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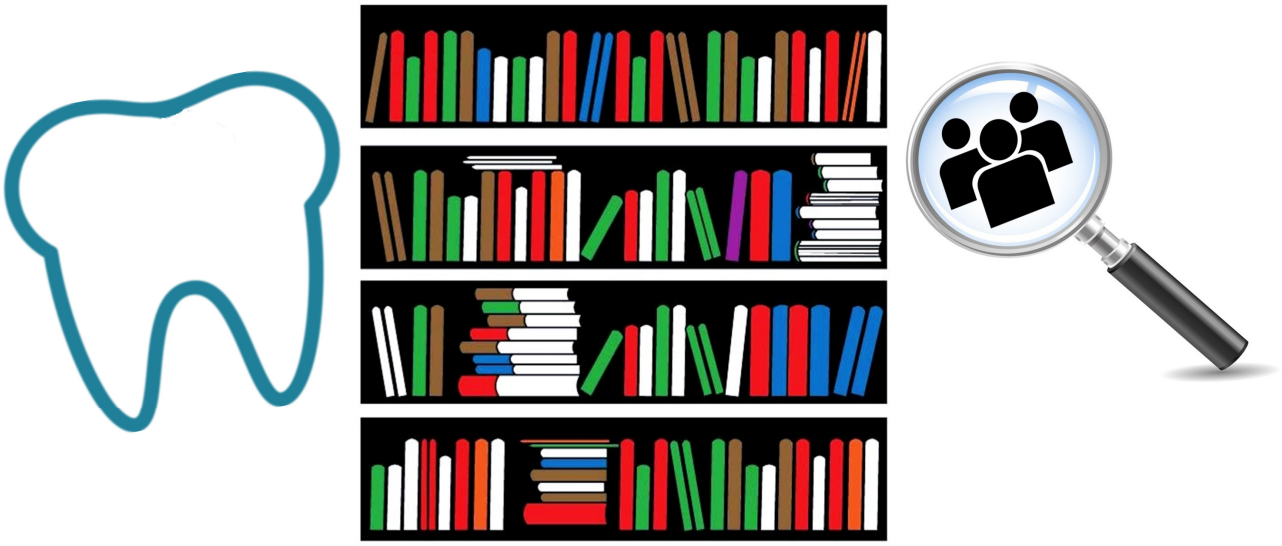
Faculty of Dentistry
Dental Public Health
The University of Hong Kong

Community Health

Project Reports 2016

Oral Health and Breastfeeding Promotion Program for Pregnant Women



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Oral Health and Breastfeeding Promotion Program for Pregnant Women

Community Health Project
2015-2016

Faculty of Dentistry
The University of Hong Kong

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1. Abstract

The aim of this project was to promote the awareness and knowledge of pregnant women and infant oral health as well as the oral benefits of breastfeeding through a multi-disciplinary approach. This pilot oral health promotion program was developed to promote oral health knowledge related to the common dental problems among pregnant women and infants, and the oral health advantages of breastfeeding for infants.

The program was conducted twice during March to April 2016 at the Queen Elizabeth Hospital. It consisted of a 15-minute PowerPoint presentation and a 15-minute small-group interactive workshop on Oral Hygiene Instructions. Evaluation forms were used to collect the feedbacks of the participants.

The feedbacks for both the PowerPoint presentation and the interactive workshop were positive. Over 70% of the participants found that the contents were well-presented and the dental students were able to answer their questions. Furthermore, the participants agreed that the stated objectives of the program were met and the content of the program could be applicable in the coming future. Over 80% of the participants expressed that they understood the oral health advantages of breastfeeding after this program.

To conclude, this program can effectively promote the key oral health messages about the common oral health problems of pregnant women and infants as well as the oral health advantages of breastfeeding. Also, this program can be effectively incorporated into the existing ante-natal classes.

Further research can be performed to quantify the effectiveness by comparing the dental knowledge of pregnant women before and after this program. Further cooperation with a wider range of organizations, such as midwifery and nursing schools should also be explored.

2. Introduction

In Hong Kong, there has been no structured oral health promotion program that addresses common dental problems among pregnant women and their infants. Free pre-natal classes have been available for pregnant women conducted by nurses regularly, but oral health messages were seldom mentioned. These nurses were not trained how to teach the pregnant women to take care of their own as well as their infants' oral health. A recent research entitled "Oral Health Knowledge of Pregnant Women on Pregnancy Gingivitis and Children's Oral Health" conducted by the Faculty of Dentistry of the University of Hong Kong, identified that pregnant women generally did not know that they were susceptible to several oral diseases due to hormonal changes and the potential adverse consequences of leaving pregnancy gingivitis untreated [1].

In recent years, the Hong Kong government has been actively promoting the health benefits of breastfeeding to mothers and babies in the ante-natal classes [2]. However, the oral health benefits of breastfeeding such as reducing chances of having malocclusions and caries were not mentioned [3].

To address these knowledge and service gaps, we designed an oral health program that can be incorporated into the existing ante-natal classes so that the important oral health messages including common oral health problems during pregnancy and their prevention methods, oral health benefits of breastfeeding to infants, and ways to maintaining proper oral hygiene for mothers and babies can be promoted. The ultimate goal of this project was to establish a service model that can promote oral health messages to pregnant women effectively with other healthcare professionals through a multi-disciplinary approach.

3. Aim and Objectives

The aim of this project was to promote the awareness and knowledge of pregnant women and infant oral health as well as the oral benefits of breastfeeding through a multi-disciplinary approach.

The objectives of this project were:

1. To develop a pilot oral healthcare program that can be incorporated into ante-natal classes of public hospitals.
2. To promote the oral health knowledge of pregnant women and infants.
3. To promote the oral health advantages of breastfeeding for infants.
4. To evaluate the effectiveness of the oral health promotion program.

4. Literature Review

4.1 Oral Health Problems during Pregnancy

Researches showed that pregnant women are more susceptible to have pregnancy gingivitis, pregnancy and and erosion [4]. Clinical studies also confirmed that systemic hormonal changes during pregnancy could affect periodontal health [5-8]. Systemic hormonal changes during pregnancy can affect oral tissues by changing the cellular metabolism and causing immune imbalances. Gingivitis may occur more frequently in the second trimester due to rise in estrogen level. Increased blood flow to the gingiva exaggerates the reaction of gingival tissue to irritants in plaque [9]. Gingiva becomes more susceptible to bacterial challenge and protective role of epithelium is weakened with reduction in keratinization of epithelium and therefore pregnant women are more prone to have periodontal disease. If the change in hormonal level is combined with lack of oral health awareness, accumulation of plaque and microorganisms, over 25% of the pregnant women may experience gingivitis and 10% may develop pyogenic granuloma [4].

Several studies confirmed an association between periodontal diseases in pregnant women and adverse pregnancy outcomes. Non-specific, general inflammatory mediators (e.g. IL-1, TNF-α, and PGE_2 in placenta) induced by periodontal disease are same as those in initiation of labor. There is a 2 to 7-fold increases in risk of delivery of preterm low birth weight infant with maternal periodontal disease untreated due to bacteremia [10-12]. Higher mid-trimester maternal serum antibody against periodontal pathogens (especially *Porphyromans gingivalis* and capnocytophaga) was found with progressing periodontitis in pregnant women [13]. If periodontal therapy is delivered before the 35th gestational week, the chance of adverse pregnancy outline will be greatly lowered in women with initial localized chronic periodontitis and threatened pre-term delivery [14].

Despite pregnant women are susceptible to these diseases, majority of the pregnant women has limited knowledge about common oral health problems during pregnancy and the ways of prevention despite information about pregnancy

gingivitis has been readily available on the website of the Hong Kong Department of Health [15].

Pregnant women are also prone to caries due to increased appetite and frequency of food intake. They also have an increased risk of dental erosion caused by morning sickness during pregnancy [16 17].

4.2 Oral Health Problems of Infants

Early Childhood Caries (ECC) has been the most prevalent oral disease among infants and was defined by the American Academy of Pediatric Dentistry as the presence of one or more decayed, missing or filled tooth surfaces in any primary tooth in a child 71 months of age or younger. Bagramian *et al.* described ECC as a public health crisis because there has been an increasing prevalence of early childhood caries globally [18]. In Hong Kong the oral health condition of infants and children was generally poor. Lo *et al.* (2012) found that 31% of 3-year-old children in Hong Kong had ECC and the mean dmft is 1.2 [19]. The latest Oral Health Survey conducted by the Department of Health in 2011 showed that the mean dmft of the five-year-old children was 2.5 and over half of them (50.7%) had caries experience. Major causes of ECC include improper feeding habits and poor oral hygiene practice [20].

Among the factors that could influence the development of ECC, studies showed that maternal oral health knowledge, belief and practice are crucial in developing and providing a proper oral hygiene routine for their children and therefore affecting children's oral health [21]. Maternal education is important because many mothers had little infant oral health-care knowledge. Oral health awareness of pregnant women can significantly affect their own oral hygiene and health as well as their infants'. The maternal microbiome directly affects the neonatal microbiome and it is one of the key determinants of a range of important maternal and child health outcomes [22 23]. Oral hygiene practices alter the oral microbiome and also initiate imbalance in the gut microbiome [24]. Poor oral hygiene is greatly responsible for the accumulation of bacteria within biofilms and will lead to overgrowth of bacteria that may become pathogenic, reduce biodiversity of the oral cavity, and ultimately cause

diseases such as dental caries or periodontal disease. Good maternal oral hygiene can reduce the transmission of pathogens to infants. There is a correlation between maternal oral hygiene practices and routine dental check-ups during pregnancy [7]. Lucey *et al.* showed that providing pregnant mothers information and support in regards to the child oral cavity, and oral health promotion initiated during pregnancy can significantly reduce the occurrence of severe ECC once the child was born [25].

Despite the importance of primary dentition in mastication, speech, esthetics and preserving space of dental arches for eruption of secondary teeth has been widely addressed [26-28], Zhong *et al.* (2015) found that 18% of the pregnant women thought that cleaning a child's teeth once daily was acceptable and some did not realize the importance of primary teeth as they would be soon replaced [1]. Actually, untreated caries may affect the development of the permanent dentition and premature extraction of primary teeth may cause space loss and lead to malocclusion [29]. ECC may also adversely affect children's growth and cognitive development by interfering with nutrition, sleep and concentration at school. It may also affect the quality of life of these children [20]. About the oral health related practices, Chu *et al.* found that less than 40% of preschool children in Hong Kong started brushing their teeth before 18 months old and Chan *et al.* found that only 18% of parents assisted in child's brushing until the children were 3 years old [30 31]., Dental and other health-care professionals should work together to educate pregnant women to prevent childhood dental problems as early as possible.

4.3 Benefits of Breastfeeding to Mothers and Infants

Breastfeeding is known to be beneficial to both mothers and their infants systemically [2]. The American Academy of Pediatrics and the World Health Organization recommend exclusive breastfeeding for the first 6 months of a child's life, with continued breastfeeding up to 12 months of age or longer along with the introduction of solid foods as the optimal way of feeding infants to ensure healthy development [32-34].

In terms of benefits for the mother, the benefits of breastfeeding to both mother and children is widely recognized and increasingly documented in the scientific community. Studies have shown that breastfeeding reduces postpartum bleeding and hemorrhage risk that help mothers recover from child delivery [35]. Women that breastfeed may be protected from breast cancer by reduced estrogen exposure through removal via breast milk and delayed ovulation [36 37]. Women may also be protected from ovarian cancer by breastfeeding that it suppresses ovulation and decreases gonadotropin levels [38].

Breast milk is tailored to the infant's specific nutritional needs, it contains immunological agents such as secretory IgA and IgG, and has anti-inflammatory properties that offer protection to the immature immune systems [39]. Breast milk contains bioactive components that are resistant to digestive processes and enhances the infant's immune system, thereby contributing to short and long term health protection [2]. Breastfeeding has a critical role of maternal transfer of skin and non-skin bacteria. Breastfeeding is also known to protect infants against infections (such as otitis media, respiratory tract infections, gastroenteritis and diarrhea), life-threating diseases (such as necrotizing enterocolitis and sudden infant death syndrome), and reduced risk of having asthma, obesity and diabetes mellitus [2 39 40].

The oral health benefits of breastfeeding in infants were also confirmed by clinical studies. According to a study published in 2015 by the Faculty of Dentistry of the University of Hong Kong, exclusive breastfeeding for over six months is positively associated with primary dental arch development in the anterior sagittal dental segment and on the horizontal arch width in primary dentition and a lower chance of developing abnormal dental relationships [41 42]. Many international studies also showed that exclusive breastfeeding in infants can reduce the chance of development of malocclusion [42-45], particularly posterior crossbites [46-49] and anterior openbite [50]. Longer duration of breastfeeding diminishes the risk of developing non-nutritive sucking habits because oral musculatures used in breastfeeding are different from that of bottle-feeding and the use of pacifiers.

Although the Hong Kong Department of Health has been vigorously promoting breastfeeding, the dental benefits of breastfeeding were seldom mentioned [3].

Despite knowing the advantages of breastfeeding to mothers and babies, there are many barriers that may prevent its achievement. Despite the World Health Organization recommends giving breast milk exclusively for the first six months of a baby's life and the Department of Health (DH) of Hong Kong has been vigorously promoting breastfeeding in recent years [51], only 2.3% of the mothers exclusively breastfed their baby for six months, according to a 2013 DH survey [52]. Furthermore, according to the 2015 annual survey from the Baby Friendly Hospital Initiative Hong Kong Association, 86% of new mothers initiate breastfeeding right after birth. But by the day of discharge from hospital, only about 27% were still doing it exclusively. In Hong Kong, the increase in the number of mothers who breastfeed their children upon discharge from hospital and provides exclusive breastfeeding in 2015 could be due to sustained efforts to educate pregnant women and breastfeeding mothers and to make more health facilities accessible to them [53].

4.4. Antenatal Oral Health Education

Researches showed that pregnant women generally did not know that they are susceptible to pregnancy gingivitis, pregnancy epuils and erosion due to hormonal changes [4]. A local study conducted by Zhong *et al.* in 2015 showed that there was significant deficiency in knowledge among pregnant women about proper common oral health diseases related to pregnancy and infant oral health care [1]. Only 36% of the participants were able to identify signs of pregnancy gingivitis, such as swollen and reddened gums, apart from bleeding gums; and only 39% of the respondents knew that hormonal changes are contributing factors to pregnancy gingivitis [1]. Over 20% of the respondents incorrectly related pregnancy gingivitis to other dental problems such as tooth decay and tooth sensitivity [1]. Even worse, majority of the pregnant women lack the awareness of the potential adverse pregnancy consequences of leaving pregnancy gingivitis untreated [1]. In terms of preventive measures, almost all of the participants understood the importance of proper cleaning of their teeth by brushing and flossing, while very few knew the

importance of regular dental checkups before pregnancy and during the second trimester [1]. Furthermore, this study also revealed that pregnant women were also were not sure about how to maintain proper oral hygiene for their infants [1].

Lack of awareness of oral health problem among pregnant women, in particular the potential adverse consequences of leaving pregnancy gingivitis untreated, was also common in other developed countries. In a study conducted in USA in 2015, it was found that few oral health interventions for pregnant women addressed oral-related symptoms, hygiene behaviors, and potential oral-systemic implications specific to mothers [54]. Another research conducted in southwestern Sydney revealed that more than half of the pregnant women respondents were unaware of the potential effects of poor maternal oral health on pregnancy and infant outcomes [55]. A Poland study also showed that over 60% of the pregnant women rated their knowledge and practical skills concerning care of their own teeth and of the child to be born as limited, inadequate or none [56]. These indicated that there is a need for assessment of oral health status, implementing preventive measures, particularly oral hygiene, healthy diet plans and ante-natal oral health promotion programs to improve oral and systemic health for the mother and her child [54 57].

Although free ante-natal classes are provided by the public hospitals and non-governmental organizations in Hong Kong, oral health messages were seldom mentioned in these classes. To address these problems, ante-natal oral health program can be developed and tried to incorporate into these classes. Previous researches showed if women are exposed through oral health promotion programs during pregnancy, they were able to improve their gingival health, their dental knowledge related to pregnancy and infants as well as positive influence on their oral hygiene practice [58]. Plutzer *et al.* also found that such oral health program can reduced incidences of severe early childhood caries [59].

We believe that the choice of a suitable oral health promotion method is crucial in successfully delivering our oral health messages and helping the participants to put the theories into action. Although previous researches showed that a number of key messages can be delivered to the pregnant women, from the findings of Zhong *et*

al., we believe that emphasis should be placed on routine dental checkups before or during the second trimester can help pregnant women to develop good oral hygiene practice.

Therefore, a new model should be developed that can incorporated into the existing ante-natal classes so that the oral health messages can also be delivered to the pregnant women. A combination of a short lecture and small group interactive workshop can help the participants master related oral health knowledge as they can raise questions and learn from each other's experience.

Through this project, we provide pregnant women the means to take care of their own and their children's health and further incentives to breastfeeding. These could promote the oral health of the pregnant women and their infants. To achieve this, multi-disciplinary collaboration among dental and other healthcare professionals is crucial to the development of an effective ante-natal oral health program [60].

5. Materials and Methods

5.1 Ethical considerations

All the data collected in this study was anonymous and no sensitive data was collected. Evaluation forms **(Appendix V)** were only stored in Prince Philip Dental Hospital. Only primary investigators and the associated supervisors could access the data. The form was approved by the Faculty of Dentistry and the Department of Obstetrics and Gynaecology of the Queen Elizabeth Hospital. Pregnant women have the right to make the final decision according to their own will.

5.2 Participant Recruitment

The target population of this project was pregnant women who joined the ante-natal classes of the Queen Elizabeth Hospital (QEH). Such classes have been well-established and regularly conducted at QEH. Pregnant women who joined these classes were informed that an oral health promotion program was also added into the existing ante-natal classes as the second part of the classes.**5.3 Oral Health Program Development**

We hoped that this pilot program can be incorporated into their ante-natal class in a more organized and comprehensive way. We aimed to promote the oral health knowledge and awareness to the pregnant women's own as well as their infants' oral health through this program. Therefore, we first approached Ms. Kamela MA, (Nursing Officers of the University Health Services of the University of Hong Kong) on February 2016 for advice on program development. She advised us know that in order to reach more pregnant women, we should contact the in-charge of the public hospital ante-natal program or the non-governmental organizations that focus on breastfeeding promotion. We performed an online search to locate several target organizations. We were able to contact Ms. Christine LAM (Chief Lactation Consultant of the Department of Obstetrics and Gynaecology of QEH). After initial phone and e-mail contacts, the program proposal, PowerPoint, and evaluation forms **(Appendix I)** were sent to QEH in early March 2016. Prior to the confirmation of the content of this program, we also attended the ante-natal class instructed by Ms. LAM. We gave a trial presentation to her on 21 March 2016 to make sure the

content of our program was coherent with the existing ante-natal class. After that, we amended the content of our program according to the comments provided by Ms. LAM and our supervisors. The program was conducted at QEH on 31 March and 14 April 2016 respectively.

5.3.1 PowerPoint Development

The PowerPoint had two parts and was designed to convey the key oral health messages to the pregnant women and their future infants. Although many oral health information could be useful to the participants, we focused on the most relevant messages according to the aim and objectives of this project within the time constraint. We also included many clinical photos and colorful pictures in the presentation to enhance the participants' attraction and facilitate our audiences to understand the key concepts about disease prevention. The content of the PowerPoint presentation was attached in **Appendix II**.

Figure 1 Presentation at the ante-natal class

Part 1 focused on information about the potential oral health problems (pregnancy gingivitis, pregnancy epulis and erosions) related to hormonal changes and dietary preference changes during pregnancy. The importance of prevention of common oral health problem and their preventive methods were also stressed.

Part 2 focused on the recommendation of oral health advantages of breastfeeding to infants. During the presentation, reducing possibility of malocclusion and caries

were highlighted and explained. Also, oral hygiene practice for infants was introduced.

5.3.2 Interactive Workshop Development

The interactive oral hygiene instruction workshop was around 15 minutes. The focus was mainly on toothbrushing and flossing. Around 10 participants were divided into a small group and two of our groupmates demonstrated the techniques with the tooth models **(Appendix IV).** "Tell-show-do" method was used and we also encouraged interactive discussion among the participants and offered opportunity for them to ask questions and share their personal experiences. Afterwards, participants were requested to practice on the tooth models so that our groupmates could modify the technique if needed.

Figure 2 Toothbrushing demonstration during the interactive workshop

5.3.3 Evaluation Form

After attending the interactive workshop, participants were invited to fill in an evaluation form **(Appendix V)**. Each form was assigned with a number so as to facilitate its collection and data input. The forms were checked on-site to ensure all questions were answered.

In the form, we would like to find out if the contents are in appropriate depth and length. We requested specific comments on the contents, and evaluated whether this format of presentation was suitable for promoting oral health care. Furthermore, we would like to know what other topics that the participants were also interested in. This can help the future establishment of a routine oral health care program for pregnant women and infants. After an initial trial, Ms. Lam. advised us to summaries certain questions into the same categories, to make our form more presentable.

There were five parts in the finalized evaluation form. Part 1 was about the program design. Part 2 was about whether the program objectives could be achieved. Part 3 was about the comments on the PowerPoint presentation. Part 4 was about whether the participants learned something new from the program. Part 5 was about the knowledge and decision about breastfeeding after the program and also if there was any change in attitude towards breastfeeding after the program. An open-ended section allowed participants to give their feedbacks on the contents, knowledge, format, helpfulness, general comment of the program.

After completing the evaluation form, as a token of thanks, each participant was given a souvenir pack of oral health products that were suitable for pregnant women **(Appendix IV).** We also encouraged them to use these oral hygiene products to maintain optimal oral hygiene.

5.4 Data Analysis

Three of our group members were responsible for data entry and analysis. All the data were entered and analyzed with Microsoft Excel 2013. All the data were double-checked to make sure the entries were accurate. For open-ended questions with answers or comments given by the participants, the data were summarized and then categorized into around five categories according to mutual agreement among the three members. The categorical data were then summarized and presented with relevant figures.

6. Results

The two oral health promotion programs were conducted at the Queen Elizabeth Hospital on 31 March and 14 April 2016 respectively. A total of 94 program evaluation forms **(Appendix V)** were collected.

The participants' feedbacks on the PowerPoint presentation was recorded in the evaluation form. All the 94 participants completed the questions related to the evaluation of the program and their responses were positive. Over 70% of participants agreed that the *"Content was presented in an organized way"* and around 2% of the participants disagreed this **(Figure 3)**. Also, around 70% of the participants agreed that the *"Content was presented clear and effectively"* and around 3% of the participants disagreed this **(Figure 4)**.

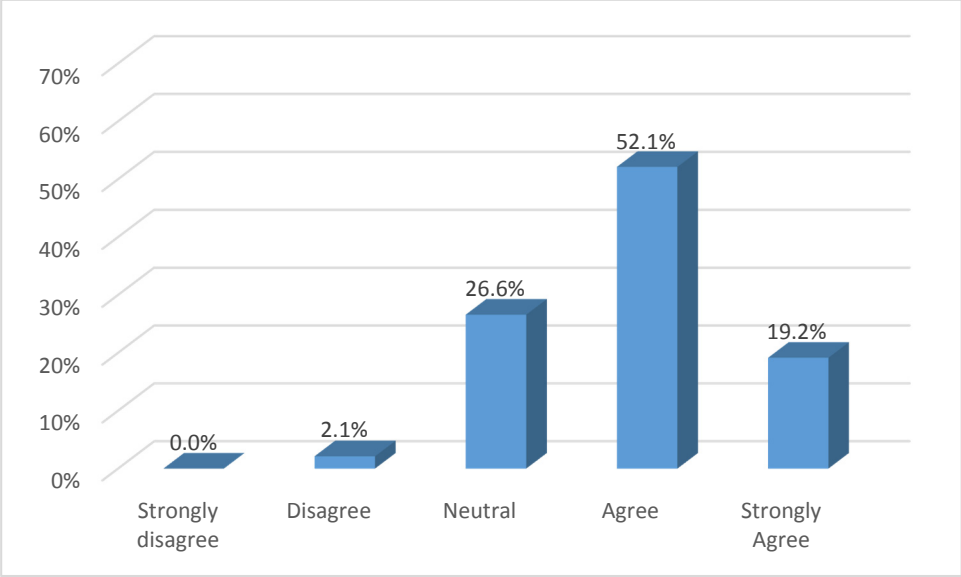


Figure 3 Responses on "Content was presented in an organized way"

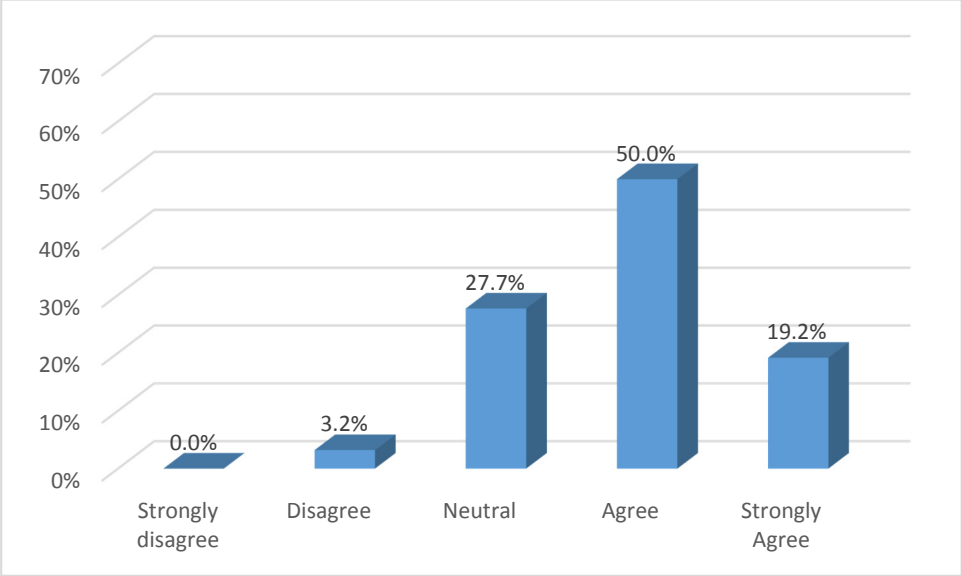


Figure 4 Responses on "Content was presented clearly and effectively"

Around 80% of the participants agreed that the *"Content was easy to understand"* and around 1% of them disagreed this **(Figure 5)**. Over 70% of the participants agreed that the *"Presenters were responsive to questions / comments"* and around 1% of them disagreed this **(Figure 6).**

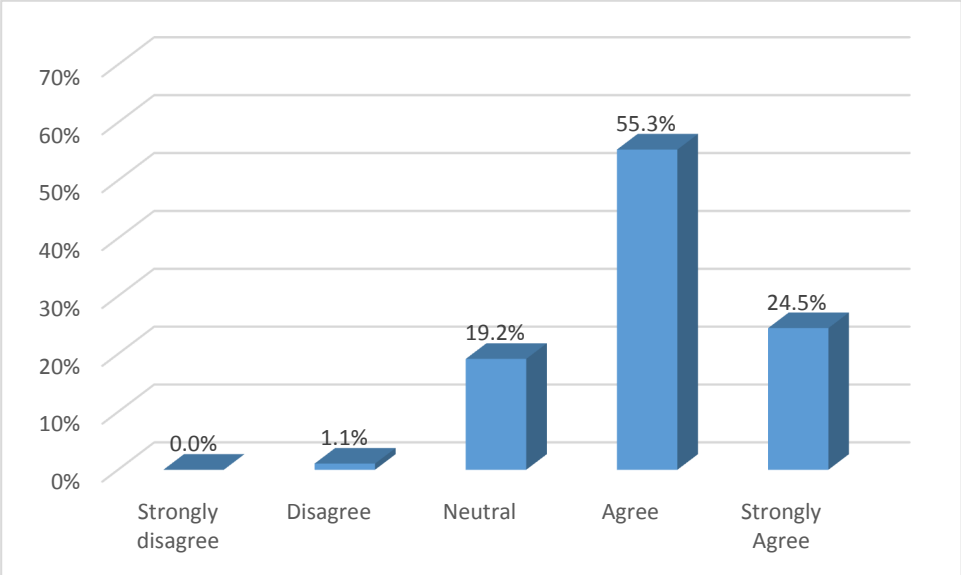


Figure 5 Responses on "Content was easy to understand"

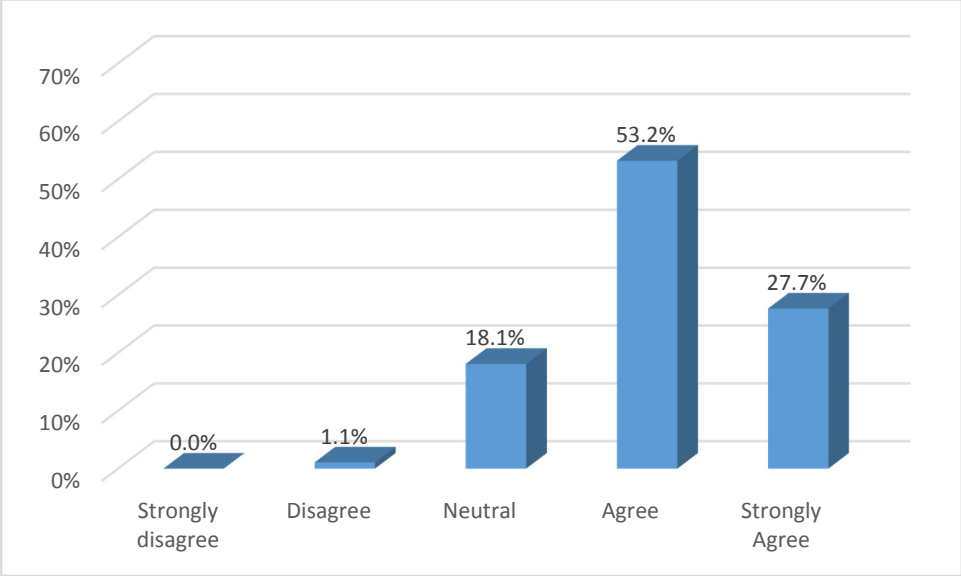


Figure 6 Responses on "Presenters were responsive to questions / comments"

Over 70% of the participants agreed that the *"Teaching aids /audiovisuals were used effectively*" and around 2% of them disagreed this **(Figure 7)**. Over 75% of the participants agreed that "Content met the stated objectives" and around 1% of them disagreed this **(Figure 8)**.

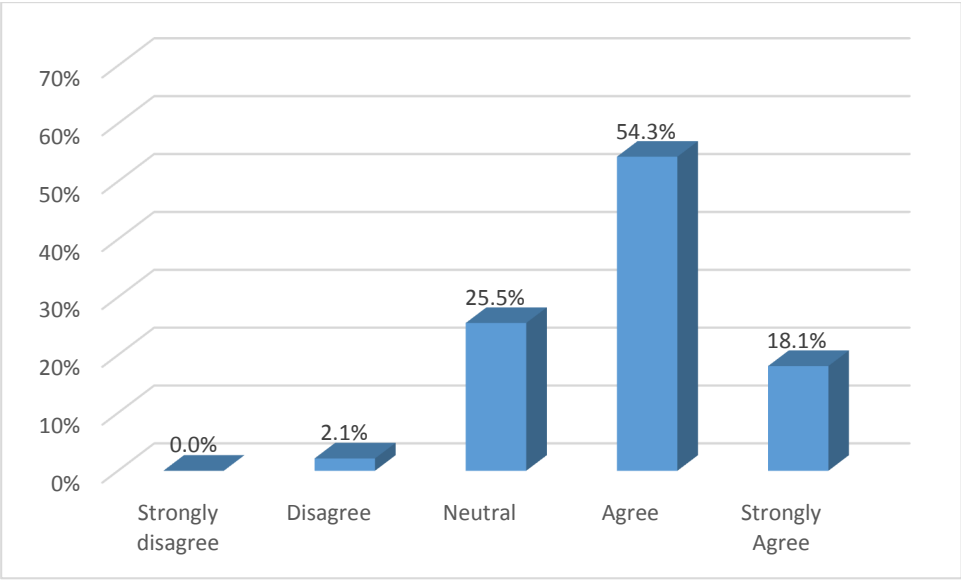


Figure 7 Responses on "Teaching aids / audiovisuals were used effectively"

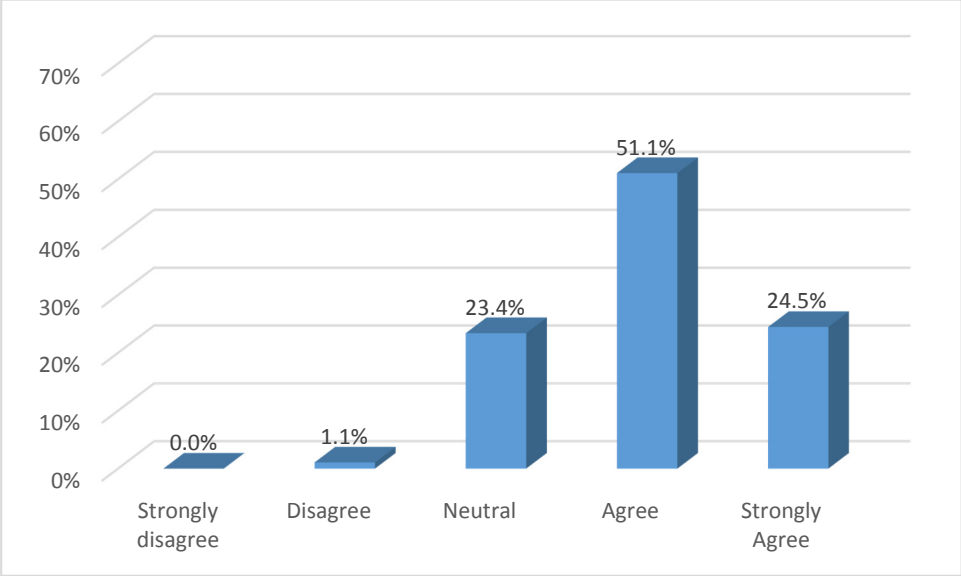


Figure 8 Responses on "Contents met stated objectives"

Over three quarters of the participants agreed that the *"Content presented was applicable in the future"* and around 1 % of them disagreed this **(Figure 9)**.

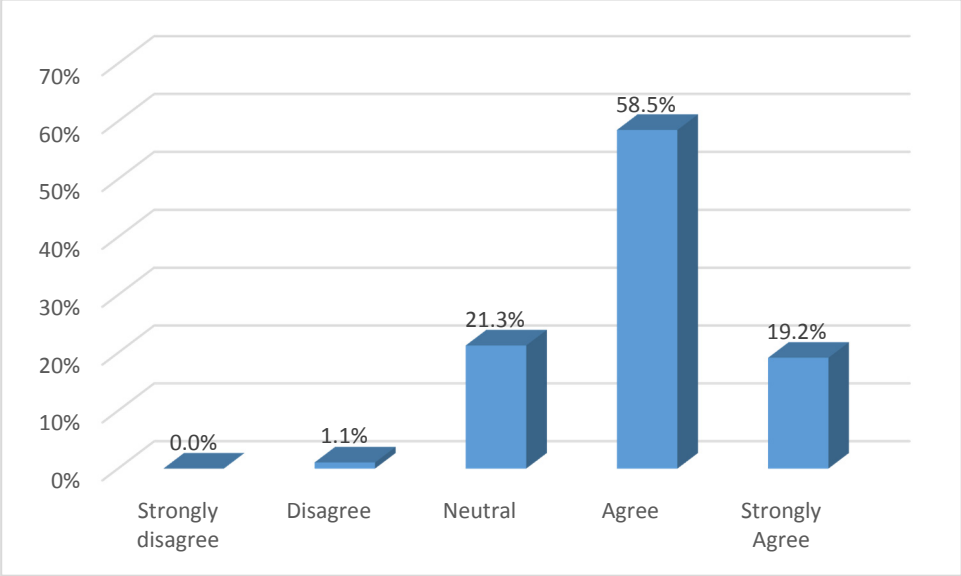


Figure 9 Responses on "Content presented was applicable in the future"

Another part of the questionnaire was about the workshop evaluation. All the 94 participants completed the questions related to the interactive workshop and their responses were positive. Over 80% of the participants agreed that *"The content of*

the workshop met my needs" and only 1% of the participants disagreed about this (**Figure 10).**

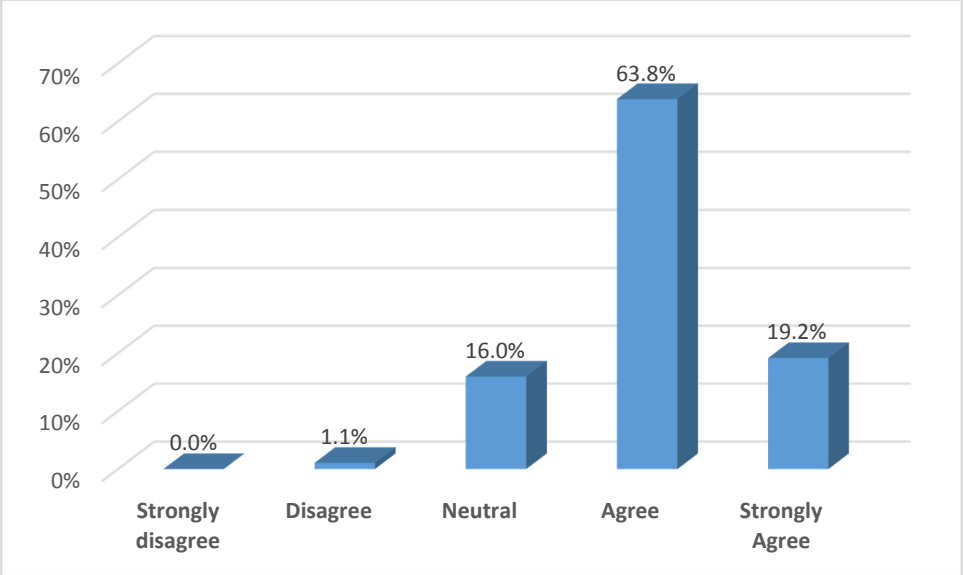


Figure 10 Responses on "The content of the workshop met my needs"

For the length of the workshop, Over 80% of the participants agreed that the "*The length of the workshop was adequate"* and only 3.2% of them disagreed about this (**Figure 11)**.

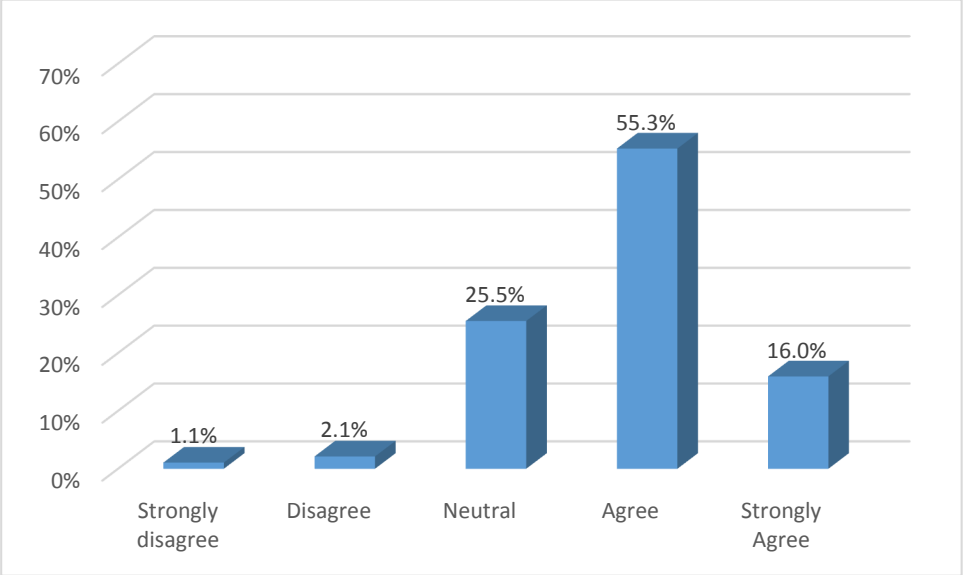


Figure 11 Responses on "Length of the workshop was adequate"

Among the 42 participants responded to the open-ended question *"What did you like most about the course?"* and they indicated that "infant oral healthcare knowledge" (43%) and "mother oral healthcare knowledge" (29%), "presentation skills" (11.8%), and "workshop design" (16%) as their most favorable contents that were delivered during the workshop.

Another open-ended question asking *"What specific things did you least like about the workshop?"*, and four participants commented the presentation pace was too fast. For the question *"If the workshop was repeated, what should be left out or changed?"*, five participants recommended adding cleaning infant oral cavity demonstration and Putonghua translation in the question and answer session.

Another part of the evaluation form was used to collect comments on workshop objectives. All the 94 participants completed the questions and most of them found that the objectives were achieved. Around 80% of the participants agreed that the workshop achieved the objective of *"Understanding the oral health advantages of breastfeeding for infants"* and around 1% of them disagreed this **(Figure 12).** Also, around 80% of the participants agreed the workshop achieved the objective of increasing the *"Awareness of the susceptibility of pregnant women towards oral diseases"* and only 1% of them disagreed this **(Figure 13)**.

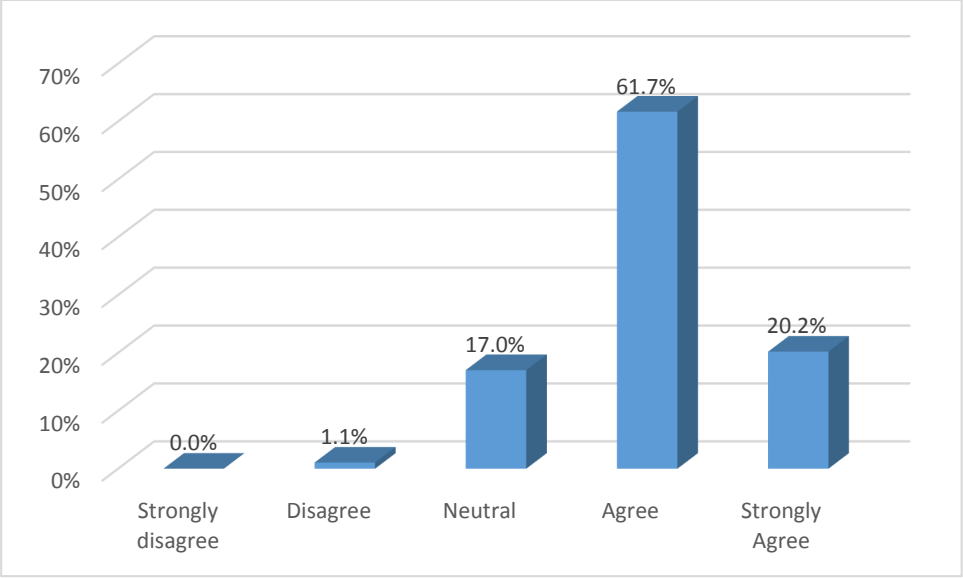


Figure 12 Responses on "Understanding the oral health advantages of breastfeeding for infants"

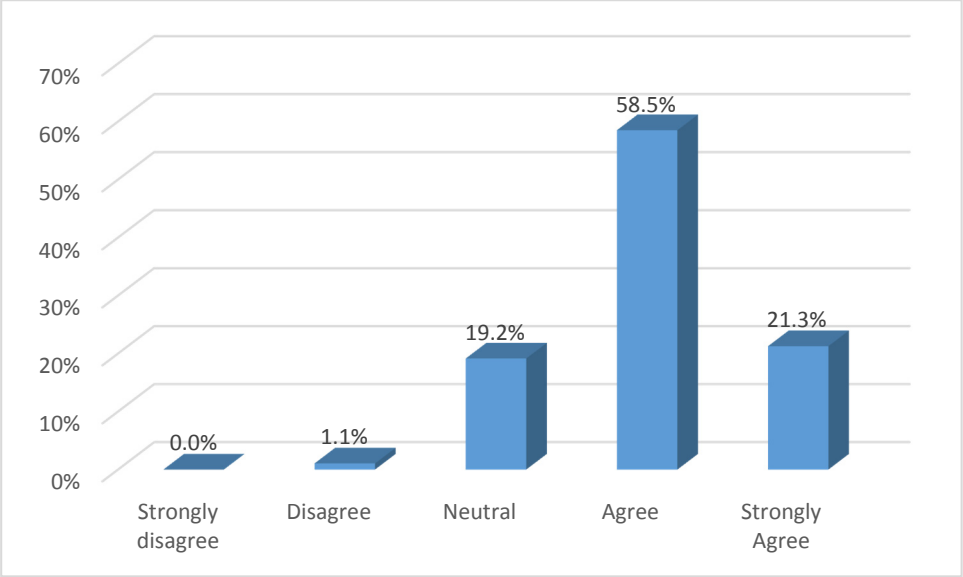


Figure 13 Responses on "Awareness of the susceptibility of pregnant women towards oral diseases"

Over 70% of the participants agreed that the workshop could achieve the objective of providing *"Information of management to oral diseases in pregnant women"* and only around 2% of them disagreed **(Figure 14).** Over 75% of the participants agreed that the workshop could achieve the objective of *"Increase knowledge regarding oral disease prevention in infant and pregnant women"* and around 1% of them disagreed this **(Figure 15).**

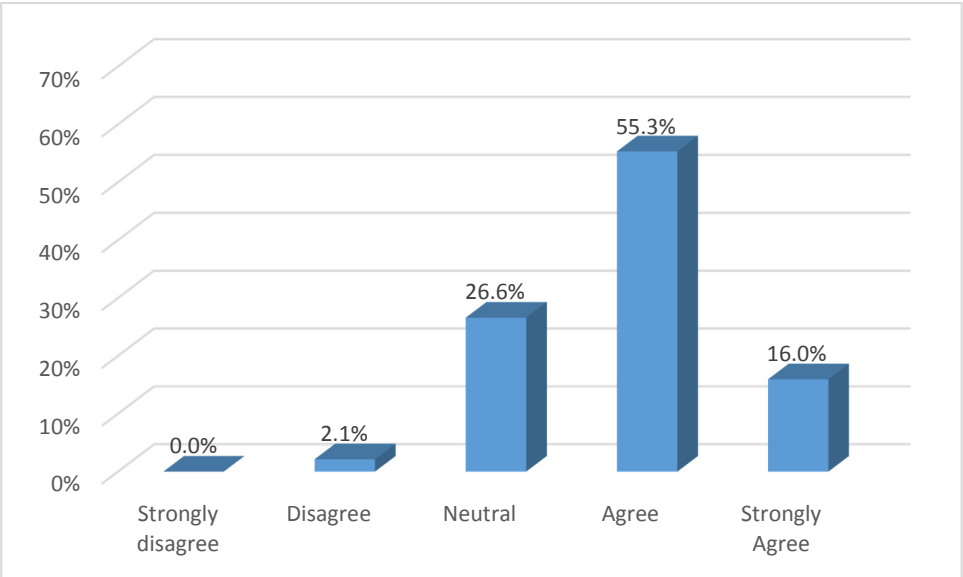


Figure 14 Responses on "Information of management to oral diseases in pregnant women"

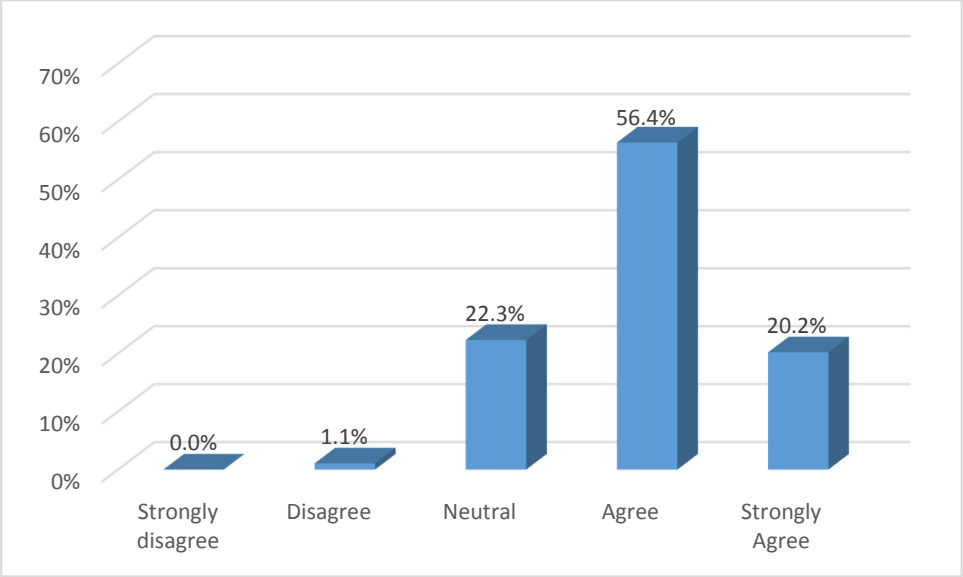


Figure 15 Responses on "Increase knowledge regarding oral disease prevention in infant and pregnant women"

Despite that the models for demonstration of infant oral hygiene practice was not available, Over 80% of the participants agreed that this workshop could help their *"Skills development in oral hygiene practice for infants"* and only around 1% of them disagreed this **(Figure 16).**

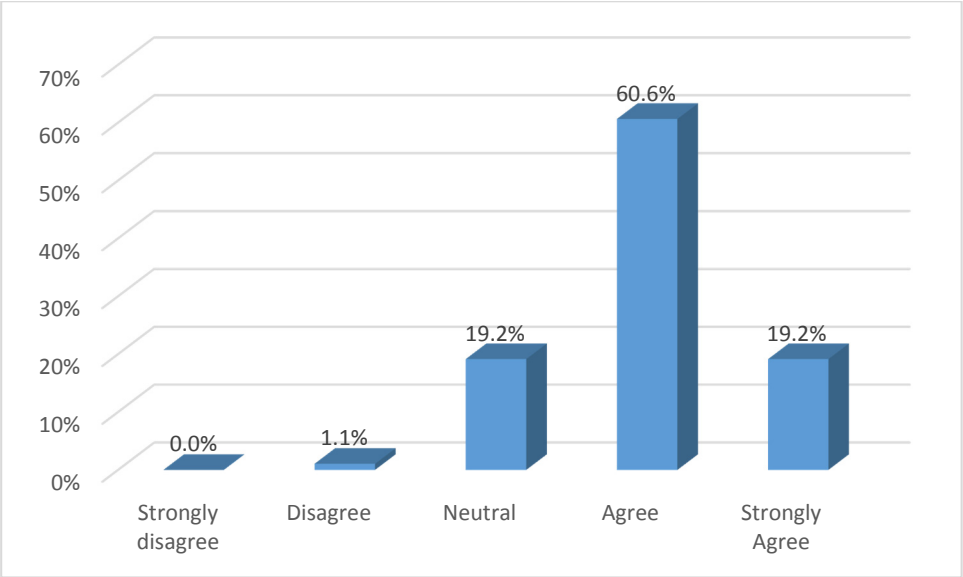


Figure 16 Responses on "Skills development in oral hygiene practice for infants"

Another part of the evaluation form recorded the overall comments of all the 94 participants after joining the oral health promotion program. **Table 1** summarized the proportions of participants thought that after attending the program, the possible changes that they could achieve. **Table 2** summarized the overall comments about future practice of breastfeeding after joining the program.

Table 1 Overall comments about joining the oral health promotion program

Overall comments	N (%)
I gained one or more specific ideas that I can implement in my pregnancy.	66 (47.8%)
It may help me do a better job.	45 (32.6%)
I learned a new approach to my pregnancy.	22 (15.9%)
I do not see the impact of this course on my pregnancy.	4 (2.9%)
Others	1 (0.7%)

Table 2 Overall comments about future practice of breastfeeding

Overall comments	N (%)
I will try exclusive breastfeeding.	63 (34.6%)
I have better knowledge regarding exclusive breastfeeding.	53 (29.1%)
I acquired new and/or advanced skills.	39 (21.4%)
I am reconsidering my views toward exclusive breastfeeding.	21 (11.5%)
The topic presented was appropriate, but I am undecided as to my own views.	5 (2.8%)
Others	1 (0.6%)

The overall ratings on this oral health promotion program was summarized in **Figure 17**. Over 90% of the participants found the program was good to excellent.

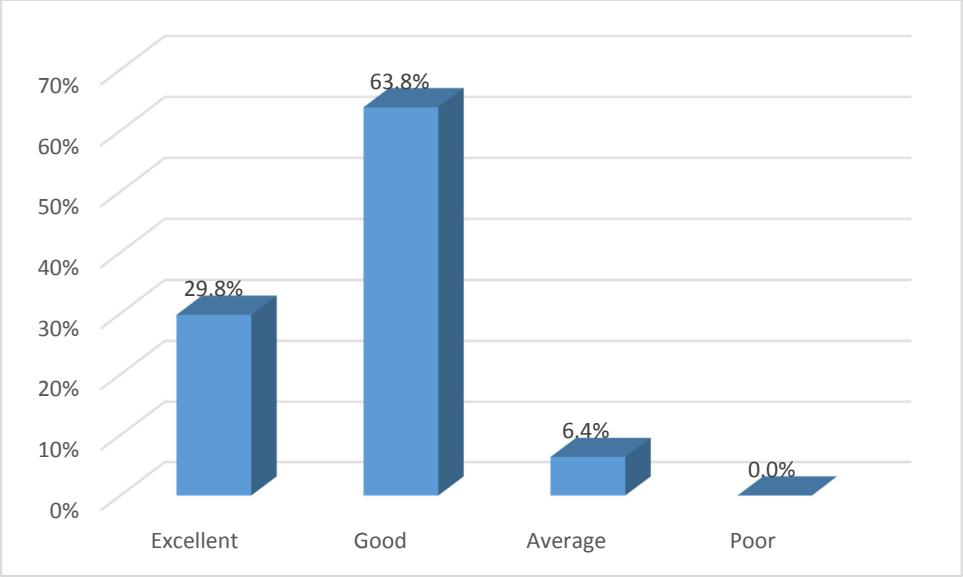


Figure 17 Overall ratings on the oral health promotion program

7. Discussion

7.1 Program Design

This pilot oral health promotion program was able to address the knowledge and service gaps that pregnant women generally lacking, namely they are more susceptible to several oral diseases due to hormonal changes and the potential adverse consequences of leaving pregnancy gingivitis untreated [1], and addressing the lack of oral health promotion messages to the pregnant women and infants in the existing ante-natal classes. In this study, we incorporated the common dental problems among mothers and their babies and their preventive methods into the existing ante-natal classes. Also, we promoted the oral health advantages of breastfeeding and support one major objective of these ante-natal classes, namely breastfeeding promotion.

The success of this program could be related to the careful planning and expert inputs of healthcare professionals from different fields, particularly Ms. Christine LAM, the Chief Lactation Consultant of the Department of Obstetrics and Gynaecology of Queen Elizabeth Hospital. She is also an International Board Certified Lactation Consultant and Chairperson of the Hospital Authority Breastfeeding Promotion Subcommittee, and a director in WHO Breastfeeding Counselling Course. She gave us much input about how to design the content of our program in order to fulfil our stated aim and objectives. Before finalizing our program, we attended her ante-natal class so we could familiarized the contents of the regular class as well as our target audiences. We learned how to teach them in a more interactive and practical way. Before finalizing our program, we conducted trial run with Ms. Lam and received valuable feedbacks. Then, we incorporated relevant oral health knowledge into the existing ante-natal classes. We also calibrated the depth of knowledge delivered to the participants and then finalized the presentation. Gladly, over 70% of the participants found our program interesting and useful.

We designed an evaluation form **(Appendix VII)** to collect the feedbacks regarding to the design, contents, presentation format, knowledge delivered, helpfulness, and general comments on the program. It was used to evaluate if there was changes in attitude towards breastfeeding after the program. It was also used to test if the contents of the program were in suitable depth and length as well as to collect further comments from the participants. Also, we would like to evaluate whether the presentation format was suitable for promoting oral health care from the perspective of pregnant women and whether they were interested in the presentation topics. This would facilitate the future establishment of a routine oral health promotion program for pregnant women and infants.

We chose questionnaire to collect data because of its advantages of being practical and responses are gathered in a standardized way. Large amounts of information can be collected from a large number of people in a short period of time in a relative cost-effective way. The results of the questionnaires can usually be quickly and easily quantified by a researcher or through the use of a software package. Furthermore, when data has been quantified, it can be used to compare and contrast other research and may be used to measure changes. However, its potential disadvantages could include no opportunity for the participants to clarify the questions and no way of telling how much a respondent thought has put in. The process of coding in the case of open-ended questions opens a great possibility of subjectivity by the researcher. Furthermore, respondents may answer superficially especially if the questionnaire takes a long time to complete.

After the program, the participants were invited to filling in an evaluation form. Each form is assigned with a number so as to facilitate the form collection and data input. Each evaluation form was checked on-site to ensure all questions were answered. After that, each participant received a souvenir pack **(Appendix IV)** to encourage them keeping optimal oral hygiene practice.

Our program focused on the prevention of pregnancy related oral diseases, particularly periodontal diseases, correct oral hygiene methods for pregnant women was introduced in the interactive workshop. Also, demonstrations on cleaning

infant's oral cavity were carried out. The workshop was conducted in an interactive format in order to make it more interesting.

7.2 Program Evaluation

Understanding the crucial oral health information and put it into daily practice after our workshop were the important aspects that we consider as the success of our program. The response was good and 94 participants gave us their feedbacks. The program was practical and effective. Over 70% of the participants found that the contents were well-presented and the presenters were able to answer their questions. From the results, the program had generally achieved the set objectives of promoting oral health advantages of breastfeeding for infants (81.9%) as well as increasing the awareness of pregnancy related oral diseases (79.8%). Over 80% of the participants expressed that they understood the oral health advantages of breastfeeding after this program. More than 75% of the participants agreed that the information provided was consistent with our main theme and almost 80% think that the information was useful and applicable to future daily life. Over 80% of them agreed that the content matched their needs. Moreover, among the 42 out of the 94 participants who responded to the open-ended question "What did you like most about the course?" they indicated that infant oral healthcare knowledge (43%) and mother oral healthcare knowledge (29%) as being the most interesting aspect delivered during the workshop.

After the interactive workshop, majority of the pregnant mothers (70.2%) had learned one or more than one new knowledge or skill which would be helpful throughout their pregnancy. These techniques included basic tooth-brushing and flossing technique, and oral hygiene techniques for infants. The results showed that oral hygiene awareness in Hong Kong was inadequate. Some participants were still using the wrong way to brush or floss their teeth and did not know how to clean their babies' mouth properly before attending this workshop. Therefore, more public education should be done to promote oral health care. Almost half (47.8%) of the participants think that the workshop could help them to implement the knowledge and skills better during their pregnancy. We believe the application of the skills and

knowledge in daily life would be especially helpful during their pregnancy, such as taking better care of their oral hygiene and improving their choice of diet. Some of the pregnant mothers reflected that our workshop inspired them a lot and helped them to face pregnancy in a positive way.

However, four participants thought that the workshop could not influence their attitude on pregnancy. This might be due to they already had well-established knowledge about oral health for pregnant women and infants. They might have higher education background and were aware of the relevant information that was provided to them and therefore the content of the program might not be informative enough for them. To compensate for the discrepancy in knowledge levels, pamphlets on oral health education for infants and pregnant women published by the Hong Kong Department of Health and were included in the souvenir package **(Appendix VI).**

The participants' attitude on breastfeeding was positive, 67% of them planned to breastfeed their children after the workshop and 56% of them thought the program allowed them to know more about the oral health advantages of breastfeeding. Moreover, 22% of them changed their perception towards breastfeeding after this program. These indicated that we had successfully introduced the oral health advantages of breastfeeding to the pregnant woman.

Some participants also suggested some rooms for improvement of our program. Four participants commented that the pace of presentation of our program was too fast. But this program was incorporated into an existing two-hour ante-natal class, only 30 minutes were allowed for oral health promotion. As over 80% of the participants found that the length of the program was satisfactory, we could allocate more time for the presentation. The question and answer session could be arranged after the small group interactive workshop. This would also facilitate the discussion among the participants.

We noted that the participants were eager to know more about their infant's oral health. Several participants requested for a demonstration might indicate that they

lacked such knowledge in proper infant oral care. Practicing with an appropriate manikin could facilitate their understanding. However, we could not find a suitable baby manikin with oral cavity and tongue for infant oral hygiene care demonstration and the participants lacked the chance to simulate infant oral hygiene practice. We could only describe the method orally with the pictures presented in the PowerPoint. Despite the absence of a demonstration, 99% of the participants agreed that this workshop helped them to develop the oral hygiene technique for infants. As knowledge about infant oral healthcare might not be readily accessible to pregnant women and thus further infant oral health knowledge should be promoted. A baby manikin should also be designed to facilitate infant oral health promotion. For the demonstration of tooth-brushing and flossing with the tooth models, over 70% of the participants agreed that the assisting tools and appliances could facilitate their learning of appropriate techniques.

One participant reflected that Putonghua session should be provided despite the program was targeted to Cantonese-speaking participants. Future programs could be designed with different languages, such as English and Putonghua, to overcome the language barrier.

Over 70% of the participants agreed that this program could help them to better understand the management of oral diseases among pregnant women and their susceptibility in developing have pregnancy gingivitis, pregnancy epulis, and erosion. Over 94% of pregnant mothers rated our workshop to be good or excellent in general and none of them rated the workshop as poor. This indicated most of the pregnant women were satisfied with our program and it had positive influence on their oral health.

Though this program, we proved that with careful planning and execution, oral health knowledge can be incorporated into the existing ante-natal classes to teach a large number of pregnant women efficiently. We convinced our partner organizations by providing the published evidence about the prevalence of the common dental problems among pregnant women and infants and the prevention methods. We also let them know we could contribute the updated findings about

the oral health benefits of breastfeeding, which could support their breastfeeding promotion objective.

8. Conclusions

This program was able to promote oral health knowledge related to the common dental problems among pregnant women and infants. Also, the dental advantages of breastfeeding could be effectively promoted. Furthermore, this program for promoting oral health and breastfeeding for pregnant women can be effectively incorporated into the existing ante-natal class.

9. Recommendations

Based on the findings of this study and the experiences of development of this pilot program, several recommendations were made to improve effectiveness of similar program in the future:

Other than oral hygiene demonstration for adult tooth brushing and flossing, infant oral cleaning demonstration can be incorporated into the interactive workshop. Baby manikin with an oral cavity and tongue should be prepared to facilitate parents' understanding in infant oral health care.

Due to time constraint and disparity in the education levels of our audience, extra information should be provided to cater for their needs. For example, extra pamphlets of different topics can be distributed to encourage self-directed post-program learning.

Wider scopes of organizations and target groups can be reached. Other than government hospitals, the program can even be more influential by "training the trainers" e.g. midwifery and nursing schools. Once the midwives are equipped with more oral health knowledge, they can spread the message to pregnant women during midwifery care.

If similar programs are carried out in the future, further research can be performed, such as offering pre- and post-program questionnaires, to quantify the effectiveness of the program.

Concerning the language in the delivery of program, it is recommend to provide Putonghua or English as medium-of-instruction if group of target audience in need are gathered.

10. Acknowledgements

We would like to express our greatest gratitude to many supporting individuals and organizations for their positive attitude towards our project.

Firstly, we have to show our appreciation towards our supervisors, Dr. Marcus FUNG and Dr. Harry PANG for their effort and guidance throughout this project. We are also grateful to Ms. Kamela MA (Nursing Officer and Health Education Officer of the University Health Service of the University of Hong Kong) and Ms. Christine LAM (Chief Lactation Consultant of the Department of Obstetrics and Gynaecology of the Queen Elizabeth Hospital) for their expert guidance and comments on our program development and execution.

Furthermore, we would like to express of our great thanks to all the participants who gave us the valuable feedbacks and comments after joining our program. Last but not least, we would like to express our sincere thanks to the Knowledge Exchange Unit of the HKU Faculty of Dentistry for finding sponsorship and providing souvenir packs for us.

10. Appendices

Appendix I: Program Proposal

The University of Hong Kong
Faculty of Dentistry
Group 4a.5 Public Health Project 2015-2016
Antenatal Oral Healthcare Workshop Proposal

Aims
To promote infant oral health through educating pregnant women.

Objectives
(i)To promote the oral health advantages of breastfeeding;
(ii)To promote the importance of primary teeth;
(iii)To promote the oral health of infants and pregnant women

Background
The benefits of breastfeeding to both mother and children is widely recognized and increasingly documented in the scientific community. Examples include decreased postpartum blood loss and more rapid involution of the uterus in women while infants score higher in intelligence tests and are less prone to problems such as obesity and malocclusion. [1-2] The World Health Organization recommends exclusive breastfeeding for the first 6 months of a child's life, with continued breastfeeding up to 12 months of age or longer along with the introduction of solid foods as the optimal way of feeding infants to ensure healthy development of infants. [3] In Hong Kong, the increase in the number of mothers that breastfeed their children upon discharge from hospital and provides exclusive breastfeeding in 2015 is due to sustained efforts to educate pregnant women and breastfeeding mothers in Hong Kong and to make more health facilities accessible to them. [4] Likewise, a study has shown that if women are exposed through oral health promotion programmes during pregnancy, there is significant benefit to the infant oral health such as reduced incidences of severe early childhood caries. [5] Through this presentation, we hope prepare pregnant women on their journey to motherhood dentally by providing pregnant women further incentives to breastfeed their children, equipping them the ability to maintain their own oral health during this period and understanding the needs of their children's oral health to ensure healthy the oral development of their children and continue the increasing trend of breast feeding women in Hong Kong.

References:
1) Breastfeeding and the Use of Human Milk SECTION ON BREASTFEEDING. Pediatrics Mar 2012, 129 (3) e827-e841; DOI: 10.1542/peds.2011-3552
2) Peres KG, Cascaes AM, Nascimento GG, Victora CG: Effect of breastfeeding on malocclusions: a systematic review and meta-analysis. Acta Paediatr. 2015 Dec;104(467):54-61. DOI: 0.1111/apa.13103.
3) World Health Organization: Global strategy for infant and young child feeding. Geneva: World Health Organization 2001, 1-5
4) Baby Friendly Hospital Initiative Hong Kong Association: World Breastfeeding week 2015: survey report. Hong Kong: Author 2015
5) Plutzer, K. and Spencer, A. J. (2008), Efficacy of an oral health promotion intervention in the prevention of early childhood caries. Community Dentistry and Oral Epidemiology, 36: 335–346. doi: 10.1111/j.1600-0528.2007.00414.x

Proposal workshop information
Target group: Pregnant Women
Target number of participants: 60
Number of Presentation: 2 to 4
Proposed date: 28 February 2016 to March 2016
Proposed time: To be confirmed
Approximate time for each workshop: 30 mins

Workshop Flow

PowerPoint Presentation: (~20 mins)

Before Delivery...

- Pregnancy and Oral Health
  - Teeth problems
  - Gum diseases
  - Best Time for Dental Check-up
  - Calcium Intake for Fetus Oral and Maxillofacial Development

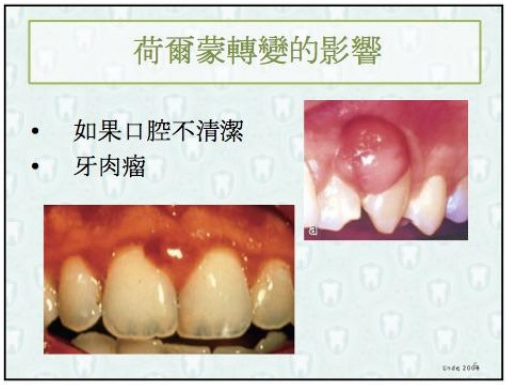
After delivery…

- Health Benefits of Breastfeeding
  - General
  - Dental
- Better Occlusion Relationship
- Teething
- Early Childhood Caries and Other Complications
- Oral Hygiene Instructions and Preventions for Infants

Post Presentation Evaluation and Questions and Answers Session (~10 mins)

(i) Presentation Evaluation form
(ii) Questions and Answers
(ii) Distribution of souvenirs to participants with the completion of the Questionnaires

Appendix II: PowerPoint




您會
胃口大增


口乾乾？
想吃酸的食物


對口腔的影響
• 牙齒酸蝕
• 蛀牙


蛀牙成因
時間
牙齒
細菌
食物


解決方法


• 孕吐後
• 30分鐘後

什麼都不可以吃嗎？

13

預防勝於治療！

14

檢查牙齒的最佳時機

- 例行檢查
- 第13至27週
- 產後才接受非緊急治療

15

16

牙齒與顎骨的發展

- 6至8週
- 上下顎和乳齒開始形成
- 1000毫克鈣質

17

世界衛生組織

- 出生後首六個月純母乳餵哺
- 母乳餵哺和補充食物直至兩歲或以上

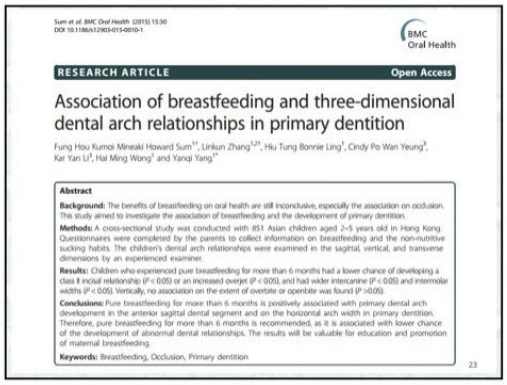
18


好處
• 與寶寶肌膚接觸
19


好處
• 提供抗體
20


生活副刊
餵母乳 BB少啃牙
晴報
明報
吃母乳逾半年 幼童較少啃牙 港大研究：上顎亦較闊 有助牙齒整齊
hket


埋身餵母乳防幼兒啃牙
餵6個月以上助牙齒正常咬合
日蘋果報
東網


BMC Oral Health
RESEARCH ARTICLE
Open Access
Association of breastfeeding and three-dimensional dental arch relationships in primary dentition
Abstract
Keywords: Breastfeeding, Occlusion, Primary dentition
23


好處
• 習慣用鼻呼吸
• 減少長大後咬合不佳的機會
24

好處

- 減少哨牙
- 外觀差
- 咀嚼功能
- 下降消化不良

25

好處

- 減少O形嘴
- 漏風
- 發音不正
- 外觀差

26

何時開始清潔牙齒

- 從寶寶出生開始
- 建議每次餵哺後
- 掃風後

27

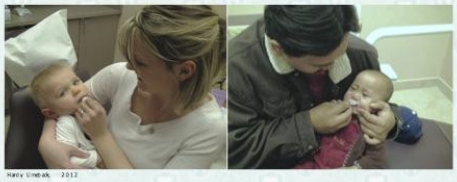
口腔清潔

- 口腔細菌
- 耳朵受感染

28

正確姿勢

- 平放於梳化或床上/ 抱在懷內
- 方便看見口腔



29

如何清潔?

- 用紗布或手帕裹著手指
- 可先蘸上木糖醇(xylitol)
- 減少抗拒

30

第一次牙科檢查

- 第一隻牙齒長出後
- 預防勝於治療
- 習慣看牙醫

問答環節

Appendix III: Program Photos


Please switch the telecommunication device to vibration mode.
Please delete the file or data before leaving the meeting venue.
母子孕牙記

Appendix IV: Tools that were used in the Interactive Workshop

Tooth model with interproximal space which assists flossing demonstration

Tooth model assists tooth brushing demonstration

Dental Floss

Tooth Brush

Appendix V: Endorsement Letter for Souvenirs

LETTER HEAD

2 February 2016

Dear Ms. Cheng,

Re: Request for Oral-Care Products

I am a fourth year Bachelor of Dental Surgery student from the University of Hong Kong, currently working on a Community Health Project with my colleagues. Our project aims to promote the dental advantages of breastfeeding and prepare future mothers for proper oral health care. We would also like to promote infant oral health and, ultimately, the overall well-being of infants through presentations and interactive workshops.

We acknowledge that KE unit has supported previous dental student projects and we would greatly appreciate their generous support in our project for the promotion of oral health. We hope that we would be able to provide small souvenir packages containing dental products and educational materials suitable for pregnant women by mid-March as our project will be conducted in late March to early April 2016.

Thus, we would like to request for the following products that will be included in our souvenir packages:

Dental floss x 100	Mouthrinse x 100
Chewing gum x 100	Toothpastes x 250
Pens x100	Toothbrushes x 100
Infant Oral Health Care Leaflets x 200	

We would be truly grateful if any of the KE unit would like to support our Community Health Project. Please feel free to contact us through the email (u3504064@connect.hku.hk). Attached please see our Community Health Project proposal for your reference.

Thank you very much for your time and consideration.

Yours sincerely,

Cheung Man Ho	Dr. Fung Ho Tak Marcus
BDS Year 4 Student (Group 4.5 representative)	Clinical Lecturer
	Dental Public Health, Faculty of Dentistry
	The University of Hong Kong

Appendix VI: Souvenir Pack

Appendix VII a: Evaluation Form (English Version)

The University of Hong Kong
Faculty of Dentistry
Group 4a.5 Public Health Project 2015-2016
Infant Oral Healthcare Workshop – Evaluation Form

Workshop Evaluation

A. Workshop Design (Circle the number to indicate your level of agreement/disagreement with each of the aspects of workshop design.)

		Strongly Disagree				Strongly Agree
1.	The content met my needs.	1	2	3	4	5
2.	Length of the workshop was adequate.	1	2	3	4	5

3. What did you like most about the course?

4. What specific things did you like least about the workshop?

5. If the workshop was repeated, what should be left out or changed?

B. Workshop objectives (Circle the number to indicate your level of agreement/disagreement with the degree to which workshop objectives were met.)

	Strongly Disagree				Strongly Agree
1. Understanding the oral health advantages of breastfeeding.	1	2	3	4	5
2. Awareness of the susceptibility of pregnant women towards oral diseases.	1	2	3	4	5
3. Information of management to oral diseases in pregnant women.	1	2	3	4	5
4. Increase knowledge regarding oral disease prevention in infant and pregnant women.	1	2	3	4	5
5. Skills development in oral hygiene practice for infant.	1	2	3	4	5

C. Evaluation of the presentation:

	Strongly Disagree				Strongly Agree
1. Content was presented in an organized way.	1	2	3	4	5
2. Content was presented clearly and effectively.	1	2	3	4	5
3. Content was easy to understand.	1	2	3	4	5
4. Was responsive to questions/comments.	1	2	3	4	5
5. Teaching aids/audiovisuals were used effectively.	1	2	3	4	5
6. Content met stated objectives.	1	2	3	4	5
7. Content presented was applicable in the future.	1	2	3	4	5

D. As a result of attending this workshop, I see its value to my pregnancy in the following ways (check all that apply):

___I gained one or more specific ideas that I can implement in my pregnancy.
___I learned a new approach to my pregnancy.
___It may help me do a better job.
___I do not see the impact of this course on my pregnancy.
___Other

E. By attending this workshop, I believe (check all that apply):

___I will try exclusive breastfeeding.
___I acquired new and/or advanced skills.
___I have better knowledge regarding exclusive breastfeeding.
___I am reconsidering my views toward exclusive breastfeeding.
___The topic presented was appropriate, but I am undecided as to my own views.
___Other

Overall I would rate this workshop as:

___Excellent
___Good
___Average
___Poor

Other learning needs: (List any other topics you would be interested in for the future)

Appendix VII b: Evaluation Form (Chinese version)

香港大學牙醫學院
4a.5 組 公共口腔衛生專題 2015-2016
母子孕牙記工作坊 –意見問卷調查

甲、工作坊的內容
(您認為工作坊是否能達到以下目的？請圈出您的「認同程度」以 1-5 評分，1 分為最低，5 分為最高。)

	非常不同意				非常同意
1. 內容切合我的需要。	1	2	3	4	5
2. 工作坊的長度適中。	1	2	3	4	5

3. 您最滿意的部分是？

4. 您最不滿意的部分是？

5. 如果再次舉辦工作坊，什麼部分可以刪除或改善？

乙、工作坊的主題
(您認為工作坊是否能達到以下目的？請圈出您的「認同程度」以 1-5 評分，1 分為最低，5 分為最高。)

	非常不同意				非常同意
1. 更了解母乳對口腔健康的好處。	1	2	3	4	5
2. 提升對懷孕期間容易患上口腔疾病的認知。	1	2	3	4	5
3. 更明白處理懷孕期間口腔疾病的方法。	1	2	3	4	5
4. 增加對防止孕婦和初生嬰兒口腔疾病的知識。	1	2	3	4	5
5. 建立為初生嬰兒保持口腔衛生的技巧。	1	2	3	4	5

丙、工作坊的表達方式
(請圈出您的「認同程度」以 1-5 評分，1 分為最低，5 分為最高。)

	非常不同意				非常同意
1. 內容表達得有條理。	1	2	3	4	5
2. 內容有效而清晰。	1	2	3	4	5
3. 內容易於明白。	1	2	3	4	5
4. 會回應聽眾的問題和意見。	1	2	3	4	5
5. 有效利用輔助工具音響器材。	1	2	3	4	5
6. 內容切合主題。	1	2	3	4	5
7. 內容能應用於將來的生活。	1	2	3	4	5

丁、我認為此工作坊對我懷孕期間有以下的幫助： (請 ☑ 符合的選項，可選多項)
□ 我得到一項或以上可以在懷孕期間能應用的新知識。
□ 我學到一種新方式應對我的懷孕。
□ 這工作坊能幫助我在懷孕期間做得更好。
□ 這工作坊對我的懷孕毫無影響。
□ 其他

戊、上完此工作坊後，我相信：(請 ☑ 符合的選項，可選多項)
□ 我會嘗試純母乳餵哺。
□ 我得到了新的技巧。
□ 我對純母乳餵哺有更多的認識。
□ 我對純母乳餵哺有了新的看法。
□ 工作坊內容正面，但我仍未能作出決定。
□ 其他

整體而言，我認為這工作坊

- □ 非常好
- □ 不錯
- □ 普通
- □ 惡劣

其他學習需要：(請列出其他你會感興趣的主題。)

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