

## Components of Healthy and Hygienic Behavior in Oral and Dental Health: A Case Study of Intervention Mapping Protocol

BAHAREH KABIRI<sup>1</sup>, ALIREZA HEIDARNIA<sup>2</sup>, MEHDI MIRZAEI ALAVIJEH<sup>2</sup>, MOHAMMADESMAEEL MOTLAGH<sup>4</sup>

<sup>1</sup>Health Education and Health Promotion, School of Medicine, Tarbiat Modarres University, Tehran, Iran

<sup>2</sup>Professor, Department of Health Education and Health Promotion, School of Medicine, Tarbiat Modarres University, Tehran, Iran

<sup>3</sup>Department of Health Education and Health Promotion, School of Health, Kermanshah University of Medical Sciences, Kermanshah, Iran

<sup>4</sup>School of Medicine, Jundishapur University of Medical Sciences, Ahvaz, Iran

Correspondence to Bahareh Kabiri

### ABSTRACT

**Background:** Health education models and theories play an important role in designing interventions and improving oral health.

**Aim:** To determine the predictors of the deciduous teeth health status in children by using the intervention mapping (IM) protocol.

**Methods:** In this empirical study, the simple random sampling method was employed to select 60 mothers with 6-months-to-1-year-old children visiting the Comprehensive Urban Health Center No. 6 in Ilam, Iran. A questionnaire, designed through the intervention mapping protocol, was then utilized to analyze them at baseline and 6 months after the educational intervention. The validity and reliability of the questionnaire had been confirmed earlier.

**Findings:** There was a significant relationship between demographic variables and cognitive social structures (CSS). In addition, five structures of perceived self-efficacy, practice guidance, social norms, attitude, and perceived barriers were identified as the strongest predictors of behavioral intention.

**Conclusion:** According to the results, the intervention mapping framework can be used as a basis for access to intervening variables in oral health.

**Keywords:** Intervention mapping protocol, children, deciduous teeth, mothers, dental health

---

### INTRODUCTION

The mouth reflects the general health of the body, and the teeth are the main components of the mouth<sup>1</sup>. According to the World Health Organization, oral health is a necessity and component of public health throughout life, and poor oral health and untreated oral diseases can profoundly affect the quality of life<sup>2</sup>. Deciduous teeth begin to grow at the age of six months old, whereas permanent teeth start to grow from the age of six years old. Tooth decay usually begins in childhood; however, its symptoms may remain hidden for several years both for the child and for parents or dentists<sup>3</sup>. According to the survey plan of 2016, the decayed, missing, and filled teeth (DMFT) index in six-year-old children was 5.84 in Iran and 6.73 in Ilam Province, of which 85.14% and 89% cases were related to the number of decayed deciduous teeth in Iran and Ilam Province, respectively<sup>4</sup>. Studies have shown that factors related to premature decay in children include *Streptococcus mutans*, visible dental plaque or poor oral hygiene, socioeconomic status, parental education, oral flora, enamel hypoplasia, bottle-feeding especially at bedtime, prolonged breastfeeding, bad mood, bottle-feeding during the day, males, sleeping with a bottle, ethnic and racial status, and parental education<sup>5</sup>. The most important barriers to children's dental health behavior by mothers are maternal inability to transfer the brushing and flossing knowledge, low educational level, fatigue, laziness, impatience, depression, lack of time, and toothpaste expensiveness<sup>6,7</sup>. In 1-to-3-year-old children, parents are the main caregivers for oral hygiene who teach the child about brushing, the right amount of toothpaste (the size of a pea), and flossing.

Given the importance of deciduous teeth in children's health, proper understanding of the dental condition and treatment of this group are the most important prerequisites for healthcare planning in any country [8]. Success in any field can be increased through management and planning, and this is a task of any program manager. As a planning framework of health promotion programs, the IM protocol will be employed to explain the predictive framework of tooth decay prevention behavior and to develop a theory-based training program. The IM protocol was first introduced in the Journal of Health and Behavior in 1998 by Kay Bartholomew and Guy Parcel from the University of Houston, Texas, and Gerjo Kok from the University of Maastricht in the Netherlands. This protocol consists of six steps including 1) needs assessment of the health problem, 2) construction of the matrix or tables of change objectives in people behavior and environmental factors, 3) selection of theory-based intervention methods and selection or creation of practical applications for theoretical methods, 4) planning of intervention program, 5) planning for adoption, implementation, and sustainability of the program, and 6) planning for evaluation of the program [9]. Due to the important roles of mothers in relation to other contexts, a family-centered study was conducted to determine the predictors of the deciduous teeth health status in children based on the intervention mapping protocol.

### MATERIALS AND METHODS

This empirical study was conducted on mothers with 6-month-to-one-year-old children in Ilam within the 2018-

2019 period. The mothers were selected through the simple random sampling method.

$$n = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2 * (s_1^2 + s_2^2)^2}{\mu_2 - \mu_1}$$

$$= \frac{(1.96 + 0.86)^2 * (3.88^2 + 0.49^2)}{17.61 - 11.27}$$

$$= \frac{(1.96 + 0.86)^2 * (3.88 + 0.49)^2}{5.86} = 26$$

$$\approx 30$$

In this formula, the mean and standard deviation (brushing behavior), proposed in Karami, Shakeri Nejad, Kabir *et al.*'s dissertations, were used [10] and considering  $\alpha=0.95$  and  $\beta=80\%$ , and the sample size was calculated 30 mothers for each group.

The total population of District One is 110,000, of whom 5,5141 are mothers. District 1 has 9 comprehensive urban health centers including the Comprehensive Urban Health Center No. 6. This center covers 14,856 people, the highest population among urban centers, indicating the high population density of this district. This center covers 7605 mothers. The necessary sample was randomly selected from mothers invited to participate in the study at the Comprehensive Urban Health Center No. 6 and randomly divided into intervention and control groups.

The inclusion criteria were having a child of 6 months to one year, having a healthy child, having a health record, and having the minimum literacy or reading and writing. The exclusion criteria were pregnancy, underlying disease of the mother and the child, separation, and divorce.

The data were collected through a questionnaire. The questionnaires of references 11-16 were employed to develop the structures of a questionnaire within the framework of the intervention mapping approach. The items of the questionnaire were then discussed and reviewed in the meetings of the research team. The researcher was also present to answer the possible questions of the participants. The questionnaire consisted of 2 parts, the first of which pertained to demographic characteristics including the child age (month), the mother age (year), the mother education (dropout, diploma, university), the mother job (housewife, unemployed, freelancer, employee), the spouse age (year), the spouse education (dropout, diploma, university), and the spouse job (retired, unemployed, freelancer, employee).

The second part pertained to the cognitive social structures (CSS) and consisted of 13 information assessment items ( $\alpha=0.75$ ) with a score range of 0-26 (for example, deciduous tooth decay can underlie permanent tooth decay), 5 attitude assessment items ( $\alpha=0.71$ ) with a score range of 5-25 (for example, it is important for me that my child has beautiful and healthy teeth), 4 perceived severity items ( $\alpha=0.81$ ) with a score range of 4-20 (for example, deciduous tooth decay can underlie permanent tooth decay), 4 perceived benefits items ( $\alpha=0.71$ ) with a score range of 4-20 (for example, if my child has healthy

deciduous teeth, he will also have healthy permanent teeth), 4 perceived barriers items ( $\alpha=0.71$ ) with a score range of 4-20 (for example, I am busy and cannot control my child's brushing every night), 5 perceived self-efficacy items ( $\alpha=0.78$ ) with a score range of 0-25 (for example, I can make healthy snacks for my child), 5 behavior intention items ( $\alpha=0.70$ ) with a score range of 5-25 (for example, I have decided to brush my child's teeth after each meal and food), 3 practice guidance items ( $\alpha=0.73$ ) with a score range of 3-15 (for example, my spouse reminds me not to forget brushing my child), 4 social norms items ( $\alpha=0.74$ ) with a score range of 4-20 (for example, it is important for me to know what others think and say about my child's mouth and teeth), and 4 subjective norms items ( $\alpha=0.76$ ) with a score range of 4-20 (for example, my friends care about the oral health of their children). All items were measured on a Likert scale from 1 (totally disagree) to 5 (totally agree).

The questionnaire validity was determined by using the two indicators of content validity ratio (CVR) and content validity index (CVI). CVR was measured by providing the questionnaire to 10 experts in health education and health promotion and dentists, and the necessary modifications were made. In addition, the questionnaire construct validity was determined through exploratory analysis, whereas the questionnaire reliability was examined and confirmed using Cronbach's alpha. The data of both groups were then collected at baseline and six months after the educational intervention. The data were then analyzed in SPSS 21 through statistical tests of linear regression, ANOVA, and correlation at the significant level of 95%.

## RESULTS

The mean age of mothers and their spouses were  $34 \pm 5.8$  and  $31.8 \pm 6.09$  years in the intervention group and  $38.2 \pm 7.6$  and  $36.1 \pm 7.2$  years in the control group, respectively.

Half of the mothers (50%) and the spouses (45%) had a diploma or higher. The majority of mothers were housewives (61.5%) and 85% of their spouses were employed. Table 1 shows the demographic characteristics of the participants.

According to the correlation test of the intervention and control groups, there was a significant relationship between cognitive-social structures (CSS) and demographic variables (Tables 2 and 4). In addition, a significant correlation was found between some cognitive-social structures in the two groups (Tables 3 and 5).

The linear regression analysis was performed at baseline in the intervention and control groups to explain the variables affecting the oral health behavior among children. According to Table 6, Model 5, obtained from combination of attitude, barriers, self-efficacy, practice guidance, and social norms, can explain 30% of variance of oral health behavior intention among children in Iranian society.



<i>Step 1</i>					
<b>Knowledge</b>	0/034	0.108	0.055	0.315	0.756
Attitude	0.319	0.162	0.407	1.966	0.063
Severity	0.197	0.150	0.231	1.312	0.205
Benefits	0.008	0.115	0.010	0.071	0.944
Barriers	0.328	0.113	0.438	2.907	0.009
Self-efficacy	0.098	0.109	0.156	0.896	0.381
Practice guidance	0.143	0.236	0.120	0.606	0.551
Social norms	0.293	0.138	0.347	2.119	0.047
Subjective norms	0.116	0.149	0.168	0.778	0.446
<b>Step 2</b>					
Knowledge	0.035	0.104	0.057	0.336	0.740
Attitude	0.319	0.158	0.407	2.018	0.056
Severity	0.199	0.146	0.232	1.362	0.188
Barriers	0.327	0.110	0.437	2.983	0.007
Self-efficacy	0.096	0.104	0.154	0.921	0.368
Practice guidance	0.144	0.230	0.121	0.625	0.539
Social norms	0.294	0.135	0.347	2.182	0.041
Subjective norms	0.116	0.145	0.169	0.805	0.430
<b>Step 3</b>					
Attitude	0.343	0.139	0.438	2.476	0.021
Severity	0.203	0.142	0.238	1.432	0.166
Barriers	0.324	0.107	0.434	3.028	0.006
Self-efficacy	0.095	0.102	0.152	0.927	0.364
Practice guidance	0.127	0.220	0.107	0.577	0.570
Subjective norms	0.296	0.132	0.349	2.241	0.035
Social norms	0.136	0.130	0.197	1.041	0.309
<b>Step 4</b>					
Attitude	0.307	0.134	0.391	2.283	0.032
Severity	0.185	0.141	0.216	1.307	0.204
Barriers	0.304	0.105	0.406	2.880	0.008
Self-efficacy	0.151	0.087	0.242	1.749	0.094
Practice guidance	0.248	0.187	0.208	1.325	0.198
Social norms	0.357	0.118	0.422	3.021	0.006
<b>Step 5</b>					
Attitude	0.219	0.118	0.279	1.854	0.076
Barriers	0.341	0.103	0.457	3.320	0.003
Self-efficacy	0.156	0.088	0.250	1.781	0.088
Practice guidance	0.342	0.175	0.288	1.958	0.062
Social norms	0.330	0.108	0.472	3.279	0.003
<b>Step 6*</b>					
Barriers	0.353	0.108	0.472	3.279	0.003
Self-efficacy	0.126	0.090	0.202	1.396	0.175
Practice guidance	0.453	0.172	0.381	2.634	0.014
Social norms	0.386	0.120	0.455	3.222	0.004
Final model: Adjusted R-squared = 0.500, F =30/019 and p<0.001					

## DISCUSSION

Since mothers are usually responsible for the oral health of children under the age of 6, and preschool children are not adequately grown to take care of their mouth and teeth, many characteristics of mothers can be reflected in children's oral health behavior<sup>17</sup>. Parental influence is one of the most important factors in maintaining oral health in children, and involving parents in improving children's health behavior is more effective than self-learning methods<sup>18,19</sup>.

Education is one of the most important socioeconomic indicators that can affect the information, attitude, and skills necessary to adopt health-related behavior. People with higher education seem to have access to different and more resources to acquire knowledge and information; therefore, education of parents can better affect the oral health of

children<sup>20</sup>. In this study, a significant relationship was found between the control and intervention groups in parental education variable and cognitive social structures (CSS) such as perceived self-efficacy, behavior intention, and subjective norms. According to studies, mothers' education has a significant relationship with information and attitude, and highly educated mothers have a more positive attitude and a higher level of knowledge about their children's oral health<sup>21-25</sup>. In this study, a significant relationship was found between parents' occupation with perceived severity, attitude, barriers, subjective norms, and behavior intention structures. This can be attributed to the fact that working mothers have more contact with people in society and spend a larger share of their income for health care of themselves and their children. Numerous studies have shown a significant relationship between parents' occupation and the attitude towards children's oral health

[26]. In some other studies, no significant relationship was found between parents' occupation and attitude [27]. In addition, an inverse relationship was reported in other studies between mothers' job and their performance in caring for their children's oral health, and working mothers had less time to care for their child's oral health [28]. Jackson *et al.* found an inverse relationship between socioeconomic status and deciduous tooth decay [29]. In this study, a statistically significant relationship was found between the age of parents and the behavior intention construct. In other studies, age had a statistical significant relationship with information and attitude constructs [30].

There was also a significant relationship between behavior intention and the two constructs of information and self-efficacy in the control group. According to other studies conducted on the effect of oral health behavior intention on constructs of attitude and abstract norms, behavior intention had a positive, significant relationship with attitude and abstract norms. This finding is inconsistent with the results of the present study<sup>31-34</sup>.

Before the educational intervention was performed in this study, Model 5, including the constructs of attitude, barriers, self-efficacy, practice guidance, and social norms, accounted for 30% of the variance of behavior intention. The two constructs of abstract norms and attitude accounted for 63% and 27-52% of behavior change variance in the study of Peyman *et al.* and some other studies, respectively [32, 35]. Hosseini *et al.* showed that the two constructs of subjective norms and attitude accounted for 66% of behavior change variance [36]. In a study by Pakpouret *et al.*, 51% of brushing behavior variance pertained to the three constructs of attitude, abstract norms, and control of perceived behavior<sup>37</sup>.

Other studies emphasized the role of attitudes, subjective norms, and self-efficacy as strong predictors of oral health behavior. Only one study stated that self-efficacy accounted for 36% of flossing behavior variance<sup>38-41</sup>.

## CONCLUSION

According to the findings of this study, cognitive factors, especially 5 determinants of attitude, barriers, self-efficacy, practice guidance, and social norms had effective roles in preventing deciduous teeth decay in children in the Iranian society. Therefore, it seems absolutely necessary to consider the cognitive components in providing preventive intervention programs.

**Acknowledgments:** This paper is a part of the doctoral dissertation financially supported by the Tarbiat Modarres University of Tehran with the ethical code IR.MODARES.REC.1398.021. The authors would like to thank the Research Council of Tarbiat Modarres University and all the mothers who participated in this study.

## REFERENCES

- Greenspan D. Oral health is global health. *J Dent Res* 2007; 86: 485.
- U.S. Department of Health and Human Services. Healthy people 2010: understanding and improving health. Washington (DC): U.S. Government Printing Office (GPO); 2000
- Mc Donald, Ralph E, Avery DR. *Dentistry for the child and adolescent*. St Louis: Mosby; 2008: 11-12.
- Samadzadeh, H. Ministry of Health and Medical Education. Health Deputy. Oral Health Office. Oral and dental health Feature of Iran in 2012 and 2016.
- Bruerd B, Jones C. preventing baby bottle tooth decay: eight-year results. *Pub Health Reports* 1996; 111: 63-6. Kelly SE, Binkley CJ, Neace WP, Gale BS. Barriers to care-seeking for children's oral health among low-income caregivers. *American Journal of Public Health* 2005; 95 (8): 1345-51.
- De Maio FG. Income inequality as a social determinant of health. *Salud Colectiva*. 2010; 6 (2): 195-209.
- Kelly SE, Binkley CJ, Neace WP, Gale BS. Barriers to care-seeking for children's oral health among low-income caregivers. *American Journal of Public Health* 2005; 95 (8): 1345-51.
- Whaley L, Wong D. *Nursing care of infant and children*. Washington Mosby; 2006: 727-728.
- Mirzaei-Alavije M, Jalilian F, Karami-matin B, Hosseini SH, Jouybari TA, Mahboubi M, Firoozabadi A. patient education in nursing: investigation the role of individual and organizational barriers. *Research journal of Applied Sciences*. 2016; 11 (8): 704-8.
- Karami K, Shakerinejad G, Ahmadi Angali K, Kabiry B. Effect of education based on health belief model on the alteration of oral health behavior among students in primary schools in Ahvaz in 2012 (Master's thesis). Ahvaz Jundishapur University of Medical Sciences, 2014. pp. 1-93.
- Arora A, Al-Salti I, Murad H, Tran Q, Itaoui R, Bhole S, Ajwani S, Jones Ch, Monohar N, Adaptation of oral oral health education leaflets for Arabic migrants in Australia: a qualitative study. *BMC Oral health* 2018; doi: 10.1186 / s12903-017-0469-z
- Poorhashemi S. the success rate of current preeventive methods employed against caries in 12 years old Tehrani children. *journal of shahid beheshty medical sci* 1998; 32 (4): 21.
- Freudenthal JJ, Bowen DM. Motivational interviewing to decrease parental risk-related behavior for early childhood caries. *Journal of Dental Hygiene*. 2010; 84 (1): 29-34.
- Weber-Gasparoni K, Reeve J, Ghosheh N, Warren JJ, Drake DR, Kramer KW et al. An effective psychoeducational intervention for early childhood caries prevention: part I. *Pediatric Dentistry*. 2013; 35 (3): 241-6.
- Mirzaei-Alavije M, Jalilian F, Karami-matin B, Hosseini SH, Jouybari TA, Mahboubi M, Firoozabadi A. patient education in nursing: investigation the role of individual and organizational barriers. *Research journal of Applied Sciences*. 2016; 11 (8): 704-8.
- Schaalma H, Kok G. Decoding health education interventions: the times are a-changing. *Psychol Health*. 2009; 24 (1): 5-9.
- Mehdipour A, Montazeri Hedishi R, Asayesh H, Karimi A, Omidikopayee R, Asgari H. Evaluation of knowledge, attitudes and performance of the parents of preschool and primary school children referred to health centers of Qom City about the importance of preserving primary teeth and its related factors. *Iran. Qom Univ Med Sci J* 2016; 10(6): 94-105.
- Poutanen R, Lahti S, Seppä L, Tolvanen M, Hausen H. Oral health-related knowledge, attitudes, behavior, and family characteristics among Finnish school children with and without active initial caries lesions. *Acta Odontol Scand*. 2007; 65 (2): 87-96.
- Dye BA, Vargas CM, Lee JJ, Magder L, Tinanoff N. Assessing the relationship between children's oral health status and that of their mothers. *J Am Dent Assoc*. 2011; 142 (2): 173-83.
- Hooley M, Skouteris H, Boganin C, Satur J, Kilpatrick N. Parental influence and the development of dental caries in children aged 0-6 years: a systematic review of the literature. *J Dent* 2012; 40 (11): 873-85.
- Nagarajappa R, Kakatkar G, Sharda AJ, Asawa K, Ramesh G, Sandesh N. Infant oral health: Knowledge, attitude and

- practices of parents in Udaipur, India. *Dental Research Journal (Isfahan)* 2013; 10 (5): 659-65.
22. Kaur B. Evaluation of oral health information in parents of preschool children. *Indian J Dent Res* 2009; 20 (4): 463-5.
  23. Goodarzi A, Tavaffian SS, Heidarnia AR, Ziaoddini H. Health Literacy and Oral Health in Primary School Students of District 14 in Tehran, Iran. *Military Caring Sciences*. 2016;2(4):229-237.
  24. Noorollahian H, Hassanzadeh R. Knowledge of parents about oral health in children with heart diseases. *ZJRMS* 2010; 12 (3): 39-43.
  25. Balalimeybodi F, MahmoudiZarandi M, Hasani M. [Knowledge, attitude and practice of healthworkers working in the southern cities of Kerman province about oral and dental health in 2009. *J Rafsanjan Univ Med Sci* 2011; 10 (1): 69-74.
  26. Poutanen R, Lahti S, Seppä L, Tolvanen M, Hausen H. Oral health-related knowledge, attitudes, behavior, and family characteristics among Finnish schoolchildren with and without active initial caries lesions. *Acta Odontologica* 2007; 65 (2): 87-96.
  27. Azad A, Tallatof Z, Momeni P. Evaluation of Knowledge and Attitudes of Primary Students' Parents about Fissure Sealants, Flurid Therapy and Preventive Orthodontic Treatment in Shiraz. *J Isfahan Dent Sch* 2017; 13(3): 250-257.
  28. Talekar BS, Rozier RG, Slade GD, Ennett ST. Parental perceptions of their pre school- aged children's oral health. *N Engl J Am Dent Assoc* 2005; 136 (3): 364-372.
  29. Jackson R. Parental Health Literacy and Children's Dental Health: Implications for the future. *Pediatrician Dent* 2006; 28: 72-75.
  30. Elhami Nasab E, Aghaian Z, Hashemian M. Evaluation of knowledge of mothers visiting Sabzevar Health Centers on the importance of moral and dental health for their children from birth to 3 years and the relationship of this knowledge with demographic characteristics. *Beyhagh (Quarterly) Journal of Student Research Committee Sabzevar University of Medical Sciences* 2011; 16 (1): 1-6.
  31. SMM H. Effect of educational interventions based on theory of planned behavior (tpb) in selecting delivery mode among pregnant women referred to Rasht health centers. *ZUMS Journal* 2011; 19 (77): 94-106.
  32. Brickell TA, Chatzisarantis NL, Pretty GM. Using past behavior and spontaneous implementation intentions to enhance the utility of the theory of planned behavior in predicting exercise. *Br Health Psych* 2006; 11 (2): 249-62.
  33. Karami K, Shakerinejad G, Kabiry B. Effect of education based on health belief model on the alteration of oral health behavior among students. *Ilam UniMedSci J*. 2012, 21(7): pp. 141-134.
  34. Hosseini N, Morrowati Sharifabad MA, Rahaei Z, Fallahzadeh H, Haerian A. A Survey of Predictors of Oral and Dental Care in Pregnant Women in Yazd: Based on the Theory of Planned Behavior. *Tolooebehdasht Journal*. 2018; 17(1): 50-61.
  35. Peyman N, Samiee Roudi Kh. The Effect of Education Based on the Theory of Planned Behavior on Caries Prevention of Permanent Teeth in Fifth Grade Students in Khaf City. *Journal of Mashhad School of Dentistry*. 2015. 39(2): 123-126.
  36. Kasmaei P, Amin Shokravi F, Hidarnia A, Hajizadeh E, Atrkar-Roushan Z, Karimzadeh Shirazi K, Mantazeri A: Brushing behavior among young adolescents: does perceived severity matter. *BMC public Health* 2014; 14 (8): 2-6.
  37. Pakpour Hajiagha A, Saffari M. Application of planned behavior theory in predicting dental brush behavior among Iranian adolescents in Qazvin. *Journal of the Islamic Dental Association of Iran*. 2012. 24(3): 201-207.
  38. Schwarzer R, Schulz B, Jochen P, Ziegelmann, Lippke S, Luszczynska A, Scholz U. Adoption and Maintenance of Four Health Behaviors: Theory-Guided Longitudinal Studies on Dental Flossing, Seat Belt Use, Dietary Behavior, and Physical Activity. *Journal of Predicting Four Health Behaviors*. 2007, 33 (2): 156-166.
  39. Christina N. Anderson a, Seth M. Noar b & Brandi D. Rogers. The Persuasive Power of Oral Health Promotion Messages: A Theory of Planned Behavior Approach to Dental Checkups Among Young Adults. *Journal of Health Communication*, 2013, 28. 304-313.
  40. Alexandrina L, Dumitrescu, Wagle M, Beatrice C. Dogaru, Bogdan Manolescu B. Modeling the theory of planned behavior for the intention to improve oral health attitudes: the impact of attitudes, knowledge, and current behavior. *Journal of Oral Science*, 2011; 53 (3) .369-377.
  41. Luzzi L, Spencer A. Factors influencing the use of public dental services: An application of the Theory of Planned Behavior. *Journal of BMC Health Services Research* 2008; 8 (93): 1-14.