ORAL HEALTH CARE FOR THE ELDERLY POPULATION IN MALAYSIA: A REVIEW OF CURRENT STATUS AND FUTURE DIRECTION

Mas Suryalis Ahmad[1], Ishak Abdul Razak[2,3] and Gelsomina Lucia Borromeo[4]

[1]Universiti Teknologi MARA, Selangor; [2]University of Malaya, Kuala Lumpur, [3]MAHSA University, Slangor, Malaysia, [4]Monash Universiy, Victoria, Australia

Abstract. Poor oral health status among the elderly population in Malaysia could be associated with various limitations in accessing oral health care services experienced by these individuals. This review discusses government policies and services available to support oral health needs of the elderly population in Malaysia. It also discusses the current status of oral health and dental treatment needs of this patient cohort, as well as the level of utilization of oral health care services. Recommendations to address the various issues are provided to serve as guidance to policy makers in formulating an effective plan aimed at improving the status of oral health and the services available for elderly individuals in the country.

Keywords: elderly population, geriatric dentistry, Malaysia, oral health

INTRODUCTION

The Malaysian National Welfare Policy of 1990 defines 'elderly people' in the country as those aged 60 years and above, in line with the definition developed during the 1982 World Assembly on Ageing (Abdul-Rani, 2007). Similar to developed countries and some developing countries in Asia, Malaysia has an increasing aging population, where elderly people represent a sizeable fraction of the country's overall age structure (Shrestha, 2000; Salomon *et al*, 2012). The latest report by the Malaysian Department of Survey and Mapping cites a growth in the number of Malaysians over 65 years of age, from 1.425 million (5.0% of the total population) in 2010 to 1.621 million (5.5% of the total population) in 2013 (Ministry of Health Malaysia, 2013; *ibid*, 2014). By 2030, it is projected 9.3% of the Malaysian population will represent those over 65 years of age (Malaysian Department of Statistics, 2012). The life expectancy of Malaysians has increased, from 74.1 years of age (71.7 for males, 76.8 for females) in 2010 to 74.7 (72.5 for males, 77.4 for females) in 2015 (Ministry of Health Malaysia, 2013; *ibid*, 2014). An increase in life expectancy is accompanied also by a rise in the number of people living with disabilities and chronic medical conditions (Global Burden of Disease Study 2013 Collaborators, 2015; Murray *et al*, 2015) indicating an increasing need and demand for healthcare intervention among the elderly population. Deterioration in health and limitations in physical function would also subject these

Correspondence: Dr Mas Suryalis Ahmad, Faculty of Dentistry, Universiti Teknologi MARA, Sungai Buloh Campus, Jalan Hospital, Sungai Buloh, Selangor 47000, Malaysia.
Tel: +60 1 6370 8484; Fax: +60 3 6126 6103
E-mail: mas_suryalis@yahoo.com

individuals to risk of oral diseases, resulting in a rising demand for oral health maintenance.

HEALTH STATUS OF THE ELDERLY

Elderly people in Malaysia have been reported to have poor health outcomes and extensive health care requirements. The elderly aged ≥75 years have hypertension (73.4%), hypercholesterolemia (58.3%), diabetes (37%), and mental illness (25.8%) (Institute for Public Health, 2015b), and those aged ≥70 years have arthritis (19%), cardiovascular disease (13%) and cerebrovascular disorders (6%) (Institute for Public Health, 2011). The presence of physical and mental disabilities also are high among the elderly (Institute for Public Health, 2015b), with individuals aged ≥60 years having some level of difficulty in walking (41.6%), seeing (39.3%), remembering (27.9%), listening (23.3%), undertaking self-care activities (12.5%), and communicating (10.7%) (Institute for Public Health, 2015b).

The presence and severity of medical conditions are further complicated by poor literacy regarding health issues and insufficient access to healthcare services (Institute for Public Health, *ibid*, 2015a; *ibid*, 2015b). Among those aged ≥75 years who report illness within the previous two weeks, only 39% seek out-patient care (Institute for Public Health, 2015a; *ibid*, 2015b). The same patient cohort also demonstrates low (16.3%) utilization of in-patient care within the previous year (Institute for Public Health, 2015a).

ORAL HEALTH STATUS OF THE ELDERLY IN MALAYSIA

In addition to systemic health, oral health status among the elderly people in Malaysia was reported to be poor. The Adult National Oral Health Survey in 2000 and 2010 reported a deterioration in oral health status among elderly populations as regards prevalence of caries and rate of edentulousness (Oral Health Division, 2004; *ibid*, 2013). Among those aged 65-74 years, the prevalence of caries has increased from 95.2% in 2000 to 99.8% in 2010, and those aged >74 years, from 94.1% to 100% (Oral Health Division, 2004; *ibid*, 2013). Although the rate of edentulousness among those aged 65-74 years has reduced over this period (40.8% in 2000 and 32.2% in 2010), an increase was observed in the group aged >74 years (50.4% to 53.3%) (Oral Health Division, 2004; *ibid*, 2013). Periodontal disease is high, but with reduced prevalence in those aged 65-74 years (97.2% to 82.8%) and >74 years (98.3% to 74.5%) (Oral Health Division, 2004; *ibid*, 2013).

Poorer oral health outcome among the elderly in Malaysia (periodontal disease, 98.4%; edentulousness, 81%) is also linked to low educational level, low income, and those living in the rural areas where oral healthcare service is less available (Oral Health Division, 2004; Seman *et al*, 2007; Mohd-Salleh and Abdul-Kadir, 2010). These figures are also higher in comparison to oral health studies of the elderly population in other countries (Slade *et al*, 2007; Rihs *et al*, 2009; Health Canada, 2010; White *et al*, 2012; Eke *et al*, 2015).

Cultural and social norms are also important determinants impacting oral health and treatment needs of the Malaysian elderly. For example, betel nut chewing, a cultural practice found common among the Indian community, has been related to the high prevalence of oral cancer among the Indian elderly in Malaysia

(Lim *et al*, 2008; Ghani *et al*, 2011). Poor oral health was also demonstrated among the elderly population in other Asian countries where individuals are limited by socio-economic status, geographical barrier, lifestyle, and habit (Pearson *et al*, 2001; Shah and Sundaram, 2004; Du *et al*, 2009; Liao *et al*, 2014).

Environmental factors affect oral health outcome of elderly people in the country. It was reported that elderly people living in residential aged-care facilities have poor oral health outcome, with a high prevalence of edentulousness (60.7%), poor oral hygiene (69.6%), high decayed/missing filled teeth (DMFT) score (29.6%) and high corrective dental treatment needs (88.6%) due to low perceived needs (32%) (Loke *et al*, 2003; Sinor, 2013). While there were no control groups in these studies, the rate of edentulousness is poorer compared with data from a national survey of similar age groups (Oral Health Division, 2013). These findings are consistent with another study in Hong Kong reporting poorer oral health among the elderly living in residential care compared with those living independently (McGrath *et al*, 2011).

HEALTH AND ORAL HEALTH CARE POLICIES AND SERVICES FOR THE ELDERLY IN MALAYSIA

In 1995, the National Policy for Senior Citizens was formulated to support welfare in a variety of areas including health, social activity, recreation, and education (Abdul-Rani, 2007). In relation to health care, the Healthcare Program for the Elderly, introduced in 1995, aimed at promoting quality of life and productive aging (Ambigga *et al*, 2011). This has subsequently led to the establishment of the National Council on the Health of Elderly in 1997 to further support the implementation of health promotion activities targeting this patient cohort (Ambigga *et al*, 2011). In 2008, the National Health Policy for Older Persons was announced to formulate new strategies for improving the health status of the elderly population (Department of Social Welfare, 2008). The new policy was developed in line with the country's Vision 2020 plan to establish Malaysia as a developed country by that year, which includes advancing the quality of its health care delivery system (Department of Social Welfare, 2008).

Health care service for elderly Malaysians is provided by both public and private health care providers as well as non-governmental organizations (Poi *et al*, 2004; Ministry of Health Malaysia, 2010). The delivery of public health care, including fees, is based on a system devised by the Ministry of Health that aims to provide primary and specialized health care services to all citizens in public hospitals and community clinics at a highly subsidised rate (Poi *et al*, 2004; Ministry of Health Malaysia, 2010). Methods of payment for health care treatment received in both public and private facilities include personal private insurance, employer-supported insurance, employer-supported health care benefit or panel clinic, and out-of-pocket expenditure (Institute for Public Health, 2015a). Federal Public Service personnel and pensioners, as well as their eligible family members (as defined in General Orders 1 [iii, iv], Chapter F; Service Circular Letter No.1 of 1993), may also produce a Guarantee Letter that exempts them from paying fees for health care services provided in public health care facilities (Division of Pension, 2016). Personnel and pensioners of the Federal

Public Service and their eligible family members may also be reimbursed for fees for treatment at a private institution under specified conditions (as set out in the Service Circular Letter No.4 of 2001) (Division of Pension, 2016). For individuals with disabilities, those who are registered with the Department of Social Welfare and hold a Disability Identification Card (defined in Part III, Section 25, Persons with Disabilities Act 2008) are exempted from payment for treatment and services offered by public health care providers (Fees Act 1951) (Department of Social Welfare, 2013; Fees Act, 1951 [statute on the Internet], 2006).

With regards to oral health care, the Oral Health Division is responsible for planning and implementation of oral health services and promoting activities under the auspices of the Ministry of Health (Oral Health Division, 2012). Malaysia National Oral Health Plan 2011-2020 was developed with the aim to improve oral health conditions of the overall Malaysian population by reducing caries, oral malignancies, dental injuries, and periodontal conditions (Oral Health Division, 2011). For elderly Malaysians, the Oral Health Care Program for the Elderly was introduced by the Oral Health Division in 1983 as an initiative to promote oral health among this patient cohort (Oral Health Division, 2002). Its implementation following the following two decades, however, was confined within residential institutions, with no subsequent evaluation of its effectiveness (Oral Health Division, 2002). In 2002, a revision of the guidelines was undertaken to formulate new objectives and strategies based on findings of the national oral health survey towards achieving 'Successful Ageing' as the national health goal for the elderly population (Oral Health Division, 2002). Among the strategies outlined in the 2002 revised guidelines was the establishment of domiciliary or mobile dental services, improvement of facilities and oral health delivery systems, and the training of oral health professionals and caregivers in oral health care for elderly patients, as well as the enhancement of multi-sector collaborations with external agencies to promote oral health of the aged population (Oral Health Division, 2002). Recently, the same guidelines underwent further revision to provide specific details of how these strategies could be effectively implemented, including presentation of recommended training module in oral health care for the elderly designed for dental staff and carers (Oral Health Division, 2014). The most recent guidelines also introduced a Geriatric Oral Health Assessment Index (in both English and Malay versions) as a self-reporting assessment tool to measure oral health-related quality of life, and a flowchart illustrating the process in accessing professional oral health care via outreach and outpatient services (Oral Health Division, 2014).

UTILIZATION OF ORAL HEALTH CARE SERVICES

Despite various efforts in assisting elderly individuals with dental attendance through the development and implementation of a number of government and health initiatives as described above, a low utilization of oral health care service still exists, with 14.7% of Malaysians aged ≥60 years never having seen a dentist, and 86.1% not seen a dentist during the previous year (Oral Health Division, 2013). Individuals of this age group gave the main reason for their last dental visit as due to a problem (65.2%), completing a part of a treatment (18.6%) or being sent a reminder

(1.5%).(Oral Health Division, 2013). Fewer than 10% attended professional dental care service because they felt that it is time to do so (Oral Health Division, 2013). The percent of those who visited government (47.5) and private (49.8) facilities during the last previous dental visit is comparable (Oral Health Division, 2013). Barriers to utilization of oral health care services among the elderly aged ≥60 years are not specifically reported, although approximately a quarter (24.8%) express some level of fear of dental visit (Oral Health Division, 2013).

Poor dental attendance results in a high burden of oral diseases and unmet treatment needs. The latest Malaysian National Oral Health Survey in 2010 found 99.8% of those aged ≥60 years require some form of professional oral health intervention, such as prosthetic treatment (65.8%), periodontal therapy (55.0%), restorative care (30.5%), and preventative management (2.6%) (Oral Health Division, 2013). In comparison with other age groups, the elderly requires a greater need for dental extraction (60.1%), construction of upper and lower full dentures (14.0%), referral for oral lesions (3.8%), caries-arresting preventative care (1.5%), and complex restorative treatment including crown and veneer (0.9%) (Oral Health Division, 2013).

FUTURE DIRECTIONS

Improvement of oral health status of the elderly population in Malaysia requires a multi-sectoral collaboration to ensure a comprehensive approach in addressing issues that may limit the attainment of a satisfactory personal and professional oral health care. As part of a holistic approach to enhance the status of oral health, it is pertinent that effective planning of oral health care services takes into account the local health care requirements and available resources. The key spheres of action highlighted under the principles of the Ottawa Charter for Health Promotion (WHO, 1986) can be adopted as a relevant model in the planning of oral health care services for the elderly population in the country. Recommendations for an improved delivery of oral health care service for the elderly, formulated based on the principles of the Ottawa Charter for Health Promotion, are summarized in Table 1, with key stakeholders identified to help steer the development of such initiatives.

CONCLUSION

The high levels of oral disease prevalence and treatment needs, as well as poor dental attendance among the Malaysian elderly population, indicate the need for an enhanced provision of oral health care services and promotion activities. An integrated, multi-sectoral approach that thrives on an effective collaboration is the key to addressing the multiple issues affecting the elderly individuals' oral health outcome. It is hoped that the recommendations provided will serve as an important guide for policy makers and stakeholders in planning a more strategic approach for improving the oral health status of the elderly in Malaysia.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

REFERENCES

Abdul-Rani, Z. Social welfare policies and

Table 1
Recommendations for an improved provision of oral health service for Malaysian elderly and identification of responsible stakeholders.

Recommendation	Stakeholder
• Establish and implement policies, which support oral health care and promotion for a wide spectrum of elderly population including those who are functionally dependent, institutionalized, frail and requiring palliative care. Areas requiring improvement are: √ pathway(s) for prioritised care for individuals receiving palliative care, as well as those who are functionally dependent and at risk of systemic health complications, √ specialized scheme(s) to provide free care for elderly who are at a socio-economic disadvantage, including those who are homeless, mental health clients and residents of government-supported living institutions, √ promotion of registration of disability status to all Malaysians who meet the criteria defined in the Persons with Disabilities Act 2008 (Part I) ("Persons with Disabilities Act 2008 [statute on the Internet].", 2008), √ communication among health care, social welfare, and education ministries, which is important for identifying individuals with disabilities who are eligible for benefits and assistance available for holders of the Disability Identification Card, issued to those registered with the Department of Social Welfare, √ awareness of the benefits from registration of disability status through education, in-house training and promotion via the mass media. • Reorient health services to empower involvement of health care practitioners in the care of the elderly, as well as promote access to oral health care services. The existence of Special Needs Dentistry services should be highlighted and publicized, and while the development of domiciliary dental service is underway, mobile dental services established in a number of learning institutions in Malaysia may be utilized to provide domiciliary dental care to individuals who are unable to attend dental clinics. • Incorporate inter-professional oral health education in undergraduate curriculum of dental, medical,	Government agencies, *eg* Ministry of Health, Ministry of Education; Ministry of Higher Education; Ministry of Finance; Ministry of Youth and Sports; Department of Social Welfare; Ministry of Women, Family and Community Development.

Table 1 (Continued).

Recommendation	Stakeholder
nursing, and allied health programs aimed at preparing future health care teams for inter-professional and multidisciplinary oral health care, especially in managing people with special health care needs. • Strengthen community action via organization of programs involving the elderly and the public aimed at in creasing awareness of the importance of oral health care in elderly individuals, as well as the support and services available for the elderly to maintain satisfactory oral health. • Empower the elderly to create healthy communities through forming associations with financial support derived from the government to run the activities. • Provide funding to support clinical, research, and educational activities relating to oral health care for the elderly. • Provide sharing of resources, such as manpower and equipment, and assist in the implementation of oral health promotion activities. • Undertake regular review of the effectiveness of current policies, programs and services available to support the needs of the elderly, which requires to be undertaken to ensure its effectiveness and to allow identification of areas for improvement. Such reviews should be conducted via surveys of customers, caregivers, special interest or focus groups; peer reviews; audit reports; and case studies. • Offer attractive remuneration and benefits, such as tax redemption, for dentists who provide care for the elderly or patients with special needs to encourage dentists, especially those in private practice, to treat such patients who may require extra time and/or specialised intervention procedures.	
• Provide elderly people with adequate knowledge of and positive attitude towards oral health care. • Provide sharing of resources, such as manpower and equipment, and assist with implementation of activities. • Undertake research activities to promote innovation in elderly patient care. • Educate dental colleagues, caregivers and other members of the health care team to develop essential skills and	Oral health care team, including practicing clinicians, academics, researchers, and administrators.

Table 1 (Continued).

Recommendation	Stakeholder
knowledge in oral health care of the elderly, and establish informed partnership to empower multidisciplinary oral health care. • Collaborate with health care and non-health care members of the multidisciplinary team in ensuring a holistic and comprehensive elderly patient care. Such collaboration should include establishing a system to promote effective daily oral hygiene care and to provide a well-defined referral protocol.	
• Cooperate with oral health care workers and other members of the multidisciplinary team to ensure a holistic and comprehensive elderly patient care. • Develop personal skills, in liaison with the oral health professional counterparts, in providing and promoting oral health care for the elderly. • Provide/assist with daily personal hygiene care, identify signs and symptoms for dental referral, provide acute emergency oral health care, advise regular dental check-ups, and promote a healthy diet and lifestyle.	Non-dental health care team, caregivers, nursing home operators/workers and others involved with management of the elderly.
• Organize/assist with the organization of activities at strengthening community action for the elderly. • Provide access, support, mentoring, and development of skills for individuals involved with management of the elderly.	Disability support group.
• Provide assistance in the form of financial aid and resources to fund education, research and other oral health promotion activities targeting the elderly. • Provide assistance to elderly individuals with financial difficulty who need professional and personal oral health care.	Private agencies, including corporate organizations, welfare foundations and philanthropists.
• Include oral health care and dental treatment as standard coverage of a private insurance policy. • Include oral health care in employer-supported insurance and health care benefits to ensure attainment of general health and well-being. • Permit flexible working hours for individuals who wish to participate in humanitarian activities, which support the well-being of the elderly and/or people with special needs. • Encourage public involvement with humanitarian activities by offering increased remuneration, award or recognition.	Employers.

services for the elderly: a country report (Malaysia). The 5th ASEAN and Japan High Level Officials Meeting on Caring Societies: Collaboration of Social Welfare and Health Services, and Development of Human Resources and Community, Aug 27-30 2007. Tokyo: Ministry of Health, Labour and Welfare, 2007: 1-31.

Ambigga KS, Ramli AS, Suthahar A, Tauhid N, Clearihan L, Browning C. Bridging the gap in ageing: translating policies into practice in Malaysian primary care. *Asia Pac Fam Med* 2011; 10: 2.

Department of Social Welfare. National health policies for older persons. Putrajaya: Ministry of Women, Family and Community Development, 2008.

Department of Social Welfare. Registration of persons with disability. Putrajaya: Ministry of Women, Family and Community Development, 2013.

Division of Pension, Malaysian Public Service Department. Medical facilities. Putrajaya: Division of Pension, 2016. [Cited 2017 Mar 25]. Available from: http://www.jpapencen.gov.my/english/medical_facilities.html

Du M, Jiang H, Tai B, Zhou Y, Wu B, Bian Z. Root caries patterns and risk factors of middle-aged and elderly people in China. *Community Dent Oral Epidemiol* 2009; 37: 260-6.

Eke PI, Dye BA, Wei L, *et al*. Update on prevalence of periodontitis in adults in the United States: NHANES 2009 to 2012. *J Periodontol* 2015; 86: 611-22.

Fees Act 1951 [statute on the Internet]. 2006, [Cited 2017 Mar 25]. Available from: http://www.agc.gov.my/Akta/Vol. 5/Act 209.pdf

Ghani WM, Razak IA, Yang YH, *et al*. Factors affecting commencement and cessation of betel quid chewing behaviour in Malaysian adults. *BMC Public Health* 2011; 11: 82.

Global Burden of Disease Study 2013 Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015; 386: 743-800.

Health Canada. Report on the findings of the oral health component of the Canadian health measures survey 2007-2009. Ottawa: Health Canada, 2010. [Cited 2017 Mar 25]. Available from: http://www.fptdwg.ca/index_htm_files/CHMS-E-summ.pdf

Institute for Public Health. National Health and Morbidity Survey 2011 fact sheet. Kuala Lumpur: Institute for Public Health, 2011. [Cited 2017 Mar 15]. Available from: http://www2.moh.gov.my/images/gallery/Garispanduan/NHMS 2011 FACT SHEET.pdf

Institute for Public Health, Ministry of Health Malaysia. National Health and Morbidity Survey 2015- Healthcare demand. Kuala Lumpur: National Institute of Health, 2015a.

Institute for Public Health, Ministry of Health Malaysia. National Health and Morbidity Survey 2015- Non-communicable diseases, risk factors and other health problems. Kuala Lumpur: National Institute of Health, 2015b.

Liao, CT, Wallace, CG, Lee, LY, *et al*. Clinical evidence of field cancerization in patients with oral cavity cancer in a betel quid chewing area. *Oral Oncol* 2014; 50: 721-31.

Lim G, Rampal S, Yahaya HE. Cancer incidence in peninsular Malaysia 2003-2005. Putrajaya: Ministry of Health, 2008. [Cited 2017 Mar 15]. Available from: http://www.moh.gov.my/images/gallery/Report/Cancer/CancerIncidenceinPeninsularMalaysia2003-2005x1x.pdf

Loke ST, Jalil NA, Giant EW, Lee SHC. The prevalence or oral diseases and treatment needs in the institutionalized elderly in Sabah. *Malaysian J Public Health Med* 2003; 3: 30-5.

Malaysian Department of Statistics. Population

projections Malaysia 2010-2040. Putrajaya: Malaysian Department of Statistics, 2012.

McGrath C, Cheng YH, Lo EC. Inequalities in oral health and oral health care delivery among adults in Hong Kong: an analysis of extant data. *Hong Kong Med J* 2011; 17 (Suppl 2): 35-7.

Ministry of Health Malaysia. Country health plan 2011-2015: Tenth Malaysia Plan. Putrajaya: Ministry of Health Malaysia, 2010.

Ministry of Health Malaysia. Health facts 2013. Putrajaya: Ministry of Health, 2013. [Cited 2017 Mar 25]. Available from: http://www.moh.gov.my/images/gallery/publications/HEALTH FACTS 2013.pdf

Ministry of Health Malaysia. Health facts 2014. Putrajaya: Ministry of Health, 2014. [Cited 2017 Mar 25]. Available from: http://www.moh.gov.my/images/gallery/publications/HEALTH FACTS 2014.pdf

Mohd-Salleh Z, Abdul-Kadir R. Oral health or older East Malaysian Indigenous in long houses. *Int J Oral Health* 2010; 6: 9-13.

Murray CJL, Barber RM, Foreman KJ, *et al*. Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990-2013: quantifying the epidemiological transition. *Lancet* 2015; 386(10009): 2145-91.

Oral Health Division, Ministry of Health Malaysia. Guidelines on oral health care for the elderly in Malaysia. Putrajaya: Ministry of Health, 2002.

Oral Health Division, Ministry of Health Malaysia. National Oral Health Survey of Adults 2000. Putrajaya: Ministry of Health, 2004. [Cited 2017 Mar 25]. Available from: https://www.mah.se/upload/FAKULTETER/OD/Avdelningar/who/WPRO/Malaysia/data/oral_health_status-malaysian_adults.pdf

Oral Health Division, Ministry of Health Malaysia. A lifetime of healthy smiles: National Oral Health Plan for Malaysia 2011-2020. Putrajaya: Ministry of Health, 2011. Available from: http://ohd.moh.gov.my/v3/images/nohp20112020.pdf

Oral Health Division, Ministry of Health Malaysia. History of dentistry in Malaysia. Putrajaya: Ministry of Health, 2012. [Cited 2017 Mar 25]. Available from: http://ohd.moh.gov.my/v3/index.php/en/about-us/history-of-dentistry

Oral Health Division, Ministry of Health Malaysia. National Oral Health Survey of Adults 2010 (NOHSA 2010). Putrajaya: Ministry of Health Malaysia, 2013.

Oral Health Division, Ministry of Health Malaysia. Oral healthcare for the elderly in Malaysia. Putrajaya: Ministry of Health, 2014.

Pearson N, Croucher R, Marcenes W, O'Farrell M. Dental health and treatment needs among a sample of Bangladeshi medical users aged 40 years and over living in Tower Hamlets, UK. *Int Dent J* 2001; 51: 23-9.

Poi PJH, Forsyth DR, Chan DKY. Services for older people in Malaysia: issues and challenges. *Age Ageing* 2004; 33: 444-6.

Rihs LB, da Silva DD, de Sousa Mda L. Dental caries in an elderly population in Brazil. *J Appl Oral Sci* 2009; 17: 8-12.

Salomon JA, Wang H, Freeman MK, *et al*. Healthy life expectancy for 187 countries, 1990-2010: a systematic analysis for the Global Burden Disease Study 2010. *Lancet* 2012; 380(9859): 2144-62.

Seman K, Abdul-Manaf H, Ismail A. Dental caries experience of elderly people living in "Pondok" in Kelantan. *Arch Orofac Sci* 2007; 2: 20-5.

Shah N, Sundaram KR. Impact of socio-demographic variables, oral hygiene practices, oral habits and diet on dental caries experience of Indian elderly: a community-based study. *Gerodontology* 2004; 21: 43-50.

Shrestha LB. Population aging in developing

countries. *Health Aff (Millwood)* 2000; 19: 204-12.

Sinor MZ. Oral health assessment among elderly staying in shelter (Rumah Seri Kenangan), Kelantan, Malaysia. *Int J Humanit Soc Sci Invent* 2013; 2: 43-8.

Siade GD, Spenser AJ, Robert Thomson KF, eds. Australia's dental generations: The National Survey of Adult Oral Health 2004-06. Canbera: Austratian Institute of Health and Welfare, 2007. [Cited 2017 Mar 25]. Available from: http://www.aihw.gov.au/publication-detail/?id=6442467953

White DA, Tsakos G, Pitts, NB, *et al*. Adult Dental Health Survey 2009: common oral health conditions and their impact on the population. *Br Dent J* 2012; 213: 567-72.

World Health Organization (WHO). The Ottawa Charter for Health Promotion. Geneva: WHO, 1986. [Cited 2017 Mar 25]. Available from: http://www.who.int/healthpromotion/conferences/previous/ottawa/en/