Original Research

Effect of the healthcare for newly wedded programme on the utilization of oral health services among married women before their first pregnancy in Kalutara District, Sri Lanka

Hewage Dona Vindya Gayathri[1,2*] & Nilantha Ratnayake[3]

[1]Postgraduate Institute of Medicine, University of Colombo, Sri Lanka; [2]Lincoln International Institute for Rural Health, University of Lincoln, United Kingdom; [3]Institute of Oral Health, Maharagama, Sri Lanka

*Correspondence: vindyagayathrihewage@gmail.com https://orcid.org/0009-0004-4063-3547

DOI: https://doi.org/10.4038/jccpsl.v29i4.8620

Received on 30 Jun 2023
Accepted on 5 Oct 2023

Abstract

Introduction: Oral health denotes an important perspective of health for women. The Healthcare for Newly Wedded Programme (HNWP) has a major role on improving oral health among married women before their first pregnancy.

Objectives: To assess the utilization of oral health services and effect of the HNWP on the utilization of oral health services among married women before their first pregnancy in Kalutara District

Methods: A community-based cross-sectional study was done among 820 married women before their first pregnancy in Kalutara District. The sample was obtained by two-stage cluster sampling method based on probability-proportionate-to-size technique. An interviewer-administered questionnaire and an oral health assessment form were used for data collection. Categorical data were presented as percentages with 95% confidence intervals (CI). Bivariate analysis was done for comparisons and multivariate analysis was done to adjust for confounders.

Results: Only 21.5% of the participants had utilized oral health care services after marriage and 38.5% of women who had perceived dental treatment needs, utilized oral health services. In this context, the most frequent reason for non-attendance was thinking that there was no need for treatment. Participation in the HNWP was significantly associated with the utilization of oral health services ($p<0.001$), screened for oral diseases ($p<0.001$) and free of oral diseases ($p=0.003$). Being referred to a dental clinic was significantly associated with the utilization of oral health services ($p=<0.001$), screened for oral diseases ($p=0.001$) and free of oral diseases ($p=0.001$).

Conclusions & Recommendations: Utilization of oral health services among married women prior to their first pregnancy remained at an unsatisfactory level. The results of the present study indicated that the HNWP is effective in improving utilization of oral health services among them. Therefore, utilization of oral health services among married women before their first pregnancy should be improved through the HNWP.

Keywords: *pre-conceptive women, utilization of oral health services, reasons for under-utilization of oral health services*

Introduction

Oral health denotes an important perspective of health for every woman, and it affects their quality of life significantly (1). Furthermore, maintaining better oral health during pregnancy is essential as it is a cherished milestone in a woman's lifecycle. Poor oral health of pregnant women is believed to negatively affect their pregnancy. Periodontal diseases may cause adverse pregnancy outcomes, such as preterm babies, low birth weight babies and gestational diabetic mellitus (2-4). Furthermore, cariogenic bacteria can transmit to the baby from the mother, therefore these babies are more prone for developing oral diseases (5).

Oral health of females may be influenced by the changes in their levels of reproductive hormones (oestrogen and progesterone) at different stages of their lifecycle (puberty, menstrual cycle, preconception, pregnancy, menopause). Furthermore, the hormonal changes due to hormonal contraceptives may affect the women's oral health. The high levels of oestrogen and progesterone may lead to a reduction in saliva amount, increase in bacterial colonization, changes in saliva composition, results in dry socket after extraction and exaggerate pre-existing inflammations (lead irritated gingiva to aggressive periodontitis) (6-8).

The HNWP has been implemented in November 2011 through the family health programme in Sri Lanka to extend the maternal health continuum further before pregnancy occurs (9). Tools in the programme are an invitation card (10), a screening tool (11), a guide for health workers (12) and a booklet for new couples (13). Newly married couples undergo health education sessions, identifying and preventing risk behaviours, evidence-based risk screening and treatment through the HNWP. Under the oral health component of the HNWP, newly married couples are given oral health knowledge and referred to dental clinics by the staff of the medical officer of health (MOH) office. Furthermore, a small description of the importance of oral health during pregnancy is given in the booklets of the newly married couples and health staff (12-13).

Regular dental care is essential to improve the oral health. However, poor utilization of oral health services by women in reproductive age has been reported in Japan (20.87%) (14), Tanzania (26.9%) (15), India (10.5%) (16) and Turkey (17.4%) (17). The National Oral Health Survey Sri Lanka 2015 - 2016 (NOHS) reported that 56.9% of 35–44-year-old females had not attended a dental clinic last year (18). The reasons for poor utilization are financial barriers, lack of knowledge, fear of treatment, issues in taking time off job, transport problems, distance to the dental clinic and thinking that dental care is less important than other general health problems (15, 19-22).

The lifecycle approach and the continuum of care are effective approaches for prevention of diseases. Therefore, oral health care during the preconception period is beneficial throughout the lifecycle of the mother and the newborn (1, 23). Some dental treatments are restricted or difficult to perform during the pregnancy period as pregnant mothers are suffering from nausea, vomiting and postural difficulties (24). Early identification and addressing oral diseases during pre-conceptive period would prevent oral health complications during pregnancy (1, 23). Clinical oral examination by a dental surgeon is essential for early identification of oral diseases. Therefore, all married women should attend a dental clinic before their first pregnancy. Even though there is an existing oral health component in the HNWP, oral diseases still exist as a major public health problem among pregnant women in Sri Lanka and requires stringent measures for further reduction. A study done in Ambalantota, Sri Lanka indicated that the mean Decayed, Missing, Filled Teeth (DMFT) index was 3.8 (SD=5.17) among pregnant women (25). According to another study done in Western Province, Sr Lanka, among rural pregnant women, 60% had bleeding gum, 30.3% had calculus and the mean DMFT value was 5.4 (SD=3.0). Among urban

women, 73% had shallow periodontal pockets and the mean DMFT value was 3.69 (SD=3.62) (26). This demands a strong mechanism to improve the utilization of oral health services of married women before their first pregnancy and to make them oral disease free when they are conceived. Since the HNWP is an ongoing programme in Sri Lanka, it is important to assess the effect of HNWP on the utilization of oral health services and reasons for under-utilization. This is the first-ever study in Sri Lanka conducted on the effect of HNWP on the utilization of oral health services in this target group. The objective of this study was to determine the utilization of oral health services among the married women before their first pregnancy in Kalutara District and to assess the effect of HNWP on the utilization of oral health services.

Methods

A community-based cross-sectional study was carried out in Kalutara District from April 2019 to August 2020. The study population consisted of married women in reproductive age (15 – 49 years) and before their first pregnancy. All women who have married 6-24 months before the date of data collection were included in the study. Those residing in Kalutara District less than three months before the date of data collection were excluded. Sample size was calculated as 820 using the formula for sample size calculation for descriptive cross-sectional studies (27) by considering the estimated percentage of oral health services utilization by pre-conceptive women as 50%, desired level of precision as 0.05, desired level of confidence as 95%, rate of homogeneity as 0.1, cluster size as 10 and non-response rate as 10%. Public health midwife (PHM) area was taken as a cluster, and they were divided into three sectors (urban, rural, estate) based on the administrative settings. Two-stage cluster sampling method was used to select 82 clusters (7 urban, 72 rural and 3 estate) using probability-proportionate-to-size (PPS) sampling technique. Cluster size was decided as 10 after careful evaluation of field settings and considering feasibility issues. The location of the study was selected randomly within the PHM area from the list of roads. The first house to be selected within the selected road was determined randomly. Subsequent houses were selected in a predetermined order. This procedure was continued until the required cluster size was completed. Only one study participant was randomly selected from one house to minimize intra-cluster correlation. When a study participant was not available at the first visit, maximum of two further visits were made to the same house.

Data collection was done using a pretested interviewer-administered questionnaire in Sinhala and Tamil languages, which included questions on demographic characteristics and utilization of oral health services. With the consensus of experts, participation in the HNWP was defined as women who had attended HNWP at least one month before data collection. Clinical examination (active dental caries, calculus, gingival bleeding, periodontal pockets, clinical loss of attachment, gingival recession, oral potentially malignant disorders and oral cancers) was done using the oral health assessment form to assess being free of oral diseases (healthy + treatment completed) status. The examinations were done by the first author (VG) and tested against the gold standard who was a consultant in community dentistry (CCD). Examiner calibration of the NOHS 2015 – 2016 (18) was done with the same consultant who had experience as an examiner in previous surveys. Percentage agreement (kappa) was 0.94.

Data analysis

Data were processed and analysed using Statistical Package for Social Science (SPSS) version 22. Categorical data were presented as percentages with 95% confidence intervals (CI). In univariate analysis, the utilization of oral health services, screening for oral diseases and being free of oral diseases were compared between those who participated in the HNWP and those who did not. Furthermore, the

same variables were compared between those who were referred to a dental clinic and those who were not, among the women who participated in the HNWP. Binary logistic regression analysis was performed to adjust for potential sociodemographic confounders along with the variables which were significant in the bivariate analysis. Significance level was set at 0.1 to select variables for regression analysis.

Results

This study included 820 study participants and the response rate was 100.0%. Majority (53.4%) of the sample was aged 25-31 years; married 13-18 months before the data collection date (52.7%); and currently employed (59.1%) (Table 1).

Only 21.5% of the study population utilized oral health services after getting married. Of them, 33.5% did so for regular dental check-ups, 45.5% for emergency dental problems and 48.3% for routine non-emergency dental problems. The majority (40.9%) had visited the clinic during last six months. Among those who had perceived dental treatment needs, only 38.5% had attended a clinic for all their needs. Among others, 29.5% thought that it was too early for dental treatment although there was a need, while 27.7% admitted that it was due to their ignorance (Table 2).

Oral health service utilization, as well as screening for oral diseases and being free of oral diseases were higher in proportion among women who participated in the HNWP than those who did not. Even after adjusting for confounders, all three remained significant in regression analysis (Table 3). Among those who participated in the HNWP, oral health service utilization was higher among women who were referred to a dental clinic (43.8%) than who were not (20.3%). Also, screening for oral diseases and being free of oral diseases were higher among those who were referred to a dental clinic in both univariate and regression analysis (Table 4).

Discussion

This is an attempt to fill the gaps of scarcity of data regarding the effect of HNWP on the utilization of oral health services among married women before their first pregnancy in Sri Lanka.

The utilization of oral health services in this target group was low (21.5%). Similar findings had been revealed in a study conducted in Tanzania (26.9%) (15), however, several other studies had shown higher utilization of dental services, which includes 85% of 15-year-old females and 92.5% of 35-44-year-old females visiting dental clinics in NOHS Sri Lanka 2015-2016 (18), the study by Nagarjuna et al. in Andhra Pradesh, India (46%) (28), retrospective study done by Dany et al. in Moradabad, India (55.93%) (29) and the study done by Kadaluru et al. in Bangalore, India (35.85%) (30). These differences are likely to be due to health seeking behaviour at different occasions at different settings. Also, higher utilization than the present study has been reported in the studies done by Azofeifa et al. (64.8%) (31) and Boggess et al. (58.0%) (32) in the United States (US). The healthcare delivery in the US is a paid service in contrast to free of charge service in Sri Lanka. Therefore, attending dental services for preventive procedures may be economical for US women rather than attending for therapeutic procedures.

In the present study, few study participants visited a dental clinic for dental check-ups (7.2%). A study done in Chandigarh, India (10.5%) (16), a study in Japan (20.87%) (14) and a hospital-based study in Turkey (17.4%) (17) reported low frequencies of attending dental check-ups by women similar to the present study. However, Azofeifa et al. (31) showed contrast findings to the present study, since it revealed that preventive care is the main reason for dental visits among women (55.9%) in the US. The financial cost associated with therapeutic procedures in developed countries compared to developing countries might be the reason behind the differences of interest and utilization of preventive dental services.

Table 1: Socio-demographic and socio-economic data (N=820)

Characteristics	No.	%
Age (years)		
18 - 24	281	34.3
25 - 31	438	53.4
32 - 38	101	12.3
Time since marriage		
6 – 12 months	292	35.6
13 – 18 months	432	52.7
19 – 24 months	96	11.7
Ethnicity		
Sinhala	710	86.6
Tamil	35	4.3
Muslim	75	9.1
Burger	0	0.0
Highest educational level		
No formal school education	0	0.0
Primary level (Grade 1 – 5)	0	0.0
Grade 6 – 10	20	2.4
Ordinary level	142	17.3
Advance level	358	43.7
Diploma/Technical/Vocational training	97	11.8
Universities/Higher education	203	24.8
Current occupation status		
Unemployed	299	36.5
Employed	521	63.5
Type of occupation		
Professionals, managerial, legislators, senior officers and upper-level business	69	8.4
Clerical, technical and middle level business	238	29.0
Skilled/unskilled laborers and lower-level business	214	26.1
Housewife/unemployed	299	36.5
Average monthly household income level		
Less than 20000/=	100	12.2
20000/= - 50000/=	317	38.7
More than 50000/=	403	49.1

In the present study, majority of the study participants had undergone permanent fillings (52.3%) in contrast to the other Sri Lankan and global studies. According to the NOHS 2015 – 2016, the most frequently received treatment type among 15-year-olds was oral hygiene instructions (21.5%), whereas it was extractions (51.5%) for 35–44-year-olds (18). Tooth extraction was the most frequent treatment (35.85%) in the study by Kadaluru et al. in Bangalore, India (30) and it was periodontal therapy

Table 2: Distribution of the married women before their first pregnancy according to their utilization of oral health services

Utilization of oral health services	No. (%)	95% CI
Utilised services		
Married before 6–12 months	43 (14.7)	10.9, 19.3
Married before 13–18 months	98 (22.7)	18.8, 26.9
Married before 19–24 months	35 (36.5)	26.9, 46.9
Total	176 (21.5)	18.8, 24.4
Screened for oral diseases		
Married before 6–12 months	16 (5.5)	3.2, 8.8
Married before 13–18 months	46 (10.6)	7.9, 13.9
Married before 19–24 months	8 (8.3)	3.7, 15.8
Total	70 (8.5)	6.7, 10.7
Free of oral diseases		
Married before 6–12 months	62 (21.2)	16.7, 26.4
Married before 13–18 months	119 (27.5)	23.4, 32.0
Married before 19–24 months	35 (36.5)	26.9, 46.9
Total	216 (26.3)	23.4, 29.5
Purposes of the utilization of oral health services (n=176)*		
For dental checkups	59 (33.5)	26.5, 40.5
Emergency dental problems	80 (45.5)	38.1, 52.9
Dental problems which are not emergencies	85 (48.3)	40.9, 55.7
Last dental visit from the date of data collection (n=176)*		
Less than 6 months	72 (40.9)	33.6, 48.2
6 months–1 year	68 (38.6)	31.4, 45.8
More than 1 year	36 (20.5)	14.5, 26.5
Attendance to a dental clinic to receive 'perceived dental treatment needs' (n=364)**		
Yes, attended for all needs	140 (38.5)	33.6, 43.6
Not attended a dental clinic at all	223 (61.3)	56.2, 66.1
Attended for some but not for all needs	1 (0.3)	0.1, 1.5
Reasons for not attending clinic to receive 'perceived dental treatment needs' (n=224)***		
Financial constrains	0 (0.0)	0.0, 0.0
Transport difficulty	4 (1.8)	0.1, 3.5
Distance to the dental clinic	0 (0.0)	0.0, 0.0
Conflicts with other commitments	21 (9.37)	5.5, 13.2
Ignorance of dental problems	62 (27.7)	21.8, 33.6
Afraid for dental treatments	12 (5.4)	2.4, 8.4
Clinic date and time is not favourable	20 (8.9)	5.2, 12.6
Large waiting time	11 (4.9)	2.1, 7.7
No specific reason	51 (22.8)	17.3, 28.3
Don't think it is important / necessary	27 (12.1)	7.8, 16.4
Thinking no need to take treatments early	66 (29.5)	23.5, 35.5

*Total percentage exceeds 100% since the answers were not mutually exclusive; ** Those who had perceived dental treatment needs; *** Those who did not attend a dental clinic to receive perceived dental treatment needs

(62.54%) in another study in India (29).

Furthermore, the present study revealed that "thinking no need to take treatments early" and "ignorance of dental problems" were the most frequent reasons for the under-utilization. However, none of them mentioned "financial constrains" as a barrier, which reflects the utility of government oral health services in which is supplied free of charge to all individuals in Sri Lanka. Transport difficulty was mentioned as a barrier by a few study participants (1.8%) which could be attributed to the deficiencies in the Sri Lankan transport system. In addition, some of the women have relocated in the study area after their marriage. Thus, they are not familiar with the surroundings. The study carried out by Nagarjuna et al. in Andra Pradesh, India (28) indicated that the major reason for not visiting the dentist was "no need to visit dentist unless there is pain". However, Kadaluru et al. revealed that the major barrier for attending dental clinics was "high cost" (22.2%) among women in Bangalore, India (30). According to the cross-sectional study done by Ajayi & Arigbede in Southwest Nigeria, fear of experiencing pain, fear of dental injections and cost of treatment were the most reported barriers, while "no access to dentists" and "transportation problems" were the least reported barriers (19), However, those barriers were less frequent in the present study. The study done by Gupta et al. in Chandigarh, India (16) indicated that the most frequent reason for underutilization of dental clinics was "no need to attend" which is similar to the present study. Furthermore, it indicated that lack of time, cost and fear were the reasons for the underutilization, however those reasons were less frequent in the present study.

Results of the present study indicated a significant improvement of oral health services utilization by participation in the HNWP and referral to a dental clinic. It is essential to do the oral disease screening by a dental surgeon for the early identification and treatment of oral diseases. Therefore, it is necessary to ensure a sound referral mechanism to refer all the target women to a dental clinic while assessing the gaps in the existing programme.

The National Oral Health Programme for Pregnant Mothers (NOHPM) is a similar type of programme in Sri Lanka as the HNWP. However, Ranasinghe (33), reported a higher utilization of oral health services by pregnant mothers in Gampaha district, Sri Lanka through the NOHPPM. The Multi-centre randomised controlled trial by George et al. in Sydney, Australia (34) showed significant improvement in use of dental services among pregnant mothers (87.2%) who received midwifery intervention and dental intervention including assessment and treatment from cost free local dental services compared to the pregnant mothers (28.3%) who received midwifery intervention including oral health education, screening and referrals to existing dental pathways and the control group (20.2%).

Table 3: Comparison of the married women before their first pregnancy by their participation in the HNWP

Factor		Participated in the HNWP		Multivariate analysis	
		Yes (n=401)	No (n=419)	Adjusted OR* (95% CI)	p value
Utilized oral health services	Yes	112 (27.9)	64 (15.3)	2.07 (1.47, 2.93)	0.000
	No	289 (72.1)	355 (84.7)		
Screened for oral diseases	Yes	52 (13.0)	18 (4.3)	3.23 (1.85, 5.64)	0.000
	No	349 (87.0)	401 (95.7)		
Free of oral diseases	Yes	127 (31.7)	89 (21.2)	1. 65 (1.19, 2.29)	0.003
	No	274 (68.3)	330 (78.8)		

* Reference group was 'not participated in the HNWP' group

Study participants were recruited irrespective of their availability on the first visit and were approached during evenings, weekends and holidays to ensure the maximum response rate. Furthermore, women those who needed dental treatment according to the oral examination were referred to the nearest dental clinic. Recall bias could be introduced due to the time gap between marriage and data collection date. To minimize it, women with limited time gap (6 – 24 months) were selected. Furthermore, to address the effect of time duration since marriage to outcome variables, stratified analysis was done. Bias due to confounding was minimized through the multivariate analysis which was done to control the known confounders. The first author (VG) who collected all data was not blinded for the participation status in the HNWP and referral status for a dental clinic when conducting oral examination. Therefore, information bias could be introduced. To minimize it, VG was calibrated against the gold standard. Oral examination was done before administration of questionnaire. Therefore, VG did not aware about the participation status in the HNWP and referral status when doing examination. Furthermore, oral examination is an objective assessment, and it was done according to the pre-determined criteria.

Conclusions & Recommendations

Utilization of oral health services among the married women before their first pregnancy was poor. The more frequent reasons for non-attendance were less importance given to oral health and ignorance of dental care. Improving oral health services utilization among this target group through the HNWP seems to be effective, since the findings indicated its effect on improving the utilization of oral health services. An effective intervention should be delivered while addressing the gaps in the existing HNWP to improve the utilization of oral health services among this target group. The study findings would be useful for the dental service providers and for the policy makers to plan and provide an effective oral health service for the married women before their first pregnancy in Sri Lanka.

Table 4: Comparison of the married women before their first pregnancy be their referral to a dental clinic at the HNWP

Factor		Referred to a dental clinic		Multivariate analysis	
		Yes (n=130)	No (n=271)	Adjusted OR* (95% CI)	p value
Utilized oral health services	Yes	57 (43.8)	55 (20.3)	3.29 (2.01, 5.39)	0.000
	No	73 (56.2)	216 (79.7)		
Screened for oral diseases	Yes	27 (20.8)	25 (9.2)	2.79 (1.53, 5.09)	0.001
	No	103 (79.2)	246 (90.8)		
Free of oral diseases	Yes	61 (46.9)	66 (24.4)	2.22 (1.37, 3.61)	0.001
	No	69 (53.1)	205 (75.6)		

* Reference group was 'not referred to a dental clinic' group

Public Health Implications

- Maintaining better oral health is essential during the pre-conceptive period of women since it affect their pregnancy as well as their rest of life. However, utilization of oral health services among them is low (21.5%) and the main reason for under-utilization was that they do not think oral health is important. Therefore, improving oral health services utilization of this target group through the existing HNWP is important since it is an established programme in Sri Lanka.

Author Declarations

Competing interests: The authors declare that they have no competing interests.

Ethics approval and consent to participate: Ethics clearance was granted by the Ethics Review Committee of the Faculty of Medicine, University of Colombo (EC-19-021). Informed written consent was obtained from each participant prior to data collection. Administrative clearance was obtained from Provincial Director of Health Services Western Province, Regional Director of Health Services Kalutara and Director National Institute of Health Sciences.

Funding: Self-funded

Acknowledgements: Our sincere thanks and gratitude goes to all study participants. Further we are grateful to the Postgraduate Institute of Medicine, University of Colombo.

Author contributions: VG participated in study designing, collected data, performed the statistical analysis, interpreted data and drafted the manuscript. NR participated in study designing, performed the statistical analysis, interpreted data and drafted the manuscript.

References

1. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century-the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2003; 31(Suppl 1): 3-23. https://doi.org/10.1046/j.2003.com122.x.
2. Bobetsis YA, Barros SP, Offenbacher S. Exploring the relationship between periodontal disease and pregnancy complications. *J Am Dent Assoc* 2006; 137 Suppl: 7S-13S. https://doi.org/10.14219/jada.archive.2006.0403.
3. López R. Periodontal disease and adverse pregnancy outcomes. *Evid Based Dent* 2008; 9(2): 48. https://doi.org/10.1038/sj.ebd.6400581.
4. Wimmer G & Pihlstrom BL. A critical assessment of adverse pregnancy outcome and periodontal disease. *J Clin Periodontol* 2008; 35(8 Suppl): 380-397. https://doi.org/10.1111/j.1600-051X.2008.01284.x.
5. Law V, Seow WK, Townsend G. Factors influencing oral colonization of mutans streptococci in young children. *Aust Dent J* 2007; 52(2): 93-100. https://doi.org/10.1111/j.1834-7819.2007.tb00471.x.
6. Shourie V, Dwarakanath CD, Prashanth GV, Alampalli RV, Padmanabhan S, Bali S. The effect of menstrual cycle on periodontal health - a clinical and microbiological study. *Oral Health Prev Dent* 2012; 10(2): 185-192. https://doi.org/10.3290/j.ohpd.a28007.
7. Thomas KE & Chitra N. Periodontal changes pertaining to women from puberty to postmenopausal stage. *Int J Pharma Bio Sci* 2013; 4(2): 766-771. https://doi.org/10.22376/ijpbs.
8. Steinberg BJ. Women's oral health issues. *J Calif Dent Assoc* 2000; 28(9): 663-667. https://doi.org/10.1007/978-1-59745-469-8_14
9. Ministry of Health. *Guidelines for delivery of the Service package for newly married couples*. Colombo: Family Health Bureau, Ministry of Health, 2009. Available from: http://fhb.health.gov.lk.
10. Ministry of Health. *Invitation Card for Newly Married Couples*. Colombo: Family Health Bureau, Ministry of Health, 2012. Available from: http://fhb.health.gov.lk.

11. Ministry of Health. *Screening tool -Service package for newly married couples*. Colombo: Family Health Bureau, Ministry of Health, 2012. Available from: http://fhb.health.gov.lk.

12. Ministry of Health. *Handbook to guide health staff on Health Care for Newly Wedded*. Colombo: Family Health Bureau, Ministry of Health, 2012. Available from: http://fhb.health.gov.lk.

13. Ministry of Health. *Booklet for Newly Married Couples ("Sonduru Kedellakata Suwahasak Subapathum")*. Colombo: Family Health Bureau, Ministry of Health, 2009. Available from: http://fhb.health.gov.lk.

14. Taniguchi-Tabata A, Ekuni D, Mizutani S, Yamane-Takeuchi M, Kataoka K, Azuma T, Tomofuji T, Iwasaki Y, Morita M. Associations between dental knowledge, source of dental knowledge and oral health behaviour in Japanese university students: a cross-sectional study. *PLoS One* 2017; 12(6): e0179298. https://doi.org/10.1371/journal.pone.0179298.

15. Masalu JR, Kikwilu EN, Kahabuka FK, Senkoro AR, Kida IA. Oral health related behaviours among adult Tanzanians: a national pathfinder survey. *BMC Oral Health* 2009; 9(1): 22. https://doi.org/10.1186/1472-6831-9-22.

16. Gupta S, Jain A, Mohan S, Bhaskar N, Walia PK. Comparative evaluation of oral health knowledge, practices and attitude of pregnant and nonpregnant women, and their awareness regarding adverse pregnancy outcomes. *J Clin Diagnostic Res* 2015; 9(11): 26–32. https://doi.org/10.7860/JCDR/2015/13819.6756.

17. Akarslan ZZ, Sadik B, Sadik E, Erten, H. Dietary habits and oral health related behaviors in relation to DMFT indexes of a group of young adult patients attending a dental school. *Med Oral Patol Oral Cir Bucal* 2008; 13(12): 800-807. http://www.ncbi.nlm.nih.gov/pubmed/19047971.

18. Ministry of Health. *National Oral Health Survey 2015-2016*. Colombo: Ministry of Health, 2018. Available from: http://www.moh.gov.lk.

19. Ajayi DM & Arigbede AO. Barriers to oral health care utilization in Ibadan, Southwest Nigeria. *Afr Health Sci* 2012; 12(4): 507-513. https://doi.org/10.4314/ahs.v12i4.17.

20. Al-Hussyeen AJA. Factors affecting utilization of dental health services and satisfaction among adolescent females in Riyadh City. *Saudi Dent J* 2010; 22(1): 19-25. https://doi.org/10.1016/j.sdentj.2009.12.004.

21. Kim N, Kim CY, Shin H. Inequality in unmet dental care needs among South Korean adults. *BMC Oral Health* 2017; 17(1): 80. https://doi.org/10.1186/s12903-017-0370-9.

22. Olusile AO, Adeniyi AA, Orebanjo O. Self-rated oral health status, oral health service utilization, and oral hygiene practices among adult Nigerians. *BMC Oral Health* 2014; 14(1): 140. https://doi.org/10.1186/1472-6831-14- 140.

23. Stiefel DJ, Truelove EL, Chin MM, Zhu XC, Leroux BG. Chlorhexidine swabbing applications under various conditions of use in preventive oral care for persons with disabilities. *Spec Care Dentist* 1995; 15(4): 159-165. https://doi.org/10.1111/j.1754-4505.1995.tb00505.x.

24. Hemalatha VT, Manigandan T, Sarumathi T, Aarthi NV, Amudhan A. (2013). Dental considerations in pregnancy-a critical review on the oral care. *J Clin Diagnostic Res* 2013; JCDR, 7(5): 948-953. https://doi.org/10.7860/JCDR/2013/5405.2986.

25. Hirimuthugoda LK, Chaminda JLP, Gunasekara NP, Samarapala HJM, Kumari SHM, Pathirana IL, Ramachandra RBBS, De Silva SHP. Determinants on dental caries among pregnant mothers in medical officer of health area, Ambalantota, Sri Lanka. *Int J Dent* 2018; 4(1): 5-8. https://doi.org/ 10.11648/j.ijdm.20180401.12.

26. Karunachandra N, Perera I, Fernando G. Oral health status during pregnancy: rural–urban comparisons of oral disease burden among antenatal women in Sri Lanka. *Rural Remote Health* 2012; 12: 1902. https://doi.org/10.22605/RRH1902.

27. Lwanga SK & Lemeshow S. *Sample Size Determination in Health Studies: a Practical Manual.* Geneva: World Health Organization,

1991. Available from: https://apps.who.int/iris/handle/10665/40062.

28. Nagarjuna P, Reddy VCS, Sudhir K, Kumar RVSK, Gomasani S. Utilization of dental health-care services and its barriers among the patients visiting community health centers in Nellore District, Andhra Pradesh: A cross-sectional, questionnaire study. *J Indian Assoc Public Health Dent* 2016; 14(4): 451-455. https://doi.org/10.4103/2319-5932.195844.
29. Dany SS, Naik C, Tangade P, Satpathy AK. Felt and normative needs for oral health and utilization of services. *Int j preventive clin dent res* 2017; 4(4): 258-261. https://doi.org/10.5005/jpjournals-10052-0120.
30. Kadaluru U, Kempraj V, Muddaiah P. Utilization of oral health care services among adults attending community outreach programs. *Indian J Dent Res* 2012; 23(6): 841-842. https://doi.org/10.4103/0970- 9290.111290.
31. Azofeifa A, Yeung LF, Alverson CJ, Beltrán-Aguilar E. Oral health conditions and dental visits among pregnant and nonpregnant women of childbearing age in the United States, national health and nutrition examination survey, 1999-2004. *Prev Chronic Dis* 2014; 11: E163. http://dx.doi.org/10.5888/pcd11.140212.
32. Boggess KA, Urlaub DM, Massey KE, Moos MK, Matheson MB, Lorenz C. Oral hygiene practices and dental service utilization among pregnant women. *J Am Dent Assoc* 2010; 141(5): 553-561. https://doi.org/10.14219/jada.archive.2010.0228.
33. Ranasinghe N. *Evaluation of the National Oral Healthcare Programme for Pregnant Mothers in the District of Gampaha: Coverage, Quality, Effectiveness and Sustainability.* MD Thesis (Community Dentistry). Colombo: Post Graduate Institute of Medicine, 2015.
34. George A, Dahlen HG, Blinkhorn A, Ajwani S, Bhole S, Ellis S, Anthony Y, Elcombe E, Johnson M. Evaluation of a midwifery initiated oral health-dental service program to improve oral health and birth outcomes for pregnant women: A Multi Centre Randomised Controlled Trial. *Int J Nurs Stud* 2018; 82: 49-57. https://doi.org/10.1016/j.ijnurstu.2018.03.006.