ASSESSMENT OF PARENT'S ORAL HEALTH LITERACY AND ITS ASSOCIATION WITH CARIES EXPERIENCE OF THEIR PRESCHOOL CHILDREN ATTENDING HOSPITAL UNIVERSITI SAINS MALAYSIA

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by

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TABLE OF CONTENTS

ACKNOWLEDGEMENT ..... **ii**

TABLE OF CONTENTS ..... **iii**

LIST OF TABLES ..... **vi**

LIST OF FIGURES ..... **vii**

LIST OF ABBREVIATIONS ..... **viii**

LIST OF APPENDICES ..... **ix**

ABSTRAK ..... **x**

ABSTRACT ..... **xii**

CHAPTER 1 INTRODUCTION **1**

1.1 Background of the Study 1

1.2 Problem Statement 3

1.3 Justification of Study 5

1.4 Research Questions 7

1.5 Objectives 7

1.5.1 General Objective 7

1.5.2 Specific Objective 7

1.6 HYPOTHESIS 8

1.6.1 Null Hypothesis 8

CHAPTER 2 LITERATURE REVIEW **9**

2.1 Oral Health Literacy 9

2.2 Association of Oral health literacy of Parents and Caregivers with Oral Health Status of Preschool Children 11

2.3 Importance of Oral Health Literacy Among Parents of Preschool Children 14

2.4 Factors Influencing the Oral Health Literacy Among Parents of Preschool Children 16

2.5 Health Literacy 19

2.6 Factors Associated with Health Literacy 21
2.7 Instruments to Measure Oral Health Literacy 27
2.7.1 List of Instruments to Measure OHL 28
2.8 Definition of Dental Caries 32
2.9 Consequences of Dental Caries in Preschool Children 33
2.10 dmft 34
CHAPTER 3 METHODOLOGY 38
3.1 Study Area 38
3.2 Study Design 38
3.3 Population and Sample 38
3.3.1 Reference Population 38
3.3.2 Source Population 38
3.3.3 Sampling Frame 39
3.3.3(a) Inclusion Criteria 39
3.3.3(b) Exclusion Criteria 39
3.4 Sample Size Determination 39
3.4.1 Objective One 40
3.4.2 Objective Two 40
3.4.3 Objective Three 40
3.5 Sampling Method 41
3.6 Variables and Research Tools 41
3.7 Research Tools 42
3.8 Data Collection 44
3.9 Statistical Analysis 45
3.10 Inter-Examiner and Intra-Examiner Reliability Assessment 45
3.11 Ethical Considerations 48
3.11.1 Subject Vulnerability 48

3.11.2 Declaration of Conflict of Interest 48

CHAPTER 4 RESULTS 50

4.1 Sociodemographic Background 50

4.2 Oral Health Literacy of Parents 52

4.3 Caries Experience of Preschool Children 55

4.4 Association between Caries Experience of Preschool Children and Parent's OHL 58

CHAPTER 5 DISCUSSION 64

5.1 Sociodemographic Background 64

5.2 Oral Health Literacy of Parents 65

5.3 Caries Experience of Preschool Children 68

5.4 Association of Parents OHL With Caries Experience of Their Preschool Children 70

5.5 Limitations 73

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS 75

6.1 Conclusions 75

6.2 Recommendations 75

REFERENCES 77

APPENDICES

LIST OF PUBLICATIONS

LIST OF TABLES

Page

Table 3.1 Inter-Examiner Reliability by calculating kappa score for dental caries examination 47

Table 3.2 Intra-Examiner Reliability by calculating kappa score for examination of dental caries examiner 1..... 47

Table 3.3 Intra-Examiner Reliability by calculating kappa score for examination of dental caries examiner 2..... 47

Table 4.1 Sociodemographic profile of the Parents and their preschool Children..... 51

Table 4.2 OHLI-M scale level statistics (*n*=230)..... 52

Table 4.3 Distribution of parents according to OHL level (n = 230)..... 53

Table 4.4 Comparison of total OHLI-M scores of parents..... 54

Table 4.5 Descriptive statistics of preschool children..... 55

Table 4.6 Caries experience of preschool children. 56

Table 4.7 Distribution of preschool children according to age, gender, decayed, missing and filled teeth in relation with caries experience and dmft score. 57

Table 4.8 Final Model of the Associated Factors for Caries Experience by Multiple Logistic Regression 60

Table 4.9 Comparison of OHL level of parents with dmft score of preschool children..... 62

Table 4.10 Comparison of education of parents with dmft score of preschool children..... 63

LIST OF FIGURES

Page

Figure 2.1 Oral Health Literacy Framework Adapted from (Horowitz and Kleinman, 2012) 18

Figure 2.2 Conceptual framework of Health Literacy (Squiers et al., 2012)..... 24

Figure 2.3 Conceptual Framework of the Study 37

Figure 3.1 Flow Chart of the Study 49

Figure 4.1 ROC curve. 61

LIST OF ABBREVIATIONS

ADA	American Dental Association
ADHA	American Dental Hygienists Association
CMOHK	Comprehensive Measure of Oral Health Knowledge
DHLA	Malay Dental Health Literacy Assessment
dmft	Decayed, Missing and Filled Teeth
HOSPITAL USM	Hospital University Sains Malaysia
HKREALD-30	Hong Kong Rapid Estimation of Adult Literacy in Dentistry
HKOHLAT-P	Hong Kong Oral Health Literacy Assessment Task for Pediatric Dentistry
HeLD-14	Health Literacy in Dentistry-14
IOM	Institute of Medicine
OHL	Oral Health Literacy
OHLI	Oral Health Literacy Instrument
OLHI-M	Oral Health Literacy Instrument Malay Version
OHL-AQ	Oral Health Literacy Adult Questionnaire
OHRQoL	Oral Health Related Quality of Life
REALD	Rapid Estimation of Adult Literacy in Dentistry
REALM	Rapid Estimation of Adult Literacy in Medicine
REALD-M	Rapid Estimation of Adult Literacy in Medicine and Dentistry
ToFHLA	Test of Functional Health Literacy in Adults
TOFHLiD	Test of Functional Health Literacy in Dentistry
TS-REALD	Two Stage Rapid Estimation of Adult Literacy in Dentistry
WHO	World Health Organization

LIST OF APPENDICES

Appendix A	Questionnaire Form Malay
Appendix B	Research Information Form Malay
Appendix C	Research Information Form English
Appendix D	Human Ethical Approval
Appendix E	Turnitin Report
Appendix E	Publication

PENILAIAN TAHAP LITERASI IBU BAPA TERHADAP KESIHATAN MULUT DAN PERKAITANNYA DENGAN PENGALAMAN KARIES ANAK-ANAK PRA-SEKOLAH MEREKA YANG MENGHADIRI HOSPITAL UNIVERSITI SAINS MALAYSIA

ABSTRAK

Literasi kesihatan mulut (OHL) merupakan aspek penting bagi kesihatan oral dan kehidupan seseorang individu secara amnya. OHL merangkumi kemahiran membaca, menulis, bertutur, mendengar, membuat keputusan yang tepat dan mempunyai skil numerasi. Tahap OHL ibu bapa memainkan peranan penting dalam mencegah karies gigi anak-anak mereka. Kajian ini bertujuan untuk menilai tahap OHL ibu bapa dan perkaitannya dengan pengalaman karies anak-anak pra-sekolah mereka. Ini adalah kajian keratan rentas deskriptif yang melibatkan kaedah pensampelan secara rawak sistematik menggunakan sampel seramai 230 orang ibu bapa dan anak-anak pra-sekolah mereka yang menghadiri klinik pedodontik, Hospital USM yang memenuhi kriteria. Borang soal selidik OHL yang tersusun dan dikendalikan sendiri serta merangkumi soalan faktor sosiodemografi telah digunakan dalam kajian ini. Pemeriksaan mulut kanak-kanak dilakukan untuk mencatat status dmft (gigi reput, hilang, gigi yang dipenuhi). Analisis statistik dengan kaedah deskriptif, analisis multivariat regresi dan ANOVA sehala serta analisis post hoc telah digunakan. Daripada 230 orang ibu bapa ini, seramai 24 orang lelaki dewasa dan 206 orang perempuan dewasa, membabitkan min umur 31.43 ± 5.82 tahun, serta 92 orang kanak-kanak lelaki dan 139 orang kanak-kanak perempuan, membabitkan min umur 4.82 ± 1.04 tahun telah terlibat dalam kajian ini. Kajian ini juga dibahagikan kepada 3 mengikut kumpulan etnik. Sebahagian besar ibu bapa berpendidikan ijazah dan

kebanyakannya bekerja. Min skor OHL ibu bapa adalah 58±27.39. Ibu bapa yang mempunyai tahap OHL yang tidak mencukupi (43.9%) adalah lebih ramai berbanding ibu bapa yang mempunyai tahap OHL yang mencukupi (31.3%) dan di tahap margin (24.8%). Kejadian karies dalam kalangan kanak-kanak adalah sebanyak 68.7% manakala sebanyak 31.3% kanak-kanak tidak mempunyai karies. Min skor dmft adalah 4.27±4.36, di mana min tertinggi yang dikenalpasti adalah dalam kalangan kanak-kanak yang berusia 6 tahun, diikuti 5, 4, dan 3 tahun. Perkaitan umur ($p < 0.01$) dan jantina ($p = 0.01$) kanak-kanak prasekolah terhadap skor dmft adalah signifikan. Selepas pelarasan faktor sosiodemografi, analisis regresi berganda terhadap jantina ibu bapa (OR = 5.921, 95% CI: 1.355–25.879), status pekerjaan ibu bapa (OR = 0.273, 95% CI: 0.079–0.941), skor OHL ibu bapa (OR =16.122 , 95% CI: 5.846–44.462), dan umur kanak-kanak (OR = 0.108, 95% CI: 0.014–0.816) menunjukkan perkaitan secara signifikan dengan pengalaman karies kanak-kanak prasekolah. Perubahan signifikan didapati di antara skor dmft dan tahap OHL dengan nilai $p < 0.05$. Perubahan signifikan juga didapati di antara tahap pendidikan ibu bapa dan skor dmft kanak-kanak prasekolah dengan nilai $p < 0.05$. Kesimpulannya, terdapat perkaitan secara signifkan di antara tahap OHL ibu bapa dan pengalaman karies anak-anak prasekolah mereka.

ASSESSMENT OF PARENT'S ORAL HEALTH LITERACY AND ITS ASSOCIATION WITH CARIES EXPERIENCE OF THEIR PRESCHOOL CHILDREN ATTENDING HOSPITAL UNIVERSITI SAINS MALAYSIA

ABSTRACT

Oral health literacy (OHL) is an important aspect of oral health and general well-being of an individual. The OHL includes reading, writing, speaking, listening, appropriate decision making and numeracy skills. The OHL of parents plays an important role in the prevention of dental caries among their children. This study aimed to assess the OHL of parents and its association with the caries experience of their preschool children. This was a descriptive cross-sectional study involving a systematic random sampling method, using a sample of 230 parent/preschool child pair attending the pedodontics clinic, Hospital Universiti Sains Malaysia (Hospital USM), who participated and met the inclusion criteria. A structured, self-administered OHLI-M questionnaire including sociodemographic factors was used in this study. A child's oral examination was performed to check the dmft (decayed, missing, filled teeth) status. Statistical analysis was done using descriptive, multivariate regression analysis and one-way Anova with post-hoc analysis. Among 230 parents, 24 were males and 206 were females with mean age (31.43 ± 5.82) years old, among children, 92 were boys and 138 were girls with mean age (4.82 ± 1.04) years old participated in this study. The participants are divided into 3 groups depending upon ethnicity. Most of the parents were educated with a basic degree, and more parents were employed. The mean OHL score of the parents was (58±27.39). The inadequate OHL level (43.9%) of parents was more followed by adequate OHL level (31.3%) and then marginal OHL

level (24.8%). The caries prevalence among the preschool children was 68.7% and 31.3% were caries free. The mean dmft score was (4.27±4.36), where a higher mean dmft was noted amongst children with 6 years of age followed by 5 years, 4 years and then 3 years old. The age (p<0.001) and gender (p=0.01) of preschool children was significant in relation to their dmft score. The multiple regression analysis showed that after adjustment for sociodemographic factors, parents' gender (OR = 5.921, 95% CI: 1.355–25.879), parents' employment status (OR = 0.273, 95% CI: 0.079–0.941), parents' OHL score (OR = 16.122, 95% CI: 5.846–44.462), and child age (0.018, 95% CI: 0.014–0.816) were significantly associated with caries experience in children. Significant difference was found between dmft score and all the levels of OHL with p-value < 0.05. Further, significant difference was found between education of parents and dmft score of preschool children with p-value < 0.05. We conclude that there is a significant association between the OHL of parents with the caries experience of their preschool children.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Oral health literacy (OHL) is an important factor of oral health and general well-being of an individual (Tyagi *et al.*, 2017). The OHL has been subjected to little attention in dentistry until the last decade, the oral health practitioners and researchers have been increasingly interested in learning the association between the oral health and health literacy, leading to development of the term OHL (Kaur *et al.*, 2015a). The OHL is now emerging as a research field in dentistry (Lee *et al.*, 2007). The American Dental Association claims that individuals with low OHL is a hurdle to effective treatment, diagnosis and prevention of dental diseases and has implemented an effective strategy to develop OHL among the population (ADA, 2009). Also, the recent researchers have stated that it is essential to improve the OHL among the people to reduce the oral health problems and a better outcome of oral health in the community (Batista *et al.*, 2018; Firmino *et al.*, 2018a; Yazdani *et al.*, 2018). The institute of medicine (IOM) committees of oral health and American Dental Hygienist's Association (ADHA) conducted a study which includes the experts in health promotion, epidemiologist's, physicians, nurses, dentists and dental hygienists has shown that, individuals literacy is an aspect that need to be measured to evaluate the potential risk of general or oral health (ADHA, 2008). Efforts are needed to research the impact of OHL in various healthcare settings and on different health outcomes, also to develop an instrument that helps to recognize those who are struggling with literacy and how to promote OHL on community and individual bases (Chopra *et al.*, 2013).

The definition of OHL proposed by the US Department of Health and Human Services/National Institutes of Dental and Craniofacial Research is "oral health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate oral health decisions (Nutbeam, 2000). According to this definition OHL includes reading, writing, speaking, listening, appropriate decision making and numeracy skills, which are the ability to understand instructions on prescription drug bottles, appointment slips, medical education brochures, dental professional's directions and the consent forms (Nutbeam, 2000; Sabbahi *et al.*, 2009). The authors revealed that individuals with low OHL is associated with poorer oral health knowledge (Sabbahi *et al.*, 2009). The patients with low OHL do not visit dental clinic regularly, failing to show for dental appointments (Holtzman *et al.*, 2014). Also, the people with limited OHL may lead to low oral health-related quality of life (Lee *et al.*, 2007). Low OHL among the individuals with oral diseases are also associated with more severe periodontal disease and also worse self-reported oral health status (Parker and Jamieson, 2010; Wehmeyer *et al.*, 2014). Further, self-efficacy is suggested to influence the effects of literacy on oral health status (Lee *et al.*, 2012).

The prevalence of dental caries is high with respect to diet and behaviour-related oral diseases in children (Okada *et al.*, 2002). While the dental caries is not dangerous but has a harmful effect on quality of life, nutrition, eating ability, influence on self-esteem and overall health of a child (WHO 2003). The early onset of caries and its infectious nature requires the most concern on preventive oral healthcare and primary treatment amongst children (Okada *et al.*, 2002). Earlier studies revealed that parent plays an important role in prevention and management of caries amongst their children and there is a direct association between oral hygiene behaviour of parents with oral health-

related habits of their children (Khodadadi *et al.*, 2016; Okada *et al.*, 2002). The role of mothers is important in first three years of child's life, parents are still the primary caretakers of children's oral health even in their preschool period (Bozorgmehr *et al.*, 2013). Some factors like age, parental education, employment, their attitude, behaviour and knowledge can offer awareness for improving healthy habits among themselves and in their children's oral health secondarily (Bozorgmehr *et al.*, 2013).

The OHL for parents of preschool children is very crucial, because OHL level of parents may influence the oral health status of preschool children. In addition, to know the OHL level of parents may be helpful for policymakers in terms of designing intervention and decide oral health promotion strategies to reduce oral health problems of pre-schoolers (Wong *et al.*, 2013). To the best of our knowledge, there is no specific study conducted to assess OHL in parents of preschool children of Kelantan state in Malaysia. Therefore, it was decided to conduct this study, the objective of our study was to assess the association between OHL of parents and dmft (d=decayed, m=missing, f=filled teeth) status of their preschool children in Kelantan state Malaysia.

1.2 Problem Statement

Health literacy concept relates to all areas of the health including oral health. Early childhood caries is a phenomenon that has emerged as a serious health concern for preschool children (Peterson-Sweeney and Stevens, 2010). The OHL of parents plays an important role in the prevention of dental caries among their children. The domestic background which is not in a form of good oral health supervision, the child is predisposed to caries because of low OHL level of parents in regard to oral health status of their children (Leghari, 2012). The OHL associations and its outcomes are

few, which is mainly due to the absence of studies and comparatively unexperienced approaches in the existing studies (Berkman *et al.*, 2011). Currently, awareness has been to raise the role of OHL in dentistry, and attempts have been made to apply the idea of health literacy to dentistry and research (Fabillah *et al.*, 2015). According to the Malaysian National Oral Health Plan 2011-2020, the strategies were planned by the policy makers (ministry of health, government dental services, ministry of education etc), the key goals were set to reduce 50% of preschool children with caries-free dentition by the year 2020 (NOHPM, 2011). The activities were planned for oral health promotion to improve OHL among the population, which have an effect on caries experience of their children (NOHPM, 2011). It is a new field in research globally and to the best of our knowledge only few studies has been conducted in Malaysia (Dolah *et al.*, 2019; Fabillah *et al.*, 2015; Ismail *et al.*, 2018a).

As the age advances the preschool children with early childhood caries are likely to develop dental problems like gingival and periodontal diseases, children with caries have more dental infections and pain which results in problem with eating and nutrition (Silk, 2010). The incidence of caries among children is five times more frequent than asthma and seven times more frequent than hay fever (Silk, 2010). Therefore, the parents must know that caries is a chronic and complex disease (Silk, 2010). The children with low economic status, low education level of parents and increase usage of sugar in the food are 32 times more liable to dental caries (AAPediatrics, 2003). In the paediatric healthcare background, there is considerable evidence in the literature showing significant associations between level of parental OHL and oral health status of their children. There was a strong connection between the OHL levels of caregivers in the Cantonese population and the oral health status of preschool children (Bridges *et al.*, 2014). The parents with low OHL are less likely to

have the knowledge about their children's health and also they practice unhealthy attitude and behaviour which effects the health of children (DeWalt *et al.*, 2004)

Hence it is the parent's duty to take care of the child's oral health which should preferably begin before the birth of the child. The mother should know the nourishment and deal of certain medications during pregnancy and lactation in the child's growth. Parents should know the effects of eating sweets, sweet drinks, poor brushing habits and sub-optimal diet in children's oral health as well as in the prevention of caries by using fluoridated toothpaste. These preventive measures should be started before and at the pre-school level. Hence it is important for the parents to have adequate level of OHL to prevent and protect the child oral health status (Veerasamy, 2010).

1.3 Justification of Study

The population of Kelantan state in 2019 was 1.89 million (5.70% of Malaysian population) in which 0.95% are males and 0.93% are females and the literacy rate was 95.90% (Department of statistics, 2019; Ministry of Education, 2019). Millions of dollars are now increasingly being invested by governments and international organisations, such as the World Bank, in health development initiatives, as well as by voluntary donations by individuals themselves (Catford, 2006). Still people are not becoming familiar about their personal health which is related to poor health outcomes in the community. The mean OHL score found among the parents of preschool children in Malaysia was 62.96 by using REALD-99 (Ismail *et al.*, 2018a). The prevalence of dental caries reported was 70-90% among children in Malaysia (Kaur *et al.*, 2015b; Ruhaya *et al.*, 2012). A recent study done in Kelantan state among the preschool children showed a mean dmft of 7.56 and the prevalence of dental carious

reported was 74.6% for deciduous dentition (Dolah *et al.*, 2019). The OHL of parents was not assessed to correlate it with the caries experience of their preschool children.

The OHL of parents has been agreed as one of the important factors because low OHL leads to poor oral hygiene practices, lack of oral health awareness, improper food intake (Divaris *et al.*, 2012). Furthermore, individuals with low OHL are not regular to dental check-ups, finds difficulty to follow oral hygiene instruction and receive treatment which leads to poor oral health related quality of life (Divaris *et al.*, 2012). Parental education level and socioeconomic status have a significant association on the oral health status of preschool children (Ismail *et al.*, 2018a). The contributing factors which are responsible for the incidence of dental caries are oral health behavior, dietary intake and lifestyle habits (Granville-Garcia *et al.*, 2008; Kaur *et al.*, 2015b).

Individuals with a high degree of OHL have been found to know where to go for oral health treatment and how to make appointments, complete forms, meet appointment attendance, follow-up and medication (Hom *et al.*, 2012). Limited OHL is associated with inaccurate knowledge about preventive measures such as brushing habits, water fluoridation, dental care visits and oral health-related quality of life (Hom *et al.*, 2012). Low OHL is associated with a low level of knowledge which may affect the health outcomes for both parents and children (Hom *et al.*, 2012). Limited OHL is a potential barrier to effective prevention, diagnosis, and treatment of oral disease and that clear, accurate and effective communication is an essential skill for the effective practice of dentistry. If policymakers can find the level of OHL among parents of preschool children, it will help to reduce oral health disease burden by designing effective intervention for them (Dickson-Swift *et al.*, 2014). Our study results will be helpful for policymakers to take appropriate measures and make strategies to increase

OHL among parents and in this manner, the prevalence of dental caries among preschool children will decrease gradually.

1.4 Research Questions

1. What is the OHL level among parents of preschool children attending Hospital Universiti Sains Malaysia?

2. What is the caries experience score of preschool children attending Hospital Universiti Sains Malaysia?

3. What is the association of OHL and sociodemographic characteristics of parents with caries experience of their preschool children attending Hospital Universiti Sains Malaysia?

1.5 Objectives

1.5.1 General Objective

To assess parent's OHL and its association with the Caries experience score of their preschool children attending Hospital Universiti Sains Malaysia.

1.5.2 Specific Objective

1. To identify OHL level among parents of preschool children attending Hospital Universiti Sains Malaysia.

2. To assess the caries experience score of preschool children at pedodontics screening clinic Hospital Universiti Sains Malaysia.

3. To determine the association of OHL and sociodemographic characteristics of parents with caries experience of their preschool children attending Hospital Universiti Sains Malaysia.

1.6 HYPOTHESIS

1.6.1 Null Hypothesis

1. There is no significant difference in the OHL level among parents of preschool children at pedodontics screening clinic Hospital Universiti Sains Malaysia.

2. There is no significant difference in the caries experience score of preschool children at pedodontics screening clinic Hospital Universiti Sains Malaysia.

3. There is no association of OHL and sociodemographic characteristics of parents with caries experience of their preschool children attending Hospital Universiti Sains Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 Oral Health Literacy

The OHL allows an individual to move through the health care system relatively than just allowing them to read, write and relate oral health literature (Nutbeam, 2000). Literacy skills are needed in all aspects of oral health, such as reading and identifying basic oral health messages on a doctor's card, drug labels, awareness booklets, pictures and resources (Nutbeam, 2000). There is a significant amount of knowledge available on the internet nowadays, but literacy skills are very important to be able to understand and interpret a tool or content online or offline. The health literacy has been receiving attention in the medical setting since 1948, the role of OHL was discussed in context of oral health two decades ago (Nutbeam, 2000).

Oral health is an important part of physical health and well-being, even more than a clean mouth, a great smile, and relief from pain and infection. It also relates significantly to self-esteem and personal achievement (Chopra *et al.*, 2013). The U.S. Surgeon General pointed to oral and dental diseases as a "silent epidemic" targeting mostly vulnerable people (such as low-income and under-educated communities, elderly, racial and ethnic minorities) (Ju *et al.*, 2017). The OHL is the social determinant of health, being directly related to upstream causes like socioeconomic inequality and disparities in access to dental services (Ju *et al.*, 2017).There is enough evidence in the literature with several studies which reveals that the OHL is significantly associated with an adult's oral health status, as well as children's oral health (Bridges *et al.*, 2014; Divaris *et al.*, 2012; Parker and Jamieson, 2010). Early childhood caries can only be avoided with the support of parents, and it has been shown that the more supportive the

attitude of mother about the oral health of her children, the less caries experience the children had (Okada *et al.*, 2002).

The literature has shown that, the overall level of OHL among different populations seems to be low (Atchison *et al.*, 2010; Lee *et al.*, 2007; Macek *et al.*, 2010; Sabbahi *et al.*, 2009). In general, the women participants have a high degree of OHL when compared to men (Macek *et al.*, 2010; Sabbahi *et al.*, 2009). The participation rate of females was significantly higher while conducting the studies when compared to males (Gong *et al.*, 2007). Education and OHL are related to each other, and people with university education as well as high socioeconomic background have high level of OHL when compared to others (Lee *et al.*, 2007; Macek *et al.*, 2010; Richman *et al.*, 2007; Sabbahi *et al.*, 2009).

People with a high level of OHL have been reported to perceive good oral health status (Dickson-Swift *et al.*, 2014). A study done by Wehmeyer *et al.* (2014) revealed that low OHL is substantially associated to severe periodontitis and a high-level OHL is related with less or no periodontal illness.

As far as we know only a few studies have revealed a correlation between oral health related quality of life (OHRQoL) and OHL (Dolah *et al.*, 2019; Kranjčić *et al.*, 2014; Swelem *et al.*, 2014). A study done by Divaris *et al.* (2011) in North Carolina on women caregivers shown that poor OHRQoL has been reported among participants with low OHL compared to those with higher OHL levels. People with minimal OHL have been documented to have a greater risk of oral disease and their associated problems (Divaris *et al.*, 2011).

Baskaradoss (2018) assessed the OHL and its relation with oral health status among patients attending university hospital, 150 patients were interviewed with comprehensive measure of oral health knowledge (CMOHK) questionnaire to check the

OHL, and data for oral health status was obtained from the patients electronic dental record, the author concluded that there was a significant association between the OHL and oral health status and also with several oral health characteristics (Baskaradoss, 2018).

Khan *et al.* (2014) did a pilot study to measure OHL among the older adults by using rapid estimation of adult literacy in dentistry 30 (REALD-30) instrument including word recognition and comprehension. A total of 75 each female and male over 50 + years of age participated. The authors concluded that the OHL score was high among the participants with more on word recognition than the comprehension, while word recognition does not suggest proper understanding in agreement with the other studies (Khan *et al.*, 2014).

2.2 Association of Oral health literacy of Parents and Caregivers with Oral Health Status of Preschool Children

The OHL of parents and caregivers was associated with oral health status of preschool children, several studies were done among different populations which have shown a significant association between OHL of parents and caregivers with their children's oral health status (Bridges *et al.*, 2014; Dieng *et al.*, 2020; Divaris *et al.*, 2012; Ismail *et al.*, 2018a; Khodadadi *et al.*, 2016; Montes *et al.*, 2019; Vann Jr *et al.*, 2010). The OHL of parents and caregivers play a critical role in the prevention and management of caries which is the most common oral health problems among preschool children (Bridges *et al.*, 2014). The effectiveness to develop healthy habits among children depends on parental OHL, behaviour, attitude, knowledge and practice like brushing habit, balanced diet etc concerning oral health, which is essential for primary prevention actions (Dieng *et al.*, 2020). Parents and caregivers with low OHL generally

have less knowledge of children's oral health or preventive practices (Blizniuk *et al.*, 2015).

To define the comparison between parental OHL and the status of dental health among their children a cross-sectional study was conducted in Iran. A total of 384 parents and children were included, dmft index was measured for children and an "Oral Health Literacy-Adults Questionnaire" for the accompanying parents. The outcome of the study was, that the OHL of parent's was found to be inadequate and it was related with children experiencing excessive dental caries and less dental fillings. The authors concluded that in order to develop the oral health of children, planning interventions to develop' OHL of parents would be important in children's oral health promotion procedures, particularly in the countries with a developing oral health system (Khodadadi *et al.*, 2016).

Chu *et al.* (2012) labels the experience of dental caries in preschool children in Hong Kong and issues affecting their dental caries status. A sample of children from seven different schools was included. A questionnaire was used to measure the OHL of parents. The caries experience is recorded by using dmft index tool. A substantial data was found which relates the dental caries involvement of children and their parental OHL, educational level, family income, and oral health-related habits. Authors concluded that in Hong Kong the early childhood caries is more prevalent among preschool children. The status of their oral health and caries experience is related to parental OHL, education, income and their oral health behaviour (Chu *et al.*, 2012)

Ismail *et al.* (2018a) conducted the study to assess OHL of parents and its relation to their preschool children's oral health status. A sample of 200 parent/child were involved in this study. The OHL of parents was determined by Rapid Estimation of Adult Literacy in Dentistry-99 (REALD-99) questionnaire with socio-demographic

characteristics. The clinical examination of preschool children was done to identify the oral health status. The authors concluded that there was a significant relation between OHL of parents and their preschool children's oral health status (Ismail *et al.*, 2018a).

A previous study was conducted to define the association of OHL of caregivers with oral health status of their preschool children among the Hong Kong population, a sample of 301 pair of children and parents were included in the study. The OHL tool Hong Kong Rapid Estimation of Adult Literacy in Dentistry-30 (REALD-30) was used to measure the OHL among parents and dmft index for children. The authors concluded that there was a significant association of oral health status of preschool children with their parental OHL (Bridges *et al.*, 2014)

Vann Jr *et al.* (2010) conducted a study to determine the association of parent's OHL, knowledge and behaviour with oral health status of their children. A total of 1158 of children/caregivers were interviewed from a low socioeconomic population. The OHL was evaluated by employing REALD-30. The authors concluded that, the lower OHL among caregivers was significantly associated with harmful oral health outcomes in the children (Vann Jr *et al.*, 2010).

A study conducted by DeWalt *et al.* (2004) which states that in dentistry, caregiver health literacy is directly related to the knowledge of caregiver. The caregiver's oral health knowledge among infant and early childhood is of prime importance, it's because of early reorganization of oral health behaviours by the caregiver (DeWalt *et al.*, 2004). The caregivers' attitude towards their young children's oral health status are very important when viewing oral health of children because early childhood caries susceptibility has been linked to parent and family considerations (Divaris *et al.*, 2012).

A cross-sectional study was conducted to determine the comparison between a child's oral health outcome and caregiver's literacy. Complete oral examination of 106 children was done and the extent of oral health knowledge and behaviour of caregiver was studied. Around 86 percent of mothers participated in this study. READ-30 questionnaire was used to measure oral health knowledge and the result of this study showed an association between caregiver's literacy and oral health status of children (Miller *et al.*, 2010).

2.3 Importance of Oral Health Literacy Among Parents of Preschool Children

The OHL among parents of preschool children is of prime importance because it influences the preschool children to develop healthy habits as they spend most of their time with their parents (Naidu *et al.*, 2012). The parents play a vital role in providing knowledge and support for healthy lifestyles among their preschool children. Their actions have a significant effect on the dental and physical health of the children. The more supportive approach parents have with regards to the oral health and dental treatment, the better oral hygiene their children will have (Shetty *et al.*, 2016).

During the early phase of childhood, the daily dietary and health habits are directly or indirectly influenced by the oral health actions, attitudes, values and awareness of their parents and caregivers (Blinkhorn, 1989). Three factors that causes early caries in childhood are micro-organisms, diet rich in sugar and teeth that are unprotected. The micro-organisms are transmitted from parents to children by unhealthy habit and action of parents through close contact, tasting and sharing food with pacifier or spoon (Freudenthal and Bowen, 2010). Improper dietary habits like providing sugary snacks in between meals have been identified as an important cause

of caries in early childhood among preschool children (Astrom and Kiwanuka, 2006). Tooth brushing is seen to be a significant factor which helps in the reduction of dental caries. The parents are supposed to brush their child's teeth before they know the importance and technique of brushing (Freudenthal and Bowen, 2010). The removal of biofilm daily from the children's teeth is important to prevent growth of micro-organisms (Freudenthal and Bowen, 2010). Hence the parents should have adequate OHL and knowledge to take necessary actions against all three measures to prevent early dental caries among preschool children (Peter, 2000).

Cho (2016) conducted a study to examine the OHL of mothers and its influences on their preschool children's oral health status. A total of 233 mothers with their preschool children were participated in the study. The survey was done by asking the mothers to fill a self-administered questionnaire form and children were examined for decayed, missing and filled teeth. Multiple regression analysis was done. The authors concluded that the OHL of mothers revealed a statistically significant influence on their children's oral health status with negative correlation. There is a decrease in dmft score of the preschool children as the OHL level of mothers increases. The OHL in parents is an important factor to improve the oral health status among their preschool children (Cho, 2016).

In another study conducted in Hiroshima to find weather the parental behaviour has influence on the child's dental health status. The study showed that there is direct influence of parental behaviour over child's oral health status. Children's original behaviour like tooth brushing have shown to be adapted from parents (Okada *et al.*, 2002).

Sayegh *et al.* (2005) conducted a study to assess the relationship of oral health to sociodemographic factors, oral hygiene behaviour, dietary practices and infant

feeding in 4-5-year-old Jordanian children. The authors concluded that children from a less privileged background had high occurrence of dental decay (Sayegh *et al.*, 2005).

2.4 Factors Influencing the Oral Health Literacy Among Parents of Preschool Children

A good education and economic background have an influence on OHL of parents, which in turn have impact on oral health status of their children (Bridges *et al.*, 2014; Ismail *et al.*, 2018a; Naghibi Sistani *et al.*, 2014). This might be due to improved privileges in taking precautions, early detection and treatment options that are accessible for them (Ismail *et al.*, 2018a). In general, highly educated parents are more likely to have access to suitable information resources and they recognize that information properly, which in turn enhances their OHL (Williams *et al.*, 2002). The information like importance of brushing, frequency of using sugar, role of sugar causing dental caries, the benefits of using fluoridated toothpaste, oral health related educational instructions and messages (Williams *et al.*, 2002).

There is a direct or indirect impact of income on OHL of parents which have an influence on oral health at family or community level (Fisher-Owens *et al.*, 2007a). Studies have shown evidence of link between the low socioeconomic background of parents and adverse oral health outcome in the children (Fisher-Owens *et al.*, 2007b; Kaplan *et al.*, 1996; Stansfeld *et al.*, 2006). A greater interest has been shown by dental epidemiologists towards designing the oral health of children in a population (Fisher-Owens *et al.*, 2007b).

The factors which have direct or indirect influence on the OHL among parents of preschool children are social, environmental and economic factors that contribute the outcome of oral health (Horowitz and Kleinman, 2012). Interventions must be designed

with respect to these three areas to improve the OHL. These factors are displayed in the fig 2.1

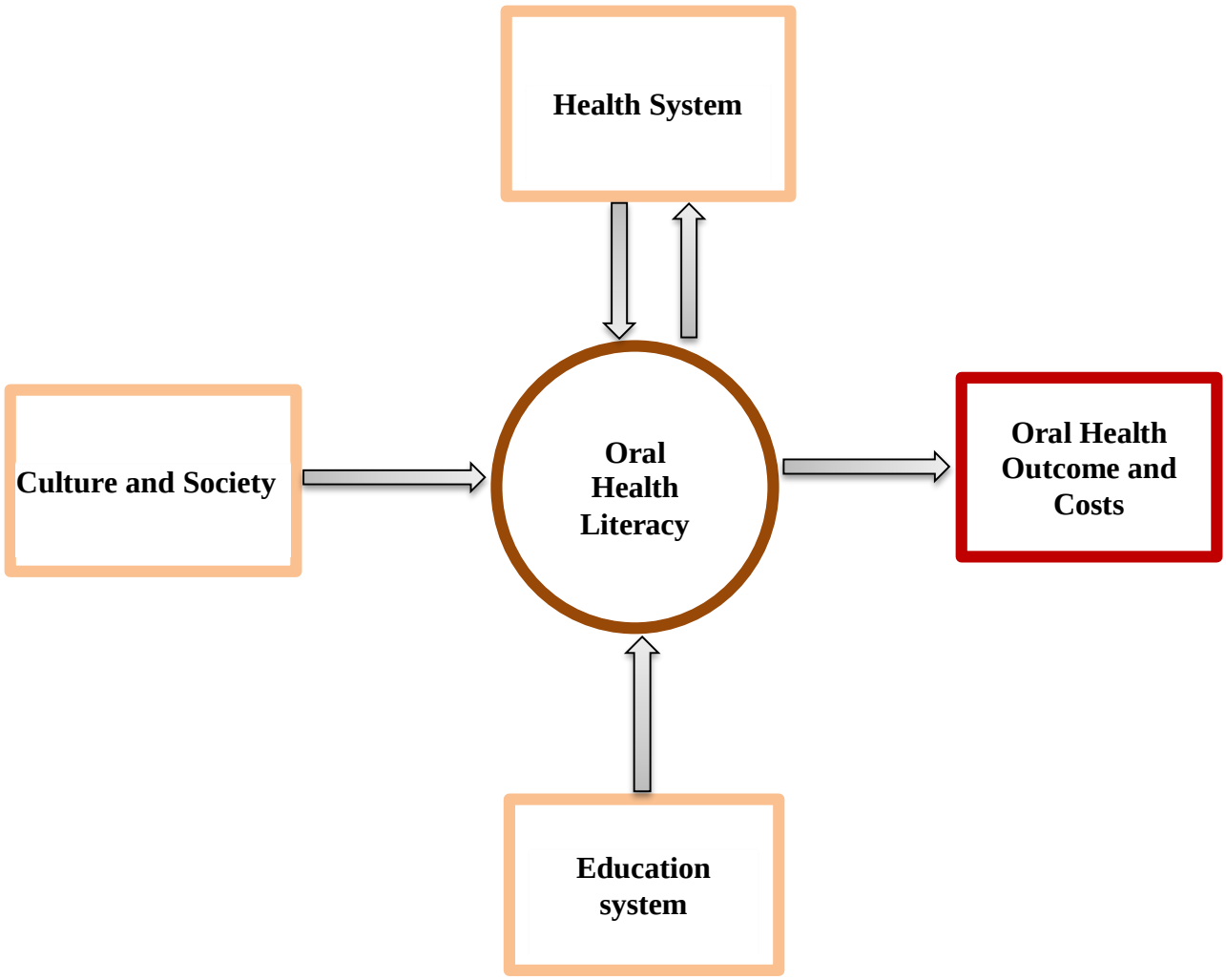

Figure 2.1 Oral Health Literacy Framework Adapted from (Horowitz and Kleinman, 2012)

2.5 Health Literacy

The health literacy as a term was first employed in the year 1974 as a policy concern affecting the health system in the discussion of standard health education in all grade school level (Ratzan and Parker, 2000; Simonds, 1974). To be a health literate allows a person to define his own health, his family's health and the community health as well, as to define the reasons that are influencing health and creating better choices to tackle them (Sørensen *et al.*, 2012) . Health literacy describes the relation between patient literacy levels and their ability to understand the recommended therapeutic regimens (Nutbeam, 2000).

The expert panel from the Institute of Medicine divided the field of health literacy into four groups (Ozdemir *et al.*, 2010)

i. Conceptual and cultural awareness.
ii. Oral literacy, comprising talking and listening abilities.
iii. Script literacy, comprising reading and writing abilities.
iv. Numeracy

Previously health literacy has been utilized more in background of the associations between health education and health literacy. The health literacy and its importance has now been expanded to the scientific study, which includes knowing the literacy level of patients before planning the treatment choices and their ability to understand prescribed medication as directed (Berkman *et al.*, 2011). The World Health Organisation (WHO) defined health literacy as "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health" (Nutbeam, 1998).

According to Coulter *et al.* (2008) the health literacy has been divided into three different levels, functional, interactive and critical.

- ✓ Functional- lowest possible skills necessary for proper functioning in a healthy background such as reading and writing.
- ✓ Interactive- further developed skills than functional, this include social skills that are more actively involved in healthcare and the higher level of literacy with thinking skills.
- ✓ Critical- capacity to critically analyze, evaluate and utilize the information available and manage to take better decisions and actions which influences health benefits.

Health literacy significantly broadens the scope of communication and health education. It has also been suggested that health literacy can bring both individual and social benefits, and has important implications for the methods of communication and education (Nutbeam, 2000).

Over the years, the aspects like literacy and health literacy have been described, developed and evaluated by several means, having to respond to changing requirements in an progressively sophisticated society (Berkman *et al.*, 2010). Advances have been made in the recent period for the growing concern toward the interest in health literacy which is defined as an integral part of the health communication. The area of health literacy is rapidly growing, expanding to include a wider and multidisciplinary audience, while there is greater acceptance of its complexity and multi-layered nature (Berkman *et al.*, 2010).

Health literacy inspires and allows a person to read the information, manage it and utilize it to ensure his good health and well-being (Dickson-Swift *et al.*, 2014). Previous studies have shown that individuals with low health literacy are not capable of identifying what is better and what is harmful for their health, which in turn prevents

them from making right decisions which increases the possibility of harmful health results (Berkman *et al.*, 2011; Jackson, 2006; Peterson *et al.*, 2011).

Health literacy, in turn, seems to influence health behaviour and the use of healthcare facilities, which does have an impact on health conditions and healthcare expenses in society. Health literate individuals at the systemic level can participate in continuous public and private discussions on healthcare, scientific and cultural practices (Sørensen *et al.*, 2012). The advantages of health literacy thereby directly affect the complete range of life's activities such as home, work, culture and society (Sørensen *et al.*, 2012)

In 2015 a comparative survey on health literacy was conducted in eight European countries. The data collected was created on Eurobarometer standard and the application of health literacy survey Europe questionnaire in computer-assisted or paper-aided interviews. The authors concluded that health literacy signifies a vital role for health practices and health policies throughout Europe, with a different level for different nation. The social gradient of health literacy must be explained thoroughly while creating public health strategies for advancing health equity in Europe (Sørensen *et al.*, 2015).

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2.6 Factors Associated with Health Literacy

National Assessment of Adult Literacy (NAAL) conducted a survey in 2003 among American population, the overall literacy rate was 36%, which is defined as basic or low literacy level. Hence, the adult literacy rate was found to be low among 87 million US population. The cost for low health literacy ranges from $106 to $238 billion dollars (Vernon *et al.*, 2007).

Health literacy is a vital and important determinant of health, as it influences the efficiency of patients seeking care and receiving treatment. Inequalities in health care due to poor interaction, inadequate information, and unreadable instructions suggests that individuals with low health literacy might contribute to considerable deficiencies in the development of health resources (Vernon *et al.*, 2007).

The health literacy is a changeable factor that can be expected to improve with education (Bröder *et al.*, 2018; Nutbeam, 2000). The health literacy plays an important role in interventions pointing towards prevention of disease and promotion of good health (Manganello *et al.*, 2015). Literature has revealed that the adult health literacy has shown to follow a social gradient from both medical and public health sector, it is expressed in low levels among the minorities, individuals with low socioeconomic status, also with low educational level among populations (Arozullah *et al.*, 2006; Kindig *et al.*, 2004; Pelikan *et al.*, 2018; Rikard *et al.*, 2016; Smedley *et al.*, 2003; Sudore *et al.*, 2006). Furthermore, low health literacy is also more common in older people and immigrants. Literature has shown, low health literacy is prominent in public hospitals and also common among elderly in private setting (AMA; Schillinger *et al.*, 2002)

A systematic review done by examining the presence of low health literacy and outlining these results by measuring demographic relations in combined evaluations, which shows that low health literacy, as described in the literature is common and consistently linked to education, ethnicity and age. It is essential to improve health education and simplify the healthcare services (Paasche-Orlow *et al.*, 2005).

Low health literacy is indirectly associated with poor socio-economic conditions and this in turn related to negative health results that are independent of other lifestyle factors (Nutbeam, 2008). There are various factors which influences the health literacy

skills like demographic factors, prior knowledge, conceptual knowledge of health and healthcare, resources and capabilities. These factor influences the health related-behaviour and outcomes directly or indirectly (Squiers *et al.*, 2012). The framework of interdependence between these factors is acknowledged in the figure 2.2.

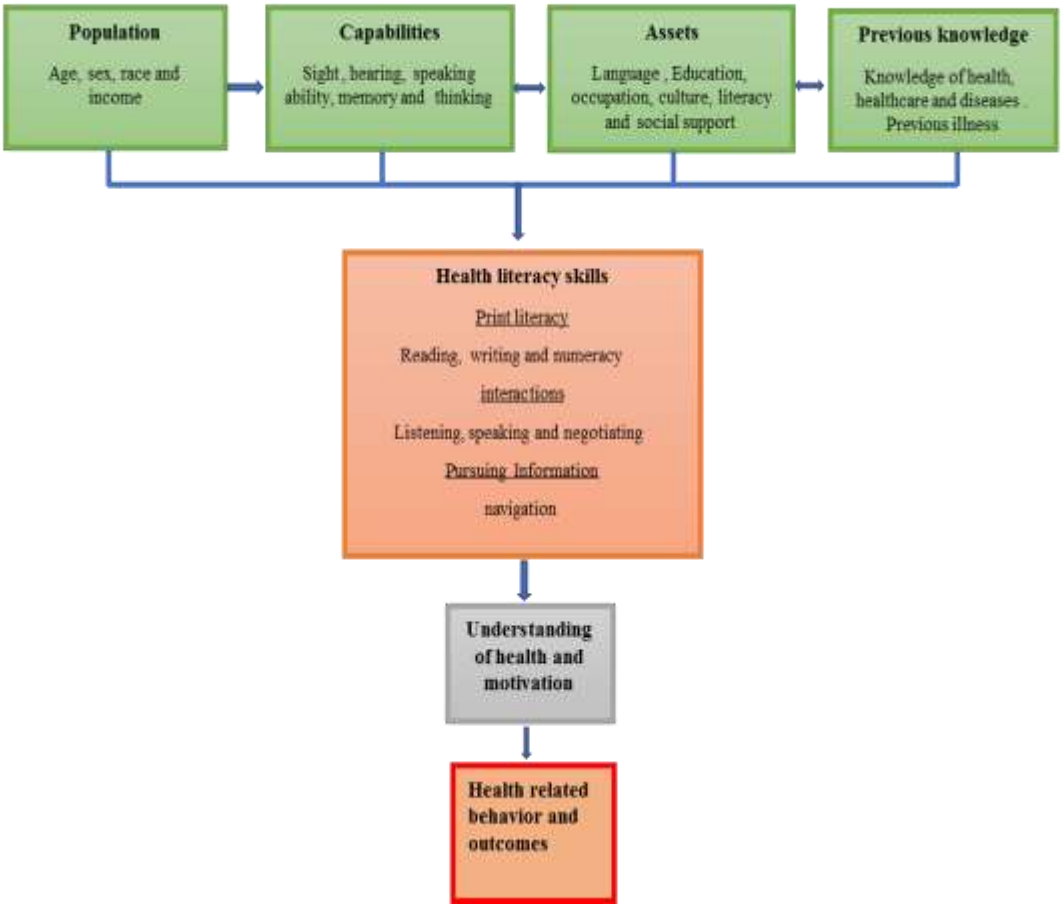

Figure 2.2 Conceptual framework of Health Literacy (Squiers et al., 2012)