





REPUBLIC OF TURKEY

MARMARA UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

**AN EVALUATION OF ORAL HEALTH STATUS IN  
CHILDREN WITH DOWN SYNDROME ACCORDING  
TO SOCIO-ECONOMIC AND EDUCATIONAL STATUS  
OF THEIR FAMILIES**

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MASTER THESIS

DEPARTMENT OF PEDIATRIC DENTISTRY

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İSTANBUL

2019

## **STATEMENT (DECLARATION)**

Hereby I declare that this thesis study is my own study, I had no unethical behavior in all stages from planning of the thesis until writing thereof, I obtained all the information in this thesis in academic and ethical rules, I provided reference to all of the information and comments which could not be obtained by this thesis study and took these references into the reference list and had no behavior of breaching patent rights and copyright infringement during the study and writing of this thesis.

**Elif Mutlu Ünal**

## **ACKNOWLEDGEMENTS**

First, I would like to express my respect and gratitude to Prof. Dr. Serap Akyüz for her scientific guidance. My special thanks to my thesis supervisor Prof. Dr. İlknur TANBOĞA, whose knowledge and experience led to completion of this research Project. Her constant guidance and support were more than precious to me throughout the duration of the study. My special thanks to my professors Prof Dr. Ali MENTEŞ, Prof Dr. Betül KARGÜL, who gave me the opportunity to be a member of this department and shared their knowledge and experience with me.

The department members Assist. Prof Dr. Işıl Özgül KALYONCU, Assist. Prof Dr. Eda HAZNEDAROĞLU, Assist. Prof Dr. Sertaç PEKER, Assist. Prof Dr. Başak DURMUŞ, moreover, Dr. Figen Eren GİRAY, Dr. Ahu DURHAN for their clinical guidance and assistance.

Also, my deepest thanks go to all my friends and colleagues in the university, whose support and help whenever needed was more than valuable to me. Finally, I would like to appreciate to my family for their love and support during my academic years.



# **Down Sendromlu Çocuklarda Ağız Sağlığı Durumunun, Ailelerinin Sosyo-Ekonomik ve Eğitim Düzeylerine Göre İncelemesi**

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## **ÖZET**

**Amaç:** Bu çalışma; Down Sendromlu çocuklarda ağız sağlığı durumunu, ailelerinin sosyo-ekonomik ve eğitim düzeylerine göre incelemeyi amaçlamaktadır. Bu araştırma da; yüksek sosyo-ekonomik ve eğitim düzeyine sahip Down Sendromlu çocuk sahibi aileler ile düşük sosyo-ekonomik ve eğitim düzeyine sahip Down Sendromlu çocuk sahibi aileleri karşılaştırarak, aradaki farkları belirlemeyi amaçlamaktadır.

**Gereç ve Yöntem:** Araştırma cross-sectional özellik göstermektedir. İkameti İstanbul'da bulunan ve Marmara Üniversitesi hastası olan 66 Down Sendromlu çocuk, ağız sağlığı ve ailelerin sosyo-ekonomik ve eğitim düzeyi açısından hem anket hem de klinik muayene ile velileri tarafından sözlü olarak anamnez alınarak değerlendirilmiştir.

**Bulgular:** Cinsiyet grupları arasında; Chi kare testi ile diş fırçalama sıklığı, ebeveynlerin bilinci, ağız muayenesi sıklığı, medikal tedavi alma ve tedavi sırasında stres yaşama, eğitim düzeyi gibi kategoriler incelenmiştir. Aile farkındalığı listesinde 3 grup arasında; Diş fırçalama sıklığı, medikal tedavi, gelir ve eğitim düzeyi, tedavi sırasındaki stres ve oral kontrol sıklığı gibi kategoriler Chi kare testi ile karşılaştırıldı. Tüm analizlerde anlamlılık düzeyi 0.05 olarak ölçüldü ve doğruluğu kanıtlanmıştır.

**Sonuçlar:** Down sendromlu çocukların ailelerinin sosyoekonomik düzeyi, ağız sağlığı durumlarında ve düzeylerinde önemli rol oynamaktadır.

**Anahtar Sözcükler:** Down Sendromu, Sosyo-ekonomik Düzey, Ağız sağlığı, DMFT İçeriği, Aile.

# **An Evaluation of Oral Health Status in Children With Down's Syndrome According To Socio-Economic And Educational Status of Their Families**

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## **SUMMARY**

**Aim:** The aim of this study is to examine the oral health status of children with Down syndrome in terms of the socio-economic and educational levels of their families. In this study a comparison has been made between families with a high socio-economic and educational level of children with offspring with Down's syndrome and families with low socio-economic and educational level with Down's syndrome to determine the differences.

**Material and Method:** The study is cross-sectional. 66 children with Down Syndrome that are patients of Marmara University, have been assessed for oral health with a clinical examination and their families have been subjected to survey for socio-economic and educational information.

**Findings:** Between groups of gender; categories such as frequency of dental brushing, awareness of parents, frequency of oral check-up, having a medical treatment and experiencing stress during the treatment, and educational level were examined via Chi square test. Among 3 groups in the list of family awareness; categories such as frequency of dental brushing, having a medical treatment, income and education level, experiencing stress during the treatment and frequency of oral check-up were compared via Chi square test. In all of the analyses significance level was measured to be 0.05.

**Results:** The socio-economic level of families of children who have down syndrome play important role in their oral health conditions and levels.

**Key Words:** Down Syndrome, Socio-Economic, Oral Health, DMFT Index, Family.

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## **ABBREVIATIONS**

WHO – World Health Organization

UNDP – United Nations Development Programme

HIV - Acquired Immunodeficiency Syndrome

US – United States of America

EU – European Union

GNP – Gross National Product

HDI – Human Development Index

UNICEF – United Nations International Children’s Emergency Fund

DS – Down Syndrome

IQ – Intelligence Quotient

DMFT – Decayed Missing Filled Teeth

DMF – Decayed Missing Filled

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## **INTRODUCTION AND AIMS**

In the literature information, oral and mouth health levels of children have been always perceived as a hot topic through gravitated attention and interest by both of academicians and field practitioners. The reason behind augmented given importance on the topic of children oral care and health cases could be explained that this process has a deterministic role for individuals' oral health conditions in their adolescence and adulthood phases as it is indicated by both of scientists and field practitioners (Rosen, 2015). Therefore; building up a particular level of healthy oral and mouth conditions in childhood process in human beings might provide an undeniable prevention for oral health risks and handicaps in adulthood phase for individuals (Tengilimoğlu, Işık and Akbolat, 2014). Also, when the displayed higher level of interest to children oral care and health by professions is questioned in order to observe whether this gravitated attention affects parents to go more frequently to a dentist, it is stated that there has been a gradual increasing in frequency of applying to a dentist by families over the last 20 years in developed and developing countries regarding the cases on rates for routine control sessions (Rosen, 2015). Statistics showed up that while there were %13 of families who applied to a dentist in 2001, this portion augmented to %22 in 2008 and again raised to %35 in 2013. More interestingly, a recent study indicated that % 47 of families were observed to apply a dentist for a routine control in 2017 in both of developing and developed countries (Casamassimo, Hammersmith, Gross and Amini, 2018). This displayed information could be evaluated that parents who live these categorized countries became more aware and conscious about the importance of child oral care and health over the last decade.

In this point, Mishra, Pandey, Chopra and Arora (2018) conducted a study in order to clarify which factors play important role in changing of increased frequency of application of families to pedodontics over the time. Researchers reported out that education, socio-economic status and cultural background of the families might be considered as the factors that determine to what extent they give importance toward the pedodontics (Mishra, Pandey, Chopra and Arora, 2018). Further to that frequency of applying to pedodontics for families who have middle and higher education level

was significantly higher than families who have low-level of education. Also, this evidence was observed as similar for the variable of socio-economic status, which consequence brings us the information that families who have middle or high socio-economic status apply to pedodontics more than low or poor families (Mishra, Pandey, Chopra and Arora, 2018). Therefore, the displayed information might be evaluated that while the portion and frequency of parents to apply pedodontics augmented over the years, there are some particular factor which play important role in this attempt and behaviour of families.

In addition to this case that Smith (2001) found out that health condition and status of children could be also considered as a forceful impact for families to apply medical treatment and control sessions in more frequent way. Especially, families with children who have down syndrome, autism or mental handicapped were seen as attempting to go medical control sessions as compared to families of children without any handicapped (Smith, 2001). Statistics showed up that parents of children with down syndrome were found as the major group who apply to pedodontics among families of children who have any handicapped (Oredugba, 2007). The reason behind the rationale of this information might be explained that with the nature of this disease, children are born with a degenerated mouth, oral and chin structure. Therefore, the possibility and frequency of having oral health problems on the population of children with down syndrome are considered to be much more than the other mentally handicapped children groups.

According to the obtained information from current studies, Khocht, Janal and Turner (2010) indicated that socio-economic conditions, awareness levels, education background and psychological status of families of children with down syndrome are the main factors which affect and shape frequency of applying to pedodontics and giving importance to medical treatment control sessions. Researchers figured out that parents of children with down syndrome, who have middle and high level of awareness about importance of health care and oral health, socio-economic status, education background and psychological well-being are observed as applying to pedodontics more than the ones who have low level of awareness about importance of health care and oral health, socio-economic status, education background and psychological well-

being. As it could be added that Khocht, Janal and Turner (2010) indicated that psychological well-being and awareness levels of those families were found as the most influential causes and impacts for them in terms of applying to pedodontics for their children. Thus, it could be inferred that although economic and demographic variables of families place a vital role in attempting to medical and oral care for their children, their psychological balances, dynamics and status are seen as the central impactful conditions to determine to what extent they apply to pedodontics.

After clarifying minds of readers about the significance of oral care and health in children and importance factors for families to apply pedodontics, it might be crucial to mention to what extent Turkish literature has been focused this topic over the years and what kinds of evidences have been found out about the influential factors for Turkish families with down syndrome children, to apply pedodontics.

When literature information is screened in Turkey-oriented and based, it is observed that studies were mainly conducted to figure out how oral and mouth health conditions are affected and developed in mentally handicapped children (Demir and Güler, 2013). Also, there are few studies generated to provide measurement and comprehension about how and in which level; psychological stress, anxiety and depression are emerged in families of mentally handicapped children (Uğuz, Toros, İnanç and Çolakkadıoğlu, 2004). However, it might be clearly indicated that there is no study found on which factors affecting and playing essential roles for families with mentally handicapped children in the case of applying to medical care and oral health operations or control sessions. As it is evaluated that Turkish literature and density field has a huge gap regarding the cases of figuring out motivations of families with mentally handicapped children in terms of caring their health status. Therefore, this gap might lead some certain negative influences and consequences to societal order. To explain the circumstance that while the forceful factors to lead families of mentally handicapped children applying to pedodontics are not accurately known, both of governmental institutions and field practitioners could not be able to figure out how they increase the desire for them to show this behaviour, and help those children. So that, it is inferred that analysing motivations, patterns and forceful factors for families who have mentally handicapped children and detecting the deficient sides for them

and trying to consummate these points could be observed as one of the most essential cases in delivering medical and oral help conditions to those children.

Therefore, the inspirational point behind the rationale of this study could be observed as trying to complete the gap about which factors are seen as influential for families of children who have down syndrome in terms of applying to pedodontics and helping public institutions through providing a scientific data and opportunity to produce a development plan for those families and children.

The aim of this study is to examine how the oral health status of children with down syndrome are associate with socio-economic and educational levels of their families. Also, it might be vital to mention that the importance of this investigation could be indicated that this examining is going to be the first study in the literature which figuring out how demographic variables of families of children with down syndrome and oral health conditions of those children are related and providing scientific data to the literature in order to ensure governmental institutions and field practitioners through supporting opportunity to produce a development plan for those families and children. Therefore, due to the increased value of being the first study on its area and its contribution to public, the importance of this investigation might be perceived as higher and valuable.

Further to that the next part of this study is going to contain literature information about oral health, its importance and its appearance in children and children with down syndrome, and then, the following part will address the concept of economic poverty and its effects on families and their pedodontics application frequencies. After that methodological procedures and implementations of this investigation are going to be explained and, last chapter will consist of results, discussions and evaluations for both of literature and field practitioners.

# 1. LITERATURE REVIEW

## 1.1 Oral Healthiness

Oral health is not limited only to teeth, gums and the tissues that support them but also includes the plate and floor of the mouth, tongue, the status of the mouth and throat, lips, secretions, upper and lower jaws and the masticatory muscles. Oral health also includes the branches of the body's nervous system, the defence system and the blood vessel system (Chrisopoulos, Harford and Ellershaw, 2016). In addition to this information that oral health is the general health of the tissues which enable us to talk and smile, breathe and kiss, smell, taste, touch, chew and swallow, cry from pain and express our emotions with our facial expressions. Oral health and general health – a relationship that is easy to understand. The health of oral tissues is also an indication of the health of the organs and systems in our bodies (Kassebaum, Smith, Bernabé, Fleming, Reynolds, Vos and Alsharif, 2017).

A detailed oral examination can reveal nutritional deficiencies, microbial infections, defensive system disorders and some forms of cancer.

- The examination of saliva with a microscope can give clues about a disease.
- Facial nerves are associated with other nerves in the body.
- The jaw bones and temporomandibular joint are a part of the skeletal system in the other part of the body. The smallest problem in the jaw bone may be reflected as pain elsewhere in the skeletal system.
- A problem in the heart muscles can be reflected as pain in the jaw bones.

Additionally, previous investigations suggested that a disease in the mouth - especially gum diseases - is linked to problems in the body (Kassebaum, Smith, Bernabé, Fleming, Reynolds, Vos and Alsharif, 2017). Infections in the mouth cause bacteria to enter the bloodstream to cause disease and can be likened to a door opening and inviting diseases such as:

- Heart diseases,
- Respiratory system infection,
- Diabetes,
- Stomach ulcers,
- Low birth weight or premature births,
- Joint diseases,
- Caries and gum diseases are the most common encountered and widespread dental diseases.

As it could be evaluated that the displayed diseases that are derived from oral health deficiencies are observed as negatively influential factors which downsize the daily living conditions and lead individuals to suffer from reduction of both of psychological and physiological well-being status. Therefore, this case could be also considered as a main resource for addressing the importance of oral care and health conditions for individuals.

Further to that with the awareness and increased recognition about negative impacts of deficient oral and mouth care in children and individuals, there are such and particular government and community protection programs like fluoridation of drinking water, dental health seminars in schools, nutrition education and smoking prevention programs save billions of dollars each year in community health costs and best of all, they help many people to preserve their natural teeth for a lifetime (Kassebaum, Smith, Bernabé, Fleming, Reynolds, Vos and Alsharif, 2017). Literature indicated that these implications and implementations have an impact on the awareness and conscious levels in the minds of both of families and children regarding the cases on importance of applying to pedodontics and influences of protecting oral health to physiological care conditions (Watson, Horowitz, Garcia and Canto, 2001).

## **1.2. Importance of Oral Health in Children**

One of the most important issues that parents should take into consideration in the development of their children is oral and dental health.

Initially, primary teeth, which start to last for about 6 months in babies, are completed at the age of 2.5-3 years. As a general guideline, these teeth are considered

as actually the foundation of oral and dental health that starts with childhood. The initial functions of these teeth could be stated that they help to guide and chew on future teeth while maintaining a place (Glick, Williams, Kleinman, Vujicic, Watt and Weyant, 2016). Also, it is important to mention that the emergence of extraction that can occur due to early withdrawal can extend to the occurrence of orthodontic problems and some skeletal problems. Furthermore, when the changing process of primary teeth are considered and investigated that it is indicated in the literature, the change of all primary teeth occurs at 12-13 years old in human beings (Lindmark, Jansson, Lannering and Johansson, 2018). Change process begins with the resorption of lower middle incisors around 5-6 years. Due to these ten teeth falling off the first time, it is considered that the other teeth will change a few months or even before in adolescents. However, the average age of change of the molar teeth is 10-11 (Lindmark, Jansson, Lannering and Johansson, 2018). There are many risk factors for caries. At the beginning of these nutrition, oral hygiene, saliva structure, genetic income.

- Night feeding

It is the first and greatest risk in terms of primary teeth, especially after 18 months of breastfeeding. Even though the mother's breast has many pain-relieving properties, if the primary teeth is given repeatedly at night with the onset of the nipple, it creates a danger to the teeth. Especially after 18 months, mother's breast, baby food, cow's milk, fruit juice are given repeatedly at night, and saliva flow is accompanied with the effect of cleansing of the teeth between night and night sleep. Early childhood caries starting with a chalky white image in primary teeth and continuing with fractures(Lindmark, Jansson, Lannering and Johansson, 2018).

- Tooth Brushing

It is not possible for a child whose motor functioning ability is believed to be 8-9 years old to be able to clean his teeth on his own. As a toothbrushing criterion on its own, shoes can be attached, hair can be cleaned of its own. Brushing by a parent is very important, especially before bedtime. An opportunity can be given in the morning to do it on their own. Thus, brushing habit and self-confidence are provided to those

children in terms of augmenting the quality and efficiency of oral health care (Nogueira, Nogueira, Fonseca, Brandão, Menezes and Tembra, 2016).

Also, allergic asthma etc. mouth inhalators used by reason, these oral medicines contain certain amounts of sugar, so the mouth should be rinsed with water. Therefore, the frequency of peroral sugar-based beverages in childhood and adolescence processes.

Given pure chocolate instead of waffle, gum chewing and saliva flow in the mouth can reduce the risk of caries in children's oral health development. Dried fruit may be preferred as a snack. Thus, snacking frequency can be reduced (Nogueira, Nogueira, Fonseca, Brandão, Menezes and Tembra, 2016).

Further to that, it could be evaluated and mentioned as an important point that regular physician control, protective practices, raising awareness of the child's relationship with the physician, and gaining the habit of brushing teeth are factors that will make the child comfortable in the future (Gil-Montoya, de Mello, Barrios, Gonzalez-Moles and Bravo, 2015).

## **2. GENERAL REVIEW OF ECONOMIC POVERTY IN WORLD AND TURKEY**

Poverty, as a global problem, has reached universal dimensions without regard to the distinction between developed and underdeveloped. Poverty is not only a problem of the underdeveloped regions of the world, it has become a major problem for developing countries and even developed countries. Today, 10% of the world's population has more than seventy percent of the world's total income. About 2.5 billion to about half of the world's population with sub-billion to two-billion-year-olds live below the \$ 2 per day poverty line, 1 billion to nearly one-in-six poverty lines per day. With poverty, the dimensions of inequality between countries and regions are also increasing. Since the poor countries on average have a slower growth rate than the rich countries, the income gap between the countries is gradually widening. While the income of the richest 20 countries in 1960 was 18 times higher than the income of the poorest 20 countries, this ratio doubled to 37 in 1995 (Baydar and Akcinar, 2015). The industrialized sector, which is a quadrant of humanity, holds 85% of the world's wealth.

As it is indicated in the literature that every year, 100 thousand people die from hunger and side effects. Only in 2000, 36 million people lose their lives, and every 6 minutes a human being is blind because they can not get the necessary vitamins, 826 million of them are constantly malnourished and chronic hunger. 1 billion people can not reach clean water, 2.4 billion people are deprived of adequate health conditions (Ravallion, 2017). While 4 million people die from diarrhea each year, 1.1 million African children carry the HIV virus. There is a 25-year difference in average human life between Europe and the African continent. It is said that the hunger problem of the whole world population can be solved in the US and EU countries with the total money spent for perfumes only in 1 year. When all these world realities are examined, it is understood how important the problem is (Ravallion, 2017).

Poverty studies published by international organizations, notably the World Bank and UNDP, also highlight this high level of poverty attained in various countries (SPO, 9th Development Plan). The World Bank has conducted research on the distribution of poverty in the region between 1981-2020 (estimated 2020). WB

accepted people living with less than \$ 1 a day, \$ 1.25 a day and \$ 2 a day as poor (Bhalla and Lapeyre, 2016).

According to the World Bank (WB) data, between 1 January 1981 and 1 January 2000, the fasting population was estimated at \$ 1.25, while the population between the years 2005-2020 was estimated at \$ 1.25 (Table 1). The proportion of the poor population has gradually decreased in the 1981-2001 period. Although this ratio increased in 2005 compared to the previous year, it is estimated that this ratio will gradually decrease in 2015 and 2020. It is estimated that in 2020 the least poor population is Europe and Central Asia, and the poorest is the Sub-Saharan Africa. As can be seen from Table 1, the poverty rates of the countries in terms of regions are the lowest in Europe and Central Asia, and the poorest in the sub-Saharan Africa (Bhalla and Lapeyre, 2016).

World Bank reveals per capita GDP figures of the poorest and richest 10 countries in the world as of 2008. As Table 2 suggests, the per capita GNI in the world's poorest countries is below \$ 1000. According to DB data, the Democratic Republic of the Congo is the poorest country in the world by 2008, with the lowest per capita GNP of \$ 290. When we look at the GNP figures of the world's poorest 10 countries among themselves, Kongo Dem is the first in poverty. In the Republic, GNP per capita is \$ 290, while Liberia, which ranks second, is \$ 300 and Malawi, 10th, is \$ 830 (Arciprete and Biggeri, 2017).

The country with the highest GDP per capita in the world, as determined by DB in 2008, is Norway at \$ 58,500. Given the per capita GDP figures between the world's poorest and richest country, the incredible gap between them is striking. With the Democratic Republic of the Congo in the poorest GNP rank at \$ 290, Norway has the highest GNP rank at \$ 58,500. This means that the richest region of the world in terms of GNP is about 200 times larger than the poorest region. Thus, once again a global dimension of poverty, the incredible income gap between countries is clearly visible (Deaton, 2018).

The poverty studies carried out by many international organizations, especially the United Nations Development Program, show how serious the dimensions of poverty in our country are. which is published annually by the UNDP and human

development, health, and taking into account non-economic indicators of development such as training, according to the measure 2010 human development report with the HDI. As a sign of the education index, education gross enrollment rate is 74.3%, adult literacy rate is 90% in Europe & Central Asia and 27th in the world. As a health indices indicator, life expectancy at birth is in the 19th place in Europe & Central Asia with 72.2, 90th place in the world, it is in the rank of the region in terms of income index and 63rd in the 12th world rank. All of this data constitutes a human development value of 0.754 cubic in 2010 for Turkey (Deaton, 2018).

In international comparisons, not in very bright conditions with regard to poverty indicators, Turkey is among the countries where the income distributed as extremely unjust. In a developing country such as poverty, Turkey has become one of the most important issues. While the unfair income distribution on the one hand, the low share of the national income on the other side, the economic crises that have been happening in recent years, the unsuccessful policies have taken poverty to an even more severe dimension (Zacharias, Masterson and Memiş, 2014).

1980 is an important process of structural transformation in Turkey. With the new economic program implemented on January 24, 1980, a radical change took place in the economic and social structure (Yildirim, Bakır and Savas, 2018). In the 1990s, after the recessionary crises, the economy shrank and unemployment increased. Globalization process of neo-liberal policies and the economic crisis of the combined effects of the deterioration of income distribution in the country, has led to an increase in deepening poverty and the gap between social strata and Turkey, being a country where relatively evenly distributed income to come out, rich with which the size and reach to deserve the qualification abyss of difference between the poor has become a country (Yildirim, Bakır and Savas, 2018).

Food poverty rate was the highest at 1.35 percent in 2002, while it dropped to 0.48 percent in 2009. The proportion of the population under the poverty line, which includes food and non-food expenditures, was 26.96 percent in 2002, the highest level compared to other years, as well as 18.08 percent in 2009 (Yildirim, Bakır and Savas, 2018). Per capita daily spending is not available as of 2006 due to the purchasing power parity below \$ 1. The rate of living below 2.15 dollars per person per person in

2002 decreased from 3.04 percent in 2009 to 0.22 percent in 2009. The poverty rate, which was below \$ 4.3 per day per person per day in terms of purchasing power parity, showed a continuous decline from 2002 to 2009. In 2009, the hunger for 4 people was estimated to be 287 TL monthly hunger and 825 TL monthly poverty limit (Yildirim, Bakır and Savas, 2018).

While the poverty rate, which was 34.62% in 2008, rose to 38.69% in 2009, the poverty rate of those living in urban areas decreased from 9.38% to 8.86%. It is seen that in 2007, 328,000 people were on hunger, and 12,261,000 people were unable to afford food and non-food spending. In the same year, 4,968,000 in urban areas and 7.293 million in rural areas are unable to cover food and non-food expenditures. In 2007, 2008 and 2009, it is observed that the number of poor individuals who can not afford food and non-food spending in cities and in the country is quite far from each other. The poverty line of the World Bank has been set at \$ 1 per day for poverty analysis (Yildirim, Bakır and Savas, 2018).

According to this place; in 2007, 2008 and 2009 there were not any poor people in our country with per capita income of less than \$ 1. In 2007, in Turkey, the number of poor below 2.15 dollars daily income is around 356,000 people. The same year, 43,000 people living in the city and 313,000 people living in the country live on this poverty line. When we look at some years, it has been found that the number of poor people below this limit has decreased to 159,000 in 2009. When we look at the individual figures below the per capita income of \$ 4.3 per day; In 2007, there were 5,796,000 people, which declined over the years. As a result, despite Turkey's years be seen as a reduction in poverty, poverty is still present a very high level (Yildirim, Bakır and Savas, 2018).

## **2.1. Economic Poverty**

Poverty is not an economic term, but the current literature uses daily income per capita as a measure of poverty. The World Bank recognizes \$ 1 per person per day as "international poverty line". Poverty determined according to this class is called "income poverty" and the fact that basic necessities such as water, the minimum calories required for nutrition and children's inability to start schooling can not be met is called as "basic need poverty" while all income is spent for food and yet adequate

food is not provided is described as "extreme poverty (Subramanian and Subramanian, 2016).

According to the World Health Organization (WHO) 's 2016 Health Report, 1/6 of the world's population has less than 1 dollar per person per day and about half of the population have less than 2 dollars per day. According to the same report, the most important risk factor for health is poverty. The negative effects of poverty on health are too numerous to count (Hou, Liao and Huang, 2018). In a recent study that examines the major risk factors that cause diseases at global and regional scale, the most important risk factor is "low weight of children and their mothers" (Hou, Liao and Huang, 2018).

It is quite difficult to define the concept of poverty because every world view approaches different concepts of poverty. Although there are different opinions in the literature on the concept of poverty, it is possible to find some common points in terms of concepts and types (Hou, Liao and Huang, 2018).

The dictionary meaning of a person who is literally poor, not having enough money or having the tools necessary to live comfortably. Poverty word expresses the deprivation of the possibilities that life requires. The poverty concept always brings about the comparison of the standard situation with the observed situation (Aktan and Vural, 2002), since what is needed to survive will vary depending on the gathering, environment and circumstances. In terms of social politics, poverty is a level of life that suits human dignity and personality, either fully or relatively insufficiently in the material direction. In other words, society, morality, family and culture are a disaster, a public social threat threatening our lives (Seyyar, 2002).

Poverty has always existed since people began to live in communities and to relate to their production. It is possible to trace the origin of the poverty as a social problem from the beginning of the 17th century. John Locke, the greatest theorist and pioneer of liberalism in the 17th century. liberal theorists are beginning to argue that while advocating private property rights from the very beginning to the question of poverty, it should not exclude the poor and that the right to subsistence is necessary for the security of the social order and that society can be achieved by creating an increase that will provide for the prosperity of the poor (Şenses, 2001).

Important thinkers and theoreticians are increasingly observed in the 18th and 19th centuries, when industrialization-based capitalism, which is closely related to the question of poverty, began to root and expand (Şenses, 2001). The industrial revolution that developed in the middle of the 18th century in the mid-18th century was one of the great transformations of human history which provided extraordinary increases in labor productivity and enabled massive production transition possibilities, but with urbanization, population growth, a mass society, and bringing intense competition between the rapidly industrializing countries, thus posing a problem of poverty as an important social problem.

When defining the poverty, an important point that needs to be emphasized is that the concept must be defined in terms of pure economic criteria or social and political criteria. Amarty Sen's approach to this issue is remarkable. According to this approach; is a number of important steps that define the poverty and satisfaction that people have with their material and spiritual assets and the opportunities that exist in society and their quality of life. Thus, the concept of poverty comes to the forefront with its cultural and subjective dimensions rather than economic emphasis (Hou, Liao and Huang, 2018).

## **2.2. Economic Poverty in the World**

The world is faced with a deep and violent poverty as well as wealth. 10% of the world's population produces 70% of the world's income by producing 70% of total goods and services, which equates to an annual average of about US \$ 30,000 per capita. On the other hand, according to the world population of 6 billion (estimated to be around 7 billion of world population by the end of June 2012), 2.8 billion- about half - after the year 2010 lives below the \$ 2 daily poverty line (Hou, Liao and Huang, 2018). 1.2 billion (About one fifth) of this population have to make their lives under the \$ 1 daily limit. In rich countries, less than 1 in 100 children cannot reach the age of five. In poor countries, more than 5 out of every 100 children cannot reach the age of five. In rich countries, five percent of the under-five-year-old population is undernourished, while in the poorer countries, this rate is in excess of 50 per cent (DPT, 8th and 9th Development Plans).

Humanitarian conditions, such as global abundance (wealth), global communication and technological capabilities, have progressed far in comparison with the rest of history in the last hundred years, but poverty and / or neediness continue to exist vigorously. And similarly, the distribution of global gains is far from equal (Raitzer, Sparks, Huelgas, Maligalig, R., Balangue, Launio and Ahmed, 2015). The average income of the richest 20 countries is 37 times higher than the income of the poorest 20, and this difference has doubled in the last four decades.

Table1: The World's 10 Poorest and Richest Countries in Terms of National Income Levels Per Capita (GNP per Capital(\$)) Source: World Bank, World Development Report 2016.

Poorest Countries	GDP \$	Richest Countries	GDP \$
Malawi	830	Norway	58500
Togo	820	Singapore	46940
Mozambique	770	USD	46870
Sierra Leone	750	Switzerland	46460
Mid. Africa Rep.	730	Hong Kong	43960
Niger	680	Austria	37680
Eritrea	630	Ireland	37350
Brondi	380	Denmark	37280
Liberia	300	Canada	36220
Kongo	290	Finland	35660

The World Bank manifested the GNP figures as of 2016 for the 10 poorest and richest countries world. As can be seen in Table 3, the per capita GNP in poor countries is less than \$1000. According to the World Bank, the Democratic Republic of the Congo is the poorest country in the world with the lowest GNP per capita of \$ 290. The GNP per capita of the world's poorest 10 countries is \$ 300 in Liberia, which ranks second, and \$ 830 in Malawi which ranks in 10<sup>th</sup> place. As of 2015 the World Bank quotes Norway as having the world's highest GNP per capita at \$ 58,500.

Given the per capita GDP figures between the world's poorest and richest country, the incredible gap between them is striking. With \$ 290 the Democratic

Republic of the Congo is the poorest country in terms of GNP while Norway is at the top of the list of GNP per capita with \$ 58,500. This means that the richest region of the world in terms of GNP is about 200 times greater than the poorest region. Thus, once again the global dimension of poverty, the incredible income gap between countries is clearly manifested (Raitzer, Sparks, Huelgas, Maligalig, R., Balangue, Launio and Ahmed, 2015).

According to the data for 2016, 5% of the wealthiest people in the world have one-third of the world's income and 10% of the world's rich people have a 50% income. On the other hand, 50% of the low-income population in the world get only 8.5% of the income while the population in the lowest level get only 0.8% of the revenue (Demiral et al, 2016).

### **2.3. Effects of Poverty on Children Health**

Socioeconomic and sociodemographic factors have been shown to be associated with health. In disadvantaged groups; they have a lower chance of survival, they have more severe illnesses, they are exposed to chronic illness and disability at an earlier age, they are aged faster and suffer more, they have lower quality of life, they have not benefited from the distribution of resources and have benefited less from high standard health services. It is known that with the health condition they perceive good and the life span they have are less (Karimu, Asiedu and Abor, 2018).

Children and adolescents are members who are most vulnerable to the adverse effects of poverty in any society. UNICEF's "State of the World's Children 2005" report identifies children living in poverty. "Children who live in poverty live in a way lacking the necessary material, spiritual and emotional resources in terms of life, growth and development so that they can not enjoy their rights, fully develop their skills and participate in society as full and equal members". As children feel poverty more deeply, they are the ones most affected by poverty and inequality (Durgun, 2011).

Children with high needs are at the same time the most vulnerable children. Poverty can be especially harmful for growing children. Poverty can lead to malnutrition and illness, education can be cut in half, and children can be exposed to

all forms of violence, exploitation and neglect. Poor children are likely to be poor adults in the future. UNICEF recognizes infant and child mortality rates as the indicator of child poverty, the proportion of underweight or low-birth rate children under the age of five, the proportion of children reaching clean drinking water, adequate sanitation and health care, the proportion of fully married children and the proportion of children starting primary education (Karimu, Asiedu and Abor, 2018). In Figure 1, the effects of poverty on child health are shown schematically (Fajth, Engilbertsdóttir and Kurukulasuriya, 2012).

The most common and most prevalent effect of poverty on children is inadequate nutrition. Poverty plays a role as the main determinant of inadequate nutrition in children, due to inadequate home food, premature infant stress due to domestic stress and chronic fatigue of the mother, maternal insufficiency and low birth weight of infants. Malnutrition can cause more than a third of all children under five to die worldwide. In addition, deaths, blindness, stunting, retardation in motor and cognitive development, and low IQ can be seen in children when basic nutrients such as vitamins, iron or zinc taken from fruit, vegetables, fish or meat are not taken in sufficient quantities. small proportion of children under five are stunted subjected in Turkey in 1998, 16.0% in 2003, was determined to be 12.2% and 10.3% in 2008. It has also been found that there is a strong relationship between dietary insufficiency due to poverty and the appearance of stunted children in studies conducted abroad. In the study conducted by Hackett et al. (2009) in Colombia, Bisai et al. (2010) in India, the odds of stunting of poor children were 42.1% and 52.7%, respectively. In Fotso and colleagues (2012) study in Kenya, the odds of stunting children in poor families were 9% in the first three months of life, increasing steadily, reaching 60% when children were 15-17 months old (UNICEF, 2012).

Poverty and malnutrition are the poorest children (Anthony King and Austin, 2011, Durgun, 2011, UNICEF, 2011), as the inadequacy affects the physical and mental development of children with disabilities, developmental deficits and chronic illnesses.

Ersoy (2006) and Trani and Cannings (2013) found that the incidence of poverty among children with disabilities was higher. In the same study performed by

Ersoy (2006), it is seen that 22% of the children aged 0-5 years in Diyarbakır sample and 10% in Ankara have continuous disease. Other studies have also found that chronic illnesses such as Type II Diabetes, obesity and hypertension are more common in children of poor families (Anthony King and Austin, 2011, Phipps et al., 2006).

Sufficient and balanced nutrition as well as a safe and solid housing is the basic necessity of children. In addition to malnutrition alone, the health of children is adversely affected by poor housing, poor housing, poor housing, inadequate access to water and sanitation facilities, and inadequate protection in crowded environments. Some of the poor children are struggling to survive on the street by not finding a home to stay (Karimu, Asiedu and Abor, 2018).

Children who do not have adequate nutrition and do not get adequate stimulation especially during early childhood can not realize their full potential. They have problems focusing on their lessons and are unable to fulfill their academic duties. Poor children are less likely to get quality care or attend pre-school education. In addition, these children may have difficulty in accessing the school, buying school supplies, or finding places to study. Both these reasons and school problems, poor school attendance, poor school enrollment and school dropout rates among poor children who can not attend school due to behavior problems and frequent illnesses are high (Anthony King and Austin, 2011).

Another important aspect of child poverty is child labor (Clean 2008). Children living and working in the streets must have clearly defined solutions for those who are kidnapped and sold for various purposes and who work as workers at childhood. The worst forms of child labor, such as working in the streets and seasonal agricultural work, still continue in our country. Children working in these jobs are left behind by their schools, unable to find free time and socialization. In other words, the future of children is also dangerous. Children face various risks ranging from malnutrition to illnesses, accidents, violence trends, street life, or suicide (UNICEF, 2011, 2012).

The causes of child labor include socioeconomic and cultural factors, as well as poverty, as well as gaps in legislation and control. Because poor families are not interested in children, it is expected that these children will be contributed to the livelihood of the household by giving responsibility and independence at an early age.

For the poor man is his own body capital. Childhood is also seen as a capital. Although the income is low, the family expects the child to work because the family needs it. Time is too long for education. In this case, the child mostly faces the street and all the negative effects of the street without being supervised. When there is consciousness of material and spiritual poverty, it becomes easier to turn to succes and risky behaviors by reacting to this situation (Durgun, 2011, SVET, 2007, UNICEF, 2011, Zuberi, 2012).

Children who live in poor families are as important as their basic needs in their own homes, and should not be able to find positive role models and live in a criminal environment. Poor children have to have risky relationships with children and families living in this environment, causing them to turn to risky behaviors (Zuberi, 2012). In the study performed by Tasci and colleagues (2005), 31.4% of the students, 31.4% of the alcohol and 15.7% of the students used drugs. In the study conducted by Görgün, Tiryaki and Topbaş (2010), the prevalence of substance use once in a lifetime of participants was determined as 5.6%. Other studies have also found that the proportion of adolescent pregnancy, crime, and violence in children of poor families is higher (Anthony, King and Austin, 2011, Drake and Rank, 2009, Sampson, Morenoff and Gannon-Rowley, 2002).

### **3. DOWN SYNDROME**

#### **3.1. Definition and Epidemiology**

Down syndrome is a disorder associated with the presence of an additional part or a whole copy of the genetic material found in chromosome 21. It is also called "Trisomy 21". Down syndrome can occur without distinguishing between any economic or social structure, race, geographical area. Down syndrome, was officially described for the first time by Edouard Onesimus Seguin in 1846. Down syndrome occurs approximately every 1:800 births. At birth, it can be easily detected by examining the facial structure of the infant (Horvath, Garagnani, Bacalini, Pirazzini, Salvioli, Gentilini and Franceschi, 2015).

In the etiology of Down syndrome; maternal age, drug and alcohol use and exposure to radiation during pregnancy are mentioned. For example, a 25-year-old mother carries the risk of Down's syndrome at a rate of 1: 1250 while the rate for a 40-year-old mother is 1: 100. Obviously, the frequency of Down Syndrome increases with maternal age (Horvath, Garagnani, Bacalini, Pirazzini, Salvioli, Gentilini and Franceschi, 2015).

Immunological problems, neurological diseases such as congenital heart diseases, epilepsy, gastrointestinal disorders, hearing and vision problems, endocrine diseases, premature aging are manifested in individuals with Down syndrome. Down Syndrome is not a disease that needs to be treated, but a genetic difference. Incorrect division during cell division results in the insertion of an extra chromosome in the 21st chromosome pair. The only known cause of Down syndrome is the age of pregnancy, which increases risk for 35-year-old pregnancies.

There is no difference in country, nationality, socio-economic status. The average is seen every 800 births. There are around 6 million individuals with Down syndrome all over the world. We do not have a complete data in Turkey, but it is estimated that there are about 70,000 people with Down syndrome (Necchi, Pinto, Tillhon, Dutto, Serafini, Lanni and Prosperi, 2015).

It causes mild or moderate mental and physical growth retardation. Some physical features seen in Down syndrome are pulled small eyes, short nose, short fingers, curly fingers, thick nape, only one line in the palm, the big toe is more open than the other fingers. All or some of these features can be seen. Infants with Down syndrome grow up slower than their peers with exceptions. Therefore, infants might be exposed to mental retardation within this emerging process. This retardation appears to be more distinct as the age grows, but with appropriate education programs, children with Down syndrome can achieve in various areas. Here is a regular and disciplined training program and again it is the most important factor (Necchi, Pinto, Tillhon, Dutto, Serafini, Lanni and Prospero, 2015).

Individuals with Down syndrome are generally shorter than their peers and may experience weight problems later in life if they do not acquire proper eating habits due to the slow metabolism. They need physiotherapy support for muscle laxity (Hypotonia) at different grades. As soon as your baby is born, it is very important that we consult with the physiotherapist and prepare a prospective support program. Some babies may have difficulty keeping their heads as stable for a long time, depending on whether the hypotonia is low or high, but completing the stages of development with physiotherapy support at their own pace (Necchi, Pinto, Tillhon, Dutto, Serafini, Lanni and Prospero, 2015).

Like every child, children with Down's syndrome also have different levels of intelligence, ability and personality. The key point here is that your child can get timely and accurate support to maximize his capacity. Options such as early education programs, physiotherapy, language therapy, alternative therapies, playgroups should be thoroughly assessed by parents and should be decided by reaching the right resources (Deidda, Parrini, Naskar, Bozarth, Contestabile and Cancedda, 2015).

Even if they cannot read, they are now able to finish high school and even university, learn a second language, work, live independently or semi-independent lives. On the other hand, literature information indicated that each of the children with DS has different development, improvement and psychological process, therefore, a smooth level of caring, education and interest by both of society and their families

could increase living quality and conditions of them substantially (Deidda, Parrini, Naskar, Bozarth, Contestabile and Cancedda, 2015).

In addition to this case that mentally handicapped does not mean being emotionally disabled. Babies with Down syndrome are babies before anything else. Babies who need nutrition, cleansing, love; are crying, bored, angry, nauseous, laughing, not sleeping at night. Young people with Down syndrome are young people who have sexual identities, who live in adolescence depression, who are in love, who break hearts, fight with their siblings, knock on doors and listen to music, laughing and dancing. Like us, they also live all their emotions. A triple test of 16th week of all age measures the level of 3 hormones that can indirectly detect calf down syndrome and gives the patient a risk ratio (Deidda, Parrini, Naskar, Bozarth, Contestabile and Cancedda, 2015). It is suggested that amniocentesis and chromosome analysis, which is a definite diagnosis for the family, might be considered as a mainstream resource for families to understand what kinds of situation and disease that their children are exposed to. Chromosome analysis is performed on the specimen taken from amnion fluid wrapped around the fetus with amniocentesis. Fetus Down syndrome, an extra 21th chromosome is detected. More importantly, with these methods, a definite diagnosis can be made before the baby is born, and the family decides whether to continue the pregnancy or not(Deidda, Parrini, Naskar, Bozarth, Contestabile and Cancedda, 2015).

Down syndrome has no treatment, but with thyroid gland disorders and heart disease early diagnosis and treatment, these people can lead to a more comfortable life. During the pregnancy, all the mothers whose ages are over 35 are at risk. This risk is multiplying exponentially with age. Moreover, it is found out in the literature information that the most risky age group for women to have a child with DS is detected as the ages between 30 and 35 years old (Deidda, Parrini, Naskar, Bozarth, Contestabile and Cancedda, 2015).

### 3.2. Symptoms of Down Syndrome

The symptoms of Down syndrome can be seen in many parts of the body. The disease can be identified at the time of pregnancy or during delivery. If new-born babies carry this condition, there are some differences in their appearance.

These babies are born with a different face. Their head is smaller than the other children and the back is flat. Also, individuals diagnosed with DS have wide and short forms of back of the neck part in their body as compared to normal and healthy population. To further that the eyes are separate and pulled apart. It is observed that the ears are smaller than the head. The nose structure is flattened against the roots, the neck is strangled. The fingers are wide and the fingers are chubby and short. Body structures are also faint and short. Intelligence level is lower than other children. Treatment of these children with childbirth will lead to better quality of life, avoiding premature deaths (Hartley, Blumenthal, Carrillo, DiPaolo, Esralew, Gardiner and Lott, 2015).

These children are attracted by the curved eye lines on the sides of the eye, their flat arched noses. The length of the body is shorter than the other children. There is a one-handed line in either one or both of the palms (Olmos-Serrano, Kang, Tyler, Silbereis, Cheng, Zhu and Goodliffe, 2016).

At first, because of looseness in the muscles, babies can recover their back with the treatments to be applied, even though they have problems with incontinence, walking and sitting. These physical differences do not cause health problems, but they help to diagnose the disease more easily (Olmos-Serrano, Kang, Tyler, Silbereis, Cheng, Zhu and Goodliffe, 2016).

Children who experience a problem with muscle relaxation by 80% will learn skills such as walking, sitting, holding their head later. Also, learning difficulties can be started to be observed in children with DS after one and half year in terms of language and basic understanding abilities. It is seen that they can reach the ability to establish sentences in 2-3 years. In some cases this can spread over a longer period of time. With special trainings to be earned, it takes more time to acquire these skills for

children diagnosed with DS. Another essential information could be indicated that the intelligence levels of children with this condition differ from each other according to the previous investigations (Olmos-Serrano, Kang, Tyler, Silbereis, Cheng, Zhu and Goodliffe, 2016). Intelligence levels during infancy, although close to other children, will increase later in the day. Through early childhood education that develops intelligence, it may be possible to develop skills and intelligence levels. On this count, they can live a life close to normal people, increasing their quality of life (Olmos-Serrano, Kang, Tyler, Silbereis, Cheng, Zhu and Goodliffe, 2016).

Contrary to the common assumption, new born babies with Down syndrome are not alike. Like other babies, they resemble their parents whose characteristics they have inherited. However, some general features may be the same. When pregnant women deliver a baby with Down syndrome which has not diagnosed during their prenatal follow-up visits, the baby's physical appearance is suspected and genetic analysis is carried out and diagnosed. A newborn baby has many physical attributes that bring Down syndrome into question. However, it must be taken into consideration that almost all of these physical characteristics can be encountered albeit more rarely in normal individuals. Therefore, diagnosis should not be done by looking only at the physical characteristics. Chromosome analysis must be done for diagnosis (Paz, Felipe-Blanco, Royo, Zabala, Guerra-Merino, García-Orad and Parada, 2015).

New born babies with Down syndrome do not seem to be alike. Like other babies, they are similar to their parents, who have inherited characteristics. However, some general features may be the same. When pregnant women bring a baby with Down syndrome to the world who is not diagnosed during their follow-up visits to birth, the baby's physical appearance is suspected and genetic analysis is performed and diagnosed (Paz, Felipe-Blanco, Royo, Zabala, Guerra-Merino, García-Orad and Parada, 2015).

In addition to this information that exploring and mentioning the main symptoms of DS in children could provide better and deeper level of comprehension for readers in order to understand how to detect and diagnose DS in children. Down Syndrome in infants symptoms are followed as;

- "Hypotonia", the scarcity of tense muscles.

- The nose is small, the face structure is flat and flattened.
- It's a scab at the root of his nose.
- "Epicantus" A typical skin fold at the inner margin of the eye.
- Abnormal placement in the ear structure,
- "Simian line" A line dividing the palm of the hand in two.
- "Hyperflexibility" is the opening of the joints as usual.
- The middle finger is not present on the fingernails of the hand.
- Abnormal clearance between the head of the foot and the second finger.
- The tongue is too big compared to your mouth.

As noted earlier, such abnormalities (even at very low rates) can be seen in normal babies. Abnormal conditions are found in 50% of infants with Down syndrome, only in 1-2% of infants with normal genetic structure. Similarly, too much bending of the back of the hand at the hand is seen in 77% of those with Down syndrome and in 28% of normal babies.

### **3.3. Down Syndrome Symptoms in Pregnancy**

There are several methods that are used to diagnose Down syndrome when the baby is in the womb. These methods are prenatal screening tests such as binary test, triple test, quadruple test and nuchal translucency measurement tests. Because these screening tests are more sensitive than ultrasound, these methods are used more frequently and ultrasound is less prominent. Also, it is important to mention that validity and correctness potential of these screening tests are observed in %80 level for babies with Down syndrome. Approximately thirty percent of infants with Down syndrome can be diagnosed with ultrasonography and also, 30% of structural anomalies can be detected with ultrasonography. However, many infants with Down syndrome appear normal with ultrasonography. Therefore, it could be indicated that screening tests have some handicaps and risks to diagnose children with a wrong or in

deficient way. Medical practitioners and families have to gravitate their attention to this situation and would be searching for alternative methods to ensure the diagnoses about their children's health conditions.

No abnormality is detected in the spots that points to down syndrome (Scrivner, Rodriguez, Savitsky, Zwerling, Bullard and Caughey, 2017).

The main methods used to diagnose Down syndrome during pregnancy are prenatal screening tests such as double, triple, quadruple test, nuchal thickness. Also, in the field operations, ultrasonic tests are taken into account as secondary information resources instead of considering them as the main source of information, because they are observed as less sensitive in measurement processes and techniques as compared to screening tests. Screening tests on average can detect up to 80% of babies with down syndrome, but about 30% of babies with DS have structural abnormalities that can be detected by ultrasound. Therefore, most of the infants with Down syndrome appear normal with ultrasonography and do not show any abnormality that can be detected. Major anomalies observed in pregnancy ultrasound in infants with Down syndrome might be followed as;

- Holes may be seen between the heart chambers, especially the ventricular septal defect,
- Mild ventriculomegaly,
- Duodenal atresia,
- Increased nuchal thickness,
- Cystic hygroma,
- Hydrops fetalis.

Increased nuchal translucency ( $\geq 6$  mm) can be detected in approximately 40-50% of infants with Down syndrome between 15-20 weeks of pregnancy. Also, it is known that nuchal translucency is considered as a risk factor for emergence of Down syndrome in infants between 11-14 weeks of the pregnancy process. At 20 weeks can recover this thickness at more weeks and the sensitivity is reduced (Scrivner, Rodriguez, Savitsky, Zwerling, Bullard and Caughey, 2017).

Approximately 40% of infants with Down syndrome have a heart anomaly. Also, there are symptoms called as "soft markers" observed in normal fetuses as well as in infants diagnosed with down syndrome. These are:

- Short humerus (short upper arm bone),
- Short femur (short upper leg bone),
- Echogenic intracardiac focus (brightness of the heart),
- Echogenic bowel,
- Pyelectasis (enlargement in the kidney),
- Hypoplasia of small toe in middle phalangeal bone,
- Separation in footprints (sign of sandal gap),
- Absence of nasal bone (hypoplasia),
- Less ear length,
- Sidewalk angle width.

Soft markers are seen more frequently in Down syndrome fetuses but they might appear in 11-17% of normal fetuses respectively. Especially, the risk of Down syndrome (or aneuploidy) is increased especially when more than one soft marker is monitored. However, the issue of which soft markers should be used is controversial because of overestimation of soft markers with low specificity may cause unnecessary stress in the family and perhaps these wrong and unnecessary interventions might result in loss of normal babies. There are opinions that for this reason, the "major anomalies" mentioned above and the screening tests are kept on the forefront in the case of Down syndrome (Huang, Dennis, Meschino, Rashid, Mak-tam and Cuckle, 2015).

CVS or amniocentesis is recommended for definitive diagnosis when risk is detected in prenatal screening tests such as double, triple, quadruple test.

Amniocentesis is recommended for pregnancies in which prenatal screening tests are normal but risk for ultrasound down syndrome is established. Of course, amniocentesis also has some risks, so the main decision on whether or not to be done is still common.

Approximately 50% of infants with Down syndrome manifest an increase in nuchal thickness between 15 and 20 weeks of pregnancy. The period between the 11th and 14th week are Nuchal thickness can be corrected after the 20<sup>th</sup> week (Bergström, Carr, Petersson, Stephansson, Bonamy, Dahlström and Johansson, 2016).

### **3.4. Types of Down Syndrome**

There are 3 different types of Down syndrome. These; Trisomy 21, Mosaic and Translocation.

Trisomy 21: The majority of individuals with Down syndrome are in this group. In trisomy 21, the chromosome pair 21 has one extra chromosome. It is the first definition and description emerged in the literature for the disease of DS, generated by Lejeune et al in 1959. 21st.chromosome, the chromosomes of group G, exists as on two chromosomes (47 in the female, 47, in XX, 21 + in the male, 47 in the male XY, 21+ (Zemel, Pipan, Stallings, Hall, Schadt, Freedman and Thorpe, 2015).

Mosaic: There are 3 chromosomes in only part of the cells, not all. 8% of individuals with Down syndrome constitute this group. And the research shows that the average intelligence of the individuals in the mosaic group is higher than the others (Zemel, Pipan, Stallings, Hall, Schadt, Freedman and Thorpe, 2015).

This type of Down syndrome was detected in 1961 by Clarke et al. While there are 46 chromosomes in some of the mosaic down syndrome cells, normally 46 ,Though it is a requirement that two chromosomes in the 21st chromosome pair should exist, there are three chromosomes (46, XY i .47, XY, 21+).. The symptoms of mosaic down syndromes are less severe than the other down syndromes (Başaran, 1986).

Translocation: The excess of chromosome 21 is associated with another chromosome, and the disorder of cell arrangement occurs. It is the only type of Down syndrome that might emerge through hereditary pathways. 2% of individuals with genetic disorders are present in this group and are likely to recur in other pregnancies. It was discovered by Polani and his colleagues in 1960 in the case of a girl with Down's

syndrome. One of the three chromosomes on the 21st chromosome is added to one of the chromosome pairs and thus the translocation type Down syndrome occurs. If the excess chromosome in the 21st pair translocates to a double chromosome, G/D type Down syndrome occurs and if the excess chromosome translocates to one of the chromosome pairs in the extra chromosome D group, then G/D type translocation is seen. There will not be an apparent increase in the number of chromosomes here, but there will be a change in the shape of the chromosome and hence in the gene balance. The incidence of translocation type down syndrome does not depend on maternal age (Şaylı and Başaran 1986).

### **3.5. Diseases Emerged in Down Syndrome**

The most common major malformation in children with Down syndrome is congenital heart diseases (CHD). It is known that the incidence of congenital heart disease in Down Syndrome cases is 30-60% and that 4-6% of cases of CHD have Down syndrome, Down syndrome cases with CHD have shorter life spans. The most commonly encountered anomaly is the endocardial cushion defect. Ventricular septum defect (VSD) and atrial septum defect (ASD) are also common anomalies. Tetralogy of Fallot is encountered less frequently. The presence of heart disease is one of the factors determining the life span. It has also been reported that children with Down syndrome born to older mothers develop more CHD than children born to younger mothers (Zemel, Pipan, Stallings, Hall, Schadt, Freedman and Thorpe, 2015).

In addition to this case that the incidence of gastrointestinal system anomalies in Down syndrome cases is 20 times greater than in the healthy population. Gastrointestinal system anomalies are duodenal atresia, aganglionic megacolon, omphalocele, duodenal bands, annular pancreas, ileal and jejunal atresia, anal atresia, malrotation, diaphragmatic hernias, pyloric stenosis and tracheoesophageal fistula, most of which can be corrected surgically. Imperforate anus and Hirschsprung's disease is more common in Down Syndrome cases than in the general population. Common problems without anomalies include chronic constipation, vomiting, abdominal distension, and respiratory tract gastroesophageal reflux disease which may cause symptoms (Zemel, Pipan, Stallings, Hall, Schadt, Freedman and Thorpe, 2015). Gastroesophageal reflux is common in children with Down's syndrome and can be

severe enough to result in the aspiration of stomach contents. This can cause respiratory symptoms such as persistent cough, wheezing, and pneumonia. Celiac disease often occurs in Down's syndrome. According to one study, 7% of Down's syndromes or everyone in 14 individuals with Down's syndrome have celiac disease. Screening for celiac disease is recommended for children with Down syndrome over two years of age (Zemel, Pipan, Stallings, Hall, Schadt, Freedman and Thorpe, 2015).

Additionally, thyroid dysfunction and especially hypothyroidism are common in individuals with Down syndrome and occur in about 17% of cases. Hyperthyroidism is also encountered. Children with Down Syndrome are inclined to be obese. It is known that men are generally infertile, while women have a low fertility rate. Elderly patients with Down syndrome may develop autoimmune thyroid dysfunction in later years. It is recommended that cases with Down Syndrome are checked for thyroid function once per year. Autoimmune diseases such as alopecia areata, vitiligo, gluten enteropathy, diabetes mellitus, juvenile idiopathic arthritis, psoriasis and polyarthritis are more common in Down's syndrome cases and first degree relatives. Children with Down syndrome are more prone to recurrent respiratory and systemic infections. This may be due to deficiencies in some immunoglobulin levels. IgA deficiency can be encountered in individuals with Down's syndrome as well as lack of IgG subcategories (Zemel, Pipan, Stallings, Hall, Schadt, Freedman and Thorpe, 2015).

Moreover, in Down Syndrome, childhood leukemia is 10 to 18 times more common in Down's Syndrome cases compared with the general population. Acute non-lymphoblastic leukemia is encountered in the first year of life and acute lymphoblastic leukemia is encountered 10 times more frequently after the age of 3. The prevalence of transient myeloproliferative syndrome and leukemoid reactions in newborns with Down Syndrome is increased (Gally, Rao, Schmitz, Colvin, Yeager and Perraud, 2018). Acute lymphoblastic leukemia is now a treatable disease and 60 to 70% of children with Down syndrome respond to treatment. Interestingly, children with Down syndrome with acute myeloid leukemia have a higher recovery rate compared to children without Down Syndrome (Gally, Rao, Schmitz, Colvin, Yeager and Perraud, 2018).

In addition; children with Down syndrome usually have problems with vision and ophthalmological problems. Among them, refractive problems such as myopia, hypermetropia and astigmatism are the most common ones. Other common eye diseases include strabismus, nystagmus, congenital cataracts, glaucoma, and keratoconus with the cornea protruding like a cone (Kleschevnikov, Yu, Kim, Lysenko, Zeng, Yu and Mobley, 2017).

In cases with Down syndrome, eye examinations should be performed in the first 6 months of life and annual follow-up is recommended. The underlying cause of many ear, nose and throat problems encountered in children with Down's syndrome is the midline hypoplasia defect. Many children experience recurrent ear infections or persistent middle ear effusion. Hearing loss is very common. Hearing loss may be unilateral, bilateral, sensorineural or mixed. The severity of the loss varies between mild and moderate to severe and profound. Hearing loss can be congenital or acquired and emerging with speech difficulties and deficiencies respectively. A narrow nose and sinus channels make these children susceptible to sinusitis and nasopharyngitis. Obstructive sleep apnea may develop. In terms of improving the quality of life of children with Down syndrome, it is recommended that the hearing function is evaluated once per year control and effective treatment is carried out for infections (Kleschevnikov, Yu, Kim, Lysenko, Zeng, Yu and Mobley, 2017).

Moreover, in Down Syndrome, atlantoaxial subluxation is defined as the increased mobility of the cervical spine at the level of the first and second vertebrae. This may lead to the subluxation of the spinal cord. This is true for about 10% to 30% of individuals with Down syndrome. Other orthopedic conditions encountered in Down syndrome cases include genuvalgus, excessive pronation of the ankle, flat feet and scoliosis.

To further that, in Down Syndrome, the ability to mimic is remarkable with children with Down syndrome. They are happy, fun, loving, extroverted and quite social. According to the theory of multiple intelligences, their social intelligence is higher than the other types of intelligence. They develop friendships very quickly. They connect with new acquaintances rapidly and quickly adapt to new environments. Some individuals may have a tendency to be offensive and aggressive. I

Alzheimer's disease or Alzheimer-like dementia occurs at relatively early ages. These are characterized by memory loss, inadequate learning of new knowledge and decline in intellectual skills (Jenkins, Ye, Marchi, Krinsky-McHale, Zigman, Schupf and Silverman, 2017).

Also, as it is indicated in the literature that epilepsy is one of the major neurological problems observed in DS cases. At early ages, there may be neurological manifestations such as infantile spasms and tonic-clonic seizures manifested with myoclonus and tonic clonic seizures such as partial or complex seizures, focal neurological manifestations, incontinence, EEG changes, tremors, sensory system changes at older ages in DS patients (Jenkins, Ye, Marchi, Krinsky-McHale, Zigman, Schupf and Silverman, 2017).

### **3.5.1. Dental Symptoms in Children with Down Syndrome**

In the case of dental symptoms of DS in children, the first influential point might be observed and considered as the typical face appearance of them. Because, the way that they born with a typical face profile, leads some particular deficiencies and problematic dental issues in their dental health conditions (Regezi, Sciubba and Jordan, 2016).

To explain this case in a deeper way that, in these individuals, the tongue stays out of position due to macroglossia with micrognathia. Malocclusions, defects in tooth mines, short conical roots, eruption of teeth and congenital tooth defects and deformities in teeth are other commonly observed intra-oral findings (Regezi, Sciubba and Jordan, 2016). Due to some genetic conditions or past high fevers, children with disabilities may be affected in terms of dental enamels , they become more susceptible to tooth decay. Also, degenerative oral motor function and weakened muscles seen in highly mentally disabled individuals, cause chewing problems and affect swallowing.

These patients are often fed with mashed, semi-solid foods. In addition, people who need someone else's help to drink something cannot take full advantage of the liquids' cleaning effect because they consume less fluid than normal individuals. Muscle coordination disorder also results in bruxism and speech impairment. The saliva flow is due to excessive swallowing disorder rather than excessive excretion of

saliva. Other causes include inadequate lip closure, malocclusion, dysmotility and stabilization of the cheek muscles. Respiratory problems, sleep apnea and snoring can also be seen. Vital emergencies may arise as a result of food aspiration of the airways due to the weakness of the pharyngeal reflex (Regezi, Sciubba and Jordan, 2016).

Additionally, mentally disabled individuals are often fed with a cryogenic and soft diet. Individuals who are forced to take medication in the form of continuous syrup are at increased risk of tooth decay due to the sugar contained in the syrups. (Asci et al., 2003) showed that tooth erosion and mean DMFT values in mentally retarded individuals aged between 4-18 years are considerably higher than healthy individuals.

Further to that, regulation of muscle coordination, allergic conditions or medicines given for sedative purposes reduces the saliva flow. Mental retardation may not be sufficient for oral hygiene procedures, such as tooth brushing, which require manual skill, due to cognitive deficits in individuals and impaired motor function at various grades. Therefore, in patients with poor oral hygiene, retention of food between teeth, intense dental plaques are common. In general, gynaecological diseases are more common in the mentally retarded patients than in the normal population (Regezi, Sciubba and Jordan, 2016).

Also, oral health of children with Down syndrome, cerebral palsy, autistic disorder, and continuing mental deficiency attending to private schools were compared. While DMFT levels were found to be at the similar levels in all the disabled people, oral hygiene at autistic children was found at best level and it was determined as the lowest level for the children with mental retardation. It has been reported that 225 mental handicaps in the age range of 12-30 years in India have a general poor oral health, and a decaying, periodontal diseases increase with the age. Having Down syndrome, having low education level parents and low IQ were recorded as the most important variables in poor oral hygiene (Regezi, Sciubba and Jordan, 2016).

Interestingly, however, gingivitis was more common in Down syndrome, with the incidence of caries being similar or even lower (Stagni, Giacomini, Guidi, Ciani and Bartesaghi, 2015). It has been suggested that IgA, which is higher in children with Down syndrome than in normal children, increases the resistance of individuals In this group to tooth decay. Davis and Anders (2010), who examined 27 studies on oral

health of mentally retarded adults, found that oral hygiene was worse in mentally retarded individuals when compared to the normal population in the literature review and concluded that the prevalence and extent of periodontal disease was higher. It could be also indicated that caries rates were found to be lower or similar in the healthy population as compared to unhealthy and handicapped population and more importantly, untreated caries rates are at higher levels as compared to unhealthy and handicapped population (Davis and Anders, 2010).

In addition, these patients may also develop gingival hyperplasia due to drugs (such as phenytoin used for epilepsy treatment). Forsberg et. al (1985) found gingival hyperplasia in 21% of people with severe mental retardation. Van Grunsven and Koelen (1990) reported that mouth odour, outflow of saliva, and orofacial malfunctions are the most serious problems in children with disabilities and that dentists and hygienists avoid treatment of children with disabilities due to insufficient knowledge and education. Compared to the healthy population, higher incidence of dental incontinence are observed in the mentally handicapped patients according to the literature information.

As a result, patients with DS are at early age phases might suffer from partial toothlessness and need to use prosthesis in long term oriented processes. Moreover, prosthesis use is also problematic due to occlusion and bruxism in a majority of patients. As it is also observed in Lesch-Nyhan syndrome, some mentally handicapped patients tend to compulsively harm themselves. Patients constantly bite the lip, tongue and mouth mucosa. Thus, it could be inferred that the oral protectors can be used to prevent patients' harming themselves, but tooth extraction is often required for those who have such behavioural patterns Stagni, Giacomini, Guidi, Ciani and Bartesaghi, 2015).

### **3.5.2. The Rules That Must Be Considered in The Development of Oral Health of Mentally Handicapped Individuals**

The main causes of more frequent oral and dental health problems in disabled people are; mouth-tooth structure, physical barriers, special diets and medications.

#### **3.5.2.1. Assessment of the patient**

First of all, a very good anamnesis must be taken. Anamnesis should include complaints, complaint story, medical story, system review, family and social story, and dental story. Laboratory tests should be carried out where necessary. Taking necessary precautions before making any intervention may be needed for the patients with mental disabilities connected with syndromes. For example, approximately half of the Down syndrome cases have congenital heart disease, especially atrioventricular septal defect. In Fragile X syndrome, the incidence of cardiac anomaly is high. The need for antibiotic prophylaxis should be considered as a protective factor and barrier for bleeding in order to prevent the possibility of developing bacterial endocarditis in this patient group (Stagni, Giacomini, Guidi, Ciani and Bartesaghi, 2015). If necessary, the patient's physician is consulted regarding the general health status of the patient, sedation and general anaesthesia compliance. Potential complications that may arise during and after the operation are taken into consideration with the benefits of the planned intervention. A good evaluation is made and the most appropriate treatment method is decided for the patient.

Approximately one-third of cases with cerebral palsy have learning disabilities or mental disabilities. However, 60-70% of them are affected by oromuscular structure, and consequently they have speaking problems and related communication problems. Such patients should not be confused with mental disability and also, informed consent forms must be obtained from all patients (or the patient's custodians) prior to dental treatment. (Moynihan, Makino, Petersen and Ogawa, 2018).

#### **3.5.2.2. Establishing the patients**

Patients with cerebral palsy have neurological symptoms such as involuntary spastic movements in the head, hands and legs. Uncontrolled movements may cause aspiration or ingestion of fluids, small tools or materials. These patients should be

placed in an upright position or backward inclined position with a maximum angle of 45 degrees. When children with spastic-type cerebral palsy are stimulated, hyperirritability of muscles that result in excessive contractions and restricted control of neck muscles make it difficult to work. If the head of these patients is suddenly turned to one side, the arm and leg on that side extend in the direction of the face and solidify. Resistance, disobedience, and aggressive behaviour may be seen in some patients. These behaviours may prevent a safe dental care. Movements can be controlled by fixing the patient so that the treatment can be applied more comfortably in patients whose head, arms and legs are over-moving, displaying sudden movements or aggressive behaviours. The physical fixation of the patient may be in the form of holding the arms, legs and head by an assistant, as well as by the bands or belts through obtaining approval. In addition, apparatus enabling the mouth to remain at an open position and biting blocks can be used to keep the mouth open (Moynihan, Makino, Petersen and Ogawa, 2018).

### **3.5.2.3. Behaviour control and communication with the patients**

First of all, the degree of the mental function of the patient must be assessed. Depending on the degree of IQ, the cooperative status of the patients may change. For those who have mild to moderate mental retardation, procedures can be performed under local anaesthesia. For example, individuals with Down syndrome who have mildly mental retardation are mostly calm, cheerful and willing to communicate. There is not much problem in patient compliance in dental treatment. In addition, additional sensory impairments such as visual and hearing impairments affect the communication of the mentally retarded individuals. A loving and patient approach should be demonstrated in communication with the patients. It may be helpful to familiarize the patients with the clinical setting at the first appointments.

The patient should be encouraged to trust. The narrative - show and apply method can be applied to the patients. What is to be done is explained to the patient, dental instruments that cause anxiety are introduced, and then practicing is applied. In a study conducted at the Trakya University Research and Practice Centre for Mentally and Physically Handicapped Children, it was established that informing 20 mentally handicapped children about dental procedures positively affected children's reaction

to dental examinations and procedures (Moynihan, Makino, Petersen and Ogawa, 2018). It is also important to keep the sessions short.

Procedures that the patient responds to suddenly should be avoided, and no pain alert should be generated during the procedure. Positive orientation, distraction with television or music can be applied. Mentally handicapped patients have a strong perception. In these patients, a brief and simple explanation should be made and the instructions given should be repeated. The patient must be motivated in the positive direction. If they allow a process to be done in their mouths, a reward they will receive may motivate them. In cases where direct communication with the patient is difficult, the patient's relatives and caregiver should be present with the patient in terms of information. Sedation should be considered firstly in patients who are incompatible and unable to cooperate. Compared with general anaesthesia, sedation causes less physical and psychological stress in the patient. Oral examination and simple dental procedures in severe mental disabilities and for those with mild to moderate intellectual disabilities sedation can be successfully applied in many dental treatments.

In conscious sedation, the patient may be able to provide the airway opening itself, the laryngeal and swallowing reflexes are in place and may obey oral instructions. Conscious sedation can be achieved by oral, iv, rectal and inhalation. Generally benzodiazepine group of drugs (for example, diazepam or midazolam) are preferred for oral or iv administration. Apart from some faculties in our country, sedation by inhalation with nitrogen oxide / oxygen, which is widely used in medical institutions in developed countries, is also very usefully. While the dentist takes responsibility for sedation for ASA class I (healthy) and ASA class II (patient with mild systemic diseases), for those within class III (patients with severe systemic diseases limiting activity ) and class IV (patient with systemic disease with vital risk), after consultation with the patient's physician it is decided what to be done (Gunilla Klingberg, the Handicapped and Oral Care). In patients with severe mental disabilities (such as those with phenylketonuria or cri-du-chat syndrome) who are unable to cope with dental treatment at all, the need for intervention under general anaesthesia is a considered. General anaesthesia also makes it possible to perform different treatments (such as preservative resin restorations, tooth extraction, endodontic treatment, and construction of stainless steel crowns) at single application. In cases where the

procedure is to be performed under general anaesthesia, the patients are examined preoperatively by the anaesthesiologist for systemic health in terms of general anaesthesia compliance and the necessary tests are performed (Moynihan, Makino, Petersen and Ogawa, 2018).

The circumstances under which the procedure is performed in the evaluation of the disabled patient is also taken into account. At this stage it is the general anaesthesiologist's responsibility to decide on the circumstances under which the procedure of obtaining all consultations of the patient and examining all related systems can be performed. The safe operation of general anaesthesia in patients with complex medical problems requires a full-fledged hospital and an experienced anaesthesiologist. However, many intellectual disability patients can be intervened in general anaesthesia units, which serve daily patient care in dental hospitals. Thus, the patient and the relative / caregiver experience less troubles and the related operations proceed with simple procedures. In this group of patients, a good examination and evaluation should be made and their suitability for operation for general anaesthesia under daily conditions should be decided (Moynihan, Makino, Petersen and Ogawa, 2018).

During general anaesthesia, the dental team concentrates on dental treatments while the anaesthesia team causes the patient's vital findings to continue. It has been reported that the most common problem within the postoperative 24 hours is agitation and pain in mentally retarded patients under general anaesthesia. Ensuring oral hygiene and sustaining of oral health in patients with disabilities, oral hygiene is worse when compared to the general population.

The first step in providing oral hygiene is to train the patient. These patients have abstract concepts. For this reason, patients should be encouraged to brush their teeth by showing them in concrete terms and pictures why dental care is necessary. A large proportion of mentally handicapped patients attach great importance to how they appear. Therefore, having beautiful teeth can be used as a slogan. In most of the mentally disabled patients, muscle coordination weakness and decreased sensory-motor activity of the tongue lead to saliva's flowing out-of- mouth. In such cases, the use of appliances such as Castillo Morales or Dr. Heinz appliances can increase the

swallowing reflex and thus it reduces the flow of saliva out of the mouth. These patients also need to practice frequently to be successful in complex movements based on coordination. In this sense, the patient should be taught the technique of tooth brushing. If the muscle function is weakened and the hands can not be used effectively, additional devices may be needed to help handle toothbrush. Automatic toothbrushes operated with battery for people who do not have the skill of hand are quite useful. In children with mild mental retardation, electrical toothbrushes that flicker during removal of the dental plaque were found to be more effective than manual brushes (Moynihan, Makino, Petersen and Ogawa, 2018). It is generally intended that the patient independently sustains his/her oral health. However, disabled people are dependent on someone to some degree or completely. At a more advanced level, mentally retarded people often need help in oral care. Severely handicapped patients may experience problems even in protective procedures such as mouth washing. If the patient is unable to provide oral hygiene, the person responsible for the care of the patient or his / her family members should be able to apply oral hygiene. With the help of someone else, it was found that the periodontal health of those who brush their teeth every day is better than those who try to brush themselves.

Heavy mental disabilities living in nursing homes are reported to have a higher oral hygiene index score, and lower incidence of tooth decay than those not living in nursing homes. This shows the need for assistant staff in patients who are severely mentally retarded and who are dependent on someone else for self-care. Within the Scandinavian countries, many nursing homes have been closed down and the mental retardation has been integrated in collecting individuals within the scope of the integration policy of individuals with mental disabilities (Gabre, 2000).

Investigated the effect of increased degrees of independence on oral health in mentally retarded adult subjects receiving regular preventive oral and dental care for a period of 8.5 years (22). Compared with nursing homes, Gabre (2000) found that the less restrictive living environment and milder stress are associated with higher caries rates. When all the retarded individuals having regular dental care were compared to the normal Swedish population, it was established that they have satisfactory oral health. In this respect, training of family members and those responsible for patient care is important in controlling oral health. The people who take care of these patients

should be trained in oral hygiene, health, teeth brushing and diet. In a survey study, the caregivers working in nursing homes, where mentally retarded people reside, said that they believed that oral hygiene was important, but also stated that due to the time constraints and the limited number of staff members, they were not as much helpful as possible for the oral care of the disabled in the nursing home. They also noted that in oral care individuals with mental disabilities encounter difficulties such as biting toothbrushes, refusing care, and not opening mouths (Moynihan, Makino, Petersen and Ogawa, 2018). It seems that the staff working in the nursing homes needs training programs on oral hygiene.

In a study conducted by Lange et al. (2000), the staff responsible for patient care was trained on oral hygiene and tooth brushing techniques, and also provided feedback on dental plaque scores of handicapped people with regular visits to a dental hygienist. Within this context it was observed that dental plaque index in the trained group with the feedback was much better than both the control group and the non-feedback caregivers group. It was reported that oral hygiene is also poor in families with low socioeconomic status and educational level. Particular attention should be paid to the education of these families and their awareness in terms of oral health. Oral health checks should be done regularly in patients with mental disabilities. The necessary hygiene procedures should be followed and they should focus on preventive approaches. Protective treatment options such as fissure protector and fluoridation should be applied as early as possible. In patients with gingival hyperplasia, the gums are reshaped by gingivectomy. This procedure can be done conventionally with a bisturi or laser and electro surgery. In the case of repetition of gingival hyperplasia after gingivectomy or advanced hyperplasia the drugs with less effect on the gum by communicating with the patient's dentist may be preferred. In this group, conservative and endodontic treatment should be preferred to tooth extraction for dental continuity. If cooperation with the patient is possible, endodontic therapy can be performed and if possible it should be terminated at single application. If patient co-operation is not good, whose teeth have been highly harmed, the stainless steel crowns may be preferred to other restorations. In the prosthetic rehabilitation of patients with partial or full tooth, the construction of fixed or overdenture prostheses with a dental implant can be considered.

There are also studies reporting successful outcomes of implant applications in patients with mild to moderate mental retardation. In the case of repetition of gingival hyperplasia after gingivectomy or advanced hyperplasia the drugs with less effect on the gum by communicating with the patient's dentist may be preferred. In this group, conservative and endodontic treatment should be preferred to tooth extraction for dental continuity. If cooperation with the patient is possible, endodontic therapy can be performed and if possible it should be terminated at single application. If patient co-operation is not good, whose teeth have been highly harmed, the stainless steel crowns may be preferred to other restorations. In the prosthetic rehabilitation of patients with partial or full tooth, the construction of fixed or overdenture prostheses with a dental implant can be considered. There are studies reporting successful outcomes of implant applications in patients with mild to moderate mental retardation (Moynihan, Makino, Petersen and Ogawa, 2018).

## **4. MATERIAL AND METHODS**

This project was approved by the Ethics Committee of Marmara University in Istanbul in 2017. Written informed consent for participation and publication was obtained from adult responsible for each DS individual participated in this study. The study included a convenience sample of all DS individuals attending “Marmara University Hospital”, located in Istanbul during summer of 2017. The age of sample ranged from 2 to 18. The institution and parents confirmed DS diagnosis of each children simultaneously. Therefore, conducted analyses to understand oral health levels of children with DS were applied from June to September in 2017 and surveys which were distributed to families of the children with DS were given in June in 2017; both of the applications were proceed in Pedodontics Department of Marmara University Hospital.

### **4.1. Materials**

#### **4.1.1. Sampling**

66 children with DS; 46,97% female and 53,03% male aged 2-18 years; participated the study. All children are officially diagnosed with DS and are students of “Marmara University Hospital”.

In the case of inclusion criteria for the sample of this study; age, diagnosis and voluntariness condition of families. To explain these criteria; age of the children who were recruited into the study had to be ranged between 2 to 18 due to being in a children status officially. Also, they had to be chosen from the ones who had diagnosed with Down Syndrome for the condition of diagnosis criteria. Lastly, families of children with DS had to be volunteer in involving to the study for the concept of other criteria.

Additionally, in the situation of exclusion criteria, having a different neurological disease except Down Syndrome or being diagnosed with any different mental illness, suffering from a heavy systemic disorder, being an adopted child, living without parents and being under the control of any medication treatment which could affect the results.

All children were living with their parents and were not on any medication and supplementation therapy during the study. Written informed consent was obtained from all parents.

## **4.2. Methods**

### **4.2.1. Data Collection**

The survey contains questions which are related to dental background of children and socio-economic status of parents. Questions concerning dental background such as frequency of brushing teeth, frequency of medical examination the type of hospital or clinic chosen for examination also give information about parents' awareness of dental health.

Socio-economic status of families is analysed through educational and income level which is measured by questions concerning monthly household income and the school parents graduated from.

Furthermore, in the survey, the questions between 44 and 51 were asking the demographic information from the families; including education and income levels. The items between 32 and 43 were including the questions for measuring and evaluating the stress levels of families. The items between 1 and 31 were determining the awareness levels of families of children with DS.

The data was processed in order to categorize families within three different groups; awareness, education and income levels of them. In each group, they were separated into three different levels as low, middle and high.

### **4.2.2. Oral Health and Caries Analyses**

The dentition and number of caries are analyzed through DMFT and dft indexes which determines the total number of teeth that are decayed (D), missing (M), filled (F). The dft index is applied for primary dentition and excludes missing primary teeth. The DMFT and dft indexes are calculated by dentist in the examination and filled in a paper describing.

The DMF index used today has been defined by Klein and Palmer in 1938. This criterion defines D (decayed) indicating decayed teeth, M (missing) stands for missing teeth and F (filled) depicts teeth with fillings in permanent teeth. The dental health level of society, treatment requirements, utilization of services, priorities in planning the services are determined by using this criterion. In practice, DMF indexes are used for permanent teeth. The indexes in the same context used for primary teeth are expressed in lower case letters as dft . The DMF Index is called the DMF-T index when calculated only for teeth. In this case only decayed, extracted or filled teeth are included in the index calculations.

When the DMF Index is used to calculate tooth surface instead of teeth, it is taken as the DMF-S index. In this case the current decays and fillings on the external surface of each tooth and extracted teeth are included in the calculations. The formulas used for the calculation of DMF indexes are presented below:

- DMFT INDEX= number of decayed teeth + filled teeth + extracted teeth determined among the permanent teeth of the patient / Number of examined patients
- DMFS INDEX = number of decayed teeth + filled teeth + missing surfaces determined among the permanent teeth of the patient / Number of examined patients
- dmft INDEX= number of decayed teeth + filled teeth + extracted teeth determined among the primary teeth of the patient / Number of examined patients
- dmfs INDEX = number of decayed teeth + filled teeth + missing surfaces determined among the primary teeth of the patient /Number of examined patients

In the relevant source (Sümbüloğlu) the dft and dfs have been calculated without including the dmft and dmfs indexes into the missing (missing) factor formula, in

current studies since losses (m) in primary teeth are included in the index and calculated, the relevant formulas above have been displayed to include the loss (m) factor. The main advantage of this index is its simplicity and adaptability to special circumstances. Therefore, it is an assessment method which has been accepted for many years. The method depends on the correct presentation of the DMF factors depending on age. However, some factors such as the fact that MF factors indicate past events (fillings and losses) and the fact that composite fillings can not be detected easily are mentioned as factors which reduce the benefit of this index.

Statistical analyses have been assessed via NCSS Statistical Software and IBM SPSS 25. In this study, Spearman and Kendall's Tau correlation tests were employed to see if a correlation existed in between variables such as dft, DMFT, awareness of parents, educational level of parents, and their income level.

In the study certain categorical variables such as gender, frequency of dental brushing, awareness of parents, frequency of oral checkup, having a dental treatment, stress during the treatment, having anesthesia during treatment, the type/place of treatment institution were contrasted with income and education level. Chi square analysis was employed in these comparisons.

Mann-Whitney U test was used between groups of income level and educational level by utilizing mean data of age, DMFT and dft. Gender, educational level of parents, income level, frequency of dental brushing, awareness of parents, frequency of oral checkup, having some dental treatment, stress during the treatment, having anesthesia during treatment, treatment institution were compared among primary, permanent and mix groups. Chi square analysis was employed in these comparisons.

Significant findings were analyzed via Spearman's Correlation coefficient. Mean age was compared among primary, permanent and mix groups. Distribution of data with respect to groups was analyzed via Kolmogorov Smirnov Test. Since variables deviated from normal distribution with respect to groups, Kruskal-Wallis test was harnessed to measure distribution of age variable with respect to groups. To identify the original groups that caused these differences, Mann-Whitney U test was employed to analyze the groups as pairs. Between groups of educational level;

categories such as frequency of dental brushing, awareness of parents, frequency of oral checkup, having a medical treatment and experiencing stress during the treatment were analyzed via Chi square test.



## 5. RESULTS

In the study certain categorical variables such as gender, frequency of dental brushing, awareness of parents, frequency of oral checkup, having a dental treatment, stress during the treatment, having anesthesia during treatment, the type of treatment institution were compared in between income level and education level.

Ratio of categories analyzed between income groups and chi-square significance values are as listed below.

**Table2: Frequency Rates and Evidences of Categoriic Variables**

		n (%)		p
		Low Income	High Income	
Gender	Female	14(42,4%)	17(51,5%)	0,459
	Male	19(57,6%)	16(48,5%)	
Frequency of brushing teeth	too young	2(6,1%)	1(3,0%)	0,004*
	once a week max	9(27,3%)	3(9,1%)	
	at least once a week	9(27,3)	15(45,5%)	
	once a day	13(39,4%)	6(18,2%)	
	twice a day	0(0,0%)	8(24,2%)	
Awareness of parents	unhealthy	11(33,3%)	8(24,2%)	0,701
	neither healthy nor unhealthy	9(27,3%)	11(33,3%)	
	Healthy	13(39,4%)	14(42,4%)	
Frequency of medical examination	Never	12(36,4%)	9(28,1%)	0,259
	1 year+	10(30,3%)	6(18,8%)	
	6 months ago	11(33,3%)	17(53,1%)	
Dental treatment	No	8(38,1%)	5(21,7%)	0,235
	Yes	13(61,9%)	18(78,3%)	
Stressful Patient	No	4(36,4%)	8(47,1%)	0,576
	Yes	7(63,6%)	9(52,9%)	

Anaesthetized during treatment	No	8 (53,3%)	5(41,7%)	0,712
	Local	4(26,7%)	5(41,7%)	
	General	3(20,0%)	2(16,7%)	
Place of dental treatment	Private	5 (23,8%)	5(21,7%)	0,553
	Public	15(71,4%)	18(78,3%)	
	Dental Clinic	1(4,8%)	0(0,0%)	

A statistically significant difference was detected with respect to brushing between different income groups. ( $p < 0.05$ ) 87.9% of high income level group brushed their teeth minimum 1 time in a day or in a week, while the same ratio lowered to 66.7% among low income level group. In high-income level group, frequency of brushing is significantly high.

Between income groups there was not a statistically significant difference ( $p > 0.05$ ) with respect to categories such as gender, awareness of parents, frequency of oral checkup, having a dental treatment, stress during the treatment, having anesthesia during treatment or type and place of treatment institution.

Ratio of categories compared with respect to educational levels is as below.

**Table3: Frequency Rates and Evidences of Categorical Variables**

		n (%)		p
		Low Education	High Education	
Gender	Female	11(33,3%)	20(60,6%)	0,026*
	Male	22(66,7%)	13(39,4%)	
Frequency of brushing teeth	too young	2(6,1%)	1(3,0%)	0,606
	once a week max	7(21,2%)	5(15,2%)	

	at least once a week	12(36,4%)	12(36,4%)	
	once a day	10(30,3%)	9(27,3%)	
	twice a day	2(6,1%)	6(18,2%)	
Awareness of parents	unhealthy	10(30,3%)	9(27,3%)	0,956
	neither healthy nor unhealthy	10(30,3%)	10(30,3%)	
	Healthy	13(39,4%)	14(42,4%)	
Frequency of medical examination	Never	12(37,5%)	9(27,3%)	0,008*
	1 year+	12(37,5%)	4(12,1%)	
	6 months ago	8(25,0%)	20(60,6%)	
Dental treatment	No	8(40,0%)	5(20,8%)	0,165
	Yes	12(60,0%)	19(79,2%)	
Stressful Patient	No	5(45,5%)	7(41,2%)	0,235
	Yes	6(54,5%)	10(58,8%)	
Anaesthetized during treatment	No	8(45,5%)	5(41,2%)	0,712
	Local	5(54,5%)	4(58,8%)	
	General	2(13,3%)	3(25,0%)	
Place of dental treatment	Private	5(25,0%)	5(20,8%)	0,495
	Public	14(70,0%)	19(79,2%)	
	Dental Clinic	1(5,0%)	0 (0,0%)	

In the comparisons it was identified that between genders there was a significant difference in terms of education. ( $p < 0.05$ ) Accordingly in families with high education level the ratio of girls is above boys. Likewise in low-educational families the ratio of boy kids is above the ratio of other group. With respect to oral checkup a significant difference was measured between groups of different educational levels. In the group with higher education level measured frequency was above the other group. ( $p < 0.05$ ) In the group with higher education degree, the percentile of participants examined 6 months ago was 71.4% but in low educational level group the

ratio equated to only 28.6%. Between education-level groups, there was not a statistically significant difference ( $p>0.05$ ) with respect to categories such as awareness of parents, frequency of brushing, having a dental treatment, stress during the treatment, having anesthesia during treatment or place of treatment institution.

In the comparison of mean age, DMFT and dft scores between income and education levels there was a significant difference for the mean age only in education level groups ( $p<0.05$ ). Mean age ( $7.15\pm 3.92$ ) of children of high educational families was lower than the ratio of low educational level group ( $9.63 \pm 4.63$ ). Mean DMFT ratio was  $3.18\pm 2.12$  in low educational groups and  $2.43\pm 2.50$  in high educational families whereas mean dft was measured to be  $2.48\pm 3.02$  in low educational families and  $2.83\pm 2.94$  in high education families. In low income families mean age was  $8.60\pm 4.47$  but in high income families mean age was  $8.18\pm 4.46$ . Mean DMFT value was  $2.88\pm 1.96$  in low income families but  $2.85\pm 2.41$  in high income families. Mean dft value was  $3.18\pm 3.36$  in low income families but  $2.20\pm 2.48$  high income families.

Between education groups, not any significant difference was detected for the other DMFT and dft. Between income level groups, variables such as age, DMFT and dft caused not any significant difference ( $p>0.05$ ). Among the 3 groups of group variable, distribution ways of the other categories and chi square significance values are as displayed in the table.

**Table4: Frequency Rates and Evidences of Categorical Variables**

		n (%)			p
		Primary	Permanent	Mix	
Gender	Female	14(50,0%)	2(20,0%)	15(53,6%)	0,173
	Male	14(50,0%)	8(80,0%)	13(46,4%)	
Educational level of parents	Primary	10(35,7%)	8(80,0%)	9(32,1%)	0,119
	Middle	1(3,6%)	0(0,0%)	4(14,3%)	
	High	10(35,7%)	1(10,0%)	10(35,7%)	
	University And Higher	7(25,0%)	1(10,0%)	5(17,9%)	
Income	<3000	15(53,6%)	6(60,0%)	12(42,9%)	0,590

		3000-5000	5(17,9%)	3(30,0%)	9(32,1%)	
		>=5000	8(28,6%)	1(10,0%)	7(25,0%)	
Frequency of brushing teeth		too young	3(10,7%)	0(0,0%)	0(0,0%)	0,581
		once a week max	6(21,4%)	1(10,0%)	5(17,9%)	
		at least once a week	10(35,7%)	4(40,0%)	10(35,7%)	
		once a day	7(25,0%)	4(40,0%)	8(28,6%)	
		twice a day	2(7,1%)	1(10,0%)	5(17,9%)	
	Awareness of parents		unhealthy	5(17,9%)	4(40,0%)	10(35,7%)
		neither healthy nor unhealthy	5(17,9%)	4(40,0%)	11(39,3%)	
		Healthy	18(64,3%)	2(20,0%)	7(25,0%)	
Frequency of medical examination		Never	16(57,1%)	3(30,0%)	2(7,4%)	0,002*
		1 year+	3(10,7%)	4(40,0%)	9(33,3%)	
		6 months ago	9(32,1%)	3(30,0%)	16(59,3%)	
Dental treatment		No	3(25,0%)	0(0,0%)	10(40,0%)	0,113
		Yes	9(75,0%)	7(100,0%)	15(60,0%)	
Stressful Patient		No	4(50,0%)	4(57,1%)	4(30,8%)	0,466
		Yes	4(50,0%)	3(42,9%)	9(69,2%)	
Anaesthetized during treatment		No	3(75,0%)	0(0,0%)	10(50,0%)	0,087
		Local	0(0,0%)	3(100,0%)	6(30,0%)	
		General	1(25,0%)	0(0,0%)	4(20,0%)	
Place of dental treatment		Private	4(33,3%)	1(14,3%)	5(20,0%)	0,758
		Public	8(66,7%)	6(85,7%)	19(76,0%)	
		Dental Clinic	0(0,0%)	0(0,0%)	1(4,0%)	

Among primary, permanent and mix groups a significant difference was measured with respect to awareness of parents. ( $p < 0.05$ ) Accordingly it was identified

a statistically significant low-level relationship in a negative direction. (-0.32) As the group moves from primary to the mix level awareness of parents partially decreases. Awareness ratio of primary group is 64.3%, the ratio is 20% in permanent group and in mix group it equates to 25.0%.

Among primary, permanent and mix groups a significant difference was measured with respect to frequency of examination (checkup). ( $p < 0.05$ ) Accordingly it was identified a statistically significant low level relationship in a positive direction (0.39) As the group moves from primary to the mix level, frequency of examination (checkup) also enhances. In primary group the ratio of those never have been examined before is 57.1 % but in mix group this ratio is just 7.4%. In primary group the ratio of those being examined in the recent 6 months is 32.1% whereas in mix group it equates to 59.3%. Among primary, permanent and mix groups there was not a statistically significant difference ( $p > 0.05$ .) with respect to categories such as gender, educational level of the family, frequency of brushing, having a dental treatment, stress during the treatment, having anesthesia during treatment or place of treatment.

**Table5: Frequency Rates and Evidences of Categorical Variables**

		N	Mean	Std. Deviation	p
Gender	Primary	28	4,8571	2,92	0,000*
	permanent	10	15,70	2,21	
	Mix	28	9,32	1,90	

Table: Kruskal Wallis Test

Mean age was compared among primary, permanent and mix groups and test results provided a statistically significant difference between groups ( $p < 0.05$ ). All of the pair comparisons conducted to identify the origin of differences among all the groups proved to be statistically significant ( $p < 0.05$ .) In a different saying mean age of 3 groups are all different (respectively 4.8, 15.7 and 9.3). Highest mean age belonged to permanent group but lowest mean age belonged to primary group. With respect to gender groups, distribution ways of the other categories and chi square significance values are as displayed in the table.

**Table6: Frequency Rates and Evidences of Categorical Variables**

		n (%)		P
		female	male	
Frequency of brushing teeth	too young	0(0,00%)	3(8,57%)	0,30
	once a week max	4(12,90%)	8(22,86%)	
	at least once a week	13(41,94%)	11(31,43%)	
	once a day	9(29,03%)	10(28,57%)	
	twice a day	5(16,13%)	3(8,57%)	
Awareness of parents	Unhealthy	12 (38,71%)	7 (20,00%)	0,20
	neither healthy nor unhealthy	7 (22,58%)	13 (37,14%)	
	Healthy	12 (38,71%)	15 (42,86%)	
Frequency of medical examination	Never	8(25,81%)	3(38,24%)	0,18
	1 year+	6(19,35%)	10(29,41%)	
	6 months ago	17(54,84%)	11(32,35%)	
Dental treatment	No	8(34,78%)	5(23,81%)	0,42
	Yes	15(65,22%)	16(76,19%)	
Stressful Patient	No	3(23,08%)	9 (60,00%)	0,11
	Yes	10(76,92%)	6(40,00%)	

Between gender groups not any statistically significant difference was measured with respect to categories of frequency of brushing, awareness of parents, frequency of examination, having received a medical treatment and having experienced treatment stress. ( $p>0.05$ ). With respect to awareness of parents groups, distribution ways of the other categories and chi square significance values are as displayed in the table.

**Table7: Frequency Rates and Evidences of Categorical Variables**

		n (%)			p
		Unhealthy	neither healthy nor unhealthy	healthy	
Educational level of parents	Primary	10(52,63%)	7(35,00%)	10(37,04%)	0,57
	Middle	0(0,00%)	3(15,00%)	2(7,41%)	
	High	6(31,58%)	5(25,00%)	10(37,04%)	
	University And Higher	3(15,79%)	5(25,00%)	5(18,52%)	
Income	<3000	11(57,89%)	9(45,00%)	13(48,15%)	0,82
	3000-5000	5(26,32%)	6(30,00%)	6(22,22%)	
	>=5000	3(15,79%)	5(25,00%)	8(29,63%)	
Frequency of brushing teeth	too young	0(0,00%)	2(10,00%)	1(3,70%)	0,49
	once a week max	5(26,32%)	4(20,00%)	3(11,11%)	
	at least once a week	8(42,11%)	5(25,00%)	11(40,74%)	
	once a day	4(21,05%)	5(25,00%)	10(37,04%)	
	twice a day	2(10,53%)	4(20,00%)	2(7,41%)	
Frequency of medical examination	Never	4(21,05%)	3(15,00%)	14(53,85%)	0,01*
	1 year+	8(42,11%)	6(30,00%)	16(7,69%)	
	6 months ago	7(36,84%)	11(55,00%)	28(38,46%)	
Dental treatment	No	4(26,67%)	3(17,65%)	6(50,00%)	0,16
	Yes	11(73,33%)	14(82,35%)	6(50,00%)	
Stressful Patient	No	1(10,00%)	7(53,85%)	4(80,00%)	0,01*
	Yes	9(90,00%)	6(46,15%)	1(20,00%)	

Among the 3 groups exemplifying awareness of parents, a statistically significant difference was observed with respect to experiencing treatment stress ( $p < 0.05$ ). Accordingly, as the awareness level rises, the ratio of stressful patients decreases; hence there is a negative correlation between two variables. In unhealthy group those responding "yes" to stress-asking question was 90%, in "neither healthy nor unhealthy" group the response equated to 46,15%, in healthy group it was measured to be 20,00%.

As regards awareness of parents, there was a statistically significant difference among 3 groups with respect to the frequency of medical examination ( $p < 0.05$ .) Accordingly, as awareness of the parents increases frequency of examination tends to rise which then goes downward. In unhealthy group the ratio of those having never had a dental examination is 21.5%, in "neither healthy nor unhealthy" group the ratio is 15.00%, in healthy group the ratio rises to 53.85%. The ratio of those having had an oral checkup for the last 6 months is 36.84% in unhealthy group, the ratio is 55.0% in "neither healthy nor unhealthy" group and it is measured to be 38.46% in healthy group.

As regards awareness of family, not any statistically significant difference was measured among 3 groups in categories of frequency of teeth brushing, experiencing medical treatment, income level and educational level ( $p > 0.05$ .)

Also, as it is found out that there were 31 female (%41.97) and 35 male (%53.03) participants recruited into study. In the view of the demographic data, the education level of parents of participants were observed that 27 of them (%40.91) has primary education level, 5 of them (%7.58) has middle level of education background, 21 of them (%31.82) has high level of education background and 13 of them (%19.70) has university or higher degree. Table 1 and 2 will present the information about gender and education below;

**Table8: Frequency of Distribution of Gender**

Gender	Cumulative Count	Count	Percent	Cumulative Percent	Graph of Percent
female	31	31	46,97%	46,97%	
male	35	66	53,03%	100,00%	

**Table9: Frequency of Distribution of Educational Level of Parents**

<b>Educational level of parents</b>	<b>Count</b>	<b>Cumulative Count</b>	<b>Percent</b>	<b>Cumulative Percent</b>	<b>Graphof Percent</b>
Primary	27	27	40,91%	40,91%	
Middle	5	32	7,58%	48,48%	
High	21	53	31,82%	80,30%	
University and higher	13	66	19,70%	100,00%	

In addition to this circumstance that in the case of the frequency of continuous variables, it might be indicated that the mean of monthly household income level of the families of children with down syndrome is found as 3945.455 (SD0391.517) and age mean of children with down syndrome was observed as 8.39 (SD=4.44). Table 3 will display the mentioned information below;

**Table10: Demographic of Continuous Variables**

<b>Variable</b>	<b>Count</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Lower 95% CL Mean</b>
<b>Monthly Household Income</b>	66	3945,455	3180,696	391,5166	3163,542
<b>Age</b>	66	8,393939	4,440647	0,5466059	7,302292
<b>DMFT</b>	38	2,868421	2,183118	0,3541484	2,150848
<b>dft</b>	56	2,678571	2,961002	0,3956805	1,88561

Between groups of gender; categories such as frequency of dental brushing, awareness of parents, frequency of oral checkup, having a medical treatment and experiencing stress during the treatment, and educational level were examined via Chi square test. Among 3 groups in the list of family awareness; categories such as frequency of dental brushing, having a medical treatment, income and education level, experiencing stress during the treatment and frequency of oral checkup were compared via Chi square test. In all of the analyses significance level was measured to be 0.05.

Additionally, the tables of the correlations analysed in this study are as below.

**Table11: Correlation of DMFT Awareness and Income**

Tests Of Correlation		
	Spearman Correlation P-Value	Correlation
DMFT - Awareness of parents	-0,3194	0,0506
dft - Income	-0,0391	0,7748
DMFT - Income	-0,0652	0,6973

**Table12: Correlation of DMFT Awareness and Education Level**

Tests Of Correlation		
	Kendall's Tau Correlation P-Value	Correlation
dft - Awareness of parents	-0,6655	0,000
dft - Educational level of parents	-0,0070	0,9563
DMFT - Educational level of parents	-0,2235	0,0971
Awareness of parents - Educational level of parents	0,0724	0,5104
Awareness of parents - Income	0,0924	0,4095

As seen above, in the conducted tests the only difference measured to have statistical significance was between dft and family awareness. ( $p < 0.05$ ) Between the two variables a mid-level and negative correlation was identified.

Correlations between the other analyzed variables are statistically insignificant and randomized. ( $p>0.05$ ).



## 6. DISCUSSION

The aim of this study was to examine how the oral health status of children with down syndrome are associate with socio-economic and educational levels of their families. In this study a comparison has been made between families with a high socio-economic and educational level of children with offspring with Down syndrome and families with low socio-economic and educational level with Down syndrome to determine the differences. The study is cross-sectional. 66 children with Down Syndrome that are patients of Marmara University, have been assessed for oral health with a clinical examination and their families have been subjected to survey for socio-economic and educational information.

Conducted analyses revealed that there is a medium-level and negative way correlation between dft and awareness of family. Difference was evident between genders and that girl children had higher education level than boys. Between different income groups, frequency of brushing also varied. In high income group frequency of brushing was higher than low income-level group. On the other hand, between groups with different educational level, there was measurable difference with respect to the frequency of received check-up. Children of families with high education level had increased quantities of dental examination when compared to children belonging to families with low educational level. It is thus feasible to claim that in families with high income and educational level accentuated importance is attached to children's oral healthcare. Besides, as regards mean age, there was a significant difference between educational levels of families.

Children's dental health age in high educational group is lower than lower educational group. Furthermore; in this study some difference was measured among primary, permanent and mix groups with respect to awareness of parents and frequency of dental examination. A negative-way and low-level relationship was measured as regards parental awareness of groups, but the same relation was low and in a positive way for examination frequency. On the other hand, age difference was measured among different groups. Mean age of 3 groups was non-identical. As regards awareness of parents some difference was measured among 3 groups concerning experiencing treatment stress and the frequency of received examination. As seen, in

parallel with the heightened level of awareness, it was less likely for their children to experience stress. Finally; as regards frequency of examination first there was an increment from low awareness to high awareness but the ratio decreased again in due time.

When the literature information and evidences from previous investigations are compared to our study, it is observed that the consequences of the study conducted by Mishra, Pandey, Chopra and Arora in 2018 were revealed as valid with our results. To explain the similarities that in both of the investigations, families' awareness and education levels play essential role in attempting to go pedodontics and oral health levels of the children who diagnosed with DS. Therefore, this information could be evaluated that education and awareness levels of parents with children who diagnosed with DS are the common factors for families in terms of applying pedodontics. Additionally, in the study generated by Mishra, Pandey, Chopra and Arora in 2018, socio-economic status of parents is also resulted as a influential variable for families regarding the cases on relationship between oral health of their children with DS. However, in our study, this variable was not observed as an impactful factor for the association with oral health of children with DS. This difference might be evaluated that in Western countries, social security and health conditions are mainly depending on socio-economic status of individuals, while it is based on a free social security opportunity provided by government in Turkey. Therefore, our health system supports a remarkable opportunity to individuals to have benefit from any medical operation and need in our country. Thus, the difference in the results in terms of effectivity of socio-economic status of families on oral health conditions of children with DS might be emerged from the difference between social security principles and policies of countries where the data collected from.

In addition to that Smith (2001) discovered that wellbeing condition and status of parents of children with DS could be considered as an intense effect for families to apply restorative treatment and control sessions. Particularly, families with kids who have DS, chemical imbalance or mental debilitated were viewed as endeavouring to go medical control sessions when contrasted with groups of youngsters with no disabled (Smith, 2001). Insights showed up that parents of children with DS were found as the significant gathering who apply to pedodontics among parents of kids

who have any disability (Smith, 2001). Also, Smith (2001) resulted in that awareness level of the parents of children with DS, about the oral health and positive impacts of pedodontics for their children are the most crucial factor in the case of relationship with the oral health conditions and rates of their children. As it could be compared to our consequences that there is a validity observed between current study and Smith's investigation's evidences regarding the cases on association between parents' awareness and oral health conditions of their children and impact of families' awareness on this condition status. Thus, it might be evaluated that the literature information and indicated knowledge about the relationship between parents' awareness levels and oral health conditions of their children with DS are observed in valid and reliable ways.

As indicated by the acquired data from literature, Khocht, Janal and Turner (2010) demonstrated that financial conditions, mindfulness levels, instruction foundation and mental status of groups of parents of children with DS are the fundamental elements which influence and shape recurrence of applying to kid density and offering significance to medical treatment control sessions. These indications also show up that the literature information and indicated knowledge about the relationship between parents' awareness levels and oral health conditions of their children with DS are observed in valid and reliable ways again. However, in the study of Khocht, Janal and Turner (2010) financial status of parents is also considered as an influential factor, which reveals different from our results. The rationale behind this case could be explained that in western nations, standardized savings and wellbeing conditions are basically relying upon financial status of people, while it depends on a free standardized savings opportunity given by government in Turkey. Hence, our wellbeing framework underpins a striking chance to people to have profit by any restorative activity and need in our nation. Consequently, the distinction in the outcomes as far as effectivity of financial status of families on oral wellbeing states of kids with DS may be risen up out of the contrast between government disability standards and approaches of nations where the information gathered from.

## 7. CONCLUSION

After clarifying our minds about to what extent current study's results and indications are valid and reliable with the global literature, it might be important to mention to what extent current study's results and indications are valid and reliable with the previous investigations generated and implemented in Turkey.

However, as it is indicated in the introduction part of this study, there was not any previous investigation which focuses on the demographic and psychological factors that impact on families of children who diagnosed with DS in the case of attempting to pedodontics and the association of these displayed variables with the oral health conditions and status of those children. Therefore, this current investigation is considered as the first and initial one within Turkey's literature.

- The significance of this examination could be demonstrated that with the conduction of study, researchers and field practitioners are provided with a deeper and detailed understanding and comprehension about to what extent demographic and psychological variables of parents of children with DS diagnosis have effects and influences on the oral health care conditions and status of their children.
- Therefore, academicians who focus on the subject and desire to gravitate their interest to this topic could be able to comprehend that self-awareness and educational background of the parents play the most significant roles on the oral health care conditions and status of their children in the first-instance.
- This information could lead them to produce such governmental programmes, educational trainings and social works in order to provide better elucidating about the importance of oral health care for their children and augmentation about the frequency of applying to pedodontics by the families of children who are diagnosed with DS.
- More importantly, governmental institutions might prepare orientation days and trainings for the families and parents of children with DS about this topic when they learn their children's disorder in the first-instance in order to prevent

the possibility to have emergence of other diseases that might be derived from poor caring of oral health conditions.

- Another contribution of this study could be considered that pedodontists might prepare themselves with the information about the importance of oral health care in childhood process for children with DS and provide a detailed information to those families. This attempt could be also affect the frequency of applies and augmentation in awareness levels of the parents and help those children's oral and general physiological well-beings.
- In the case of further studies, researchers might gravitate their attention and interests toward the other psychological factors for those families in which the cases determine their well-being, coping with a DS children and augmentation in their awareness and interest levels to their children.
- The relationship between these variables and oral health conditions of children with DS might provide us deeper information about how we can reach those families and support their life conditions in order to help them and their children. Also, it could be considered as a new topic for further investigations that older age groups of individuals diagnosed with DS could be also measured through analysing the relationship between psychological awareness, education levels and well-being and oral health status of them.
- With clarifying the influential factors that shape the families' application frequency and awareness levels about the importance of oral health care for the children, it is believed that both of governmental institutions and field practitioners might help either the families and children diagnosed with DS in more efficient ways.

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## APENDIXES

### App1: CLIENT INFORMED CONTENT FORM

#### ONAY FORMU

##### Hasta Onam Formu

Down Sendromlu cocuklarda ağız sağlığının, ailelerin sosyo-ekonomik durumuyla ilişkisinin araştırılması.

Araştırmaya ait hasta/kisi numarası:

Araştırmacı adı:

Universite hastanesi protokol

Marmara Üniversitesi Dis Hekimliği Fakültesi, Pedodonti Anabilim Dalı Araştırma Projesi Bilgilendirme yazısını okudum ve anladım. Sorularına Dt. Elif Mutlu Ünal tarafından beni tatmin eden cevaplar verildi. Adı geçen projeye kendi rızam ile hiçbir baskı altında kalmadan katılmayı kabul ediyorum. İstedğim anda çalışmadan çıkabileceğim ve bunun normal tedavi sürecini etkilemeyeceğini, çalışmadan kendi isteğimle çıkmam halinde tıbbi ve hukuki haklarımın saklı olduğunu biliyorum.

Hasta kişi

Tarih

İmza

Velayet yada vesayet altında

Tarih

İmza

## App2: QUESTIONNAIRE

### Down Sendromlu çocuđunuz ile ilgili genel sorular

1. Çocuđunuzun doğum tarihi ..... (GÜN)/.....(AY).....(YIL)

2. Çocuđunuzun cinsiyeti nedir?

- Kız - Erkek

3. Bu anketi hangi çocuđunuz için dolduruyorsunuz?

- 1. çocuk -4. çocuk  
- 2. çocuk -5. çocuk  
- 3. çocuk -.....çocuk

4. Çocuđunuz nerede yaşıyor?

-Evde (her iki ebeveyn ile birlikte)  
-Evde (anne veya baba ile birlikte)  
-Anneanne(babaanne) ve dede ile birlikte  
-Haftaiçi Engelli çocuklar eğitim merkezinde, haftasonu evde  
-Haftaiçi ve haftasonu Engelli çocuklar eğitim merkezinde  
-Diđer

5. Down sendromlu çocuđunuzda aşağıdaki sađlık sorunlarından varsa işaretleyiniz  
(Birden fazla cevap işaretleyebilirsiniz)

-Görme problemleri (miyop, katarakt, göz bebeđinin titremesi...)  
-Solunum problemleri (kronik havayolu enfeksiyonu)  
-Astım  
-Kulak, burun ve bođaz problemleri (farenjit, sinüzit, üst solunum yolu enfeksiyonu)  
-Kardiyovasküler problemler  
-Duyuma problemleri  
-Hormon problemleri (tiroid problemleri)  
-Gastrointestinal bölge problemleri (ör: kabızlık, çölyak hastalıđı, gastrointestinal bölge doğumsal defektleri)  
-Obezite  
-Diabet  
-Nörolojik problemler (ör: epilepsi)  
-İmmunolojik problemler (enfeksiyonlara yüksek duyarlılık)  
-Diđer.....

6. Çocuđunuza otizm teşhisi kondu mu?

-Evet -Hayır

7. Çocuđunuz son 12 ayda hiç hastanede yattı mı? Yattı ise kaç defa?  
(Hiç yatmadı ise lütfen 0 yazınız)

.....defa

8. Hastanede yatma nedeni/nedenleri nelerdir?

.....

9. Çocuğunuzun genel sağlığını nasıl değerlendirirsiniz

- Mükemmel
- İyi
- Orta
- Zayıf
- Çok zayıf

10. 5. Sorulardan farklı olarak belirtmek istediğiniz bir sağlık sorunu var mı?

.....

**Bundan sonraki bölümde, çocuğunuzun dişhekimi muayenesi ile ilgili sorular sorulacaktır.**

11. Çocuğunuz dişhekimine en son ne zaman gitti?

- Çocuğum daha önce hiç dişhekimine gitmedi (12. soruya geçiniz)
- 1 yıldan fazla (13. soruya gidiniz)
- 1 yıldan az fakat 6 aydan fazla (13. soruya gidiniz)
- 6 ay veya 6 aydan önce (13. soruya gidiniz)
- Bilmiyorum/Hatırlamıyorum (12. soruya gidiniz)

12. Çocuğunuz henüz dişhekimine hiç götürmemenizin nedeni nedir?  
(Birden fazla cevap işaretleyebilirsiniz)

- Çocuğum dişhekimine gitmek için henüz çok küçük
- Çocuğum ne yapması gerektiğini anlayacak durumda değil
- Çocuğum diş muayenesi sırasında zorluklar yaşayacaktır
- Ben dişhekimine gitmekten korkuyorum
- Dişhekimine gitmek için vaktim yok
- Dişhekimine ulaşmak/gitmek çok zor
- Diş muayenesi fiyatları çok yüksek
- Heniz iyi bir dişhekimi bulamadım
- Down sendromlu çocuğuma bakmak isteyen dişhekimi bulamadım
- Çocuğum, ağız sağlığından çok daha önemli diğer sağlık problemlerine sahip
- Çocuğumun dişhekimine ilk defa ne zaman gitmesi gerektiğini bilmiyorum
- Bilmiyorum
- Diğer.....

**24. Soruya geçiniz.**

13. Çocuğunuzun yakın zamanda dişhekimine götürmüş iseniz nedeniniz ne idi? (Birden fazla cevap işaretleyebilirsiniz)

- Down sendromlu olmayan çocuklarımla dişhekimi ziyaretine, Dawn sendromlu çocuğum ile birlikte gittik
- Çocuğumun diş ağrısı vardı
- Çocuğum düştü ve ağız yaralanması oldu
- Diş kontrolü için
- Çocuğumun dişlerinde renklenme olduğunu farkettilim
- Çocuğumda çürük olduğunu düşündüm
- Okuldan önerdiler
- Sağlık uzmanı önerdi
- Engelli Çocuk eğitim merkezindeki bakıcısı önerdi
- İnternette okudum
- Daha fazlasını bilmiyorum
- Diğer.....

14. Down sendromlu çocuğunuza dental bakım nerede yapıldı  
(Birden fazla cevap işaretleyebilirsiniz)

- Genel dişhekimi
- Özel hastane
- Devlet hastanesi
- Ağız-diş sağlığı merkezi
- Diğer:.....

15. Down sendromlu olmayan çocuklarınız ile Dawn sendromlu çocuğunuzu aynı dişhekimine mi götürüyorsunuz?

- Evet
- Hayır
- Diğer çocuğum (çocuklarım) dişhekimine gitmek için henüz çok küçükler
- Sadece 1 çocuğum var
- Bilmiyorum
- Diğer:.....

16. Down sendromlu çocuğunuz için diş muayenesi zor oldu mu?

- Evet
- Az veya çok
- Hayır
- Bilmiyorum

17. Down sendromlu çocuğunuz için diş tedavisi zor oldu mu?

- Evet
- Az veya çok
- Hayır
- Bilmiyorum

18. Çocuğunuza diş bakımı/tedavisi sırasında anestezi yapıldı mı?

- Diş kliniğinde local anestezi
- Genel anestezi (hastanede)
- Nitroz oksit (gülme gazı) ile sedasyon
- Diş kliniğinde tedavi öncesinde ilaçla (benzodiazepinler) sedasyon (ör: Diazepam, Valium, Xanax,....)
- Çocuğuma listedeki anestezi çeşitlerinden hiçbiri uygulanmadı
- Bilmiyorum

19. Son 1 yıl içinde (son 12 ay) çocuğunuza hangi diş tedavileri uygulandı?

- Muayene (diş kontrolü)
- Diş temizliği (diştaşı temizliği ve fırçalama)
- Ağız bakım önerileri
- Radyografi
- Dolgu
- Fissür örtücü (Koruyucu dolgu)
- Diş çekimi
- Ortodonti (braket veya hareketli aparey)
- Bilmiyorum
- Diğer:.....

20. Dişhekiminiz, Down sendromu ile ilgili olarak karşılaşılabileceğiniz aşağıda sıralanan ağız-diş problemleri ile ilgili sizi bilgilendirdi mi?  
(Birden fazla cevap işaretleyebilirsiniz)

- Ağız bakım önerileri
- Diş çürüğünün önlenmesi ile ilgili fluor/fluor tedavisi önerileri
- Beslenme önerileri
- Ağız kapanışı ile ilgili öneriler
- Ağız solunumu ile ilgili öneriler
- Uyku apnesi, uyku sırasında normal solunumda kesilmeler hakkında öneriler
- Çocuğunuzun dili ile ilgili öneriler
- Salya akıntısı ile ilgili öneriler
- Çocuğunuzun ağız çalkalaması ile ilgili öneriler (ör: diş fırçalama sonrası suyu yutmaması gibi...)
- Dişeti hastalıkları ve dişeti kanaması ile ilgili öneriler
- Hassas dişler ile ilgili öneriler
- Eksik dişler ile ilgili öneriler
- Dişlerin yavaş sürmesi ile ilgili öneriler (süt dişinden daimi dişlere geçiş)
- Diş sıkması/gıcırdatması ile ilgili öneriler
- Diğer:.....

21. Diş hekiminizden memnun musunuz ve Down sendromlu çocuğunuzun doğru şekilde tedavi ettiğini düşünüyor musunuz?

- Evet/İyi (Soru 22 ye geçiniz)
- Oldukça iyi (Soru 22 ye geçiniz)
- Normal (Soru 22 ye geçiniz)
- Oldukça kötü (Soru 23 e geçiniz)
- Hayır/Kötü (Soru 23 e geçiniz)

22. Diş hekiminiz hakkında olumlu düşünüyorsanız, iyi bir dişhekimi için istenen özellikler nelerdir? Sadece 3 (üç) tanesini işaretleyiniz.

- Diş hekimi hevesli
- Diş hekimi canayakın
- Diş hekimi çok bilgi veriyor
- Diş hekimi herşeyi açıklıyor ve çocuğumu da diyaloglara dahil ediyor
- Diş hekimi çocuğumun güvenini kazanabiliyor
- Diş hekimi fazladan zaman ayırabiliyor
- Diş hekimi çok sabırlı
- Diş hekimi Engelli çocukların tedavisinde uzmanlaşmış olmalıdır
- Diş hekimi acil durumlarda yardımcı olmalı
- Diğer:.....
- Bilmiyorum

23. Diş hekiminiz hakkında olumlu düşünmüyorsanız, en önemli 3 nedeniniz nedir?

- Diş hekimi hevesli değil
- Diş hekimi canayakın değil
- Diş hekimi hiç bilgi vermiyor
- Diş hekimi yapacağı tedavi hakkında açıklama yapmıyor ve çocuğumu diyaloglara dahil etmiyor.
- Diş hekimi çocuğumun güvenini kazanmıyor
- Diş hekimi fazladan zaman ayırmıyor
- Diş hekimi yeterince sabırlı değil
- Diş kliniğine ulaşım çok zor (ör: ulaşımında zorluk, bina içerisinde çok fazla merdiven var...)

- Bekleme odasında her zaman çok beklemem gerekiyor
- Randevu alabilmek için her zaman öncesinde uzun beklemem gerekiyor
- Diğer:.....
- Bilmiyorum

24. Diş muayenesi sırasında yukarıdaki sorulardan farklı olarak belirtmek istediğiniz veya ilave etmek istediğiniz birşey var mı?

Sonraki bölüm, diş fırçalama, diş macunu, diş fırçaları,.....gibi soruları içermektedir.

25. Çocuğunuz dişlerini ne sıklıkla temizliyor?

- Çocuğum dişlerini fırçalamak için henüz çok küçük
- Haftada 1 kez veya daha az
- Hergün değil fakat haftada en az 1 kez
- Günde 1 kez
- Günde 2 kez veya daha fazla
- Bilmiyorum

26. Çocuğunuz dişlerini tek başına fırçalıyor ise, hala yardım ediyormusunuz?

- Hiçbir zaman çünkü çocuğum dişlerini kendi fırçalayabiliyor
- Haftada 1 kez veya daha az
- Hergün değil fakat haftada 1 den fazla
- Her gün
- Bilmiyorum

27. Çocuğunuz dişlerini fırçalamak için hangi fırçayı kullanıyor?

- Normal/el diş fırçası
- Dönen/elektrikli/pilli diş fırçası
- Her ikisini de
- Bilmiyorum

28. Çocuğunuz dişlerini diş macunu ile mi fırçalıyor?

- Evet
- Hayır
- Bilmiyorum

29. Çocuğunuz şimdi ya da daha önce dişlerini fırçaladıktan sonra ve suyu yutmadan tükürme konusunda zorluk çekiyor mu?

- Evet
- Hayır
- Bilmiyorum

30. Çocuđunuza diřlerini fırçaladıktan sonar, hi diřmacunu kalmayınca kadar alkalamasında yardımcı oluyormusunuz?

- Evet
- Hayır
- Bilmiyorum

31. Down sendromlu çocuđunuzun diřlerinin fırçalanması ile ilgili en faydalı bilgileri nasıl öğrendiniz? (Birden fazla ılık işaretleyebilirsiniz)

- Diř hekiminden
- Çocuk doktorundan
- Okuldan
- Konuşma terapistinden
- Fizyoterapistten
- Aile veya arkadaşlardan
- Engelli çocuklar eğitim merkezindeki öğretmenlerden
- Hemşireden
- Kitaplardan
- İnternette
- Diđer Down sendromlu çocukların ailelerinden
- Diřfırçalama ve ağız hijyeni ile ilgili henüz bir bilgi vermediniz
- Diđer:.....

32. Diř fırçalaması hakkında yukarıdaki sorulardan farklı olarak belirtmek istediđiniz veya ilave etmek istediđiniz birşey var mı?

**Bu anketin 4. bölümü ağız boşluđunda ve çevresinde sık karşılaşılan problemleri içermektedir.**

33. Çocuđunuzun nefesinde kötü koku var mı?

- Evet
- Hayır
- Önceden vardı fakat artık yok
- Bilmiyorum

34. Çocuđunuz bazı sert gıdaları yemekten kaçınıyor mu? (ör: bütün elma, havuç, et)

- Evet
- Hayır
- Bilmiyorum

35. Çocuđunuzun yiyecekleri yutmadan önce yeterince çiğnediđini düşünüyormusunuz?

- Evet
- Hayır
- Bilmiyorum

36. Çocuğunuzu emzirirken veya biberonla beslerken emme zorlukları oluyormuydu?

- Evet
- Hayır
- Hatırlamıyorum

37. Çocuğunuz bardaktan su içerken zorlanıyor mu?

- Evet
- Hayır
- Önceden evet fakat artık zorlanmıyor
- Bilmiyorum

38. Çocuğunuz kolaylıkla ve sıklıkla tıkanma yaşıyor mu?

- Evet
- Hayır
- Önceden daha çoktu fakat şu anda daha iyi
- Önceden yoktu fakat şu an daha fazla
- Bilmiyorum

39. Çocuğunuzun ağız ve diş sağlığını nasıl değerlendirirsiniz?

- Mükemmel
- İyi
- Orta
- Kötü
- Çok kötü

40. Çocuğunuzun dudakları sıklıkla kuruyor ve acıyor mu?

- Evet
- Hayır
- Bilmiyorum

41. Çocuğunuzun ağızının etrafında sıklıkla kızarıklık (salya akıntısına bağlı tahriş,.....) oluşuyor mu?

- Evet
- Hayır
- Bilmiyorum

42. Çocuğunuz ağız içerisindeki aft yaralarından sıkıntı çekiyor mu?

- Evet
- Hayır
- Bilmiyorum

43. Yukarıdaki sorulardan farklı olarak belirtmek istediğiniz veya ilave etmek istediğiniz birşey var mı?

.....

Bu anketin son bölümünde sizin hakkınızda bazı genel bilgiler soracağız.

44. Down sendromlu çocuğa yakınlık düzeyiniz nedir?

- Anne
- Baba

45. Kaç yaşındasınız? .....yaşındayım.

46. Siz kendi dişlerinizi ne sıklıkta fırçalıyorsunuz?

- Hiç
- Haftada 1 kez veya daha az
- Her gün değil fakat haftada 1 kezden daha fazla
- Günde 1 kez veya daha fazla
- Günde en az 2 kez

47. Diş kontrolü için dişhekiminize en son ne zaman gittiniz?

- 5 veya daha fazla yıl önce
- 1 yıldan fazla fakat 5 yıldan az zaman önce
- 1 yıldan az zaman önce

48. Eğitim durumunuz nedir?

- İlkokul (12 yaşına kadar)
- Ortaokul (15 yaşına kadar)
- Lise (18 yaşına kadar)
- Üniversite
- Master
- Bilmiyorum

49. Aylık hane geliriniz ne kadardır?  
.....

50. Siz veya aile büyükleriniz göçmen mi?

- Evet
- Hayır (52. soruya geçiniz)

51. Bir önceki soruyu evet olarak cevapladıysanız, siz veya aile büyükleriniz nereden göç ettiniz?

- Doğu Avrupa
- Asya
- Kuzey Afrika
- Orta ve Güney Afrika
- Türkiye
- Orta Amerika
- Güney Amerika
- Diğer:.....

52. Bu anket ile ilgili öneri veya görüşleriniz varsa lütfen alta yazınız.  
.....

## ETHIC COMMITTEE APPROVAL FORM



T.C.  
MARMARA ÜNİVERSİTESİ  
Diş Hekimliği Fakültesi  
Klinik Araştırmalar Etik Kurulu

Projenin Adı: An evaluation of oral health status in children with Down Sendrome according to social-economical and educational status of their families

Proje yürütücüsü: Prof. Dr. İlknur Tanboğa,

Projedeki Araştırmacılar: Dt. Elif Mutlu Ünal

Onay tarihi ve sayısı: 23.10.2017, 2017-138

Sayın Prof. Dr. İlknur Tanboğa,

2017-147 Protokol nolu "An evaluation of oral health status in children with Down Sendrome according to social-economical and educational status of their families " isimli anket çalışmanız Marmara Üniversitesi Klinik araştırmalar Etik kurulu tarafından incelenmiş ve etik yönden uygunluğuna karar verilmiştir.

M.Ü. Diş Hekimliği Fakültesi

Klinik Araştırmalar Etik Kurulu Başkanı

Prof. Dr. Nimet Gençoğlu

Adı Soyadı

İmza

Prof. Dr. Nimet Gençoğlu

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Prof. Dr. Şebnem Erçalık Yalçınkaya

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## BIOGRAPHY

I was born in Bremen, Germany in 1988. I graduated from Irmak Koleji in 2008. I attended the Dentistry Faculty in Yeditepe University from 2008-2014. I have enrolled as a MSc student in the Pediatric Dentistry of Marmara University

## PERSONAL INFORMATION

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