

# Lifestyle factors and risk of head-neck cancer subtypes

Citation for published version (APA):

Maasland, D. H. E. (2016). *Lifestyle factors and risk of head-neck cancer subtypes: a prospective cohort study*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20161005dm>

## Document status and date:

Published: 01/01/2016

## DOI:

[10.26481/dis.20161005dm](https://doi.org/10.26481/dis.20161005dm)

## Document Version:

Publisher's PDF, also known as Version of record

## Please check the document version of this publication:

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## **Valorization**



By law, Dutch universities have three main tasks: to educate at an academic level, to conduct scholarly research, and to ensure that research findings impact society. Valorization is the term that governmental and university policymakers use to denote this process of ‘translating academic wisdom to societal benefit’. This chapter outlines the valorization potential of the research findings presented in this thesis.

### **From scientific to societal value**

Knowledge valorization involves the process of creating societal and/or economic value from scientific knowledge. How could this dissertation’s key finding—that lifestyle factors importantly influence HNC risk—have a societal impact that goes beyond well-cited publications?

It has been estimated that up to half of HNC cases are preventable by appropriate diets and associated lifestyle factors.<sup>1</sup> The results described in this thesis underline that prevention—by making healthy lifestyle choices—is a promising strategy in HNC. Alcohol consumption and cigarette smoking are main risk factors for HNC and strongly increase HNC risk. Furthermore, we clearly showed that other lifestyle factors significantly influence HNC risk as well. Vegetable and fruit consumption, as well as vitamin C intake, were significantly associated with a decreased HNC risk. Finally, a low toenail selenium status was associated to an increased HNC risk, as well as being underweight (BMI <18.5 kg/m<sup>2</sup>) at baseline. In conclusion, lifestyle factors, including nutrition, significantly influence HNC risk. Especially since treatment options are limited and survival rates poor, the focus on prevention of HNC—by lifestyle—is of great importance.

Furthermore, the lifestyle factors that influence HNC risk also influence risk of other diseases, such as cardiovascular diseases (CVD) and other cancer types. The World Cancer Research Fund systematic review of worldwide research<sup>2</sup> shows that not only many HNC cases, but also about a third of the most common cancers are preventable through diet, a healthy weight, and physical activity. Cigarette smoking and alcohol consumption are known risk factors for CVD and many types of cancer. Dietary factors, like vegetable and fruit intake, importantly influence risk of other diseases as well. The same applies for overweight and obesity.

In view of the above, our findings may have an impact in several ways. We will describe what merit our results might have for public health, both nationally and internationally; for health care, in general and for the individual; and finally for education and future research regarding lifestyle factors and HNC risk.

## Translating research into (daily) practice: dietary recommendations?

Together with prior and future research findings, our findings could jointly result in useful outcomes such as dietary recommendations. Our results strengthen the evidence that lifestyle factors importantly influence HNC risk, and health guidelines may help support and encourage people to act accordingly.

The Cancer Prevention Recommendations set up by the World Cancer Research Fund (WCRF)<sup>2</sup> are an example of such guidelines (Chapter 7, Table 7.2, and Figure 1 below). These recommendations are the result of years of ongoing research, known as the WCRF Continuous Update Project (CUP)<sup>3</sup>. As part of the CUP, global scientific research—randomized controlled trials and cohort studies—on how diet, physical activity, and weight affect cancer risk and survival is being systematically reviewed. Among experts, the WCRF CUP is a trusted, authoritative scientific resource, which underpins current guidelines and policy for cancer prevention.<sup>3</sup>

Our findings directly contribute to the CUP with regard to HNC, thereby proving their value from scientific results to practical recommendations. A review of the Cancer Prevention Recommendations is expected in 2017; where applicable, our results support the current recommendations. The American Institute for Cancer Research (AICR)<sup>4</sup> is part of the WCRF and thus disseminates the same recommendations for cancer prevention. These recommendations enable everyone, from policy makers to members of the public, to have access to the most up-to-date information on how to minimize the risk of developing cancer.

Eventually, our findings may also contribute to the WCRF NOURISHING framework<sup>5</sup>. This framework helps policymakers worldwide to identify where action is needed to promote healthy diets and to reduce obesity and other non-communicable diseases, including cancer. As a result, many different policy actions have already been taken, a perfect example of valorization. Key domains are food environment (NOURIS), food system (H), and behavioral change (ING). Examples of areas where governments need to take action are to offer healthy foods and set standards in public institutions and other specific settings; to set incentives and rules to create a healthy retail and food service environment; to harness food supply chain & actions across sectors to ensure coherence with health; to inform people about food & nutrition through public awareness; to give nutrition advice and counselling in health care settings; to give nutrition education and skills.<sup>5</sup>



**Figure 1.** Infographic launched by WCRF<sup>2</sup> for World Cancer Day: ‘Empowering people to make healthy choices’

In addition to the WCRF and AICR, other public health organizations set up dietary recommendations to lower disease—including cancer—risk as well, based on sound scientific results which in the future might include ours. The World Health Organization (WHO) acts globally to help people eating healthier and governments enabling people to do so.<sup>6</sup> The Health Council of the Netherlands (Gezondheidsraad)<sup>7</sup> advises the Dutch authorities on health recommendations. Based on dietary guidelines of the Health Council<sup>8</sup>, the Netherlands Nutrition Centre<sup>9</sup> (NNC; Voedingscentrum) recently released their latest version of the so-called Food Pyramid, in Dutch better known as ‘De Schijf van Vijf’<sup>10</sup> (Figure 2). The NNC states that healthy food is an essential part of a healthy lifestyle, and that healthy eating habits are often the best remedy for many of today’s most common health problems as well as to prevent chronic diseases. The NNC seeks to explain the relevance of scientific knowledge and translate it into understandable and practical dietary guidelines. Lastly, the NNC puts the issue of healthier and more sustainable nutrition on the agendas of the food industry and consumers, as well as in politics and the media.<sup>9</sup>

The Food Pyramid is a practical information tool used by the NNC in order to encourage consumers to develop and maintain healthy eating habits, and to prevent obesity. Scientific results are thus being translated into a tool for daily practice.<sup>9,10</sup> Key messages of the Food Pyramid are to eat lots of vegetables, fruits, and wholemeal products; less meat, and more legumes, nuts, eggs, or tofu instead; and to limit consumption of processed foods, which generally contain a lot of sugar, salt and unhealthy fats.<sup>9,10</sup> Where applicable, the current recommendations of the Food Pyramid are in concordance with our study results.



Figure 2. The Food Pyramid, released March 2016<sup>10</sup>

### Other possible implications for public health and healthcare

In addition to a possible contribution to health recommendations and dietary guidelines, our results have been considered relevant and drawn attention in various ways. We communicated our study findings to various audiences, with possible implications for public health, healthcare, and future research.

In 2012, 2013 and 2015, our results were shown at the Dutch General Meeting for Otorhinolaryngology, with an audience consisting mostly of clinicians. In 2013, our study results were presented to a public of largely clinicians as well at the 4th World Congress of the International Academy of Oral Oncology in Greece. Furthermore, our study was one of the topics at the Rank Prize Funds mini-symposium on Alcohol and Nutrition in the United Kingdom in 2011. These Funds have as their objectives the advancement and promotion for the public benefit of knowledge, education and

learning. Finally, our study findings have been presented at the Dutch Epidemiology Meeting in 2012. An invitation to speak for dentists, general practitioners and other clinicians at a conference entitled 'Nutrition—healthy living!' in November 2016 has been accepted.

Furthermore, our findings were highlighted in the Dutch media. In 2014, our results concerning alcohol consumption, cigarette smoking and HNC risk were published in *Metro*, a Dutch newspaper.<sup>11</sup> News about the inverse association between vegetables and fruit intake and HNC risk appeared online and in the newspaper *Het Parool*.<sup>12-14</sup> Finally, our findings regarding vitamin C and HNC risk were broadcasted by TV Maastricht, a local television channel, in August 2015, and appeared on the known Dutch news website *NU.nl*.<sup>15,16</sup> Hopefully, the announcement of our results at several conferences and in the media has contributed to creating awareness regarding lifestyle factors and HNC among both clinicians and the public.

Treatment decisions regarding HNC are complex, often with side effects resulting in significant morbidity with respect to basic functions such as speaking, swallowing, and breathing, as we wrote in Chapter 1. For these reasons, we believe our results might contribute to individual health care. We hope our findings will eventually lead to a decrease in morbidity and mortality due to HNC that could possibly have been prevented. Through (future) health guidelines and increased awareness, we ultimately aim for the preservation of health and well-being of individual persons. The findings described in this thesis may also impact the community as a whole, by affecting the economic burden of health care provided to HNC patients as well as productivity loss at work due to health problems. Lastly, since the beneficial effects of a healthy lifestyle go beyond those respecting HNC risk and also influence other common (chronic) diseases such as cancer, CVD, and diabetes, the implications of a healthy lifestyle for health, well-being and healthcare may be even more far-reaching.<sup>2</sup>

As mentioned before, increased awareness about the relationship between lifestyle factors and health among both the public and clinicians is important. Ideally, information—for example by dietary guidelines—on how to eat and live healthy should be something to talk about in healthcare, at the general practitioner as well as in hospitals. Lately, there has been an increased interest in the relationship between lifestyle, nutrition, health, and disease prevention among public and clinicians, and there have been promising initiatives. Our own academic hospital, the Maastricht University Medical Center+, is a good example of this: its focus has been aimed at 'Healthy Living', including prevention, for a while now.<sup>17</sup> Furthermore, together with the foundation *Voeding Leeft*<sup>18</sup>, two Dutch general practitioners established the

Vereniging Arts en Voeding<sup>19</sup> to increase national awareness about diet and health among clinicians, and encourage them to use this knowledge in their work. In addition, they plead for more health education and promotion, starting with more attention for nutrition, in medical studies. Another recent initiative is the release of the website Sick of Smoking<sup>20</sup>, which is supported by patients, clinicians, midwives and others, and aims to increase public debate regarding smoking. Earlier, two Dutch pulmonologists started the Stichting Rookpreventie Jeugd<sup>21</sup>, helped set up the website TabakNee<sup>22</sup>, and held a TEDx talk<sup>23</sup> in their mission to stop people from smoking in 2013.

In view of the foregoing, however, it has to be noted that it is not easy to put health recommendations into practice for everyone. Especially since we live in an environment that constantly offers challenges in making healthy lifestyle choices, with unhealthy foods and products easily available, changing dietary or smoking habits remains difficult. Ideally, healthy foods and products should be plenty available in public institutions such as schools or railway stations. Thus, as described earlier regarding the WCRF NOURISHING framework<sup>5</sup>, food environment, food system, and behavioral change are important subjects for policy action.

### **Precaution and future research**

For some lifestyle factors, the evidence is firmer than others. As one of the largest cohort studies on lifestyle factors and HNC risk so far, our findings regarding alcohol consumption, cigarette smoking, and intake of vegetables and fruits and HNC risk confirm and strengthen the existing evidence. In addition, these findings fit current—and probably add to future—dietary recommendations.

For other factors, however, we believe we should be more conservative before jumping to conclusions with regard to lifestyle recommendations or any clinical advice. We believe more research is warranted regarding the association between selenium and HNC risk, as described in Chapter 5. We also recommend future research to investigate the underlying mechanisms and to confirm our results regarding the association between intake of vitamins and carotenoids and HNC risk. Finally, future studies are warranted for further clarifications of the possible mechanisms regarding BMI and HNC risk. Other recommendations for further research have been described in Chapter 7.

## Conclusion

This chapter shows how the scientific findings described throughout this thesis might contribute to public health, healthcare, and future research and education. Our results could be used by policymakers, clinicians, researchers, and—last but not least—the public, to increase health and well-being and—ultimately—attain a decrease in the burden of disease and mortality due to preventable causes. In that view, our results may eventually lead to lower societal costs by reducing the health care burden related to HNC, as well as costs associated with productivity losses. Furthermore, our results provide important new leads for further research regarding lifestyle factors and HNC that could affect (future) health care and health guidelines as well. In conclusion, our results underline that prevention is a promising strategy in HNC and can be translated into societal value in many ways.

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