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***Dimensions of oral cancer in Europe: an
epidemiological study***

**Fernando Pessoa Universtiy
Faculdade de Ciencias da Saude
Porto, 2022**

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*Dissertation presented to Universidade
Fernando Pessoa, as part of the
requirements for obtaining a Master's
degree in Dental Medicine*

Resumo

Objectivo : O objetivo deste estudo é fornecer uma revisão atualizada da incidência, prevalência e mortalidade do cancro oral na Europa e analisar o papel do médico dentista no âmbito desta doença

Método: bases de dados científicas (especialmente GCO IARC) foram usadas para recuperar dados sobre cancro oral em vários países europeus. As taxas de incidência, prevalência e mortalidade entre homens e mulheres em cada país foram comparadas e analisadas para fornecer uma visão geral da situação na Europa.

Esta análise foi completada por um foco no papel do médico dentista durante todo o percurso do doente, desde a prevenção ao diagnóstico e acompanhamento do tratamento e vigilância.

Resultados: o cancro oral é um importante problema de saúde e a redução da sua incidência e mortalidade depende da prevenção primária ainda não padronizada a nível europeu.

À luz dos dados recuperados, observamos diferenças significativas entre os países europeus e entre homens e mulheres em cada país. Isso pode ser explicado por um contexto político, económico e cultural diferente, além de fatores individuais (baixa escolaridade e baixos rendimentos) que podem ser um obstáculo ao acesso aos cuidados básicos de saúde.

Conclusão: Só podemos esperar que os países continuem e reforcem seus esforços na prevenção primária e secundária, promovam treino dedicado ao cancro oral para dentistas e sensibilizemos pacientes, e que a união europeia estabeleça diretrizes para todos os países

Palavras-chave: cancro oral, incidência, prevalência, mortalidade, factores de risco, prevenção, detecção, tratamento, dentistas, Europa

Abstract

Objectives: The aim of this study is to provide an up-to-date review of the incidence, prevalence, and mortality of oral cancer in Europe and analyze the role of dental practitioner within the scope of this disease.

Methods: Scientific databases (especially GCO IARC) were used to retrieve data regarding oral cancer in several European countries. Incidence, prevalence and mortality rates between man and woman in each country were compared and analyzed to provide an overview of the situation in Europe.

This analysis was completed by a focus on the role of dental practitioner during the whole patient path, from prevention to diagnosis and follow-up treatment and surveillance.

Results: Oral cancer is a major health issue and the reduction of its incidence and mortality depends on primary prevention which is not yet standardized at the European level.

In the light of the data retrieved, we observed significant differences between European countries so as between men and women in each country. It can be explained by a different political, economic, and cultural context, in addition to individual factors (low education and low income), which can be an obstacle to access to care.

Conclusion: We can only hope that countries will continue and reinforce their efforts in primary and secondary prevention, promote training dedicated to oral cancer for dental practitioners and educate patients, and that the European Union will set guidelines for all countries.

Keywords : *oral cancer, incidence, prevalence, mortality, risk factors, prevention, detection, treatment, dental practitioners, Europe*

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Table of contents

Resumo	V
Abstract.....	VI
Acknowledgements.....	VII
Abbreviations.....	IX
List of tables.....	X
List of figures.....	XI
I. Introduction	1
II. Tools and research methods	2
III. Body.....	3
1. <i>Incidence, prevalence, mortality and ASR</i>	3
2. <i>Literature review</i>	3
3. <i>Epidemiological data</i>	7
IV. Discussion.....	11
V. Conclusion.....	18
VI. Bibliography	19
VII. Appendix.....	26

Abbreviations

CE : Continuing Education

HPV: Human Papilloma Virus

IARC: International Agency for Research on Cancer

HNC : Head and Neck Cancer

NIDCR : National Institute of Dental and Craniofacial Research

NCBI: National Library of Medicine

OPMD: Oral Potentially Malignant Disorders

OSCC: Oral Squamous Cell Carcinoma

SBDE: Spanish Board of Dentists and Stomatologists

WCRF: World Cancer Research Foundation

WHO: World Health Organization

List of tables

Table 1 : Incidence, prevalence and mortality rates in 2020, lip and oral cavity, Europe
26

List of figures

Figure 1 : Share of preventable cancer among most common cancer types in Europe (Strengthening Europe in the fight against cancer, 2020)	26
Figure 2 : Human papillomavirus vaccination policies in EU/EEA countries and the United Kingdom, adapted from Colzani, et al., 2021	26
Figure 3 : Head and neck cancer risk factors adapted from Sun et al., 2021	27
Figure 4 : Estimated age-standardized incidence rates in 2020 for lip, oral cavity in Europe adapted from IARC.....	27
Figure 5 : Estimated age-standardized mortality rates in 2020 for lip, oral cavity in Europe adapted from IARC	28

I. Introduction

Lip and oral cavity cancers (or « oral cancers ») are one of the most frequent types of cancer in the world with 377 000 new cases diagnosed in 2020 (Giraldi et al., 2021). In Europe, around 100 000 people are diagnosed with oral cancers every year (European Parliament, 2021) and almost 90% of the total oral cancers are squamous cell carcinomas (OSCC) (D'souza and Addepalli, 2018). Recent research showed an increasing trend in OSCC for young patients (Mohideen et al., 2021).

Nowadays in Europe, oral and pharyngeal cancer represents the 8th most common cancer and the 11th leading cause of cancer-related mortality (Diz et al., 2017). Many scientific studies highlighted the causes as being predominantly lifestyle-related (Johnson et al., 2011), as smoking, alcohol, dietary habits, viral infection and pollution are part of the main risk factors. The contribution of these different factors varies from country to country but overall:

- oral cancer is particularly a disease of poor people (Johnson et al., 2011) ;
- 90% of oral cavity and lips cancer are preventable if lifestyle risk-factors are prevented (European Parliament, 2020), **see Figure 1 (in appendix)** ;
- there is a 2 to 1 ratio for oral cancer between man and woman, as men are smoking more, drinking more and are more likely to visit dentists less frequently than woman (Lipsky, MS et al., 2021);
- in Europe, Human Papilloma Virus (HPV) infections are responsible of a growing percentage of oral cancers among young people (WHO, 2022) ;
- 70% of cancers of the oral cavity are diagnosed very late, thus reducing the chance of recovery;
- tobacco and alcoholic patients are very often outside the medical system ;
- early cancer (stage 1 and 2) are curable as 90% of the concerned patients survive 2 years, and advanced cancer (stage 3 and 4) have a 45% chance of survival over 2 years if treated with surgery and chemotherapy (Ilhan et al., 2021).

With a high incidence and a high mortality rate, oral cancer is considered as a major public health problem. If primary prevention fails, the screening to detect oral cancer as early as possible is very important, that is why dental practitioners play a key role as they are making visual inspection and manual palpation. If patient with early-stage cancers

that have painless small ulcers, modular lesions or growths are detected early, they can follow the recommended treatment (surgery or radiotherapy alone), which results in an 80% chance of five-year survival rate (Sankaranarayanan et al., 2015). It highlights the importance of improved educational methods for dentists on oral cancer detection and prevention.

II. Tools and research methods

The aim of this study is to provide an up-to-date review of the incidence, prevalence, and mortality of oral cancer in Europe and analyze the role of dental practitioner within the scope of this disease.

In order to write the literature review, several institutional and international databases were used such as Pubmed, IARC, Globocan. Scientific articles were mainly found thanks to Elsevier database using the following keywords: oral cancer, incidence, prevalence, mortality, risk factors, prevention, detection, treatment, dental practitioners, and Europe.

Regarding **inclusion criteria**, we selected scientific articles written in English, Portuguese and French. We tried to base our study on recent articles and only few of them dated back to 2013. Regarding the content of the selected articles, we only chose those referring to oral cancer in Europe or more specifically those taking place in a particular country in order to gain insight on particular points linked to oral cancer (epidemiological data, launches of prevention campaigns, evolutions in the formation of dental practitioners...).

The main **exclusion criteria** was the category of cancer : all studies, figures and researches focusing on another type of cancer different than C00-006 were excluded.

In the end, 63 articles were used to work on this thesis and all are listed in the references section.

III. Body

1. Incidence, prevalence, mortality and ASR

Incidence “refers to the number of individuals who develop a specific disease or experience a specific health-related event during a particular time period (such as a month or year) (Harvard School of Public Health, 2022).

Prevalence “refers to the total number of individuals in a population who have a disease or healthcondition at a specific period of time, usually expressed as a percentage of the population” (Harvard School of Public Health, 2022).

Mortality is “the number of deaths occurring in a given period in a specified population. It can be expressed as an absolute number of deaths per year or as a rate per 100,000 persons per year” (International Agency for Research on Cancer, 2022). In this case, it is the number of deaths due to a specific disease.

Age-standardized rate (ASR) “is a summary measure of the rate that a population would have if it had a standard age structure. Standardization is necessary when comparing several populations that differ with respect to age because age has a powerful influence on the risk of dying from cancer. The ASR is also expressed per 100,000” (International Agency for Research on Cancer, 2022).

2. Literature review

Classification of oral cancer

Today there is an International Classification of Diseases for Oncology (ICD-O) coding. According to the classification found in Sarode, G et al (2020), oral cancers are cancers that develop in the floor of the mouth, the dorsal surface of the tongue, buccal mucosa, hard and soft palate, gums and inner lips.

Oral cavity is the most frequent anatomical subsite of upper aero-digestive tract malignancies.

Causes and risk factors related to oral cancer

i. Tobacco and alcohol

Association of tobacco and alcohol is, by far, the most common risk factor. For tobacco, the risk of development of oral cancer will increase with the duration of exposition and is 3 times higher for smokers than for nonsmokers (Nath et al., 2022).

Alcohol habits are part of risk factors that are strongly linked to oral cancers. The World Cancer Research Fund International (WCRF) estimated that 90% of mouth cancer worldwide are mainly linked to tobacco use, alcohol consumption or the combination of both (World Cancer Research Fund, 2018).

ii. HPV

HPV infection is the most common sexually transmitted disease in the world and is a risk factor for several types of cancer, including oral cancer. Of the more than 100 types of HPV, about 40 types can spread through direct sexual contact to genital areas, as well as the mouth and throat.

- About 10% of men and 3.6% of women have oral HPV during their lives (Lechner, et al., 2022) ;
- Most people clear HPV within one to two years but HPV infection is also likely to persist (Center for Disease and Control Prevention, 2022) ;

According to a study conducted by the NCBI, the HPV vaccine shows positive results regarding its effectiveness on oral and oropharyngeal infections (Nielsen et al., 2021). The measurements made on the quantity of antibodies formed present in post-vaccinated patients make it possible to neutralize the infection with HPV pseudovirions. In Western Europe, vaccination campaigns began fifteen years ago targeting young women. For nearly two years, vaccination campaigns have been recommending to include boys. In some western countries (France, Denmark) young women can be vaccinated for free. In Portugal, since October 2020, boys born from 2009 onwards can get the vaccine for free, under the National Vaccination Program. (Liga Portuguesa contra o Cancro, 2022). **Figure 2 (in Appendix)** highlights the different levels of HPV vaccination policy across Europe.

iii. Other risk factors : age, sun exposure, diet, nutrition, obesity

- Age : the occurrence of this cancer is rather late, with nearly 9 new cases out of 10 which are diagnosed beyond the age of 50 for men and women (Les cancers en

France, 2017).

- The oral cancer rates increase when people reach 50 years, and peak between 60 and 70 years (National Institute of Dental and Craniofacial Research, 2018).
- Sun exposure and outdoor activities have been linked to an increased risk of lip cancer.
- Nutrition in the broad sense (food, alcohol, physical activity and weight) and diet habits are also important risk factors :
 - being overweighted or obese increases the risk of cancer of the mouth (Mouth and oral cancers | WCRF International, 2022) ;
 - eating more fruits and vegetables tends to decrease the risk of developing oral cancers (Mouth and oral cancers | WCRF International, 2022) ;

In conclusion, oral cancers are mainly linked to behaviors that we can modify (smoking, alcohol consumption, unhealthy diet, activity, insufficient physical activity, UV exposure), as exposed in **Figure 3 (in Appendix)**.

Oral cancer prevention, detection, prognosis, and treatment

Taking into account the low survival rate of oral cancer detected at a late stage, reduction of risky behavior (primary prevention) and early detection (secondary prevention) is key to reduce incidence, cost burden and mortality (Hashim et al., 2019).

i. Primary prevention

The Institute for Work and Health in Canada defines primary prevention as being all the measures taken to “prevent disease or injury before it ever occurs. This is done by preventing exposures to hazards that cause disease or injury, altering unhealthy or unsafe behaviors that can lead to disease or injury, and increasing resistance to disease or injury should exposure occur” (Institute for Work and Health, Canada, 2015). Among these measures, we find all educational programs about healthy, safe habits and empowering individuals in order to take charge of their own health.

A healthy diet, good oral and sexual hygiene and awareness of the signs and symptoms are very important and should represent a major part of public health messages (Sankaranarayanan et al., 2015). It was demonstrated that providing patients with up-

to-date information about oral hygiene and OSCC is necessary to improve the prognosis of the cancer (Nocini et al., 2020). Information technologies could be useful to raise awareness among general population, especially to make them have regular self-inspections and go to dental practitioners (Capocasale et al., 2020).

As 80% of oral cancer new cases could be avoided if tobacco was eliminated and drinking reduce, dentist have a clear role to play in terms of primary prevention: encouraging their patients to adopt a healthier lifestyle (Bagán Sebastián, 2016).

ii. Secondary prevention: early screening and detection

Secondary prevention aims to “reduce the impact of a disease or injury that has already occurred” (Primary, secondary and tertiary prevention, 2015), which signifies the importance of detecting the disease at an early stage. Regarding oral cancer, it includes regular exams and screening tests of the oral cavity. Several studies highlighted the positive impact of visual screening of the oral cavity, in terms of its accuracy to detect oral precancerous lesions and cancer, and its cost- effectiveness (Sankaranarayanan et al., 2013).

Dentists should have a routine dental examination in order to identify any suspicious malignant lesions such as persistent red or white patches on the mucosa in the oral cavity or unexpected tooth mobility (Bagán Sebastián, 2016).

Early detection of oral cancer is then key regarding the prognosis and the survival rate of the patient. Therefore, delay in diagnosis can have a really negative outcome. About 30% of patients usually wait more than 3 months before consulting a medical/dental practitioner after seeing any signs or symptoms (Gajul, 2021). The main reasons found in the study are financial barrier, low income and low education, absence of pain, lack of awareness.

iii. Prognosis

The prognosis highly depends on the moment when patients are going to a healthcare professional and the stage at which the appropriated treatment begins (Gajul, 2021). It also mainly depends on tumor resectability (technical ability to resect the tumor with a clear margin) and patient comorbidities. The usual delayed diagnosis explains the poor prognostic of oral cancer in spite of what exists in terms of prevention and therapeutic

methods (Paré and Joly, 2017).

Impact of Covid-19

Recent research highlighted that since the beginning of the Covid-19 crisis, tobacco use, alcohol consumption and obesity rates have risen significantly (Nath et al., 2022). If this trend goes on, researchers are expecting an increase in oral cancer rates and advise for more systematic screening practices.

Globally, the pandemic situation has highly modified lifestyle habits that can have a rather consequent impact on oral cancer incidence, detection and treatment, as lockdowns have prevented people from receiving routine dental care service.

Another study published by the NCBI in 2022 (Nath et al., 2022) confirms that the pandemic has had a major impact on the regularity of patient consultations.

3. Epidemiological data

According to the Europeans regions defined by the United Nations, we obtained data on the incidence, prevalence and mortality for oral and oropharyngeal cancer in Northern Europe, Eastern Europe, Southern Europe and Western Europe. We found the data from the International Agency for Research on Cancer (IARC), a population-based cancer registry, and chose to focus on 12 countries (5 from Western Europe, 3 from Southern Europe, 3 from Northern Europe and 1 from Eastern Europe). We analyzed each of them to better understand the country and then compare them if it is relevant.

We chose to look at the list of cancer as published by the European Cancer Information System (European Commission Information System, 2022) and more precisely at the code ranging from C00 to C06 which includes cancer of the lips and oral cavity.

The **Table 1 (see below)** presents a selection of the chosen countries in order to provide an overview and draw conclusions about epidemiologic figures in each country. That is why, in the table below, you will find the incidence of the pathology, according to gender, the prevalence of the disease as well as the mortality rate. The ASR is a weighted mean of the age-specific rates where the weights are taken from the population distribution of a standard population (the ASR is expressed per 100.000). ASR is an essential term when we want to compare statistics between countries because the population are not equal

between them. ASR provides a precise vision of the impact of the pathology on a given population.

Countries	Incidence				Prevalence (5 year)			Mortality rate			
	Estimated number of newcases in 2020				Proportions per100 000			Estimated number ofdeaths in 2020			
	M	W	Both	ASR	M	W	Both	M	W	Both	ASR
Europe C00-06	44519	20760	65279	4.6	132213	65302	197515	17645	6930	24575	1.6
Hungary	792	361	1153	6.3	2279	1088	3367	430	134	564	3.2
France	4244	2333	6577	5.4	12978	7373	20351	1131	534	1665	1.2
Portugal	804	299	1103	5.3	2333	903	3236	290	92	382	1.7
UK	3931	2386	617	5.1	12431	7865	20296	1074	656	1730	1.2
Belgium	640	352	992	4.6	2020	1147	3167	202	109	311	1.3
Spain	3035	1779	4814	4.5	9407	5571	14978	791	479	1270	1.1
Germany	4478	2855	7333	4.3	14377	9567	23944	1557	763	2320	1.1
Netherlands	885	673	1558	4.3	2866	2242	5108	175	156	331	0.8
Denmark	238	166	404	3.6	765	552	1317	89	51	140	1.1
Austria	369	196	565	3.4	1153	637	1790	202	79	281	1.4
Sweden	356	331	687	3.1	1176	1103	2279	124	107	231	0.9
Italy	2368	1669	4037	2.8	7305	5214	12519	932	653	1585	0.9

Table 1 : Incidence, prevalence and mortality rates in 2020, lip and oral cavity, Europe

The average values of all European countries are shown in the first line of the table (grey line).

These figures do not correspond to a calculated mean among countries in this table.

Figures in red are highlighting countries which ASR ratio are above the European average values.

M : Men W : Woman Both : Men + Woman

As you can see in Table 1, the ASR **Incidence ratio of oral cancer** in Europe is 4.6 (grey line). In our study, only four countries have higher ARS ratio. Detailed ASR ratio are highlighted in **Figure 4 (in Appendix)**.

Prevalence of oral cancer (over a period of 5 years, and proportions for 100,000) concerns 132213 men and 65302 women.

Regarding **ASR Mortality of oral cancer**, you can see that the ratio of the whole of European countries is **1.6** (only Hungary and Portugal have higher ratio). Detailed ASR ratio are highlighted in **Figure 5 (in Appendix)** : in 2020, it represented an estimated number of deaths of 17645 men, 6930 women, for a total of 24575 deaths. We are now going to expound the situation in each country. They are ranked according to their geographical area and ASR, from high to low.

i. Western countries

In **France**, the incidence of oral and pharyngeal cancer has traditionally been high in both men and women and has shown marked geographical variability, with a higher incidence in the north, west, and east of the country compared with the south. The incidence for men is 4244, 2333 for women, for a total of 6577, which are quite high values while taking into account a very high ASR (5.4). Prevalence for men is 12978 and 7373 for women. The mortality rate is also quite high with 1131 deaths for men and 534 for women. The ASR for mortality also shows high value with 1.6. France is the 4th country in Europe in term of population.

In **Belgium** has also quite high values for a smaller population. Belgium is ranked 11th in Europe in term of population but has significant values for its population. Incidence rate for men is 640 and 352 for women for a total of 992 and a pretty high ASR (4.6). Prevalence is 2020 for men and 1147 for women for a total of 3167. Finally the mortality rate is also quite high with 202 deaths for men during 2020 and 109 deaths for women, for a total of 311 deaths in the country in 2020. The ASR of mortality rate is 1.3.

In **Germany**, which is the 2nd Europe biggest rate in population, values are not high as France with an incidence of 4478 for men and 2855 for women, with a 4.3 ASR. Prevalence is 14377 for men and 9567 for women for a total of 23944. The mortality rate for men is 1557 for men and 763 for women, for a total of 2320 deaths in 2020. Germany's mortality rate ASR is 1.1

Netherlands also has standard values, low values, with an incidence of 885 for men and 673 for women with a 4.3 ASR which is under the average. Prevalence for men is 2866 for 100,000 people and 2242 for women. Mortality rate is 175 for men and 156 with a 0,8 ASR. One thing we can notice here is the relatively equal ratio of men to

women.

Austria has the 2nd lowest stats on this table with an incidence of 369 for men and 196 for women. The ASR value is also quite low with a 3.4, which shows the country is below average and a low estimated number of new cases. The prevalence is also very low compared to other countries on the table with 1153 for men and 637 for women. Finally, the mortality rate is 202 for men and 109 for women with a 1.4 ASR, which is also a really low value in comparison to other countries. This type of cancer is placed at the bottom of the grid of the types of cancer recorded in Austria.

ii. Southern countries

Portugal, on the contrary, has high values for its country with an incidence of 804 for men and 299 for women. We also can notice the gap between men and women, which shows men are more affected by oral cancer than women. The ASR, 5.3, is the (third) highest rate of our table. The prevalence is 2333 for men and 903 for women. The mortality rate is also quite high with 290 for men and 92 for women. Mortality rate ASR for Portugal is 1,7 which is upper the world ASR.

Spain has higher values than the last 3 countries we evaluated with 3035 of incidence of men and 1779 for women with a 4,5 ASR. ASR is still under Europe average but is kind of close. Spain is the 6th country in term of population compared to Europe. Prevalence for Spain is 9407 for men and 5571 for women. Mortality rate is 791 for men and 479 for women, with an ASR of 1,1.

Italy, which is ranked 5th in terms of population in Europe, has a really low incidence rate compared to other countries on the table with 2368 new cases for males and 1669 for women. Italy's incidence ASR is 2.8. The prevalence is 7305 for men and 5214 for women. Mortality rate is also interesting here with 932 deaths for men and 653 for women but above all, the second lowest ASR of our table with 0.9. Oral cancer is the 30th cancer in the leading causes of death in Italy (for 50 diseases evaluated). Italy has definitely one of the lowest rate for its population in term of oral cancers in Europe.

iii. Northern countries

United Kingdom has an incidence of 3931 for men and 2386 for women with and ASR of 5,1 which is also higher than Europe rate. The prevalence for UK is 12431 for men

and 7865 for women. It's good to mention that UK is 3th country rank in term of population in Europe. The mortality rate for UK is 1074 for men and 656 for women, with a ASR of 1.2, that place UK upper the Europe average as well.

Denmark has lower statistics with an incidence of 238 for men and 166 for women, for a 3.6 ASR, which is quite under Europe values. Prevalence for Denmark is 765 for men and 552 for women. The mortality rate is also quite low with 89 deaths for men and 51 deaths for women in 2020, with a ASR of 1.1, showing that the country has one of the lowest mortality rate in Europe, compared to others countries on the table.

Sweden has also lower statistics with an incidence of 356 for men and 331 for women. The ASR is 3.1, which is the 2nd lowest incidence rate on the table. The prevalence is 1176 for men and 1103 for women. Finally, the mortality rate for men is 124 and 107 for women with a ASR of 0.9, which places Sweden as the 2nd lowest mortality rate of our table. One thing we can mention are the similar values between the two genders.

iv. Eastern countries

Hungary has the highest incidence rate ASR (6.3) and highest mortality ASR (3.2) among the studies European countries. The prevalence is 2279 for men and 1088 for women. Mortality in 2020 reached 430 for men and 134 for women. Hungary mortality's ASR is the highest in Europe with 3.2.

IV. Discussion

As shown in Table 1, the ASRs of the different countries vary significantly : the lowest incidence ASR being 2.8 in Italy and highest value being 6.3 in Hungary (among countries within the scope of this study). Only Hungary, France, Portugal and UK have a higher incidence ASR value than the European mean. Regarding mortality, only Hungary and Portugal have a higher value than the European mean, as shown in **Table 1**.

Differences between countries can be explained by several factors. Countries are listed according to their ASR incidence ratio.

The statistics of Hungary are important to analyze because this country has very values, much higher than European means. These high values are mainly due to a lack of oral health consciousness of population, a poor performance of systematic primary and

secondary prevention, high tobacco and alcohol consumption and low physical activity. More than one in four adults reported smoking daily in 2014 (Cselkó, et al., 2018).

In France, the socio-economic status is a major risk factor associated with oral cancer, as people with low level of education or a low income are more likely to develop this type of cancer, regardless of smoking or alcohol consumption (Jéhannin-Ligier et al., 2017).

Moreover, France is renowned for being the country of gastronomy. Good food, alcohol, and tobacco take an important place in social life, both in production and consumption. This way of life induces an excess incidence and excess mortality of oral cancer in certain regions such as Hauts de France, Pays de la Loire, and Normandie, i.e. the North/North West part of the country.

Ile de France, Grand-Est, Auvergne-Rhône-Alpes and Bourgogne maintain an incidence equivalent to the national average. Occitania, Corsica and the Overseas are characterized by a low incidence. These data can help regional health authorities develop measures to combat tobacco and alcohol consumption, taking into account the needs and specificities of their population.

In Portugal, several factors can be considered to explain these statistics. According to the Portuguese Cancer league, lifestyle, smoking, alcohol consumption and pre-cancer lesions are the main causes linked to the development of oral cancer. Other factors must be taken into account such as exposure of the lips to the sun, diet (Cancro da Boca: Liga Portuguesa Contra o Cancro, 2022). The Portuguese league against cancer recommends quitting smoking, reducing alcohol consumption, and increasing the frequency of check-ups with a dentist to avoid late diagnoses.

To reduce the values, prevention campaigns as well as the education of the population to the risks of developing this disease are the main challenges, as a study carried out on the population of Porto showed that the concept of oral cancer was among the last in the awareness of the population. Moreover, coverage of treatment, access to care, equipment and medicines are another challenge that Portugal is trying to improve. There is a very strong and consistent association between socioeconomic status. The last point to mention is the presence of many private establishments which can be a hindrance for a low-income patient the chances of being treated.

In the United Kingdom in 2019, 23% of oral cavity cancers were detected at stage 1, 12,7% at stage 2, 9,7% at stage 3, 36% at stage 4 and for 18,3% of them, the stage was unknown (Proportion of Cancer Cases by Stage at Diagnosis, England, 2019). As the stage of detection is crucial for survival, Britain national healthcare policy put in place a “2-week rule” policy as patients had to be examined by a specialist within a timelapse no longer than 2 weeks (Langton et al., 2019). Moreover, those with suspected oral cancer symptoms must receive a treatment within 31 days.

In Belgium, a study about the quality of care and treatment for Head & Neck (HNC) cancers in Belgium was published in 2021 (Verleye et al., 2021) concerning the evaluation of patients with a squamous cell carcinoma of the head and neck region between 2009 and 2014. The results of this study in Belgium highlighted several important points regarding the management and the the need to improve the quality of care of the hospitals. It is important to notice that not all hospitals are equipped with the same machines and this leads to the creation of a waiting list. Another point which is underlined by the study is the presence of contraindications after receiving radiotherapy treatment which is not followed by chemotherapy. At the end of this population-based study comprising all patients with head and neck cancer between 2009 and 2014, hospitals treating HNC were able to receive their individual feedback and were encouraged to improve certain aspects necessary to increase the quality of care.

In Spain, the Spanish Board of Dentists and Stomatologists (SBDE) decided to launch in 2009 an experimentation regarding Continuing Education (CE) of dental practitioners. The aim of this experiment was to assess preventive and clinical attitudes related to oral cancer. It was found that dental practitioners who attended those classes were twice as likely to perform mucosa checks, twice as likely to give alcohol advice to their patients and more than three times as likely to take biopsies of suspicious lesions (Seoane et al., 2012). To sum up, the study showed a positive link between dental practitioners taking CE and preventive attitudes about oral cancer (routine mucosa exploration and biopsy performance).

In Netherlands, an interesting qualitative research was conducted in 2017 regarding the opinion of dentist students on how they see their role in prevention of HPV-related oral cancer (Poelman et al.,2017). The majority was convinced that they played an important

role as more education for patients about symptoms could lead to an increase in screening of oral cancers. They are also in favor of being involved in both primary and secondary prevention of HPV-related cancer, and to include HPV vaccination within their dental studies.

A study was done in northern Germany after they noticed that there was no systemic approach to warn the population about the development of the disease (Hertrampf et al., 2020). A campaign was launched in 2012 to raise awareness about oral cancer. Globally, stage IV is the most detected stage and that stage I is the second most detected stage (for men and women). Thanks to this study, a “small shift towards detection of tumors at earlier stages” was highlighted and researcher concluded to a successful campaign as a slight increase of the incidence of stages I-III cancer was observed over the period, as well as stage I cancers concerning women. This oral cancer awareness campaign in the federal state of Schleswig-Holstein was the first of its kind in Germany.

One interesting statistic about Denmark is their national healthcare system which succeeded in significantly reducing the waiting time for treatment for patients with oral cancer. General practitioners are their main point of contact, and if needed, they are directly referred to a specialist, thus avoiding the hospital step.

A study conducted in 2014 highlighted the need of a routine follow-up after treatment for HNC. These recommendations were published in Danish Head and Neck Cancer (DAHANCA) Group guidelines (Pagh et al., 2013) and are meant to improve surveillance of patients regarding the efficacy of treatment, the appearance of any complications, support the patient during rehabilitation among others. Sweden has observed a significant decrease in the number of smokers in the last thirty years (Koskinen, et al., 2022). Beyond the HPV infection which seems to be their primary cause of the development of cancer, this reduction in the number of smokers (one of the lowest in Europe) is closely linked to these rates. A modest consumption of alcohol in this country compared to the others can also explain these numbers. Sweden has also offered medical care practically free-of-charge to the population.

In Italy, researchers launched a study to know to what extent the population was aware of the disease, symptoms and preventive behaviors, and the conclusion was that the knowledge was limited. Only 40% of Italian who answered said that they would go to a dentist in case of oral lesions. The recommendation of this study (Nocini, et al., 2020)

was to create educational programs to raise awareness about oral cancer.

Globally in Europe

Prevention campaigns have had, according to certain articles studied above, a preponderant role in the approach and more advanced detection of stages of cancer. These epidemiological studies have provided overviews with important numbers to observe and have a better understanding of the development of cancer in their population. The sooner they are treated, the better the chances of recovery. Another aspect that may explain these differences is the quality of care and access to treatment. The differences between the quality of hospital care maybe a factor that explains this phenomenon, in this case in terms of equipment and reduction of waiting lists. Vaccination campaigns related to HPV have also been introduced and their increase has made it possible to highlight positive results. If all European countries could standardize these processes and make them more accessible, survival and cure rates will increase considerably. In Europe, there is still no consensus that standardizes the management of oral cancer, whether it is prevention, detection, treatment, patient education or that of caregivers.

Different trends can be noted. As part of the National Health Strategy 2018-2022, French government has increased health financing 400 million euros over five years for prevention programs. In Germany a study has found that there is no reasoned approach to make people aware of the risks involved. This northern German education campaign has made it possible to promote or detect most of the lesions better and earlier. Belgium has highlighted the errors in the follow- up and the treatment of cancers, and has suddenly implemented a procedure to improve the quality of national care. The United Kingdom also insists on the need to be examined for prevention and care. As for Denmark, follow-up treatment were formalized in guidelines since 2014 and improvements in their statistics are partly based on work to reduce waiting time, either for routine examinations or for treatment. Netherlands has turned to the curriculum of its dentistry students in order to make them aware of the role they will have to play in prevention, detection, but also by setting an example by getting vaccinated against HPV. At the same time, Spain insists on specialized courses in order to make dentists more efficient in this area. As for Hungary and its values, several studies have shown that beyond the lack of education of patients about the disease, there were major

deficiencies in the Hungarian health program, both financially and in terms of lack of government interest. Access to care and the unequal distribution of caregivers are issues that the Hungarian government is trying to improve given the situation. It is obvious that access to care, in each country is intimately linked to the social background of the population, their income and the degree of difficulty in accessing treatment points (hospitals, specialists, or private clinics) in particular in terms of distance, but this does not necessarily explain all these differences in values between all the countries studied. These points can explain its different values are mainly within the population itself, but also at the level of government decisions.

Globally in Europe, awareness of the pathology is still irregular, care is not yet harmonized and the quality of care variable. We must convince the exposed population of the risk of developing cancer so that patients voluntarily participate in the prevention movement and do not let themselves be guided solely by government measures. I think it would be interesting for European authorities to set up a database that all the professions concerned in Europe can share in order to study them and draw the appropriate conclusions. The exploitation of this data would make it possible to create a multidisciplinary working group which can propose standardization of the conduct of extra-intra oral examinations and care.

An important point concerns not the population and the government but the caregivers and in particular the dentists. Oral cancer is identifiable in very early stage, it is important to mention that care providers in Europe are not all trained in the same way and do not all perform such meticulous examinations. The last point concerns not the population and the government but the caregivers and in the particular the dentists. Since the disease is identifiable very early in the stages, it's mandatory for dentists in Europe to be concerned in the same way to improve the quality of these meticulous examinations.

Role of dentists

Reinforcing dental practitioners training is very important as they have low performance in discriminating oral cancer from oral potentially malignant disorders (OPMD) and benign oral confounders (Ilhan, et al. 2021). Globally, there is a need for "increased alertness amongst healthcare professionals about presenting symptoms of

oral cancer and to diminish the number of prereferral consultations in order to optimize the primary care interval” (Varela-Centelles et al., 2021).

Moreover, the research study of Varela-Centelles et al. (2021) shows that the first consultation where the patient presents a symptom is very often what will define the number of subsequent consultations to treat the pathology. If we can reduce the number of these prereferral consultations this may allow more time to be devoted to the treatment and care of the pathology.

Globally, it is important to tackle the different reasons explaining delays (duration before dental appointment) in order to improve the chance of detection of oral cancer and thus chances of survival.

Evolution of dental practices with the evolution of technologies

The development of online consultation increased during the spread of the Covid-19 pandemic and allowed many patients to be able to consult a professional more quickly in the event of symptoms that could lead to consultations with a specialist. These methods have allowed many people to be able to receive an earlier diagnosis and save a lot of time. Nevertheless, like any online consultation, the practice of the extra/intra oral examination is not as precise and the methods of observation, palpations or even access to complex areas such as the retro-molar zone is impossible, whether for the patient or specialist.

The evolution of current technologies can give a better approach when it comes to early OSCC diagnosis. The help of these tools should not replace a meticulous extra/intra oral examination but is a relatively reliable alternative in the early detection of OSCC, or at least help the dentist to confirm his doubts.

From my point of view, these technological advances are beneficial to scientific research in the fight against cancer, but there are still differences, particularly economic and politic, within the different countries. Each country must carry out their prevention campaigns, invest in infrastructures in a more equitable way, facilitate access to HPV vaccine for young people of bothsexes. It is important to maintain proper public health measures, even with the pandemic crisis, foreach countries. Oral health care providers must be more vigilant with the bad habits that people may have developed during the pandemic.

V. Conclusion

According to the Cancer Prevention Europe study published in 2020, 90% of oral cancers are preventable as it is lifestyle-related (Johnson et al., 2011). Therefore, the reduction of incidence and mortality is dependent on primary prevention, which passes through the recommendations of dentists and general practitioners. Despite European plans such as “Horizon Europe” and “the Porto Declaration” at the 2021 European Colloquium in Lisbon, many differences are still observed in terms of incidence, prevalence, and survival rates between European countries.

The differences between European countries are presented regarding prevalence and mortality rates. Many of these differences have their roots in socio-economic inequalities derived from diverse political systems, as limited treatment facilities (Diz et al., 2017).

Although a number of initiatives have been taken at European level, at European national and local levels, the implementation of the recommendations is still far from complete and there are still significant inequalities in access to cancer screening in the EU as shown by large variations in coverage rates and other performance indicators. To improve the levels of early diagnosis of cancer, the public must be made sufficiently aware of the potential symptoms of cancer.

At the dentist level, for a better management of symptoms and disease, beyond the role of patients, dental practitioners must provide more in-depth examinations, especially during the first consultations. Accompaniment and care management as well as the reduction of time intervals are the keys to better processing. If we manage to Europeanize the examination standards, group data between countries, and make all dentists aware of the importance of these examinations, then we will be able to better manage the development of oral cancers and reduce the values.

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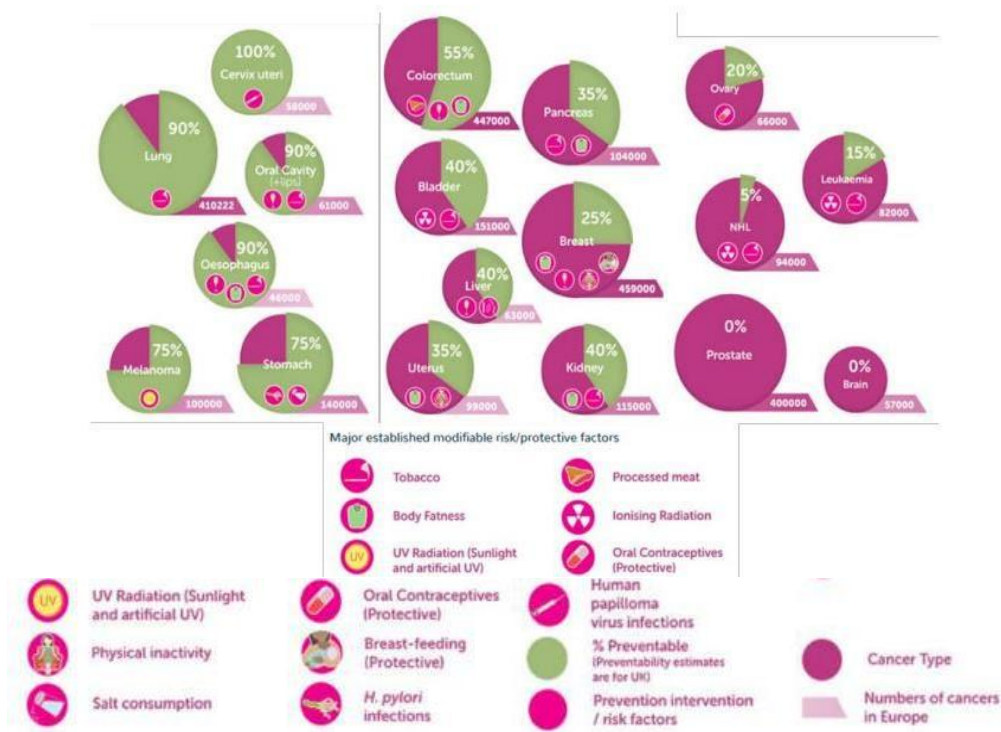
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VII. Appendix



Source: Adapted from Cancer Prevention Europe's website <https://cancerprevention europe.iarc.fr/preventable-cancers/> (accessed March 2020).

Figure 1: Share of preventable cancer among most common cancer types in Europe (Strengthening Europe in the fight against cancer, 2020)

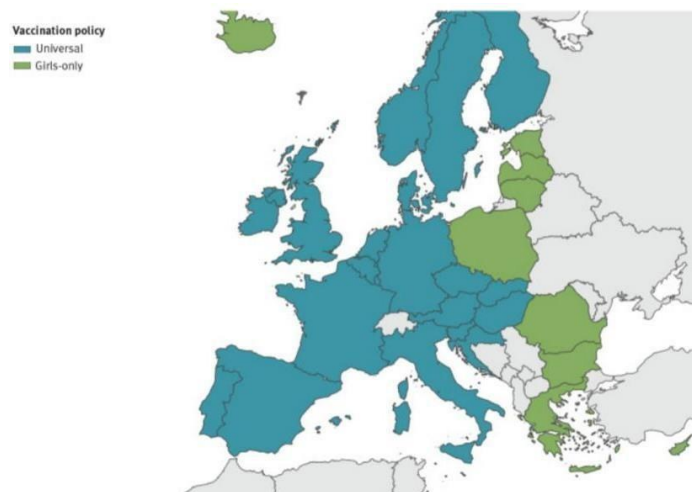


Figure 2 : Human papillomavirus vaccination policies in EU/EEA countries and the United Kingdom, adapted from Colzani, et al., 2021

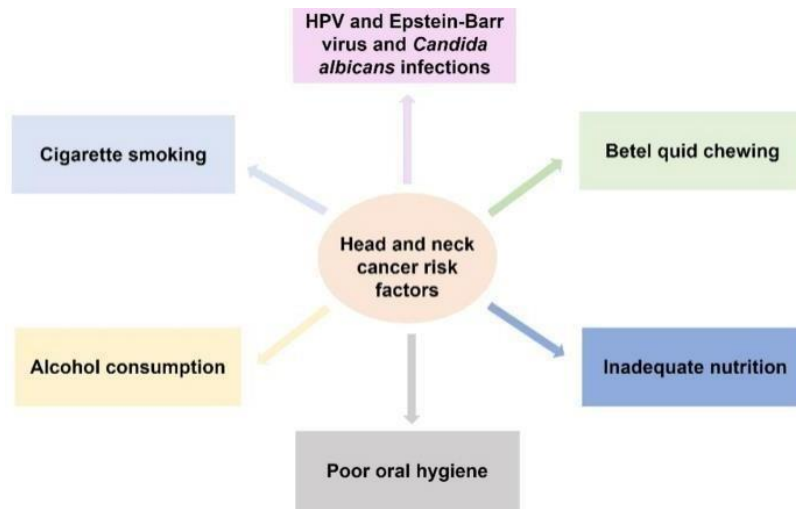


Figure 3 : Head and neck cancer risk factors adapted from Sun et al., 2021

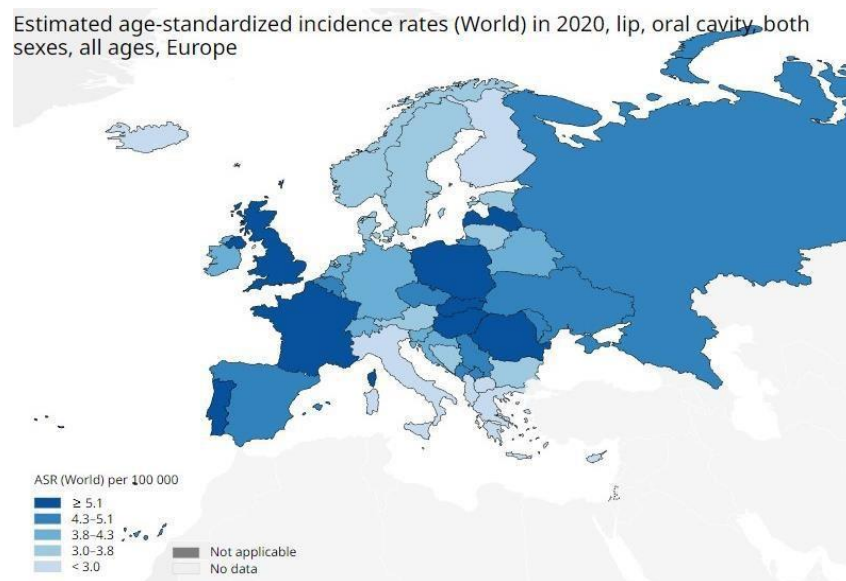


Figure 4 : Estimated age-standardized incidence rates in 2020 for lip, oral cavity in Europe adapted from IARC

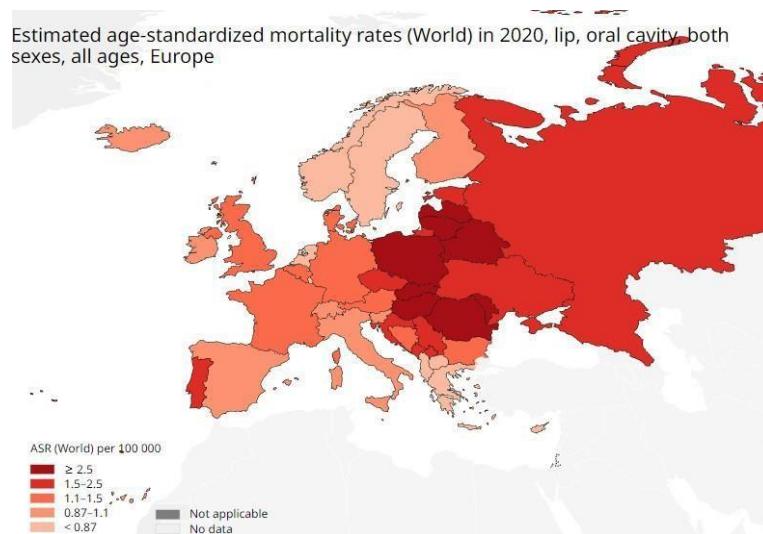


Figure 5 : Estimated age-standardized mortality rates in 2020 for lip, oral cavity in Europe adapted from IARC