Objectives: The study aims at reviewing Myanmar’s current situation to consider an improved oral health system and at promoting the oral health status of the Myanmar population. Materials and Methods: This review was conducted using the World Health Organization’s (WHO’s) six building blocks of the health system: oral health-care service delivery, dental workforce, oral health information system, essential medicine, health financing, and leadership and governance. The review was established on scientific articles and documents and information from reliable government and nongovernment organizations’ websites. Results: According to the National Oral Health Survey (2016–2017), the prevalence rate of untreated caries in six-year-old Myanmar children (84.1%), and in the 35–44 and 65–74 age group (above 40%) is high, which reflects a low utilization of oral health-care services. The dentist to population ratio is approximately 1:16,000: There are around 5,000 dentists and 400 trained dental nurses in Myanmar, and only about 1,000 dentists serve in government sectors. The inequalities in dental health care are compounded by a limited dental workforce and inequality of dentists between the public and private sectors in Myanmar. In the last National Health Plan (NHP, 2006–2011), the Myanmar government’s funding for required dental equipment and materials in each dental unit (around 5726 USD) has been considered inadequate. The current expenditure is not transparent. The other challenges are an insufficient supply of dental materials and instruments to all public dental sectors and a lack of oral health-care infrastructure. Conclusions: Such findings suggest a pressing need to address the effective oral health-care system and decree the specific goals for the Myanmar population’s oral health.

Keywords: Dental workforce, essential medicine, leadership and governance, health financing, Myanmar, oral health information, oral health service delivery, oral health system
are many impediments to providing adequate health services to the whole nation, such as lack of personnel, language barriers, different cultures and beliefs, and inadequate transportation infrastructure. Myanmar government recently started the NHP covering four years (2017–2021), which is a part of a long-term NHP of achieving UHC by 2030.[9] Nevertheless, the oral health policy has been neglected in most NHPs.[5,9]

This study aims at reviewing the oral health system in Myanmar, with the WHO’s six building blocks of the health system.[10] Scientific articles about oral diseases and oral health in Myanmar had already been published.[11-21] Although information about the health system and human resources for health in Myanmar were found in some articles,[6,7,22] items related to the oral health system have not yet been mentioned. Therefore, this article reports the current conditions and challenges of Myanmar’s oral health system based on the published articles and the reliable local documents that are inaccessible by non-native speakers and non-health professionals added value to the academic world in the overview of the oral health system.

MATERIALS AND METHODS

The oral health system analysis was conducted based on the WHO’s six building blocks of the health system: health service delivery, health workforce, health information systems, access to essential medicines, health financing, and leadership and governance.[10]

For inclusion in the review, articles and documents dealing with oral health and the health system in Myanmar based on the WHO's six building blocks of the health system and oral health status were considered: dental caries, gingival diseases, periodontal diseases, dental fluorosis, cleft lip and palate, and oral cancer in Myanmar.

Articles were searched from PubMed and Google Scholar. The search terms used were Myanmar, oral health system, health system, oral health services, health resources, health financing, health information, essential medicine, and leadership and governance for oral health and health system-related information. The terms: oral health status, Myanmar, dental caries, gingival diseases, periodontal diseases, dental fluorosis, cleft lip and palate, and oral cancer were used to inform oral health status. Moreover, related information on dental health from reliable websites of governmental and nongovernmental sectors was also searched. Articles published until August 2020 were explored.

All electronic records were imported into Endnote X7. Titles, abstracts, keywords, and contents of articles and documents were scanned to meet the eligibility criteria and eliminate irrelevant items. Articles with information unrelated to the standards were excluded. Potentially relevant articles were selected and collected as full-text records. Selected full-text journals were appraised for their meeting the eligibility criteria. A total of twenty-nine articles and documents matching these criteria were used as included articles in this review.

ORAL HEALTH STATUS IN MYANMAR

Dental caries and periodontal disease are the most common oral diseases in Myanmar. Two studies of Thwin et al.[11,12] showed that the prevalence of dental caries in 3-year-, 4-year-, and 20- to 45-year-olds were 78.9%, 87%, and 90.8%, respectively. In the Pathfinder survey of different regions,[13,14] dental caries’ prevalence was high (above 50%) in the 5-year, 12-year, and 35–44 age groups. According to the national oral health survey, the untreated caries level is very high among 6-year-old children (84.1%).[14,15] The prevalence was lower than 50% in other studies, such as in those by Chu et al.,[16] Aung et al.[17] and Mon et al.[18]

The National Oral Health Survey (2016)[14,15] showed that the percentages of bleeding on probing in the 12-, 15–18-, 35–44-, and 60- to 74-year age groups were higher than 60%. The prevalence of dental caries, as shown in Table 1, and that of gingival and periodontal diseases was high among Myanmar people and was followed by an upward trend with age.

Other common oral health problems in Myanmar are oral cancer, dental fluorosis, cleft lip, and palate.[14,15,19-21] According to a review of oral cancer in Myanmar, oral cancer is the fifth most common cancer[19] in Myanmar. Betel quid chewing has been considered one of the important risk factors for oral cancer.[19,20] Moreover, based on the statistical report of representative cancer referral hospitals in Myanmar, oral cancer accounted for 3.5% of all cancer cases. It ranked at the sixth position in males (5.3%) and the 10th position in females (2.2%).[20] The National Oral Health Survey also reported that the prevalence of dental fluorosis was high (13.3%–21.67%) in the areas of Central Myanmar.[14,15] According to the Annual Hospital Statistics Report (2013), cleft lip and palate is the third most common congenital disability in Myanmar and it accounted for 18.5% of all congenital malformations.[14,21]

Oral health service delivery

There are two sectors for oral health service delivery: governmental and nongovernmental.

In the governmental sector, departments under the Ministry of Health and Sports (MOHS) are shown in Chart 1.[23]
Public dental clinics in state and region hospitals, district hospitals, township hospitals, station hospitals, and health centers under the Department of Medical Service and the Department of Public Health take the primary responsibility to deliver oral health-care services to the Myanmar population. Universities of Dental Medicine (Yangon and Mandalay) under the Department of Health Professional and Resource Development also provide dental care services to the community. Among the nongovernmental organizations, Myanmar Dental Association (MDA) gives continuous educational training programs for Myanmar dental professionals and also provides dental care services to the population in both urban and some rural areas. Moreover, community-based organizations provide public dental health-care services on a nonprofit basis. Private dental clinics offer services to the population for which the people have to pay for out-of-pocket.

**Oral health promotion activities**

The following oral health promotion programs were established in Myanmar for different targeted groups:

(i) Early Childhood Caries Prevention Program for younger than five-year-old children, including toothbrushing and oral health education to caregivers

(ii) Institution-based School Oral Health-care Activity for school children, including toothbrushing, oral examination, oral health education, and essential dental treatment

(iii) Maternal Oral Health Education Program, including oral health services for pregnant women, improved maternal and child health

(iv) Feasible Effective and Affordable Fluoride Program for the whole population

(v) Oral Cancer Awareness Program by screening among tobacco and betel quid consumers in suburban and rural areas

The primary prevention of oral health is to prevent diseases from occurring; the secondary prevention is to get an early diagnosis and prompt treatment; and the tertiary prevention is to restore oral health functions. In Myanmar, most dentists are extensively involved in the parts of secondary prevention and tertiary prevention. However, the role of Myanmar dentists in primary prevention is currently limited.

**Accessibility for oral health-care services**

Dental clinics under the government sectors, including the two universities, implement free-of-charge services for necessary dental treatments such as dental checkups, tooth extraction, restoration, and sedative dressing. Other services such as endodontics treatment, minor or major oral surgery, fixed or removable prosthetic treatment,
and orthodontics treatment can be fulfilled with some contribution fees.[7] Dentists involved in school health teams administer the oral health examination, dental health education, tooth extraction, sedative dressing, and atraumatic restorative treatment for free-of-charge to appropriate cases among school children.[7]

Coverage of percentage of the population with selected oral health-care services in Myanmar
Although Myanmar people can access dental services from both public and private sectors, reported data of services coverage were available only from the public sector, as follows. According to reports of the South East Asia region, 2008,[28] the coverage percentage of the regular oral examination in 12-year-old children was 73%, and emergency dental care in adults and elderly was 35% and 34.5%, respectively. Also, the percentage of fluoride toothpaste use was 100%.

Dental workforce
There are insufficient numbers of dentists and dental nurses, and there are no dental therapists or dental hygienists in Myanmar.[22,28] Dental professionals educated from two dental universities (Yangon and Mandalay) provide oral health-care services in the public and private sectors for the whole population in Myanmar.[29] In addition, there are limited numbers of army-dentists trained under the Defense Services Medical Academy (DSMA) to serve.[29]

The latest total number of registered dentists under the Myanmar Dental Council till 2018 was 4,539,[29] where the dental nurses’ number was 503,[29] as shown in Figure 1. The dentist to population ratio is approximately 1:16,000,[29] fewer than the WHO recommended proportion of 1:7500.

Dentists working in the public sector are under the Department of Medical Service and the Department
of Public Health of MOHS, Myanmar, whereas private dentists work in private dental clinics or private hospitals. According to Figure 1, the number of dentists working in the public sector was decreased, and private dentists were increased based on 2016 data compared with 2014 data.\cite{6, 22} However, the number of dental nurses working in the public sector has increased since 2009. Figure 2 shows the number of dentists working in the public sector in 14 states/regions of the country according to the data of 2016.\cite{22} The numbers of dentists working in the public sector are higher, approximately around 100 in big cities: Yangon and Mandalay Divisions, and Shan State.\cite{22}

**Oral health information system**

The National Health Information System is an organized system of keeping the records, processing, analysis, reporting, usage, and feedback of information based on systematic data collection, community surveys, clinical studies, health system research, and census data. It is used to make decisions and formulate policies for health programs.\cite{30} Data are collected manually by trained basic health staff using standardized forms (monthly, quarterly, and annually) in the current information system.\cite{7} To strengthen the current information system, an electronic information system has been introduced and its robustness identified.\cite{7}

The current system comprises hospital information and public-health information. All the data are sent through the Township Health Department and the respective Region or State Health Department to the Department of Health Planning.\cite{7} The Central Statistical Organization under the Ministry of National Planning and Economic Development takes responsibility for
analyzing statistics for the country according to the Central Statistical Authority Act 1952.[7]

Oral health status, risk factors, utilization of dental services, and service coverage are constituents of the oral health information system.[31] The dentists working in the public sector report monthly dental patients’ data from their hospitals or fields through the current health information system.

**Access to essential medicine**

Myanmar Essential Medicines Project has been implemented in collaboration with the WHO since 1988 and has developed a National List of Essential Medicines (NLEM) to follow the concepts of essential medicine use.[32] For dental use, the dental cartridge (local anesthesia) and anti-bacterial drugs for oral diseases shown in Table 2 are included in the new edition of the National List of Essential Medicines (2016), which contains 486 items of medicine.[32] Drugs, including essential medications, are mainly supplied by the Central Medical Store Department (CMSD) under the MOHS to all hospitals under governmental sectors.[32] The crucial medicines, equipment, and materials required for dental use are also distributed by the CMSD to dental clinics under government sectors periodically.[7,32]

**Health financing**

Health financing is one of the critical issues that Myanmar is currently facing. The primary sources of finance for health-care services are the government, private households, social security systems, community

| Local anaesthesia | Route of administration | Strength | Category |
|-------------------|-------------------------|----------|----------|
| Lignocaine (hydrochloride) | Dental cartridge Spray | 2% + 1:80,000 adrenaline 10% | A |
| Lignocaine + epinephrine | Dental cartridge | 2% (lidocaine hydrochloride) + 1:80,000 epinephrine 1%, 2% (lidocaine hydrochloride or sulfate) + 1:200,000 epinephrine in vial | A |

**Antibacterial drugs**

| Antibacterial drugs | Route of administration | Strength | Category |
|---------------------|-------------------------|----------|----------|
| Amoxicillin (trihydrate) (sodium salt) | Tablet/capsule Injection Oral liquid | 250mg, 500mg 500mg, 1g vial 125mg/5mL | A |
| Amoxicillin with clavulanic acid (Co-amoxiclav) | Tablet Injection Oral liquid | 375mg, 625mg 600mg (1500mg + 100mg), 1.2mg (1000mg + 200mg)/vial 156mg/5mL | A |
| Cephalixin | Tablet/capsule Oral liquid | 250mg, 500mg 125mg, 250mg/5mL | A |
| Ceftriaxone | Injection | 1g, 2g/vial | C, E1 |
| Cloxacillin | Capsule Injection Oral liquid | 250mg, 500mg 500mg in vial 125mg/5mL | A |
| Flucloxacillin | Capsule Injection Oral liquid | 250mg, 500mg 500mg, 1g vial 125mg/5mL | A |
| Azithromycin | Tablet/capsule Oral liquid Injection | 250mg, 5000mg 200mg/5mL 250mg/vial, 500mg/vial | C |
| Clarithromycin | Solid oral dosage form | 500mg | D |
| Clindamycin | Capsule Injection | 150mg, 300mg 300mg/2mL | B |
| Lincomycin | Capsule | 250mg, 500mg | C |
| Metronidazole | Tablet Injection Oral liquid | 200mg, 500mg 500mg/100mL bot 200mg/5mL | A |
| Norfloxacin | Tablet | 400mg | A |

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**Table 2: Local anesthesia and anti-bacterial drugs for dental use** Category A = for any doctor, B= Alternative to A, C = for experienced doctors, D, E1 =Trained personnel with expert qualifications (drugs to be used in the specialized center)
contributions, and external aid.\textsuperscript{[30,33]} Total health expenditure as a share of GDP was reported as approximately 4.7% (Myanmar MOHS, 2017), which in absolute terms of health spending per capita was 70,100 kyat, or about US$54.\textsuperscript{[34]} The government share of total health expenditure, including government budgetary and social insurance, was 23% (Myanmar MOHS, 2017).\textsuperscript{[34]} Governmental health expenditure increased from 647 million USD in 2014 to 1048 million USD in 2019,\textsuperscript{[35]} as shown in Figure 3. This expenditure is for medical, dental, and other medical-related fields, including the funding of medical equipment, electro-surgical technology, the provision of free medical treatment for government employees, and medical professionals’ training.\textsuperscript{[35,36]} According to the WHO, Myanmar has the highest out-of-pocket-payment rates of health-care spending in the Association of Southeast Asian Nations (ASEAN) (73.9%).\textsuperscript{[34,35]}

The MOHS primarily grants funds for dental equipment and materials required in public dental sectors. Around 1,100 million kyats (715,786.50 USD) for 125 dental health units with an average of about 5,726 USD for each dental unit was provided in the last NHP (2006–2011).\textsuperscript{[37]} One study\textsuperscript{[38]} reported that the percentage of household expenditure spent on dental care in Myanmar was 1.5%.

**Leadership and Governance**

Health legislation plays a crucial role in the governance and leadership components of the health system. They are described next.\textsuperscript{[30]}

**The National Health Committee (NHC)**

The NHC was founded on 28 December 1989. It takes the leadership role as a compositional committee with the MOHS and other ministries’ collaboration. It gives guidance for implementing the health programs systematically and efficiently. The NHC sets the policies for the whole nation and makes decisions to guide the health-care sectors based on the policies. It enacted the long-term visionary NHP endorsing the goal of achieving UHC by 2030, which includes NHPs covering every four years. The objectives of the NHP are: (1) to reduce public health problems and promote the health status of the people, (2) to ensure universal coverage of health services for the whole nation, (3) to train and produce human resources for health, (4) to develop medical research to international standards, and (5) to ensure sufficient quantity of essential medicine. Nevertheless, the priority of plans for oral health is still ambiguous in the NHP.

**Decentralization**

Decentralization is the intention to improve health service delivery efficiency to address capacity-building and human resources management for all health-related fields. It gives permission to freely act depending on each individual’s independent assessment and decisions working in the public hospitals and clinics under the government while maintaining the government’s policy integrity.

**Universal health coverage**

The long-term NHP aims at paving the way toward the Universal Health Coverage (UHC). The UHC’s goal is to provide health-care services, including essential dental services, to everyone regardless of social status, cultural and religious background, without suffering from financial hardships. The current NHP, which covers four years (2017–2021) in the UHC framework, was formulated to access primary health-care services, essential services, and interventions at the township level and below within the community.\textsuperscript{[8]} The secondary and
tertiary health-care services will be emphasized in the next NHP (2021–2026 and 2026–2031). Nevertheless, it has been contemplated that there is no specific target or goal for the coverage of oral health care services to the population.

**Myanmar health sector coordinating committee (M-HSCC)**

M-HSCC is the leading health sector and stakeholder in Myanmar. The specific objectives of the M-HSCC include advising the MOHS on strengthening the health sector; providing a strategic discussion on health-related issues; acting as a coordination body for the health sector in obtaining the expected benefits of improved health care coverage, health status, medical education, and health knowledge of the people; development of health research and traditional medicine; and a reduction in morbidity through practical information, education, and communication activities. Nevertheless, the role of M-HSCC in the area of oral health issues is obscure.

**Health impact assessment (HIA)**

The primary element of HIA is to support decision making between options and to predict the future consequences of implementing different options. It is essential to address the health inequities of the population. It also considers health determinants such as biological factors, individual lifestyle factors, social and community networks, living and working conditions, and general socioeconomic conditions, which regulate health and oral health.

**Discussion**

It can be seen that the oral health status of Myanmar is underprivileged, which may indicate people's poor access to dental services in people. Essential oral health care service delivery, necessary to strengthen the oral health system, is one of its significant components. The MOHS is the primary provider for public health and dental care services. Therefore, the government should take responsibility for it by supporting both governmental and nongovernmental organizations. Nevertheless, unavailable dental services for some remote areas in Myanmar due to transportation difficulties are among the challenges encountered by government and dental professionals. Besides, the Myanmar dental surgeons’ roles in primary prevention and oral health promotion programs, including oral health education, oral examination, toothbrushing, fluoride application, and specific preventive measures for target groups, should be promoted since primary prevention is a better approach to strengthen oral health in Myanmar as a developing country.

Approximately one-fourth of the registered dentists and dental nurses are working in the public sector. It is seen that the dental workforce for oral health is minimal, and there is inequality between public and private oral health sectors for dental services in Myanmar. This may be because some dentists resigned from government jobs owing to various personal concerns or unfavorable working hours and working environment. Besides, recently graduated young dentists did not apply to the MOHS but continued their private-sector careers. There is also no auxiliary oral health workforce such as dental hygienists and dental therapists, unlike in some other countries in the South East Asia region: Thailand, Indonesia, India, Bhutan, Nepal, Maldives, Sri Lanka, and Timor Leste. Further, there is still no unequivocal methodological approach to handle the health-care workforce planning since allocating the right workforce with the right expertise to deliver the right health-care services to the right people in the right place is a complex issue. Nevertheless, one study suggested an integrated approach to face this complex task even though more efforts are needed. It can be described as a framework combining segments from both demand and supply of the health-care workforce in terms of estimating the demand based on socioeconomic factors, epidemiological factors, and services utilization rates and supply from training, productivity, and skill mix. However, it would be difficult to implement in Myanmar as it is a developing country with limited data, where extensive data are required to apply the model. Therefore, a further suggestion of this review about the oral health-care workforce is to consider training auxiliary dental health-care workers to provide services and to allow dental personnel to participate in the formulation and implementation of the national level of oral health policy for better policies and oral health care services based on available dental manpower.

Since the essential medicine project was developed by collaboration with the WHO, Myanmar may be included in the countries that encompass more than 300 necessary prescriptions of the WHO model lists (414 eligible medicines). Although local anesthesia and some anti-bacterial drugs used in dental care were included in the Myanmar National List of Essential Medicine items (2016) and supplied by CMSD, the current supplement of dental materials and equipment is extremely insufficient for the public sector’s dental clinics. On the other hand, the oral health information system still does not reach a proper stage to utilize the collected data even though the dentists working in the public sector report monthly
Myanmar's health spending as a share of GDP was below average (5.9%), and the government share of total health spending was also below average (47.3%) compared with other countries at a similar income level.\[^34\] The percentage of the household expenditure on dental care in Myanmar was the lowest among neighboring countries: China (2.5%), Bangladesh (7.9%), India (6.8%), and Laos (1.5%), which was the same as Myanmar.\[^38\] Myanmar is a developing country, and around 70% of Myanmar people live in peri-urban and rural areas.\[^7\] Some people living in rural areas are considered to have low socioeconomic status, and underprivileged people are more vulnerable to under-served education and health care.\[^43\] According to one study,\[^44\] health-care utilization was associated with household income even though there are still no detailed data for dental services utilization in Myanmar. Concurrently, it was assumed that those with dental treatment needs might not afford to go to private dental clinics due to their costs. Lack of awareness for dental services utilization also impacts the severity of the diseases and treatment needs and raises the financing issue.\[^37\] Besides, governmental funding for the dental role is not transparent because separate oral health expenditure data for dental units, dental professionals training, and public oral health care programs are not available. Moreover, funding for dental materials and equipment was only reported in the last NHP (2006–2011), and this amount was considered inadequate. On the other hand, current spending is not available.\[^37\] Public financial spending on health in Myanmar is lower than that in other countries of ASEAN with a similar level of income and health spending, despite a substantial increase in recent five years because out-of-pocket payment is a major source of spending and there is a lack of health insurance.\[^7,34\] Therefore, a specific financial investment in oral health may be a constraint for the government.

In Thailand as a neighboring country of Myanmar, its policy on UHC has successfully progressed since 2002 and every Thai citizen is now enabled to access essential preventive, curative, and palliative health services.\[^45\] Also, it is now declared that the primary health care system would proceed from basic health care to integrated, community-coordinated, and person-focused care with a national budget prioritization for its UHC policy's sustainment.\[^45\] Besides, oral health was a part of UHC with a life course approach through a services network to improve access to services and oral health status in Thailand.\[^29\] In contrast, the attainment of Myanmar’s UHC by 2030 has a long way to go although the current NHP (2017–2021) in UHC policy focuses on primary care services.\[^39\] This is because of very challenging aspects in the low coverage of health services below the UHC target of 80%, high financial risk due to out-of-pocket payments, and large inequalities in assessing services across the rich and poor and urban and rural populations.\[^19\] Moreover, oral health priority in Myanmar's UHC framework is still low and there are no specific goals for oral health. Therefore, to address this issue, one study committed to prioritizing the coverage of health services and financial risk protection for vulnerable populations and aimed at helping in making important decisions for policymakers in UHC.\[^39\] In the view of oral health, administering the benefits package of essential oral health care services delivered in hospitals or health centers level should also be considered in the UHC framework even though facing a financial issue. Besides, Myanmar dental professionals should be empowered in addressing specific and practical oral health policy for oral health in UHC.

**Conclusion**

The current oral health-care system in Myanmar is frail. Challenges such as poor oral health status and low dental services utilization must be addressed nationally using all oral health human resources available, despite having inequality between the public and private dental workforce. Moreover, the participation of dental surgeons in primary preventive programs should be promoted. Misinformation must be combated with a proficient public relations team to reach an effective oral health information system. A prompt and appropriate solution to the insufficient supply of dental equipment and materials must be sought. Financing issues should be resolved with discussions between the MOHS and the central government. Therefore, the Myanmar government needs to address a firm oral health policy for an effective oral health system and specific goals for specific challenges to promote oral health-care coverage for the whole nation.
ACKNOWLEDGMENT
Not applicable.

FINANCIAL SUPPORT AND SPONSORSHIP
The PSU-Faculty of Dentistry, International Student Graduate Scholarship.

CONFLICTS OF INTEREST
There are no conflicts of interest.

AUTHORS’ CONTRIBUTIONS
Not applicable.

ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT
Not applicable.

PATIENT DECLARATION OF CONSENT
Not applicable.

DATA AVAILABILITY STATEMENT
Not applicable.

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