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Demographics of oral cancer in older people: Global trends and challenges

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Abstract

Background: Oral cancer is the sixth most common cancer worldwide. The mean age of diagnosis of oral cancer among older people is 63 years. Various factors such as betel quid chewing, tobacco use, socio economic and cultural factors have resulted in an increased predilection geriatric oral cancer for Asia. Oral cancer significantly affects quality of life in elder individuals and the estimated future increase in their incidence and mortality rates implies its significance as a major public health concern.

Objective: Ensure Dental professionals to realize that oral cancer is much more prevalent among older people compared to the young, to illustrate the geographical distribution patterns and identify future trends and challenges in geriatric oral cancer.

Methods: Literature review searches were done PubMed, Wiley Online & Cochrane Library Databases using keywords.

Keywords: Oral cancer, global demographics, elderly population, aging, incidence, mortality

1. Introduction

Oral cancers comprise of malignant neoplasms that arise from the tissues of the oral cavity and the oro-pharynx. Oral cancers are classified under head and neck cancers which comprise of malignancies that arise from the oral cavity, laryngo-pharyngeal complex, nasal cavity and paranasal sinuses. The majority of oral cavity cancer (OCC) are squamous cell carcinomas^[1] (SCC) and present usually with little or no distance metastasis. Alcohol, tobacco consumption^[2] and prior infection with human papilloma virus (HPV)^[3] are the predominant risk factors associated with OCC. It is widely accepted that Oral cancer among the elderly is caused by the use of tobacco and its related products. However, recent clinical suggests increased incidence of SCC in the elderly as a result of HPV infections^[4].

The advances in medical science and technology have resulted in an increase in the average human life expectancy. This reflects in the increase in the percentage of older people globally. According to the World cancer research fund International (WCRF), Cancer of the lip and oral cavity was the 16th most common cancer worldwide in 2020 with a total of 377,700 documented cases^[5]. However, there is a scarcity of data with regards to the epidemiology of OCC among older people. Therefore, treatment protocols for such patients are derived from retrospective data analysis from other population subgroups or by adapting treatment protocols designed for a younger population^[6]. This article is an attempt at identifying the current trends in the demographics of oral cancer in older people. Furthermore, this article aims to identify the challenges that needs to be overcome in order to make relevant data to be made available to researchers and clinicians.

¹ de Castro JG, Dos SA, Aparecida DA. Tongue cancer in the young [J]. *Curr Opin Oncol*. 2016;28(3):193-4.

² Chaturvedi P, Singh A, Chien CY, Warnakulasuriya S. Tobacco related oral cancer. *Bmj*. 2019 Jun 5;365.

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⁴ Zumsteg ZS, Cook-Wiens G, Yoshida E, Shiao SL, Lee NY, Mita A, Jeon C, Goodman MT, Ho AS. Incidence of oropharyngeal cancer among elderly patients in the United States. *JAMA oncology*. 2016 Dec 1;2(12):1617-23.

⁵ World cancer research fund International (WCRF), mouth and oral cancer statistics 2020. Available from <https://www.wcrf.org/cancer-trends/mouth-and-oral-cancer-statistics/> [Accessed 18th August 2022]

⁶ VanderWalde NA, Fleming M, Weiss J, Chera BS. Treatment of older patients with head and neck cancer: a review. *The oncologist*. 2013 May;18(5):568-78.

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This will enable clinicians to design and implement treatment protocols which are specific to older people who are afflicted by oral cavity cancer.

Global Demographics of Aging – 2022 till 2050

The United Nations defines an older person as someone who is 60 years and above. Older people are a significant yet underrepresented proportion of the general population at present. The rate at which the global population grows is expected to be significantly different for different regions of the world. The United Nations projects that approximately 61 countries will experience a reduction in their population from 2022 till 2050 while eight countries shall be populated by approximately 50 percent of the global population by 2050. These countries are Egypt, Ethiopia, India, Democratic Republic of Congo, Pakistan, Nigeria, Philippines and the Republic of Tanzania. Therefore, while some countries shall experience an increase in population while others shall experience a decrease or static population growth rates. However, in contrast to this trend, the percentage of people who are aged 65 and above are estimated to increase significantly all over the world from 2022 till 2050.

Table 1: United Nations Global Geriatric population percentage projections– 2022 till 2050

Region	2022	2030	2050
World	9.7	11.7	16.4
Sub Saharan Africa	3.0	3.3	4.7
Northern Africa & Western Asia	5.5	7.0	12.5
Central & Southern Asia	6.4	8.1	13.4
Eastern & South Eastern Asia	12.7	16.3	25.7
Latin America & Caribbean	9.1	11.5	18.8
Australia / New Zealand	16.6	19.4	23.7
Oceania – excluding Australia & New Zealand	3.9	5.1	8.2
Europe & North America	18.7	22.0	26

Source: United Nations Department of Economic and Social Affairs, Population Division. world population prospects 2022

According to the UN population report 2019, the percentage of people who are 65 years and older will grow by 120% between 2019 and 2050 while the percentage of people who are 80 years and older are expected to be 197.9% in the same time frame. This implies that there will be an increased representation of the old and the very old in the general population. Since oral cancer is the 6th most common cancer among older people as of now, healthcare professionals need to be aware of the challenges OCC in elderly can pose to quality of life in older people.

Global demographics of Oral Cancer by age

According to the American Cancer society, the medial age of diagnosis for oral cancer is 62 years. Furthermore approximately 75% of patients are diagnosed above the age of 55 years. This section tries to highlight the predilection of oral cancer among the elderly population by summarizing the results of studies done around the world.

The biopsy records of oral cancer patients from the Department of Oral medicine and Diagnosis in nine universities located in five countries between 2005 and 2014 were reviewed for a multi-center study approved by the Chulalongkorn University, Faculty of Dentistry Thailand. The demographic findings are as follows.

Table 2: Oral cancer patients – Average age, male: female ratio and prevalence

Country	Prevalence	Mean Age +/- SD	Male: Female Ratio
Canada	1.71	69.22±15.51	1.28:1
Korea	3.43	61.41±14.36	1.67:1
Iran	3.88	56.55±19.80	1.13:1
Taiwan	0.83	54.83±12.34	5.62:1
Thailand	6.23	59.13±17.32	0.86:1
Total	1.30	58.37±15.77	2.22:1

Source: Oral cancer: A multicenter study. Med Oral Patol Oral Cir Bucal. 2018 Jan 1;23 (1): e23-9 [7].

According to the National Institute of Dental and Craniofacial Research, USA oral cancer incidence among Americans peaks between 70 and 80 years [8]. A retrospective epidemiological study of data from the Saudi Cancer registry between January 1994 till December 2015 confirms a positive correlation between oral cancer and older age groups [9]. Furthermore, there is a greater predilection for males than females. These findings were consistent among a number of epidemiological studies conducted worldwide. The findings from the studies mentioned above are depicted in the following figures.

Oral cancer in older people – Current and future trends

The global cancer observatory {GLOBOCAN} is an online database which is a part of the international agency for cancer research and the World Health Organization. This database provides statistics about 36 types of cancers from 180 countries [10].

The following figure depicts the number of oral cancer cases globally as on 2020 and the estimated projections for the same from 2020 till 2040.

Many studies have concluded that oral cancer is more prevalent in Southern Asia than in other parts of the world. Factors like tobacco and alcohol usage, betel quid chewing and socio-cultural norms have been found to be responsible for this predilection [11]. Regarding Oral cancer, the elderly population globally exhibit the same trend. As of 2020, the Asian geriatric population {58.1%} has been found to have the highest number of Oral cancer patients followed by Europe {22.1%} and Northern America {9.6%}. Figure 4 illustrates that Asian geriatric population is estimated to contribute the newest cases of Oral cancer from 2020 till 2040 followed by Europe and Northern America.

Among countries globally, Papua New Guinea has the highest incidence and mortality rates for older cancer among older people in 2020. This is followed by Sri Lanka, Bangladesh, India and Pakistan.

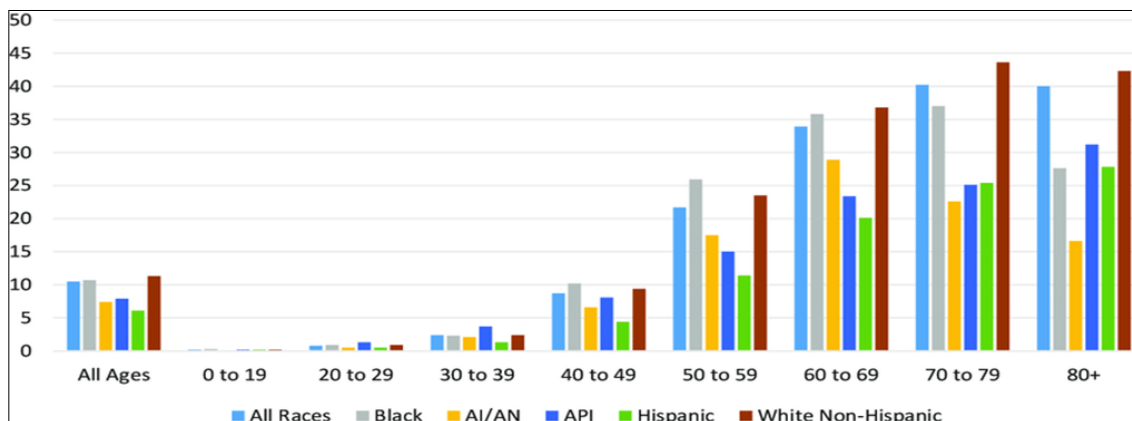
⁷ Dhanuthai K, Rojanawatsirivej S, Thosaporn W, Kintarak S, Subarnbhesaj A, Darling M, Kryshalskyj E, Chiang CP, Shin HI, Choi SY, Lee SS. Oral cancer: A multicenter study. Medicina oral, patologia oral y cirugia bucal. 2018 Jan;23(1):e23.

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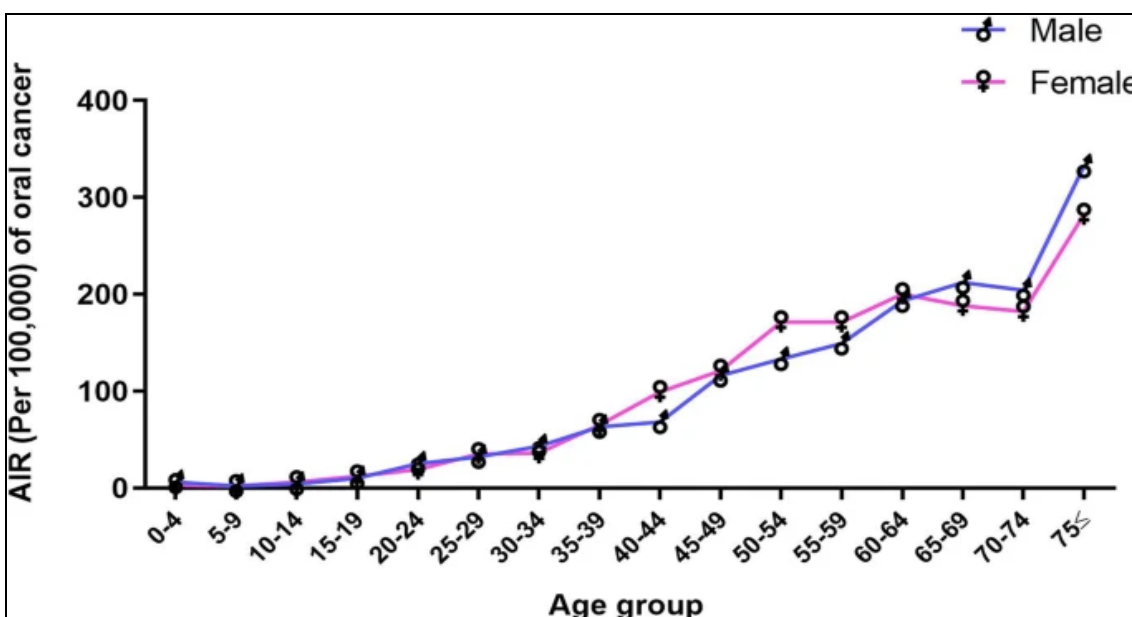
¹⁰ Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians. 2021 May;71(3):209-49.

¹¹ Rao SV, Mejia G, Roberts-Thomson K, Logan R. Epidemiology of oral cancer in Asia in the past decade-an update (2000-2012). Asian Pacific journal of cancer prevention. 2013;14(10):5567-77.



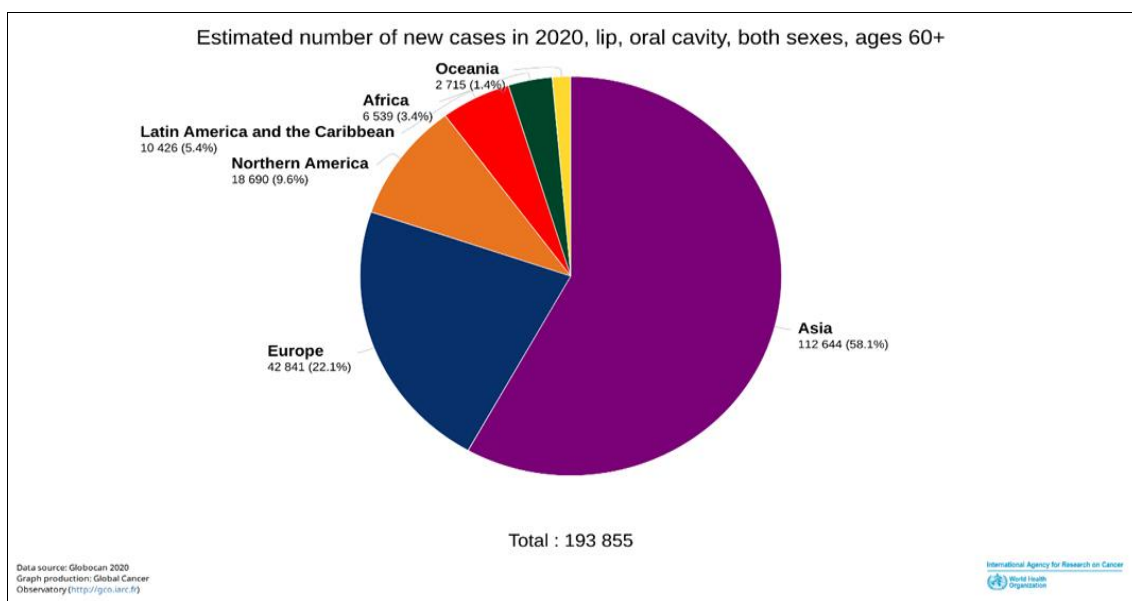
Source: National Institute of Dental and Craniofacial Research, 2009

Fig 1: Oral cancer incidence among 100,000 people by race, age & gender in USA



Source: Saudi Cancer Registry, 1994 – 2015

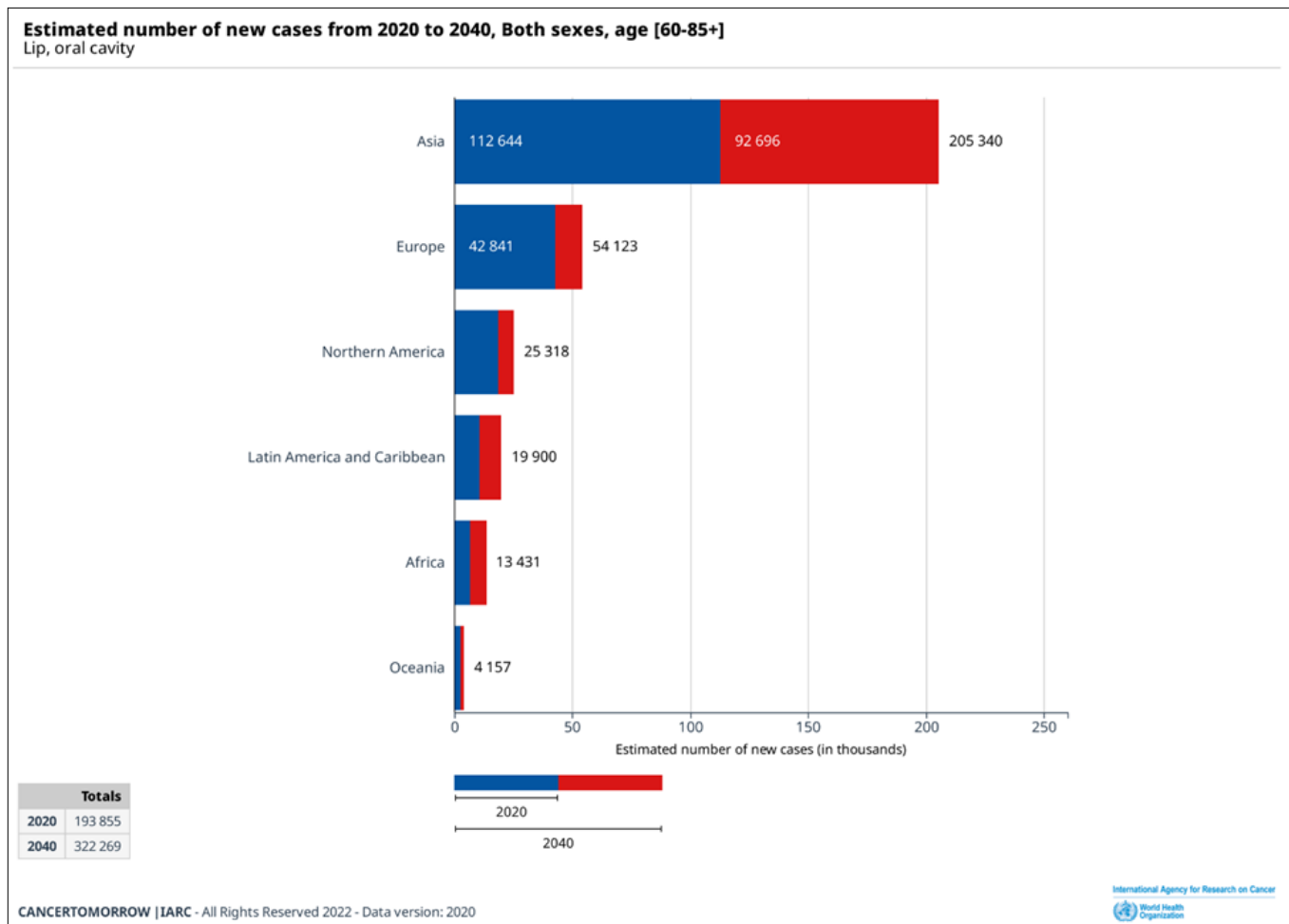
Fig 2: Age specific incidence {AIR} in Saudi Arabia between 1994 and 2015



Source: Global cancer observatory, 2020 [12].

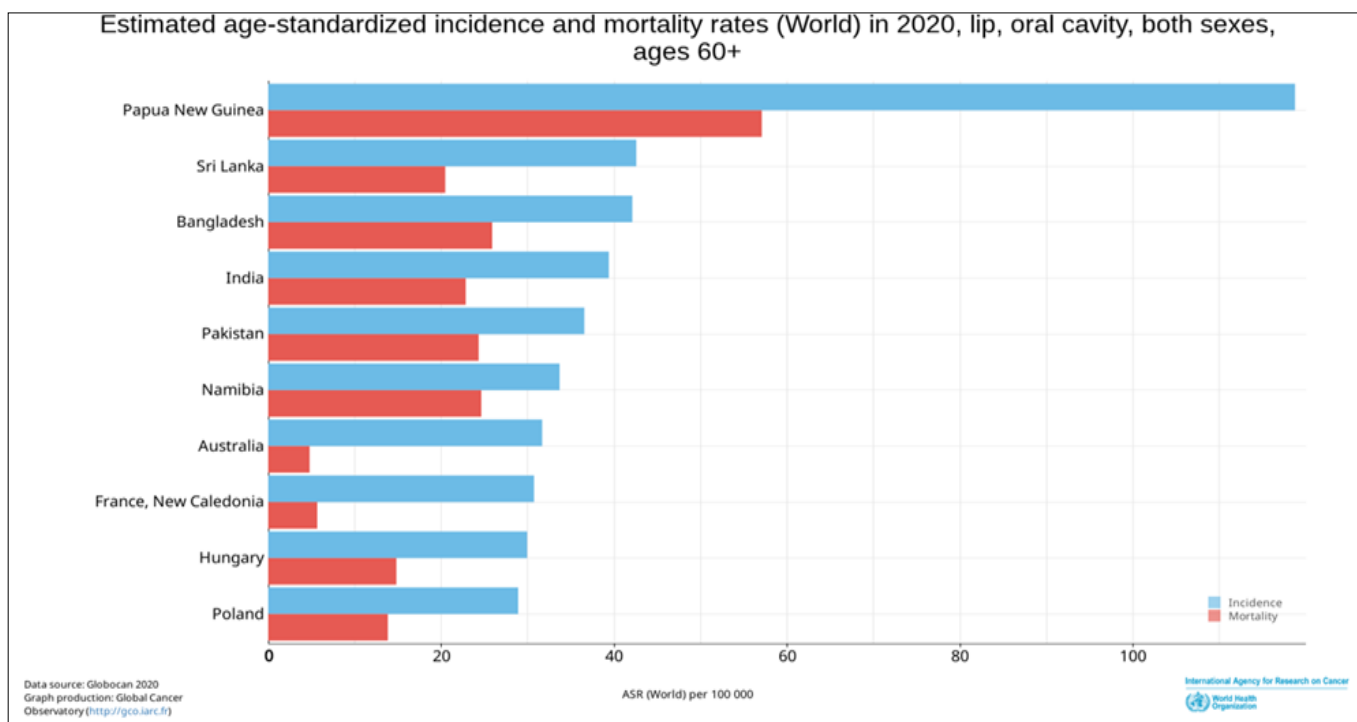
Fig 3: New oral cancer cases among elderly population globally- 2020

¹² World Health Organization International Agency for Research on Cancer (IARC). GLOBOCAN 2012: estimated cancer incidence, mortality and prevalence worldwide in 2012. [homepage on the internet]; 2012 [cited 2016 Apr 23].



Source: Global cancer observatory, 2020

Fig 4: Estimate of new oral cancer cases among elderly population globally, 2020 - 2040

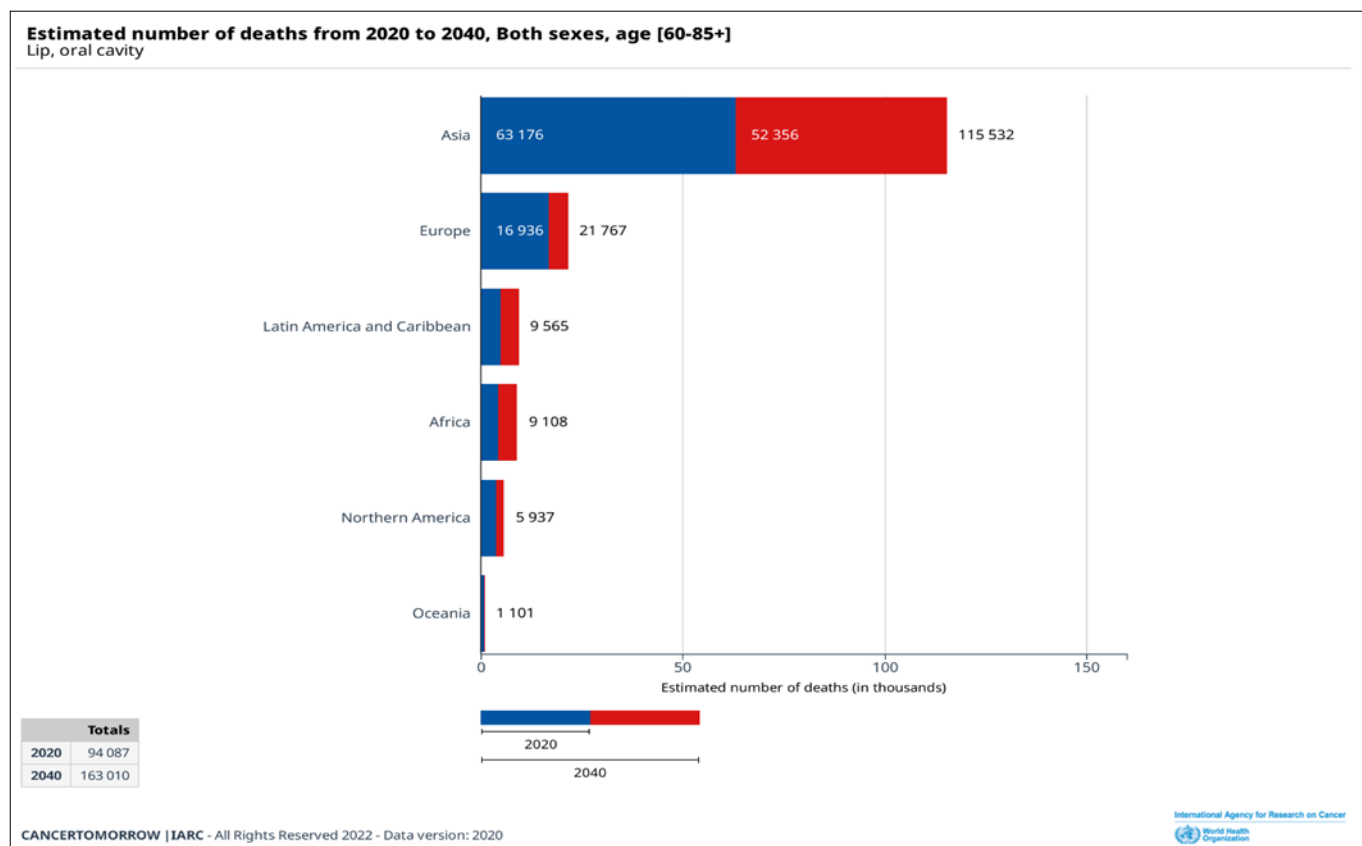


Source: Global cancer observatory, 2020

Fig 5: Countries with highest incidence and mortality rates of Oral cancer among elderly population globally- 2020

Asia is estimated to have the highest mortality rate due to oral cancer among elderly from 2020 till 2040 followed by Europe and Latin America/Carribbean. This trend follows the estimated new cases in the same time frame with one exception. Northern America which was estimated to have the 3rd highest number of new Geriatric oral cancer patients has

the least expected number of deaths next only to Oceania region for the same time frame. The increased rates for geriatric oral cancer coupled with the decreased mortality rates can be probably attributed to the advanced healthcare and socio-economic systems in place in the developed northern Americas.



Source: Global cancer observatory,2020

Fig 6: Countries with highest estimated deaths of Oral cancer among elderly population globally, 2020 till 2040.

Oral cancer in older people – Challenges

There is a scarcity of data when it comes to the treatment of malignancies among the elderly population and oral cancer is no exception to this. Treatment protocols for oral cancer are derived from analysis of retrospective data derived from a predominantly younger population [13]. There are lot of factors that contribute to this scarcity of data. These include the existence of multiple comorbidities in the elderly population, lack of access to proper to healthcare especially in rural areas, nutrition status, cognitive ability, dependency on familial and social care networks for activities of daily living and socio-economic factors which are a combination of a person's education, income, employment status, familial and social support.

In addition to above, factors such as fear for post treatment complications, limited socio economic/familial support and perceived shortened rest of life affects a physician's choices with regards to the treatment of oral cancer in elderly patients [14]. According to Jelinek *et al.* [15] a thorough geriatric

assessment must be done prior to any decision regarding treatment options and this assessment must include a thorough assessment of the factors mentioned earlier [16].

Oncologists use various indices to assess the impact of comorbid disease conditions and physical status on mortality and how it affects success rates of any treatment procedure. Examples of these indices include the Charlson comorbidity index (CCI) [17], Eastern Cooperative Oncology Group (ECOG) performance status [18]. Karnofsky performance index, Adult Comorbidity Evaluation-27 (ACE-27) and the American Society of Anesthesiologists (ASA) classification of physical status. The ECOG performance status index and the Charlson comorbidity index are illustrated below.

¹³ VanderWalde NA, Fleming M, Weiss J, Chera BS. Treatment of older patients with head and neck cancer: a review. *The oncologist*. 2013 May;18(5):568-78.

¹⁴ Chen RC, Royce TJ, Extermann M, Reeve BB. Impact of age and comorbidity on treatment and outcomes in elderly cancer patients. *In: Seminars in radiation oncology* 2012 Oct 1 (Vol. 22, No. 4, pp. 265-271). WB Saunders.

¹⁵ Jelinek MJ, Howard AS, Haraf DJ, Vokes EE. Management of early head and neck cancer in elderly patients. *Journal of oncology practice*. 2018 Sep;14(9):541-6.

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¹⁸ ECOG Performance Status [Internet], ECOG-ACRIN Cancer Research Group; Philadelphia (PA): 2021. [cited 2021 Jan 18]. Available from: <https://ecog-acrin.org/resources/ecog-performance-status>.

Table 2: Eastern Cooperative Oncology Group (ECOG) performance status index

Grade	ECOG performance status
0	Fully active, able to carry on all pre-disease performance without restriction
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work
2	Ambulatory and capable of all selfcare but unable to carry out any work activities; up and about more than 50% of waking hours
3	Capable of only limited selfcare; confined to bed or chair more than 50% of waking hours
4	Completely disabled; cannot carry on any selfcare; totally confined to bed or chair
5	Dead

Table 3: Charlson comorbidity index (CCI) and head and neck CCI (HN-CCI) scores

Congestive heart failure	1	Congestive heart failure
Peripheral vascular disease	1	
Cerebrovascular disease	1	Cerebrovascular disease
Dementia	1	
Chronic pulmonary disease	1	Chronic obstructive pulmonary disease
Rheumatologic disease	1	
Peptic ulcer disease	1	Peptic ulcer disease
Mild liver disease	1	Liver disease
Diabetes	1	Diabetes
Cerebrovascular (hemiplegia) event	2	
Moderate-to-severe renal disease	2	
Diabetes with chronic complications	2	
Cancer without metastasis	2	
Leukemia	2	
Lymphoma	2	
Moderate or severe liver disease	3	
Metastatic solid tumor	6	
Acquired immune-deficiency syndrome (AIDS)	6	

However, there are no such indices for the measurement of other factors such as socio-economic factors that greatly influence the treatment outcomes in geriatric oral cancer patients. Such assessments are comprehensive in nature, require time, and cooperation between professionals from different domains such as medical & dental physicians, geriatrician, gerontologist and social care workers. Furthermore, protocols and systems must be designed and put in place for such comprehensive assessments to be conducted at an earlier stage so that their results can be incorporated into treatment planning by the physicians.

Conclusion

Many studies have shown that age is not a single factor that determines treatment modality and outcomes in the elderly with oral cancer. Furthermore, it is evident that oral cancer is

significant public health challenge among all population age groups especially the elderly. Oral cancer can be expected to be an increasing cause of mortality among the elderly in the near future unless adequate action is taken now. These could be public health practices such as educating people about the harmful effects of habits such as smoking and betel quid chewing to developing healthcare systems and practices that includes more summative assessments of patient's individual circumstances, developing data and artificial intelligence models that enhance treatment outcomes, to advanced treatment modalities that ensure better quality of life among older people.

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