

IMPACT OF EARLY CHILDHOOD CARIES ON ORAL HEALTH-RELATED QUALITY OF LIFE
AMONG 5-YEAR-OLD CHILDREN IN MANDALAY, MYANMAR



A Dissertation Submitted in Partial Fulfillment of the Requirements
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ซอร์ เน มิน : ผลกระทบของโรคฟันผุในเด็กปฐมวัยต่อคุณภาพชีวิตที่สัมพันธ์กับโรคในช่องปากของเด็กอายุ 5 ปี ในเมือง มัณฑะเลย์ ประเทศพม่า . (IMPACT OF EARLY CHILDHOOD CARRIES ON ORAL HEALTH-RELATED QUALITY OF LIFE AMONG 5-YEAR-OLD CHILDREN IN MANDALAY, MYANMAR) อ.ที่ปรึกษาหลัก : ผศ. ทพญ.ดร.พลินี เดชสมบูรณ์รัตน์, อ.ที่ปรึกษาร่วม : ผศ. ทพญ. ดร.ดวงพร ดวงทิพย์, Assoc. Prof.Gao, Sherry Shiqian D.D.S., M.Sc, Ph.D.

วัตถุประสงค์: การศึกษาที่มีวัตถุประสงค์เพื่อพัฒนาการปรับเปลี่ยนข้ามวัฒนธรรมและคุณสมบัติการวัดทางจิตวิทยาของมาตรวัดผลลัพธ์ทางสุขภาพช่องปากในเด็กอายุ 5 ปี และ ประเมินผลกระทบของโรคฟันผุในเด็กปฐมวัยต่อคุณภาพชีวิตในเด็กอายุ 5 ปีในเมืองมัณฑะเลย์โดยใช้แบบสอบถามมาตรวัดผลลัพธ์ทางสุขภาพช่องปากในเด็กอายุ 5 ปี **วัสดุและวิธีการ:** มาตรวัดผลลัพธ์ทางสุขภาพช่องปากในเด็กอายุ 5 ปีได้รับการแปลจากต้นฉบับภาษาอังกฤษเป็นภาษาพม่าและแปลย้อนกลับ และทดสอบความเที่ยงตรงตามเนื้อหา ความสอดคล้องภายใน การวัดความเที่ยงด้วยวิธีทดสอบซ้ำ ความเที่ยงตรงตามโครงสร้างและความตรงเชิงจำแนกในเด็กอายุ 5 ปี และผู้ปกครองในการศึกษาและการศึกษาภาคตัดขวางได้ดำเนินการโดยใช้แบบสอบถามด้วยตนเองเพื่อประเมินผลกระทบของโรคฟันผุในเด็กปฐมวัยและปัจจัยที่เกี่ยวข้องที่สัมพันธ์กับคุณภาพชีวิตในมิติสุขภาพช่องปากของเด็กในการศึกษาในระยะที่สอง ผลการศึกษา พบว่า เด็กและผู้ปกครองจำนวน 509 คู่ใน 7 เขตในเมืองมัณฑะเลย์ ประเทศพม่า ได้รับการคัดเลือกเพื่อเก็บข้อมูลทั่วไป พฤติกรรมสุขภาพช่องปาก และคุณภาพชีวิตในมิติสุขภาพช่องปากโดยใช้มาตรวัดผลลัพธ์ทางสุขภาพช่องปากในเด็กอายุ 5 ปี ทั้งฉบับสำหรับ เด็ก และ สำหรับ ผู้ปกครอง และได้รับการตรวจทางคลินิกเพื่อประเมินค่าเฉลี่ย ผู้ดูแล การศึกษาวิเคราะห์ข้อมูลด้วยการวิเคราะห์โคสควร์และการวิเคราะห์การถดถอยโลจิสติก **ผลการศึกษา:** แบบสอบถามได้รับการประเมินความเที่ยงและความตรงในเด็กจำนวน 173 คน สำหรับ การศึกษา ระยะ แรก พบว่า การตรวจสอบค่าสัมประสิทธิ์แอลฟาของครอนบาชในการวัดความสอดคล้องภายในมีค่าเท่ากับ 0.82 ในฉบับเด็ก และเท่ากับ 0.79 ในฉบับผู้ปกครอง ค่าสหสัมพันธ์ภายในขึ้นในการวัดความเที่ยงด้วยวิธีทดสอบซ้ำ มีค่าเท่ากับ 0.90 และ 0.89 สำหรับฉบับเด็กและผู้ปกครองตามลำดับ คะแนนมาตรวัดผลลัพธ์ทางสุขภาพช่องปากในเด็กอายุ 5 ปี ทั้งฉบับเด็กและฉบับผู้ปกครองมีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับข้อคำถามโดยรวม ยกเว้น ข้อคำถาม “ ผลกระทบด้านสุขภาพทั่วไปของเด็ก ” ใน ส่วน ของ ผู้ปกครอง นอกจากนี้แบบสอบถามฉบับภาษาพม่ามีความสามารถในการจำแนกเด็กที่มีฟันผุและเด็กที่ปราศจากฟันผุได้ ($p < 0.001$) ผลการศึกษาในระยะสอง พบว่า ร้อยละ 64.4 ของเด็กมีผลกระทบต่อคุณภาพชีวิตในมิติสุขภาพช่องปากในเด็กอายุ 5 ปี และร้อยละ 67.8 ของผู้ปกครองรายงานว่าเด็กมีผลกระทบต่อคุณภาพชีวิตในมิติสุขภาพช่องปากเช่นเดียวกัน ค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐานของคะแนนมาตรวัดผลลัพธ์ทางสุขภาพช่องปากในเด็กอายุ 5 ปีมีค่าเท่ากับ 1.8 (2.2) และ 2.6 (3.2) ในฉบับรายงานโดยเด็กและผู้ปกครองตามลำดับ ผลการวิเคราะห์การถดถอยโลจิสติก พบว่า เด็กที่มีค่าเฉลี่ยผู้ดูแลสูงกว่าจะมีโอกาสที่มีคุณภาพชีวิตในมิติสุขภาพช่องปากต่ำกว่าทั้งที่รายงานโดยเด็ก (OR: 1.23 (95% CI 1.16 - 1.31, $p < 0.001$) และรายงานโดยผู้ปกครอง (OR: 1.24, 95% CI 1.17 - 1.33, $p < 0.001$) นอกจากนี้คะแนนอายุในช่องปาก (OR: 2.12, 95% CI 1.40 - 3.23, $p < 0.001$) และ อายุที่เริ่มแปรงฟัน (OR: 1.61, 95% CI 1.03 - 2.51, $p = 0.037$) เป็นปัจจัยที่มีผลต่อคุณภาพชีวิตในมิติสุขภาพช่องปากอย่างมีนัยสำคัญทางสถิติสำหรับฉบับเด็ก ผลการศึกษานี้สอดคล้องกับผลในฉบับผู้ปกครองที่พบว่า คะแนนอายุในช่องปาก (OR: 2.08, 95% CI 1.35 - 3.21, $p = 0.001$) อายุที่เริ่มแปรงฟัน (OR: 1.89, 95% CI 1.21 - 2.98, $p = 0.006$) และ ความถี่ในการแปรงฟันต่อสัปดาห์ (OR: 1.98, 95% CI 1.00 - 3.92), $p < 0.049$) เป็นปัจจัยที่ส่งผลต่อคุณภาพชีวิตในมิติสุขภาพช่องปากในเด็ก **สรุปผล:** การศึกษานี้แสดงหลักฐานว่า มาตรวัดผลลัพธ์ทางสุขภาพช่องปากในเด็กอายุ 5 ปี ฉบับภาษาพม่าทั้งที่รายงานโดยเด็กและผู้ปกครองมีความเที่ยงและความตรงที่ดี และสามารถใช้ในการประเมินคุณภาพชีวิตในมิติสุขภาพช่องปากในเด็กอายุ 5 ปีในประชากรที่ใช้ภาษาพม่าได้ การศึกษาในระยะสองพบว่ามีความสัมพันธ์ระหว่างโรคฟันผุในเด็กปฐมวัยกับคุณภาพชีวิตในมิติสุขภาพช่องปากสำหรับเด็กอายุ 5 ปี อย่างมีนัยสำคัญทางสถิติทั้งการรับรู้ของเด็กและผู้ปกครอง นอกจากนี้ ประสิทธิภาพพินิจปัจจัยทางสังคม อายุนัยช่องปาก และอายุที่เริ่มแปรงฟัน เป็นปัจจัยที่สัมพันธ์กับคุณภาพชีวิตในมิติสุขภาพช่องปากทั้งฉบับเด็กและผู้ปกครอง

| | | |
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KEYWORD: Early Childhood Caries, Scale of Oral Health Outcomes for 5-year-old Children (SOHO-5), Oral Health Related Quality of Life, Validation, Psychometric Properties

Saw Nay Min : IMPACT OF EARLY CHILDHOOD CARIES ON ORAL HEALTH-RELATED QUALITY OF LIFE AMONG 5-YEAR-OLD CHILDREN IN MANDALAY, MYANMAR. Advisor: Asst. Prof. Palinee Detsomboonrut, D.D.S., M.Sc, Ph.D. Co-advisor: Asst. Prof. Duangporn Duangthip, D.D.S., M.Sc, Ph.D., Assoc. Prof. Gao, Sherry Shiqjan, D.D.S., M.Sc, Ph.D.

Purpose: The study aimed to develop the cross-cultural adaptation and psychometric properties of the Myanmar Version of SOHO-5 and assess the impact of ECC on oral health quality of life among 5-year-old children in Mandalay using the Myanmar version of the SOHO-5 questionnaire. *Materials and methods:* The Myanmar SOHO-5 version was conducted with the forward-backward translation method and investigated the content validity, internal consistency, test-retest reliability, construct validity, and discriminant validity on 5-year-old children and their parents in phase I. A cross-sectional study was conducted using a self-administered questionnaire to investigate the impact of ECC and relative factors on the oral health related quality of life of children in phase II. A total of 509 child-parent pairs in seven districts of Mandalay city, Myanmar were recruited to collect data related to the child's demographic, oral health behavior, and children's OHRQoL using parental and child versions of SOHO-5 questionnaire. Clinical examinations were performed to determine the dmfs caries. Chi-squared analysis and multiple logistic regression were used to analyze the data. *Results:* In Phase I, the questionnaires were tested on 173 five years old children and their parents for reliability and validity. Cronbach's alpha coefficient values for internal consistency were 0.82 for the children's report and 0.79 for the parental report. The ICCs were 0.90 and 0.89 for the total scores of the children and parental versions in the test-retest reliability analysis. The total SOHO-5 scores for both reports were significantly associated with the global rating questions except for the 'impact on children's general health' question in the parental report. Furthermore, the Myanmar version discriminated between the children with and without caries experiences ($p < 0.001$). The result in phase II showed that 64.4 % of children reported an impact on OHRQoL (SOHO-5 score > 0), and 67.8% of the parent reported an impact on their children's OHRQoL. The mean (standard deviation) total score of the SOHO-5 was 1.8 (2.2) and 2.6 (3.2), for child self-report and parental version, respectively. In multivariate logistic regression analysis, children with a higher dmft score had a significantly higher chance of having a poorer OHRQoL (OR: 1.23 (95% CI 1.16 - 1.31, $p < 0.001$) for children's report and (OR: 1.24, 95% CI 1.17 - 1.33, $p < 0.001$) for parent's report. Moreover, the debris score (OR: 2.12, 95% CI 1.39 - 3.23, $p < 0.001$) and the starting age for tooth brushing (OR: 1.61, 95% CI 1.03 - 2.51, $p = 0.037$) were the significant factors affecting children's OHRQoL based on children's report. Similarly in parent's report, the debris score (OR: 2.08, 95% CI 1.35 - 3.21, $p = 0.001$), starting age for tooth brushing (OR: 1.89, 95% CI 1.21 - 2.98, $p = 0.006$) and brushing day per week (OR: 1.98, 95% CI 1.00 - 3.92), $p < 0.049$) had a greater probability of exerting an impact on children's OHRQoL. *Conclusion:* This study provides evidence that the Myanmar SOHO-5 version's children and parental reports have good reliability and validity and can be used to assess the OHRQoL of 5-year-old children in a Burmese-speaking population. In phase II, there was a significant relationship between ECC and OHRQoL of 5-year-old children in terms of the perceptions of both children and their parents. Furthermore, the study showed that the children's OHRQoL was significantly associated with caries experiences, oral hygiene status, and starting age for tooth brushing in both reports, and brushing days per week in the parent report.

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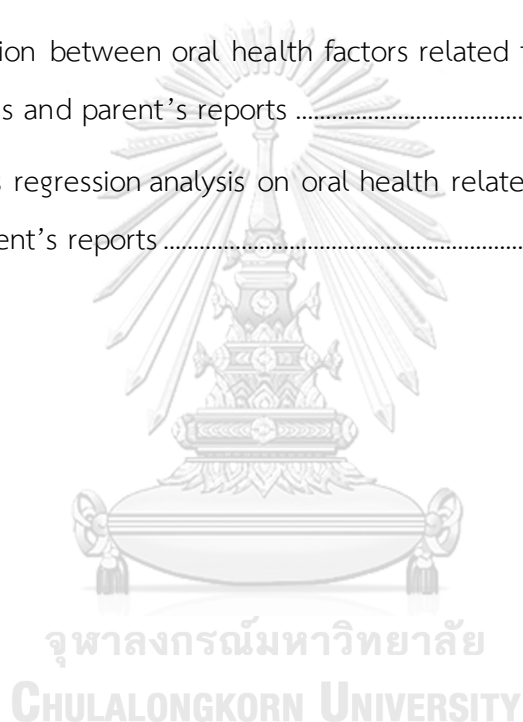
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CHAPTER I

INTRODUCTION

1.1 Background and rationale

Although dental caries can be treated and prevented, it is still a one of the most frequent chronic oral disease across the globe (Sharma, Puranik, & K, 2015). In recent years, despite dental caries prevalence in children have declined in the western countries, the caries in preschool children remains a problem in both developed and developing countries (Çolak, Dülgergil, Dalli, & Hamidi, 2013).

According to the American Academy of Pediatric Dentistry, early childhood caries (ECC) is the primary caries occurring before the age of 71 months, which exists in one or more decayed (non-cavitated or cavitated lesions), missing due to caries or filled tooth surfaces in any primary tooth (Hui Bin, Zhang, & Zhou, 2017). ECC is a multifactorial and it involves interaction between socioeconomic, microbiological factors and behavioral characteristics (H. Wong, C. McGrath, N. King, & E. Lo, 2011).

The prevalence of early childhood caries (ECC) is high in the middle and low-income-countries especially among socioeconomically disadvantaged people (Phantumvanit et al., 2018). ECC can begin in early in life and progress rapidly to cavitated lesions (Sirinan Mabangkhu, Duangthip, Hung, Phonghanyudh, & Jirattanasopha, 2020) and 90% of ECC in developing countries is untreated due to accessibility and financial problems (Contreras, Toro, Elias-Boneta, & Encarnación-Burgos, 2017).

The common consequences of ECC are pain, abscesses and systemic infection (Li, Zhi, Zhou, Qiu, & Lin, 2015). If ECC is left untreated, the oral health condition of children become worsens and leading to more complex treatment with increase treatment cost (Zafar, Harnekar, & Siddiqi, 2009). Some children have destruction at the anterior region due to caries and which are reducing chewing efficiency and developing parafunctional habits— such as tongue interposition and affecting aesthetics with negative psychological impacts (Bönecker, Abanto, Tello, & Oliveira, 2012). Children with caries of primary teeth in their earlier life are high risk of additional caries developments in their primary and permanent dentition (Zafar et al., 2009). Early loss of molars is likely to become future teeth crowding and treatment for this problem is often financially out of reach for their parents.

The impacts of ECC are not limited to oral health only (Li et al., 2015) and it can also have negatively impact on the quality of life of the children (Naidu, Nunn, & Donnelly-Swift, 2016). The negative impacts of caries on lives of children consists of functional factors, such as impairment of chewing and speaking abilities, daily life activities, such as preschool absenteeism, decline school performance, psychological issues, such as disturb in sleeping, and factors related to social interaction such as smiling and refraining from speaking (Bönecker et al., 2012). ECC can also result the delay physical development of children especially in height and weight due to decrease in appetite which is caused by dental pain (Martins-Júnior et al., 2013). Children can suffer psychological trauma such as poor self-esteem due to taunting by peers, sibling and even family members (Zafar et al., 2009).

Assessing the clinical parameters of oral health condition cannot only reflect the full impact of oral disease and disorders on affected individuals (Kramer et al., 2013). Therefore, apart from clinical parameters, evaluating impacts on oral health related quality of life has been widely used in patient-based assessment tools (Jiang, Wong, Chu, Dai, & Lo, 2019). Oral health-related quality of life (OHRQoL) measures is subjective assessment based on information provided from patients about their oral health status and the impacts of their oral health condition on the quality of their daily life (Gomes et al., 2014).

Many studies reported the impact of early childhood caries on the oral health related quality of life of children and their family including social-psychological and economic consequences (S. Mabangkhu, Duangthip, Chu, Phonghanyudh, & Jirattanasopha, 2020). Oral or dental pain and difficulty in pronouncing words have been the most common reported items for the preschool children in several worldwide studies. These studies have presented that the frequency scores have varied depend on the severity of dental caries experience among the study population, with Argentina at 29.1%, Brazil from 4.6% to 79.7%, Australia at 38.5%, China at 39.4%, Trinidad at 10%, the United States at 51% and Uganda at 36.5% (Pesaressi, Villena, & Frencken, 2020).

Currently, there are several oral health-related quality of life (OHRQoL) questionnaires and the development of OHRQoL measures for young children is challenging. There are six OHRQoL instruments for preschool children and most of them are proxy-report in which parents or caregivers act as respondent. Assessing the OHRQoL of children through only the parents or caregivers might have incomplete knowledge about the children's oral health status due to their working condition or social life and time duration children staying at daycare centers (Matheus França Perazzo et al., 2020).

Based on the evidence that 4-6 years old children can report reliably on some domains such as pain or dysfunction of their oral health and quality of life. Now, the scale of oral health outcomes for 5-year-old children (SOHO-5) is newly developed to measure the OHRQoL of preschool children like early childhood oral health impact scale (ECOHIS) index (Rachmawati, Pratiwi, & Maharani, 2017). The difference between ECOHIS and SOHO-5 is that OHRQoL information of preschool children depends only on parents or caregiver in ECOHIS index, and SOHO-5 is intended to measure the OHRQoL in children through both selves and parental reports instead of parents alone (Rachmawati et al., 2017). Moreover, parental and child reports of SOHO-5 can measure the different realities and evaluate the child's OHRQoL from both perspectives (Matheus França Perazzo et al., 2020).

Myanmar is one of the developing countries where people's oral health awareness is still low (Thwin, Zaitsu, Ueno, & Kawaguchi, 2016a). Caries prevalence in pre-school children is high, and most of the decayed teeth are left untreated due to limited availability of restorative treatment and human resources. According to the first National Oral Health survey in 2017, mean dmft of 6 year-old-school children was 5.7 and the prevalence of untreated caries was 84.1% (Thwin, 2019). The caries prevalence of school children in Myanmar has not been significantly decreased within these years compared to previous studies.

Moreover, there is no information about the effect of ECC on OHRQoL among preschool children in Myanmar at present. Such knowledge on the impact of ECC on OHRQoL of preschool children can contribute to improve the quality of care and guide the preventive protocols (Scarpelli et al., 2013). Furthermore, it can support the implementation of public policies aimed at minimizing social inequalities and prioritizing the oral health care for younger children to improve their oral health related quality of life.

The aims of the study were to develop the cross-cultural adaptation and psychometric properties of Myanmar Version of SOHO-5 and assess the impact of ECC on oral health quality of life among 5-year-old children in Mandalay using the Myanmar version of SOHO-5 questionnaire.

1.2 Research Questions

The research question of this study was: How much is it to find out the oral health related quality of life in 5-year-old children in Mandalay?

1.3 Research Hypothesis

Null hypothesis

Oral health status, sociodemographic factors and oral health behavior of the children have no significant impact on the oral health related quality of life of children.

Alternative hypothesis

Oral health related quality of life of children is affected not only by oral health status but also by other demographic and oral health behavior of the children.

1.4 Research Objectives

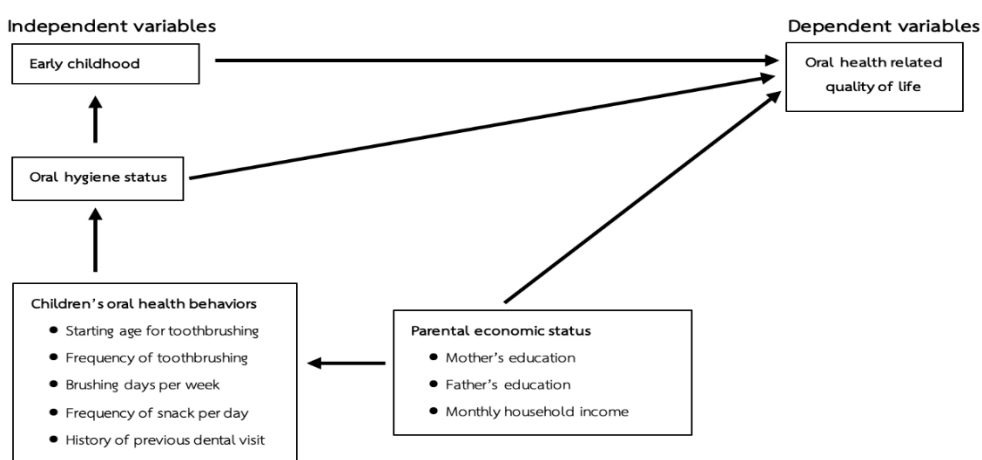
Primary Objective

- To assess the oral health related quality of life of 5-year-old Myanmar children using SOHO-5 Myanmar version questionnaire
- To investigate the impact of early childhood caries, children's oral health behavior and sociodemographic factors on the oral health related quality of life of the children

Secondary Objective

- To cross-culturally adapt the SOHO-5 for the Myanmar population and investigate its validity and reliability

1.5 Research Conceptual Framework



1.6 Benefit of the study

Despite the ECC is preventable, it is still a public health problem due to its multifactorial origin. Many studies showed that socioeconomic factors are significantly associated with the caries development and its effects on the oral health quality of life of children in Myanmar. The magnitude of this effect in Myanmar children remains still unclear.

Quality of life has important implications for health research and practice. Assessing the impact of oral health on the life quality of children and their family can improve communication between patients, parents and the dental team (Gomes et al., 2014). The findings highlighted the needs to develop oral health promotion strategies that support parents and caregivers. Moreover, it can provide essential information in assessing the treatment needs of individuals and populations, as well as making clinical decisions and evaluating the interventional strategies, services and public health programs (Alsumait et al., 2015).

This research will identify certain risk factors of early childhood caries in Myanmar 5-year-old children and provide the basic information for the dental caries status of children. Hence, from this study, knowledge about prevalence and associated factors of ECC will be used to develop targeted preventive interventions for dental caries control and reduction of its consequences (Prakash, Subramaniam, Durgesh, & Konde, 2012) (Prakash et al., 2012). Moreover, the participated children in this study will be selected through the schools of different districts and the factors from wide sociodemographic background and their gender will represent the children of this study area.

If SOHO-5 Myanmar version has acceptable reliability and validity, the researchers can apply this to assess the oral health related quality of life of children in other study areas of the country.

1.7 Operational Definition

Oral health related quality of life (OHRQoL) is defined as an individual's assessment of how the following aspects affect his or well-being-being: functional factors, psychological factors, social factors and experience of pain or discomfort in relation to orofacial concerns (Mascarenhas et al., 2020).

ECC refers to early childhood caries and defined as 'the presence of one or more decayed, missing due to caries or filled tooth surfaces in any primary teeth in children under-age of 6 years of age (American Academy of Pediatric Dentistry).

SOHO-5 refers to scale of oral health outcomes for 5-year-old children (SOHO-5). It was developed to assess the oral health related quality of life of young children through both self-report and parental or caregiver reports. It comprises of child version and parental or caregiver version. Both versions have seven items and meaning of items are similar but there is difference in response scale: 5-point Likert response scale in parental or caregiver version and 3-point Likert response scale in child version.

Cross cultural adaptation is the adaptation of existing measures primarily developed in a different cultural setting. Two steps should be clearly distinguished in the cross-cultural development of an instrument of health status to be used in another culture: (1) translation in standard language plus adjustment of cultural words, idioms and context, possibly involving the complete transformation of some items in order to capture the same concept and (2) the validation of the transformed instrument (Guillemin, 1995).

Psychometric properties refer to the validity and reliability of the measurement tool. Before being able to state that a questionnaire has excellent psychometric properties, meaning a scale is both reliable and valid, it must be evaluated extensively.

Validity is the ability of a measurement method to measure what it is intended to measure.

Reliability is the ability of the measurement method of being repeatable, i.e. inter-observer and intra observer reliability.

Construct validity refers to the evaluation of a survey variable assuming that there are well-developed theories or hypotheses about the relationships of that variable to others being measured in the study. Convergent and discriminant validities are two fundamental aspects of construct validity. To establish validity, it is important to show not only that the instrument is associated with measures of the same concept but also that it is not associated with measures of concepts that are different.

Convergent validity refers to how closely the new scale is related to other variables and other measures of the same construct.

Discriminant validity refers the degree to which a test or measure diverges from (i.e., does not correlate with) another measures whose underlying construct is conceptually unrelated to it.

Five years old Myanmar children refer to the 5 years old children population in Mandalay city.

CHAPTER II

LITERATURE REVIEW

2.1 Distribution of Dental Caries

2.1.1 Global caries status

Although assessment of dental caries for frequency and distribution are complicated due to different diagnostic criteria used in studies but the prevalence and severity of caries in permanent teeth shows decrease trend at many developed countries over recent years (Selwitz, Ismail, & Pitts, 2007). Nowadays, the distribution of dental caries has shown more complex due to economic development, rapid changes in lifestyle and increase sugar consumption rate at low and middle-income countries. Socioeconomic differences are more important factor for caries prevalence among other differences between countries such as ethnicity, sex and eating habits (Pitts et al., 2017).

The global caries trend showed continuing declination for High and Middle-Income- Countries but declination pattern has been reduced in Middle and Low-Income-Countries (MLIC) at 2000 due to globalization and increase sugar consumption (Alsuraim & Han, 2020).

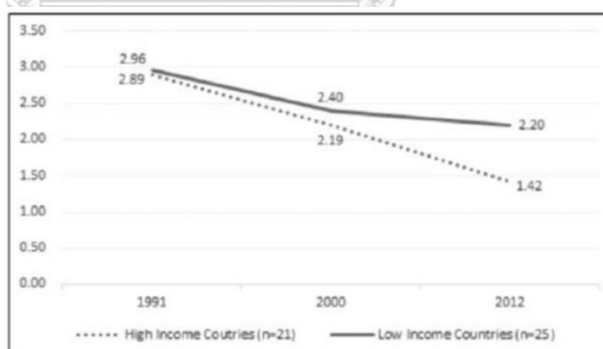


Figure 1. Dental caries trend in High vs Middle and Low-Income-Countries

During last fifty years, many people around the world have benefitted through newly developed and implemented strategies to reduce the burden of dental caries (J. E. Frencken et al., 2017). Among global population, 2.4 billion people or 35% of population had untreated carious lesions and most prevalent condition in 2010 whereas untreated caries in primary teeth was the 10th most prevalent conditions affecting the 621 million children or 9% of the global population (Marcenes et al., 2013).

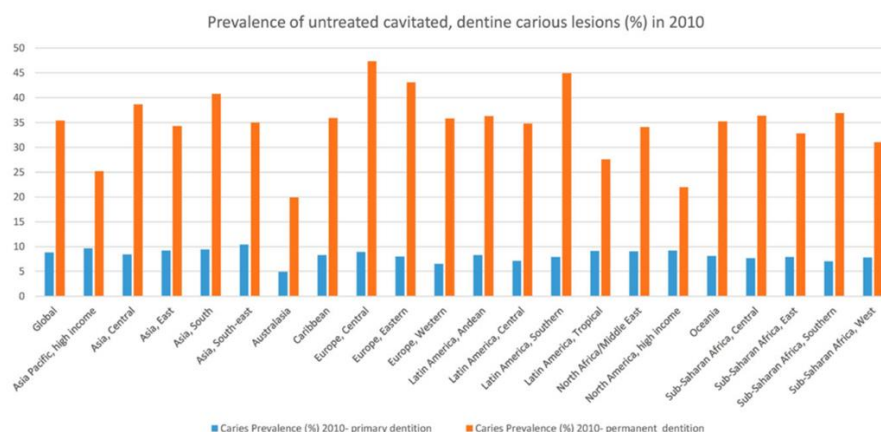


Figure 2. Prevalence of untreated cavitated, dentine carious lesions (%), by region in 2010 in primary and permanent dentition

The Global Burden of Diseases (2017) study reported that 2.3 billion people had untreated caries in permanent teeth as well as 532 million children had untreated caries in primary teeth among total 3.5 billion of oral diseases in 2017. The prevalence of untreated caries for primary teeth reached highest at age 5 years of children while the highest prevalence for permanent was at age 20 to 24 years of adult. (Bernabe et al., 2020). According to information collected by WHO Collaborating Center for Community Oral Health Program and Research, the population of 5-6-year-old children have significantly affected by burden of dental caries in all WHO regions (WHO, 2019).

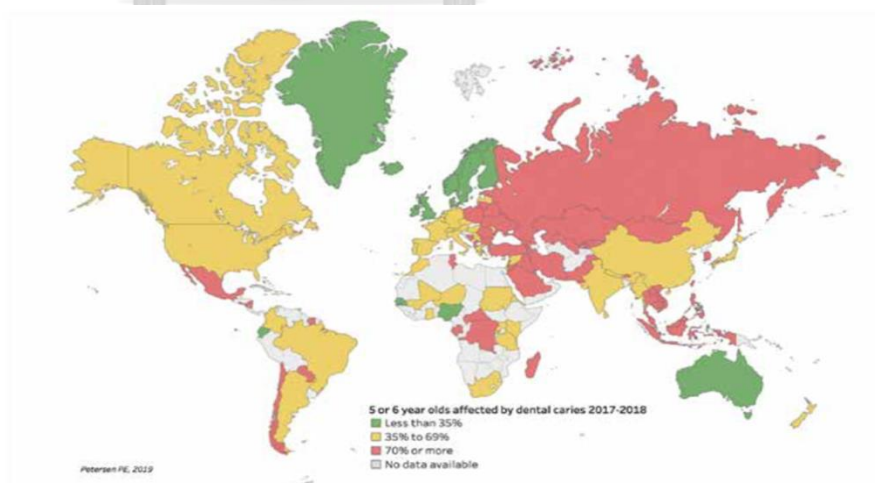


Figure 3. Percentages of children aged 5 and 6 years affected by dental caries in 2017-2018

Twelve years old children at South East Asia and Americas have been more effected by dental caries among WHO regions such as Western Pacific (WPRO), Americas (AMRO), Europe (EURO), South East Asia (SEARO),

Africa (AFRO) and Eastern Mediterranean (EMRO) where as children with lowest DMFT are seen in Africa and Western Pacific regions (Mascarenhas, Okunseri, & Dye, 2020).



Figure 4. Mean DMFT among 12-year-olds among WHO regions

From 1990 (31407 cases per 100,000) to 2017 (30129 cases per 100,000), prevalent cases of untreated dental caries have been decreased only 4% in the world. Nowadays, Caries risk population were increase in all low and middle-income countries due to their increase sugar consumption without appropriate fluoride exposure and socioeconomic factors (Lagerweij & Van Loveren, 2015). Moreover, many millions of poor people in developing countries cannot afford the basic dental care and primary oral health services accessibility in most countries is often low due to unequal distribution of oral health professionals and a lack of appropriate health facilities.

Thus, the global data showed that the burden of untreated caries in both dentition has not relatively changed within these 30 years ago and still be a public health problem for many Low and Middle-Income-Countries due to a rise in prevalence (Peres et al., 2019).

2.1.2 Oral health status in Myanmar

Myanmar, one of Southeast Asia countries, composed of seven states, seven regions and one union territory (Nay Pyi Taw). The states - Chin, Kachin, Kayah, Kayin, Mon, Rakhine, and Shan - cover mainly the upland areas and are largely populated by national races/ethnic communities. The regions - Ayeyarwady, Bago, Magway, Mandalay, Sagaing, Tanintharyi, and Yangon - are situated mainly on the plains with a population of predominantly Bamar origin.



Figure 5. States/regions - Myanmar

Approximately 30% of 51.4 million population lives in urban while the remaining 70% are living in rural area according to 2014 Myanmar Population Census. Over one hundred languages are used among total 135 ethnic groups and life expectancy is 64.7 years in Myanmar. Approximately 4% of total government expenditure have been allocated for health expenditure (UNFPA, 2015).

There are two public universities for dental institution such as University of Dental Medicine (Yangon) and University of Dental Medicine (Mandalay) and no private dental university in Myanmar. Army dentists participated in serving basic oral health care to a community, especially in remote areas (Aung, Maung, Zaitsu, & Kawaguchi, 2019).

In Myanmar, about 1200 dentists of total 4875 are serving as government dentists (200 dentists are in teaching while 1000 dentists are in public health or hospitals) and the rest are the private sector (Thwin, 2019). In 2016, 503 trained dental nurses are serving and there is no dental therapist or dental hygienist training programs in Myanmar. At 2014, the estimated dentist-population ratio (1:16,000) is higher than recommended ratio (1:7500) of WHO in Myanmar (Saw et al., 2019).

Dental caries and periodontal diseases are most prevalent oral diseases in Myanmar population. The periodontal diseases were prevalent in adult and prevalence of bleeding on probing is about 72.6 % in 35-44 and 76.8% 60-74 age groups.

The prevalence rate of oral cancer and precancerous lesion has shown rising trend because tobacco chewing is widely spread among young people. Other oral health problems in Myanmar are cleft lip and palate, dental fluorosis and dental trauma. According to the "Prevention and control of birth defects in South- East Asia

region: Strategic framework (2013-2017)", cleft lip and palate is the 3rd most common defects at birth in Myanmar (Thwin, 2019).

In National Oral Health survey (2017), first survey of Myanmar, mean dmft of 6-year-old-school children was 5.7 (prevalence of untreated caries was 84.1%) while mean DMFT of 12 years old were 0.80 with 34.8% untreated caries prevalence and 1.13 with 40.7 % at 15 years old. The untreated caries prevalence of 35-44 and 60-74 age groups were 41% (DMFT=2.96) and 49.6% (DMFT=11.44). Bourgeois and et. al., (2014) showed similar result in which the mean dmft of 6-7 school children in Myanmar was 4.34 (SD=3.36) (Bourgeois & Llodra, 2014). In Path finder survey 2006, the caries prevalence of 5 years age was 81.7 % with mean dmft 5.21 whereas the prevalence of 12 years age was 51.9% with mean DMFT 1.38 (Aung et al., 2019).

2.2 Determinant of Dental Caries

Dental caries is a complex chronic disease and is developed by interacting the fermentable sugar with micro-bacteria in biofilm aggregating on tooth surfaces while remineralization process is not enough to balance the continuous cycles of demineralization (Mascarenhas et al., 2020). Diet and oral hygiene habits are determinant factors for dental caries formation at individual level, it is influenced by many other factors such as socio-economic disparity, oral health knowledge, their behavior and accessibility to health services at community level (Manton, 2018).

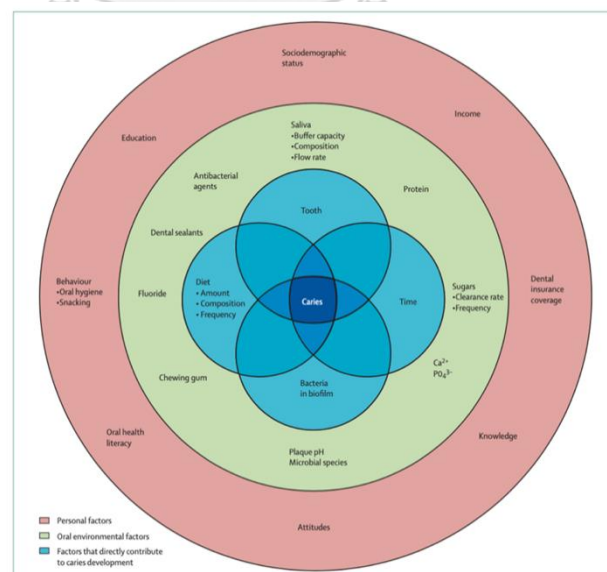


Figure 6. Illustration of the factors involved in caries development

2.2.1 Biological factors

There are four important process in dental caries (1) the interaction of protective and deleterious factors in saliva and plaque (2) the balance between the cariogenic and non-cariogenic microbial population within saliva and in particular plaque, and (3) the physicochemical characteristics of enamel, dentine and cementum that make the dental hydroxyapatite more or less vulnerable to acidogenic challenge.

The biological factors in saliva and plaque such as salivary flow rate, buffering capacity, antimicrobial activity, micro-organism aggregation and clearance from the oral cavity, immune surveillance and cariogenic bacteria levels are key factors in demineralization and remineralization process (Hicks, Garcia-Godoy, & Flaitz, 2003).

The physicochemical properties of the mineral comprising the tooth surface and subsurface modulate the development, arrestment and remineralization of dental caries. Post-eruption maturation of enamel surfaces and exposed root surface is important in order for more susceptible mineral phases to be modified by incorporation of soluble fluoride from the plaque into dental hydroxyapatite (Hicks, Garcia-Godoy, & Flaitz, 2004).

2.2.2 Social determinant of health

Oral health is affected by a wide range of social determinants, which WHO defines as the circumstances in which people are born, grow up, live, work and age. Social gradient is characteristics of oral health which refers to inequalities among social positions in health condition, influenced by socio-economic and political situation. Mostly people with high socio-economic status have better oral health and huge disease burden can be seen in people at lower socio-economic situation or bottom of the gradient (Sheiham et al., 2011).

Inequalities in oral health are universally recognized as a major problem (CSDH, 2008). The utmost oral health inequalities are found in excluded society or marginalized people such as prisoners, homeless people, emigrants and disable people. A study at High-income-countries (England, Wales and Northern Ireland) indicated that homeless people have more untreated carious lesions, suffering toothache and severe tooth loss than general population as shown in figure (Peres et al., 2019).

Low socio-economic status can be assumed as marker for high risk of dental caries and it is significantly associated with prevalence of untreated caries experiences. A study conducted by Costa and colleagues presented that the increase of a unit of SES level was related with a rise in 10.35 unit in DMFT, $p=0.05$ (Costa, Martins, Pinto, Vasconcelos, & Abreu, 2018). Steele and his colleagues reported that There were significant

association between income and number of the remaining teeth for older groups, up to 4.5 teeth (95% CI, 2.2 to 6.8) between richest and poorest (Steele et al., 2015).

Moreover, worldwide studies have showed that socially disadvantaged people not only have poorer oral health but also exhibit different patterns of oral health service utilization (Hosseinpoor, Itani, & Petersen, 2012). Increasing household income, advancing age, higher education level of the head of the household, and having complementary insurance coverage (OR = 1.72) had positive relationships with the increased utilization of dental services (Nouraei Motlagh et al., 2019).

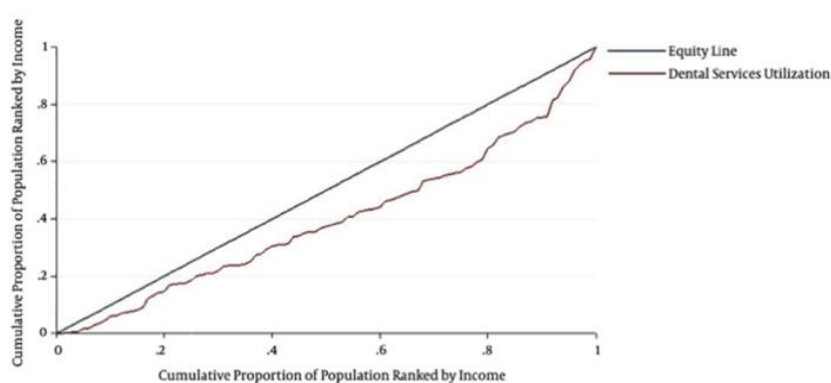


Figure 7. Concentration curve of the utilization of dental services

Although social determinants have been known as very important factors to improve oral health, the effectiveness of strategies to tackle these determinants shows low impacts. Upward trending of dental caries and other NCDs particularly in low-middle-income countries due to increase free sugar consumption and lifestyle (Peres et al., 2019) can't be solved by focusing on dental professional alone and radical approach such as common risk factor approach now needed to address this global health challenge.

2.3 Impact of Dental Caries

Although dental caries is preventable, it is still a one of the most common diseases in children and people are at risk to the disease through their whole life. Moreover, it is the main causative factor for pain in oral cavity and tooth loss (Selwitz et al., 2007).

Dental caries is closely linked to socioeconomic status especially affecting the poorer and marginalized groups in society and widely influenced by vast health related social determinants. Dental caries has significant effects, causing pain, reduced quality of life, decreased productivity in work and moreover, the treatment costs can be considerable for both the individual and the health-care system (Peres et al., 2019).

2.3.1 Economic burden of dental caries

The economic burden of a disease is identified to know the topmost amount of the available resources that could be saved when the partial or whole extent of the disease was removed. Policy makers can criticize the importance of the particular disease in public health dentistry by analyzing the magnitude of the financial or social impacts of that disease on community or different population groups (Listl, Galloway, Mossey, & Marcenes, 2015).

One of the main worldwide public health problems, dental caries has greater effects on social and economic development of the people with several hour loss in their works and education in all over the world (Petersen, Bourgeois, Ogawa, Estupinan-Day, & Ndiaye, 2005). Worldwide in 2015, economic burden of dental diseases totals US\$544.41 billion accounted for US\$356.80 billion in direct costs. When comparing estimation for 2010 (direct cost: US\$298 of total US\$442 billion), the direct costs estimation showed 21% increase in indirect costs between 2010 and 2015 (Righolt, Jevdjevic, Marcenes, & Listl, 2018).

The estimated indirect costs (negative effects on status of employment and work productivity) due to major dental diseases were in 144.25 billion in which 25.14 billion (17%) was attributable to untreated caries in permanent teeth and 2.09 billion (1%) for deciduous teeth (Righolt et al., 2018). The highest productivity loss proportion due to untreated caries in permanent teeth was found in North Africa and Middle East, South Asia and some African countries (Listl et al., 2015).

For low-income-countries in which the prevalence of untreated caries is more than 90% of all carious conditions, and the restoration approach for dental caries is not feasible. The estimated total financial cost for restoration of all caries in children of country with low income is US\$861 million. This cumulative cost significantly beyond the financial resources for health care in most of the developing nations (Kathmandu, 2002).

Restorative strategies place a considerable economic burden on industrialized countries, as oral health care expenditure is 5-10% of public health spending (Kassebaum et al., 2015). Due to limited resources in many countries, private dental services play a main role in dental health care and out of pocket expenses percentage is high. High out-of-pocket in payments for dental services is a significant burden on million peoples of low and middle-income countries (Bernabé, Masood, & Vujicic, 2017).

Table 1. Caries treatment needs in children of low, middle and high-income countries

| Country | Dmft (N) | Untreated caries % for dmft | DMFT (N) | Untreated caries % for DMFT |
|------------------------------|----------|-----------------------------|----------|-----------------------------|
| Low-income African countries | 3.1 (7) | 95 | 2.0 (14) | 87 |
| Low-income Asian countries | 4.1 (5) | 94 | 2.4 (19) | 90 |
| Middle income Countries | 4.3 (16) | 84 | 3.4 (33) | 71 |
| High income countries | 1.6 (5) | 1.6 | 2.3 (9) | 22 |

Strategy targeted mainly on treatment approach on is not economically sustainable, socially desirable and to prevent a very large proportion of oral diseases, community-based prevention generally is cost-saving compared with a treatment-focused approach (Tomar & Cohen, 2010). Preventive programs for dental caries management have been shown in significant savings of dental expenditure (Petersen et al., 2005)(Sheiham et al., 2011). Global improvements in oral health may achieve significant economic benefits, not only in reduction of oral health care expenditure but also improving productivity in labor market (Jin et al., 2016).

2.4 Oral Health Quality of Life (OHQoL)

Oral health quality of life is defined as “an individual’s assessment of how the following aspects affect his or well-being-being: functional factors, psychological factors, social factors and experiences of pain or discomfort in relation to orofacial concerns” (Mascarenhas et al., 2020). Although not a life-threatening condition, dental caries can cause pain as well as problems related to sleeping, eating, socialization and self-esteem (Ramos-Jorge, Ramos-Jorge, de Paiva, Marques, & Pordeus, 2015).



Figure 8. Determinants factors related to Oral Health Related Quality of Life

Dental caries is important oral disease affecting negative impact on the quality of life of school-age children (Krisdapong, Prasertsom, Rattananangsim, & Sheiham, 2013). The consequences of this impact include pain, decreased appetite, difficulty chewing, difficulty eating and drinking hot or cold beverages, weight loss, difficult in sleeping and poor academic performances (Ramos-Jorge et al., 2015).

To measure disease burden, Disability Adjusted Life Years (DALYs) or Year Life with Disability YLDs (DALYs for oral condition) is commonly used and can be interpreted as year lost from health life due to either premature death or disabilities. (Kassebaum et al., 2017). In 2017, the total number of YLDs for all-age due to untreated caries for deciduous teeth was 0.1 million (95% UI, 0.06 to 0.3 million) while 1.6 million all-ages YLDs (95% UI, 0.7 to 3.1 million) was reported for permanent teeth (Bernabe et al., 2020).

Dental caries is the most common cause of toothache but it may affect the quality of life via other aspects such as dissatisfaction with decayed or missing teeth and decrease in productivity (Clementino et al., 2015). There are many studies showing that negative impacts on OHRQoL due to oral diseases in populations across the world (Hernández, Díaz, & Vilchis, 2015). The study conducted in Thai 12 and 15-year-school children for the impact on quality of life due to caries showed that caries prevalence was 58.8% with mean DMFT 1.6 (n=1063) for 12 years old and 68.6% with mean DMFT 2.4 (n=811) for 15 years old school children. Eating was the most commonly affected among the daily performance. The Condition Specific (CS) impacts attributed to dental caries was 47% of 12 and 40% of 15 years old (Krisdapong et al., 2013).

In the study of Pakistan adult population, 87% of study population had one or more carious tooth and difficult in eating and sleeping were the top reported impacts. It showed that having caries increased chances for having higher impacts on OHRQoL. Linearly for every added carious tooth, there was 1.38 increases in OIDP score after adjusting for clinical presence of previously filled and missing teeth as shown in figure below (Shahzad et al., 2020).

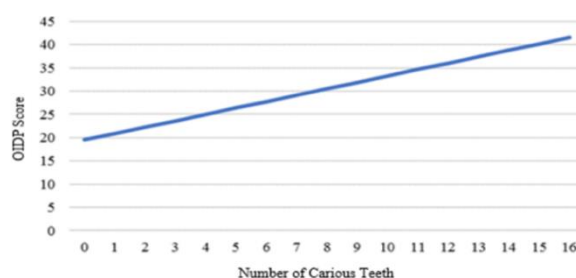


Figure 9. Graphical representation of linear association of caries and OIDP scores

Between 1990 and 2017, the percentage change for deciduous teeth in the number of prevalent cases was 1.3% and in YLDs was 0.2% respectively. The comparing changes rate from 1990 to 2017 was 35.9% for prevalence and 32% for all ages YLDs in permanent teeth. Between 1990 to 2017, it was found that the lower the World Bank income group, the higher the increase in number of prevalent cases and all age YLDs for permanent teeth (Bernabe et al., 2020).

Recently, children's OHRQoL including its social, functional and psychological aspects, has drawn more and more attention. The study conducted in China showed that effect of early childhood caries on child function domain was the highest ECOHIS score of 0.9 and child social interaction domain was the lowest score of 0.2 among 3-4 years old school children. Furthermore, approximately half of the parents reported that their children were affected by at least one item of ECOHIS in this study and caries status of children were significantly correlated with ECOHIS scores (Li et al., 2015).

A study among Brazilian preschool children presented that the negative impacts of ECC on the child section of the ECOHIS were more prevalent (36.8%) than the family section (31.4%) and the impact scores on OHRQoL was significantly associated with the child dental caries status (prevalence ratio = 2.18). Pain and discomfort due to caries are the most common factors which affect negatively on the quality of life among children and untreated condition leads to disfigurement, acute and chronic infections, changing in eating and sleeping, as well as high treatment costs, and reduced school performance due to diminished ability to learn (Çolak et al., 2013).

Moreover, a study conducted among Hong Kong preschool children reported that 36.9% of all participants (n=434) had caries experiences with mean dmft score of 1.7 (3.2) and the prevalence of negative consequences of untreated caries was 3.3%. The mean ECOHIS scores for child section was 3.8 (4.3) while the mean score for family section was 2.0 (2.6). 'Difficult pronouncing any words' (51.2%) and 'difficult eating some foods' (44%) were the most frequent reported items and for parental distress, 'been upset and felt guilty' were 46.5% and 41.1% accordingly. The study showed that school children with high dmft had a significantly increase chance of poor OHRQoL (OR=1.2, 95% CI 1.07 to 1.35) (Duangthip, Gao, Chen, Lo, & Chu, 2020).

There was a very few studies about the oral health related quality of life study in Myanmar and a study among Myanmar dwelling middle aged and older adults in Magway region presented that 57% of 633 participants

had impaired OHRQoL and 'self-conscious (55.9%) and discomfort when eating food (46.3%)' are most common problems in OHIP-14 measures (Htun & Peltzer, 2019).

2.5 Oral Health Related Quality of Life measures for Children

The assessment for impact of children's oral health status on their OHRQoL is complex, and measurements of this assessment have only recently been developed.

2.5.1 Child Perception Questionnaire (CPQ)

Child Perceptions Questionnaire (CPQ) is one of the first measurement instrument for OHRQoL in children. Parent's Perceptions Questionnaire (P-CPQ) and a Family Impact Scale (FIS) are added in CPQ to evaluate the OHRQoL information from the different perspectives.

There are two sorts of CPQ which are CPQ for children from 11 to 14 years of age and CPQ for children aged 8 to 10 years. Both two versions are used to evaluate the impact of oral conditions in children at emotional, social and functional level. They are composed of four domains such as oral symptoms (n=6), emotional well-being (n=9), functional limitations (n=9), and social well-being (n=13) including 37 items in CPQ 11-14 and 29 items in CPQ 8-10. The questions aim to measure the frequency of events related to oral condition during the previous three months in CPQ 11-14 and four week period in CPQ 8-10 (Jokovic, Locker, & Guyatt, 2006).

2.5.2 Child Oral Impacts on Daily Performances (C-OIDP)

The C-OIDP index is a short, easy to use questionnaire which was developed in English and validated among 11–12-year-old Thai children (Gherunpong, Tsakos, & Sheiham, 2004). This index aims to measure the impacts of oral health problems on daily activities commonly performed by children such as eating, speaking, relaxing, emotion, cleaning teeth, and smiling, studying, and social contact. The 0–3 scale is used to measure for each of these eight daily activities and the total score can be calculated by summing the scores for all activities, divided by the maximum score =72 and multiplying by 100. Therefore, the index score ranges between 0-100. The C-OIDP has two modes such as interviewer-administered and self-administered with same questionnaire.

2.5.3 The Child Oral Health Impact Profile (COHIP)

The COHIP has five domains such as oral health, socio-emotional well-being, functional well-being, school performance and self-image and consists of 34 questions. This instrument composed of positive and negative questions and aims to measure self-reported OHRQoL in children 8-15 years of age. Responses were

recorded as 'never' = 0, 'almost never' = 1, 'sometimes' = 2, 'fairly often' = 3, and 'almost all of the time' = 4.

Twenty eight negatively-worded items were scored reversely (Broder & Wilson-Genderson, 2007).

2.5.4 Scale of Oral Health Outcomes (SOHO)

This index aims to measure oral health related quality of life in very young-aged children, and it is the first self-reported OHRQoL measure among 5-year-old children. Children and parents were asked about difficulties related to eating, drinking, playing, speaking, smiling (because teeth hurt), smiling (because of the way teeth look), and sleeping.

Table 2. Properties of cross-cultural adaptations of SOHO-5 Questionnaire in different languages

| Country | N | Cronbach's A | Test-retest (ICC) |
|-----------|-----|-----------------|-------------------|
| Brazil | 193 | 0.9 C / 0.77 P | 0.92 C / 0.98 P |
| Bengali | 272 | 0.79 C / 0.87 P | 0.85 C |
| China | 249 | 0.71 C / 0.82 P | 0.85 C / 0.46 P |
| Dominican | 69 | 0.85 C | NR |
| Indonesia | 161 | 0.89 C / 0.86 P | 0.94 C / 0.81 P |
| Persian | 160 | 0.82 C / 0.67 P | 0.8 P |

The questions are worded in simple, and the answer consisted of 3 options (no; a little; a lot) facilitated by a prompt/explanation card with relevant faces. The total score varies from 0 to 14 for children and from 0 to 28 for the parents (Tsakos et al., 2012).

The SOHO-5 measure was translated into six different languages and it was proven to be valid, reliable, reproducible, and responsive to change in cross-cultural adaptations.

2.5.5. The Early Childhood Oral Health Impact Scale (ECOHIS)

ECOHIS index was designed to measure OHRQoL of children for preschool age and younger. It depends on parental ratings of the 13 items consists of two main parts: the child impact section (CIS) and the family impact section (FIS). There are four domains in CIS such as child symptoms (1 item), child psychology (2 items), child functions (4 items) and child self-image and social interaction (2 items). The family impact section has two domains: family function (2 items) and parental distress (2 items). Each question aims to measure the frequency

of an oral health-related problem and is scored as never (score 0), hardly ever (score 1), occasionally (score 2), often (score 3), very often (score 4), don't know (score 5) (Pahel, Rozier, & Slade, 2007).

2.5.6. Pediatric oral health related quality of life (POQL)

The POQL is a valid and reliable measure of oral health-related quality of life for use in preschool, school-age and pre-teen children. The POQL has four dimensions – Physical Functioning, Role Functioning, Social Functioning and Emotional Functioning. The POQL had similar items with other measures of OHQL in children, particularly items about Physical and Role Functioning. However, 60% of items in POQL index focus on socio-emotional impacts and the social items focus more on concerns about appearance while the social items of other measures focus more on interactions with others, such as feeling shy or not talking to others (Huntington et al., 2011).

Table 3. Oral health related quality of life measures for children

| Name | Questions | Dimensions |
|---|-------------------------------|---|
| Child Oral Health Quality of Life (CPO) | 25 or 37/5 point Likert scale | Two versions; for children 8-10 years of age (CPO 8-10) and for children 11-14 years of age (CPO 11-14). Functional limitations, oral symptoms and emotional and social well-being for (CPO) and Parental-Caregiver's Perceptions Questionnaire (PPQ). Family Impact Section (FIS) – impact on the family |
| Child OIDP | 8/3 point Likert scale | Age 11 and above, impact on eight daily performances - eating, speaking, smiling, cleaning teeth, emotional stability, relaxing, doing schoolwork and social contact |
| Child OHIP | 34/5 point Likert scale | Age 8+, negative and positive impacts in five domains – oral health, social/emotional well-being, functional well-being, school environment, and self-image |
| ECOHis | 13/5 point Likert scale | Parents/caregivers complete questions on behalf of children aged 3, six domains - symptoms, psychology, function, social interaction/self-image, parental distress and family function |
| SOHO-5 | 7/3 point scale | Age 5, difficulties with eating, speaking, drinking, smiling, playing and sleeping due to oral problems |
| POQL | 10*2/5 point Likert scale | Preschool: parent report on child PRC only School age/preteen (8+): PRC and child self-report (CSR) |

2.6 Guideline for cross-cultural adaptation process and psychometric properties

Cross-cultural research can be conducted to explore the same question in several cultures or measure differences across cultures. For either goal, researchers need the same questionnaire in different languages. If the questionnaire is available in another language, researchers should adapt a questionnaire with documented

validity rather than create a new one because the cross-cultural adaptation (CCA) is faster and is assumed to produce equivalent measure.

There are many different methods for the translation and cross-cultural adaptation process. Among those, the forward- and backward-translation design is the most commonly used technique for cross-cultural research. However, there is still no clear international consensus on the optimal approach to performing transcultural adaptation. Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures are based on a review of cross-cultural adaptation in the medical, sociological, and psychological literature. This review led to the description of a thorough adaptation process designed to maximize the attainment of semantic, idiomatic, experiential, and conceptual equivalence between the source and target questionnaires. The steps according to the guideline for the process of cross-cultural adaptation consists of initial translation, synthesis of initial translations, back translation, evaluation of an expert committee, and the pretesting process of the prefinal version in subjects from the target setting Table 4.

Table 4. Guideline for the process of the cross-cultural adaptation of self-reported measure

| Step | Description | | Rating scheme |
|-------------------------|--|------------------|---|
| Translation | Two or more translators should independently translate the original questionnaire. The translator should preferably be native speakers to target language. | + ? - 0 | Translation performed at least two independent translators Doubtful translation procedure Translation performed by only one translator No information about translation |
| Synthesis | The translators should synthesis the multiple translations to procedure a consensus of the translations. | + ? 0 | Performed synthesis Doubtful design No information about synthesis or translation performed by only one translator |
| Back translation | Translators, blinded to the original questionnaire should translate the consensus translation back into original language | + ? - 0 | Back translation performed by at least two independent translators Doubtful back translation procedure Back translation performed by only one translator No information about back translation |
| Expert committee review | The expert committee should consolidate all the versions of the questionnaire and develop what would be considered the prefinal version of the questionnaire for testing | + ? 0 | Clearly reported the existence of an expert committee Doubtful design No information about the expert committee |
| Pretesting | The prefinal questionnaire undergoes pilot testing with numbers of the target population. | + ? 0 | Performed pretesting Doubtful design No information |

In developing the cross-cultural adapted questionnaire, the adaptation and validation of a questionnaire are two different steps. Adaptation specifies that the underlying concept and hypotheses of the adapted questionnaire are those of the original questionnaire. In theory, an adapted questionnaire should have the same properties as the original, so if the properties of the original are poor, the adapted questionnaire will also have poor properties. In any case, the adapted questionnaire should always be validated by means of proper statistical tools. The COSMIN group provided recommendations and a checklist to verify a proper validation Table 5. The COSMIN criteria for good measurement properties provide a quality rating based on the results reported in the validation studies regarding the psychometric property of an outcome measure, making it advantageous compared with other tools due to its independent quality rating scores for each property.

Table 5. Criteria for good measurement properties (COSMIN)

| Properties | Rating | Quality criteria |
|----------------------|--------|---|
| Structural validity | + | CTT: CFA: CFI or TLI or comparable measure >0.95 OR RMSEA <0.06 OR SRMR <0.08 IRT/Rasch: No violation of uni-dimensionality: CFI or TLI or comparable measure >0.95 OR RMSEA <0.06 OR SRMR <0.08 AND no violation of local independence: residual correlations among the items after controlling for the dominant factor < 0.20 OR Q3's < 0.37 AND no violation of monotonicity: adequate looking graphs OR item scalability >0.30 AND adequate model fit: IRT: $\chi^2 > 0.01$ Rasch: infit and outfit mean squares ≥ 0.5 and ≤ 1.5 OR Z-standardized values > -2 and < 2 |
| | ? | CTT: Not all information for '+' reported IRT/Rasch: Model fit not reported |
| | - | Criteria for '+' not met |
| Internal consistency | + | At least low evidence for sufficient structural validity AND Cronbach's alpha ≥ 0.70 for each unidimensional scale or subscale |
| | ? | Criteria for "At least low evidence for sufficient structural validity" not met |
| | - | At least low evidence for sufficient structural validity AND Cronbach's alpha < 0.70 for each unidimensional scale subscale |
| Reliability | + | ICC or weighted Kappa ≥ 0.70 |
| | ? | ICC or weighted Kappa not reported |
| | - | ICC or weighted Kappa < 0.70 |
| Measurement error | + | SDC or LoA $< MIC$ |
| | ? | MIC not defined |
| | - | SDC or LoA $> MIC$ |

| | | |
|---|---|---|
| Hypothesis testing for construct validity | + | The result is in accordance with the hypothesis |
| | ? | No hypothesis defined (by the review team) |
| | - | The result is not in accordance with the hypothesis |
| Cross-cultural validity | + | No important differences found between group factors (such as age, gender, language) in multiple group factor analysis OR no important DIF for group factors (McFadden's $R^2 < 0.02$) |
| | ? | No multiple group factor analysis OR DIF analysis performed |
| | - | Important differences between group factors OR DIF was found |
| Criterion validity | + | Correlation with gold standard < 0.70 OR $AUC \geq 0.70$ |
| | ? | Not all information for '+' reported |
| | - | Correlation with gold standard < 0.70 OR $AUC < 0.70$ |
| Responsiveness | + | The result is in accordance with the hypothesis OR $AUC \geq 0.70$ |
| | ? | No hypothesis defined (by the review team) |
| | - | The result is not in accordance with the hypothesis OR $AUC < 0.70$ |

Table 6 showed the validity and reliability of the SOHO-5 measure in a different version. The psychometric properties of the SOHO-5 in all studies were satisfactory and provided strong support for its reliability and validity. Only the Spanish SOHO-5 version conducted confirmatory factor analysis (CFA) to test the fit of the data in structural validity process. All the studies assessed the internal consistency determined by Cronbach's alpha ranging from 0.71–0.90, which indicated sufficient internal consistency. For the test-retest reliability, the ICC ranged from 0.46–0.98 on both reports. Most of the studies presented an adequate ICC or weighted kappa values (> 0.70) for test-retest reliability with the appropriate test-retest period (1–2 weeks) under similar test conditions; however, one study of the Spanish version did not report this parameter. In the assessment of measurement error, only the Bengali study reported the difference in SOHO-5 scores exceeding the respective standard error of measurement ($SEM = 1.04$). The studies reported the total SOHO-5 scores compared with several criteria, such as subjective clinical indicators, satisfaction, self-reported caries, treatment need, general health, or proxy oral health to assess the construct validity. These were significantly correlated with Spearman's coefficient (r) ranging from 0.27–0.68 ($p < 0.001$). Moreover, all versions discriminated the different stages of caries severity among children ($p < 0.001$). However, none of the studies tested the cross-cultural validity and responsiveness of the measures.

Table 6. Assessment of the measurement properties of the studies using the criteria for the good psychometric properties

| Language (Country) | Structural validity | Internal consistency (Cronbach's alpha) | Reliability (Test-retest) | Measurement Error | Hypothesis Testing for Construct validity | Cross-cultural validity | Responsiveness |
|--------------------------------|---|---|---|-------------------|---|-------------------------|----------------|
| Bengali Bangladesh | NR | + 0.79 (Child) 0.87 (Parent) | + Weighted Kappa = 0.85 (Child) | SEM = 1.04 | + Significant association between SOHO-5 scores and subjective clinical oral health indicators for both versions Discriminant validity between the caries groups and dental sepsis groups ($p < 0.001$) | NR | NR |
| Brazilian Portuguese Brazil | NR | + 0.77 (Child) 0.90 (Parent) | + ICC = 0.92 (Child) ICC = 0.98 (Parent) | NR | + Spearman's correlation coefficient of the child's SOHO-5 scores with satisfaction $r = 0.51$, self-reported caries $r = 0.53$ Spearman's correlation coefficient of the parent's SOHO-5 scores with proxy oral health $r = 0.68$, satisfaction $r = 0.68$, treatment need $r = 0.51$, child's general health $r = 0.60$ Discriminant validity between caries experiences groups ($p < 0.001$) | NR | NR |
| Chinese China | NR | + 0.71 (Child) 0.82 (Parent) | + ICC = 0.85 (Child) - ICC = 0.46 (Parent) | NR | + Spearman's correlation coefficient of the child's SOHO-5 scores with satisfaction $r = -0.35$, self-reported caries $r = 0.37$ Spearman's correlation coefficient of the parent's SOHO-5 scores with proxy oral health $r = -0.57$, satisfaction $r = -0.48$, treatment need $r = 0.27$, child's general health $r = 0.51$ Discriminant validity between caries experiences groups ($p < 0.001$) | NR | NR |
| Indonesian Indonesia | NR | + 0.89 (Child) 0.86 (Parent) | + ICC = 0.94 (Child) ICC = 0.81 (Parent) | NR | + Spearman's correlation coefficient of the child's SOHO-5 scores with self-reported caries $r = 0.31$ Spearman's correlation coefficient of the parent's SOHO-5 scores with proxy oral health $r = 0.24$, satisfaction $r = 0.27$, treatment need $r = 0.22$ Discriminant validity between caries experiences groups ($p < 0.001$) | NR | NR |
| Persian Iran | NR | + 0.82 (Child) - 0.67 (Parent) | + ICC = 0.80 (Parent) | NR | + Spearman's correlation coefficient of the parent's SOHO-5 scores with proxy oral health $r = 0.5$, satisfaction $r = 0.4$ Discriminant validity between current toothache, toothache experiences, and reported caries ($p < 0.001$) | NR | NR |
| Spanish Dominican Republic | + CFI = 1.000 > 0.95 TLI = 1.000 > 0.95 RMSEA = 0.000 < 0.05 | + 0.85 (Child) | NR | NR | Discriminant validity between moderate and extensive caries lesions (ROC = 0.82, $p < 0.001$) | NR | NR |
| Burmese Myanmar | NR | + 0.82 (Child) 0.79 (Parent) | + ICC = 0.90 (Child) ICC = 0.89 (Parent) | NR | + Spearman's correlation coefficient of the child's SOHO-5 scores with satisfaction $r = 0.71$, self-reported caries $r = 0.62$, Spearman's correlation coefficient of the parent's SOHO-5 scores with proxy oral health $r = 0.77$, satisfaction $r = 0.76$, treatment need $r = 0.75$ Discriminant validity between caries experiences groups ($p < 0.001$) | NR | NR |

*Statistically significant ($p < 0.05$),

¹ICC: Intraclass correlation coefficient, ²CFA: Confirmatory factor analysis, ³ROC: Receiver Operating Curve,

Global rating questionnaire: Satisfaction and self-reported caries questionnaires for child

Proxy-rated oral health, satisfaction, treatment need and impact on general health questionnaire for parent

Subjective oral health variables: Current toothache, toothache lifetime experience, satisfaction with teeth, presence of tooth cavities

2.7 Measurement of Dental Caries

Measuring a disease is the basic step for planning, monitoring for control of this disease actions and assessment of oral health prevention program. Only effective measurement tool can perform the high-quality information of dental caries assessment in epidemiologic surveys and this accurate information is important for problem solving in this disease condition (Castro, Vianna, & Mendes, 2018). Several methods are used to measure dental caries in the population such as DMF index, NYVAD System, the Significant Caries Index (SIC), Caries Activity Index, International Caries Detection and Assessment Systems (ICDAS) and Caries Spectrum Assessment and Treatment (CAST) etc.

2.6.1 Decayed, Missing, and Filled (DMF) index

The most widely used index is the decayed, missing, and filled (DMF) assessment described by Klein and Palmer in 1937 (Castro et al., 2018). This traditional worldwide index is used to evaluate caries prevalence in epidemiologic studies but not in clinical practice. It is number of affected teeth per individual evaluated at either the tooth (DMFT) or tooth surface (DMFS). The DMFT records the caries experiences for both current and past caries. The DMFT scores per person can range from 0 to 28 and 0 to 128 of DMFS without including third molar.

The variation of this index for primary dentition is def index and can be evaluated as the total number of teeth that are decayed (d), indicated for extraction (e), or filled (f). The def index scores for primary teeth ranging from 0 to 20 and 0 to 88 in def index in children. (Mascarenhas et al., 2020).

Among most recent caries detection systems, the three systems such as ICDAS, NAYVD criteria and CAST have gone through clinical and histologic validation (Mascarenhas et al., 2020).

2.6.2 International caries detection and assessment system (ICDAS)

It was designed to detect six stages of the carious process, ranging from the early clinically visible changes in enamel caused by carious demineralization to extensive cavitation. ICDAS was divided into sections covering coronal caries (pits and fissures, mesial-distal, and buccal-lingual), root caries, and caries associated with restorations and sealants (CARS). The 'D' in ICDAS stands for detection of dental caries by (i) stage of the carious process; (ii) topography (pit-and-fissure or smooth surfaces); (iii) anatomy (crowns versus roots); and (iv) restoration or sealant status. The 'A' in ICDAS stands for assessment of the caries process by stage (non-cavitated or cavitated) and activity (active or arrested) (Ismail et al., 2007).

The detection of dental caries on coronal tooth surfaces is a two-stage process. The first decision is to classify each tooth surface on whether it is sound, sealed, restored, crowned, or missing.

The second decision that should be made for each tooth surface is the classification of the carious status on an ordinal scale.

2.6.3 NYVAD system

The NYVAD classification is a visual-tactile caries classification system developed to enable the detection of the activity and severity of caries lesions with special focus on low-caries populations. This classification reflects the entire continuum of caries, ranging from clinically sound surfaces through non-cavitated and micro-cavitated caries lesions in enamel, to frank cavitation into the dentin. Lesion activity at each severity stage is discriminated by differences in surface topography and lesion texture. The reliability of the Nyvad criteria is high to excellent when used by trained examiners in the primary and permanent dentitions. Lesion activity assessment performed successfully as a screening tool to identify individuals with a poor caries prognosis. Because of their predictive validity, the Nyvad criteria are superior to other current caries lesion descriptors for the detection of changes in the lesion activity status over time (Nyvad & Baelum, 2018).

2.6.4 Caries Assessment Spectrum and Treatment (CAST)

The CAST system aims to detect whole caries spectrum, from sound tooth to enamel or dentine carious lesions, carious lesions with pulpal involvement and tooth loss due to caries as well as the protective measures such as sealant and restorations for dental caries management. The CAST instrument has the similar criteria list of WHO caries assessment and therefore, the epidemiological survey of CAST system assessment can be compared to other which have used WHO assessment criteria.

Furthermore, the CAST instrument use one code for enamel, two codes for dentine carious lesions and the presence of sealants. It also has a code for carious lesions with pulpal involvement and one code for abscess/fistulae. By adding the pufa/ PUFA index in CAST can provide comprehensive information on the caries status in a population, help for implementing plans to improve it (Jo E Frencken, de Souza, van der Sanden, Bronkhorst, & Leal, 2013).

2.7 Strategic oral health care services in Myanmar

The Oral Health Unit of the Department of Health delivers basic oral health care services in all states and regions via oral health care sections. Ministry of Health and Sport (MOHS) and World Health Organization (WHO) had jointly implemented the primary oral health care services in 1999. Later in, “Campaign for Tooth Brushing after Lunch” is started at primary schools of selected townships (Aung et al., 2019).

The planning and implementations for healthcare services has been reinforced by government at 2016. A National Health Plan (2017 – 2021) was launched, aims to deliver basic essential packages of health services throughout whole country by 2020 (Saw et al., 2019). Recently, the Oral Health Unit operated various oral health care activities and programs for all population to reduce oral disease burden, and to promote public oral health status such as: (i) “Early Childhood Caries Prevention Program” at preschool children with delivering health education and correct toothbrushing training to caregivers (ii) “School based oral healthcare activities” (iii) “Maternal Oral Health Education Programs” to improve overall maternal and child health, (iv) “Feasible Effective and Affordable Fluoride Program” to improve oral health for the all population (Aung et al., 2019).

As public oral health services are limited, many people are commonly depending on the private sector or charity clinic for their oral health care and people paying out of pocket expenditure for these services. The study of Bernabé et al. presented that the percentage of the household expenditure spent on dental care was 1.5% in Myanmar (Bernabé et al., 2017), but this study might be underestimated the impact of payments for dental care service because most of the patients can't afford the costs of dental services for their necessary treatments.

2.8 Challenges or limitations

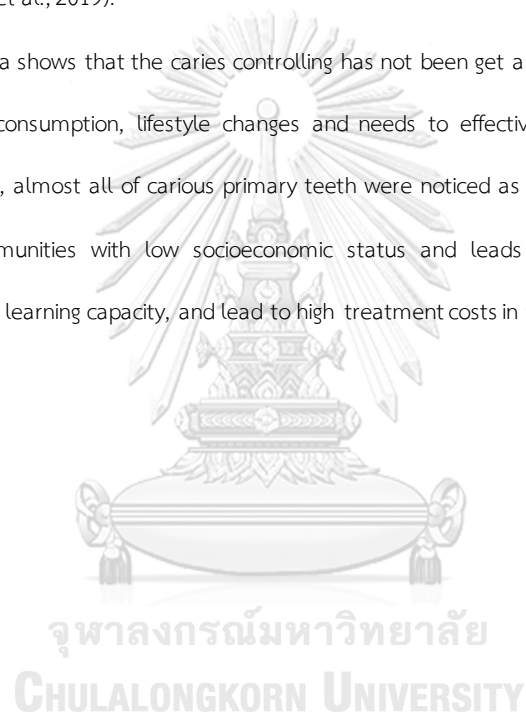
Recently Myanmar government tried to implement “Universal Health Coverage (UHC)” in the National Health Plan (2017-2021) but oral health priority on most national agenda is low (Aung et al., 2019). Moreover, high prevalence of untreated caries in permanent teeth (40-50%), severe periodontitis in adults and untreated caries in deciduous teeth (85%) still remained a challenge.

Oral health information system needs to upgrade for data collection and surveillance on disease prevalence and trend (Aung et al., 2019). Evaluation process is almost nil in the oral health promotion activities in Myanmar, so the effective or efficient of current activities to improve oral health is uncertain (Thwin, 2019).

Another issue of dental public health concern in Myanmar is large oral health inequalities. It needs to address oral health inequalities between urban and rural areas and reduce barrier to access oral health care services in remote areas (geographic barriers) and financial problem (Thwin, 2019).

Myanmar has faced shortage of human resources for health due to discrepancy between supply and demand for health professionals and staffs. According to World Health Report in 2006, Myanmar is one of the 57 crisis countries encountering shortages for health workforce. Serving at the public health sector is unattractive to health professionals due to long working hours, unfavorable working environment, heavy burden of workload and low remuneration (Saw et al., 2019).

The above data shows that the caries controlling has not been get a satisfactory change and it might be due to increase sugar consumption, lifestyle changes and needs to effective oral health prevention program (Thwin, 2019). Moreover, almost all of carious primary teeth were noticed as 'untreated teeth' and related with higher severity in communities with low socioeconomic status and leads to negative impacts on physical development, children's learning capacity, and lead to high treatment costs in the future (Aung et al., 2019).



CHAPTER III

RESEARCH METHODOLOGY

This study was conducted among 5-year-old children in the Mandalay region. Mandalay is the second-largest city in Myanmar and has a population of 1,225,553 according to the 2014 census. There are seven sub-districts in this region and a total of 270 primary schools in this area.

In Myanmar, the official entry age for primary education is 5 years, thus all children aged 5 years who can access education enter formal school. According to Administrative Data of the Department of Education Research, Planning and Training (Ministry of Education), the school enrolment rate of five-year-old children was 93% (97.4% in males and 88.5% in females) in the 2014-2015 academic year (UNICEF, 2018).

The total out-of-school rate for primary school age (age 5-9) children was 12.3% in Myanmar. There was no significant difference in the primary school enrolment rate among the states and regions except in Rakhine state where only 65.1% of primary-school-age children were in school compared to 85% on average across the country.

There were two parts conducted to this study; phase one was to cross-culturally adapt SOHO-5 for the Myanmar population and test the psychometric properties of the SOHO-5 Myanmar Version. The phase 2 was to assess the impact of early childhood caries on oral health and quality of life among 5-year-old children in Mandalay, using the Myanmar version of the SOHO-5 questionnaire.

3.1 Phase 1: Develop the cross-cultural adaptation and psychometric properties of the Myanmar Version of SOHO-5

After obtaining approval by the Chulalongkorn University Ethics Committee (HREC-DCU 2021-047) and the Research and Ethics Committee, Myanmar (ERC-F4-2021), the study was implemented as follows:

In this study, the newly developed questionnaire in Myanmar version was used for assessing oral health quality of life of children. The scale construction process composed two steps: 1) test cross-cultural adaptation; 2) test psychometric properties according to their instructions, these steps were carried out.

The SOHO-5 consists of a child self-report and a parental report for the child's oral health history. Both versions contain 7 items. For child report, the items are 'difficult in eating, drinking, speaking, playing,

sleeping, avoid smiling due to pain and smiling due to appearance' with response of 3-point scale (no = 0, a little = 1 and a lot = 2). The items in parental report include 'difficulty in eating, playing, speaking, sleeping, avoid smiling due to pain, avoid smiling due to appearance and affected self-confidence' with response of 5-point scale (n = 0, a little = 1, moderate = 2, a lot = 3, and a great deal = 4). The SOHO-5 scores for both versions are calculated as the sum of response codes and a higher score denotes a greater negative degree of oral impact on the children's quality of life.

3.1.1 Cross-cultural adaptation

The original SOHO-5 English version was first translated into Burmese, the major language spoken in Myanmar, by two bilingual independent professionals according to the guidelines. These Myanmar versions were discussed to develop into a draft. Then, this draft was translated back into English by another two Myanmar dentists who were masked from the original wording of the SOHO-5. The cross-cultural equivalence of the back-translated version and the original version was verified by an expert panel consisting of one pediatric dentist, one language professional, and one public health researcher who had bilingual capability. The consensus version was developed after the revision was carried out.

The pilot study of the consensus version in the Myanmar language was tested in 20 children aged 5 years old and caregivers to examine the comprehensibility of the Myanmar SOHO-5 version. Based on the feedback, the final Myanmar SOHO-5 version was revised by the expert panel so that the questionnaire was suitable for school children and their parents.

3.1.2 Psychometric properties

A cross-sectional study was performed in Mandalay city to test the psychometric characteristics of the Myanmar version of the SOHO-5 questionnaire.

The study population comprised 5-year-old children and their parents living in the subdistricts of Mandalay. Five-year-old children from kindergarten schools and their parents were invited to participate in this study. An invitation letter with the purpose of the study was sent to the parents.

Children who were aged five years, Burmese speaking, and whose parents can understand Burmese were recruited for this study. Children with developmental delay, disabilities, and who were uncooperative or refused oral examination were excluded.

Sample size calculation was performed according to the internal consistency test (Cronbach's alpha statistics). In this study, we were interested to estimate the value. For a question with seven items (k), by setting the expected value of Cronbach's alpha (H0) as 0.80 with a 4.9% precision value and type I error as 0.05. The sample size calculation was performed using the computer software Microsoft Excel and a formula recommended by a previous study (Bonett, 2002).

$$n = \{2k / (k - 1)\} (z_{\alpha/2} + z_{\beta})^2 / \ln(\delta)^2 + 2,$$

Where $z_{\alpha/2}$ and z_{β} are points on the standard normal distribution exceeded with probability $\alpha / 2$ and β , respectively. Replace $z_{\alpha/2}$ with z_{α} for a one-tailed test. $\delta = (1-c) / (1- \rho k)$, and ρk denotes coefficient alpha based on a scale having k parts and is the expected value obtained from expert opinion or prior research. The minimum sample size was 155 and a total of 173 individuals with a 10% dropout completing the study was sufficient.

I. Test for validity

A. Content Validity

In examining the accuracy of the content of the proposed measuring tools, a copy of the newly developed Myanmar version of the questionnaire was sent to three experts in the related field. All experts were asked to assess the relevance and adequacy of this questionnaire. The grading system was as follows

1 for relatively valid item

0 for not sure

-1 for relatively irrelevant item

The obtained scores from each item were calculated to demonstrate the validity of each item by using the following formula:

$$IC = \frac{\sum R}{N}$$

Where,

IC = Item correlation

$\sum R$ = Total scores of that item

N = Number of experts

The items that obtain $IC < 0.5$ were modified or discarded.

B. Construct validity

Construct validity refers to the evaluation of a survey variable assuming that there are well-developed theories or hypotheses about the relationships of that variable to others being measured in the study. Construct validity tests whether a hypothesized association between a survey measure and a measure of the same concept (convergent validity) or a different concept (discriminant validity) is confirmed. In this study, the construct validity of the measure was assessed by investigating the relationship between dental caries status (discriminant validity).

To determine the convergent validity of the Myanmar SOHO-5 version, the children and the parents were asked to answer the two global health-rating questions (subjective self-reported health measures) added at the end of the scale. Thus, this validity was tested by assessing the correlation between the SOHO-5 scores of parents and children and additional global rating questionnaires.

The additional global rating questions were added to the children's and parental questionnaires. For the children's questionnaires, it consists about their satisfaction with oral health ('How happy are you with your teeth? very happy = 0, a little happy = 1, and not happy = 2') and the presence of dental cavities ('Do you have any holes in your teeth? No = 0, Yes = 1'). For the parental questionnaires, the following ratings included proxy-rated oral health ('How would you rate your child's dental health?; excellent = 0, very good = 1, good = 2, fair = 3, poor = 4'), satisfaction with child's oral health ('How happy are you with your child's dental health?; very happy = 0 to very unhappy = 4'), the child's overall well-being ('Do you think the overall well-being of your child is affected by the conditions of their teeth?; not at all = 0 to a great deal = 4'), and the child's perceived dental treatment needs ('Do you think your child needs any dental treatment because of the state (holes in teeth or pain) of his/her teeth?; no = 0, Yes = 1').

Discriminative validity is considered a subcategory of the construct validity (Asunta, Viholainen, Ahonen, & Rintala, 2019) and refers to the principle that the indicators for different constructs should not be so highly correlated across constructs as to lead one to conclude that the constructs overlap. Thus, the validity of the scale was tested by comparing the extent to which SOHO-5 scores discriminated between children with and without caries experience. Therefore, children with caries experience should have a higher SOHO-5 score (indicating a poorer oral health-related quality of life) than children without caries experience. Caries experience with the children was recorded using the dmft index. The dmft scores were assumed as a moderate-to-high correlation with SOHO-5 scores.

II. Test for reliability

The tool's reliability testing must be performed for the consistency of questionnaires. Reliability is the overall consistency of a measure, describing the extent to which a measure is stable when repeated under consistent conditions. In this study, the reliability of the measure was tested by both internal consistency and test-retest reliability.

Internal consistency is a measure of the extent to which items in a questionnaire (sub)scale are correlated (homogeneous), thus measuring the same concept which is an important measurement property for questionnaires that intend to measure a single underlying concept (construct) by using multiple items (Terwee et al., 2007). The internal consistency of this measure was assessed by Cronbach's alpha coefficient, inter-item, and item-total correlations.

Cronbach's alpha is considered an adequate measure of internal consistency. A low Cronbach's alpha indicates a lack of correlation between the items in a scale, which makes summarizing the items unjustified. A very high Cronbach's alpha indicates high correlations among the items in the scale, i.e., redundancy of one or more items. Mostly, a criterion of 0.70-0.90 is proposed as a measure of good internal consistency.

Test-retest reliability refers to the relative stability of the assessment over time, assessing the degree to which the measurement tool scores are consistent from one test administration to the next. The intraclass correlation coefficient ICC is the most suitable and most commonly used reliability parameter for continuous measures. Often 0.70 is recommended as a minimum standard for reliability in a sample size of at least 50 patients. For test-retest reliability measurements, children will receive an additional questionnaire within 1-2 weeks of the first administration.

3.1.3 Data collection

A total of 173 children and their parents from nine kindergarten schools in seven districts were recruited. The SOHO-5 questionnaire for child report was completed by conducting face-to-face interviews individually with each child in the classroom. Three interviewers conducted the interviewing before the oral health examination. Each child was asked to answer the two additional global rating questions for assessing construct validity.

The SOHO-5 questionnaire for the parental report was conducted by three trained interviewers before the child's oral examination in school. The parents were asked four additional global rating questions to assess

the construct validity. Duplicate interviews were performed on 50 child-parent pairs 1-2 weeks after the first interviews by the same interviewers.

Children's Oral examination:

A single examiner who had previously calibrated examined the oral health status of the participants. An oral examination was performed while the child was in a seated position on a chair under natural light in the classroom. The dental caries status of the children was assessed according to World Health Organization criteria (WHO, 2013) using a penlight, disposable dental mirror, and WHO-CPI probe. Caries' experience in primary teeth was recorded in a modified oral health assessment form using the dmft index. Oral hygiene status was assessed at selected index teeth (primary incisor and second primary molar) with the modified Simplified Oral Hygiene Index (OHI-S).

3.1.4 Data analysis

The SPSS analytical software was used for data analysis. The distribution of the SOHO-5 scores of both children's and parents' reports did not follow the normal distribution. Thus, the spearman rank correlation was used to assess the association between SOHO-5 scores and the responses of additional global rating questions for criterion validity. The normality test also found that the distribution of the responses of SOHO-5 scores in both caries and caries-free groups did not follow a normal distribution. The discriminant validity of the SOHO-5 Myanmar version was assessed by the Mann-Whitney U test comparing the SOHO-5 scores of children with and without dental caries experiences.

Participants for the content validation study were experts recruited from the departments of the University of Dental Medicine (Mdy), University of Dental Medicine (Ygn), Myanmar, and University of Chulalongkorn University (Thailand). The item correlation (IC) for content validity was calculated by using the formula. The reliability of the SOHO-5 Myanmar version was assessed by both internal consistency and test-retest reliability. The internal consistency was assessed by Cronbach's alpha coefficient, item-total correlation coefficients, and Cronbach's alpha if the item deleted for each item. The intra-class correlation coefficient (ICC) was used to assess the test-retest reliability by measuring the level of agreement of the answers between first and duplicate questionnaires. The statistical significance of $p=0.05$ was set for all analytical tests.

3.2 Phase 2: Evaluate the impact of ECC on oral health quality of life of Myanmar

preschool children

3.2.1 Research design

The cross-sectional study was conducted to assess the impacts of early childhood caries (ECC) on oral health related quality of life of 5 years old Myanmar children.

3.2.2 Research setting

The site of the study was located in the subdistricts of Mandalay city, Mandalay region. Mandalay is the middle part of Myanmar and the second-largest city which consists of seven subdistricts. Mandalay region has a population of 1,225,553 people and the majority of the population is Burmese. The Burmese language is the official language mainly used for communication among people. Table 7 described the distribution of the 5 years old children in seven districts of Mandalay city according to the Myanmar Information Management Unit (MIMU), 2019.

3.2.3 Population and sample selection

The study population comprised of 5 years old children and their parents living in this Mandalay city. Due to the COVID-19 pandemic and the political situation in Myanmar, public health strategies to stop the virus from spreading such as social distancing, homestays, and the closure of schools were established by the government. Therefore, we chose the convenience sampling method instead of the stratified sampling method for the recruitment of the participants in this study. The recruitment procedure was based on the distribution of the 5 years old children population in seven districts of Mandalay city. The purpose and procedures of the study were explained to the parents of the preschool children and invited them to participate in this study. Written parental consent was asked for before implementing the study.

Inclusion criteria

Samples were children aged 5 years old who live in this study area with the following criteria: (1) children who were aged five years, Burmese speaking (2) caregiver being capable to understand Burmese (3) children with informed consent.

Exclusion Criteria

Children were excluded if (1) children with developmental delay and disabilities (2) they are uncooperative or refused the oral examination.

Table 7. Distribution of 5 years old children in districts of Mandalay (MIMU, 2019)

| Townships | Pyi Gyi Tagon | Patheingyi | Maha Aung Myay | Chan Mya Tharzi | Chanaye Tharzan | Aung Myay Tharzan | Amarapura | Total |
|----------------|-----------------------------|-------------------------------|------------------------------|-------------------------------|----------------------------|-------------------------------|-----------------------------|-------------------------------|
| No of schools | 7 | 73 | 23 | 13 | 33 | 34 | 64 | 247 |
| 5 years | | | | | | | | |
| Male | 1384 | 1810 | 928 | 1595 | 929 | 1627 | 3438 | 11711 |
| Female | 2775 | 1560 | 850 | 1458 | 950 | 1606 | 1634 | 10833 |
| Total | 2775 (13%) | 3370 (15.9%) | 1778 (8.4%) | 3053 (14.4%) | 1879 (9%) | 3233 (15.3%) | 5072 (24%) | 21160 (100%) |

3.2.4 Sample size

The minimum sample size was calculated based on the F tests- Linear multiple regression test: fixed model, R^2 deviation from zero by using G*Power software (3.1.9.4).

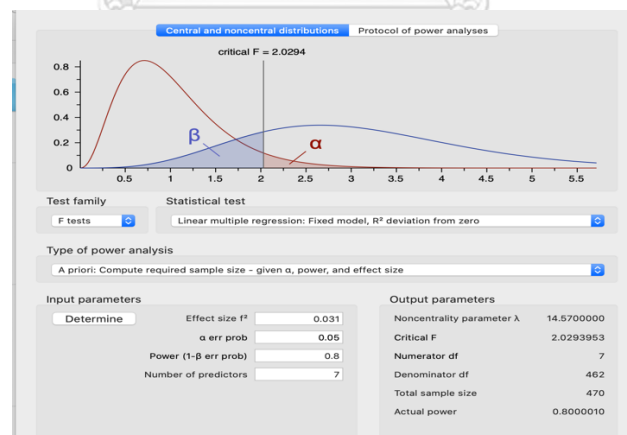


Figure 10. Sample size calculation based on the linear multiple regression (G*Power)

From the previous study (H. M. Wong, C. P. McGrath, N. M. King, & E. C. Lo, 2011), the oral health related quality of life in child impact section was significantly associated with caries status of children with caries prevalence of 35% and the R^2 value of this linear regression analysis is 0.18. we assumed the effect size based on the caries prevalence of the Myanmar 5 years old children in this study. According to the Myanmar information

management unit, the total number of 5-year-old school children in Mandalay was approximately 21,160. The untreated caries prevalence in 5 years old school children was 84.1% (dmft – 5.7) according to a national oral health survey. The effect size f^2 0.031 for the seven predictors variable, significant level α 0.05 ($Z = 1.96$) and the 80% power will be used for this calculation. Then, the minimum sample size of a total participant 470 and a total of 517 participants with 10% dropout was required.

3.2.5 Research implementation steps and data collection

After obtaining approval from the Human Research Ethics Committee, Chulalongkorn University (HREC-DCU 2021-047) and the Research and Ethics Committee, Myanmar (ERC-F4-2021), the study was implemented as follows:

Five hundred and fourteen child-parent pairs were recruited for this phase. Table 8 showed the distribution of the sample recruitment based on the population ratio of the children in seven districts in Mandalay city. A self-administered questionnaire related to the child's demographic and behavior was interviewed the parents before their child's oral health condition was examined. Children's OHRQoL was collected from parents and children via interview by using parental and child versions of the SOHO-5 questionnaire.

Table 8. Sample recruitment according to the proportion of sample population

| Township | Pyi Gyi Tagon | Pa Thein Gyi | Maha Aung May | Chan Mya Thazi | Chanaye Tharzan | Aung Myay Tharzan | Amarapura | Total |
|-----------------------------|------------------|-----------------|------------------|-------------------|--------------------|----------------------|---------------|-----------------|
| 5 years (%) | 2775 (13%) | 3370 (15.9%) | 1778 (8.4%) | 3053 (14.4%) | 1879 (9%) | 3233 (15.3%) | 5072 (24%) | 21160 (100%) |
| Expected sample | 65 | 80 | 42 | 72 | 45 | 76 | 120 | 500 |
| Sample recruited | 85 (16.7%) | 89 (17.5%) | 57 (11.2%) | 62 (12.2%) | 47 (9.2%) | 59 (11.6%) | 110 (21.6%) | 509 (100%) |

3.2.6 Data collection

A. Questionnaire survey

One of the parents or caregivers of children was interviewed to respond the oral health behavior and sociodemographic condition of the child. The child's oral health related quality of life information was collected

from the parent or caregiver and child themselves via face-face interview by using Myanmar SOHO-5 questionnaires. The interviews were conducted on the same day prior to the clinical examinations by three trained interviewers who were blind to the clinical findings.

B. Children's Oral examination:

An oral examination was performed while the child was in a seated position on a chair under natural light in the classroom. The dental caries status of the children was assessed by two calibrated examiners according to World Health Organization criteria (WHO, 2013) using a penlight, disposable dental mirror, and WHO-CPI probe. Caries experience in primary teeth was recorded in a modified oral health assessment form using dmft index. A tooth was recorded as decayed (dt) when a dentine lesion had an unmistakable cavity or when both a dentine carious lesion and a restoration were present. A tooth was recorded as missing (mt) when it was extracted as a result of caries. A tooth was recorded as filled (ft) when a permanent filling without caries was present.

Oral hygiene level was determined using a modified Simplified Oral Hygiene Index (OHI-S) for the Debris index of Green and Vermillion (Greene & Vermillion, 1964). The modification was scored on two index teeth (primary incisor and second primary molar) instead of the permanent teeth for which the index was originally designed. Training and calibration exercises were conducted before the study. A high degree of agreement was demonstrated ($k = 0.81$ to 0.87) for inter-examiner reliability using the kappa method. Ten percent of the sample was reexamined by each examiner and the intra-examiner reliability was kappa value 0.84 to 0.90 .

3.2.7 Research Instrument

Questionnaires

The questionnaire comprised of two parts as follows: 1) Child's demographic and behavior; 2) The SOHO-5 Myanmar version for oral health quality of life of 5-year-old children shown in Appendix.

A. Child's demographic and behavior

The parent's or caregiver's data comprised of age, relationship to the child, household income, and education (Appendix A). The child's data comprised gender, age, history of illness and oral health behavior, frequency of snacks between meals, types of snacks, starting age for tooth brushing, frequency of tooth brushing, and previous dental visit experiences.

B. Dental caries and oral hygiene assessment form

Caries status was assessed by decayed, missing, and filled teeth index (dmft) following the criteria of the WHO. Caries was recorded as present when a lesion in a pit or fissure, or on a smooth tooth surface, has an unmistakable cavity, undermined enamel, or a detectably softened floor or wall. In the case where the crown has been destroyed by caries and only the root is left, the caries was judged, and it therefore scored as caries (WHO, 2013).

The criteria for diagnosing a tooth status and the coding are as follows (codes applied to primary teeth are given in parentheses):

A - *Sound crown*. A crown is coded as sound if it shows no evidence of treated or untreated clinical caries

B - *Carious crown*. Caries is recorded as present when a lesion in a pit or fissure, or on a smooth tooth surface, has an unmistakable cavity, undermined enamel, or a detectably softened floor or wall

C - *Filled crown, with caries*. A crown is considered filled, with decay, when it has one or more permanent restorations and one or more areas that are decayed

D - *Filled crown, with no caries*. A crown is considered filled, without caries, when one or more permanent restorations are present and there is no caries anywhere on the crown

E - *Missing tooth due to caries*. This code is used for permanent or primary teeth that have been extracted because of caries and are recorded under the coronal status

F - *Fissure sealant*. This code is used for teeth in which a fissure sealant has been placed on the occlusal surface, in pits or for teeth

G - *Fixed dental prosthesis abutment, special crown, or veneer*. This code is used under coronal status to indicate that a tooth forms part of a fixed bridge abutment

Oral hygiene status was assessed at selected index teeth (primary incisor and second primary molar) with the modified Simplified Oral Hygiene Index (OHI-S). The coding systems used in the assessment of debris are 0: No debris; 1: Less than 1/3 of tooth surface covered by soft debris; 2: 1/3-2/3 of tooth surface covered by soft debris; 3: More than 2/3 of tooth surface covered by soft debris. The debris score of each tooth surface was added and divided by the number of teeth examined to calculate the mean debris score.

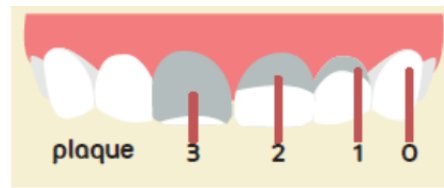


Figure 11. Criteria for classifying debris

C. SOHO-5 questionnaire

The SOHO-5 Burmese version was used to collect the oral health quality of life of 5-year-old children, and details are as follows:

The SOHO-5 questionnaire is composed of a child self-report and a parental report for the history of the child's oral health. For the child version, the report included seven questions about the difficulty in eating, drinking, speaking, playing, sleeping, smiling (due to pain), and smiling (due to appearance). The answers for the child version are using a 3-point scale (no=0, a little=1, and a lot=2).

There were also seven items in the parental version which are difficulty eating, difficulty playing, difficulty speaking, difficulty sleeping, avoiding smiling due to pain, avoiding smiling due to appearance, and affected self-confidence. The answering options followed a 5-point scale (no=0, a little=1, moderate=2, a lot=3 and a great deal = 4). The SOHO-5 scores were calculated as the sum of response codes of all questions. The total score varies from 0 to 14 for the children and from 0 to 28 for the parents. For both SOHO-5c and SOHO-5p, a higher score refers to a greater negative impact on oral health-related quality of life of children.

3.2.8 Data Analysis

Data were analyzed by using the SPSS statistical package. Statistical analyses included the followings:

Mean, standard deviation, frequencies, and percentage were performed to describe oral health related quality of life of children and the socio-demographic status of caregivers. Mean and standard deviation of dmft and percentage of caries prevalence were performed to describe the oral health status of children. Cohen's kappa coefficient was used to assess the intra-examiner and inter-examiner reliability for caries diagnosis.

The parent-child agreement was assessed by calculating the intra-class correlation coefficient (ICC) between the total and item scores of the children's and parents' report. The agreement level determined by the ICC was categorized as poor (<0.20), weak (0.20–0.40), moderate (0.41–0.60), substantial or strong (0.61–0.80), and excellent (0.81–1.0).

Bivariate analysis was used to compare the baseline information of the study children among two groups. The student's t-test or Mann-Whitney U test was used to evaluate the statistical significance of the mean difference in dmft and debris score between children who have OHRQoL and children without OHRQoL and Chi-square was used to compare differences between two groups for categorical variables. A multiple logistic regression model was constructed to identify the variables associated with a binary outcome (0 for "No having OHRQoL", 1 for "Having OHRQoL"). The variables associated with having the quality of life in the univariate analysis were eligible for entry into multiple logistic regression models if they were significantly associated at $p < 0.25$. Family and child related factors such as caries status, oral hygiene status, child demographic, and oral health behaviors were chosen and entered into the baseline model. Odds ratios and 95% confidence intervals (CI) were calculated. Estimated coefficients and their standard errors (SEs) were calculated using the method of maximum likelihood. Variables were eliminated from the model one at a time based on likelihood ratio tests. When all nonsignificant ($p > 0.05$) variables had been eliminated from the multivariate model, calibration was assessed using the Hosmer-Lemeshow goodness-of-fit test. This test evaluates the degree of correspondence between a model's estimated probability of OHRQoL and the actual OHRQoL of the children spanning the entire range of probability.

CHAPTER IV

RESULTS

4.1 Phase 1: Develop the cross-cultural adaptation and psychometric properties of the Myanmar Version of SOHO-5

Three experts participated to assess the content validity of a translated SOHO-5 Myanmar version. Two were assistant lecturers at the Preventive and Community Dentistry Department, University of Dental Medicine, Mandalay, and Prosthodontics Department, University of Dental Medicine, Yangon, respectively. The other expert was a pediatric dentist who at the time of the study was enrolled as a second-year Master candidate at the Pediatric dentistry department, Chulalongkorn University. The mean age of the experts was 35.33 (SD, 4.77) years. The number of questions in the SOHO-5 questionnaire remained unchanged after the validation process. Item correlation IC of each item in the questionnaire was shown in Table 9. Briefly, IC for the questionnaire ranged from 0.67 to 1.00. Six out of seven questions in the questionnaire for children reported having an IC of 1.00, demonstrating complete agreement among the content experts. “Avoid smiling due to appearance” item in the children’s report had an IC of 0.67. Five out of seven questions in the questionnaire for the parental report had an IC of 1.00, demonstrating complete agreement among the content experts. “Avoid smiling due to appearance” and “influence in self-confident” items in the parent’s report had an IC value of 0.67. Difficulty in eating, difficulty in sleeping, difficulty in speaking, difficult in playing, and avoid smiling due to pain were the reported items for complete agreement among the experts. The IC scores of all items in both children and parental reports were greater than the predefined score (IC > 0.5).

The participants in this study comprised 173 children and their parents. The participants consisted of 53.8% boys (n = 93) and 46.2% girls (n = 80). Approximately forty percent of the parents had above the high school education and 37% had high school education and 23 % had middle or lower education. Forty-two percent of subjects came from a family with a total parental income of > 300,000 Kyats (USD162.01)/ month and 45 % came from a family with a total parental income of 150,000 – 300,000 Kyats (USD3 81.01- 162.01)/month and 13 % were from the total monthly income of < 150,000 (USD 81.01) (Table 10). The prevalence of dental caries (dmft>0) in the study population was 85.5% and their mean dmft was 5.2 (SD = 4.6). The children’s

Myanmar SOHO-5 scores ranged from 0–11, with a mean of 1.9 (SD 4.6). The parents' scores ranged from 0–16, with a mean of 2.8 (SD 3.1).

More than 62% of the children and 67% of the parents reported an oral impact on the quality of life of the children (SOHO-5 scores > 0). 'Difficulty in eating' was the most reported item, followed by 'difficulty in sleeping' in both reports (Table 11 and 12). The overall Cronbach's alpha coefficients were 0.82 for the children's and 0.79 for the parental version, respectively, indicating good internal consistency (Table 13). For the test-retest reliability, the ICCs were 0.90 and 0.89 for the total scores of the children and parental versions, respectively, which demonstrated good reproducibility (Table 13).

The construct validity of the children's version demonstrated that the total SOHO-5 scores were significantly correlated in the expected direction with the two global rating questions, i.e., satisfaction with their oral health ($r = -0.71, p < 0.001$) and self-reported caries ($r = 0.62, p < 0.001$). In the parental version, the total SOHO-5 scores were significantly correlated with the three respective questions, i.e., parent-rated oral health ($r = 0.77, p < 0.001$), satisfaction with the child's oral health ($r = 0.76, p < 0.001$) and the child's perceived treatment need ($r = 0.75, p < 0.001$) (Table 14 and 15). Although some items in the parent's report were significantly correlated with the global rating question of the impact on child's general health, the total SOHO-5 scores were not correlated significantly. For the discriminant validity, the children with a history of dental caries had a higher mean rank of SOHO-5 total scores compared with children without caries experiences in the children's reports (96.12 vs. 33.00, $p < 0.001$ and parental report (96.61 vs. 30.08, $p < 0.001$) (Table 16 and 17).

Table 9. Content validity of a Myanmar version of SOHO-5

| Item | Expert's rater | | | IC |
|---|----------------|---|---|------|
| | 1 | 2 | 3 | |
| Children's report | | | | |
| အစားစားရာတွင် ခက်ခဲခြင်း (Difficulty in eating) | 1 | 1 | 1 | 1 |
| ရေသောက်ရာတွင် ခက်ခဲခြင်း (Difficulty in drinking) | 1 | 1 | 1 | 1 |
| စကားပြောရာတွင် ခက်ခဲခြင်း (Difficulty in speaking) | 1 | 1 | 1 | 1 |
| ကစားရာတွင် ခက်ခဲခြင်း (Difficulty in playing) | 1 | 1 | 1 | 1 |
| အိပ်စက်ရာတွင် ခက်ခဲခြင်း (Difficulty in sleeping) | 1 | 1 | 1 | 1 |
| နာကျင်သောကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် (Avoid smiling due to pain) | 1 | 1 | 1 | 1 |
| ပုံသဏ္ဍန်အသွင်အပြင်ကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် (Avoid smiling due to appearance) | 0 | 1 | 1 | 0.67 |
| Parent's report | | | | |
| အစားစားရာတွင် ခက်ခဲခြင်း (Difficulty in eating) | 1 | 1 | 1 | 1 |
| စကားပြောရာတွင် ခက်ခဲခြင်း (Difficulty in speaking) | 1 | 1 | 1 | 1 |
| ကစားရာတွင် ခက်ခဲခြင်း (Difficulty in playing) | 1 | 1 | 1 | 1 |
| အိပ်စက်ရာတွင် ခက်ခဲခြင်း (Difficulty in sleeping) | 1 | 1 | 1 | 1 |
| နာကျင်သောကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် (Avoid smiling due to pain) | 1 | 1 | 1 | 1 |
| ပုံသဏ္ဍန်အသွင်အပြင်ကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် (Avoid smiling due to appearance) | 0 | 1 | 1 | 0.67 |
| မိမိကိုယ်ကို ယုံကြည်မှုအပေါ် သက်ရောက်မှုရှိခြင်း (Influence self-confidence) | 1 | 1 | 0 | 0.67 |

Table 10. Demographic characteristics of the children and primary caregiver

| Group | Frequency | Percentage |
|--|-----------|------------|
| Demographic background | | |
| Gender | | |
| Female | 80 | 46.2 |
| Male | 93 | 53.8 |
| Relationship to child | | |
| Mother | 129 | 74.6 |
| Father | 26 | 15.0 |
| Relative | 18 | 10.4 |
| Mother's education | | |
| Middle or lower | 45 | 26.0 |
| High | 64 | 37.0 |
| Tertiary | 64 | 37.0 |
| Father's education | | |
| Middle or lower | 39 | 22.5 |
| High | 63 | 36.4 |
| Tertiary | 71 | 41.0 |
| Monthly household income in Kyat (\$) | | |
| < 150,000 (\$ 81.01) | 21 | 12.1 |
| 150,000 – 300,000 (\$ 81.01 – 162.01) | 78 | 45.1 |
| > 300,000 (\$162.01) | 74 | 42.8 |

Table 11. Distribution of the Child's SOHO-5 responses

| Item | No (%) | A little (%) | A lot (%) |
|---------------------------------|------------|--------------|-----------|
| Difficulty in eating | 69 (39.9) | 66 (38.2) | 38 (22.0) |
| Difficulty in drinking | 157 (90.8) | 15 (8.7) | 1 (0.6) |
| Difficulty in speaking | 154 (89.0) | 15 (8.7) | 4 (2.3) |
| Difficulty in playing | 160 (92.5) | 10 (5.8) | 3 (1.7) |
| Difficulty in sleeping | 120 (69.4) | 43 (24.9) | 10 (5.8) |
| Avoid smiling due to pain | 130 (75.1) | 38 (22.0) | 5 (2.9) |
| Avoid smiling due to appearance | 151 (87.3) | 21 (12.1) | 1 (0.6) |

Table 12. Distribution of the Parent's SOHO-5 responses

| Item | Not at all (%) | A little (%) | Moderate (%) | A lot (%) | A great deal (%) |
|---------------------------------|----------------|--------------|--------------|-----------|------------------|
| Difficulty in eating | 63 (36.4) | 43 (24.9) | 38 (22.0) | 25 (14.5) | 4 (2.3) |
| Difficulty in speaking | 152 (87.9) | 15 (8.7) | 6 (3.5) | 0 | 0 |
| Difficulty in playing | 160 (92.5) | 11 (6.4) | 2 (1.2) | 0 | 0 |
| Difficulty in sleeping | 108 (62.4) | 39 (22.5) | 20 (11.6) | 6 (3.5) | 0 |
| Avoid smiling due to pain | 128 (74.0) | 30 (17.3) | 14 (8.1) | 1 (0.6) | 0 |
| Avoid smiling due to appearance | 153 (88.4) | 17 (9.8) | 3 (1.7) | 0 | 0 |
| Influence self confidence | 134 (77.5) | 35 (20.2) | 4 (2.3) | 0 | 0 |

Table 13. Reliability analysis and item characteristics in children and parent report

| Item | Internal consistency reliability | | Test-retest reliability | | |
|---------------------------------|----------------------------------|----------------------------------|-------------------------|-------------|---------|
| | CITC | Cronbach's alpha if item deleted | ICC | 95%CI. | p value |
| Child version (0-14) | | | | | |
| Difficulty in eating | 0.67 | 0.78 | 0.96 | 0.94-0.98 | <0.001 |
| Difficulty in drinking | 0.59 | 0.79 | 0.69 | 0.51-0.81 | <0.001 |
| Difficulty in speaking | 0.65 | 0.78 | 0.45 | 0.20-0.65 | <0.001 |
| Difficulty in playing | 0.55 | 0.80 | 0.56 | 0.34 – 0.73 | <0.001 |
| Difficulty in sleeping | 0.59 | 0.79 | 0.84 | 0.73-0.91 | <0.001 |
| Avoid smiling due to pain | 0.70 | 0.76 | 0.70 | 0.53-0.82 | <0.001 |
| Avoid smiling due to appearance | 0.33 | 0.82 | 0.64 | 0.45-0.78 | <0.001 |

| | | | | | |
|---------------------------------|-----------------------|------|------|-----------|--------|
| Total scores | Cronbach's alpha 0.82 | | 0.90 | 0.83-0.94 | <0.001 |
| Parental version (0-28) | | | | | |
| Difficulty in eating | 0.73 | 0.73 | 0.92 | 0.87-0.96 | <0.001 |
| Difficulty in speaking | 0.61 | 0.75 | 0.67 | 0.48-0.80 | <0.001 |
| Difficulty in playing | 0.55 | 0.77 | 0.48 | 0.24-0.67 | <0.001 |
| Difficulty in sleeping | 0.67 | 0.72 | 0.83 | 0.72-0.90 | <0.001 |
| Avoid smiling due to pain | 0.64 | 0.73 | 0.74 | 0.58-0.85 | <0.001 |
| Avoid smiling due to appearance | 0.28 | 0.79 | 0.57 | 0.35-0.73 | <0.001 |
| Influence self confidence | 0.41 | 0.78 | 0.60 | 0.39-0.75 | <0.001 |
| Total scores | Cronbach's alpha 0.79 | | 0.89 | 0.82-0.94 | <0.001 |

CITC – Corrected item-total correlation, ICC – Intraclass correlation coefficient, CI – Confidence interval

Table 14. Construct validity of the Child's SOHO-5

| Item | Satisfaction with oral health | | Self-reported caries | |
|---------------------------------|-------------------------------|----------------|----------------------|----------------|
| | <i>r</i> | <i>p-value</i> | <i>r</i> | <i>p-value</i> |
| Difficulty in eating | -0.68 | <0.001 | 0.62 | <0.001 |
| Difficulty in drinking | -0.28 | <0.001 | 0.20 | 0.007 |
| Difficulty in speaking | -0.33 | <0.001 | 0.22 | 0.003 |
| Difficulty in playing | -0.32 | <0.001 | 0.18 | 0.017 |
| Difficulty in sleeping | -0.53 | <0.001 | 0.42 | <0.001 |
| Avoid smiling due to pain | -0.41 | <0.001 | 0.31 | <0.001 |
| Avoid smiling due to appearance | -0.37 | <0.001 | 0.17 | 0.028 |
| Total score | -0.71 | <0.001 | 0.62 | <0.001 |

Table 15. Construct validity of the Parent's SOHO-5

| Item | Parent rated oral health | | Satisfaction | | Impact on general health | | Treatment need | |
|---------------------------------|--------------------------|-----------------|--------------|-----------------|--------------------------|-----------------|----------------|-----------------|
| | <i>r</i> | <i>p</i> -value | <i>r</i> | <i>p</i> -value | <i>r</i> | <i>p</i> -value | <i>r</i> | <i>p</i> -value |
| Difficulty in eating | 0.77 | <0.001 | 0.76 | <0.001 | 0.13 | 0.096 | 0.72 | <0.001 |
| Difficulty in speaking | 0.33 | <0.001 | 0.38 | <0.001 | 0.22 | 0.003 | 0.26 | <0.001 |
| Difficulty in playing | 0.31 | <0.001 | 0.39 | <0.001 | 0.16 | 0.031 | 0.20 | 0.008 |
| Difficulty in sleeping | 0.59 | <0.001 | 0.62 | <0.001 | 0.17 | 0.022 | 0.54 | <0.001 |
| Avoid smiling due to pain | 0.43 | <0.001 | 0.45 | <0.001 | 0.02 | 0.771 | 0.39 | <0.001 |
| Avoid smiling due to appearance | 0.30 | <0.001 | 0.30 | <0.001 | 0.004 | 0.957 | 0.257 | 0.001 |
| Influence on self-confidence | 0.25 | <0.001 | 0.25 | 0.001 | 0.05 | 0.506 | 0.33 | <0.001 |
| Total score | 0.77 | <0.001 | 0.76 | <0.001 | 0.09 | 0.225 | 0.75 | <0.001 |

r - Spearman's correlation coefficient

Table 16. Discriminant validity of the Child's SOHO-5

| Item | Mean ranks | | P value |
|---------------------------------|--------------------|---------------|---------|
| | <i>Caries free</i> | <i>Caries</i> | |
| Difficulty in eating | 35.00 | 95.78 | <0.001 |
| Difficulty in drinking | 79.00 | 88.35 | 0.085 |
| Difficulty in speaking | 77.50 | 88.60 | 0.059 |
| Difficulty in playing | 80.50 | 88.10 | 0.125 |
| Difficulty in sleeping | 60.50 | 91.48 | <0.001 |
| Avoid smiling due to pain | 65.50 | 90.63 | 0.002 |
| Avoid smiling due to appearance | 76.00 | 88.86 | 0.040 |
| Total score | 33.00 | 96.12 | <0.001 |

Table 17. Discriminant validity of the Parent's SOHO-5

| Item | Mean ranks | | P value |
|---------------------------------|--------------------|---------------|---------|
| | <i>Caries free</i> | <i>Caries</i> | |
| Difficulty in eating | 32.00 | 96.29 | <0.001 |
| Difficulty in speaking | 76.50 | 88.77 | 0.045 |
| Difficulty in playing | 80.50 | 88.10 | 0.125 |
| Difficulty in sleeping | 54.50 | 92.49 | <0.001 |
| Avoid smiling due to pain | 64.50 | 90.80 | 0.002 |
| Avoid smiling due to appearance | 77.00 | 88.69 | 0.052 |
| Influence on self-confidence | 70.88 | 89.72 | 0.017 |
| Total score | 30.08 | 96.61 | <0.001 |
| Mann-Whitney U test | | | |

4.2 Phase 2: Evaluate the impact of ECC on oral health quality of life of Myanmar

preschool children

4.2.1 Demographic characteristics of the children and primary caregivers

In total, 514 children and their parents were invited to participate in this study, corresponding to a response rate of 100%. Of these children, 5 children refused the oral examination, and 509 child-parent pairs completed the questionnaire. Thirty-seven percent of the parents had above the high school education and 35% had high school education and 27 % had middle or lower education. Thirty-four percent of subjects came from a family with a total parental income of > 300,000 Kyats (USD162.01)/ month and 57.8 % came from a family with a total parental income of 150,000 – 300,000 Kyats (USD3 81.01- 162.01)/month and 8.3 % were from the total monthly income of < 150,000 (USD 81.01). According to the organization of the MAP financial inclusion survey highlights, Myanmar (2018), two-thirds (66%) of adults personally earn Myanmar Kyats 100,000 or less per month. The questionnaires were answered by mother (78.2 %), father (11.0%), or relative (10.8%), and the mean age of the respondent was 34.4 (7.5). Table 18 described the children's demographic characteristics clinical characteristics and oral health related behavior. Among the participants, 261 (51.3%) were girls.

4.2.2 Dental caries and oral hygiene status

A total of 441 (86.6%) had caries experiences (dmft > 0) and the mean dmft score of the children was 5.6 (4.5). A total of 411 children (86.6%) had caries experience, 12 (2.4 %) had missing teeth because of caries, and only 16 (3.1 %) had filled teeth. Almost all of the decayed teeth were unrestored and decay teeth ($dt = 6.37 \pm 4.88$) were the major component (93%) of dmft while numbers of missing and filled teeth were very low ($mt = 0.03 \pm 0.20$ and $ft = 0.03 \pm 0.27$). Twenty-point two percent of the participant had no debris on their teeth. The mean debris score for all children was 0.8(0.5) with the debris index range of 1-3.

4.2.3 Child rearing and oral health behavior

In this study, the majority of the parents started brushing of their children's teeth after one year of age (46.4 %) whereas they started at 6 -12 months (27.9%) and 25 – 36 months (20.6%). The frequency of tooth brushing in children was mostly once a day (77.8 %) and approximately half (42.6%) of the children were brushing every day. The frequency of consumption of sugary snacks between meal per day was common in children with

53.8 % in 1-2 times per day and 43.6 % more than three times per day. Sixty-seven percent of the children had no history of a previous dental visit.

4.2.4 Quality of life of children

Tables 19 and 20 showed the distribution of responses to the items and the mean score of each item according to the children's and parents' SOHO-5 reports. Overall, 64.4 % of children reported an impact on OHRQoL (SOHO-5 score > 0), while 67.8% of the parent reported an impact on their children's OHRQoL. The highest SOHO-5 score reported was 11 out of the total 14 on the child self-report version and 20 out of the total 28 on the parental version. The mean (standard deviation) total score of the SOHO-5 was 1.8 (2.2) and 2.6 (3.2), for child self-report and parental version, respectively. Among SOHO-5 analyzed items, the highest-impact item to OHRQoL was eating difficulties for both reports. Difficulty eating, difficulty sleeping, and avoid smiling (due to pain) were the most frequently reported items on the child self-report version, while difficulty eating, difficulty sleeping, and self-confidence were the most frequently reported on the parental version. Table 21 described the correlation between the parent's and children's SOHO-5 scores for total and each item. The ICC for the total score was 0.78 (0.65 – 0.84) and ranged from 0.35 (avoid smiling due to appearance) to 0.77 (difficulty in eating) among the items. There were significant differences in the SOHO-5 scores among the severity of early childhood caries groups (Table 22).

4.2.5 Bivariate analysis of SOHO-5 score and oral health related factors

The bivariate analysis was done to analyze the effect of various factors on the oral health related quality of life of children (SOHO-5) shown in Tables 23. The caries status (dmft), oral hygiene status (debris score) ($p < 0.001$), frequency of the frequency of sugary snacks per day ($p < 0.001$), the starting age for toothbrushing (p -value < 0.001), and the tooth brushing day per week (p -value - 0.003) were significantly associated with the oral health related quality of life (SOHO-5 > 0) in both children's and parent's reports.

4.2.6 Multiple regression analysis of SOHO-5 scores and oral health related factors

Table 24 showed the multivariate logistic regression analysis of various factors associated with the SOHO-5 of > 0 based on the children's self-reports and parent's reports. The adjusted model for children's reports demonstrated that children who have one unit increase in dmft score were 1.23 times (95% CI 1.18 - 1.33) more likely to have an impact on the child's OHRQoL. The debris score (OR: 2.12, 95% CI 1.39 – 3.23, $p < 0.001$)

and the starting age for tooth brushing (OR: 1.61, 95% CI 1.03 – 2.51, $p = 0.037$) were the significant factors affecting children's OHRQoL (SOHO-5 score > 0) based on children's report.

In the adjusted model of the parent's report, the caries experience (dmft) (OR: 1.24, 95% CI 1.18 - 1.35, $p < 0.001$), the debris score (OR: 2.08, 95% CI 1.35 – 3.21, $p = 0.001$), starting age for tooth brushing (OR: 0.1.89, 95% CI 1.21 – 2.98, $p = 0.006$) and brushing day per week (OR: 1.98, 95% CI 1.00 – 3.92), $p < 0.049$) had a greater probability of exerting an impact on children's OHRQoL.

Table 18. Children's demographic background, clinical characteristics, oral health-related behaviors

| Group | Frequency | Percentage |
|--|-----------|------------|
| Demographic background | | |
| Gender | | |
| Female | 261 | 51.3 |
| Male | 248 | 48.7 |
| Relationship to child | | |
| Mother | 398 | 78.2 |
| Father | 56 | 11.0 |
| Relative | 55 | 10.8 |
| Mother's education | | |
| Middle or lower | 145 | 28.5 |
| High | 186 | 36.5 |
| Tertiary | 178 | 35.0 |
| Father's education | | |
| Middle or lower | 132 | 25.9 |
| High | 174 | 34.2 |
| Tertiary | 203 | 39.9 |
| Monthly household income in Kyat (\$) | | |
| < 150,000 (\$ 81.01) | 42 | 8.3 |
| 150,000 – 300,000 (\$ 81.01 – 162.01) | 294 | 57.8 |
| > 300,000 (\$162.01) | 173 | 34.0 |
| Clinical characteristics; Mean (SD) | | |
| Dmft score | 5.6 (4.5) | - |
| Debris score | 0.8 (0.5) | |
| OHRQoL (SOHO-5); Mean (SD) | | |
| Children's SOHO-5 | 1.8 (2.2) | |
| Parent's SOHO-5 | 2.6 (3.2) | |

| Oral Health Behavior | | |
|---|-----|------|
| Starting age for tooth brushing | | |
| 6-12 months | 142 | 27.9 |
| 13-24 months | 236 | 46.4 |
| 25-36 months | 105 | 20.6 |
| ≥ 37 months | 26 | 5.1 |
| Frequency of tooth brushing | | |
| 1 time /day | 396 | 77.8 |
| 2 times or more /day | 113 | 22.2 |
| Brushing days per week | | |
| 1-2 days/ week | 16 | 3.1 |
| 3-5 days / week | 64 | 12.6 |
| 5-6 days /week | 212 | 41.7 |
| everyday | 217 | 42.6 |
| Frequency of snack per day | | |
| No | 13 | 2.6 |
| 1-2 times per day | 274 | 53.8 |
| ≥ 3 times per day | 222 | 43.6 |
| History of previous dental visit | | |
| Never | 341 | 67.0 |
| When child has pain | 150 | 29.5 |
| Every 12 months | 18 | 3.5 |

Table 19. Distribution of Child's SOHO-5 responses

| Item | No (%) | A little (%) | A lot (%) | Mean (SD) |
|---------------------------------|------------|--------------|------------|-----------|
| Difficulty in eating | 205(40.3) | 197 (38.7) | 107 (21.0) | 0.8 (0.7) |
| Difficulty in drinking | 458 (90.0) | 49 (9.6) | 2 (0.4) | 0.1 (0.3) |
| Difficulty in speaking | 457 (89.8) | 46 (9.0) | 6 (1.2) | 0.1 (0.3) |
| Difficulty in playing | 471 (92.5) | 35 (6.9) | 3 (0.6) | 0.1 (0.3) |
| Difficulty in sleeping | 326 (64.0) | 145 (28.5) | 38 (7.5) | 0.4 (0.6) |
| Avoid smiling due to pain | 431 (84.7) | 71 (13.9) | 7 (1.4) | 0.2 (0.4) |
| Avoid smiling due to appearance | 459 (78.8) | 48 (17.3) | 2 (0.4) | 0.1 (0.3) |

Table 20. Distribution of the Parent's SOHO-5 responses

| Item | Not at all (%) | A little (%) | Moderate (%) | A lot (%) | A great deal (%) | Mean (SD) |
|---------------------------------|----------------|--------------|--------------|-----------|------------------|-----------|
| Difficulty in eating | 192 (37.7) | 152 (29.9) | 95 (18.7) | 60 (11.8) | 10 (2.0) | 1.1 (1.0) |
| Difficulty in speaking | 442 (86.8) | 51 (10.0) | 15 (2.9) | 1 (0.2) | 0 | 0.2 (0.5) |
| Difficulty in playing | 457 (89.8) | 43 (8.4) | 5 (1.0) | 3 (0.6) | 1 (0.2) | 0.1 (0.4) |
| Difficulty in sleeping | 294 (57.8) | 133 (26.1) | 64 (12.6) | 17 (3.3) | 1 (0.2) | 0.6 (0.8) |
| Avoid smiling due to pain | 423 (83.1) | 62 (12.2) | 19 (3.7) | 5 (1) | 0 | 0.2 (0.6) |
| Avoid smiling due to appearance | 460 (90.4) | 39 (7.7) | 7 (1.2) | 3 (0.6) | 0 | 0.1 (0.4) |
| Influence self confidence | 412 (80.9) | 80 (15.7) | 12 (2.2) | 3 (0.6) | 2 (0.4) | 0.2 (0.6) |

Table 21. Correlations between parent and children for total and item's (SOHO-5)

| Item | Parent vs children ICC (95 % CI) |
|---|----------------------------------|
| Total score | 0.78 (0.65 – 0.84) |
| Difficulty in eating | 0.77 (0.62 – 0.85) |
| Difficulty in speaking | 0.60 (0.54 – 0.66) |
| Difficulty in playing | 0.52 (0.45 – 0.58) |
| Difficulty in sleeping | 0.73 (0.64 – 0.79) |
| Avoid smiling due to pain | 0.66 (0.61 – 0.71) |
| Avoid smiling due to appearance | 0.35 (0.27 – 0.42) |
| Difficulty in drinking (Child) / Influence self-confidence (Parent) | * |

* Different items for versions of children and parent

Table 22. Relationship between severity of early childhood caries and SOHO-5 scores

| Variables | Children's report | | | Parent's report | | |
|------------------------|-------------------|--------------|---------|-----------------|--------------|---------|
| | Mean (SD) | Median (IQR) | p value | Mean (SD) | Median (IQR) | p value |
| ECC severity | | | | | | |
| Caries free (dmft = 0) | 0.61 (1.36) | 0.00 (0) | | 0.69 (1.50) | 0.00 (0) | |
| ECC (dmft = 1-5) | 1.29 (1.63) | 1.00 (2) | < 0.001 | 1.80 (2.37) | 1.00 (3) | < 0.001 |
| Severe ECC (dmft > 5) | 2.60 (2.55) | 2.00 (2) | | 3.85 (3.66) | 3.00 (4) | |

Kruskal-Wallis

Table 23. Association between oral health factors related to the total SOHO-5 score based on children's and parent's reports

| Variables | Children's report | | | Parent's report | | |
|--|-------------------|-------------|---------|-----------------|-------------|---------|
| | SOHO-5 = 0 | SOHO-5 > 0 | p value | SOHO-5 = 0 | SOHO-5 > 0 | p value |
| Gender | | | | | | |
| Female | 34.9% (91) | 65.1% (170) | 0.737 | 32.6% (85) | 67.4% (176) | 0.864 |
| Male | 36.3% (90) | 63.7% (158) | | 31.9% (79) | 68.1% (169) | |
| Mother's education | | | | | | |
| Middle or lower | 37.2% (54) | 62.8% (91) | | 36.6% (53) | 63.4% (92) | 0.265 |
| High | 35.5% (66) | 64.5% (120) | 0.857 | 32.8% (61) | 67.2% (125) | |
| Tertiary | 34.3% (61) | 65.7% (117) | | 28.1% (50) | 71.9% (128) | |
| Father's education | | | | | | |
| Middle or lower | 37.9% (50) | 62.1% (82) | | 39.4% (52) | 60.6% (80) | 0.119 |
| High | 37.4% (65) | 62.6% (109) | 0.502 | 30.5% (53) | 69.5% (121) | |
| Tertiary | 32.5% (66) | 67.5% (137) | | 29.1% (59) | 70.9% (144) | |
| Monthly household income in Kyat (\$) | | | | | | |
| < 150,000 (\$ 81.01) | 38.1% (16) | 61.9% (26) | | 35.7% (15) | 64.3% (27) | 0.650 |
| 150,000 – 300,000 (\$ 81.01 – 162.01) | 32.3% (95) | 67.7% (199) | 0.195 | 30.6% (90) | 69.4% (204) | |
| > 300,000 (\$162.01) | 40.5% (70) | 59.5% (103) | | 34.1% (59) | 65.9% (114) | |
| dmft score (Mean, SD) | 3.39 (3.56) | 6.81 (4.56) | <0.001 | 3.28 (3.66) | 6.7 (4.5) | <0.001* |
| Debris score (Mean, SD) | 0.61 (0.47) | 0.83 (0.53) | <0.001 | 0.60 (0.47) | 0.82 (0.52) | <0.001* |
| Frequency of snack per day | | | | | | |
| 2 times or less | 42.2% (121) | 57.8% (166) | <0.001 | 38.3% (110) | 61.7% (177) | 0.001 |
| More than 2 times | 27.0% (60) | 73.0% (162) | | 24.3% (54) | 75.7% (168) | |
| Starting age for tooth brushing | | | | | | |
| 12 months | 49.3% (70) | 50.7% (72) | <0.001 | 47.9% (68) | 52.1% (74) | <0.001 |
| More than 12 months | 30.2% (111) | 69.8% (256) | | 26.2% (96) | 73.8% (271) | |
| Frequency of tooth brushing | | | | | | |
| 2 times or more /day | 43.4% (49) | 56.6% (64) | 0.050 | 34.5% (39) | 65.5% (74) | 0.554 |
| 1 time /day | 33.3% (132) | 66.7% (264) | | 31.6% (125) | 68.4% (271) | |
| Brushing days per week | | | | | | |
| More than 5 days or everyday | 38.0% (163) | 62.0% (266) | 0.009 | 35.0% (150) | 65.0% (279) | 0.003 |
| 3-5 days or less | 22.5% (18) | 77.5% (62) | | 17.5% (14) | 82.5% (66) | |

* Mann-Whitney test, Chi-square test

Table 24. Logistics regression analysis on oral health related quality of life based on children's and parent's reports

| Variables | Number | Bivariate | | Multivariate | |
|--|--------|----------------------|---------|-------------------------|---------|
| | | Crude OR (95% CI) | p value | Adjusted OR (95% CI) | p value |
| Children's report | | | | | |
| Gender | | | | | |
| Female | 261 | 1.00 | | | |
| Male | 248 | 0.94 (0.65 - 1.35) | 0.737 | | |
| Mother's education | | | | | |
| Middle or lower | 145 | 1.00 | | | |
| High | 186 | 1.08 (0.69 - 1.70) | 0.741 | | |
| Tertiary | 178 | 1.14 (0.72 - 1.80) | 0.579 | | |
| Father's education | | | | | |
| Middle or lower | 132 | 1.00 | | | |
| High | 174 | 1.02 (0.64 - 1.61) | 0.926 | | |
| Tertiary | 203 | 1.27 (0.80 - 2.00) | 0.313 | | |
| Monthly household income in Kyat (\$) | | | | | |
| < 150,000 (\$ 81.01) | 42 | 1.00 | | | |
| 150,000 – 300,000 (\$ 81.01 – 162.01) | 294 | 1.29 (0.66 - 2.52) | 0.457 | | |
| > 300,000 (\$162.01) | 173 | 0.91 (0.45 - 1.81) | 0.779 | | |
| dmft score | 509 | 1.24 (1.18 - 1.31) | < 0.001 | 1.23 (1.18 - 1.33) | < 0.001 |
| Debris score | 509 | 2.41 (1.65 – 3.50) | < 0.001 | 2.12 (1.39 – 3.23) | < 0.001 |
| Frequency of snack per day | | | | | |
| 2 times or less | 287 | 1.00 | | 1.00 | |
| More than 2 times | 222 | 1.97 (1.35 - 2.87) | < 0.001 | 1.48 (0.97 - 2.26) | 0.067 |
| Starting age for tooth brushing | | | | | |
| 12 months | 142 | 1.00 | | 1.00 | |
| More than 12 months | 367 | 2.24 (1.51 – 3.34) | < 0.001 | 1.61 (1.03 – 2.51) | 0.037 |
| Frequency of tooth brushing | | | | | |
| 2 times or more /day | 113 | 1.00 | 0.050 | | |
| 1 time /day | 396 | 1.53 (0.99 – 2.35) | | | |
| Brushing days per week | | | | | |
| More than 5 days or everyday | 429 | 1.00 | | 1.00 | |
| 3-5 days or less | 80 | 2.11 (1.21 – 3.69) | 0.009 | 1.57 (0.83 – 2.96) | 0.165 |

| Parent's report | | | | | |
|--|-----|--------------------|---------|--------------------|--------|
| Gender | | | | | |
| Female | 261 | 1.00 | | | |
| Male | 248 | 1.03 (0.71 - 1.50) | 0.864 | | |
| Mother's education | | | | | |
| Middle school or lower | 145 | 1.00 | | | |
| High school | 186 | 1.18 (0.75 - 1.86) | 0.476 | | |
| Tertiary school | 178 | 1.48 (0.92 - 2.36) | 0.105 | | |
| Father's education | | | | | |
| Middle school or lower | 132 | 1.00 | | | |
| High school | 174 | 1.48 (0.92 - 2.39) | 0.104 | | |
| Tertiary school | 203 | 1.59 (0.99 - 2.52) | 0.050 | | |
| Monthly household income in Kyat (\$) | | | | | |
| < 150,000 (\$ 81.01) | 42 | 1.00 | 0.505 | | |
| 150,000 – 300,000 (\$ 81.01 – 162.01) | 294 | 1.26 (0.64 - 2.48) | | | |
| > 300,000 (\$162.01) | 173 | 1.07 (0.53 - 2.17) | 0.844 | | |
| dmft | 509 | 1.25 (1.18 - 1.32) | < 0.001 | 1.24 (1.18 - 1.35) | <0.001 |
| Debris score | 509 | 2.36 (1.61 – 3.46) | < 0.001 | 2.08 (1.35 – 3.21) | 0.001 |
| Frequency of snack per day | | | | | |
| 2 times or less | 287 | 1.00 | | 1.00 | |
| More than 2 times | 222 | 1.93 (1.31 - 2.85) | 0.001 | 1.44 (0.94 - 2.22) | 0.095 |
| Starting age for tooth brushing | | | | | |
| 12 months | 142 | 1.00 | | 1.00 | |
| More than 12 months | 367 | 2.59 (1.73 – 3.88) | < 0.001 | 1.89 (1.21 – 2.98) | 0.006 |
| Frequency of tooth brushing | | | | | |
| 2 times or more /day | 113 | 1.00 | | | |
| 1 time /day | 396 | 1.14 (0.73 – 1.78) | 0.554 | | |
| Brushing days per week | | | | | |
| More than 5 days or everyday | 429 | 1.00 | | 1.00 | |
| 3-5 days or less | 80 | 2.53 (1.38 – 4.66) | 0.003 | 1.98 (1.00 - 3.92) | 0.049 |

CHAPTER V

DISCUSSION

5.1 Phase 1: Develop the cross-cultural adaptation and psychometric properties of the Myanmar Version of SOHO-5

The present study performed a cross-cultural adaptation of SOHO-5 to the Burmese language and evaluated its reliability and validity in 5-year-old children. The results demonstrated that the Myanmar SOHO-5 version was successfully developed, and its psychometric properties were acceptable for Myanmar 5-year-old children. An accurate cross-cultural adaptation procedure was followed to ensure that all the items in the child's and parent's reports were retained in the Myanmar SOHO-5 version.

In this study, the 5-year-old children understood the content of the SOHO-5 and responded appropriately to the questions. The children's and parents' versions reported that ~60% of the children in the sample population had an oral impact on their daily life with $SOHO-5 > 0$. Therefore, it also revealed that the children could report their perceptions of their OHRQoL, and studies on the OHRQoL of children should not only depend on the parental proxy reports.

When evaluated for reliability, all inter-item correlations were positive, and all corrected item-total correlations were above the minimum recommended level of 0.20 for including an item in a scale, which indicated the items in the SOHO-5 scale were correlated conceptually (Gherunpong et al., 2004). Furthermore, the child's and parent's versions had a standardized Cronbach's alpha above the recommended level of 0.70 indicating good internal consistency, which was similar to the results of the original study and studies in other populations (McHugh, 2012). The value of the total Cronbach's alpha did not improve when any of the items were deleted, however, after deleting the item 'avoid smiling due to appearance'; the Cronbach's alpha values for both versions were the same as the total alpha values. The high Cronbach's alpha value of the item 'avoid smiling due to appearance' shown in accordance with the low value of inter-item correlations. It may come from causes that most of young children do not think much of their appearance and self-confidence. However, this result is not sufficient justification to remove this item from the Myanmar SOHO-5 while the other results demonstrated good performance. The ICC values of the child's and parent's reports in this study presented a

high degree of agreement between the scores at different times, which reflected the excellent test-retest reliability.

The construct validity results indicated that the associations between the total SOHO-5 scores and the different subjective global rating questions of the child's and parent's reports were significant in the expected direction, however, "the impact on child's general health" question in the parent's version had a significant correlation in some items. This finding regarding the impact on children's general health was similar to studies in Indonesia (Rachmawati et al., 2017) and may be due to the parent's underestimation of the impact of oral health on the overall well-being of the children. Moreover, our study included participants primarily of middle and lower socioeconomic status and therefore, their oral health knowledge might be low. The other possible reason is the lack of people's awareness of oral health due to an insufficient number of dental professionals, limited oral health promotion activities, and oral health care services in the Myanmar (Nomura et al., 2019).

However, these consistent findings indicated good construct validity for both versions of this measure. Moreover, the total SOHO-5 scores of both reports were significantly higher in children with caries, which demonstrated the discriminant ability of the measures between children with and without caries experiences. When consider as the criteria for good measurement properties tool of the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) (Mokkink et al., 2018), this Myanmar version followed all the steps according to the guideline for the process of cross-cultural adaptation which consists of back translation in the forward-backward translation process, an expert committee, and reported the pretesting process of the prefinal version in subjects from the target setting. However, this study did not conduct the structural validity due to the characteristic of the unidimensional SOHO-5 scales. Myanmar where English is not frequently used in addition to the native language and where bilingualism is not common, therefore it cannot assess the cross-cultural validity. Moreover, due to the limitation of the cross-sectional study design and further longitudinal studies are required to examine the properties of the measurement error and the responsiveness of SOHO-5.

Myanmar SOHO-5 is the first measurement tool in the Myanmar language to assess the OHRQoL of preschool children through their self-report. Tooth decay in young children in Myanmar is a public health issue. In Myanmar, dental manpower and resources are limited and national programs to tackle the burden of ECC are not yet prioritized (Chen et al., 2021). Using the Myanmar SOHO-5 in addition to oral health surveys or project

evaluation will be beneficial for health policymakers and health workers where the oral diseases in children are high and left untreated in Myanmar. The limitation of the study should be also addressed. Although Burmese is the national language and the most commonly used language in Myanmar, there are several ethnic minorities who speak various dialects in Myanmar. Thus, the Myanmar SOHO-5 might not be able to be used in some areas where young children do not speak Burmese well. Further research on assessing the OHRQoL of children using a representative sample with a wide range of socio-economic positions is recommended.

5.2 Phase 2: Evaluate the impact of ECC on oral health quality of life of Myanmar preschool children

Regarding the oral problems during childhood, early childhood caries has been the greatest indicators of impact on the quality of life of preschool children. ECC is a multi-factorial disease related to the microorganisms attacking the tooth surface, diet, oral hygiene, use of fluoride, and socioeconomic factors (Detsomboonrat & Pisarnaturakit, 2015), which may exert a negative impact on oral health-related quality of life (Bönecker, Abanto, Tello, & Oliveira, 2012a). There was limited oral health data of children in Myanmar (Thwin, Zaitu, Ueno, & Kawaguchi, 2016), and this is the first study that has used a validated SOHO-5 measure to assess the impact of ECC on the OHRQoL of young children according to the perception of the children themselves and their parents.

The results of this study indicated that dental caries, poor oral hygiene and oral health behavior were associated with worse OHRQoL of 5 years old children in terms of perceptions of both children and their parents. Total 64 % of the children and 68 % of the parents reported an adverse effect on OHRQoL (SOHO-5 score > 0) for at least one item. This finding also demonstrates that children's self-reports can be reliable for their oral health information and the perceptions of parents comparing with the children's perception allow a more comprehensive evaluation of the child's OHRQoL (Matheus F Perazzo et al., 2017).

In this study, caries prevalence and dmft of children were very high, and almost all of the carious teeth were untreated. The items 'difficulty eating' and 'difficulty in sleeping' had the highest mean scores on both the child and parent/caregiver versions of the SOHO-5, which is in agreement with the previous studies (Abanto, Tsakos, Paiva, Carvalho, et al., 2014; Dantas et al., 2015; Matheus F Perazzo et al., 2017). This functional limitation is frequently associated with pain due to dental caries and caries was the only oral clinical condition to cause an

impact on all items and total scores of children self-report and parental version of the Myanmar SOHO- 5. This negative impact might affect the children's daily activities and can result in growth delay, weight loss, malnutrition and sleeping disorders (Matheus F Perazzo et al., 2017).

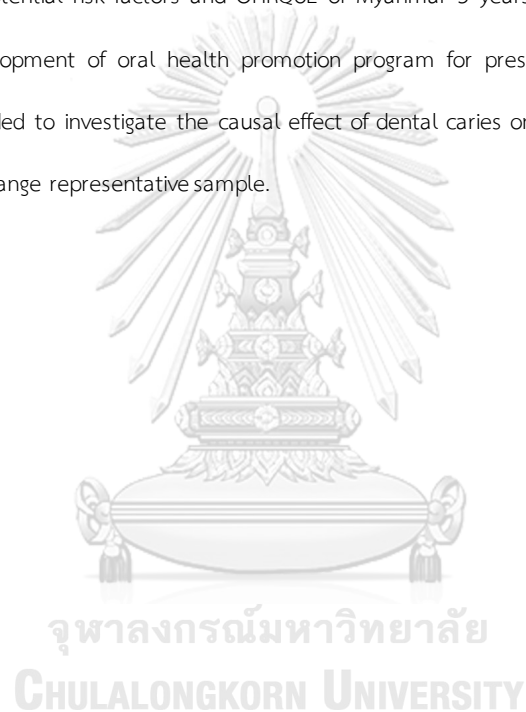
From both reports, children with higher caries experience have more chances of having negative impact on their OHRQoL. In this study. Children who have one unit increase in dmft score have 1.23 times higher chance of having an impact on their OHRQoL. This finding was similar to the result of the studies in Hongkong (Duangthip et al., 2020), Trinidad (Naidu et al., 2016) and Brazil (Granville-Garcia et al., 2018).

Regarding total scores, the correlation between reports of parent-child pairs was substantial, while other studies that used the SOHO-5 instrument in Brazilian children demonstrated the excellent agreement between mother vs child (Abanto, Tsakos, Paiva, Raggio, et al., 2014) and moderate between reports of parent vs. children (Paiva, Filho, Medina, & Hanan, 2019). The level of agreement (ICC) of the different items varied from weak to substantial, and the best agreement (ICC = 0.72) was observed in the "difficulty in eating" item. The best agreement level of this item between the parents and their children might be because majority of the respondent in this study was mother who have easily insight into it.

The majority of this sample consist primarily of middle and lower socioeconomic status (SES) children. Many studies found that parent's education level and socio-economic status are important risk factors for the development of ECC, but parent's educational level and household income did not influence the oral health quality of life of the children in this study. Following the results of multivariate logistic regression analysis, the caries status, debris score, and starting age for tooth brushing were significant predictors of children's OHRQoL in both reports. Additionally, brushing days per week was significant in parent's report in the model after adjustment. This finding indicated that caries experience, oral hygiene status, tooth brushing habits are the most important modifiable factors that need to be addressed to reduce the burden of ECC in this study.

Effective prevention program including behavior changes and fluoride usage should be implemented to improve the oral health condition of Myanmar preschool children. ECC is still a public health issue in Myanmar and school-based silver diamine fluoride application should be implemented for arresting cavitated caries due to its easy to use, safety and effectiveness. Moreover, government and non-governmental organization should be cooperated on oral health promotion of children to improve their OHRQoL especially young children.

The limitation of the study should be also addressed. The present study used the convenience sampling method due to current situation. As a result of the sampling bias, we cautiously make generalization from the study sample to other population. Therefore, the results could not be generalized to all Myanmar children. Moreover, the exposure, outcomes and the confounding factors were simultaneously assessed in this cross-sectional study. Thus, there was no evidence for causality between dental caries and OHRQoL of children. However, the acceptable participation rate, use of a validated instrument, good inter and intra- examiner reliability assure the findings of this study. Nevertheless, the present findings could provide the information on dental caries status, potential risk factors and OHRQoL of Myanmar 5 years old children and it can assist the policy maker for development of oral health promotion program for preschool children. Future longitudinal studies are recommended to investigate the causal effect of dental caries on OHRQoL of the children and their parents using the wide-range representative sample.

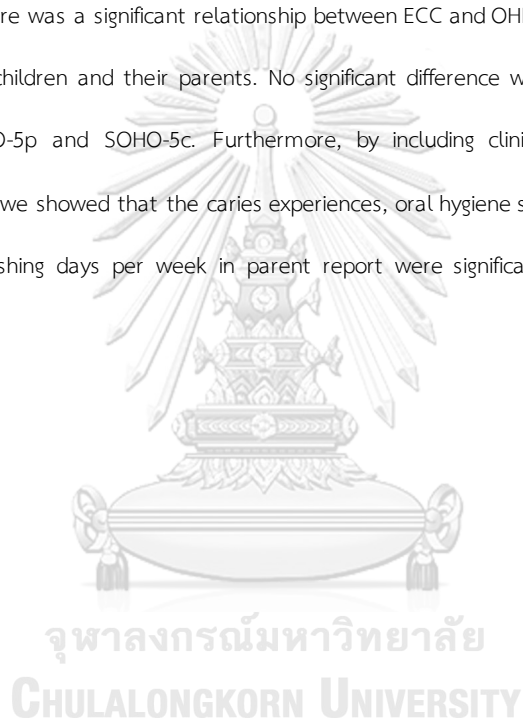


CHAPTER VI

CONCLUSION

This phase I study demonstrates that both Myanmar SOHO-5 versions have good reliability (internal consistency, test-retest reliability) and validity (construct, discriminant validity). Therefore, this instrument was successfully developed and is appropriate to use in the assessment of OHRQoL of 5-year-old children in Myanmar.

In phase II, there was a significant relationship between ECC and OHRQoL of 5-year-old children in terms of perceptions of both children and their parents. No significant difference was found between the perceptions indicated by the SOHO-5p and SOHO-5c. Furthermore, by including clinical and sociodemographic factors together in our models, we showed that the caries experiences, oral hygiene status, starting age of tooth brushing in both report and brushing days per week in parent report were significantly associated with the children's OHRQoL.



REFERENCES



จุฬาลงกรณ์มหาวิทยาลัย
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- Abanto, J., Tsakos, G., Paiva, S. M., Carvalho, T. S., Raggio, D. P., & Bönecker, M. (2014). Impact of dental caries and trauma on quality of life among 5- to 6-year-old children: Perceptions of parents and children. *Community Dentistry and Oral Epidemiology*, *42*(5), 385-394. doi:10.1111/cdoe.12099
- Abanto, J., Tsakos, G., Paiva, S. M., Raggio, D. P., Celiberti, P., & Bönecker, M. (2014). Agreement between children aged 5-6 years and their mothers in rating child oral health-related quality of life. *Int J Paediatr Dent*, *24*(5), 373-379. doi:10.1111/ipd.12081
- Alsumait, A., ElSalhy, M., Raine, K., Cor, K., Gokiart, R., Al-Mutawa, S., & Amin, M. (2015). Impact of dental health on children's oral health-related quality of life: a cross-sectional study. *Health and quality of life outcomes*, *13*(1), 1-10.
- Alsuraim, B. S., & Han, D.-H. (2020). Effect of globalization on global dental caries trend. *Medicine*, *99*(35).
- Asunta, P., Viholainen, H., Ahonen, T., & Rintala, P. (2019). Psychometric properties of observational tools for identifying motor difficulties—a systematic review. *BMC pediatrics*, *19*(1), 1-13.
- Aung, E. E., Maung, K., Zaitso, T., & Kawaguchi, Y. (2019). An overview of oral health situation and challenges in Myanmar. *Asian Journal of Research in Medicine and Medical Science*, 1-10.
- Bernabe, E., Marcenes, W., Hernandez, C., Bailey, J., Abreu, L., Alipour, V., . . . Arefi, Z. (2020). Global, regional, and national levels and trends in burden of oral conditions from 1990 to 2017: a systematic analysis for the global burden of disease 2017 study. *Journal of dental research*, *99*(4), 362-373.
- Bernabé, E., Masood, M., & Vujicic, M. (2017). The impact of out-of-pocket payments for dental care on household finances in low and middle income countries. *BMC Public Health*, *17*(1), 109.
- Bönecker, M., Abanto, J., Tello, G., & Oliveira, L. B. (2012a). Impact of dental caries on preschool children's quality of life: an update. *Brazilian oral research*, *26*, 103-107.
- Bönecker, M., Abanto, J., Tello, G., & Oliveira, L. B. (2012b). Impact of dental caries on preschool children's quality of life: an update. *Brazilian oral research*, *26*(SPE1), 103-107.
- Bonett, D. G. (2002). Sample size requirements for testing and estimating coefficient alpha. *Journal of educational and behavioral statistics*, *27*(4), 335-340.
- Bourgeois, D. M., & Llodra, J. C. (2014). Global burden of dental condition among children in nine countries participating in an international oral health promotion programme, 2012-2013. *Int Dent J*, *64* Suppl 2, 27-34. doi:10.1111/idj.12129

- Broder, H. L., & Wilson-Genderson, M. (2007). Reliability and convergent and discriminant validity of the Child Oral Health Impact Profile (COHIP Child's version). *Community dentistry and oral epidemiology*, 35, 20-31.
- Castro, A. L. S., Vianna, M. I. P., & Mendes, C. M. C. (2018). The knowledge and use of population-based methods for caries detection. *BMC Oral Health*, 18(1), 153. doi:10.1186/s12903-018-0612-5
- Chen, K. J., Duangthip, D., Gao, S. S., Huang, F., Anthonappa, R. P., Oliveira, B. H., . . . Attia, D. (2021). Oral health policies to tackle the burden of early childhood caries: a review of 14 countries/regions. *Frontiers in Oral Health*, 2, 30.
- Clementino, M. A., Gomes, M. C., Pinto-Sarmiento, T. C., Martins, C. C., Granville-Garcia, A. F., & Paiva, S. M. (2015). Perceived Impact of Dental Pain on the Quality of Life of Preschool Children and Their Families. *PLoS One*, 10(6), e0130602. doi:10.1371/journal.pone.0130602
- Çolak, H., Dülgergil, Ç. T., Dalli, M., & Hamidi, M. M. (2013). Early childhood caries update: A review of causes, diagnoses, and treatments. *Journal of natural science, biology, and medicine*, 4(1), 29.
- Contreras, V., Toro, M. J., Elías-Boneta, A. R., & Encarnación-Burgos, M. A. (2017). Effectiveness of silver diamine fluoride in caries prevention and arrest: a systematic literature review. *General dentistry*, 65(3), 22.
- Costa, S. M., Martins, C. C., Pinto, M. Q., Vasconcelos, M., & Abreu, M. H. (2018). Socioeconomic factors and caries in people between 19 and 60 years of age: an update of a systematic review and meta-analysis of observational studies. *International journal of environmental research and public health*, 15(8), 1775.
- Dantas, L. R., Gomes, M. C., Dantas, L. R., Cruz-da-Silva, B. R., de F. Perazzo, M., Siqueira, M. B. L. D., . . . Granville-Garcia, A. F. (2015). The impact of dental treatment on oral health-related quality of life among preschool children. *Journal of Public Health (Germany)*, 23(6), 327-331. doi:10.1007/s10389-015-0687-2
- Detsomboonrat, P., & Pisarnurakit, P. P. (2015). Dental caries and related oral health factors among 9 to 18 month old Thai children. *The Southeast Asian Journal of Tropical Medicine and Public Health*, 46(4), 786-797.
- Duangthip, D., Gao, S. S., Chen, K. J., Lo, E. C. M., & Chu, C. H. (2020). Oral health-related quality of life and caries experience of Hong Kong preschool children. *International dental journal*, 70(2), 100-107.
- Frencken, J. E., de Souza, A. L., van der Sanden, W. J., Bronkhorst, E. M., & Leal, S. C. (2013). The caries assessment and treatment (CAST) instrument. *Community dentistry and oral epidemiology*, 41(1), e71-e77.

- Frencken, J. E., Sharma, P., Stenhouse, L., Green, D., Lavery, D., & Dietrich, T. (2017). Global epidemiology of dental caries and severe periodontitis - a comprehensive review. *J Clin Periodontol*, *44 Suppl 18*, S94-S105. doi:10.1111/jcpe.12677
- Gherunpong, S., Tsakos, G., & Sheiham, A. (2004). Developing and evaluating an oral health-related quality of life index for children; the CHILD-OIDP. *Community dental health*, *21(2)*, 161-169.
- Gomes, M. C., de Almeida Pinto-Sarmiento, T. C., de Brito Costa, E. M. M., Martins, C. C., Granville-Garcia, A. F., & Paiva, S. M. (2014). Impact of oral health conditions on the quality of life of preschool children and their families: a cross-sectional study. *Health and quality of life outcomes*, *12(1)*, 1-12.
- Granville-Garcia, A. F., Gomes, M. C., Perazzo, M. F., Martins, C. C., Abreu, M., & Paiva, S. M. (2018). Impact of Caries Severity/Activity and Psychological Aspects of Caregivers on Oral Health-Related Quality of Life among 5-Year-Old Children. *Caries Res*, *52(6)*, 570-579. doi:10.1159/000488210
- Greene, J. G., & Vermillion, J. R. (1964). The Simplified Oral Hygiene Index. *The Journal of the American Dental Association*, *68(1)*, 7-13. doi:<https://doi.org/10.14219/jada.archive.1964.0034>
- Guillemin, F. (1995). Cross-cultural adaptation and validation of health status measures. *Scandinavian journal of rheumatology*, *24(2)*, 61-63.
- Hernández, J. d. I. F., Díaz, F. d. C. A., & Vilchis, M. d. C. V. (2015). Oral Health Related Quality of Life. In *Emerging Trends in Oral Health Sciences and Dentistry*.
- Hicks, J., Garcia-Godoy, F., & Flaitz, C. (2003). Biological factors in dental caries: role of saliva and dental plaque in the dynamic process of demineralization and remineralization (part 1). *J Clin Pediatr Dent*, *28(1)*, 47-52. doi:10.17796/jcpd.28.1.yg6m443046k50u20
- Hicks, J., Garcia-Godoy, F., & Flaitz, C. (2004). Biological factors in dental caries: role of remineralization and fluoride in the dynamic process of demineralization and remineralization (part 3). *J Clin Pediatr Dent*, *28(3)*, 203-214. doi:10.17796/jcpd.28.3.w0610427l746j34n
- Hosseinpoor, A. R., Itani, L., & Petersen, P. E. (2012). Socio-economic inequality in oral healthcare coverage: results from the World Health Survey. *J Dent Res*, *91(3)*, 275-281. doi:10.1177/0022034511432341
- Htun, K. C. S. S., & Peltzer, K. (2019). Oral health-related quality of life among community dwelling middle-aged and older adults in an urban area in Magway region, Myanmar. *Nagoya journal of medical science*, *81(1)*, 103.

- Hui Bin, S., Zhang, W., & Zhou, X. B. (2017). Risk factors associated with early childhood caries. *Chin J Dent Res*, 20(2), 97-104.
- Huntington, N. L., Spetter, D., Jones, J. A., Rich, S. E., Garcia, R. I., & Spiro III, A. (2011). Development and validation of a measure of pediatric oral health-related quality of life: the POQL. *Journal of public health dentistry*, 71(3), 185-193.
- Ismail, A. I., Sohn, W., Tellez, M., Amaya, A., Sen, A., Hasson, H., & Pitts, N. B. (2007). The International Caries Detection and Assessment System (ICDAS): an integrated system for measuring dental caries. *Community dentistry and oral epidemiology*, 35(3), 170-178.
- Jiang, M., Wong, M. C. M., Chu, C. H., Dai, L., & Lo, E. C. M. (2019). Effects of restoring SDF-treated and untreated dentine caries lesions on parental satisfaction and oral health related quality of life of preschool children. *J Dent*, 88, 103171. doi:10.1016/j.jdent.2019.07.009
- Jin, L., Lamster, I., Greenspan, J., Pitts, N., Scully, C., & Warnakulasuriya, S. (2016). Global burden of oral diseases: emerging concepts, management and interplay with systemic health. *Oral diseases*, 22(7), 609-619.
- Jokovic, A., Locker, D., & Guyatt, G. (2006). Short forms of the Child Perceptions Questionnaire for 11-14-year-old children (CPQ11-14): development and initial evaluation. *Health Qual Life Outcomes*, 4, 4. doi:10.1186/1477-7525-4-4
- Kassebaum, N., Bernabé, E., Dahiya, M., Bhandari, B., Murray, C., & Marcenes, W. (2015). Global burden of untreated caries: a systematic review and metaregression. *Journal of dental research*, 94(5), 650-658.
- Kassebaum, N., Smith, A., Bernabé, E., Fleming, T., Reynolds, A., Vos, T., . . . Collaborators, G. O. H. (2017). Global, regional, and national prevalence, incidence, and disability-adjusted life years for oral conditions for 195 countries, 1990–2015: a systematic analysis for the global burden of diseases, injuries, and risk factors. *Journal of dental research*, 96(4), 380-387.
- Kathmandu, R. Y. (2002). The burden of restorative dental treatment for children in Third World countries. *International dental journal*, 52(1), 1-9.
- Kramer, P. F., Feldens, C. A., Helena Ferreira, S., Bervian, J., Rodrigues, P. H., & Peres, M. A. (2013). Exploring the impact of oral diseases and disorders on quality of life of preschool children. *Community dentistry and oral epidemiology*, 41(4), 327-335.

- Krisdapong, S., Prasertsom, P., Rattananangsim, K., & Sheiham, A. (2013). Impacts on quality of life related to dental caries in a national representative sample of Thai 12- and 15-year-olds. *Caries Res*, 47(1), 9-17. doi:10.1159/000342893
- Lagerweij, M., & Van Loveren, C. (2015). Declining caries trends: are we satisfied? *Current oral health reports*, 2(4), 212-217.
- Li, M., Zhi, Q., Zhou, Y., Qiu, R., & Lin, H. (2015). Impact of early childhood caries on oral health-related quality of life of preschool children. *Eur J Paediatr Dent*, 16(1), 65-72.
- Listl, S., Galloway, J., Mossey, P., & Marcenes, W. (2015). Global economic impact of dental diseases. *Journal of dental research*, 94(10), 1355-1361.
- Mabangkhu, S., Duangthip, D., Chu, C. H., Phonghanyudh, A., & Jirarattanasopha, V. (2020). A randomized clinical trial to arrest dentin caries in young children using silver diamine fluoride. *J Dent*, 99, 103375. doi:10.1016/j.jdent.2020.103375
- Mabangkhu, S., Duangthip, D., Hung, C. C., Phonghanyudh, A., & Jirarattanasopha, V. (2020). A randomized clinical trial to arrest dentin caries in young children using silver diamine fluoride. *Journal of dentistry*, 103375.
- Manton, D. J. (2018). Child dental caries—a global problem of inequality. *EClinicalMedicine*, 1, 3-4.
- Marcenes, W., Kassebaum, N. J., Bernabé, E., Flaxman, A., Naghavi, M., Lopez, A., & Murray, C. J. (2013). Global burden of oral conditions in 1990-2010: a systematic analysis. *Journal of dental research*, 92(7), 592-597.
- Martins-Júnior, P., Vieira-Andrade, R., Corrêa-Faria, P., Oliveira-Ferreira, F., Marques, L., & Ramos-Jorge, M. (2013). Impact of early childhood caries on the oral health-related quality of life of preschool children and their parents. *Caries research*, 47(3), 211-218.
- Mascarenhas, A. K., Okunseri, C., & Dye, B. (2020). *Burt and Eklund's Dentistry, Dental Practice, and the Community-E-Book*: Elsevier Health Sciences.
- McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia medica*, 22(3), 276-282.
- Mokkink, L. B., Prinsen, C., Patrick, D. L., Alonso, J., Bouter, L., de Vet, H. C., . . . Mokkink, L. (2018). COSMIN methodology for systematic reviews of patient-reported outcome measures (PROMs). *User manual*, 78(1).

- Naidu, R., Nunn, J., & Donnelly-Swift, E. (2016). Oral health-related quality of life and early childhood caries among preschool children in Trinidad. *BMC Oral Health, 16*(1), 1-9.
- Nomura, Y., Maung, K., Kay Khine, E. M., Sint, K. M., Lin, M. P., Win Myint, M. K., . . . Okada, A. (2019). Prevalence of dental caries in 5-and 6-year-old Myanmar children. *International journal of dentistry, 2019*.
- Nouraei Motlagh, S., Ghasempour, S., Bajoulvand, R., Hasanvand, S., Abbasi-Shakaram, S., & Imani-Nasab, M. H. (2019). Factors Affecting Demand and Utilization of Dental Services: Evidence from a Developing Country. *Shiraz E-Medical Journal, 20*(12). doi:10.5812/semj.89076
- Nyvad, B., & Baelum, V. (2018). Nyvad criteria for caries lesion activity and severity assessment: a validated approach for clinical management and research. *Caries research, 52*(5), 397-405.
- Pahel, B. T., Rozier, R. G., & Slade, G. D. (2007). Parental perceptions of children's oral health: the Early Childhood Oral Health Impact Scale (ECOHS). *Health Qual Life Outcomes, 5*, 6. doi:10.1186/1477-7525-5-6
- Paiva, C. R., Filho, A. O. A., Medina, P. O., & Hanan, S. A. (2019). Agreement between reports of parents and children about children's oral health-related quality of life. *Pesquisa Brasileira em Odontopediatria e Clinica Integrada, 19*(1). doi:10.4034/PBOCI.2019.191.124
- Perazzo, M. F., Gomes, M. C., Neves, É. T., Martins, C. C., Paiva, S. M., Costa, E. M. d. B., & Granville-Garcia, A. F. (2017). Oral problems and quality of life of preschool children: self-reports of children and perception of parents/caregivers. *European journal of oral sciences, 125*(4), 272-279.
- Perazzo, M. F., Martins-Júnior, P. A., Abreu, L. G., Mattos, F. F., Pordeus, I. A., & Paiva, S. M. (2020). Oral Health-Related Quality Of Life of Pre-School Children: Review and Perspectives for New Instruments. *Brazilian Dental Journal, 31*(6), 568-581.
- Peres, M. A., Macpherson, L. M., Weyant, R. J., Daly, B., Venturelli, R., Mathur, M. R., . . . Kearns, C. (2019). Oral diseases: a global public health challenge. *The Lancet, 394*(10194), 249-260.
- Pesaressi, E., Villena, R. S., & Frencken, J. E. (2020). Dental caries and oral health-related quality of life of 3-year-olds living in Lima, Peru. *International journal of paediatric dentistry, 30*(1), 57-65.
- Petersen, P. E., Bourgeois, D., Ogawa, H., Estupinan-Day, S., & Ndiaye, C. (2005). The global burden of oral diseases and risks to oral health. *Bulletin of the World Health Organization, 83*, 661-669.

- Phantumvanit, P., Makino, Y., Ogawa, H., Rugg-Gunn, A., Moynihan, P., Petersen, P. E., . . . Khoshnevisan, M. H. (2018). WHO global consultation on public health intervention against early childhood caries. *Community dentistry and oral epidemiology*, 46(3), 280-287.
- Pitts, N. B., Zero, D. T., Marsh, P. D., Ekstrand, K., Weintraub, J. A., Ramos-Gomez, F., . . . Ismail, A. (2017). Dental caries. *Nature reviews Disease primers*, 3(1), 1-16.
- Prakash, P., Subramaniam, P., Durgesh, B., & Konde, S. (2012). Prevalence of early childhood caries and associated risk factors in preschool children of urban Bangalore, India: A cross-sectional study. *European journal of dentistry*, 6(2), 141.
- Rachmawati, Y. L., Pratiwi, A. N., & Maharani, D. A. (2017). Cross-cultural Adaptation and Psychometric Properties of the Indonesia Version of the Scale of Oral Health Outcomes for 5-Year-Old Children. *J Int Soc Prev Community Dent*, 7(Suppl 2), S75-s81. doi:10.4103/jispcd.JISPCD_272_17
- Ramos-Jorge, J., Ramos-Jorge, M. L., de Paiva, S. M., Marques, L. S., & Pordeus, I. A. (2015). Dental Caries and Quality of Life Among Preschool Children. In *Emerging Trends in Oral Health Sciences and Dentistry*.
- Righolt, A., Jevdjevic, M., Marcenes, W., & Listl, S. (2018). Global-, regional-, and country-level economic impacts of dental diseases in 2015. *Journal of dental research*, 97(5), 501-507.
- Saw, Y. M., Than, T. M., Thuang, Y., Aung, S., Wen-Shuan Shiao, L., Win, E. M., . . . Saw, T. N. (2019). Myanmar's human resources for health: current situation and its challenges. *Heliyon*, 5(3), e01390. doi:10.1016/j.heliyon.2019.e01390
- Scarpelli, A. C., Paiva, S. M., Viegas, C. M., Carvalho, A. C., Ferreira, F. M., & Pordeus, I. A. (2013). Oral health-related quality of life among Brazilian preschool children. *Community Dent Oral Epidemiol*, 41(4), 336-344. doi:10.1111/cdoe.12022
- Selwitz, R. H., Ismail, A. I., & Pitts, N. B. (2007). Dental caries. *The Lancet*, 369(9555), 51-59.
- Shahzad, H. B., Awais, F., Shirazi, U.-e.-R., Majeed, H. A., Rafique, A., & Shahbaz, M. (2020). The impact of dental caries on oral health related quality of life amongst adult population in Lahore, Pakistan. *Makara Journal of Health Research*, 24(1), 1.
- Sharma, G., Puranik, M. P., & K, R. S. (2015). Approaches to Arresting Dental Caries: An Update. *J Clin Diagn Res*, 9(5), ZE08-11. doi:10.7860/JCDR/2015/12774.5943

- Sheiham, A., Alexander, D., Cohen, L., Marinho, V., Moysés, S., Petersen, P., . . . Weyant, R. (2011). Global oral health inequalities: task group—implementation and delivery of oral health strategies. *Advances in Dental Research, 23*(2), 259-267.
- Steele, J., Shen, J., Tsakos, G., Fuller, E., Morris, S., Watt, R., . . . Wildman, J. (2015). The interplay between socioeconomic inequalities and clinical oral health. *Journal of dental research, 94*(1), 19-26.
- Terwee, C. B., Bot, S. D., de Boer, M. R., van der Windt, D. A., Knol, D. L., Dekker, J., . . . de Vet, H. C. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of clinical epidemiology, 60*(1), 34-42.
- Thwin, K. M. (2019). Workshop for development of oral health policy and strategies in Myanmar. doi:10.13140/RG.2.2.12887.83360
- Thwin, K. M., Zaitso, T., Ueno, M., & Kawaguchi, Y. (2016a). Early Childhood Caries and Related Risk Factors among Myanmar Preschool Children. *International Journal of Clinical Preventive Dentistry, 12*(4), 229-236. doi:10.15236/ijcpd.2016.12.4.229
- Thwin, K. M., Zaitso, T., Ueno, M., & Kawaguchi, Y. (2016b). Early childhood caries and related risk factors among Myanmar preschool children. *Int J Clin Prev Dent, 12*(4), 229-236.
- Tomar, S. L., & Cohen, L. K. (2010). Attributes of an ideal oral health care system. *Journal of public health dentistry, 70*, S6-S14.
- Tsakos, G., Blair, Y. I., Yusuf, H., Wright, W., Watt, R. G., & Macpherson, L. M. (2012). Developing a new self-reported scale of oral health outcomes for 5-year-old children (SOHO-5). *Health Qual Life Outcomes, 10*, 62. doi:10.1186/1477-7525-10-62
- UNFPA, G., Myanmar. (2015). 2014 Myanmar Population and Housing Census - A Changing Population: Union Figures at a Glance, May 2015
- .
- UNICEF. (2018). Myanmar report on out of school children initiative.
- WHO. (2013). *Oral health surveys: basic methods*: World Health Organization.
- WHO. (2019). *Ending childhood dental caries: WHO implementation manual*.
- Wong, H., McGrath, C., King, N., & Lo, E. (2011). Oral health-related quality of life in Hong Kong preschool children. *Caries research, 45*(4), 370-376.

Wong, H. M., McGrath, C. P., King, N. M., & Lo, E. C. (2011). Oral health-related quality of life in Hong Kong preschool children. *Caries Res*, 45(4), 370-376. doi:10.1159/000330231

Zafar, S., Harnekar, S. Y., & Siddiqi, A. (2009). Early childhood caries: etiology, clinical considerations, consequences and management. *Int Dent SA*, 11(4), 24-36.



APPENDIX

Scale of Oral Health Outcomes for 5-years old children (Child version)

| Response | No (0) | A little (1) | A lot (2) |
|--------------------------------------|----------------------------|--------------------------|--------------------------|
| 1. Difficulty in eating | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Difficulty in drinking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Difficulty in speaking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Difficulty in playing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Avoid smiling due to pain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Avoid smiling due to appearance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Difficulty in sleeping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| How happy are you with your teeth? | | | |
| Very happy (0) | = <input type="checkbox"/> | | |
| A little happy (1) | = <input type="checkbox"/> | | |
| Not happy (2) | = <input type="checkbox"/> | | |
| Do you have any holes in your teeth? | | | |
| No (0) | = <input type="checkbox"/> | | |
| Yes (1) | = <input type="checkbox"/> | | |

Scale of Oral Health Outcomes for 5-years old children (SOHO-5) (Myanmar version)

| အဖြေ။ | မရှိပါ | အနည်းငယ် | များစွာ |
|---|--------------------------|--------------------------|--------------------------|
| ၁။ အစားစားရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၂။ ရေသောက်ရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၃။ စကားပြောရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၄။ ကစားရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၅။ နာကျင်သောကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၆။ ပုံသဏ္ဍန်အသွင်အပြင်ကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၇။ အိပ်စက်ရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| သင့်၏သွားနှင့်ပတ်သက်၍ မည်မျှပျော်ရွှင်နှစ်သက်မှု ရှိပါသနည်း။ | | | |
| အလွန်ပျော်ရွှင်နှစ်သက်ပါသည်။ | <input type="checkbox"/> | | |
| အနည်းငယ်ပျော်ရွှင်နှစ်သက်ပါသည်။ | <input type="checkbox"/> | | |
| ပျော်ရွှင်နှစ်သက်မှုမရှိပါ။ | <input type="checkbox"/> | | |
| သင့်၏သွားများတွင် အပေါက်များရှိပါသလား။ | | | |
| မရှိပါ။ | <input type="checkbox"/> | | |
| ရှိပါသည်။ | <input type="checkbox"/> | | |

Scale of Oral Health Outcomes for 5-years old children (Parental version)

| Response | Not at all (0) | A little (1) | Moderate (2) | A lot (3) | A great deal (4) |
|------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Difficulty in eating | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Difficulty in speaking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Difficulty in playing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Avoid smiling due to pain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Avoid smiling due to appearance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Difficulty in sleeping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Influence self-confidence | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

How would you rate your child's dental health?

Excellent (0) = , Very good (1) = , Good (2) = , Fair (3) = , Poor (4) =

How happy are you with your child's dental health?

Very happy (0) = , Happy (1) = , Neutral (2) = , Unhappy (3) = , Very unhappy (4) =

Do you think the overall well-being of your child is affected by the conditions of their teeth?

Not at all (0) = , A little (1) = , Moderate (2) = , A lot (3) = , A great deal (4) =

Do you think your child needs any dental treatment because of the state (holes in teeth or pain)

of his/her teeth?

No (0) = , Yes (1) =

Scale of Oral Health Outcomes for 5-years old children (SOHO-5) (Myanmar version)

အဖြေ။

လုံးဝ အနည်းငယ် အသင့်အတင့် အတော်များများ များစွာ

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| ၁။ အစားစားရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၂။ စကားပြောရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၃။ ကစားရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၄။ နာကျင်သောကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၅။ ပုံသဏ္ဍန်အသွင်အပြင်ကြောင့် ပြုံး/ရယ်ခြင်းကို ရှောင်သည် | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၆။ အိပ်စက်ရာတွင် ခက်ခဲခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ၇။ မိမိကိုယ်ကို ယုံကြည်မှုအပေါ် သက်ရောက်မှုရှိခြင်း | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

သင့်ကလေး၏သွားကျန်းမာရေးအပေါ် သင်မည်ကဲ့သို့သတ်မှတ်ပေးချင်ပါသနည်း။

အကောင်းဆုံး အလွန်ကောင်း ကောင်း အသင့်အတင့် ညံ့

သင့်ကလေး၏သွားကျန်းမာရေးအပေါ် သင်မည်မျှပျော်ရွှင်ကျေနပ်မိပါသနည်း။

အလွန်ပျော်ရွှင်ကျေနပ် ပျော်ရွှင်ကျေနပ် ပျော်ရွှင်ကျေနပ်ခြင်း၊မကျေနပ်ခြင်းမရှိပါ
ပျော်ရွှင်ကျေနပ်မှုမရှိပါ အလွန်ပျော်ရွှင်ကျေနပ်မှုမရှိပါ

သင့်ကလေးငယ်၏ကိုယ်ရော စိတ်ပါကျန်းမာပျော်ရွှင်မှုအပေါ် သူတို့၏သွားနှင့်ပတ်သက်သော အခြေအနေများက သက်ရောက်မှုရှိသည်ဟုထင်ပါသလား။

လုံးဝ အနည်းငယ် အသင့်အတင့် များစွာ အလွန်များစွာ

သင့်ကလေး၏သွားနှင့်ပတ်သက်သော အခြေအနေကြောင့် (သွားပိုးပေါက် သို့မဟုတ် နာကျင်ကိုက်ခဲခြင်း) သူ / သူမ သည် သွားနှင့်ပတ်သက်သော ကုသမှုခံယူရန် လိုအပ်သည်ဟုထင်ပါသလား။

မထင်ပါ ထင်ပါသည်

Modified Oral health assessment form

Dentition Status

| | | | | | | | | | | |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 55 | 54 | 53 | 52 | 51 | 61 | 62 | 63 | 64 | 65 | 65 |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| 85 | 84 | 83 | 82 | 81 | 71 | 72 | 73 | 74 | 75 | 65 |

Status

- A = Sound
- B = Caries
- C = Filled w/ caries
- D = Filled, no caries
- E = Missing due to caries
- F = Fissure sealant
- G = Fixed dental prosthesis/crown, abutment, veneer

dmft =

Child's Demographic Questionnaire

Respondent/ Caregiver section

1. Respondent or caregiver's ID
2. Relationship to child
 Father Mother Relatives or other (please specify)
3. Age of respondent or caregiver years
4. Mother's education
 Middle school or lower High school Tertiary education
5. Father's education
 Middle school or lower High school Tertiary education
6. Household income
 < 150,000 MMK/ months 150,000 – 300,000 > 300,000
7. Address..... Township.....
 Province.....Mandalay ... Tel. No.

Child section

8. Child's name
9. Child's gender Male Female
10. Birthdate..... MonthYear.....
11. Chronic/llness history It mean medical his
 No Yes, (please specify)
 Don't know/ Don't remember
12. Medication
 No Yes, (please specify)
 Don't know/ Don't remember

Children's Behavior

1. How often your children have sugary snack between meal?

- No (snacking in meal) 1-2 times per day ≥ 3 times per day

2. When did you begin brushing your child's teeth?

- when first teeth erupted 13-24 months 25-36 months ≥ 37 months
- Do not start to brush

3. How many times a day does your child brush his or her teeth?

- less than once 1 time /day 2 times or more /day

4. How many days per week does your child brush his or her teeth?

- 1-2 days/ week 3-5 days / week 5-6 days /week everyday

5. Do you use toothpaste?

- No Yes (please specify.....)

6. How often do you see the dentist?

- Never when child has pain every 12 months every 6 months

Modified Oral health assessment form

Dentition Status

| | | | | | | | | | | |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 55 | 54 | 53 | 52 | 51 | 61 | 62 | 63 | 64 | 65 | 65 |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| 85 | 84 | 83 | 82 | 81 | 71 | 72 | 73 | 74 | 75 | 65 |

Status

- A = Sound
- B = Caries
- C = Filled w/ caries
- D = Filled, no caries
- E = Missing due to caries
- F = Fissure sealant
- G = Fixed dental prosthesis/crown, abutment, veneer



dmft =

Oral hygiene Status

51/61 55/65

- 0 = No debris
- 1 = Less than 1/3 of tooth surface covered by soft debris
- 2 = 1/3-2/3 of tooth surface covered by soft debris
- 3 = More than 2/3 of tooth surface covered by soft debris

Scale of Oral Health Outcomes for 5-years old children (Child version)

| Response | No (0) | A little (1) | A lot (2) |
|---------------------------------|--------------------------|--------------------------|--------------------------|
| Difficulty in eating | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty in drinking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty in speaking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty in playing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Avoid smiling due to pain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Avoid smiling due to appearance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty in sleeping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Total scores - | | | |

Scale of Oral Health Outcomes for 5-years old children (SOHO-5) (Parent version)

| Response | Not at all (0) | A little (1) | Moderate (2) | A lot (3) | A great deal (4) |
|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Difficulty in eating | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty in speaking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty in playing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Avoid smiling due to pain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Avoid smiling due to appearance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty in sleeping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Influence self-confidence | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Total scores - | | | | | |

Data collection (Photo)



VITA

| | |
|-----------------------|--|
| NAME | Saw Nay Min |
| DATE OF BIRTH | 1 April 1986 |
| PLACE OF BIRTH | Mandalay, Myanmar |
| INSTITUTIONS ATTENDED | B.D.S. (University of Dental Medicine, Mandalay) M.D.Sc (Preventive and Community Dentistry) (University of Dental Medicine, Mandalay) |
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