Alcohol 54 (2016) 23–26

Contents lists available at ScienceDirect

Alcohol

journal homepage: http://www.alcoholjournal.org/

Cancer cases attributable to alcohol consumption in Brazil

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ARTICLE INFO

Article history:
Received 14 November 2015
Received in revised form
9 April 2016
Accepted 20 May 2016

Keywords:
Alcohol consumption
Cancer
Incidence
Population attributable fraction
Risk

ABSTRACT

This is the first study specifically estimating the proportion of new cancer cases that could be attributable to alcohol consumption in the year 2012 in Brazil. The proportion of exposed cases and the association between alcohol and lip and oral cavity, nasopharynx, other pharynx, larynx, esophagus, colorectum, female breast, liver, and intrahepatic bile ducts cancers was based on data made available by the Integrator System of Hospital Cancer Registries. The cancer incidence was obtained from the estimates produced by GLOBOCAN. In 2012 there were 437,592 new cancer cases in Brazil, excluding non-melanoma skin cancers. Of these, alcohol consumption was responsible for 4.8% of all new cases. The alcohol-attributable fraction was higher for men (7.0%) than for women (2.6%). A total of 21,000 new cancer cases, 15,554 in men and 5,646 in women, could be attributable to alcohol consumption. In Brazil, a significant fraction of cancer cases can be attributed to alcohol consumption, and public health measures to prevent heavy alcohol use should be implemented.

Introduction

Alcohol consumption is one of the most important known causes of human cancer after tobacco smoking (Boffetta, Hashibe, La Vecchia, Zatonski, & Rehm, 2006). Although since the first half of the twentieth century there have been suspicions that alcohol was involved in the production of cancer (Doll & Peto, 1981), only in the last 25 years has it been recognized that long-term alcohol consumption increases the risk of cancer. Since 1988, the International Agency for Research on Cancer (IARC) indicated that malignant tumors of the oral cavity, pharynx, larynx, esophagus, and liver are causally related to the consumption of alcoholic beverages (IARC, 1988). IARC included alcohol consumption in the group of substances, mixtures, and exposure circumstances that are carcinogenic to humans (IARC Group 1 carcinogens) (IARC, 1988). A large number of epidemiological studies have demonstrated the association between alcohol ingestion and the occurrence of different types of cancer. More recently, Roswall and Weiderpass (2015) extensively reviewed the 2007 World Cancer Research Fund/American Institute for Cancer Research Report (WCRF & AICR, 2007) and the 2012 IARC monograph (IARC, 2012), and concluded that there is convincing scientific evidence that alcohol can cause cancer of the oral cavity, pharynx, larynx and esophagus in men and women, colon, and rectum in men, and cancer of the breast in women. The two reports diverge on the evidence for the association with liver cancer and colon and rectum cancer in women. A recent systematic literature review analyzing the association between alcohol consumption and the development of cancer confirmed these data and added that there are still increased risks of developing cancer of the prostate and central nervous system in men (de Menezes, Bergmann, & Thuler, 2013).

The mechanisms by which alcoholic drinks exert their mutagenic and carcinogenic effects are not fully understood, but several biological mechanisms have been proposed: genotoxic effect of acetaldehyde (a metabolite of ethanol); induction of cytochrome P450 2E1; increased level of estrogen (important for breast carcinogenesis); solvent for tobacco carcinogens; production of reactive oxygen and nitrogen species; angiogenesis; nutritional deficiencies (e.g., vitamin B6, methyl donors) or excesses (vitamin A, β-carotene); reduced immune surveillance, and changes in folate metabolism (Boffetta et al., 2006; IARC, 2010). For some cancers, there is a synergistic effect of drinking alcohol and smoking tobacco that substantially surpasses the risk from any isolated factor. Concurrent alcohol and tobacco dependence may be influenced by a variety of genetic, neurobiological, conditioning, and psychosocial mechanisms (Drobes, 2002). Also, it is well known that the risk of cancer

Funding sources: The authors declare that they have no funding sources.
Conflict of interest: The authors declare that they have no conflicts of interest.

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http://dx.doi.org/10.1016/j.alcohol.2016.05.004
0741-8329/

depends on the type of alcoholic beverage consumed and increases with increasing consumption of alcohol, producing a dose–response relationship (Collaborative Group on Hormonal Factors in Breast Cancer, 2002; Corrao, Bagnardi, Zambon, & La Vecchia, 2004; WCRF & AICR, 2007).

Several authors have analyzed the proportion of new cancer cases that can be attributed to alcohol. In France, it was estimated that among men and women, 10.8% and 4.5%, respectively, of all cancer cases in the year 2000 were attributable to alcohol consumption (IARC, 2007). An estimate of the global number of cancer cases attributable to alcohol consumption was published in 2006 and stated that 3.6% of all cancers (5.2% in men and 1.7% in women) were caused by alcohol (Boffetta & Hashibe, 2006). In another study, including eight European countries (France, Italy, Spain, United Kingdom, the Netherlands, Greece, Germany, Denmark), among men and women, 10% (95% confidence interval 7–13%) and 3% (1–5%), respectively, of the 2008 cancer incidence was attributable to former and current alcohol consumption (Schütze et al., 2011). On the other hand, in Australia these figures ranged from 2.2% to 6.5% in both sexes for the year 2009 (Cancer Council Australia Public Health Committee, 2012). Differences in these statistics result mostly from variations in the prevalence of consumption in the populations (Testino, 2011). Additionally, with regard to the number of deaths that can be attributable to alcohol consumption, in one of the earliest studies on the subject, Rothman (1980) estimated that in 1974 about 3% of all U.S. cancers were attributable to alcohol. At almost the same time, Doll and Peto (1981) estimated that for U.S. cancer deaths in 1978, the true percentage lay outside the range of 2–4%. More recently, Rehm and colleagues (Rehm et al., 2009) concluded that 4% of all cancer deaths worldwide were attributable to alcohol use.

In Brazil, alcohol consumption has increased in recent years. Rising use in the youth population, increased marketing of the industry, fragile public health infrastructure, and scarcity of governmental policies and control programs may explain this increase (Caetano & Laranjeira, 2006). Data from the World Health Organization (WHO) (2014) and 2° Levantamento Nacional de Álcool e Drogas (Laranjeira, 2014) showed that half of the Brazilian population aged 15 years or older had drunk alcohol at least once in the previous 12 months. In 2010, alcohol consumption was 7.2 L of pure alcohol per capita in the country, which is considered medium to high. The beverage which Brazilians drink the most is beer (61% of the total consumption of alcoholic beverages in the country), followed by wine (25%) and spirits (12%). Among the spirits, the most consumed is cachaça, followed by whiskey and rum. Data from a telephone survey in 2010 involving 54,339 adults, in all Brazilian state capitals and in the Federal District, showed that a history of alcohol abuse is a matter of concern in both men (26.8%; 95% CI 25.2–28.3) and in women (10.6%; 95% CI 9.7–11.4) (Iser, Yokota, de Sá, de Moura, & Malta, 2012). To our knowledge, no study to date has assessed the number of new cancer cases attributable to alcohol consumption in the Brazilian population. Therefore, the objective of this study is to estimate the number of new cancer cases that can be attributed to alcohol consumption in the year 2012 in Brazil.

Methods

This is an observational study based on secondary data. The Population Attributable Fraction (PAF) measures the proportion and number of cancer cases that would not have occurred if the exposure had been nonexistent. The calculation of PAF depends on two variables: the prevalence of exposure and the risk of disease. In this study, the proportion of cases in the Brazilian population that could be attributed to alcohol exposure in 2012 was estimated as follows: $PAF = Pc\,(aOR - 1)/aOR$, where Pc is the alcohol exposure prevalence among the cases and aOR is the adjusted odds ratio (Nurminen & Karjalainen, 2001).

The risk estimates (odds ratios adjusted by sex, age, race, education, marital status, smoking, region of residence, and year of diagnosis) concerning the association between alcohol consumption and the development of each cancer type were obtained from a Brazilian case–control study comprising 203,506 cancer cases (de Menezes, Bergmann, Aguiar, & Thuler, 2015). The data source for this study was the web-based system of Hospital Cancer Registries in Brazil (Integrator System). This secondary database was also used to estimate the proportion of exposure to alcohol in cancer cases used in the present study. PAFs were calculated only for the cancer types associated with alcohol based on the evaluation of the IARC (IARC, 2012), WCRF/AICR (WCRF & AICR, 2007), and a systematic literature review (de Menezes et al., 2013): lip and oral cavity (C00–08); nasopharynx (C11); other pharynx in men (C09–10; C12–14); larynx (C32); esophagus (C15); colorectum (C18–21); female breast (C50); liver and intrahepatic bile ducts (C22) (Table 1).

In this study, data on cancer incidence were obtained from the estimates produced by GLOBOCAN for the year 2012 (Ferlay et al., 2012), since estimates produced by the Brazilian National Cancer Institute (INCA) for the years 2014 and 2015 (Brasil, 2013), although more current, did not include the cancers of pharynx, larynx in women, and liver.

We have obtained the absolute number of alcohol-attributable cancer cases by multiplying the population attributable fraction with the total number of new cancer cases estimated for 2012, for each type of cancer by sex, and summed them.

We conducted data analyses by using SPSS version 21.0 (IBM Corp., Armonk, NY, USA) and Excel 2007 (Microsoft Corporation, Redmond, WA, USA).

Results

In 2012 there were 437,592 new cancer cases in Brazil, excluding non-melanoma skin cancers. Of these, alcohol consumption was responsible for 4.8% of all new cases (7.0% of 223,077 cases in men and 2.6% of 214,515 cases in women) (Table 2).

Table 1
Adjusted odds ratios, proportion of exposed cases, and population-attributable fraction.

Cancer site (ICD-10)	Men			Women		
	aOR[a]	Pc[b]	PAF (%)[a]	aOR[a]	Pc[b]	PAF (%)[a]
Lip, oral cavity (C00-08)	3.0	71.9	47.9	2.3	27.5	15.5
Nasopharynx (C11)[c]	1.7	48.5	20.0			
Other pharynx (C09-10 and C12-14)[d]	3.8	26.7	19.7	3.9	5.7	4.2
Larynx (C32)	2.5	68.0	40.8	2.4	32.7	19.1
Esophagus (C15)	3.6	73.9	53.4	3.5	33.7	24.1
Colorectum (C18-21)	1.3	36.9	8.5	1.3	9.8	2.6
Female breast (C50)				1.6	13.3	5.0
Liver and intrahepatic bile ducts (C22)	2.8	56.2	36.1	1.9	17.0	8.1

aOR: Adjusted odds ratio; Pc: Proportion of exposed cases; PAF: population-attributable fraction
ICD-10: The 10th revision of the International Statistical Classification of. Diseases and Related Health Problems.
[a] de Menezes et al., 2015.
[b] Hospital Cancer Registries in Brazil (Integrator System).
[c] There is no association between alcohol consumption and nasopharynx cancer in women.
[d] There was no data available for the tonsils (C09) and Unspecific parts of the pharynx (C14).

Table 2
Percentage of cancer cases attributed to alcohol consumption in Brazil, 2012.

Cancer cases in Brazil in 2012	Men	Women	Total
Total number estimated[a]	223,077	214,515	437,592
Cases attributable to alcohol consumption	15,554	5,646	21,000
% of all cases attributable to alcohol consumption	7.0%	2.6%	4.8%

[a] Ferlay et al., 2012.

A total of 15,554 cancer cases in men and 5,646 cancer cases in women could be attributable to alcohol consumption. Calculations of fractions for the sites for which there was substantial evidence for a carcinogenic role show that cancer of the esophagus was the main alcohol-related cancer in men, contributing to 33.3% of all alcohol-related cancer cases, while in women this ranking was occupied by breast cancer, which was responsible for 59.5% of alcohol-related cancer cases (Table 3).

Discussion

This is the first study specifically evaluating the proportion of new cancer cases attributable to alcohol consumption in Brazil. According to our results, in 2012, in both sexes, 21,000 new cancer cases (4.8% of the total) could have been prevented by avoiding alcohol consumption. The number of alcohol-related cancer cases was highest for gastrointestinal cancers (esophageal cancer, colorectal cancer, liver, and intrahepatic bile duct cancer = 10,202 cases). They are followed by head and neck cancers (lip and oral cavity, nasopharynx and other pharynx, and larynx = 7528 cases).

The number of new cancer cases that can be attributed to alcohol consumption was higher among men than women (15,554 versus 5,646), reflecting greater alcohol consumption in men and the higher association of alcohol with specific cancer types. It is worth stressing that 59.5% of cancers attributable to alcohol use in women occur in the breast (3,357 cases). These figures are consistent with data published by other authors (Boffetta & Hashibe, 2006; IARC, 2007; Parkin, 2011; Schütze et al., 2011). These estimates are conservative, since they refer only to cancers with a recognized association with alcohol consumption, suggesting that the statistics may be even higher.

Additionally, in Brazil, an increased risk of developing cancer of the prostate and central nervous system was described in men (de Menezes et al., 2013). However, a recent meta-analysis concluded that there is accumulating evidence that alcohol consumption is associated with cancers of pancreas, prostate, lung, stomach, melanoma, and gallbladder (Bagnard et al., 2015). These cancers were not included in the present study since these cancer sites require further evaluation and are not part of the IARC carcinogen list.

It is worth emphasizing that differences across studies can result from variations in the prevalence of alcohol intake, patterns of alcohol consumption by gender, local pattern of consumption, the type of beverage consumed, and the carcinogenic effect of the kind of alcoholic beverage consumed (Boffetta & Hashibe, 2006; Ridolfo & Stevenson, 2001). In Brazil, there is no uniformity of alcohol consumption; liquors (such as sugar cane hard liquor) are consumed more frequently in the northeastern and northern regions and wine is consumed more frequently in the southern region, for example (Laranjeira, Pinsky, Sanches, Zaleski, & Caetano, 2010). Another key aspect to be considered is the already demonstrated interaction between alcohol use and tobacco smoking in the etiology of certain cancer types, mainly head and neck and gastrointestinal cancers (Moura, Bergmann, Aguiar, & Thuler, 2014). In order to minimize the influence of tobacco use – as a residual confounder – and other potential confounders such as gender, age, race, education, marital status, region of residence, and year of diagnosis, risk calculations used odds ratios adjusted for those factors (de Menezes et al., 2015).

Our results are limited by the quality of available data, as we did not have control of the quality of information from cases and controls. With respect to cancer incidence, two data sources were available: GLOBOCAN and INCA. In order to have more reliable estimates we chose GLOBOCAN, because it included the cancers of pharynx and larynx in women, and liver in both sexes, which were not available in the Brazilian National Cancer Institute estimates (Brasil, 2013). In addition, GLOBOCAN is more appropriate for international comparisons.

The data source for exposure (prevalence of alcohol consumption among cases) and risk (adjusted odds ratio) was HCR. However, these data may be subject to lack of quality and inaccuracy because they were collected over a long period of time (from 2000 to 2009) and by a large number of cancer hospitals, making it difficult to control the quality of information. A strong point that should be emphasized is that during this period, INCA promoted sustained training of cancer registrars and published several manuals in order to prevent bias.

An additional point to be discussed is that this study did not consider the amount of alcohol consumed by the patients at the present time (e.g., never consumers, regular consumption, heavy drinking, or binge drinking) or in the past (former consumers). It is well known that a substantial part of the cancer incidence is

Table 3
Estimated number of cases of cancer attributed to alcohol consumption in Brazil, 2012.

Cancer site (ICD-10)	Men			Women			Total
	No. cancer cases[b]	PAF (%)[a]	No. (%) attributable to alcohol	No. cancer cases[b]	PAF (%)[a]	No. (%) attributable to alcohol	No. attributable to alcohol
Lip, oral cavity (C00-08)	6,930	47.9	3,322 (19.3)	3,509	15.5	545 (9.3)	3,867
Nasopharynx (C11)[c]	565	20.0	113 (0.7)				113
Other pharynx (C09-10 and C12-14)[c]	4,551	19.7	895 (5.8)	953	4.2	40 (0.7)	936
Larynx (C32)	6,281	40.8	2,563 (14.9)	850	19.1	162 (2.8)	2,725
Esophagus (C15)	9,713	53.4	5,184 (30.1)	3,194	24.1	769 (13.2)	5,953
Colorectum (C18-21)	16,368	8.5	1,394 (8.1)	17,581	2.6	457 (7.8)	1,851
Female breast (C50)	–		–	67,316	5.0	3,357 (57.5)	3,357
Liver and intrahepatic bile ducts (C22)	5,766	36.1	2,083 (12.1)	3,912	8.1	315 (5.4)	2,398
Total	50,174	–	15,554 (100.0)	97,554	–	5,646 (100.0)	21,200

PAF: population-attributable fraction.
ICD-10: The 10th revision of the International Statistical Classification of. Diseases and Related Health Problems.
[a] de Menezes et al., 2015.
[b] Ferlay et al., 2012.
[c] There were no data available for the tonsils (C09) and non-specific parts of the pharynx (C14).

associated with consumption above the recommended maximal daily limit of alcohol (Schütze et al., 2011). In this regard, future studies should explore this key feature.

It is important to highlight that Brazil has a few regulations concerning alcohol consumption. For example, it is illegal to sell alcoholic beverages to people under the age of 18 and in outlets located next to roadways, and advertisements for alcoholic beverages can only be aired on radio and television between 9:00 PM and 6:00 AM. Furthermore, since 2008, the federal government instituted an act to penalize drunken driving; this is commonly referred to as "Lei Seca" (the Dry Law). It penalizes people caught driving with an illegal alcohol level in the blood (the national maximum legal blood alcohol concentration when driving a vehicle is 0.02%).

However, a recent literature review concluded that alcohol policies are still sporadically enforced in the country (Mangueira, Guimarães, Mangueira, Fernandes, & Lopes, 2015). The authors highlight the need for a revision of public policies on alcohol in order to prioritize health promotion and assistance in the various levels of health care for vulnerable groups. In this context, alcohol policies must be developed with the aim of reducing the harmful use of alcohol and the alcohol-attributable burden to society. As a considerable proportion of cancers is attributable to alcohol consumption, it is essential to continue and to increase efforts to reduce alcohol consumption in Brazil by means of public health initiatives and legislation addressing alcohol intake.

In conclusion, in Brazil a significant fraction of cancer cases are attributable to alcohol consumption, especially head and neck and gastrointestinal cancers. Although more than 60 non-neoplastic diseases related to alcohol consumption (such as neuropsychiatric conditions, cardiovascular diseases, gastrointestinal conditions, and intentional and unintentional injuries) may have an even greater impact on the global burden of diseases, the figures described in this study should not be disregarded from the perspective of public health. Although the attributable fraction for cancer related to alcohol is relatively small (4.8% of all new cases in 2012), one cannot forget the other injuries related to alcohol: in Brazil, each year, 21,000 cancer cases could be prevented by alcohol control.

References

Bagnard, V., Rota, M., Botteri, E., Tramacere, I., Islami, F., Ferdiko, V., et al. (2015). Alcohol consumption and site-specific cancer risk: a comprehensive dose-response meta-analysis. *British Journal of Cancer, 112*, 580–593.

Boffetta, P., & Hashibe, M. (2006). Alcohol and cancer. *The Lancet Oncology, 7*, 149–156.

Boffetta, P., Hashibe, M., La Vecchia, C., Zatonski, W., & Rehm, J. (2006). The burden of cancer attributable to alcohol drinking. *International Journal of Cancer, 119*, 884–887.

Brasil, & Ministério da Saúde. Instituto Nacional de Câncer José Alencar Gomes da Silva. INCA.. (2013). *Estimativa 2014 – Incidência de Câncer no Brasil*. Rio de Janeiro.

Caetano, R., & Laranjeira, R. (2006). A 'perfect storm' in developing countries: economic growth and the alcohol industry. *Addiction, 101*, 149–152.

Cancer Council Australia Public Health Committee – Nutrition and Physical Activity Subcommittee. (2012). *National Cancer prevention Policy: Alcohol and cancer*. Sydney: Cancer Council Australia. http://wiki.cancer.org.au/prevention/Alcohol Accessed 18.04.14.

Collaborative Group on Hormonal Factors in Breast Cancer. (2002). Alcohol, tobacco and breast cancer–collaborative reanalysis of individual data from 53 epidemiological studies, including 58,515 women with breast cancer and 95,067 women without the disease. *British Journal of Cancer, 87*, 1234–1245.

Corrao, G., Bagnardi, V., Zambon, A., & La Vecchia, C. (2004). A meta-analysis of alcohol consumption and the risk of 15 diseases. *Preventive Medicine, 38*, 613–619.

Doll, R., & Peto, R. (1981). The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today. *Journal of the National Cancer Institute, 66*, 1191–1308.

Drobes, D. J. (2002). Concurrent alcohol and tobacco dependence: mechanisms and treatment. *Alcohol Research & Health, 26*, 136–142, Available from: http://pubs.niaaa.nih.gov/publications/arh26-2/136-142.htm Accessed 12.04.14.

Ferlay, J., Soerjomataram, I., Ervik, M., Dikshit, R., Eser, S., Mathers, C., et al. (2012). *GLOBOCAN 2012 v1.0, Cancer incidence and mortality worldwide: IARC CancerBase No. 11 [Internet]*. Lyon, France: International Agency for Research on Cancer. 2013. Available from: http://globocan.iarc.fr Accessed 18.04.14.

International Agency for Research on Cancer. (1988). IARC monographs on the evaluation of carcinogenic risks. *Alcohol Drinking, 44*, [Internet] 1988. A link is available at http://monographs.iarc.fr/ENG/Monographs/vol44/index.php.

International Agency for Research on Cancer. (2007). *IARC working group reports. Vol. 3. Attributable causes of cancer in France in the year 2000*. Lyon: IARC. 2007. Available from: http://publications.iarc.fr/Book-And-Report-Series/Iarc-Working-Group-Reports/Attributable-Causes-Of-Cancer-In-France-In-The-Year-2000-2007.

International Agency for Research on Cancer. (2010). *IARC monographs on the evaluation of carcinogenic risks to humans. Vol. 96. Alcohol consumption and ethyl carbamate*. Lyon: IARC. 2010. A link is available at http://monographs.iarc.fr/ENG/Monographs/vol44/index.php.

International Agency for Research on Cancer. (2012). *IARC monographs on the evaluation of carcinogenic risks to humans. Vol. 100E. Personal habits and Indoor combustions*. Lyon: IARC. 2012. A link is available at http://monographs.iarc.fr/ENG/Monographs/vol44/index.php.

Iser, B. P., Yokota, R. T., de Sá, N. N., de Moura, L., & Malta, D. C. (2012). Protection from chronic diseases and the prevalence of risk factors in Brazilian state capitals–main results from Vigitel 2010. *Ciência & Saúde Coletiva, 17*, 2343–2356.

Laranjeira, R., & Organizador. (2014). *II Levantamento nacional de álcool e drogas (LENAD)*. São Paulo: Instituto Nacional de Ciência e Tecnologia para Políticas Públicas de Álcool e Outras Drogas (INPAD), UNIFESP. 2014. Available from: http://inpad.org.br/wp-content/uploads/2014/03/Lenad-II-Relat%C3%B3rio.pdf.

Laranjeira, R., Pinsky, I., Sanches, M., Zaleski, M., & Caetano, R. (2010). Alcohol use patterns among Brazilian adults. *Revista Brasileira de Psiquiatria, 32*, 231–241.

Mangueira, S. O., Guimarães, F. J., Mangueira, J. O., Fernandes, A. F. C., & Lopes, M. V. O. (2015). Promoção da saúde e políticas públicas do álcool no Brasil: revisão integrativa da literatura. *Psicologia & Sociedade, 27*, 157–168, Available from: https://dx.doi.org/10.1590/1807-03102015v27n1p157.

de Menezes, R. F., Bergmann, A., Aguiar, S. S., & Thuler, L. C. (2015). Alcohol consumption and the risk of cancer in Brazil: a study involving 203,506 cancer patients. *Alcohol, 49*, 747–751.

de Menezes, R. F., Bergmann, A., & Thuler, L. C. (2013). Alcohol consumption and risk of cancer: a systematic literature review. *Asian Pacific Journal of Cancer Prevention, 14*, 4965–4972.

Moura, M. A., Bergmann, A., Aguiar, S. S., & Thuler, L. C. (2014). The magnitude of the association between smoking and the risk of developing cancer in Brazil: a multicenter study. *BMJ Open, 4*, e003736.

Nurminen, M., & Karjalainen, A. (2001). Epidemiologic estimate of the proportion of fatalities related to occupational factors in Finland. *Scandinavian Journal of Work, Environment & Health, 27*, 161–213.

Parkin, D. M. (2011). Cancers attributable to consumption of alcohol in the UK in 2010. *British Journal of Cancer, 105*(Suppl. 2), S14–S18.

Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., & Patra, J. (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet, 373*, 2223–2233.

Ridolfo, B., & Stevenson, C. (2001). *The quantification of drug-caused mortality and morbidity in Australia, 1998. (Drug Statistics Series no. 7)*. Canberra, Australia: Australian Institute of Health and Welfare. AIHW cat. no. PHE 29.

Roswall, N., & Weiderpass, E. (2015). Alcohol as a risk factor for cancer: existing evidence in a global perspective. *Journal of Preventive Medicine and Public Health, 48*, 1–9.

Rothman, K. J. (1980). The proportion of cancer attributable to alcohol consumption. *Preventive Medicine, 9*, 174–179.

Schütze, M., Boeing, H., Pischon, T., Rehm, J., Kehoe, T., Gmel, G., et al. (2011). Alcohol attributable burden of incidence of cancer in eight European countries based on results from prospective cohort study. *BMJ, 342*, d1584.

Testino, G. (2011). The burden of cancer attributable to alcohol consumption. *Maedica, 6*, 313–320.

World Cancer Research Fund and American Institute for Cancer Research. (2007). *Food, nutrition, physical activity, and the prevention of cancer: A global perspective*. London: WCRF International. Available from: http://eprints.ucl.ac.uk/4841/1/4841.pdf Accessed 11.02.13.

World Health Organization (WHO). (2014). *Global status report on alcohol and health 2014*. Available from: http://www.who.int/substance_abuse/publications/global_alcohol_report/en/.