Burden of Oral Diseases and Noncommunicable Diseases: An Asia-Pacific Perspective

Abstract

Background: At a population level, there are no systematic data to correlate the pattern of prevalence of noncommunicable diseases (NCDs) with oral disease burden in South Asian countries. The influence of the age, gender, and geographical distribution on these diseases is not reported. We attempt to provide a population level correlation of occurrence using the Global Burden of Disease approach. Materials and Methods: Using the data from the Global Burden of Diseases, 2016, the occurrence of oral diseases (dental caries of permanent teeth, edentulism (including severe tooth loss), and periodontal diseases) and various NCDs, based on geographical region, gender and age groups were collected and subjected to correlation statistics. Statistical Package for Social Services (Version 23) was used to analyze the results. P ≤ 0.05 was considered as statistically significant. Results: Geographical location and age had a significant role in the occurrence of dental diseases. There was a considerable difference in rates of dental diseases and NCD prevalence in the various regions of Asia-Pacific. It was observed that for most of the NCDs, there was a linear significant relationship for edentulism as well as periodontal diseases with high statistical significance. Discussion: The factors that contribute to the discrepancies, phenomenon, and relationship between the oral diseases and NCDs are discussed. The current state of the importance of oral health, in maintaining overall health is discussed. Methods by which policymakers could bring about a change by utilizing the principles of “Overton window” for mobilizing the support of people are presented.

Keywords: Asia-Pacific, dental disorders, health policy making, noncommunicable diseases, oral disorders

Introduction

The burden of noncommunicable diseases (NCDs) is rising in the Asia-Pacific region.[1] The data of the systematic analysis of the Global Burden of Disease Study, 2016 indicate that the Asian region is one of the severely affected regions, with increasing prevalence of diabetes, obesity, hypertension, endocrine abnormalities, and neoplasms.[1,2] The Asia-Pacific region is one of the densely populated areas of the world and holding the two most populous countries of the world—India and China, both as emerging global economic leaders. A Global Burden of Disease search shows the huge burden of NCDs, including oral diseases in the countries of the Asia-Pacific region as shown in Figures 1 and 2. In this region, >8/10 persons (age-standardized, both genders) experience NCDs, whereas the same for oral diseases ranges is 3–6.5/10 person.[2] With increasing longevity, the oral disease burden is bound to increase and the Asia-Pacific societies may need to prepare for the same.[3,4] Oral health has been increasingly promoted as a part of the spectrum of the NCDs since the 2011 United Nations (UN) high-level meeting on NCDs. The intrinsic connection between good oral health and NCDs are being done in the recent past with molecular and immunity-based evidences.[5] There is strong interlinking between oral diseases, namely, periodontitis, oral dysbiosis, and cardiovascular diseases as well as diabetes and others. Oral cancers are strongly linked to the use of tobacco, alcohol, and human papillomavirus. These findings have been widely reported.[4,6] Maintaining proper oral hygiene and preventing oral dysbiosis has been included as a part of the Global Action Plan for the Prevention and Control of NCDs 2013–2020 of the World Health Organization (WHO), as a supporting intervention.[7] Since the last action plan on NCDs, more advances have been observed in the

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NCDs—oral health scenario. The sugar taxation and its effect on dental caries as well as the economic impact have been demonstrated in several parts of the world. An increase in sugar taxation and proper food labeling have brought a reliable reduction in the incidence of dental caries as well as reducing the overall healthcare-related economics and disease burden.\(^\[8-11\]\)

The usage of plastics has provoked that its micro- and nano-particles have reached the water table, percolated into groundwater and entered the human food chain via marine foods.\(^\[12\]\) They have turned ubiquitous. The health effects of such plastics are unfathomable and mainly caused by Bisphenol-A (BPA), a plasticizer for the synthesis of plastics and an endocrine disruptor.\(^\[10\]\) The Asia-Pacific region, with its large coastline, cannot remain immune to the harmful effects of plastic pollution. Although largely unreported, adverse health effects due to plastic pollution, particularly that of endocrine abnormalities, need to be stressed, studied and urgent action needs to be taken to mitigate noxious effects of plastic for oral and for overall health.\(^\[13,14]\) To date, it is impossible to moderate BPA exposure by diet as it is very difficult to identify BPA-free food.\(^\[14,15]\) In addition, it has been recently evidenced that bottled drinking water, which many people rely on, increase the risk of diabetes and cancer, possibly through the effects of plastics, though the concept needs to be proven.\(^\[14-16]\)

Several policy papers have outlined effective ways to combat the burden of NCDs including oral diseases in the Asia-Pacific region.\(^\[3,6,7\]\) The major underlying risk factor for the rise in NCDs in the Asia-Pacific region is the sociocultural and epidemiological transition. As a result of economic development, the region has undergone drastic changes in lifestyle, nutrition, and habits of its population. Thus, an increase in NCDs, including obesity and diabetes, has paralleled the growth of urbanization and globalization in the region.\(^\[3,17\]\) With many citizens of Asia-pacific region being exposed to NCDs and oral diseases [Figures 1 and 2], the role of dentists as oral health experts and dental associations cannot be understated. The potential of dentists to be the sentinels by whom the NCDs can be diagnosed or referred at an initial stage is considerable.

The correlations of dental diseases to NCDs are often linear as they complement each other. Worsening of certain NCDs predisposes to poor oral hygiene and oral dysbiosis that lead to increased periodontal diseases and or edentulism. Paradoxically, poor oral hygiene also, by its ability to create a low grade, persistent chronic inflammatory response, could cause a myriad of complications associated with NCDs. The correlation at population level including understanding the system dynamics of the interplay of NCDs and oral diseases would help to identify priorities, to plan to mitigate the NCD-oral disease burden and

![Image](https://example.com/image.png)
to implement and monitor the outcome.[18] The data of NCD-oral diseases would also help the clinicians to understand the synergistic progression of NCDs and oral diseases. Although the literature has sufficient evidence to highlight the individual relationship of various NCDs,[5] there are lacunae to associate the prevalence of common dental disorders—caries of permanent teeth, caries of deciduous teeth, periodontal diseases, and edentulism including severe tooth loss, notably in Asia. This manuscript intends to correlate the prevalence of the common NCDs with common dental diseases. An attempt is made to identify the influence of the Asian region, gender, age group on the prevalence of common oral diseases in Asia.

Materials and Methods

The data for the study were obtained using the primary data, as presented by Vos et al., 2016, and employed for this study.[19] Using the data of the systematic analysis of the Global Burden of Diseases (GBD) data of 2016, available at https://vizhub.healthdata.org/GBD-compare/ and http://ghdx.healthdata.org/GBD-results-tool, the data for the prevalence of caries of permanent teeth, caries of deciduous teeth, periodontal diseases, and edentulism including severe tooth loss, for both genders and age groups (15–49, 50–69, 70+ years) were obtained. Similarly, the prevalence of NCDs-cardio vascular diseases, chronic kidney diseases, chronic respiratory diseases, cirrhosis and other chronic liver diseases, diabetes, urogenital, blood, and endocrine diseases, digestive disorders, drug use disorder, mental disorders, musculoskeletal disorders, neoplasms, neurological disorders, and other NCDs were collected from the GBD website. Details of different geographical locations within the Asia-Pacific region were collated. They were classified as Australasia (Australia, New Zealand); Central (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan); East (China, North Korea, Taiwan); South East (Cambodia, Indonesia, Laos, Malaysia, Maldives, Mauritius, Myanmar, Philippines, Seychelles, Thailand, Timor-Leste, Vietnam); and South (Bangladesh, Bhutan, India, Nepal, Pakistan). The high-income Asian countries of Japan, Brunei, Singapore, and South Korea were excluded for the present study as their inputs may overshadow the significant results associated with the other East Asian countries.

The systematic analysis of the GBD 2016 details reported to employ a complex mathematical model algorithm and assumptions that have been previously described thoroughly.[19] Such approaches have been previously used successfully in other similar publications.[20,21] Data were expressed as rates (per 100,000 population). Using the unique Bayesian disease modeling approach, the GBD interactive function provided the estimates of dental caries, periodontal diseases, and edentulism including severe tooth loss.
loss. All definitions and scope used in the GBD 2016 have been retained for this purpose of this study. Only the rate, without the upper and lower uncertainty limit, was used for further analysis.

The collected data were further analyzed for descriptive and inferential statistics using the Statistical Package for Social Services (version 23, IBM, IL, USA). Descriptive statistics for NCDs and prevalence of permanent dental caries, periodontal diseases, and edentulism including severe tooth loss were studied. One-way analysis of variance and Mann–Whitney tests were employed, as appropriately, to find the difference prevalence of permanent dental caries, periodontal diseases, and edentulism regarding geographical locations, gender, and age distribution. Pearson’s correlation was employed to correlate the prevalence of permanent dental caries, periodontal diseases, and edentulism (including severe tooth loss) with NCDs. \( P \leq 0.05 \) was taken as statistically significant.

**Results**

The prevalence rate of caries of permanent teeth was the highest in Central Asia (48470 ± 1737) and the lowest in Australasia (19515 ± 3101). The difference between the various Asian regions was statistically significant (\( P = 0.000 \)). On the contrary, edentulism and severe tooth loss were the highest in Australasia (20346 ± 16899) and the lowest in South East Asia (8517 ± 7327). The difference between the different Asian regions was not statistically significant (\( P = 0.213 \)). Periodontal diseases were common in South Asian countries (26827 ± 9867) and least prevalent in Australasia (11970 ± 5114), and the difference among Asian regions was statistically significant (\( P = 0.023 \)) [Table 1].

The prevalence of various NCDs had varied presentations. The cirrhosis and liver-related ailments were least common, while diabetes, urogenital, blood, and endocrine diseases, neurological, and musculoskeletal problems were more common NCDs in various parts of Asia. The prevalence was different in different parts of India. The descriptive statistics are provided in Table 2.

In the data, we could not find significant differences in caries in permanent teeth, edentulism, permanent tooth loss and periodontal diseases etc., among males and females (\( P = 0.569, 0.512, \) and 0.393, respectively) [Table 3]. The age-group was not statistically significant for the occurrence of caries of permanent teeth (\( P = 0.763 \)) while for edentulism and severe tooth loss as well as for periodontal diseases the age group was a statistically significant factor (\( P = 0.000 \)) [Table 4].

On comparing the various NCDs with dental diseases, it was observed that only dental caries of permanent teeth was significantly correlated with neoplasm’s with Pearson correlation, \( R^2 \) being −0.621 (\( P = 0.000 \)), whereas other correlations were not statistically significant.

For edentulism and severe tooth loss, a positive correlation was observed with statistical significance [Table 5] with cardio vascular diseases, chronic kidney diseases, chronic respiratory diseases, diabetes, urogenital, blood, and endocrine diseases, mental disorders, musculoskeletal disorders, neoplasm, and other NCDs. While the drug use

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**Table 1: Prevalence rate (per 100,000) both genders combined, of oral diseases in parts of Asia Pacific, 2016**

| Caries of permanent teeth | Mean±SD            | SE                | 95% CI for mean | Minimum | Maximum | \( P \) |
|---------------------------|--------------------|-------------------|-----------------|---------|---------|---------|
| Australasia               | 19,514.929±3101.146| 1266.037          | 16,260.476      | 22,769.381 | 16,017.854 | 24,559.946 | 0.000 |
| Central Asia              | 48,470.278±1736.511| 708.928           | 46,647.922      | 50,292.635 | 46,499.989 | 51,497.753 |
| East Asia                 | 32,772.054±1500.067| 612.400           | 31,197.830      | 34,346.278 | 31,133.769 | 35,157.603 |
| South Asia                | 38,138.989±1527.629| 623.652           | 36,530.831      | 39,737.128 | 36,272.778 | 40,114.447 |
| Southeast Asia            | 39,384.447±2280.483| 931.003           | 36,991.226      | 41,777.668 | 36,650.065 | 42,864.889 |

| Edentulism or severe tooth loss | Mean±SD            | SE                | 95% CI for mean | Minimum | Maximum | \( P \) |
|-------------------------------|--------------------|-------------------|-----------------|---------|---------|---------|
| Australasia                   | 20,345.839±16898.565| 6898.810          | 2611.883        | 38,079.795 | 2535.007 | 44,778.621 | 0.213 |
| Central Asia                  | 21,315.878±18423.867| 7521.512          | 1981.216        | 40,650.541 | 2324.270 | 45,562.052 |
| East Asia                     | 7886.586±7140.951  | 2915.281          | 392.618         | 15,380.554 | 702.836  | 17,308.929 |
| South Asia                    | 10,941.102±9130.451| 3727.491          | 1359.281        | 20,522.923 | 1200.472 | 22,136.334 |
| Southeast Asia                | 8516.750±7326.839  | 2991.169          | 827.705         | 16,205.795 | 845.168  | 18,748.327 |

| Periodontal diseases          | Mean±SD            | SE                | 95% CI for mean | Minimum | Maximum | \( P \) |
|-------------------------------|--------------------|-------------------|-----------------|---------|---------|---------|
| Australasia                   | 11,970.372±5113.835| 2087.714          | 6603.732        | 17,337.012 | 5817.079 | 19,558.304 | 0.026 |
| Central Asia                  | 14,744.153±6712.800| 2740.489          | 7699.501        | 21,788.805 | 5883.753 | 22,617.643 |
| East Asia                     | 14,145.277±7805.459| 3186.565          | 5953.951        | 22,336.604 | 4064.484 | 22,741.200 |
| South Asia                    | 26,826.525±9867.116| 4028.233          | 16471.622       | 37,181.428 | 13,550.707 | 36,741.114 |
| Southeast Asia                | 19,879.979±9544.658| 3896.590          | 9863.474        | 29,896.484 | 7223.623 | 28,036.704 |
Table 2: Prevalence rate (per 100,000) both genders combined, of noncommunicable diseases in parts of Asia Pacific, 2016

| Disease                               | Australasia | Central Asia | East Asia | South Asia | Southeast Asia |
|----------------------------------------|-------------|--------------|-----------|------------|----------------|
| Cardiovascular diseases                | 18,720.65±17,402.07 | 19,837.73±18,118.17 | 17,042.74±14,528.58 | 16,617.14±14,839.05 | 17,719.51±15,126.60 |
| Chronic kidney diseases                | 10,154.7±12,194.65 | 17,862.6±18,469.66 | 661.67±6316.64 | 13,257.15±11,992.76 | 7779.15±6757.29 |
| Chronic respiratory diseases           | 17,477.30±5996.25 | 12626.07±7144.76 | 13,303.00±11,098.79 | 18,720.86±13,663.41 | 16,361.80±10,927.48 |
| Cirrhosis and other chronic liver diseases | 1125.03±453.41 | 1367.08±505.17 | 1308.05±1078.86 | 388.40±114.16 | 871.03±421.03 |
| Diabetes, urogenital, blood, and endocrine diseases | 33,681.73±16,482.49 | 45,636.67±19,231.54 | 44,254.96±13,633.53 | 60,037.52±17,240.76 | 47,246.59±16,259.79 |
| Digestive disorders                   | 3195.72±1289.36 | 4312.03±1651.19 | 12,617.58±8647.46 | 4093.81±1675.07 | 3002.85±2222.72 |
| Drug use disorder                     | 1683.91±1742.74 | 687.65±449.86 | 787.94±437.01 | 516.29±423.74 | 635.72±563.54 |
| Mental disorders                      | 20,345.84±16,898.57 | 21,315.88±18,423.87 | 7886.59±7140.95 | 10,941.10±9130.45 | 8516.75±7326.84 |
| Musculoskeletal disorders             | 39,361.85±14,339.47 | 30,012.40±14,225.28 | 28,225.80±11,717.90 | 31,492.29±13,534.16 | 30,266.73±12,097.47 |
| Neoplasms                              | 5479.61±5501.60 | 927.13±795.49 | 1492.89±1351.71 | 554.72±429.57 | 846.78±738.97 |
| Neurological disorders                 | 40,101.33±17,571.24 | 39,997.32±12,789.30 | 28,194.24±8542.14 | 42,874.90±11,899.01 | 38,407.32±11,630.86 |
| Other noncommunicable diseases         | 78,083.15±15,341.93 | 86,407.67±11,859.97 | 80,969.81±14,741.20 | 86,149.06±12,701.54 | 84,172.17±11,823.59 |

SD=Standard deviation

Table 3: Gender differences in prevalence rate (per 100,000) of oral diseases Asia Pacific region, 2016

| Disease                               | Female | Male |
|----------------------------------------|--------|------|
| Caries of permanent teeth              | 36,707.74±9769.251 | 34,602.52±10,216.591 |
| Edentulism and severe tooth loss       | 14,845.99±14,407.954 | 12,756.46±12,388.237 |
| Periodontal diseases                   | 16,048.33±9156.397 | 18,978.19±9324.686 |

SE=Standard error, SD=Standard deviation

Table 4: Age differences in prevalence rate (per 100,000) of oral diseases Asia Pacific region, 2016

| Disease                               | 15-49 | 50-69 | 70+ |
|----------------------------------------|-------|------|-----|
| Caries of permanent teeth (years)      | 37,570.63±9590.086 | 34,450.81±9936.186 | 34,943.91±10,843.043 |
| Edentulism and severe tooth loss (years) | 1782.82±9477.317 | 11,951.83±5652.292 | 27,668.98±12,428.331 |
| Periodontal diseases (years)           | 8053.10±3710.862 | 23,125.27±7813.113 | 21,361.40±6864.723 |

SE=Standard error, SD=Standard deviation, CI=Confidence interval

disorder and neurological disorders exhibited a negative correlation with statistical significance. Prevalence of periodontal diseases rate was positively correlated with cardiovascular diseases, chronic respiratory diseases, diabetes, urogenital, blood, and endocrine diseases, musculoskeletal disorders and other NCDs with statistical significance, while drug use disorder was negatively correlated with statistical significance.
Discussion

The prevalence of dental caries of permanent teeth and periodontal diseases differ significantly across various parts of Asia-Pacific. The strong heterogeneity of the population in terms of dietary factors and oral hygiene practices and other deleterious may contribute to this difference. The absence of significance between various regions for edentulism indicates that the pattern of loss of tooth across Asia, for any reason is consistent across the Asia-Pacific region. Similarly, the prevalence of NCDs across the Asia-Pacific region is also heterogenic and widespread [Tables 1 and 2]. The absence of significance between genders and age groups indicate that they are not the main drivers of the difference in the trends of occurrence of tooth loss, dental caries of permanent teeth, and periodontal diseases. The literature is concurrent with these findings.\[5\]

The association of NCDs with various oral health issues at the population level [Table 5] relates to oral dysbiosis rather than to other disease processes. The statistical significance of oral dysbiosis is highest, especially when referring to periodontal health issues and subsequent tooth loss. The absence of significance for dental caries with NCDs is another significant association.

As the findings are found at the population level, the assessment of co-morbid NCDs and dental disease pose a challenge. Future studies need to assess this aspect further.

| Correlation differences in prevalence of oral diseases and noncommunicable diseases in the Asia Pacific region, 2016 |
|---------------------------------------------------------------|
| **Caries of permanent teeth** | **Edentulism and severe tooth loss** | **Periodontal diseases** |
| Cardio vascular diseases | –0.084 | 0.859** | 0.471** |
| Significant (two-tailed) | 0.659 | 0.000 | 0.009 |
| Chronic kidney diseases | 0.130 | 0.896** | 0.355 |
| Significant (two-tailed) | 0.494 | 0.000 | 0.055 |
| Chronic respiratory diseases | –0.211 | 0.582** | 0.671** |
| Significant (two-tailed) | 0.262 | 0.001 | 0.000 |
| Cirrhosis and other chronic liver diseases | –0.121 | 0.316 | 0.117 |
| Significant (two-tailed) | 0.523 | 0.089 | 0.538 |
| Diabetes, urogenital, blood, and endocrine diseases | 0.293 | 0.400* | 0.480** |
| Significant (two-tailed) | 0.116 | 0.029 | 0.007 |
| Digestive disorders | –0.077 | 0.164 | 0.199 |
| Significant (two-tailed) | 0.686 | 0.387 | 0.291 |
| Drug use disorder | –0.301 | –0.424* | –0.537** |
| Significant (two-tailed) | 0.106 | 0.020 | 0.002 |
| Mental disorders | –0.111 | 1.000** | 0.237 |
| Significant (two-tailed) | 0.560 | 0.000 | 0.208 |
| Musculoskeletal disorders | –0.322 | 0.820** | 0.520** |
| Significant (two-tailed) | 0.082 | 0.000 | 0.003 |
| Neoplasms | –0.621** | 0.584** | –0.009 |
| Significant (two-tailed) | 0.000 | 0.001 | 0.961 |
| Neurological disorders | 0.195 | –0.377* | –0.310 |
| Significant (two-tailed) | 0.302 | 0.040 | 0.095 |
| Other noncommunicable diseases | 0.117 | 0.743** | 0.724** |
| Significant (two-tailed) | 0.537 | 0.000 | 0.000 |

**P ≥ 0.01, *P ≥ 0.05**
The findings of the linear association, especially with cardiovascular diseases, chronic kidney diseases, chronic respiratory diseases, diabetes, urogenital, blood, and endocrine diseases have been reported earlier.[5]

The increasing microplastic pollution seeping into food chain is a cause of concern. With its far-fetching impact, plastic pollution, especially in micro- and nanoparticle form could cause an unprecedented effect on the overall health of human and all biological species. The endocrine disruption of plastic is well documented.[10‑15] Endocrine disturbances, as seen in this study result are more pronounced and the role of plastic in this aspect has to be probed further. Role of bottled water, as a source of plastic has already been reported.[14‑16] The shortage of potable drinking water is on the rise in Asian economies and usage of bottled water is also on the rise in Asian countries. The possible link between the increasing incidence of this practice and the rise of NCDs needs further exploration.

Maintaining adequate oral hygiene and preserving tooth assume more significance in the light of the findings that higher human functions such as cognition are associated with mastication efficiency.[22] Loss of tooth has been associated with cognitive decline that is much pronounced in the elderly.[23,24] With replacing the lost tooth, cognitive functions have been reported to be regained, to remarkably improve the quality of life.[23,24] However this comes with additional burden, as there are studies to report, increased rate of mortality in dental implant patients, especially among those suffering from cardiovascular diseases or causes.[27] These studies underline the need for maintaining adequate oral hygiene, the need to preserve the natural tooth as well as replacing the lost tooth. If the debate on the link between poor oral health and NCDs could be presented with strong scientific evidence and a favorable outlook created among the public, a complete support from the population could be expected.

In lieu, if scientific evidence and the public response are unfavorable, the policymakers would be forced to create alternate supportive mechanisms such as a “sin tax” or “sugar tax.” In situations, especially where there is weak scientific evidence and an unfavorable public response, the support for the proper oral health measures would be negative [Figure 3]. The oral health research community, the dental policy makers, as well as the health profession’s leadership need to create awareness among the public for widespread support, while the scientific evidence needs to be developed from the members of the oral health profession. Most importantly, results of such science should reach the general public.

In health care policies, decisions and plans taken in such contrasting situations, are in line with “Window of opportunity” or the more related “Overton window.”[28] The concept refers to a narrow range of evidence-based policies considered politically acceptable in any public opinion. Often in democracy or any form of governance, policy makers, due to several constraints, are forced to operate between the windows of opportunity. They would always ensure the extremes of boundaries are not transgressed if they look to keep their positions. While the supporters of the proposed policies outside of the considered spectrum will work to convince the public to increase the scope of the window, those supporters (within the window) emphasize their stand and resist the expansion of the window. A narrow window would indicate that the widely held beliefs would be closer to evidence-based policies, and if the window is wide, in all possibilities, the policies could significantly deviate from actual science. Figure 4 indicates one such OVERTON WINDOW of oral health policies.

Maintenance of optimum oral health for overall general health needs a societal change catalyzed by oral health professionals. For this to occur, the oral health professionals need to face a narrower range of socially acceptable positions than the range of possible positions. Positions within the concept of “Overton window” are seen as mainstream and uncontroversial, while that outside of it are viewed as shocking, upsetting, and dangerously radical. The key point is that, with sufficient social pressure and awareness campaigns, the Overton window can shift over time, and today’s radicals may be tomorrow’s moderates. The oral health reform movement has to shift the Overton window to make progress. This comes with raising awareness and the motivation to change, so that oral

| Scientific Evidence | Perception-Response to Poor Oral hygiene - NCD relationship |
|---------------------|----------------------------------------------------------|
| Strong              | Favorable                                                |
| Partial support     | Unfavorable                                              |
| No support          | Unfavorable                                              |
| Partial Support     | Favorable                                                |

Figure 3: The combination of choices of scientific evidence to perception-response of public to poor oral hygiene-noncommunicable disease relationship
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health literacy, beliefs, and practices are modified among the wider public. Perceptions of oral health, which were once viewed as unthinkable radical, have now become the accepted wisdom, while those that were once considered mainstream are now outside the window and unacceptable.

To shift the Overton window, dental policymakers and the oral health profession’s leadership need to position themselves outside of it and perform successfully. Social change always begins with a few brave, such as the before mentioned leadership, that dares to advocate and promote aggressively, which is currently perceived as unthinkable. Moreover, like most of those first-generation public policy advocates, they would be facing negativity that needs to be countered with evidence-based dental science. However by their mere existence, by their willingness to stand fast on their principles and refusal to compromise, the leaders stretch the boundaries of what the majority considers possible and redefine what counts as the “moderate” position. Radical ideas take time to produce changes in policy. When social and political forces bring about change in oral health policies, the window of oral health possibility shifts up or down the spectrum, and can also expand to include more policy options or shrink to include fewer.

The existing leadership of dental associations of the Asia-Pacific region needs to collaborate with the NCD-Alliance and other medical specialty organizations, with professional groups contributing to oral health promotion and disease prevention, like educators community workers and auxiliaries, as well as with other international bodies, like the WHO and the UN, to evolve a comprehensive sentinel mechanism of mutual reference, in which the dentist can function as the central NCD-prevention reference-professional. As worsening of oral diseases and progression of several NCDs are highly interrelated, identifying, diagnosing, and treating both entities needs to see all medical professions involved. The existing National Dental Associations (NDAs) shall identify the priority of NCDs in their communities, nations, regions and enter into an official referral program. There dentists and NCD-specialists (such as the diabetologist or cardiologist) mutually refer to each other, under a noncontractual agreement in the best interest of the profession and the patient/people.

This needs a strong commitment from the leadership of the NDAs as well as the representatives of other medical specialties. As sentinels of oral health and thus general health, the existing dental associations’ leadership should take a step back and reassess strategies to combat NCDs. For this, it is absolutely essential that the voice of the oral health professionals resonates in unison with other health professionals at national, regional, and global forums and that it emphasizes their role in combating NCDs.

To enable this, the FDI World Dental Federation, as the global voice of dentistry needs to have a repository of data pertaining to oral health, NCDs and the overlap. At present, the FDI database has resources at https://www.fdiworlddental.org/resources/oral-health-atlas/oral-health-atlas-2015. The database is actually growing by collecting new data with FDI’s Oral Health Observatory project, in which many NDAs are already involved. This has to be further enriched to include the prevalence of NCDs and the overlap of NCDs and oral health. NDAs should be encouraged to collect micro-level and macro-level data, including an oral health quality of life questionnaire on a cross-sectional as well as a prospective basis to ascertain
the truest impact of oral health on the prevention as well as on the progression and treatment of NCDs. This repository of data, in real time basis, could be an immense source of data to regulate oral diseases as well as to combat NCDs. In addition, the data and their results would help FDI, backed by its regional organizations and supported by its member-NDAs, to emerge as a large player on a higher level in the global health arena. The FDI, by this virtue, would emerge as a prominent reference organization when it is about any discussion dealing with oral disease, general disease prevention and oral health promotion, and the overdue implementation of oral health in all health policies and socioeconomic planning processes. The latter would give significant support to the “triple billion targets” to be achieved until 2023 and defined in the WHO’s Universal Health Coverage.

When the societal and biopsychosocial determinants of health as a cause of NCDs and oral disease are deeply studied and adequately reported, the emerging/future business models would be forewarned to stay away from a philosophy based on negativity, over-consumption and entropy of quality that of quality of life included. This chance to radically change towards a strategy of negentropy of quality is presently knocking at our doors.[29] This means order and organization of global economics, finances, health, politics, and societies promise to lead toward a “market” that creates increased revenues and respect for the globe and for people. FDI, as the leader of NDAs and a responsible advocate for the sentinel-function of the oral health profession, should start preparing for the same. The Asia-Pacific region, with its large population, resources and strong academic drive should initiate the process of creating, maintaining, and reporting this data in real time, possibly evoking help from all available sources including big data analysis, artificial intelligence, and Internet of things.

Conclusions

At the population level, in adults, increase of NCDs is associated with the burden of dental diseases, notably of periodontal diseases. The Asia-Pacific region is one of the most populous regions of the world having both developed and developing economies. There is a sufficient difference in the occurrence of oral diseases in Asian countries and this is related to the burden of other NCDs too. The policymakers need to move the governance and public perception in favor of maintaining adequate hygiene for overall well-being. In addition, the data herein underline that combating oral diseases need to be taken on the same plane as that of diabetes, hypertension, or respiratory disorders. From literature, it is evident that oral diseases and these conditions are related at a prognostic level. It is imperative that oral health policymakers in the Asian region need to work together to make oral health a priority and to combat the increasing menace of an increasing NCD burden.

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Conflicts of interest

There are no conflicts of interest.

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