitation might be related to the decision of lumping or re-categorizing some variables that was dictated by the small number of individuals in certain variables. For instance the extreme low numbers of parents who are illiterate or only read and write forced us to re-categorize the variable level of education into college / university education (dichotomous variable) to gain power. Therefore some of the associations might be underestimated.

Finally, this study examined curative and preventive dental care separately. Due to the self-reported nature of the data, however, it was hard to accurately distinguish between the use of exclusively preventive services from that for both curative and preventive services.

## **5.6. Strengths**

To best of our knowledge, this is the first study to assess not only the utilization of dental services, but also its determinants among Lebanese adolescents. This study does not only bridge the gap in the Lebanese literature, it also adds to the global body of knowledge regarding the conceptualization of dental services utilization. We provide a more

comprehensive analysis of the dental care seeking behavior, departing from conventional assessments of merely 12 months services utilization and segregating into an assessment of preventive and curative services as separate entities. To our knowledge, this is the first study to examine this approach of modeling different types of dental services separately among adolescents, and compare them to the 12 months dental services utilization. Only one study among Japanese adults was found to have a similar approach. However, they tested income-related inequality among preventive and curative services (they did not report on the 12 months utilization) rather than testing the different predictors to explain use. Therefore, they failed to control for different confounders and did not have any objective measures for normative need or oral health beliefs. An added strength of this study lies in the statistical analysis, as in fact, we accounted for the cluster effect by using the robust standard errors for the univariate, bivariate, and multivariable regressions.

This investigation was preceded by a similar study on younger children attending private and public schools in Beirut (Karam, 2013), therefore the data collected through this research allows for comparisons between the different age groups. These comparisons are important in the assessment of the pattern of dental services utilization among Lebanese children as they grow into adolescence. In the absence of long-term cohorts, such comparisons can allow for insight on the different determinants of dental care among children of different ages, with implications for different strategies to address underutilization in certain groups.

Finally, although some selection bias due to the refusal of participation of the higher SES private schools is suspected, it did not prevent the illustration of social inequalities with different family income levels between the two types of schools. Importantly, the available knowledge on the non-participating schools suggests that our results are more likely to be more conservative than the truly existing differences rather than an overestimation.

## CHAPTER 6

### CONCLUSIONS AND RECOMMENDATIONS

#### **6.1. Conclusions**

This study demonstrates the presence of social disparities in dental care among adolescents in Beirut. Although the utilization of dental services in Lebanon appears to be relatively high, with more than two thirds of adolescents having visited the dentist at least once in the past year, the utilization of dental services is unequally distributed between private and public school-attending adolescents. Adolescents attending private schools in Beirut are more likely to utilize dental services in general and are in particular more exposed to preventive services. It is worth to note that the selective nature of our study prevented the participation of the most fortunate slice of the population, which suggests that the results of this study could even be an underestimation of greater underlying inequalities.

The most common reported reasons for not utilizing dental services in both types of schools were the absence of need, followed by elevated treatment cost. This reflects on the deficiencies in oral health awareness and in the knowledge of the benefits of preventive dental care and regular check-ups.

Our assessment of the various determinants of dental care highlights the role of both predisposing characteristics and individual need in predicting the utilization of dental services. Notably, predisposing characteristics (school type and parents education) play significant roles in predicting the use of preventive services, whereas individual need (both normative and perceived) is a significant driver for the use of curative dental services. The exception to this observation is our novel finding of the significant association between parental marital status and the adolescent's use of curative dental services.

The presence of dental insurance, a commonly implicated enabling factor, does not seem to play a significant role in the use of either curative or preventive dental services by adolescents in Beirut. More importantly, the financial reluctance of the majority of parents to invest in dental insurance (especially those at a greater disadvantage) holds important implications for the shaping of future strategies developed to address the existing social inequalities in oral health.

It is crucial to note that the conventional socio-economic indicators, income and education, do not seem to account for the entire social inequalities existing between private and public schools. School type appears to explain both the use of preventive services and the overall yearly utilization independent of the effects of parental education, family income and normative and perceived dental needs, suggesting the presence of additional systematic differences between adolescents attending the two types of school that were not captured by this investigation.

## 6.2. Recommendations

Although the control of oral disease depends on the availability and accessibility of oral health systems, reduction of risk to disease is only possible if services are oriented towards primary health care and prevention. Our findings provide extensive evidence to support the predominance of preventive care in our recommendations:

- After controlling for other co-variate school type was associated with preventive services, as adolescents in public schools tend to utilize less preventive services than those in private schools (suggesting populations at high risk approach).
- The significant negative association between past use of preventive dental services and the current presence of dental decays, in addition to the positive association between preventive care and perceived oral health status at the day of the examination underline the substantial effect of preventive dental services in reducing the burden of oral disease among Lebanese adolescents
- The utilization of curative dental services did not exhibit a social gradient as it was explained by the presence of normative need (presence of dental decay)
- The limited willingness to invest dental insurance directs future insurance strategies towards the less expensive preventive care packages rather than the more expensive curative types



- The extensive reporting of perceived absence of need for dental care, in addition to the strong association between parental education and adolescent preventive service utilization, both emphasize the potential benefits of increasing oral health awareness and of educational campaigns

### ***6.2.1. Short term recommendations***

Optimal interventions in relation to oral disease are often not universally available because of escalating costs and limited resources. Community-based programs can be preferred in light of limited resources, with special emphasis targeting either high risk populations or implementing specific interventions that are shown to be most effective. Many countries have successfully adopted such community programs (Frazier, Jenny, & Johnson, 1982; Macpherson, Anopa, Conway, & McMahon, 2013). Specific community-based dental programs are emphasized:

- Dental sealant community program

A program made for preventing cavities among school children by providing dental sealants (plastic coatings applied to the chewing surfaces of the posterior teeth). Dental sealants are not only effective tool in preventing decay; it they are also effective in stopping the progression of early disease (Stallings et al., 2008). School-based dental sealant programs been reported as an important and effective approach in promoting the oral health of children and adolescents (Gooch et al., 2009). It is worth to note that a local Lebanese NGO (Ajialouna)

has been providing free dental sealant services in several primary public schools in Lebanon, however, more efforts are required to expand the application of this program to include private schools and make it more available reaching secondary schools. The activities of such a program could involve continuing education courses to reach oral health practitioners regarding the importance of dental sealants, large-scale promotional activities, and actively providing sealants through yearly campaigns to school children.

- Public schools community program

As mentioned earlier, our results clearly illustrate the disadvantage carried by students attending public schools in receiving both general dental visits and preventive care, therefore highlighting the importance of targeting public students in order to reduce inequalities in oral health. Such a community based program would target disadvantaged populations with the aim of reducing the disparity in both the burden of oral health and the underutilization of dental services (Patel, 2012). Public school interventions should be designed to supplement the dental sealant campaigns, and may include three main simple activities performed at the school level: educational sessions on oral health for students, annual dental screening supplemented with appropriate referral letter when needed, and providing students with timely topical fluoride applications and affordable fluoridated tooth paste (Jones, Burt, Petersen, & Lennon, 2005).

### ***6.2.2. Long term recommendations***

Water fluoridation and fluoride supplements are one of the most cost effective measures that can be performed at the national level in order to prevent dental decays (Griffin, Gooch, Lockwood, & Tomar, 2001; Griffin, Jones, et al., 2001; Slade, Sanders, Do, Roberts-Thomson, & Spencer, 2013). At present, there are controversies regarding the salt fluoridation policy in Lebanon. The current recommendation is toward a re-evaluation of the salt fluoridation law, advocating for conducting a thorough assessment of fluoride exposure in the Lebanese context. For these reasons, other national oral health programs can be at the present time an alternative approach to promote oral health and reduce disease. The first step that can be taken is to incorporate oral disease into the Non Communicable Disease Unit (NCDU) of the Ministry of Health. NCDU is the national focal point for the prevention and control of Non Communicable Diseases in the country and any proposed oral health program must be addressed in the context of a comprehensive country wide NCD prevention program. Components of a comprehensive national oral health program could include:

- Awareness campaigns promoting tooth-brushing, healthy dietary behaviors, the appropriate use of topical fluoride products and periodic examination by a dentist. These must target not only adolescents, but also their parents, teachers, and health workers (Castilho, Mialhe, Barbosa, & Puppini-Rontani, 2013; Satur, Gussy, Morgan, Calache, & Wright, 2010).

- Oral health educational programs for general physicians and pediatricians. Educating general physicians and pediatricians on the importance of oral health and on the necessity of encouraging parents to receive preventive dental care measures. Pediatricians in particular, could acquire sufficient skills for the early identification and referral for treatment of oral health problems.
- Oral health educational programs for general dentists that might be carried out by oral public health workers and oral epidemiologists. Such programs must reinforce the importance of preventive oral medicine and may be implemented as part of the continuing educational courses required by the Lebanese Dental Association (LDA).
- Affordable preventive dental insurance plans focused on the less expensive preventive procedures including dental checkups, cleaning and fissure sealants. In the light of the results of this study, further analysis can be done to generate the blue prints targeting both public and private sectors to generate affordable insurance schemes.
- Possible barriers that could be encountered when developing such national oral health program may include, but are not limited to, financial and human resources, the involvement of policymakers, legal constraints and transportation.

Another very promising policy that should be implemented at the national level is healthy food in schools policy (Cooper et al., 2013). Priority should be given to such policies preventing numerous diseases linked by common, preventable and lifestyle related risk factors. With appropriate diet and nutrition, primary prevention of many oral and general health diseases can be achieved. As part of MEHE regulations, a list of foods and beverages prohibited in public schools has already been established. However, this should be followed up with serious and strict enforcement and must extend to include private schools as well.

### ***6.2.3. Recommendations for future studies***

Our in depth analysis and segregation of dental services into the preventive and curative types clearly illustrate the deficiencies and limitations of the conventionally employed 12 months indicator of dental services utilization. We therefore emphasize on the importance of separating the two types of dental services in future epidemiological studies in this field.

In this investigation, the association between school type and dental care was not accounted for by the assessed parental education, family income or even need factors. We believe that there must be other systematic differences that were not measured in this study and propose the need for additional investigations to specifically characterize these differences and associated factors. Additionally, given the significant association found between marital status and curative services, further studies aiming on examining the role

of parental marital status in adolescent curative dental care utilization are essential to validate our novel finding.

To move forward in the assessment of the determinants of dental service utilization, longitudinal studies are invaluable when assessing the determinants of utilization. Longitudinal school-based studies that follow students from early-mid childhood to adolescence have the potential to successfully rule out reverse causality. Such investigations may be incorporated with routine yearly dental examinations that are carried out part of schools' health programs.

Based on the results of this study, the challenges faced, and the experience accumulated, we propose the following practical recommendations for future scholars at the local level:

- There is a need for a national, population-based study, stratified according to governorate, to quantitatively assess the prevalence of oral health problems and the pattern of dental services utilization among Lebanese school children. Collaborations between the Ministry of Education and the Ministry of Public Health are extremely necessary in order to encourage the participation of private and public schools.
- Future cross sectional studies may be conducted at the dental clinic level rather than households or school level. This would enable both the reason for the visit and the current oral health status to be measured at the same time, regardless of the treatment delivered.

## TABLES

**Table 4.1: Percent distribution of students (11-18 years) by Socio-demographic characteristics, health beliefs (Predisposing characteristics) and type of school, adjusted for school cluster (n=948)**

<b>Predisposing characteristics</b>	<b>Private (n=514) N (%)</b>	<b>Public (n=434) N (%)</b>	<b>Total (n=948) N (%)</b>	<b>P-Value</b>
<b>Child</b>				
<b>Age</b>	14.1 (±1.5)	15.4 (±1.6)	14.7 (±1.7)	0.019*
<b>Gender</b>				
Male	250 (48.7%)	156 (35.9%)	406 (43.0%)	0.503
Female	263 (51.3%)	278 (64.1%)	541 (57.1%)	
<b>Parent / Guardian</b>				
<b>Age</b>	44.3 (±6.8)	44.1 (±7.2)	44.2 (±7.0)	0.654
<b>Marital Status</b>				
Married	447 (93.3%)	368 (91.3%)	815 (92.4%)	0.3838
Divorced / Widowed	32 (6.7%)	35 (8.7%)	67 (7.6%)	
<b>Education level</b>				
Illiterate	0 (0.0%)	6 (1.5%)	6 (0.7%)	0.0121*
Read and write	3 (0.6%)	16 (3.9%)	19 (2.1%)	
Elementary	5 (1.0%)	37 (8.9%)	42 (4.6%)	
Intermediate	51 (10.3%)	143 (34.5%)	194 (21.4%)	
Secondary	100 (20.3%)	138 (33.3%)	238 (26.2%)	
College/ University	334 (67.8%)	75 (18.1%)	409 (45.0%)	
<b>University education</b>				
No	159 (32.2%)	340 (81.9%)	499 (55.0%)	0.0004*
Yes	334 (67.8%)	75 (18.1%)	409 (45.0%)	
<b>Oral Health importance compared to general health</b>				
Less important	32 (7.0%)	62 (15.5%)	94 (11.0%)	0.0004*
As important	361 (78.8%)	252 (63.0%)	613 (81.4%)	
More important	65 (14.2%)	86 (21.5%)	151 (17.6%)	

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.2: Percent distribution of students (11-18 years) by Socio-economic characteristics (Enabling resources) and type of school, adjusted for school cluster (n=948)**

<b>Enabling resources</b>	<b>Private (n=514) N (%)</b>	<b>Public (n=434) N (%)</b>	<b>Total (n=948) N (%)</b>	<b>P-Value</b>
<b>Family monthly income</b>				
< 500,000 LL	11 (2.6%)	34 (9.0%)	45 (5.6%)	0.0000*
500,000 - 1000,000 LL	52 (12.1%)	188 (49.7%)	240 (29.7%)	
1,000,000 – 3,000,000	181 (42.1%)	148 (39.2%)	329 (39.2%)	
> 3,000,000	186 (43.3%)	8 (2.1%)	194 (24.0%)	
<b>Regular income</b>				
No	42 (15.0%)	76 (35.0%)	118 (23.7%)	0.0000*
Yes	238 (85.0%)	141 (65.0%)	379 (76.3%)	
<b>Presence of medical insurance</b>				
No	68 (14.8%)	111 (27.3%)	179 (20.7%)	0.0057*
Yes	391 (85.2%)	295 (72.7%)	686 (79.3%)	
<b>Presence of dental insurance</b>				
No	305 (84.5%)	230 (84.6%)	535 (84.5%)	0.9886
Yes	56 (15.5%)	42 (15.4%)	98 (15.5%)	
<b>Awareness of the presence of affordable dental care centers</b>				
No	256 (57.4%)	243 (61.2%)	499 (59.2%)	0.2318
Yes	190 (42.6%)	154 (38.8%)	344 (40.8%)	

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values



**Table 4.3: Percent distribution of students (11-18 years) by DMFT, IOTN, and Perceived need (Individual's need) and type of school, adjusted for school cluster (n=830)**

<b>Individual's need</b>	<b>Private (n=437) N (%)</b>	<b>Public (n=393) N (%)</b>	<b>Total (n=830) N (%)</b>	<b>P-Value</b>
<b>DMFT</b>	4.1 (±3.3)	5.8 (±3.4)	4.9 (±3.4)	0.0250*
<b>Filled teeth</b>	1.7 (±2.2)	1.3 (±2.1)	1.5 (±2.2)	0.1496
<b>Decayed teeth</b>	2.4 (±2.7)	4.4 (±3.0)	3.3 (±3.0)	0.0395*
<b>Decayed</b>				
No	145 (33.2%)	39 (10.0%)	184 (22.2%)	0.0041*
Yes	292 (66.8%)	353 (90.1%)	645 (77.8%)	
<b>Need for orthodontic treatment IOTN**</b>				
No definite need	370 (84.7%)	332 (84.7%)	702 (84.7%)	0.9959
Definite need	67 (15.3%)	60 (15.3%)	127 (15.3%)	
<b>Parental Perception of the child oral health<sup>u</sup> (N= 948)</b>				
Bad	37 (7.4%)	62 (15.1%)	99 (10.9%)	0.0121*
Average	200 (40.2%)	197 (47.8%)	397 (43.6%)	
Good	261 (52.4%)	153 (37.1%)	414 (45.5%)	
<b>Child Perception of his/her oral health</b>				
Bad	36 (8.2%)	59 (15.1%)	95 (11.5%)	0.0002*
Average	215 (48.8%)	220 (56.7%)	435 (53.0%)	
Good	190 (42.0%)	111 (28.2%)	301 (35.5%)	

\*p-value <0.05

<sup>u</sup> Numbers in cells do not add up to total N column-wise because Parental perception was measured on the parental questionnaire

When numbers in cells do not add up to total N column-wise because of missing values

\*\* Need for orthodontic treatment according to modified IOTN: **no definite need** – IOTN ≤ 3; **definite need** – IOTN > 3

**Table 4.4: Percent distribution of students (11-18 years) by utilization pattern and type of school, adjusted for school cluster (n=948)**

<b>Dental utilization</b>	<b>Private (n=514) N (%)</b>	<b>Public (n=434) N (%)</b>	<b>Total (n=948) N (%)</b>	<b>P-Value</b>
<b>Ever been to the dentist</b>				
No	25 (5.0%)	70 (17.2%)	95 (10.5%)	0.0186*
Yes	475 (95.0%)	338 (82.8%)	813 (89.5%)	
<b>Last visit<sup>a</sup> (N= 813)</b>				
< 3 months	185 (43.0%)	86 (32.2%)	271 (38.8%)	0.0424*
4-6 months	79 (18.3%)	47 (17.6%)	126 (18.1%)	
7-12 months	76 (17.6%)	41 (15.4%)	117 (16.8%)	
> 12 months	91 (21.1%)	93 (34.8%)	184 (26.4%)	
<b>Last year utilization<sup>a</sup></b>				
No	116 (25.4%)	163 (48.4%)	279 (35.2%)	0.0007*
Yes	340 (74.6%)	174 (51.6%)	514 (64.8%)	
<b>Reason for last visit</b>				
Check up	188 (40.3%)	68 (20.6%)	256 (32.2%)	0.0013*
Cleaning	99 (21.2%)	40 (12.1%)	139 (17.4%)	0.0000*
Caries	153 (32.8%)	144 (43.6%)	297 (37.3%)	0.0699
Pain	51 (10.9%)	105 (32.0%)	156 (19.7%)	0.0023*
Orthodontics	109 (24.8%)	50 (16.0%)	159 (21.1%)	0.0764
<b>Utilization of preventive services</b>				
No	229 (49.1%)	225 (68.4%)	454 (57.1%)	<0.0001*
Yes	237 (50.9%)	104 (31.6%)	341 (42.9%)	
<b>Utilization of curative services</b>				
No	141 (32.0%)	70 (22.6%)	279 (35.2%)	0.0246*
Yes	299 (68.0%)	240 (77.4%)	514 (64.8%)	
<b>Reason for not visiting the dentist in the past year (N= 279)</b>				
No need	124 (79.0%)	150 (63.8%)	274 (69.9%)	0.0005*
Treatment cost	38 (24.2%)	111 (46.4%)	149 (37.6%)	<0.0001*
Awareness (dentist)	2 (1.3%)	6 (2.6%)	8 (2.1%)	0.3454
Access	3 (1.9%)	8 (3.5%)	11 (2.8%)	0.3367
Others	9 (5.7%)	7 (3.1%)	16 (4.1%)	0.1065

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.5: Percent distribution of students (11-18 years) by orthodontic utilization pattern and type of school, adjusted for school cluster (n=948)**

<b>Dental utilization</b>	<b>Private (n=514) N (%)</b>	<b>Public (n=434) N (%)</b>	<b>Total (n=948) N (%)</b>	<b>P-Value</b>
<b>Ever been to the orthodontist</b>				
No	201 (45.3%)	250 (66.8%)	451 (55.1%)	0.0079*
Yes	243 (54.7%)	124 (33.2%)	367 (44.9%)	
<b>Age at first consultation</b>				
Mean (SD)	11.3 (2.2)	12.2 (2.4)	11.7 (2.3)	0.0833
<b>Orthodontic treatment<sup>u</sup> (N=830)</b>				
No	314 (71.9%)	339 (86.3%)	653 (78.7%)	0.0003*
Yes	123 (28.1%)	54 (13.7%)	177 (21.3%)	
<b>Parental Perceived current orthodontic treatment need</b>				
No need/Had treatment	249 (52.5%)	171 (44.9%)	420 (49.1%)	0.4740
Yes	125 (26.4%)	118 (31.0%)	243 (28.4%)	
Don't know	100 (21.1%)	92 (24.1%)	192 (22.5%)	
<b>Child Perceived current orthodontic treatment need<sup>u</sup> (N=830)</b>				
No	103 (34.8%)	149 (44.9%)	252 (40.1%)	0.3519
Yes	86 (29.1%)	85 (25.6%)	171 (27.2%)	
I don't know	107 (36.2%)	98 (29.5%)	205 (26.6%)	

\* P-value <0.05

<sup>u</sup> Numbers in cells do not add up to total N column-wise because orthodontic treatment history and child perception of orthodontic need was measured only on adolescents who got examined  
Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.6: Percent distribution of students (11-18 years) by willingness to invest and insurance plans and type of school, adjusted for school cluster (n=948)**

<b>Dental Insurance</b>	<b>Private (n=514) N (%)</b>	<b>Public (n=434) N (%)</b>	<b>Total (n=948) N (%)</b>	<b>P-Value</b>
<b>Willingness to invest</b>				
Can't afford	59 (23.2%)	113 (42.0%)	172 (32.9%)	0.0000*
100\$	87 (34.3%)	109 (40.5%)	196 (37.5%)	
200\$	47 (18.5%)	23 (8.6%)	70 (13.4%)	
300\$	42 (16.5%)	13 (4.8%)	55 (10.5%)	
400\$	10 (3.9%)	4 (1.5%)	14 (2.7%)	
500\$	7 (2.8%)	5 (1.9%)	12 (2.3%)	
>500\$	2 (0.8%)	2 (0.7%)	4 (0.8%)	
<b>Insurance plans</b>				
Plan A (500\$)	68 (23.7%)	34 (12.2%)	102 (18.0%)	0.0000*
Plan B (300\$)	74 (25.8%)	51 (18.3%)	125 (22.1%)	
Plan C (150\$)	60 (20.9%)	40 (14.3%)	100 (17.7%)	
Can't afford	72 (25.1%)	152 (54.5%)	224 (39.6%)	
Don't want	13 (4.5%)	2 (0.7%)	15 (2.7%)	
<b>Objection to visiting the dentist contracted with insurance company</b>				
No	152 (64.4%)	180 (78.6%)	332 (71.4%)	0.0018*
Yes	84 (35.6%)	49 (21.4%)	133 (28.6%)	

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Plan A (Full coverage plan):** 100% coverage for all dental procedures (preventive and restorative)  
Orthodontics: Ceiling paid by Insurance Company: 1000-1500\$ (NOT annual- onetime benefit)

**Plan B (Premium coverage plan):** 100% coverage for preventive dental procedures, Co-payment for restorative dental procedures, Orthodontics: Ceiling paid by Insurance Company: 500-1000\$ (NOT annual- onetime benefit)

**Plan C: Basic coverage plan:** 100% coverage for preventive dental procedures, Co-payment for restorative dental procedures, Orthodontics: None

**Table 4.7: Bivariate association between Predisposing characteristics of utilization and Last year dental services utilization, adjusted for school cluster (n=793)**

Predisposing characteristics	Utilization of dental services		Unadjusted odds ratio (95% CI)	P-Value
	Didn't utilize last year (n=279) N (%)	Did utilize last year (n=514) N (%)		
<b>Child</b>				
<b>Age</b>	14.9 (±1.7)	14.6 (±1.7)	0.89 (0.73-1.09)	0.256
<b>Gender</b>				
Male (ref)	126 (37.1%)	214 (63.0%)	-	
Female	153 (33.9%)	299 (66.15%)	1.15 (0.71-1.87)	0.573
<b>Parent / Guardian</b>				
<b>Age</b>	44.1 (±7.3)	44.1 (±6.6)	1.00 (0.98-1.02)	0.883
<b>Marital Status</b>				
Married (ref)	241 (34.8%)	452 (65.2%)	-	
Divorced	11 (42.3%)	15 (57.7%)	0.73 (0.31-1.71)	0.465
Widowed	12 (36.4%)	21 (63.6%)	0.93 (0.53-1.63)	0.807
<b>College education</b>				
No	173 (42.6%)	233 (57.4%)	-	
Yes	101 (27.2%)	270 (72.8%)	1.98 (1.26-3.13)	0.003*
<b>Oral Health importance compared to general health</b>				
Less important (ref)	46 (59.0%)	32 (41.0%)	-	
As / More important	221 (33.4%)	440 (66.6%)	2.86 (1.98-4.14)	0.000*

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.8: Bivariate association between enabling resources of utilization and Last year dental services utilization, adjusted for school cluster (n=793)**

Enabling resources	Utilization of dental services		Unadjusted odds ratio (95% CI)	P-Value
	Didn't utilize last year (n=279) N (%)	Did utilize last year (n=514) N (%)		
<b>Family monthly income</b>				
< 1,000,000 LL (ref)	111 (47.8%)	121 (52.2%)	-	
> 1,000,000 LL	137 (29.3%)	330 (70.7%)	2.21 (1.29-3.79)	0.004*
<b>Regular income</b>				
No	36 (37.9%)	59 (62.1%)	-	
Yes	112 (33.7%)	220 (66.3%)	1.20 (0.77-1.87)	0.425
<b>Presence of dental insurance</b>				
No	154 (33.3%)	308 (66.7%)	-	
Yes	25 (30.5%)	57 (69.5%)	1.14 (0.53-2.47)	0.740
<b>Awareness of the presence of affordable dental care centers</b>				
No	174 (39.7%)	264 (60.3%)	-	
Yes	86 (29.3%)	208 (70.8%)	1.59 (1.07-2.37)	0.021*

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.9: Bivariate association between individual’s need of utilization and Last year dental services utilization, adjusted for school cluster (n=687)**

Individual’s need	Utilization of dental services		Unadjusted odds ratio ( 95% CI)	P-Value
	Didn’t utilize last year (n=251) N (%)	Did utilize last year (n=436) N (%)		
<b>DMFT</b>	4.7 (±3.6)	4.8 (±3.5)	1.01 (0.94-1.09)	0.751
<b>Decayed</b>	3.6 (±3.6)	2.9 (±2.9)	0.93 (0.86-1.00)	0.060
<b>Decay</b>				
No	45 (26.6%)	124 (73.4%)	-	
Yes	206 (39.9%)	311 (60.2%)	0.55 (0.39-0.77)	<0.001*
<b>IOTN <sup>u</sup></b>				
No definite need	205 (35.4%)	374 (64.6%)	-	
Definite need	46 (43.0%)	61 (57%)	0.73 (0.42-1.26)	0.257
<b>Parental Perception of the child oral health<sup>u1</sup> (N=948)</b>				
Bad	31 (39.2%)	48 (60.8%)	-	
Average	142 (41.9%)	197 (58.1%)	0.90 (0.58-1.39)	0.626
Good	101 (27.8%)	262 (72.2%)	1.68 (1.01-2.79)	0.047*
<b>Child Perception of his oral health</b>				
Bad	36 (45.6%)	43 (54.4%)	-	
Average	149 (42.5%)	202 (57.6%)	1.14 (0.66-1.96)	0.650
Good	67 (25.4%)	197 (74.6%)	2.46 (1.15-5.29)	0.021*

\*p-value <0.05

<sup>u</sup> Need for orthodontic treatment according to modified IOTN: **no definite need** – IOTN ≤ 3; **definite need** – IOTN > 3

<sup>u1</sup> Numbers in cells do not add up to total N column-wise because Parental perception was measured on the parental questionnaire

When numbers in cells do not add up to total N column-wise because of missing values

**Table 4.10: Multiple logistic regression analysis showing associations between dental services utilization in last year and other variables, adjusting for school cluster**

Associated variables	Unadjusted odds ratio ( 95% CI)	Adjusted odds ratio ( 95% CI)	Robust S.E.	P-Value
<b>School type</b>				
Public (ref)	-	-		
Private	2.75 (1.53-4.91)	1.59 (1.02-2.74)	0.357	0.041*
<b>Oral Health importance compared to general health</b>				
Not important (ref)	-	-		
Important	2.86 (1.97-4.14)	2.40 (1.39-4.36)	0.674	0.002*
<b>Family monthly income</b>				
< 1,000,000 LL (ref)	-	-		
> 1,000,000 LL	2.21 (1.29-3.78)	1.71 (0.90-3.26)	0.563	0.101
<b>College education</b>				
No (ref)	-	-		
Yes	1.98 (1.25-3.13)	1.00 (0.62-1.62)	0.245	0.996
<b>Decay</b>				
No (ref)	-	-		
Yes	0.55 (0.39-0.77)	0.58 (0.37-0.91)	0.132	0.017*
<b>Awareness of the presence of affordable dental care centers</b>				
No (ref)	-	-		
Yes	1.59 (1.07-2.37)	1.55 (0.86-2.77)	0.461	0.142

\* Adjusted p-value < 0.05



**Table 4.11: Bivariate association between Predisposing characteristics of utilization and preventive dental services utilization, adjusted for school cluster (n=795)**

Predisposing characteristics	Utilization of preventive dental services		Unadjusted odds ratio ( 95% CI)	P-Value
	No (n=454) N (%)	Yes (n=341) N (%)		
<b>Child</b>				
<b>Age</b>	14.7 (±1.7)	14.6 (±1.7)	0.97 (0.88-1.07)	0.596
<b>Gender</b>				
Male (ref)	150 (44.9%)	184 (55.1%)	-	
Female	191 (41.5%)	269 (58.5%)	0.87 (0.56-1.34)	0.534
<b>Parent / Guardian</b>				
<b>Age</b>	43.8 (±6.6)	44.2 (±7.0)	1.01 (0.99-1.03)	0.336
<b>Marital Status</b>				
Married (ref)	396 (56.3%)	307 (43.7%)	-	
Divorced/Widowed	36 (66.7%)	18 (33.3%)	0.64 (0.36-1.15)	0.137
<b>College education</b>				
No (ref)	263 (66.4%)	133 (33.6%)	-	
Yes	180 (47.1%)	202 (52.9%)	2.22 (1.73-2.85)	0.000*
<b>Oral Health importance compared to general health</b>				
Less important (ref)	40 (56.3%)	31 (43.7%)	-	
As / More important	379 (56.6%)	291 (43.4%)	0.99 (0.57-1.74)	0.974

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.12: Bivariate association between enabling resources of utilization and preventive dental services utilization, adjusted for school cluster (n=795)**

Enabling resources	Utilization of preventive dental services		Unadjusted odds ratio (95% CI)	P-Value
	No (n=454) N (%)	Yes (n=341) N (%)		
<b>Family monthly income</b>				
< 1,000,000 LL (ref)	157 (69.8%)	68 (30.2%)	-	
> 1,000,000 LL	240 (51.2%)	229 (48.8%)	2.20 (1.46-3.31)	0.0002*
<b>Presence of dental insurance</b>				
No (ref)	254 (53.7%)	219 (46.3%)	-	
Yes	51 (60.7%)	33 (39.3%)	0.75 (0.36-1.58)	0.450
<b>Awareness of the presence of affordable dental care centers</b>				
No (ref)	265 (60.9%)	170 (39.1%)	-	
Yes	155 (52.4%)	141 (47.6%)	1.42 (0.90-2.23)	0.129

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.13: Bivariate association between individual's need of utilization and preventive dental services utilization, adjusted for school cluster (n=691)**

Individual's need	Utilization of preventive dental services		Unadjusted odds ratio (95% CI)	P-Value
	No (n=454) N (%)	Yes (n=341) N (%)		
<b>DMFT</b>	5.6 (±3.4)	4.0 (±3.6)	0.87 (0.82-0.92)	0.000*
<b>Filling</b>	1.7 (±2.1)	1.6 (±2.4)	0.98 (0.86-1.12)	0.802
<b>Decayed</b>	3.9 (±3.6)	2.3 (±2.9)	0.83 (0.77-0.87)	0.000*
<b>Decay</b>				
No (ref)	64 (39.5%)	98 (60.5%)	-	
Yes	342 (64.8%)	186 (35.2%)	0.36 (0.24-0.24)	0.000*
<b>IOTN <sup>‡</sup></b>				
No definite need (ref)	342 (58.3%)	245 (41.7%)	-	
Definite need	64 (62.1%)	39 (37.9%)	0.85 (0.56-1.29)	0.445
<b>Parental Perception of the child oral health<sup>‡</sup> (N=910)</b>				
Bad (ref)	67 (77.9%)	19 (22.1%)	-	
Average	232 (68.4%)	107 (31.6%)	1.63 (1.01-2.60)	0.045*
Good	149 (41.4%)	211 (58.6%)	5.0 (3.02-8.25)	0.000*
<b>Child Perception of his oral health</b>				
Bad (ref)	59 (75.6%)	19 (24.4%)	-	
Average	218 (63.0%)	128 (37.0%)	1.82 (0.66-1.96)	0.023*
Good	130 (58.8%)	138 (51.5%)	3.30 (1.77-6.15)	0.000*

\*p-value <0.05

<sup>‡</sup> Need for orthodontic treatment according to modified IOTN: **no definite need** – IOTN ≤ 3; **definite need** – IOTN > 3

<sup>‡</sup> Numbers in cells do not add up to total N column-wise because Parental perception was measured on the parental questionnaire

When numbers in cells do not add up to total N column-wise because of missing values

**Table 4.14: Multiple logistic regression analysis showing associations between preventive dental services utilization and other variables, adjusting for school cluster**

Associated variables	Unadjusted odds ratio ( 95% CI)	Adjusted odds ratio ( 95% CI)	Robust S.E.	P-Value
<b>School type</b>				
Public (ref)	-	-		
Private	2.0 (1.23-3.24)	1.45 (1.02-2.07)	0.261	0.037*
<b>College education</b>				
No (ref)	-	-		
Yes	2.22 (1.73-2.85)	1.46 (1.00-2.11)	0.276	0.047*
<b>Decay</b>				
No (ref)	-	-		
Yes	0.36 (0.24-0.24)	0.50 (0.32-0.77)	0.112	0.002*
<b>Child Perception of his oral health</b>				
Bad (ref)	-	-		
Average	1.82 (0.66-1.96)	1.65 (0.90-3.04)	0.514	0.106
Good	3.30 (1.77-6.15)	2.26 (1.11-4.60)	0.820	0.024*

\* Adjusted p-value < 0.05

**Table 4.15: Bivariate association between Predisposing characteristics of utilization and curative dental services utilization, adjusted for school cluster (n=750)**

Predisposing characteristics	Utilization of curative dental services		Unadjusted odds ratio (95% CI)	P-Value
	No (n=211) N (%)	Yes (n=539) N (%)		
<b>Child</b>				
<b>Age</b>	14.7 (±1.7)	14.7 (±1.7)	0.98 (0.89-1.08)	0.697
<b>Gender</b>				
Male (ref)	103 (32.1%)	218 (67.9%)	-	
Female	108 (25.2%)	321 (74.8%)	1.40 (0.98-2.01)	0.062
<b>Respondent</b>				
<b>Age</b>	44.3 (±7.1)	43.9 (±6.5)	0.99 (0.97-1.01)	0.379
<b>Marital Status</b>				
Married (ref)	192 (28.9%)	472 (71.1%)	-	
Divorced/Widowed	8 (15.4%)	44 (84.6%)	2.24 (1.55-3.23)	0.000*
<b>College education</b>				
No (ref)	84 (22.4%)	291 (77.6%)	-	
Yes	122 (34.0%)	237 (66.0%)	0.56 (0.44-0.72)	0.000*
<b>Oral Health importance compared to general health</b>				
Less important (ref)	18 (25.7%)	52 (74.3%)	-	
As / More important	178 (28.3%)	451 (71.7%)	0.88 (0.48-1.62)	0.674

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.16: Bivariate association between enabling resources of utilization and curative dental services utilization, adjusted for school cluster (n=750)**

Enabling resources	Utilization of curative dental services		Unadjusted odds ratio (95% CI)	P-Value
	No (n=211) N (%)	Yes (n=539) N (%)		
<b>Family monthly income</b>				
< 1,000,000 LL (ref)	42 (19.5%)	173 (80.5%)	-	-
> 1,000,000 LL	141 (31.7%)	304 (68.3%)	0.52 (0.43-0.64)	0.000*
<b>Presence of dental insurance</b>				
No (ref)	135 (30.1%)	314 (69.9%)	-	-
Yes	20 (24.4%)	62 (75.6%)	1.33 (0.72-2.45)	0.356
<b>Awareness of the presence of affordable dental care centers</b>				
No (ref)	97 (24.0%)	308 (76.0%)	-	-
Yes	91 (32.0%)	193 (68.0%)	0.67 (0.45-1.00)	0.051

\*p-value <0.05

Numbers in cells do not add up to total N column-wise because of missing values

**Table 4.17: Bivariate association between individual's need of utilization and curative dental services utilization, adjusted for school cluster (n=656)**

Individual's need	Utilization of curative dental services		Unadjusted odds ratio ( 95% CI)	P-Value
	No (n=211) N (%)	Yes (n=539) N (%)		
<b>DMFT</b>	3.6 (±3.4)	5.4 (±3.5)	1.19 (1.10-1.29)	<0.001*
<b>Decayed</b>	2.4 (±2.5)	3.6 (±3.1)	1.18 (1.08-1.28)	<0.001*
<b>Decay</b>				
No (ref)	64 (42.4%)	87 (57.6%)	-	-
Yes	113 (22.42%)	391 (77.6%)	2.56 (1.80-3.61)	<0.001*
<b>IOTN <sup>u</sup></b>				
No definite need (ref)	154 (27.6%)	404 (72.4%)	-	-
Definite need	23 (23.7%)	74 (76.3%)	1.23 (0.74-2.04)	0.431
<b>Parental Perception of the child oral health<sup>u1</sup> (N=910)</b>				
Bad (ref)	6 (7.7%)	72 (92.3%)	-	-
Average	69 (21.5%)	252 (78.5%)	0.30 (0.12-0.75)	0.010*
Good	133 (39.0%)	208 (61.0%)	0.13 (0.05-0.34)	<0.001*
<b>Child Perception of his oral health</b>				
Bad (ref)	7 (10.0%)	63 (90.0%)	-	-
Average	78 (23.3%)	257 (76.7%)	0.37 (0.16-0.86)	0.021*
Good	91 (36.0%)	162 (64.0%)	0.20 (0.08-0.46)	<0.001*

\*p-value <0.05

<sup>u</sup> Need for orthodontic treatment according to modified IOTN: **no definite need** – IOTN ≤ 3; **definite need** – IOTN > 3

<sup>u1</sup> Numbers in cells do not add up to total N column-wise because Parental perception was measured on the parental questionnaire

When numbers in cells do not add up to total N column-wise because of missing values

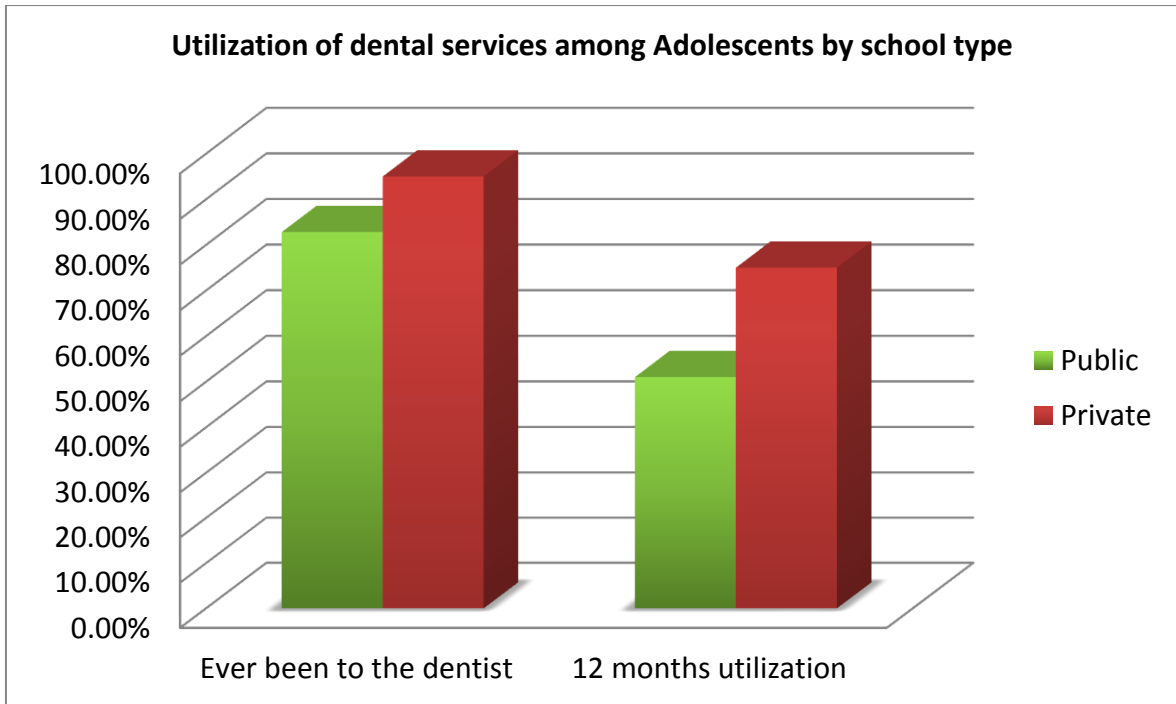
**Table 4.18: Multiple logistic regression analysis showing associations between curative dental services utilization and other variables, adjusting for school cluster**

Associated variables	Unadjusted odds ratio ( 95% CI)	Adjusted odds ratio ( 95% CI)	Robust S.E.	Adjusted P-Value
<b>School type</b>				
Public (ref)	-	-		
Private	2.0 (1.23-3.24)	1.02 (0.71-1.47)	0.189	0.896
<b>Marital status</b>				
Married (ref)	-	-		
Divorced / Widowed	2.24 (1.55-3.23)	3.52 (1.26-9.83)	1.84	0.016*
<b>Family monthly income</b>				
< 1,000,000 LL (ref)	-	-		
> 1,000,000 LL	0.52 (0.43-0.64)	0.70 (0.45-1.09)	0.157	0.115
<b>Awareness of the presence of affordable dental care centers</b>				
No (ref)	-	-		
Yes	0.67 (0.45-1.00)	0.68 (0.46-1.02)	0.141	0.065
<b>Decay</b>				
No (ref)	-	-		
Yes	2.56 (1.80-3.61)	2.28 (1.47-3.53)	0.509	<0.001*
<b>Child Perception of his oral health</b>				
Bad (ref)	-	-		
Average	0.37 (0.16-0.86)	0.42 (0.14-1.25)	0.234	0.119
Good	0.20 (0.08-0.46)	0.27 (0.12-0.65)	0.121	0.003*

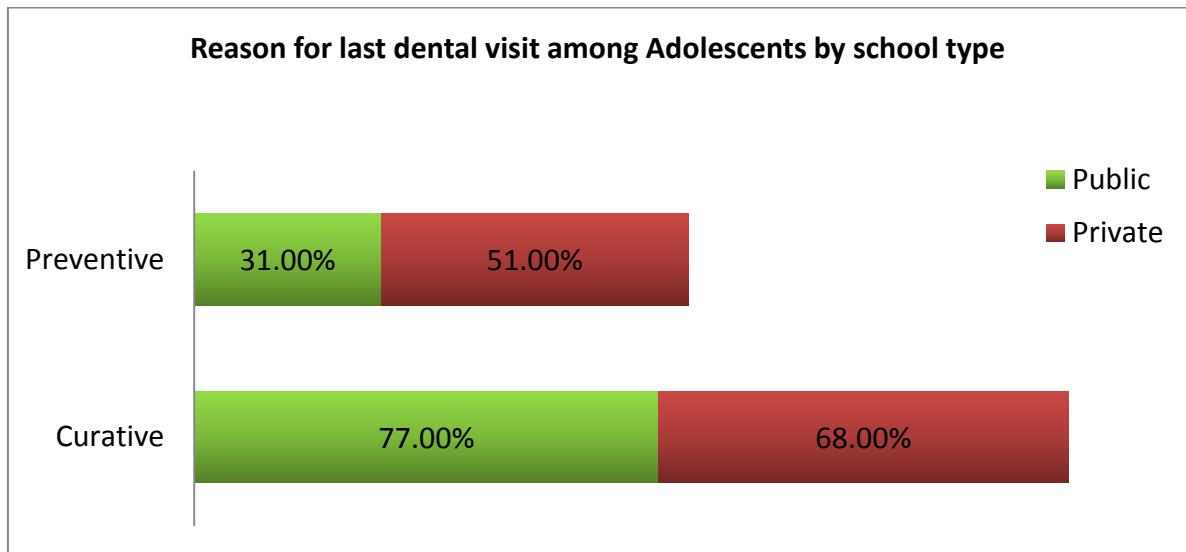
\* Adjusted p-value < 0.05



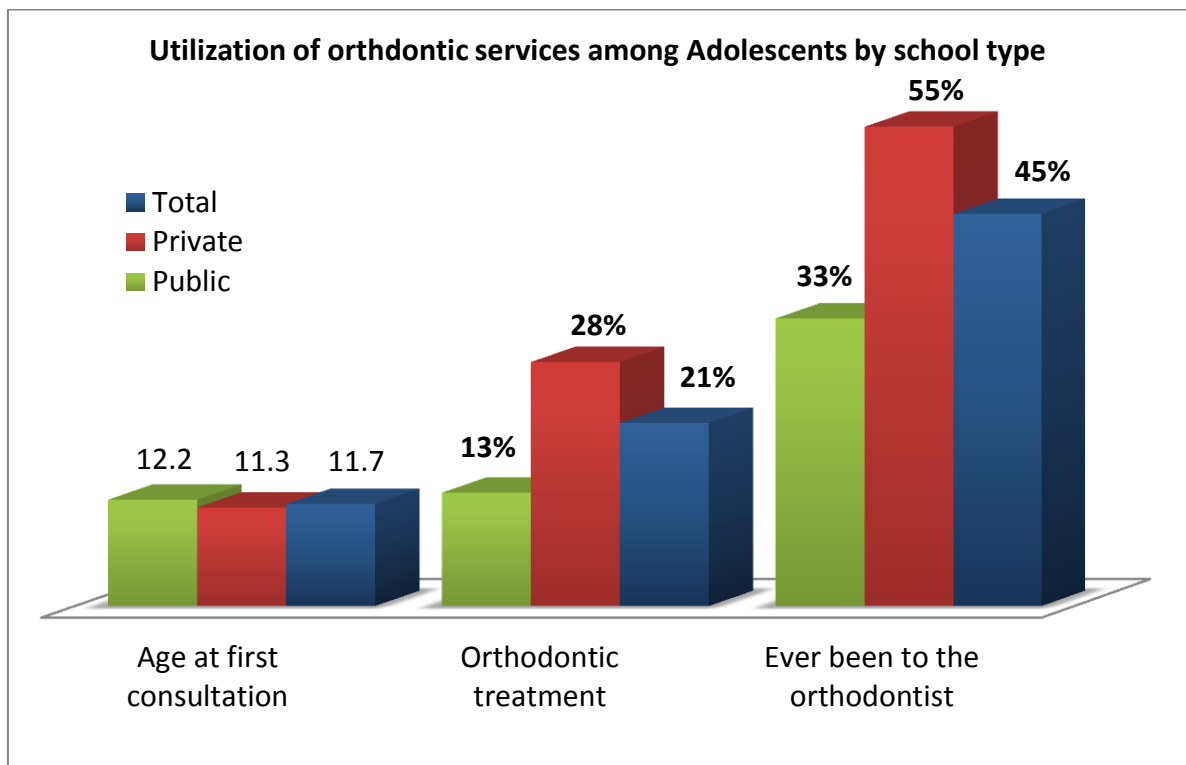
## FIGURES



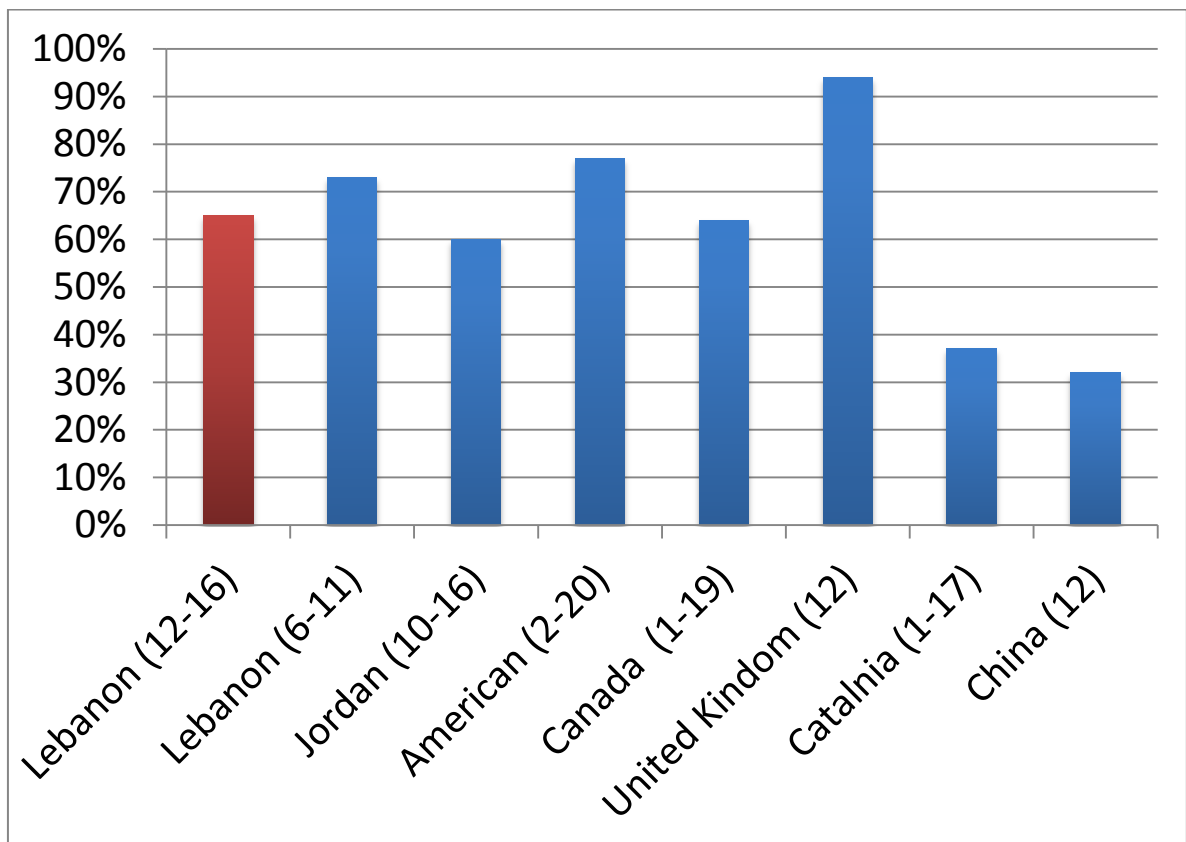
**Figure 4.1:** Utilization of dental services (ever been to the dentist and 12 months utilization indicators) among adolescents age 11-18 attending secondary schools in Beirut, by school type.



**Figure 4.2:** Reason for last dental visit among adolescents age 11-18 attending secondary schools in Beirut, by school type.



**Figure 4.3:** Utilization of orthodontic dental services among adolescents age 11-18 attending secondary schools in Beirut, by school type.



**Figure 5.1:** Past 12 months utilization of dental services among Beirut school adolescents (ages in years) compared to data from international studies

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## **Appendix I**

القسم الاول: التعريف

اسم الولد \_\_\_\_\_  
اسم المدرسة \_\_\_\_\_  
الصف \_\_\_\_\_  
عمر الولد في آخر عيد ميلاد \_\_\_\_\_  
جنس الولد:  
1. ذكر  
2. أنثى

I1. علاقتك بالولد:

1. الوالدة
2. الاب
3. الجد/الجدّة
4. أخ/أخت
5. عمّ/عمة
6. علاقة اخرى، حدد: \_\_\_\_\_

القسم الثاني: معلومات ديموغرافية/اجتماعية

SD1. عمر حضرتكم في آخر عيد ميلاد: [ ] سنة

SD2. جنس حضرتكم:

1. ذكر
2. انثى

SD3. الوضع العائلي:

1. متاهل/متاهلة
2. مُطلق/مُطلقة
3. أرمل/أرملة

SD4. أعلى مستوى علمي:

1. أمّي
2. كتابة/قراءة
3. ابتدائي
4. متوسط
5. ثانوي
6. كُليّة/جامعة

SD5. عدد الاولاد في العائلة:

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 اكثر من 4 اولاد

SD6. ترتيب ولادة الولد المعني في هذه الاستمارة؟

1. البكر
2. الاخير\الاصغر
3. آخر (حدّد).....

SD7. الدخل الاجمالي الشهري للعائلة :

1. ما دون ال 500,000 ل.ل
2. بين 500,000 و 999,999 ل.ل
3. بين 1000,000 و 3000,000 ل.ل
4. ما فوق ال 3000,000 ل.ل

SD8. هل تعمل حالياً؟

- 1) نعم، دوام كامل
- 2) نعم، دوام جزئي
- 3) ابحث عن عمل
- 4) لا اعمل حالياً
- 5) متقاعد
- 6) ربة منزل

SD9. في حال كنتم تعملون ، هل تؤمن لكم وظيفتكم دخلاً ثابتاً؟

- 1) نعم
- 2) لا

SD10. هل يكفي دخل العائلة لسد احتياجاتكم الأساسية من مأكّل، مشرب أو طبابة؟

- 1) لا يكفي
- 2) بالكاد يكفي
- 3) يكفي
- 4) يكفي و يزيد

SD11. هل لدى العائلة أي ضمان صحي؟

- 1) نعم
- 2) لا (إذا كانت الإجابة لا، انتقل إلى القسم الثالث)

SD12. في حال كانت الاجابة "نعم"، الرجاء إختيار الاحتمال المناسب:

- 1) صندوق الضمان الوطني الاجتماعي
- 2) تعاونية موظفي الدولة
- 3) ضمان الجيش
- 4) ضمان قوى الامن الداخلي

- 5) ضمان وزارة الصحة  
6) ضمان خاص

SD13. هل يغطي الضمان الصحي علاج الاسنان؟

- 1) نعم  
2) كلا

القسم الثالث: الوضع الصحي للولد

H1. هل الولد المعني بهذه الأستمارة عانى أو لا يزال يعاني من أي مرض مزمن؟

1. نعم  
2. كلا (انتقل الى السؤال H3)

H2. إذا كانت الإجابة بنعم، من أي الأمراض المزمنة التالية عانى أو يعاني منها؟

1. مرض السكري  
2. أمراض القلب  
3. مشاكل رئوية  
4. أمراض الجهاز الهضمي  
5. سرطان  
6. آخر (حدّد) \_\_\_\_\_

H3. هل يتنفس الولد المعني بهذه الأستمارة في الوقت الحالي من:

1. الأنف  
2. الفم  
3. من الأنف والفم  
4. لا اعرف

H4. في طفولته، هل كان يتنفس في الغالب من:

1. الأنف (انتقل الى السؤال H7)  
2. الفم  
3. من الأنف والفم  
4. لا اعرف (انتقل الى السؤال H7)

H5. إذا كان طفلك يتنفس من فمه، هل خضع للعلاج؟

1. نعم  
2. كلا (انتقل الى السؤال H7)

H6. إذا كانت الإجابة بنعم في أي عمر تم علاج ذلك؟ [\_\_\_\_] سنة

H7. هل كانت الوالدة تُدخّن السجائر خلال فترة حملها بالولد المعني في هذه الاستمارة ؟

1. نعم
2. كلا (انتقل الى السؤال H10)
3. لا اعرف (انتقل الى السؤال H10)

H8. خلال ايّ فصل من الحمل كانت تدخن؟

1. الأوّل
2. الثاني
3. الثالث
4. كلّ فترة الحمل
5. لا اعرف

H9. تقريبا كم عدد السجائر يوميًا كانت تدخن الأم خلال فترة الحمل؟

1. 1-10
2. 11-20
3. أكثر من 20 سيجارة
4. لا اعرف

H10. هل كانت الوالدة تُدخّن الارغيلة خلال فترة حملها بالولد المعني في هذه الاستمارة ؟

1. نعم
2. كلا
3. لا اعرف

القسم الرابع: عادات معيّنة لدى الولد

S1. هل كان الولد المعني بهذه الاستمارة يمصّ اصبعه، شفته، او ايّ شيء آخر خلال فترة الرضاعة أو الطفولة؟

1. نعم
2. كلا (انتقل الى القسم الخامس)
3. لا اعرف (انتقل الى القسم الخامس)

S2. إذا نعم، ماذا كان يمصّ ؟

1. ابهام اصبع
2. الشفة
3. اللهاية الخاصة بالأطفال
4. آخر، حدّد:

S3. في ايّ عمر بدأ بدأت هذه العادة ؟ [\_\_\_\_] سنة

S4. في ايّ عمر، اوقف او توقفت هذه العادة؟

1. [\_\_\_\_] سنة
2. لم تتوقف هذه العادة بعد



S5. كم كانت مدّة فترة ممارسة هذه العادة يوميا/ في اليوم الواحد؟

1. ساعة او اقلّ
2. أكثر من ساعة وأقل من 3 ساعات
3. أكثر 3 ساعات وأقل من 6 ساعات
4. ست ساعات وما فوق
5. لا أذكر

القسم الخامس: عادات إطعام الولد في الطفولة

F1. كيف تمّ إطعام الولد المعني في هذه الإستمارة خلال أوّل ستة اشهر من طفولته؟

1. رضاعة
2. القنينة (انتقل الى السؤال F3)
3. كلاهما
4. لا اعرف (انتقل الى القسم السادس)

F2. كم شهراً إستمرت فترة الرضاعة من الثدي ؟

1. أقل من شهرين
2. 2-4 اشهر
3. 5-6 أشهر
4. 7-12 شهر
5. 1-2 سنة
6. اكثر من سنتين
7. لا اتذكر

F3. كم كانت مدّة ارضاعه من القنينة؟

1. 1-5 اشهر
2. ما بين 6 أشهر و سنتين
3. اكثر من سنتين
4. لا اتذكر

القسم السادس: نمط الاهتمام بصحة الفم الاسنان

OH1. كيف تقيم صحة الأسنان مقارنةً مع غيرها من المشاكل الصحية؟

- 1) نفس الأهمية
- 2) أقل أهمية
- 3) أكثر أهمية

OH2. ما هي الاسباب التي قد تدفعك لاصطحاب أولادكم لزيارة طبيب الأسنان؟

- 1) فحص الاسنان نعم كلا
- 2) تنظيف الاسنان نعم كلا
- 3) تسوس الاسنان نعم كلا
- 4) ألم حاد في الأسنان نعم كلا
- 5) مظهر الأسنان نعم كلا

(6 حالات أخرى: \_\_\_\_\_)

**OH3.** هل تعتقد ان حالة فم الولد المعني هي؟

1. ممتازة
2. جيّدة
3. عاديّة
4. سيّئة
5. سيّئة جدا

**OH4.** هل تعرّضت اسنان الولد لمادة الفلوريد من غير معجون الأسنان؟

1. نعم
2. كلا (انتقل لى القسم السابع)

**OH5.** إذا نعم، كيف تمّ اخذ الفلوريد ؟

(يمكنكم اختيار أكثر من خيار)

1. بواسطة الماء
2. غسول الفمّ
3. إضافات غذائيّة\حبوب
4. خلال زيارات طبيب الاسنان

القسم السابع:الخدمات الصحية لطب الأسنان

**DS1.** هل سبق أن عاين طبيب اسنان الولد المعني في هذه الاستمارة ؟

1. نعم
2. كلا (انتقل الى سؤال DS5)

**DS2.** في حال كانت الإجابة "نعم"، متى كانت آخر مرّة أخذتم ولدكم لزيارة طبيب الأسنان؟

1. أقل من 3 اشهر
2. 4 الى 6 اشهر
3. 7 الى 12 شهر
4. أكثر من 12 شهر
5. لا أذكر

**DS3.** آخر مرة عاين طبيب اسنان الولد كانت لأيّ سبب من الاسباب التالية؟

1. كشف روتينيّ نعم كلا
2. تنظيف نعم كلا
3. تسوّس نعم كلا
4. ألم حاد نعم كلا
5. شكل الاسنان نعم كلا
6. آخر, حدد:

**DS4.** الرجاء إختيار الخدمات التي قدمت لولدكم في زيارته الأخيرة لطبيب الأسنان وتحديد مبلغ المال الذي قمتم بدفعه مقابل هذه الخدمات

المبلغ	لا	نعم	
ل.ل. _____			(1) فحص روتيني (فحص عادي)
ل.ل. _____			(2) رعاية وقائية: * ساد الشقوق sealant ،حافظ المسافة، تطبيق الفلورايد
ل.ل. _____			(3) معالجة سناً واحداً: قلع ضرس، حشوة، حشوة قناة او قطع عصب، تليبيسة
ل.ل. _____			(4) تقويم الأسنان

\* ساد الشقوق (sealant): هي مادة بلاستيكية تلتصق من قبل طبيب أسنان الأطفال على الأسنان لمنع تجمع بقايا الطعام وبالتالي الوقاية من التسوس.

\*تطبيق الفلورايد: يقوم طبيب الاسنان بتطبيق مادة تحتوي على الفلور على اسنان الطفل للوقاية من التسوس.  
\* حافظ المساحة: يقوم طبيب الأسنان بوضع جهاز داخل فم الولد للمحافظة على مساحة سنٍ مقلوع أو مفقود

**DS5.** في حال عدم إصطحاب الولد المعني لزيارة طبيب الأسنان في الأشهر ال-١٢ الأخيرة، ما هي الأسباب؟ يمكنكم إختيار أكثر من إحتمال واحد:

1. لم يكن بحاجة إلى طبيب أسنان
  2. غلاء تكاليف علاج الأسنان
  3. عدم معرفتكم بوجود عيادة أو مركز أسنان في منطقة سكنكم
  4. صعوبة وصولكم إلى عيادة أو مركز أسنان
  5. أسباب أخرى \_\_\_\_\_
- نعم كلا  
نعم كلا  
نعم كلا  
نعم كلا

**DS6.** هل سبق أن عاين أخصائي تقويم أسنان الولد المعني في هذه الاستمارة ؟

1. نعم ، في عمر: \_\_\_\_\_ سنة (أول معاينة)
2. كلا

**DS7.** هل تعتقد ان الولد المعني في هذه الاستمارة بحاجة الى تقويم اسنان في الوقت الحالي؟

1. نعم، إنه بحاجة الآن الى تقويم أسنان
  2. كلا، هو حصل على علاج تقويم أسنان وبالتالي ليس بحاجة له
  3. كلا، هو ليس بحاجة الى علاج تقويم أسنان ولم يحصل عليه سابقا
  4. لا اعرف
- (انتقل ال سؤال DS8)  
(انتقل ال سؤال DS9)  
(انتقل ال سؤال DS10)  
(انتقل ال سؤال DS10)

**DS8.** لأية اسباب تعتقد أنه بحاجة لتقويم الأسنان ؟

1. أسنان متراكمة فوق بعضها البعض أو غير منتظمة
2. أسنان ناتئة (بارزة الي الخارج)
3. وضع غير طبيعي لأي من الفكين
4. آخر ، حدّد: \_\_\_\_\_

(انتقل الي السؤال DS10)

- DS9.** لأية اسباب حصل ابنك على علاج تقويم الأسنان ؟
1. اسنان متراكمة فوق بعضها البعض أو غير منتظمة
  2. اسنان ناتئة (بارزة الي الخارج)
  3. وضع غير طبيعي لأي من الفكين
  4. آخر ، حدّد:

**DS10.** هل تعلم أن هناك مراكز/عيادات أسنان تقدم خدمات أقل كلفة من عيادات الأسنان الخاصة؟

1. نعم
2. كلا (انتقل الى القسم الثامن )

**DS11.** إذا كانت الإجابة نعم، حدد أسماء المراكز التي تعرفها: -----

**DS12.** في حال كانت الإجابة نعم، كيف علمتم بوجود هذه المراكز؟

1. الإعلام
2. حملات توعية قامت بها وزارة الصحة
3. حملات توعية قامت بها المراكز نفسها
4. مدرسة أولادكم
5. صديق أو قريب
6. غيره: \_\_\_\_\_

**DS13.** في حال كنتم على علم بهذه المراكز، هل تأخذون أولادكم لمعالجة أسنانهم فيها؟

1. نعم ( انتقل إلى السؤال DS15 )
2. كلا

**DS14.** إذا كنتم على علم بوجود هذه المراكز، لكنكم لا تأخذون أولادكم لمعالجة أسنانهم فيها، ما هي الأسباب التي تمنعكم؟

1. تكاليف العلاج مرتفعة (لا يستطيع تحمل الكلفة)
  2. عدم تصنيف صحة الفم كأولوية
  3. لا تؤمن هذه المراكز نوعية علاج جيد
  4. بعد مسافة هذه المراكز عن منزلكم
  5. أسباب أخرى: \_\_\_\_\_
- (انتقل الى القسم الثامن )

**DS15.** إذا كنتم تأخذون أولادكم لمعالجة أسنانهم في هذه المراكز، منذ متى تفعلون ذلك؟

1. اقل من سنة
2. اكثر من سنة

**DS16.** هل كنتم تتلقون من هذه المراكز إتصلاً للمراجعة؟

1. نعم
2. كلا

القسم الثامن: تكاليف علاج الأسنان

**D11.** إذا كان لديكم الخيار لأخذ أولادكم إلى احدى الإحتمالات الثلاث التالية، التي تؤمن الخدمات نفسها لمعالجة الأسنان ولكن بتكاليف مختلفة، أي إحتمال تختارون؟ (الرجاء رسم إشارة ✓ في الخانة الفارغة تحت الاحتمال الذي يناسبكم لكل من العلاجات الآتية)

(1) معاينة واحدة

مستوصف - مجاناً	مركز علاج جامعي - ٥,٠٠٠ ل.ل	عيادات خاصة - ٣٠,٠٠٠ ل.ل

(2) جلسة تنظيف أسنان واحدة

مستوصف - ١٠,٠٠٠ ل.ل	مركز علاج جامعي - ١٠,٠٠٠ ل.ل	عيادات خاصة - ٦٥,٠٠٠ ل.ل

(3) حشوة مركبة واحدة

مستوصف - ١٠,٠٠٠ ل.ل	مركز علاج جامعي - ١٥,٠٠٠ ل.ل	عيادات خاصة - ٦٠,٠٠٠ ل.ل

(4) قلع سن واحد

مستوصف - ٧,٠٠٠ ل.ل	مركز علاج جامعي - ١٥,٠٠٠ ل.ل	عيادات خاصة - ٤٥,٠٠٠ ل.ل

(5) معالجة قناة الجذر الواحدة (قطع عصب)

مستوصف - ١٥,٠٠٠ ل.ل	مركز علاج جامعي - ٢٥,٠٠٠ ل.ل	عيادات خاصة - ٧٥,٠٠٠ ل.ل

(6) ساد شقوق على ضرس واحد\* (Sealant)

مركز علاج جامعي - ١٢,٠٠٠ ل.ل	عيادات خاصة - ٣٠,٠٠٠ ل.ل

(7) جلسة تطبيق فلورايد واحدة\*

مركز علاج جامعي - ١٠,٠٠٠ ل.ل	عيادات خاصة - ٤٥,٠٠٠ ل.ل

(8) حافظ المساحة\*

مركز علاج جامعي - ١٥٠,٠٠٠ ل.ل	عيادات خاصة - ٢٢٥,٠٠٠ ل.ل

(9) علاج تقويم الأسنان\*

مركز علاج جامعي - ٢,٢٥٠,٠٠٠ ل.ل	عيادات خاصة - ٣,٣٧٥,٠٠٠ ل.ل

\* الخدمات التالية هي خدمات غير متوفرة في المستوصفات: تطبيق ساد شقوق، تطبيق الفلورايد، حافظ المساحة، علاج تقويم الأسنان

DI2. علما ان ارتفاع أقساط ضمان الأسنان يوفر تغطية إضافية لإجراءات طب الأسنان، أي قسط من الأقساط السنوية التالية (الرسم السنوي المدفوع لشركة الضمان) هو ضمن امكانياتكم ؟

- (1) \$100
- (2) \$200
- (3) \$300
- (4) \$400
- (5) \$500
- (6) اكثر من \$500
- (7) لا استطيع تحمل أي قسط من الأقساط السابقة

DI3. في ما يلي، مشاريع مختلفة وضعتها شركة ضمان صحي لتغطية علاج أسنان ولدكم. الرجاء إختيار المشروع الذي يناسبكم وذلك بوضع علامة ✓ في المربع الفارغ.

المشروع رقم ١: التغطية الشاملة - مبلغ لا يقل عن \$٥٠٠ سنويا

- تغطية ١٠٠٪ لجميع إجراءات طب الأسنان (الوقائية والإصلاحية)
- تقويم الاسنان: تقوم شركة الضمان بدفع مبلغ يتراوح بين \$١٠٠٠ و \$١٥٠٠ (وذلك لمرة واحدة فحسب)

المشروع رقم ٢: تغطية الاقساط - مبلغ لا يقل عن \$٣٠٠ سنويا

- تغطية ١٠٠٪ للإجراءات الأسنان الوقائية
- المشاركة في دفع تكاليف الإجراءات الإصلاحية للأسنان\*
- تقويم الاسنان: تقوم شركة الضمان بدفع مبلغ يتراوح بين \$٥٠٠ و \$١٠٠٠ (وذلك لمرة واحدة فحسب)

المشروع رقم ٣: تغطية التكاليف الاساسية - مبلغ لا يقل عن \$١٥٠ سنويا

- تغطية ١٠٠٪ للإجراءات الوقائية للأسنان
- المشاركة في دفع تكاليف الإجراءات الإصلاحية للأسنان\*

\*المشاركة في الدفع يعني ان شركة التأمين لا تغطي ١٠٠% لتكاليف بعض الاجراءات ويتوجب عليكم دفع الفرق إلى طبيب الأسنان

لا استطيع تحمل تكلفة أي من المشاريع السابقة

**DI4.** في حال كان لديكم ضمان يغطي تكاليف طب الاسنان، هل لديكم مشكلة في اختيار طبيب أسنان من قائمة أطباء الأسنان المتعاقدين مع شركة التأمين، والتي قد لا تشمل طبيب اسنانكم؟

1. نعم

2. كلا

**جزيل الشكر لمشاركتكم**

## **Appendix II**



**تقييم صحة الفم في المدارس التكميلية والثانوية في لبنان: مقارنة بين المدارس العامة والخاصة  
الجامعة الامريكيتية في بيروت  
موافقة الأهل المستنيرة**

**للأهالى الذين يواجهون صعوبة فى تعبئة الاستمارة الرجاء الاستعانة بفريق البحث (معلومات الإتصال تتبع على الصفحة التالية) أو يشاهد عمره فوق 18 سنة بوجود توقيع الوالد/الوالدة أو كتابته إسمه/إسمها**

تقوم كآية العلوم الصحية وبالتعاون مع قسم تقويم الاسنان في الجامعة الامريكيتية في بيروت باستطلاع يتعلّق بصحة الفم (الاسنان) لسبعمئة وعشرين - 720- طالب تتراوح أعمارهم بين 12 و 17 سنة منتسبين الى المدارس الخاصة والعامة. ان مشاركتكم طوعية. في حال قررتم المشاركة، تعاونكم المشكور سيمكننا من جمع المعلومات المتعلقة بحالة وسلامة أسنان أولادكم. هذه المعلومات سوف تستخدم ضمن دراسة تقوم ببحث العلاقة بين صحة الفم وعوامل تتعلّق بسلوكيات وعادات الأولاد والاهل معاً، بما فيها استخدام خدمات طب الأسنان الصحية. سوف يقوم هذا البحث أيضاً بدراسة الاختلافات في صحة الفم بين طلاب المدارس العامة والخاصة. كل الأسماء والأجوبة سوف تكون مجهولة المصدر، ولن تنشر مُطلقاً. سيحدد رقم تسلسل لكل استطلاع وسيستخدم هذا الرقم في الدراسة عوضاً عن اسم الطالب. جميع الاستطلاعات سوف تخزن في خزائن مقفولة لا صلاحية لفتحها إلا للباحث الرئيسي.

**نرجو ان تأخذوا وقتكم بقراءة هذه المعلومات بدقّة وروية، قبل قرار المشاركة في الاستطلاع او عدمه:**

- تتكون الدراسة من 3 أجزاء طوعية :
  1. إجابة حضرتكم الطوعية عن الأسئلة في الاستمارة الملحقة بهذه الرسالة
  2. الكشف على أسنان أبنائكم، بموافقتكم وموافقة أبنائكم، من قبل أطباء اسنان متخصصين (كيتي بيطار وسوزانا المعالي) بهدف تدوين المعلومات عن صحة فمهم وأسنانهم. لن تتم أي إجراءات علاجية ولن يشعر ابنكم/ابنتكم بأي ألم خلال الفحص ولن يتعرض لأي مخاطر.
  3. إجابة أبنائكم الطوعية عن استمارة خاصة بهم تستفسر عن صحة فمهم وأسنانهم بما يتعلّق بالعناية بنظافتها، بالإضافة الى الاستفار عن عاداتهم الغذائية ومعتقداتهم بما يخص أسنانهم.
- لن يأخذ الاستطلاع من وقتكم أكثر من 15 دقيقة ولستم مجبرين مجبرين بالإجابة عن جميع الأسئلة، حتى بعد توقيع القبول بالمشاركة.
- سوف يتم استدعاء إبنكم/ابنتكم من الصف من أجل إجراء الكشف على الأسنان. سوف يتم التنسيق مع إدارة المدرسة والمعلمين لتحديد الوقت المناسب لذلك، على أن لا يتعارض الفحص مع وقت الإمتحانات أو الحصص الدراسية الأساسية. إذا كان الولد بحاجة الى علاج معيّن لأسنانه (علاج لتسوس الأسنان أو تقويم الأسنان) سوف يتمّ إبلاغ الأهل عبر رسالة خطيّة تُرسل مع ولدهم.
- من إيجابيات مشاركة ابنكم/ابنتكم في هذه الدراسة إمكانية الإكتشاف المبكر لمشاكل صحة الفم بما فيها تسوس الأسنان وسوء الإطباق، ما يمكن المعالجة المبكرة.
- إن مشاركتكم طوعية. اختياركم عدم المشاركة لن ينتج عنه أي ضرر أو عقاب على ابنكم/ابنتكم، ولن يتم التعرض لأي من حقوق أو امتيازات ابنكم/ابنتكم كما ولن تتأثر علاقتكم بالمدرسة أو بالجامعة الأميركية في بيروت.

بعد قراءة وفهم تفاصيل الدراسة، نرجو منكم وضع علامة (صح) في المربع والتوقيع أدناه عند الجزء أو الأجزاء الذي/التي توافقون المشاركة به/بها. نذكركم بأن كل جزء بحاجة الى توقيع منفصل، وأنه بإمكانكم الموافقة على جزء واحد أو اثنين أو جميع الأجزاء.

أوافق على تعبئة الاستمارة الملحقة بهذه الرسالة وبالتالي على استخدام المعلومات التي سوف اشارك بها في الدراسة

اسم الوالد/الوالدة أو الشاهد ..... التوقيع ..... التاريخ .....

أوافق على أن يتم الكشف على أسنان إبني/ ابنتي \_\_\_\_\_ من قبل أطباء الأسنان المذكورين أعلاه وذلك داخل الحرم المدرسي وبالتنسيق مع المدرسة

اسم الوالد/الوالدة أو الشاهد ..... التوقيع ..... التاريخ .....

أوافق على أن يجيب/ تجيب إبني/ ابنتي \_\_\_\_\_ على الاستمارة الخاصة بالطلاب والتي سوف تتوفر في المدرسة أثناء وجود أطباء الأسنان المختصين

اسم الوالد/الوالدة أو الشاهد ..... التوقيع ..... التاريخ .....

شكرا سلفا لمساهمتمكم

فريق البحث، يستطيع المساعدة في حال تعذر عليكم تعبئة الاستمارة .  
الرجاء الاتصال عند الحاجة ب:

- البروفيسور مونيك شعيا، قسم الوبائيات، كلية العلوم الصحية، الجامعة الاميركية في بيروت، خلوي: 03-458143، بريد الكتروني: [mchaaya@aub.edu.lb](mailto:mchaaya@aub.edu.lb)
- الدكتور كيتي بيطار، قسم تقويم الاسنان، الجامعة الاميركية في بيروت، خلوي: 03-414082، بريد الكتروني: [kb30@aub.edu.lb](mailto:kb30@aub.edu.lb)
- الدكتور سوزانا المعالي، قسم تقويم الاسنان في الجامعة الاميركية في بيروت، خلوي: 71-520428، بريد الكتروني: [sa152@aub.edu.lb](mailto:sa152@aub.edu.lb)

للاتصال بفريق مستقل عن فريق البحث لأي استفسارات، مخاوف، شكاوى على البحث، استفسارات عن حقوقك وحقوق ابنك/ابنتك، للمزيد من المعلومات أو لمشاركة تجربتكم ، الرجاء الإتصال بلجنة الأخلاقيات:

Institutional Review Board (IRB)

Tel: +961-1-3500000 Ext: 5445 or Ext: 5454; Email: [irb@aub.edu.lb](mailto:irb@aub.edu.lb)

## **Appendix III**

الرقم المتسلسل: I I I I I I

## تقييم صحة الفم في المدارس التكميلية والثانوية في لبنان: مقارنة بين المدارس العامة والخاصة

الجامعة الامريكية في بيروت

الاسئلة الخاصة بالطالب المشارك

### القسم الاول: التعريف

الاسم \_\_\_\_\_  
اسم المدرسة \_\_\_\_\_  
الصف \_\_\_\_\_

SD1. العمر في آخر عيد ميلاد [ ] سنة  
SD2. الجنس

3. ذكر  
4. انثى

### القسم الثاني: نمط الاهتمام بصحة الفم و الاسنان

1. كم مرة تنظف أسنانك في اليوم؟

1. مرة يوميًا  
2. 2-3 مرات يوميًا  
3. اقل من مرة  
4. نادراً  
5. ابدا

2. ما هي المواد المستعملة لتنظيف الاسنان؟  
(يمكنك اختيار أكثر من خيار)

1. معجون اسنان  
2. الخيط  
3. غسول فم  
4. لاشيء  
5. آخر، حدّد:

3. هل سبق أن فحصك اي طبيب اسنان ؟

3. نعم  
4. كلا (انتقل الى القسم الثالث)

4. متى كانت آخر مرّة؟

1. شهر أو أقل
2. 1 إلى 3 أشهر
3. 4 إلى 6 أشهر
4. أكثر من 6 أشهر

5. آخر مرة عاينك طبيب اسنان كانت لأيّ سبب من الاسباب التالية؟

1. كشف روتيني نعم كلا
2. تنظيف نعم كلا
3. تسوّس نعم كلا
4. ألم حاد نعم كلا
5. مشكلة في شكل الاسنان نعم كلا
6. آخر, حدد: كلا

### القسم الثالث: صحة الفم والحياة العامة

1. هل تعتقد ان حالة فمك الصحيّة هي.....؟

6. ممتازة
7. جيّدة
8. عاديّة
9. سيّئة
10. سيّئة جدا

2. خلال الأشهر الثلاثة الماضية.... هل عانيت من أي من الأعراض الآتية بسبب أسنانك/ فمك:

(0) أبداً	(1) مرة أو مرتين	(2) بعض الأحيان	(3) غالباً/ كثيراً	(4) كل يوم/ أو تقريباً كل يوم

(4) كل يوم / أو تقريباً كل يوم	(3) غالباً/ كثيراً	(2) بعض الأحيان	(1) مرة أو مرتين	(0) أبداً	
					5. طعام عالق داخل أسنانك أو بينها؟
					6. طعام عالق بأعلى فمك؟
					7. تنفست من خلال فمك؟
					8. استغرقت وقتاً أطول من الآخرين لتناول وجبتك؟
					9. واجهت صعوبات في النوم؟
					10. صعوبة في عض أو مضغ أطعمة مثل التفاح، عرنوس الذرة، أو قطع اللحم؟
					11. صعوبة في فتح الفم على سعته؟
					12. صعوبة في نطق أي كلمة؟
					13. صعوبة في تناول الأطعمة التي تحبها؟
					14. صعوبة في الشرب بواسطة المصاصة (Chalumeau)؟
					15. صعوبة شرب أو تناول الأطعمة الساخنة أو الباردة؟
					16. سرعة الانفعال أو الإحباط؟
					17. عدم الثقة في النفس؟
					18. الخجل أو الإحراج؟
					19. القلق من رأي الآخرين حيال أسنانك؟
					20. القلق بأنك لست جيد المظهر أو مقبول الشكل كالآخرين؟
					21. الإنزعاج؟
					22. التوتر أو الخوف؟
					23. القلق بأنك لست بصحة جيدة كالآخرين؟
					24. القلق بأنك مختلف عن الآخرين؟

(0) أبداً	(1) مرة أو مرتين	(2) بعض الأحيان	(3) غالباً/ كثيراً	(4) كل يوم/ أو تقريباً كل يوم
				25. التغيب عن المدرسة بسبب ألم، أو موعد، أو عملية جراحية؟
				26. أي صعوبة في الانتباه في المدرسة؟
				27. أي صعوبة في أداء الواجبات المنزلية؟
				28. عدم الرغبة في الكلام أو القراءة بصوت عال في الصف؟
				29. تجنب المشاركة في أنشطة مثل الرياضة، أو النوادي، أو التمثيل، أو الموسيقى، أو الرحلات المدرسية؟
				30. واجهت صعوبة في اللعب على آلة نفخ موسيقية؟
				31. تجنب التحدث مع الطلاب الآخرين؟
				32. تجنب الإبتسام أو الضحك عندما كنت بصحبة غيرك من الطلاب؟
				33. تجنب قضاء الوقت مع الطلاب الآخرين؟
				34. تخاصمت مع الطلاب الآخرين أو مع عائلتك؟
				35. أغاظك أو سخر منك الطلاب الآخرون، أو نادوك بألقاب غير محببة؟
				36. أشعرك طلاب آخرون بالانعزال أو الوحدة؟
				37. وجه إليك طلاب آخرون أسئلة عن أسنانك، أو شفتيك، أو فكك، أو فمك؟

## القسم الرابع: تقويم الأسنان

الأسئلة التالية سوف تستفسر عن تقويم الأسنان. ما نعنيه بتقويم الأسنان أي جهاز ثابت أو متحرك يستخدم من قبل أخصائي تقويم الأسنان من أجل صف أسنانك

1. هل سبق أن فحصك أخصائي تقويم أسنان؟

1. نعم
2. كلا (انتقل الى السؤال 8)

2. إذا كانت الإجابة نعم، في أي عمر تقريبا عاينك أخصائي تقويم أسنان لأول مرة؟ [ \_\_\_\_\_ ] سنة

3. هل سبق أن حصلت على علاج تقويم لأسنانك؟

1. نعم (انتقل ال سؤال 8)
2. لا

4. هل انت حاليا تحت متابعة أخصائي تقويم أسنان؟

1. نعم
2. لا

5. من كان صاحب فكرة أن تحصل على علاج التقويم؟

1. انا (انتقل الى سؤال 6)
2. أهلي (أمي أو أبي) (انتقل الى سؤال 7)
3. أصدقائي (انتقل ال سؤال 7)
4. طبيب الأسنان (انتقل الى سؤال 7)
5. أخصائي التقويم (انتقل الى سؤال 7)
6. آخر، حدد:

6. لماذا كنت تظن أنك بحاجة لتقويم اسنانك؟

1. صعوبة في نطق بعض الأحرف والكلمات
2. صعوبة في المضغ والأكل
3. أوجاع في الفك أو الاسنان
4. لتحسين منظر أسناني/ابتسامتي
5. معظم أصدقائي/ زملائي حصلوا على علاج تقويم
6. آخر، حدد:



7. هل تعتقد أن قرار حصولك على علاج التقويم كان الاختيار الصحيح؟

1. نعم، السبب: \_\_\_\_\_ (انتقل الى القسم الخامس)
2. لا، السبب: \_\_\_\_\_ (انتقل الى القسم الخامس)
3. لا أعرف (انتقل الى القسم الخامس)

8. هل تعتقد أنك بحاجة لعلاج التقويم؟

1. نعم
2. لا (انتقل الى القسم الخامس)
3. لا أعرف (انتقل الى القسم الخامس)

97. لماذا تعتقد أنك بحاجة لعلاج التقويم؟

1. صعوبة في نطق بعض الأحرف والكلمات
2. صعوبة في المضغ والأكل
3. وضع غير طبيعي لأي من الفكّين
4. اسنان متراكمة فوق بعضها البعض
5. اسنان ناتئة
6. لتحسين منظر أسناني/ابتسامتي
7. معظم أصدقائي/ زملائي حصلوا على علاج تقويم
8. أهلي (أمي أو أبي) ينصحوني بذلك
9. طبيب الأسنان / أخصائي التقويم ينصحني بذلك
10. آخر، حدد: \_\_\_\_\_

10. لماذا لم تحصل على علاج التقويم على الرغم من أنك تعتقد أنك بحاجة له؟

1. ليس لدي الوقت لذلك بسبب متطلبات المدرسة
2. أهلي لا يعتقدون أنني بحاجة الى علاج
3. طبيب الأسنان / أخصائي التقويم لا يعتقد أنني بحاجة الى علاج
4. لا أحبذ فكرة وجود أجهزة ظاهرة على أسناني يستطيع أصدقائي/ زملائي رؤيتها
5. علاج تقويم الأسنان مكلف جدا

1. أي من الأنماط الغذائية التالية تتطابق مع عاداتك اليومية في تناول الطعام؟

1. أتناول ثلاث وجبات رئيسية في اليوم فقط (الفطور، الغداء، العشاء)
  2. بالإضافة الى الفطور، الغداء والعشاء، أتناول وجبة أو وجبتين خفيفتين
  3. أتناول بالعادة أقل من 3 وجبات رئيسية في اليوم. حدد الوجبة (أو الوجبات) التي لا تتناولها بالعادة
- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

2. كم مرة تتناول الوجبات السريعة عادةً؟

1. يوميًا
2. من مرة الى 3 مرات اسبوعيًا
3. من 4 الى 6 مرات اسبوعيًا
4. في المناسبات
5. ابدا

3. كم مرة تستهلك مادة الصودا عادةً؟ بيبسي، كوكاكولا وغيرها؟

1. اكثر من مرّة يوميًا
2. مرّة يوم
3. اقل من المعدل اليومي. عدّة مرات اسبوعيًا
4. في المناسبات
5. ابدا

4. كم مرة تستهلك الحلويات (كالشوكولا و السكاكر)؟

1. اكثر من مرّة يوميًا
2. مرّة يوم
3. اقل من المعدل اليومي. عدّة مرات اسبوعيًا
4. في المناسبات
5. ابدا

5. هل جربت التدخين, لو مرة في حياتك؟

1. نعم (سجائر فقط)
2. نعم (الترجيلة فقط)
3. نعم (سجائر و نرجيلة)
4. كلا (انتقل الى السؤال 8)

6 . كم كان عمرك حين دخنت أول مرة؟

- 1 . حدد العمر: سنة [ \_\_\_\_\_ ]
- 2 . لا أعرف/ لا أتذكر

7 . خلال الشهر الماضي، ما هو عدد السجائر التي دخنتها؟

- 1 . أقل من 5
- 2 . 5-10
- 3 . 10-25
- 4 . أكثر من 25
- 5 . أبداً"
- 6 . لا أعرف/ لا أتذكر

8 . خلال الشهر الماضي، كم مرة دخنت النرجيلة؟

- 1 . 1-5 مرات
- 2 . 5-10
- 3 . 10-25
- 4 . أكثر من 25
- 5 . يومياً"
- 6 . أبداً"
- 7 . لا أعرف/ لا أتذكر

9 . هل يدخن أحد والديك (سجائر أو نرجيلة)؟

- 1 . نعم، الأب
- 2 . نعم، الأم
- 3 . نعم، الأم و الأب
- 4 . كلا، لا الأم و لا الأب (انتقل الى النهاية)

10 . إذا كان أحد والديك من المدخنين (سجائر و نرجيلة)، حدد المكان الذي غالباً ما يدخنون فيه؟

- 1 . داخل غرف المنزل
- 2 . على الشرفة
- 3 . خارج المنزل فقط

جزيل الشكر لمشاركتكم

## **Appendix IV**

## SBS Child/Adolescent Assent Form

### AUB Social & Behavioral Sciences Assent to Participate in Research

**Study Title:** تقييم صحة الفم في المدارس التكميلية والثانوية في لبنان: مقارنة بين المدارس العامة والخاصة

**Researcher:** كيتي بيطار، سوزانا المعالي، مهند خندقجي

#### Purpose:

إننا نحاول درس كل ما يتعلق بأسنانك وفمك: نظافة أسنانك ووجود التسوس بها وأيضا إذا كنت بحاجة الى تقويم أسنان. اذا قررت المشاركة فإنك ستكون ضمن دراسة تقوم بها البروفيسور مونيكا شعيا من الجامعة الأميركية في بيروت لفحص العلاقة بين صحة فمك وطريقتك لتنظيف أسنانك وعاداتك وذاؤك. سوف ندرس أيضا إذا كانت هناك اختلافات بصحة الفم بين طلاب المدارس الخاصة والعامة. قد سمح لنا والديك أن تشارك بهذه الدراسة. تتكوّن هذه الدراسة من جزئين:

1. فحص للفم والأسنان لن تتجاوز مدته عن ال-10 دقائق. إذا وافقت على أن يتم فحصك، فكل ما هو مطلوب منكم هو فتح فمك كي نستطيع فحص اسنانك. لن يكون هناك أي ألم او خطر خلال المعاينة. وفي حال الحاجة للمعالجة، فسوف يتم اعلامك و اعلام والديك. سوف نتمكّن من معرفة حالة وصحة اسنانكم والتأكد إذا ما كنتم بحاجة لعلاج، وهذا يسمح لك على الحصول على العلاج اللازم.
2. الإجابة على أسئلة في استمارة. إذا وافقت على الإجابة على الأسئلة في الاستمارة، فكل ما هو مطلوب منك هو 5-10 دقائق من وقتك للإجابة على بعض الأسئلة عن صحة فمك وأسنانك بما يتعلق بالعناية بنظافة اسنانك بالإضافة الى عاداتك الغذائية.

لست مجبرا على المشاركة في هذه الدراسة. إذا قررت أن لا تشارك لن تحصل على أي عقاب ولن تخسر أي من حقوقك في المدرسة. كما وإنك لن تحصل على أي مكافآت مقابل السماح لنا بفحصك أو مقابل إجابتك على الأسئلة. يمكنك الموافقة على أي من جزئي الدراسة، وإذا وافقت على المشاركة في جزء واحد أنت لست مجبرا أن تشارك بالجزء الثاني. يمكنك التوقف عن المشاركة في هذه الدراسة ساعة تشاء. يمكنك التوقف عن اجابة الأسئلة ساعة تشاء. يمكنك رفض الاجابة عن كلّ الاسئلة، حتى بعد توقيع القبول بالمشاركة. لن يرى احد أجوبتك غير فريق البحث. ستحصل كل استمارة على رقم تسلسل ولن يستخدم اسمك في هذه الدراسة. كل الإستمارات سوف تخزن في مكان مغلق وآمن.

#### للسؤال عن الدراسة يمكنك الاتصال ب:

- البروفيسور مونيكا شعيا، قسم الوبائيات، كلية العلوم الصحية، الجامعة الاميركية في بيروت، خلوي: 03-458143، بريد الكتروني: [mchaaya@aub.edu.lb](mailto:mchaaya@aub.edu.lb)
- الدكتور كيتي بيطار، قسم تقويم الاسنان، الجامعة الاميركية في بيروت، خلوي: 03-414082، بريد الكتروني: [kb30@aub.edu.lb](mailto:kb30@aub.edu.lb)
- الدكتور سوزانا المعالي، قسم تقويم الاسنان في الجامعة الاميركية في بيروت، خلوي: 71-520428، بريد الكتروني: [sa152@aub.edu.lb](mailto:sa152@aub.edu.lb)

للاتصال بفريق مستقل عن فريق البحث لأي استفسارات، أو مخاوف، أو شكاوى على البحث، أو استفسارات عن حقوق المدرسة أو الطلاب وأهاليهم، أو للمزيد من المعلومات، أو لمشاركة تجربتكم، الرجاء الإتصال بلجنة الأخلاقيات:

Institutional Review Board (IRB)

Tel: +961-1-3500000 Ext: 5445 or Ext: 5454; Email: [irb@aub.edu.lb](mailto:irb@aub.edu.lb)

### Signing the assent form

لقد قرأت (أو شخص قد قرأ لي) هذه الورقة و فهمت مضمونها.

<p><b>القسم -2-</b> الموافقة على تعبئة الاستمارة</p> <p>..... التوقيع أو اسم الفرد</p> <p>..... AM/PM التاريخ والوقت</p>
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<p><b>القسم -1-</b> الموافقة على فحص الأسنان والفم</p> <p>..... التوقيع أو اسم الفرد</p> <p>..... AM/PM التاريخ والوقت</p>
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### Investigator/Research Staff

لقد أوضحت للمشارك قبل طلب التوقيع أعلاه. لا توجد فراغات في هذه الوثيقة. وقد سلمت نسخة من هذا النموذج إلى المشاركين أو ممثله / ممثله.

..... اسم الشخص الحاصل على موافقة	..... توقيع الشخص الحاصل على موافقة
	..... AM/PM التاريخ والوقت

**This form must be accompanied by an IRB approved parental permission form signed by a parent/guardian.**

