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Knowledge, Attitudes, Beliefs, and Practices Regarding Oral Health among Pregnant Women

Literature Review

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Executive Summary

Good oral health during pregnancy can not only improve the quality of life of the pregnant mother, but also potentially reduce complications during pregnancy as well as the risk of her child developing early childhood caries in the future. Therefore, it is important to understand pregnant women's oral health knowledge and behaviours and to identify barriers to accessing care and practicing good oral hygiene. Further, improved efforts are needed to communicate oral health information to women before, during, and after pregnancy. To be effective, communication efforts must reach pregnant women at the appropriate time and must be communicated to them in a form that they easily understand.

There is a small body of published research that assesses women's knowledge, attitudes, beliefs, and practices with respect to their oral health during pregnancy. The majority of the studies involved the distribution of written surveys, others involved conducting in-person or telephone interviews, and one study involved conducting focus groups. Study participants generally included pregnant women while some included women who recently gave birth. Some studies targeted low income women.

Themes that emerged from the published studies are:

- *Increased Risk of Oral Disease during Pregnancy*. Even though pregnancy increases the risk for certain oral diseases, there appear to be gaps in women's knowledge about this risk. Some women also appear to view negative changes in their oral health, such as bleeding gums, as a normal and accepted part of pregnancy that do not necessitate treatment.
- *Relationship between Maternal Oral Health and Pregnancy Outcomes*. At least half of pregnant women do not appear to be aware of the possible link between poor maternal oral health and adverse pregnancy outcomes such as low birth weight and premature birth.
- *Relationship between Maternal Oral Health and Infant Oral Health*. Many women appear to have a poor understanding of the relationship between maternal oral health and infant oral health, specifically, there seems to be a lack of knowledge related to the transmission of caries-causing bacteria from mother to child. Also, women's knowledge of infant oral care appears to be inadequate. Awareness regarding the timing of the child's first dental visit and knowledge of the benefits of fluoride seem to be inadequate.
- *Visiting a Dentist during Pregnancy*. At most, half (35-50%) of women visit the dentist during their pregnancy. Factors that appear to be associated with dental service use during pregnancy include early entry into prenatal care, frequency of previous utilization of dental services (when not pregnant), healthier lifestyle behaviours, greater income, college-educated, older in age, and having private health insurance. Barriers to accessing dental services include pregnancy stressors, perception of dental experience, attitude toward dental practitioners, importance and valuing of oral health, perceived ability to pay for care, time constraints, and dental practitioners' and office staff attitudes toward clients.
- *Oral Health a Low Priority*. Some studies found that some women do not prioritize their oral health during pregnancy. For instance, some women attribute more importance to healthy teeth for their baby than for themselves and do not consider a dental visit during pregnancy to be important.

- *Myths and Misconceptions*. Pregnant women often have misconceptions about oral health during pregnancy which prevents them from seeking dental care. These include believing that poor oral health is a normal and accepted part of pregnancy or that dental treatment can harm the fetus. Misperceptions and erroneous beliefs about the safety of dental treatment that may contribute to the low rate of service utilization need to be corrected through oral health education of pregnant women, oral care and prenatal care providers.
- *Racial, Ethnic, and Economic Disparities*. Racial and ethnic minority women and those with economic disadvantages appear to have less oral health knowledge than do other women. Attention to the disparities related to oral hygiene practices and dental service utilization among these groups is needed.
- *Gaps in Receiving Oral Health Information*. Most pregnant women do not receive information about oral health and the importance of dental care prior to and during pregnancy. One main reason for this is the lack of oral health advice from prenatal care providers. Many prenatal care providers do not regard oral health care as an essential part of prenatal care, and most of them do not routinely advise their prenatal patients to seek dental care. Disciplinary boundaries and the historic compartmentalization of dental practice and medical care contribute to this.
- *Communication Strategies*. There is a need for creative, consistent, and comprehensive public health communication strategies that promote oral health to women in accessible and timely manners. Social media strategies, a social marketing approach, and the application of behaviour change theory are recommended for further exploration.

The learnings from this literature review will inform the development of social marketing strategies to enhance the knowledge, attitudes, beliefs, and practices regarding oral health among pregnant women.

1. Introduction

Given the importance of good oral health during pregnancy and the role of a mother's oral health in the oral health of her children, it is important to understand pregnant women's oral health knowledge and behaviours, to identify barriers to accessing care, and recommendations for improving efforts to communicate oral health information (Buerlein, Horowtitz, & Child, 2011).

There is enough evidence-based literature to suggest that good oral health during the period of pregnancy can not only improve the quality of life of the pregnant mother, but also potentially reduce complications during pregnancy and the risk of her child developing early childhood caries in the future. Also, there is good evidence which suggests that the benefits of providing dental care during pregnancy outweigh the potential risks. However, for this information to have an impact and be useful, it must reach pregnant women at the appropriate time and must be communicated to them in a form that they easily understood (Chacko, Shenoy, Prasy, & Agarwal, 2013).

This document discusses themes that have emerged from relevant published studies assessing the oral health knowledge, attitudes, beliefs, and practices among pregnant women. The purpose is to inform the development of social marketing strategies to enhance this population's oral health knowledge.

1.1 Overview of Included Studies

There is a small body of published research that assesses women's knowledge, attitudes, beliefs, and practices with respect to their oral health during pregnancy. The majority of the studies involved the distribution of written surveys, others involved conducting in-person or telephone interviews, and one study involved conducting focus groups. Study participants generally included pregnant women, while some included women who recently gave birth. Some studies targeted low income women.

The table in Appendix 1 provides an overview of the purpose, method, and conclusions of the fourteen studies included in this review.

2. Themes from the Literature

While pregnant women have some oral health knowledge, substantial gaps exist in their overall oral health literacy. Significant gaps in knowledge, misunderstandings, and a lack of dental care access exists for a majority of pregnant women across all socioeconomic levels (Chacko et al., 2013; Habashneh et al., 2005) suggesting that better education of the importance of oral care before and during pregnancy is needed for all pregnant women. Targeted strategies are also needed for racial, ethnic, and economic groups for whom disparities related to oral health practices and dental service utilization exist.

The following themes were identified from a review of the published literature assessing the knowledge, attitudes, beliefs, and practices regarding oral health among pregnant women.

Increased Risk of Oral Disease during Pregnancy

Pregnancy increases the risk for certain oral diseases. Periodontal disease is a general term for inflammatory conditions affecting the gingiva and the supporting connective tissue and alveolar bone. These are commonly divided into those involving only the gingiva (gingivitis) and those extending into the underlying structures affecting the periodontal ligament and alveolar bone (periodontitis). Both conditions are common in pregnancy. One study reported that the prevalence of gingivitis, long known to be more frequent during than outside pregnancy, ranges from 30% to 100%, depending, among others, on age, race, and socio-economic status (Keirse & Plutzer, 2010). This study also indicated that prevalence of the more serious periodontitis ranges from 5% to 20%, with about 25% of women showing a worsening periodontal condition during pregnancy. Even higher rates have been reported in women with preterm birth.

Even though pregnancy increases the risk for certain oral diseases, there appear to be gaps in women's knowledge about this risk (Keirse & Plutzer, 2010). Some women also appear to view negative changes in their oral health, such as bleeding gums, as a normal and accepted part of pregnancy that do not necessitate treatment.

Most oral diseases are silent in nature such that people tend to delay treatment. The majority of mothers in one study who did not visit a dentist during pregnancy claimed that they had no dental problem (Saddki, Yusoff, & Hwang, 2010). In fact, most mothers in this study perceived their oral health status to be good or very good. On the other hand, many of them also reported having problems with their teeth and gum. This implies that the mothers either did not consider these symptoms to be indicative of oral health issues or did not perceive their oral health care as an urgent need and would rather delay visit until after delivery.

Another study found that 18% of women had experienced gingival bleeding before pregnancy and 41% during pregnancy, and that many pregnant women do not perceive gingival bleeding as indicating inflammatory disease and seek no professional help for it (Keirse & Plutzer, 2010). Many pregnant women in this study appeared to believe that bleeding gums are a normal physiological phenomenon of pregnancy. It is possible that pregnant women view teeth and gum problems as entirely separate issues. Other studies indicate that nearly half of the pregnant women with dental problems sought no dental care for them (Lydon-Rochelle, Krakowiak, Hujoel, & Peters, 2004) or postponed this until after the pregnancy (Dinas et al., 2004).

Relationship between Maternal Oral Health and Pregnancy Outcomes

Research has shown a possible link between poor maternal oral health and adverse pregnancy outcomes such as low birth weight and premature birth. One study found that 43% of women surveyed reported having heard about the possible connection between health in pregnancy and

oral health and 39% thought that tooth and gum problems could affect outcomes of pregnancy (Habashneh et al., 2005).

Relationship between Maternal Oral Health and Infant Oral Health

Maternal oral diseases such as gingivitis, caries, and periodontal infection affect a woman's oral health and may affect the oral health of her children. Maternal oral flora and oral health are one of the greatest predictors of childhood oral flora and oral health. If a mother has caries, her child or children are at an increased risk of developing caries. The relationship between maternal oral flora and health and child oral health is thought to be caused by the transmission of Streptococcus mutans from mother to child. Maternal behaviours, including attention to oral hygiene and dietary practice, also may influence this risk (Boggess et al., 2011). Simple measures such as maintenance of good oral hygiene, use of a fluoridated tooth paste/mouthwash, diet modification, use of xylitol chewing gums, having regular dental checkups, and receiving needed dental treatment help in decreasing the likelihood of transmission of infection from mother to child and ultimately reduces the risk of early childhood caries. Thus, there is growing evidence that good oral health of the mother right from the pregnancy could be the key to establishing good infant oral health (Chacko et al., 2013).

Among the women surveyed in one study, a majority had a poor understanding of the relationship between maternal oral health and infant oral health (Chacko et al., 2013). Women's knowledge of infant oral health was also found to be inadequate. Awareness regarding the timing of the first dental visit was poor, with most women reporting that they would only take their child to a dentist if the child had a problem. Their knowledge of the benefits of fluoride was also found to be low.

Another study found that many women seem to be aware of the relationship between sugar intake and dental caries, and they said they believe it is important to care for the teeth (Boggess et al., 2011). However, over half of the participants did not know that it is important to wipe infants' gums after they drink from a breast or bottle. Another study found that most women reported they would start cleaning their child's oral cavity only once the first tooth erupts (Chacko et al., 2013).

Visiting a Dentist during Pregnancy

One study indicated that, at most, half (35-50%) of women visit the dentist during their pregnancy (Habashneh et al., 2005). Another study found that only 35% of women had dental care during pregnancy and 35% had no dental visit for at least two years prior (Keirse & Plutzer, 2010).

Factors that appear to demonstrate a significant association with utilization of dental services during pregnancy include early entry into prenatal care, frequency of previous utilization of dental services (when not pregnant), healthier lifestyle behaviours (frequent brushing of teeth, not drinking alcohol while pregnant, non-smoker), greater income, college-educated, older in age, and having private health insurance (Habashneh et al., 2005). In general, the more knowledgeable the women are, the more likely they are to visit a dental office. Among mothers who reported having a dental visit

during pregnancy, the main types of treatment received were examination (96%) and routine cleaning (95%).

Another study found that barriers to use of dental services include pregnancy stressors, perception of dental experience, attitude toward dental practitioners, importance and valuing of oral health, perceived ability to pay for care, time constraints, and dental practitioners' and office staff attitudes toward clients (Detman, Cottrell, & Denis-Luque, 2010).

The high cost of dental care is a commonly cited problem that deters pregnant women from consulting dental professionals, especially for those from low-income families. However, it is important to note that the provision of free dental treatment during pregnancy may not necessarily increase use of dental services among pregnant women. One study discusses reports from countries that do provide free dental care during pregnancy, showing fairly low use among pregnant women, ranging from 27% in Greece to 33% in UK (George et al., 2011). One reason for the low rates in these countries may be the lack of awareness among pregnant women about the importance of oral health care during pregnancy. A recent study in Malaysia found that pregnant women who reported dental visits were more likely to be those who received oral health education during the prenatal period and knew about the potential consequences of poor maternal oral health (Saddki et al., 2010). Providing both prenatal oral health education, along with access to free dental care may be an effective way of increasing use of dental services among pregnant women. Incorporating such an approach in a community-based intervention program in the United States resulted in a substantial increase in the proportion of pregnant women seeking dental care (George et al., 2011).

Also, it is well documented that dental fear and anxiety, particularly around dental pain, have significant impact on dental care use behaviours (Saddki et al., 2010). One study conducted in the U.S. among low-income women found that it was common for the women to have had negative experiences accessing dental care, both as children and as adults (Buerlein et al., 2011). Women often recounted personal experiences with dental treatment that involved pain and fear. Personal experiences appeared to be an important deterrent, along with cost, to obtaining consistent, if any, dental care between childhood and adulthood. Most women had gone to the dentist as children, but many had not been since childhood.

Most participants in a study of low-income women described a large gap in their inclination and ability to access care between childhood and adulthood (Buerlein et al., 2011). While insurance and cost of treatment were factors, women were also unaware of the importance of maintaining oral health during preconception and pregnancy. Limited, inconsistent use of dental care may contribute to low awareness of the importance of oral health and appropriate oral hygiene practices for women and their children. This study also found it to be common for low income women to have had negative experiences accessing dental care, both as children and as adults.

The results from two other studies reveal that mothers who reported a dental visit during pregnancy were more likely to be those who had received oral health education before the current pregnancy

and knew of the association between poor maternal oral health and adverse pregnancy outcomes (Habashneh et al., 2005; Saddki et al., 2010). Thus, oral health education clearly plays an important role in imparting knowledge and increasing awareness to improve mothers' dental care-seeking behaviour.

One study makes an important point with regard to improving access to dental care during pregnancy. A significant predictor of a lack of routine dental care among women during pregnancy is a lack of routine dental care when they were not pregnant (Boggess et al., 2010). This study also discussed that lack of financial resources and the inability to pay for care also are associated significantly with the lack of use of routine dental services during pregnancy, and it is likely that these factors influence women's dental care utilization when they are not pregnant. Thus, addressing a woman's access to dental health care *only* during pregnancy is likely to have limited utility in affecting the oral health of the woman and her children.

Oral Health a Low Priority

In one study, women rated their general health significantly better than their oral health and attributed more importance to healthy teeth for their baby than for themselves (Keirse & Plutzer, 2010). Further, most of the women surveyed in another study did not consider it important to have a dental checkup during pregnancy (Chacko et al., 2013). A different study found that for the survey respondents who did not report a dental visit during pregnancy, the most common reasons for not going to the dentist were, ‘‘I was not having a problem’’ (89%), and ‘‘I chose to delay until after pregnancy’’ (68%) (Habashneh et al., 2005). Of the 34% who cited ‘‘other’’ as the reason for not having a visit, nearly two-thirds indicated that they did not think they should go to the dentist while pregnant, or had not been informed that they should visit the dentist. Approximately one-third (39%) indicated that they did not consider a dental visit a priority.

Myths and Misconceptions

Pregnant women often have misconceptions about oral health during pregnancy that prevents them from seeking dental care. These include believing that poor oral health is normal and accepted during pregnancy or that dental treatment can harm the fetus (George et al., 2011).

Folk wisdom has linked dental health with pregnancy from time immemorial. ‘‘A tooth for a child’’ has an equivalent in many languages. Its implication is that the demands of pregnancy include the loss of a tooth. The concept that dental minerals are recycled to benefit fetal bone formation was put to rest long ago, but many women apparently still believe this (Keirse & Plutzer, 2010).

Also, confusion over the safety of accessing dental care during pregnancy has led some women to avoid treatment during the prenatal period (Buerlein et al., 2011). Women in one study described numerous occasions where dentists, family, and friends had incorrectly advised them about the safety of treating oral health problems during pregnancy. It is well established that undertaking essential dental treatment during pregnancy, such as treating acute infections and dental caries, is extremely safe and will not result in adverse pregnancy outcomes. Further, the second trimester is

considered the ideal period for undertaking dental treatment. Yet many oral care and prenatal care providers remain confused about when it is safe to treat women during pregnancy. Women expressed their desire to have information that clarifies when to have treatment, the scope of the treatment, and to be reassured that diagnostic procedures such as x-rays would not be detrimental to their fetus (George et al., 2011).

Other studies identified mistaken beliefs about dental treatment being harmful to the fetus as a barrier to oral care. This misconception was reported as the most important factor limiting access to dental care among mothers in Greece (Saddki et al., 2010). Many women have questions about the need for x-rays, the types of procedures allowed, lack of pain relief or worry about its effects on the baby, beliefs among friends and family that dentists would not see pregnant women, and information from practitioners about seeking dental care (Detman et al., 2010).

Misperceptions and erroneous beliefs about the safety of dental treatment that may contribute to the low rate of service utilization need to be corrected through oral health education of pregnant women, oral care and prenatal care providers (Saddki et al., 2010).

Racial, Ethnic, and Economic Disparities

Disparities related to oral hygiene practices and dental service utilization during pregnancy exist. Gingivitis and periodontal infection are two to three times more prevalent among racial or ethnic minorities, and they are more likely to have untreated diseases. The reasons for these disparities are complex and multifactorial, and they may reflect a combination of limited knowledge regarding the importance of oral health and hygiene, inadequate oral hygiene, and lack of access to preventive oral health care. Evidence suggests that racial and ethnic minority women and those with economic disadvantages have less oral health knowledge than do other women (Boggess et al., 2011).

Gaps in Receiving Oral Health Information

Most pregnant women do not receive information about oral health and the importance of dental care prior to and during pregnancy (Habashneh et al., 2005; Detman et al., 2010). One of the reasons for the poor knowledge among pregnant women can be attributed to the lack of advice from prenatal care providers on oral health (Chacko et al., 2013). One study found that only 14% of pregnant women were referred by their doctors or nurses for a dental visit (Saddki et al., 2010).

Calls for increased awareness of oral health in pregnancy are likely to have little effect, if they only reach dental care providers and the relatively small proportion of women who already use their services in pregnancy. If any impact is to be expected, it will need to come from sensitizing prenatal care providers to the issue and from their ability to address it in prenatal visits, pre-pregnancy counseling, and prenatal education (Boggess et al., 2010).

Doctors, midwives, and nurses are the front liners in prenatal care. Their responsibilities in oral health care provision are mainly to recommend dental referral to all prenatal mothers and to emphasize the importance of good oral health. It is imperative that they are aware of the current

evidence linking maternal oral health and pregnancy outcomes. However, studies have shown that prenatal care providers do not regard oral health care as an essential part of prenatal care, and that most of them do not routinely advise their prenatal patients to seek dental care (Saddki et al., 2010). Continuing education for prenatal care providers is necessary. In addition, there should be mechanisms that can effectively facilitate communication and encourage cross-referral between dental and prenatal care providers.

Disciplinary boundaries and the historic compartmentalization of dental practice and medical care may limit sharing of information among professionals (Detman et al., 2010). Interdisciplinary learning and cross-training opportunities could be used to promote oral screening and guidance training for obstetricians, nurse practitioners, midwives, nurses, and family practitioners. Also, instituting regular anticipatory guidance during routine dental checkups to women of childbearing age about the importance of maintaining oral health and dental appointments during pregnancy may be a worthwhile avenue for oral health education, especially for women who seem to place a low priority on dental care.

There is also an important opportunity for dentists to affect a woman's oral health behaviours and use of dental care during and after pregnancy. Dental and prenatal care providers should develop policies that address access to care to improve routine dental care use before and during pregnancy, address misinformation about dental care being unsafe during pregnancy, and reduce the racial, ethnic, and economic disparities in oral health care (Boggess et al., 2010).

Communication Strategies

One study explored how oral health information could best reach women. Many participants indicated that their primary source of health information was not print materials, but rather Internet searches, advice from family and friends, and participation in social and health programs (Buerlein et al., 2011). In this study, women suggested that outreach strategies to educate pregnant women and mothers use e-mail, advertisements sent by text message to cell phones, blogs, and social media such as Facebook. Women also suggested that information be incorporated in school materials that children bring home, along with being posted in places where pregnant women may notice information such as at retail stores. The need to develop resources that are tailored to audiences with limited reading skills was reinforced. Women would benefit from short and very visual media. Women further discussed the need for brochures to utilize pictures and diagrams to convey content without text, and suggested that print materials include hands-on, illustrated instructions. Their responses indicate a need for creative, consistent, and comprehensive public health communication strategies that promote oral health to pregnant women and women in the preconception stage in accessible and timely manners, with specific strategies for those at increased risk.

This study also found that many women had not received oral health information as early as needed to take appropriate action before and during their pregnancies, or with their infants (Buerlein et al., 2011). Often, women did not receive information on how to promote oral health until seeking care

for dental problems or pain. It was evident that women are willing to implement the oral health advice they receive, but often are not exposed to information early enough to do so. Communication strategies must address underlying causes that inhibit women from seeking care. Many existing messages and materials are prescriptive in nature; they provide specific instructions on when and how to access care, but they do not address underlying fears and concerns that may play a role in not seeking care such as some mothers' fear of being separated from their children during the dental visit, or their own fear of dental care. Plain language, a cornerstone for increasing health literacy, must be used to explain concepts. Specific and easily understood examples of practices to avoid and promote should be incorporated in health messages. Additionally, conflicting messages must be addressed. For example, messages promoting consumption of tap water for its fluoride content created confusion and were ineffective, because many participants believed that tap water is to be avoided due to its lead content. Marketing messages for some food and beverage products also created confusion over whether "all natural" products were always acceptable choices, or should be limited because of sugar content (Buerlein et al., 2011).

One study explored the application of behaviour change theory which may offer insight for communications strategies (Le, Ledy, Weinstein, & Milgrom, 2009). In particular, it discussed the stages of change model as a theoretical basis for understanding the study findings. Those who do not express much understanding of the benefit of dental care during pregnancy are considered to be in the precontemplation stage. They do not have a backlog of positive dental experiences to draw from and tend to seek out only symptomatic care. There are few "pros." People who have not had regular positive contacts with dental care providers have the belief that when their teeth do not hurt them, there are no problems that require attention. The women in the contemplation stage understood and valued the benefit of dental care ("pros"). They identified barriers, however, as a deterrent to accepting care ("cons") and did not move to the action stage to accept care. Women who utilized the service recognized and managed to overcome barriers or "cons" (dental fear, lack of child care) and progressed to the action stage to accept care. These women appeared to have had previous positive dental experiences that impacted their choice to expend scarce resources to access care.

Pregnancy presents prominent stressors. Social supports are important protective factors against the effects of stress and relate to positive health practices in pregnant women (Le et al., 2009). Without this support, stress may block progression from the contemplation to the action stage. Discussion of the advantages of dental care ("pros") can encourage individuals to progress from the precontemplation to contemplation stage, but decreasing/eliminating barriers to change ("cons") is more likely to move individuals from the contemplation to action stage. Stages of change are dynamic and depend upon environmental as well as personal changes. A person in the action stage at one point of time may fall back into the contemplation stage if the environment is not supportive. Motivational interviewing, an approach congruent with the stages of change theory, has been used to promote the use of dental care for the parents of preschoolers and can be readily used with pregnant women.

This study went on to discuss ways to diminish barriers to care. Requirements include providing women in the precontemplative stage with a better understanding of the benefits of dental visits; lowering barriers (“cons”) for women in the contemplative stage by providing supportive services such as support groups for mothers, transportation, and child care; developing training for participating dental offices to increase cultural competence and improve interpersonal communication skills for the entire dental team; and offering participating dentists continuing education courses on treating pregnant women so that they can provide dental services with full knowledge of pregnant women’s sensitivities and needs (Le et al., 2009).

Another study applied an online, social marketing approach for promoting awareness of oral health messages targeted at pregnant women due to the Internet becoming increasingly affordable and accessible for people of diverse backgrounds and proving to be an effective way to market an important message (Bates & Riedy, 2012). The study builds on previous social marketing approaches by the US Department of Agriculture, the Centers for Disease Control, the US Department of Health, and others to promote healthy lifestyles including breastfeeding, decreasing fat consumption, promoting increases in physical activities, as well as improving many other preventive health behaviours. The study discussed that for a social marketing message to be effective:

- it must provide a solution to a problem that the consumer would deem important or be of true value and benefit;
- it must offer alternative choices that invite voluntary change;
- it creates an alteration of environment by providing a recommended healthy behaviour change that is more advantageous than the alternative unhealthy behavior; and
- it attempts to reach its audience with a cost-benefit relationship.

The online commercial used in the study used positive emotional benefit and heuristic appeal approaches to elicit attentive processing of the message, enhance recall of feelings and content of the message, create long-lasting attitude changes, and compliance with the health message (Bates & Riedy, 2012). The emotional benefit appeal used “rational and affective components” in the health message to generate an emotional response, while the heuristic appeal used background music and imagery to create a favourable atmosphere to capture the audience’s attention. Based on pre- and post-surveys conducted among a small sample of pregnant women, the authors concluded that a brief oral health-related message aimed at pregnant women and mothers of young children using a social media approach can be effective for changing knowledge and beliefs.

Oral Health as Part of Overall Health and Disease Understanding

None of the studies reviewed specifically discussed women’s knowledge and attitudes with respect to oral health as part of one’s overall health, or knowledge that oral conditions common during pregnancy are diseases that can impact overall health and that caries are an infectious, transmittable disease. However, it is mentioned here as this appears to be an important aspect of increasing oral health knowledge that appears in other literature (Institute of Medicine, 2013).

2. Conclusion

Good oral health during pregnancy can not only improve the health of the pregnant mother, but also potentially the health of her child. Therefore, it is important to understand pregnant women's oral health knowledge and behaviours and to identify barriers to accessing care and practicing good oral hygiene. There is a need for creative, consistent, and comprehensive communication strategies that promote oral health to women in accessible and timely manners. Further, enhanced communication is needed from oral care and prenatal care providers, particularly physicians and nurses. Communication by oral care and prenatal care providers should address the myths and misconceptions many women have about oral health during pregnancy and increase women's awareness that oral health needs special attention during pregnancy because of the higher risk of oral disease, that oral health may affect the health of a pregnancy, and that women's oral health can directly affect a child's downstream oral health.

References

Bamanikar, S. & Kee L. K. (2013). Knowledge, attitude and practice of oral and dental healthcare in pregnant women. *Oman Medical Journal, 28*(4), 288-291. doi: 10.5001/omj.2013.80

Bates, S. B. & Riedy, C. A. (2012). Changing knowledge and beliefs through an oral health pregnancy message. *Journal of Public Health Dentistry, 72*, 104-111. doi: 10.1111/j.1752-7325.2011.00289.x

Boggess, K. A., Urlaub, D. M., Massey, K. E., Moos, M. K., Polinkovsky, M., Matheson, M. B., & Lorenz, C. (2010). Oral hygiene practices and dental service utilization among pregnant women. *JADA, 141*(5), 553-561. doi: 10.14219/jada.archive.2010.0228

Boggess, K. A., Urlaub, D. M., Moos, M. K., Polinkovsky, M., El-Khorazaty, J., & Lorenz, C. (2011). Knowledge and beliefs regarding oral health among pregnant women. *JADA, 142*(11), 1275-1282. doi: 10.14219/jada.archive.2011.0113

Buerlein, J. K., Horowitz, A. M., & Child, W. L. (2011). Perspectives of Maryland women regarding oral health during pregnancy and early childhood. *Journal of Public Health Dentistry, 71*(2), 131-135. doi: 10.1111/j.1752-7325.2010.00211.x

Chacko, V., Shenoy, R., Prasy, H. E., & Agarwal, S. (2013). Self-reported awareness of oral health and infant oral health among pregnant women in Mangalore, India - a prenatal survey. *International Journal of Health and Rehabilitation Sciences, 2*(2), 109-115. Retrieved from http://www.scopemed.org/fulltextpdf.php?mno=40341

Detman, L. A., Cottrell, B. H., & Denis-Luque, M. F. (2010). Exploring dental care misconceptions and barriers in pregnancy. *Birth, 37*(4), 318-24. doi: 10.1111/j.1523-536X.2010.00427.x

Dinas, K., Achyropoulos, V., Hatzipantells, E., Marromatida, G., Zepiridis, L., Theodoridis, T., Dovas, D., Tantanasis, T., Goutzioulis, F., Bontis, J. (2007). Pregnancy and oral health: utilisation of dental services during pregnancy in northern Greece. *Acta Obstet Gynecol Scand.*, 86(8), 938-44. doi: 10.1080/00016340701371413

Ganesh, A., Ingle, N. A., Chaly, P. E., & Reddy, C. (2011). A survey on dental knowledge and gingival health of pregnant women attending government maternity hospital, Chennai. *J Oral Health Comm Dent, 5*(1), 24-30. Retrieved from http://www.johcd.org/pdf/JOHCD%20Jan%20(Art%206)%20(15-3-11).pdf

George, A., Johnson, M., Duff, M., Ajwani, S., Bhole, S., Blinkhorn, A., & Ellis, S. (2011). Midwives and oral health care during pregnancy: perceptions of pregnant women in south-western Sydney, Australia. *Journal of Clinical Nursing, 21*(7-8), 1087–1096. doi: 10.1111/j.1365-2702.2011.03870.x

Habashneh, R., Guthmiller, J. M., Levy, S., Johnson, G. K., Squier, C., Dawson, D. V., & Fang, Q. (2005). Factors related to utilization of dental services during pregnancy. *J Clin Periodontol, 32*(7), 815-821. doi: 10.1111/j.1600-051X.2005.00739.x

Hom, J. M., Lee, J. Y., Divaris, K., Baker, D., & Vann, W. F. (2012). Oral health literacy and knowledge among patients who are pregnant for the first time. *JADA, 143*(9), 972-980. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3711860/pdf/nihms487780.pdf

Institute of Medicine (2013). *Oral health literacy: Workshop summary*. Washington, DC: The National Academies Press. Retrieved from http://www.nap.edu/catalog.php?record_id=13484

Keirse, M. & Plutzer, K. (2010). Women's attitudes to and perceptions of oral health and dental care during pregnancy. *J Perinat Med, 38*(1), 3-8. doi: 10.1515/JPM.2010.007

Le, M., Riedy, C., Weinstein, P., & Milgrom, P. (2009). Barriers to utilization of dental services during pregnancy: a qualitative analysis. *J Dent Child, 76*(1), 46-52. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2891449/

Lydon-Rochelle, M. T., Krakowiak, P., Hujoel, P. P., Peters, R. M. (2004). Dental care use and self-reported dental problems in relation to pregnancy. *Am J Pub Health*, 94(5), 765-771. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448335/pdf/0940765.pdf

Saddki, N., Yusoff, A., & Hwang, Y.L. (2010). Factors associated with dental visit and barriers to utilisation of oral health care services in a sample of antenatal mothers in Hospital Universiti Sains Malaysia. *BMC Public Health, 10*, 75. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2834630/pdf/1471-2458-10-75.pdf

Strafford, K. E., Shellhaas, C., & Hade, E. M. (2008). Provider and patient perceptions about dental care during pregnancy. *Journal of Maternal-Fetal and Neonatal Medicine, 21*(1), 63-71. doi: 10.1080/14767050701796681

Appendix 1

Studies Included in Literature Review

Study (by date)	Study Purpose	Study Method	Conclusions
Bamanikar, S., & Kee, L.K. (2013). Knowledge, attitude and practice of oral and dental healthcare in pregnant women. *Oman Medical Journal, 28*(4), 288-291.	To assess women's knowledge and attitude towards oral and dental health during pregnancy and to examine their self-care practices in relation to oral and dental health.	A cross-sectional descriptive and analytical study conducted at the maternal child health center in Brunei, Darussalam. The study group was comprised of 95 pregnant women at a health clinic using convenience sampling method. A self-administered questionnaire was used.	This study highlights important gaps in dental knowledge and practices related to oral and dental healthcare among pregnant women in Brunei, Darussalam. More intense dental health education, including oral health promotion in maternal child health centers can lead to improved oral and dental health, and ultimately pregnancy outcomes.
Boggess, K.A., Urlaub, D.M., Massey, K.E., Moos, M.K., Polinkovsky, M., Matheson, M.B., & Lorenz, C. (2010). Oral hygiene practices and dental service utilization among pregnant women. *JADA, 141*(5), 553-561.	To examine women's oral hygiene practices and use of dental services during pregnancy.	Written oral health questionnaire administered to 599 pregnant women.	Racial, ethnic, and economic disparities related to oral hygiene practices and dental service utilization during pregnancy exist.
Boggess, K.A., Urlaub, D.M., Moos, M.K., Polinkovsky, M., El-Khorazaty, J., & Lorenz, C. (2011). Knowledge and beliefs regarding oral health among pregnant women. *JADA, 142*(11), 1275-1282.	To assess and compare maternal oral health knowledge and beliefs and to determine if maternal race and ethnicity or other maternal factors contributed to women's knowledge or beliefs.	A written oral health questionnaire to 615 pregnant women.	Pregnant women have some oral health knowledge. Knowledge varied according to maternal race or ethnicity, and beliefs varied according to maternal education. Including oral health education as a part of prenatal care may improve knowledge regarding the importance of oral health among vulnerable pregnant women, thereby improving their oral health and that of their children.

Study (by date)	**Study Purpose**	**Study Method**	**Conclusions**
Buerlein, J.K., Horowitz, A.M., & Child, W.L. (2011). Perspectives of Maryland women regarding oral health during pregnancy and early childhood. *Journal of Public Health Dentistry, 71*(2), 131-135.	To obtain information on low income women's knowledge, beliefs, and practices regarding oral heath during pregnancy and for infant care.	A professional focus group moderator conducted four focus groups (n = 34) among low-income women in Maryland who were either pregnant or had children aged two and younger.	Women were reasonably well informed about oral health practices for themselves and their children; however, important myths and misperceptions were common. Several themes emerged; a central one being that most women had not received oral health information in time to apply it according to recommended practice.
Chacko, V., Shenoy, R., Prasy, H.E., & Agarwal, S. (2013). Self-reported awareness of oral health and infant oral health among pregnant women in Mangalore, India - a prenatal survey. *International Journal of Health and Rehabilitation Sciences, 2*(2), 109-115.	To evaluate knowledge and practices of pregnant women with respect to their oral health, knowledge of pregnant women on Infant Oral Health and whether these parameters were influenced by maternal education level.	Questionnaire which was completed by 175 pregnant women attending various primary health centers, private clinics and nursing homes in Mangalore.	The knowledge and practices of pregnant women with respect to oral health and infant oral health was poor and was not influenced by their level of education.
Detman, L.A., Cottrell, B.H., & Denis-Luque, M.F. (2010). Exploring dental care misconceptions and barriers in pregnancy. *Birth, 37*(4), 318-24.	To explore Florida women's experience of barriers in obtaining dental care before and during their pregnancies.	One month after giving birth, face-to-face interviews were conducted with 253 African American women.	Most participants did not obtain dental care and did not recall receiving dental information during prenatal visits. Barriers to dental care included lack of insurance, difficulty in finding a dentist, low priority given to dental care, misconceptions about the safety and appropriateness of dental care during pregnancy, and sporadic anticipatory guidance during prenatal care.

Study (by date)	**Study Purpose**	**Study Method**	**Conclusions**
Ganesh, A., Ingle, N.A., Chaly, P.E., & Reddy, C. (2011). A survey on dental knowledge and gingival health of pregnant women attending government maternity hospital, Chennai. *J Oral Health Comm Dent, 5*(1), 24-30.	To determine dental knowledge and gingival health of pregnant women.	Survey among 208 antenatal women attending Government Maternity Hospital, Chennai.	A majority of the pregnant women had a fair level of oral hygiene with mild gingivitis. Even though they were aware of oral hygiene practices, they did not apply it. Only 50% of them had regular visits to the dentist. Dental health education programs should be carried out at regular intervals so as to impart knowledge on dental health and oral hygiene practices.
George, A., Johnson, M., Duff, M., Ajwani, S., Bhole, S., Blinkhorn, A., & Ellis, S. (2011). Midwives and oral health care during pregnancy: perceptions of pregnant women in south-western Sydney, Australia. *Journal of Clinical Nursing, 21*(7-8), 1087-1096.	To explore the perceptions of pregnant women in Australia towards oral health care during pregnancy and their views regarding midwives providing oral health education, assessment and referrals as part of antenatal care.	Data were collected via semi-structured telephone interviews with 10 pregnant women residing in south-western Sydney.	Thematic analyses of the data suggest a high prevalence of poor oral health among the sample of pregnant women, especially those socioeconomically disadvantaged. The findings also highlight various barriers deterring these women from seeking dental care, the most significant being lack of dental awareness, high treatment costs, and misconceptions about dental treatment during pregnancy. The absence of affordable dental care remains a major barrier in Australia. The proposed preventive program was well received by women, although issues such as education for midwives and referral pathways were highlighted.

Study (by date)	**Study Purpose**	**Study Method**	**Conclusions**
Habashneh, R., Guthmiller, J.M., Levy, S., Johnson, G.K., Squier, C., Dawson, D.V., & Fang, Q. (2005). Factors related to utilization of dental services during pregnancy. *J Clin Periodontol, 32*(7), 815-821.	To investigate factors related to utilization of dental services during pregnancy and to assess the extent of mothers' knowledge regarding oral health during pregnancy and its effect on pregnancy outcomes.	A structured questionnaire mailed to 625 mothers who had given birth in Johnson County, Iowa from August 2001 to March 2002.	There was limited knowledge of the possible relationships between oral health and pregnancy outcomes in a fairly homogeneous population of women who were of relatively high socioeconomic standing. This study suggests that better education of the importance of dental care before and during pregnancy is needed.
Hom, J.M., Lee, J.Y., Divaris, K., Baker, D., & Vann, W.F. (2012). Oral health literacy and knowledge among patients who are pregnant for the first time. *JADA, 143*(9), 972-980.	To determine the levels of and examine the associations of oral health literacy (OHL) and oral health knowledge in low-income patients who were pregnant for the first time.	An analytic sample of 119 low-income patients who were pregnant for the first time completed a structured 30-minute, in-person interview conducted by two trained interviewers in seven counties in North Carolina.	Oral health literacy was low in the study sample. There was a significant association between oral health literacy and oral health knowledge. Health literacy is the degree to which people have the capacity to obtain, process, and understand basic health information and services that are needed to make appropriate health decisions. In pregnant women, poor health knowledge resulting from low health literacy has the potential to influence the ease of self-care decisions.
Keirse, M. & Plutzer, K. (2010). Women's attitudes to and perceptions of oral health and dental care during pregnancy. *J Perinat Med, 38*(1), 3-8.	To assess pregnant women's opinions on and perceptions of oral health and their relationship to oral hygiene and dental care practices.	Questionnaire survey on perceived oral health, oral hygiene, and utilization of dental services among 649 nulliparae attending for antenatal care at all public antenatal clinics in Adelaide, South Australia.	Many pregnant women do not perceive gingival bleeding as indicating inflammatory disease and seek no professional help for it. Maternity care providers need to devote more attention to oral health in antenatal clinics and antenatal education.

Study (by date)	**Study Purpose**	**Study Method**	**Conclusions**
Le, M., Riedy, C., Weinstein, P., & Milgrom, P. (2009). Barriers to utilization of dental services during pregnancy: a qualitative analysis. *J Dent Child, 76*(1), 46-52.	To understand why low-income women did or did not utilize dental services in a pilot program to promote dental visits during pregnancy in Klamath County, Ore.	Semi structured telephone interviews regarding utilization of dental services during pregnancy with 51 pregnant women.	Pregnancy stressors and dental- related issues were identified as barriers to utilizing dental services. Identifying barriers that prevent women from taking action to access dental care may provide essential information for enhancing programs to promote dental visits during pregnancy.
Saddki, N., Yusoff, A., & Hwang, Y.L. (2010). Factors associated with dental visit and barriers to utilisation of oral health care services in a sample of antenatal mothers in Hospital Universiti Sains Malaysia. *BMC Public Health, 10*, 75.	To determine factors associated with dental visit and to describe barriers to utilization of oral health care services among antenatal mothers attending the Obstetric and Gynaecology Specialist clinic in Hospital Universiti Sains Malaysia.	A structured, self-administered questionnaire was used obtain information on the variables of interest pertaining to the current pregnancy from 124 antenatal mothers.	Utilization of oral health care services among antenatal mothers was low. Mothers who reported dental visits were more likely to be those who had received oral health education before the current pregnancy and knew of the association between poor maternal oral health and adverse pregnancy outcomes. Dissatisfaction with the services rendered and perceptions of not having any oral health problems were the main barriers.

Study (by date)	**Study Purpose**	**Study Method**	**Conclusions**
Strafford, K.E., Shellhaas, C., & Hade, E.M. (2008). Provider and patient perceptions about dental care during pregnancy. *Journal of Maternal-Fetal and Neonatal Medicine, 21*(1), 63-71.	To compare the opinions of dentists, obstetricians, and patients on dental care in pregnancy: its necessity, accessibility, and safety.	A 35-item questionnaire was distributed within Ohio, to 400 patients and 1000 providers.	Different respondent perceptions exist regarding the safety, accessibility, and necessity of prenatal dental treatments. Many patients do not seek, and are not advised to seek, routine dental care as part of their prenatal care. Dentist responders did express greater concerns about patient and fetal safety during dental treatment than their obstetrical colleagues. Obstetricians perceived safety concerns to be a major factor limiting patient and dentist comfort with treatment during pregnancy. Obstetricians also stressed concerns about cost and availability as significant limiting factors in prenatal dental care. Failure of dentists to accept Medicaid or non-insured patients was a frequent reason for lack of dental care by obstetricians and patients. Professional guidelines about oral health screening in pregnancy and the safety of dental procedures would benefit patients and providers.