

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



## Oral and Dental Health in Pregnancy

Eftekharalsadat Hajikazemi and Fatemeh Haghdoost Osquei  
*Tehran University of Medical Sciences (TUMS), Center for Nursing Care Research,  
 Iran*

### 1. Introduction

#### 1.1 The role of oral and dental in physical, psychic and social healthy

Oral health is an important part of any individual health. Therefore preventing oral diseases are essential. Hygiene and prevention plays an important role in human health in many aspects (Jones et al, 1989). In fact trying to protect health is more valuable than recover it and early detection and treatment of gum disease can help and preserve teeth and smile for life. Millions of people don't know they have this serious infection that can lead to tooth loss if not treated (AAP, 2011)

Some consequences of oral and teeth diseases are pain, anxiety and fear of the treatment, limitation in food alternative and fear of having unpleasant and disturbing appearance.

Infection in the mouth can play havoc elsewhere in the body. For a long time it was thought that bacteria was the factor that linked periodontal disease to other infection in the body; however more recent research demonstrates that inflammation may link periodontal disease to other chronic condition. Research has shown, and experts agree that there is an association between periodontal disease and other chronic inflammatory condition such as diabetes, cardiovascular disease, and Alzheimer's disease. (AAP, 2011). It is also a potential source of infection of parathyroid gland and respiratory system, heart attack, stroke and diabetes. In this case, the tongue is affected and become thick and even sore, thus the person doesn't feel the taste of food as a result problems such as malnutrition happens (Dugas, 1991).

Every tooth in your mouth plays an important role in speaking, chewing and in maintaining proper alignment of other teeth. People with dentures or loose and missing teeth often have restricted diets since biting into fresh fruits and vegetables are often not only difficult, but also painful. This likely means they don't get proper nutrition. Gum and teeth have an important role in having a good appearance as well. A beautiful smile with well ordered teeth will make you much more beautiful. (AAP, 2011) Also teeth and gum protect facial muscles. Pulling each tooth disorders this situation and makes face ugly. The lack of teeth, especially the former teeth, increases wrinkles and changes appearance in an unpleasant way and speaking condition.

Considering the importance of appearance in personality and body image, dental problems can lead to social and psychological consequences, so that individual connections with others are impaired. Gingivitis also leads to Halitosis (bad smell of the mouth) that disrupts social interaction. So prevention is serious from childhood. World Health Organization, called year 1994, "oral health for healthy life" and announced, having a healthy mouth and teeth, helps to health promotion, comfortable and self steam in any person.

Mouth and teeth disorders also affect nutritional status and health of a pregnant woman. As tooth decay is the focus of infection, it may put a mother and her fetus's life in dangers (AAP, 2011; Ogunboded, 1996). Sometimes one's sleeping is impaired by dental pain and this issue is harmful to pregnant women.

High percentage of children and adolescent do not treat their teeth and gum problem well, and married girls get pregnant without any special attention to their teeth health condition. Even such as pregnancy, menstruation and menopause in women affect physically on the oral health, so women should be more careful about their mouth and teeth health (AAP, 2011). It is necessary to note that the during the pregnancy Hormonal changes, particularly increased progesterone level in pregnancy lead to congestion and swelling gums that need special attention to provide their health. After pregnancy this congestion and swelling disappear and the gums return to the ordinary situation (Glliser, 1998; Yiping & et al, 2004).

## 2. The characteristics of healthy gum

The gums are as the holders' tissues for the teeth and protect them. The healthy gum has pink color and is strong in their place, without any swelling, redness or inflammation and spots. During brushing and dental examinations do not bleed.

Periodontal disease is often silent, meaning symptoms may not appear until an advanced stage of the disease (AAP, 2011).

## 3. How plaque and calculus form?

If hygiene of mouth and teeth do not consider gums and teeth will have serious problems. The lack of hygiene for mouth and teeth and not cleaning the teeth and the mouth environment cause the existed mouth bacteria's to form the thin, colorless layer and sticky plaque on the gum and teeth with the remaining food particles in coordination with saliva. These plaques can be removed with regular oral hygiene that includes in daily brushing and flossing. However, it is the onset of teeth decadence and gums diseases in the future, and gradually cause more stickiness of plaque upon the teeth that cannot be easily washed by water and each day increases its thickness (Jonson, 1985).

The toxins from the bacteria's in plaques gradually cause harms and destruction the tissue of gums, in addition to residue the gained mineral materials on plaque helps hardness to the extent that reform's into white, yellow or dark colored stones that no longer can be taken off by brush and they are called calculus or germs (lime-stone masses). The calculus after its formation due to the rough and uneven surface cause more concentration upon the teeth and also while brushing or eating food especially while biting hard fruits cause contact with gums injuring and bleeding of it, this situation is called gingivitis. Gingivitis is first stage of periodontal disease. So removal of calculus is necessary, because, the calculus in addition for causing gum diseases is a suitable place for growth of bacteria's and for this reason in the major cause of halitosis. Removal the germs with especial dental equipments has been carried out, if cleaning germs does not take in time, the germ will extend the bon around teeth and this factor causes looseness of the teeth and ultimately losing them (Jonson, 1985).

Removal the germs do not harm the teeth and gums and doesn't cause sensitivity of the teeth towards coldness and hot conditions. Of course some minor sensitivity temporarily and will be removed. It is clear that are once cleaning germs and good oral and dental health may some time to make needless for new germ cleaning. Of the special saliva compound

and the rate of secretion the probability for the formation of germs in some persons is more than others, so that this groups must take more care in oral health and sequential visit by the dentist in case for the need of germ cleaning within the shorter times. Some persons avoid germs cleaning for the fear of the pain or its complications, while this action does not have any particular complications and is not painful. The use of toothpaste for the elimination of germs has no effects because the germs are harder than to be taken by the toothpaste. Removal of germ for pregnant women has no dangers. The pregnant women must not be worry about it (Randy, 2005; Jeffcoat, 2000).

#### 4. Periodontal disease

Periodontal (gum) diseases, including gingivitis and periodontitis, are serious infections that, left untreated, can lead to tooth loss. The word *periodontal* literally means "around the tooth." Periodontal disease is a chronic bacterial infection that affects the gums and bone supporting the teeth. Periodontal disease can affect one tooth or many teeth. It begins when the bacteria in plaque (the sticky, colorless film that constantly forms on your teeth) causes the gums to become inflamed (AAP, 2011).

The gingivitis is common form of inflammation of the gum tissue (the first stage of periodontal disease) it has observed in all ages, but studies indicate that older people have the highest rates of periodontal disease and need the to do more to maintain good oral health (AAP, 2011).

The some effective factors in the gingivitis are bacterial plaque due to the poor oral hygiene; in the absence of treatment gingivitis may progress to Periodontitis. Consumption of tobacco, recent studies have shown that tobacco use may be one of the most significant risk factors in the development and progression of periodontal disease. Other factors are unnatural habit such as clenching or grinding teeth, poor nutrition, obesity and the consumption of some medicines, stress, genetic, puberty, pregnancy and menopause in women, diabetes and other systematic disease (AAP, 2011).

The plaques contain some number of bacteria's and sugars in foods are effective to bacteria's growth and enzymes activities, so the continuance of plaques in mouth and don't eliminations them in addition to their destruction of teeth, cause swelling and inflammation of the gum tissue, it is important that the gum-diseases in the beginning to be cured, because the cure of the disease of tissues in the final stages does not have good results. The bleeding of gums is the sign of gingivitis that must consult with the dentist and cleaning to be done, the consumption of some medicines can also be necessary the dentist will give some guide lines in this issue. Even in the cases of intensive surgery of the gums it is also necessary, sometimes massage the gums with finger-tips is useful. In the absence of treatment gingivitis may progress to periodontitis in this condition the teeth become loose and in addition of losing them and the Halitosis is created. The Halitosis is common symptom; According to the data about 40 percent of the world population suffers from the Halitosis. The cause of Halitosis is various reasons such as the poor health of mouth and teeth, the decay-teeth, gingivitis, the dryness of mouth, systematic diseases such as lung infections, uncontrolled Diabetes, the situation of nose and throat and sinuses of the jaws, the consumption of tobacco, hard regimes, and the consumption of food such as onion garlic. it must be noted that the Halitosis be dependent on time such as in the morning wake-up that according to the decrease amount of saliva during the night and could be removed by the consumption of breakfast and teeth brushing.

## 5. Signs and symptoms of gingivitis

Periodontal disease is often silent, meaning symptoms may not appear until an advanced stage of the disease. However, warning signs of periodontal disease include the following:

- Red, swollen or tender gums or other pain in your mouth
- Bleeding while brushing, flossing, or eating hard food
- Gums that are receding or pulling away from the teeth, causing the teeth to look longer than before
- Loose or separating teeth
- Pus between your gums and teeth
- Sores in your mouth
- Persistent bad breath
- A change in the way your teeth fit together when you bite
- A change in the fit of partial dentures (AAP, 2011).

The lack of hygiene for oral and dental in pregnant women cause the formation of inflammation in gums among the teeth of one or two teeth that is called pregnancy tumor, this increase volume of the swelling of teeth contains capillary and tissues that their colors according to the amount of blood vessels is from light red to unsettled Blue, it has soft constitution and pain less this inflammation in the event of smallest touch and finger – touching bleeds (Baum, 1994). There is a wrong belief: "pregnant woman normally will lose some teeth". This is dangerous and causes lack of paying attention to the issue that is avoidable. Statistically large number of developed tooth decays is reported. This is because of carelessness of mother to her oral health due to the pressure of new responsibilities after birth. Mothers should become convinced that oral problems are avoidable in case of daily attention to their teeth health while a safe and routine dental treatment during pregnancy is strongly recommended (Marjorio, 2006; Jeffcoat, 2006).

Hormonal changes, particularly increased progesterone level in pregnancy lead to congestion and swelling gums, so if there was a gum infection prior pregnancy this leads to gum inflammation. In these conditions, gum bleeding is inclined. Some women see bleeding of gums during brushing or using floss, so they stop cleaning their mouth, while in this condition, oral hygiene should be continued as soon as possible to cure the infection, because gum infection for mother and fetus can be harmful (Hajikazemi et al; AAP, 2006).

Studies have shown that sever gingival inflammatory disease in pregnant women is an important risk factor for preterm delivery and low birth weight. This conclusion has been confirmed by previous experiments on animals too. The research conducted by (Collins, 1994; Ogunboded, 1996). On laboratory mice to assess the effects of periodontal infection on pregnancy outcome, showed that gum infection in mice is associated by increasing the incidence of fetal growth retardation, fetal death and preterm labor (Lopez, 2005; AAP, 2006). Incidence of nausea in pregnant women can be another cause of their refusal of oral hygiene. On the other hand, women think if they take a few foods the oral and teeth care is not necessary, while it is a wrong belief; if plaque doesn't get removed by cleaning the mouth during 9-21days, it will lead to gum infection.

Sometimes pregnant women desire to eat the unusual material such as soil or ice, this is called "longing of pregnant women". Sometimes increase of sugar consumption is observed, this is harmful too. In case of frequent vomiting, tooth and gum problem will increase. These problems are preventable by washing the mouth after vomiting.



## 6. Preventing of the gingivitis

Gingivitis can be prevented by regular oral hygiene to reach purpose training different groups of community can be the best and easiest way. In fact the difficulties and diseases that today need the cure with high expenditure require great times, had been preventable yesterday. Usually the low income groups in the society due to the high expenditure of dental treatments do not visit dentist or it is too late, this cause serious harms to them, while with carrying out simple precautions such as daily brushing and flossing can remove the teeth from plaques. Saline normal or color hex dine mouth washes also are helpful. Consideration for the nutrition could prevent many of the problems and high cost.

Gingivitis can be prevented through regular oral health that includes correct brushing, flossing; interdentally brushes are also useful in cleaning the teeth from plaque. Incorrectly brushes do not only clean the plaque completely and from the other side can cause the injury in gums tissue, bleeding and erosion to the teeth. for brushing must not use hot water, when brush gets wet nearly one-third of its hardness is lost, so it is better to damping the brush to use the ordinary water. The brush life more with the style is dependent that the time of its usage, but the average life of brush normally is three month, if the brush hairs after six month is still straight are the sign of incorrect style of brushing. The duration of brushing is maximum ten minutes,

The importance of brushing before sleeping for all is great because the bacteria's of mouth have more opportunity for effecting upon the remains of food in the mouth and the probability of teeth destruction gets higher, it is necessary that before going to sleep to brush. This issue in the pregnant women that inflicted with some kind of inertia and sleepiness is more important.

Brushing is better to be done consciously and without mental engagements, because causes forgotten of the dean sing of some parts (Mathewson, 1994). The toothpaste has a helpful role in cleaning the teeth and mouth and is aromatic. Brushing singularly is not able to clean the teeth surface, so flossing helps the cleaning of teeth, because the onset of gum diseases is often from this area (Sharon,1994). Whatever the distance of teeth is closer to each other a thinner dental floss must be used. It is better that each time offer brushing to use the dental floss The dental floss removes the plaque between teeth, also causes the reduction of Halitosis. The usage of other tools such as pins, matches instead of dental floss to be used for teeth, because harms to the teeth. Washing the mouth with Saline normal for the cleansing of mouth and gums cause the strength of gums and reduces the bleeding. The focus of treatment for gingivitis is removal of the etiologic agent plaque, aim is reduction of oral bacteria's and may take the form of regular periodic visit to dental professional together with adequate oral hygiene.

The pregnant women must be educated for oral health. A Upon a study conducted in Riyadh in 1994, a lack of awareness in pregnant women about their oral and dental care in pregnancy and regularly visiting dentist was observed. Prime porous women knowledge was lower than others (Al-Tammie, 1998).

The pregnant women after each vomiting wash the mouth with mouth washes because the vomiting is acidic and cause harms to the teeth and mouth, and is better to use the brushes with small head and medium roughness, that reduces the vomiting while using, and teeth cares must after pregnancy to be continued. And incase for the need of diagnoses in the third till seventh months for the carrying out of therapies are suitable. In some countries, it is over half century that special attentions are paid to oral care during pregnancy. In these

countries, dental services during pregnancy up to one year after delivery are free. In these countries women treat their oral and dental diseases before they got decided for pregnancy. Recently, some activities in Iran, especially for at risk groups such as women and children, have been conducted. The integration of oral and dental hygiene into “primary health care” is one of such activities. According to the regulations of “Health Ministry” on November 1995, along with prenatal care of pregnant women, their mouth and teeth must also be examined at each visit, and the correct way of oral health must be taught to them. Their oral status in third, fifth and seventh month of pregnancy are recorded in their family record, and if any problem was observed, they got referred to the dentist of health center. Also examination and record of their oral status at three months and one year after delivery occurs. But statistics showed that women don’t use of these services enough. In most countries, pregnant women don’t take enough oral care. Considering statistics presented in 1991 Birmingham; UK, it showed that although dental services were completely free of charge, only 61% of women had referred to the dentist.

Sometimes the dentists also avoid doing some treatment for pregnant women. Studies on (non-specialist) dentists of their knowledge about the importance of dental treatment in pregnant women showed that they avoid doing some therapeutics for pregnant women, because they believe that, some women's have low awareness and negative attitudes about the oral and dental treatment and effects of dental materials on fetus, so dentists believe that, this may cause legal problems for them. So only economic barriers are not causes of not receive oral and dental care in pregnant women, but also awareness, believes and insight of women in this field have an important role. Nowadays science believes that: oral and dental disease is a behavioral disorder. Therefore it is needed that women prior to pregnancy meet the dentist and take the necessary information about oral and dental care during pregnancy and use those treatment services and facilities. Education and change of attitude of pregnant women in this field will be beneficial to maintain their oral health.

## 7. Nutritional and prevention

Today the world faces two kinds of malnutrition, one associated with hunger or nutritional deficiency and the other with dietary excess. Urbanization and economic development result in rapid changes in diets and lifestyles. Market globalization has a significant and worldwide impact on dietary excess leading to chronic diseases such as obesity, diabetes, cardiovascular diseases, cancer, osteoporosis and oral diseases. Diet and nutrition affects oral health in many ways. Nutrition, for example, influences cranio-facial development, oral cancer and oral infectious diseases. Dental diseases related to diet include dental caries, developmental defects of enamel, dental erosion and periodontal disease (WHO, 2011).

Proper Nutrition has a positive role in prevention of the oral disease. The use of all groups of food, suitable with the needs of budge considering the age and sex and particular conditions such as pregnancy, the consumption of fresh vegetables and fruit especially vitamin C and A for the generating Collagen tissue is necessary. Collagen tissue is the main protein of the tissues such as the gums. Vitamin A strengthens the weakness of gums against penetration of bacteria. The results of studies show that the decrease consumption of vitamins A and C causes gums bleeding, inflammation of gums, the decrease mineral of the bones and loosening the teeth. Also the consumption of low- fat milk, cheese, mustard seeds, cabbage, cauliflower, fish cans of fish with bones, the consumption of fluoride such as tea, and salmon fish is also in prevention of the diseases of mouth and teeth are effectual.

The consumption of kinds of cola is harmful for the health of teeth and mouth, because phosphor which is abundant in the cola causes the decrease amount of calcium in the bones some of the researcher believe that the calcium initially from the bones of jaws are removed that cause the loosening of teeth. The high consumption of sugar in addition to the speeding destruction of teeth also harms the gums tissue because the sugar cause the feeding of bacteria's that generate gingivitis, however this part must be studied more. The use of sugar sticky materials such as chocolates are harmful, because of their stickiness to the teeth for long times in the mouth. Consumption of high sugar materials and taking it more time during the day between main meals is not good; this point is important and must be emphasized. The WHO reports emphasized that despite great improvements in the oral health of populations in some countries, problems still persist. Dental caries remains a major public health problem in most high income countries, affecting 60-90% of schoolchildren and the vast majority of adults. It is also the most prevalent oral disease in several Asian and Latin American countries the World Oral Health Report 2003 anticipates that in light of changing living conditions and dietary habits, the incidence of dental caries will increase in many of that continent's low income countries. The principal reasons for this increase are growing consumption of sugars and inadequate exposure to fluoride (WHO, 2006).

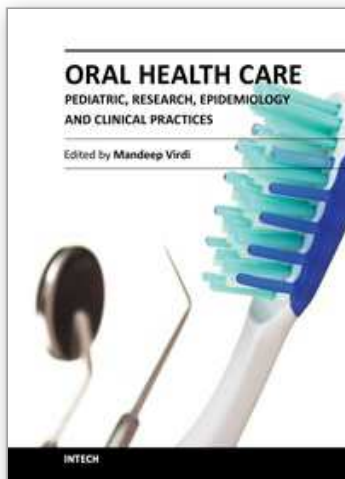
## 8. References

- American Academy of Periodontology. (2011). assess your risk of gum disease.  
URL: <http://www.perio.org/consumer/4a.htm>
- American Academy of Periodontology. (2011) Mouth-Body Connection.  
URL: <http://www.perio.org/consumer/mbc.top2.htm>.
- American Academy of Periodontology.(2011). How to Keep a Healthy Smile for Life  
URL: <http://www.perio.org/consumer/smileforlife.htm>.
- American Academy of Periodontology. (2011). Gum Disease and Pregnancy Problems.  
URL: <http://www.perio.org/consumer/mbc.baby.htm>
- American Academy of Periodontology. (2011). Protecting Children's Oral Health.  
URL: <http://www.perio.org/consumer/children.htm>
- American Academy of Periodontology. (2011). Symptoms of Gum Disease.  
URL: <http://www.perio.org/consumer/gum-disease-symptoms.htm>
- American Academy of Periodontology. (2011). Causes of Gum Disease.  
URL: <http://www.perio.org/consumer/gum-disease-causes.htm>
- American Academy of Periodontology. (2011). protecting Your Oral Health.  
URL: <http://www.perio.org/consumer/protect.htm>
- American academy of periodontology.(2006). Baby steps to a healthy pregnancy and on - time delivery. URL: [www.perio.org](http://www.perio.org).
- Al-Tammie S, Peterson P. 1998. Oral health situation of school children' mothers and school teachers in Saudi Arabia, *International Dental Journal* 43(3): 180-185.
- American academy of periodontology.( 2006). Protecting oral health throughout your life.  
URL: [www.perio.org](http://www.perio.org).
- Baum p. (1994), *Text book of the operative dentistry*.UK Sanders's co.
- Collins JG, Winley HW, Arnold RR, Offenbacher S. (1994) Effect of a prophyromonas gingivitis infection on inflammatory mediator response and pregnancy outcome in hamster, *Infection and Immunity*, 62(10): 4356-61
- Dugas,B.(1991). *Introduction to patient care*. London Sanders Co.



- Gleicher, N. (1998). *Principles & Practice of Medical Therapy in Pregnancy*. USA: Plenum Company.
- Hajikazemi E, Oskouie F, Hossain Mohseny SH, Nikpour S, Haghany H. (2008). The Relationship between Knowledge, Attitude, and Practice of Pregnant Women about Oral and Dental Care *European Journal of Scientific Research*, Vol.24 No.4 pp.556-562.
- Jones, H., Mason, J. & David, K. (1998). *Oral Manifestation of Systematic Disease*. Philadelphia: WB. Saunders.
- Jahonson, A. (1985). Dental care during pregnancy. *Nursing time*, 11. 30-31.
- Jeffcoat, A. (2000). Research presented today provides further evidence on the importance of good oral health in pregnant women. URL: [www.perio.org](http://www.perio.org)
- Lopez, N. (2005). Periodontal therapy protects preterm birth. *Journal of periodontology*, 76, 2144-53.
- Marjorio, S. (2003). Dental procedure may reduce risk of premature birth. URL: [www.perio.org](http://www.perio.org)
- Mathewson, R.J. et al. (1994). *Fundamental of dentistry for children*. London: Quintessence.
- Ogunbodede, E. (1996). Socio economic factors and dental health in an Obstetric Population. *West African Journal of medicine*, 15, 158-62.
- Ogunbodede, E. (1996). Socio economic factors and dental health in an Obstetric Population. *Journal of medicine*, 15, 158-62.
- Randy, M. (2005). Health-study: X-Ray may harm fetus. URL: [Wsbtv.com](http://Wsbtv.com)
- World Health Organization (2011). Risks to oral health and intervention. Diet & nutrition. URL: [www.who.int/oral\\_health/action/risk/en](http://www.who.int/oral_health/action/risk/en).
- World Health Organization. (2006). Global consultation on oral health Through Fluoride. WHO in collaboration with the World Dental Federation and The International Association for Dental Research. URL: [www.who.int/oral\\_health/event/Glob\\_consultation\\_en.index.html](http://www.who.int/oral_health/event/Glob_consultation_en.index.html)
- Yiping W et al. (2004). *Fusobacterium nucleatum* induces premature and term stillbirths in pregnant mice: Implication of oral bacteria in preterm birth, *Journal of Infection and Immunity*, 72(4): 2272-2279.

IntechOpen



## **Oral Health Care - Pediatric, Research, Epidemiology and Clinical Practices**

Edited by Prof. Mandeep Viridi

ISBN 978-953-51-0133-8

Hard cover, 302 pages

**Publisher** InTech

**Published online** 29, February, 2012

**Published in print edition** February, 2012

Oral health care in pediatric dentistry deals with complete oral health, including preventive aspects for children right from their conception to adolescence, encompassing all the spheres of dentistry including various specialties. It also includes planning a preventive program at individual and community levels. The current research interests in oral health care include studies regarding the role of stem cells, tissue culture, and other ground-breaking technologies available to the scientific community in addition to traditional fields such as anatomy, physiology, and pharmaceuticals etc of the oral cavity. Public health and epidemiology in oral health care is about the monitoring of the general oral health of a community, general afflictions they are suffering from, and an overall approach for care and correction of the same. The oral health care-giver undertakes evaluation of conditions affecting individuals for infections, developmental anomalies, habits, etc. and provides corrective action in clinical conditions. The present work is a compendium of articles by internationally renowned and reputed specialists about the current developments in various fields of oral health care.

### **How to reference**

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Eftekharalsadat Hajikazemi and Fatemeh Haghdost Osquei (2012). Oral and Dental Health in Pregnancy, Oral Health Care - Pediatric, Research, Epidemiology and Clinical Practices, Prof. Mandeep Viridi (Ed.), ISBN: 978-953-51-0133-8, InTech, Available from: <http://www.intechopen.com/books/oral-health-care-pediatric-research-epidemiology-and-clinical-practices/oral-and-dental-health-in-pregnancy>

**INTech**  
open science | open minds

### **InTech Europe**

University Campus STeP Ri  
Slavka Krautzeka 83/A  
51000 Rijeka, Croatia  
Phone: +385 (51) 770 447  
Fax: +385 (51) 686 166  
[www.intechopen.com](http://www.intechopen.com)

### **InTech China**

Unit 405, Office Block, Hotel Equatorial Shanghai  
No.65, Yan An Road (West), Shanghai, 200040, China  
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元  
Phone: +86-21-62489820  
Fax: +86-21-62489821

© 2012 The Author(s). Licensee IntechOpen. This is an open access article distributed under the terms of the [Creative Commons Attribution 3.0 License](https://creativecommons.org/licenses/by/3.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

IntechOpen

IntechOpen