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Investigating the evocative link among wine consumption, Human Development Index and geographical region

The Human Development Index (HDI) is a statistic composite index composed of life expectancy, education, and per capita income indicators. Currently, wine consumption is increasingly becoming significant both for reducing several diseases and for improving well-being and quality of life. The aim of this paper is to investigate spatial and temporal characteristics of wine consumption in 45 countries belonging to the World Health Organization (WHO) European Region and its relationship with the HDI. We use a balanced panel data by WHO database (2005-2015). Random effects panel data model was selected over the fixed effects model based on the Hausman test in order to assess the effect of HDI, European Union (EU) membership and geographical areas on wine consumption. Results highlight that wine consumption decreases as HDI increases. We noted higher values of wine consumption in EU countries and a positive gradient from West to East in the area considered. These findings highlight the presence of a new consumer profile seeking quality and healthy consumption and whose awareness increases coinciding with a rise in the degree of country development. National and international policies can address issues of consumption style and persuade consumers to have a new eating cultural approach towards buying quality and healthy food.

Keywords: HDI, wine consumption, WHO countries, health and well-being, random-effect panel data model, EU membership
JEL classification: Q13

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Introduction

Nowadays, food consumption models can be encapsulated within a composite behaviour characterised by several factors principally depending on the health and well-being expectations of consumers. As a consequence, the market tries to meet health, quality and safety needs of the new profile of conscious consumer (Vrontis *et al.,* 2011; Marotta *et al.,* 2014; Antonazzo *et al.,* 2015; Galati *et al.,* 2019a). Food represents increasingly, in the mind of consumers, a medicine that can help them to achieve a healthy life, to reduce disease risks, and in the same way to improve their well-being, life expectancy and quality of life (Mancini *et al.,* 2015; Maizza *et al.,* 2017; Galati *et al.,* 2019a; Fiore *et al.,* 2019b). The crucial importance of the food sector to both providing nutrition and building of "well-being" while guaranteeing health (Misso and Andreopoulou, 2017) appears clear. This should contribute to lead to a qualitative development of an area or population, resulting in higher life expectancy and lower incidence of diseases.

Since 1990, well-being, quality of life and qualitative development have become buzzwords that have resulted in new paths for international and supranational policies and strategies being outlined. Indeed, several measures alternative to gross domestic product (GDP) have been defined and proposed to avoid the limitations and weaknesses of quantitative indexes. In particular, the latter are not adequate to measure all dimensions of development because they do not take into account geographical variations in socio-cultural, ecological and 'good life' issues (Kangmennaang and Elliott, 2019; Ares *et al.,* 2016). Furthermore, over the time, several eminent studies have demonstrated that there is no significant correlation between GDP growth rate and quality of life of a country (WHO, 1997; Veenhoven, 2000; Asheim, 2000; Easterlin, 2001; Contò *et al.,* 2012; Roemer, 2014), thus shifting towards new concepts: subjective well-being, happiness and satisfaction. Happiness index as well as Human Poverty Index and Human Development Index are only some of numerous indicators that measure well-being and quality of life of a population (UNDP, 1990; Veenhoven, 2012; Alkire *et al.,* 2015; Senasu *et al.,* 2019). Within this context, the famous Human Development Index (HDI), developed by UN in 1990, is a statistic composite index composed of life expectancy, education, and per capita income indicators, that measures the well-being of a country taking into account the key dimensions of human qualitative development (UNDP, 1990; Jahan, 2019). Despite some limitations arising from the composite nature of the HDI (Jahan, 2019), this measure provides yearly a picture of the three essential levels of development necessary for a decent standard of living: it does not represent a comprehensive picture but is just an adequate measure for encouragement healthy development and for raising awareness. Therefore, the HDI can be considered a good proxy of the overall 'health' (which includes the economic health) of a population. The link among food, well-being and health push consumers to eat food not just for nutrition needs, thereby determining a conscious buying process driven by quality of food as main element of choice (Marotta *et al.,* 2014; Bailey *et al.,* 2018; Galati *et al.,* 2019a). Therefore, consumption of functional food, food supplements, organic food and food for life has been increasing because, in the consumers' mind, this typology of food products can reduce disease risks, save healthcare costs and improve quality of life, while at the same time achieving subjective well-being, happiness and hedonic pleasure (Ares *et al.,* 2014; Deshmuknh, 2018; Apaolaza *et al.,* 2018). Finally, a lifestyle and diet aimed at optimising health and well-being issues seem to be the core of current consumer choices. In all kinds of diet, a moderate intake of wine, the most popular and ancient alcoholic drink, has throughout history been considered to have a divine status for its properties, which are not only nutritional but also are perceived to offer health

and psycho-social well-being benefits (Snopek *et al.,* 2018; Fiore *et al.,* 2019a; Lerro *et al.,* 2020). These proprieties are also highlighted in the famous and contradictory phenomenon named the "French paradox" (FP) that demonstrates French population consuming a diet rich in saturated fatty acids and wine has a low coronary heart diseases (CHD) incidence compared to the northern countries, who have the same diet but drink less wine (Parodi, 1997; de Lorgeril *et al.,* 2002; de Leiris and Boucher, 2008; Opie, 2008; Dumas *et al.,* 2011).

In this framework, the present paper aims to contribute, in a new and evocative way, to current debates concerning the link among food, wellbeing and quality of life (Morozova *et al.,* 2016; Kihlström *et al.,* 2019) that refer 'to the positive, subjective state that is opposite to illness' (Meiselman, 2016). The several dimensions of this link are related to physical, social, well-being, and quality of life aspects and can be crucial in studying how culture, development and geographical approach affect food consumption in particular of wine. Specifically, according to the literature on this topic, no paper has broadly compared two variables such as alcoholic drink (wine) and quality of life/human development of a country while considering spatial and temporal features. Therefore, the purpose of this work is to implement and investigate a model that considers both spatial and temporal characteristics of the wine consumption in 45 countries belonging to the World Health Organization (WHO) European Regions, and its relationship with the HDI. The Breuch-Pagan Lagrange Multiplier (LM) test and subsequently the Hausman test were carried out to verify the random effects model over a fixed effects model. Although others variables can affect wine consumption, the choice of investigating the HDI appears very interesting because the HDI is a composite index that collects important aspects (health, education, and income) which can influence the quantity of wine, drunk by consumers.

The paper presents the following structure: the next section draws the state of art on relationship between wine consumption and health, focusing on the FP. Then, the authors present materials and methods carried out for reaching the scientific aims. The third part is composed by the results section that displays and discusses the findings. Finally, the conclusions paragraph closes the paper by highlighting insights and suggestions for future research.

Health, well-being and wine consumption

In the last decades, the increase of life expectancy at birth observed worldwide is due to many factors, such as an improvement of the quality of life, characteristics of food eaten, increase of income, etc. In particular, diet represents the world top factor related to the disease onset. Food increasingly embodies, in the mind of consumers, a medicine that can help to reach a healthy life, reduce diseases risks and in the same way cut social costs of national health systems (Mancini *et al.,* 2015; Maizza *et al.,* 2017; Fiore *et al.,* 2019b). For instance, health-oriented consumers positively welcome health-enhancing wine (Samoggia, 2016). In this current framework, the scientific community has recognised that the Mediterranean diet (MD) has great effects on longevity, advanced cognitive impairment as well as lower incidence of chronic health problems such as cardiovascular disease, diabetes, stroke and cancer. This diet is characterised by consuming of vegetables, fruits and legumes, small amounts of dairy products (principally cheese and yogurt), low quantity of seafood and poultry, legume, olive oil as dressing and above all moderate amount of wine (Yarnell and Evans 2000; Martínez-González *et al.,* 2019). In fact, according to several studies (Dang *et al.,* 1998; Rotondo *et al.,* 2001; Annunziata *et al.,* 2016; Snopek *et al.,* 2018), moderate intake of alcohol, in particular red wine, reduces the incidence of heart disease and increases longevity. Wine and its nutritive properties have been recognised for thousands of years as being beneficial thanks to the synergic mixture of some biochemical components with antioxidants anti-inflammatory proprieties such as polyphenols (e.g. bioflavonoids), tocopherols, phytosterols, anthocyanin (that contributes red wine their dark colour) (Yarnell and Evans 2000; Martínez-González *et al.,* 2019).

Wine is an element crucial in the FP; France does not have characteristics of the south Europe countries, apart from a narrow strip along the Mediterranean coast, and most of its citizens do not follow a MD (de Lorgeril *et al.,* 2002). This could be the truth, since the consumption of alcohol, in particular wine, is high in France compared with most Western countries (de Lorgeril *et al.,* 2002). The term FP was first introduced in 1986 in a newsletter of the International organization of wine and vine (Fiore *et al.,* 2019a). Dr. Renaud, a researcher of the Bordeaux University, advised wine consumption explicates above all the FP (Fehér *et al.,* 2007; Lippi *et al.,* 2010; Wiciński *et al.,* 2018; Fragopoulou *et al.,* 2018). In line with this, the work by de Leiris *et al.* (2008) highlights on one hand that moderate intake of alcohol reduces the risk of mortality and on the other hand extra health benefits seem to derive from wine. Dudley *et al.* (2008) add that PF is not related to the red wine consumption but also to the white wine that is rich in tyrosol and hydroxytyrosol. Dumas *et al.* (2011) underline also women generally feel they are not concerned, and view the danger arising from alcohol consumption as being related to drinking strong forms of alcohol or concerning alcoholics. Therefore, there is a unanimously held idea that a moderate level of wine consumption delivers beneficial effects in respect of several diseases and contributes to longevity (Artero *et al*., 2015).

Indeed, several epidemiological studies on a wide cohort of patients demonstrate that moderate alcohol intake can prolong overall life expectancy (Goldberg and Soleas, 2011). According to a study conducted by Cosmi *et al.* (2015), moderate wine intake coincides with a professed and objective positive health status, which is also psychological (i.e. there is a lower depression incidence). Indeed, an article of the Encyclopedia of Food and Health highlights that wine health benefits are perceived as a pleasing accompaniment to the sensory attributes, 'if that is part of one's preferred lifestyle' (Jackson, 2015). Finally, Mediterranean and French-style diets encourage moderate alcohol intake with regard to their impact on human health and wellbeing, a point that is also

underlined by the newest technologies and approaches such as 'foodomics' (Ndlovu *et al.,* 2019). In the light of what has been highlighted, the authors believe that there could be a relationship between wine consumption, country's development and well-being level and its geographical location. For this reason, they have placed the HDI (UNDP, 1990) in relation to wine consumption. In fact, as has already been stated in the above sections, HDI represents a good proxy for well-being and health, as it is a composite index that takes into consideration three fundamental dimensions: a long and healthy life; access to knowledge on the population's health and standard of living.

Therefore, the study focuses on the following research hypotheses:

- Human development and quality of life, considered through the HDI (ONU, 1990) value in the countries of the WHO European regions, is a determining factor for wine consumption;
- The belonging or non-belonging of the countries to the European Community is linked to significant differences in the consumption of wine;
- The WHO European region, which ranges from West coast of Greenland to the Pacific coast of the Russian Federation, is characterised by significant differences in wine consumption, from east to west.

These hypotheses will be verified through a model of fixed effects, which will allow verifying not only in relation to the statistical significance of the relationships, but also whether they are directly or inversely proportional.

Materials and methods

The WHO European Region considers 53 countries, with a population of almost 900 million inhabitants. Since the 1980s, the member states have communicated to the WHO the statistics relating to health and the sociological aspects connected to it, making it possible to create the HFA (Health for All) database. According to the geographical characteristics, the WHO European Region is divided into three areas (west, centre and east) (Figure 1).

From this database, the authors have selected and downloaded panel data of 45 countries from 2005 to 2015, based on the availability of annual data in relation to the analysed variables, i.e. 11 observations for each country that is a balanced panel dataset (accessed on 02/02/2020). According to the aim of the paper, we made use, as an outcome variable, the indicator of *Wine consumed in pure alcohol, litres per capita, age 15+ (WINE)* (WHO, 2020a). This indicator aims at monitoring the amount and trend of wine consumption in the adult population and is calculated as a ratio between the amount of recorded alcohol consumed per adult (15+ years) during a calendar year, in litres of pure alcohol, and midyear resident population (15+ years) for the same calendar year. We have considered its logarithmic transformation, indicating it with *ln_WINE*. The authors have considered as predictor the following variables: a) a dummy variable that divides countries into two groups. The first one have been members of the European Union (*EU*) since May 2004 (EU13) and the second one are not members of the EU (*non-EU*); b) location of the coun-

Figure 1: WHO European Region: the three main macro-areas.
Source: WHO (2019)

try based on Geographical Division *(G_D)* of European region according to WHO (2012) classification which considers three macro-areas: *west, centre* and *east*.

As already underlined, the HDI is a synthetic index of human development of a country, based on three fundamental dimensions: a *Long and healthy life*, measured by the indicator of *Life expectancy at birth (years); A decent standard of living* measured by the *Gross National Income per capita* (*in purchasing power parity, PPP, in $*), *Knowledge* measured by the arithmetic mean of indicators *Mean years of schoo*ling and *Expected years of schooling* (Figure 2).

These indicators are normalized by min-max transformation obtaining the following dimension indices: *Life expectancy index*, *Gross National Income Index* and *Education Index.* Finally, the HDI is obtained by calculating the geometric mean:

$$HDI = \sqrt[3]{Lifeexpectancyindex * GrossNationalIncomeIndex * EducationIndex} \quad (1)$$

HDI by countries is available at the UNDP Human Development Index web site (WHO, 2020b). We have considered its logarithmic transformation, labelling it *ln*_HDI.

The authors have started the present research with a descriptive analysis, in order to explore data and to highlight its characteristics according to the purposes and the research hypothesis of the work. There are not econometric models in the literature that relate wine consumption to the HDI. Instead, there is scientific literature that considers the relationship between alcohol consumption and level of human development, but with discordant results. Ferretti (2015) proposes an index called Unhealthy Behaviour Index (UBI), which classifies countries according to the average level of habits unhealthy (alcohol consumption, excess of calories, unbalanced diet and tobacco consumption) of their populations, following a method similar to that followed by the United Nations Development Program for the calculation of the HDI. By observing the index in 112 countries worldwide in 2012-2014 time range, the UBI values tend to increase together with the HDI value. Instead, Noel (2020), by investigating the low and middle-income countries of Latin America, proposes a linear regression model in which the adolescent exposure to alcohol was inversely associated with the HDI values.

Subsequently, in order to model the outcome variable *ln_WINE*, we adopted the LM test (Breusch and Pagan, 1980) in order to choose a random effects regression or a simple ordinary least squares (OLS) regression. The LM test foresees as a null hypothesis that the variances among the countries are equal to zero, namely no significant difference exists among the countries. By applying the test to a panel data, the null hypothesis is rejected ($p < 0.05$), i.e. a random effects model is more appropriate. Furthermore, the choice of the random effects model over a fixed effects model is confirmed by the Hausman test (Bell, 2019), if its p-value is not significant (for example >0.05) then we use random effects. According to Bell (2019), the following formula was used as a model for analysing the panel data:

$$Y_{it} = X_{it}\beta + v_i + \varepsilon_{it}, \quad (2)$$

where Y_{it} is the outcome variable in the country i at time t, X is the matrix containing the predictive variables, including the value of the constant, and β is the matrix of coefficients. As predictive variables, we considered *ln*_HDI, membership of the European Union (*Eu_not Eu)*, and geographical area *(G_D)* to check if they could affect wine consumption. The total variance in the model contains both the country error indicated by the term random effect υ_i and the country internal error indicated by ε_{it}. Finally, we calculated *rho* that is the proportion of the total variance among the countries considered. The statistical analyses were performed by using the software STATA 14 and SPSS 20.

Results

The summary statistics of the 45 sampled countries are presented in the Annex, which includes also their corresponding geographical area (west, centre and east) and the relative time span (2005-2015).

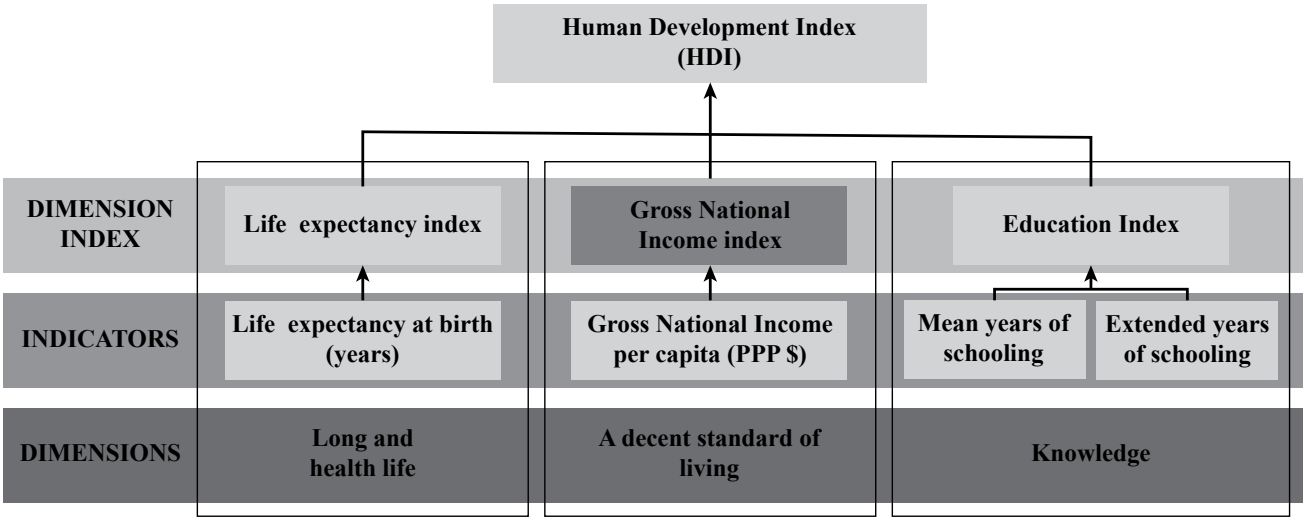

Figure 2: Graphical composition of HDI.
Source: ONU (1990)

With regard to indicator *Wine consumed in pure alcohol, litres per capita, age 15+*, in WHO European Region, the results show that the mean is equal to 2.43 L per capita, but with high variability (sd=1.87 L per capita, range 0.00-7.97 L per capita).

Regarding the relation between the three geographical macro-areas and wine consumption, the lowest value recorded was the east area, with an average wine consumption of 0.75 L per capita. On the contrary, the west area records the highest values, with an average consumption of 3.46 L per capita. However, in the same area a wide variability has been observed with a range from 0.11 to 7.97 L per capita. The average consumption of wine in the central area is 2.31 L per capita (sd=1.71 L per capita, range 0.00-5.47 L per capita). In particular, the study shows that the consumption of wine in the EU countries is about three times than that of the non-EU countries (3.31 L per capita *vs* 1.10 L per capita), with a greater range of variability in the former. Indeed, the countries with highest mean value of wine consumption are France (mean = 7.20 L per capita, sd =0.15 L per capita), following by Portugal with mean value very close to France ones (mean = 7.15 L per capita, sd = 0.53 L per capita) and Luxembourg (mean = 5.22 L per capita, sd = 0.19 L per capita) which show values distant from the previously mentioned figures. Conversely, the countries with the lowest values are Tajikistan (mean = 0.07 L per capita, sd =0.09 L per capita), Turkey (mean = 0.10 L per capita, sd =0.03 L per capita) in central area, and Kyrgyzstan (mean = 0.12 L per capita, sd = 0.01 L per capita) in east area which belong to the non-EU area.

As to the HDI, in WHO European Region, the average value of this indicator in the time span considered is 0.82, with a standard deviation of 0.08. Specifically, in the macro geographical areas: a) the east is characterised by the lowest HDI, with an average of 0.74; b) the western records the highest values, with an average of 0.88; c) and the central showing values between the previous area and equal to 0.80. Thus, the results show a positive gradient from east to west in accordance with the high HDI values that characterise these latter countries.

Regarding the comparison between EU and non-EU countries, the results show a HDI on average equal to 0.86 and 0.76 respectively. Three non-EU countries have recorded the lowest mean such as Tajikistan (mean =0.61, sd = 0.02); Kyrgyzstan (mean = 0.64, sd = 0.02) and Uzbekistan (mean =0.66, sd = 0.03). Equally, countries with the highest HDI are not located in the EU area such as Norway (mean = 0.94, sd = 0.01) and Switzerland (mean =0.92, sd = 0.01) except the Netherlands (mean = 0.91, sd = 0.01).

Figures 3 shows bivariate plot of *ln*_HDI and *ln_WINE* by geographical zones (west, centre and east) and by membership of EU, for the years 2005 and 2015, which represent the first and last year of the time span considered.

According to the results of descriptive statistics, Figure 3 shows that the countries of the European Union are mainly characterised by high values of both variables, whereas considering the geographical area of origin, both the values of WINE and HDI increase from east to west. In particular, Figure 4 shows the average values of HDI and wine consumption in EU countries from 2005 to 2015.

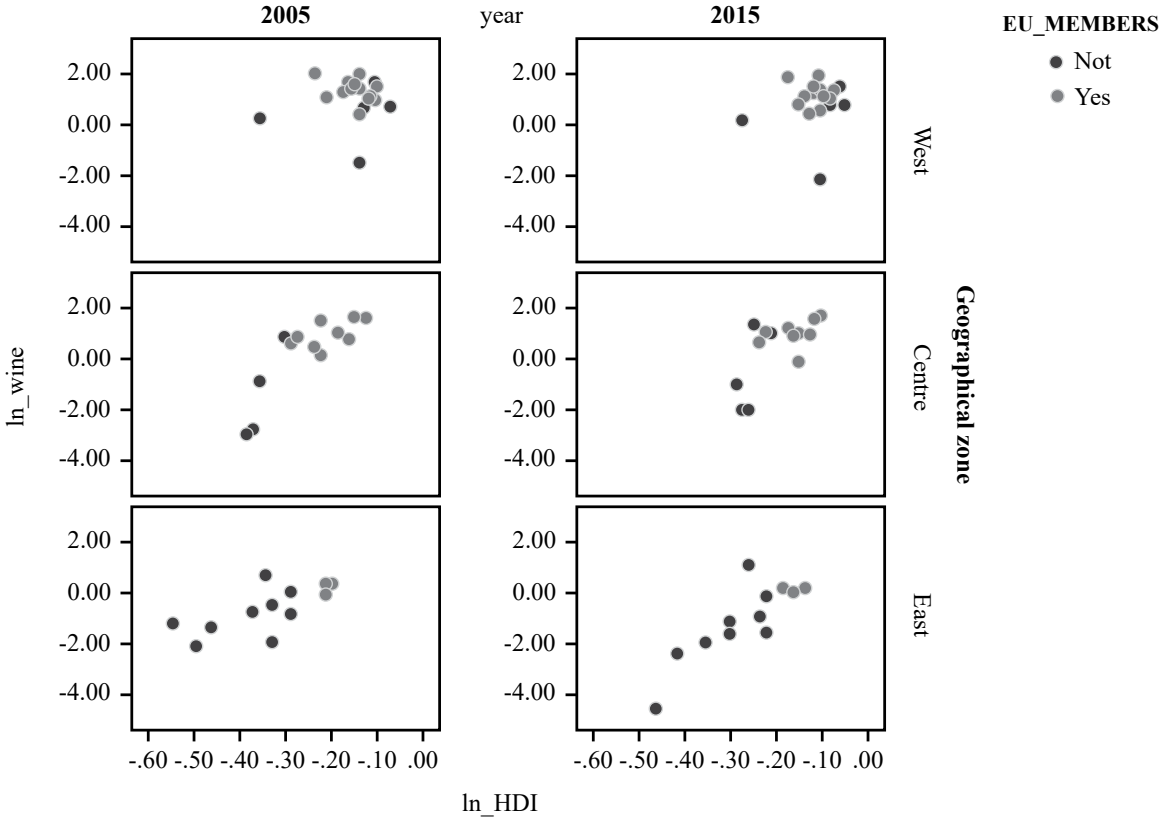

Figure 3: Biplot of ln_*HDI* and ln_*WINE*, from 2005 to 2015, by geographical zone and EU membership.
Source: our processing based on European Health Information Gateway

Furthermore, in Figure 5, the trend of the two indices considered in the same time span is reported. This shows that the HDI's positive trend corresponds to a decrease in wine consumption. All these findings led the authors, according to the aim of paper, to apply a panel data model to analyse the relationship between wine consumption and predictor variables that have been mentioned above. We applied Breuch-Pagan Lagrange Multiplier (LM) test to choose whether a random effects regression was more appropriate than simple OLS regression, and since the null hypothesis is rejected (Chi=1928.98 p <0.001), we adopted random effects.

In addition, the choice of the random effects model over a fixed effects model is confirmed by the Hausman test, in that its p-value is not significant (p >0.05) (Table 1).

Table 1: Results of the random effects model.

Variable	Coefficient	p value
*ln*_HDI	-1.054	0.050
EU_notEU (1; 0)	1.343	0.000
Geographical division (east)	-0.834	0.017
Geographical division (west)	0.585	0.052
Constant	-0.667	0.039
sigma_u	0.829	-
sigma_e	0.234	-
rho	0.926	-
Hausman Test	-	0.000
Breusch and Pagan Lagrangian multiplier test for random effects	Chi = 1,928.98	0.000

Source: Own composition based on European Health Information Gateway

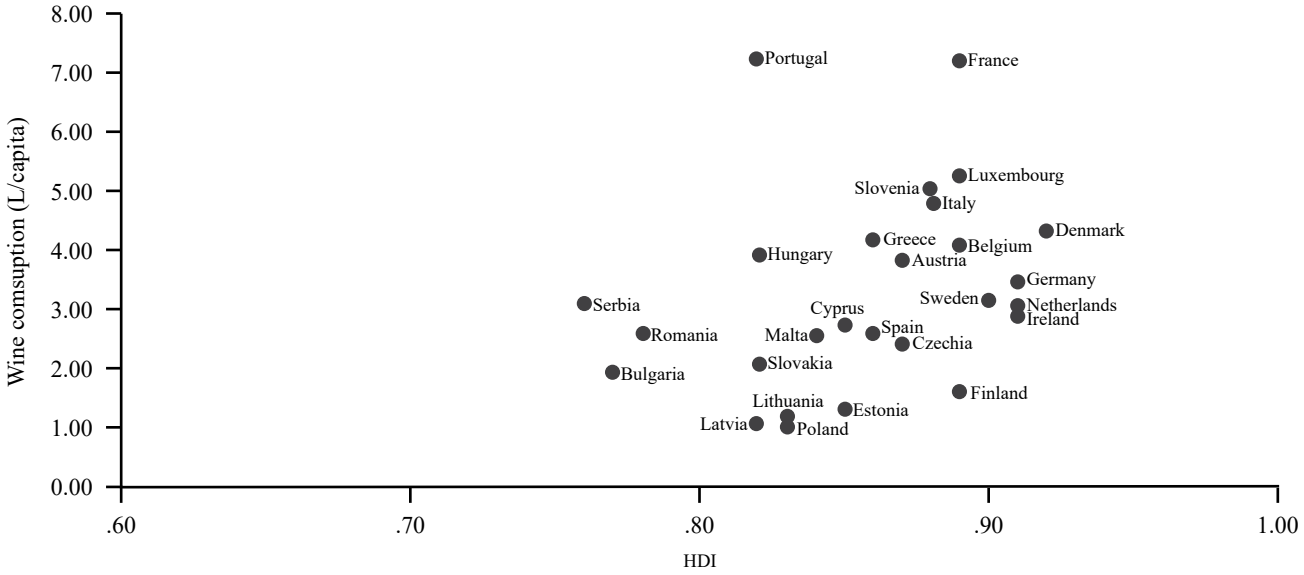

Figure 4: Average values of HDI and wine consumption in the European Union, 2005-2015.
Source: our processing based on European Health Information Gateway

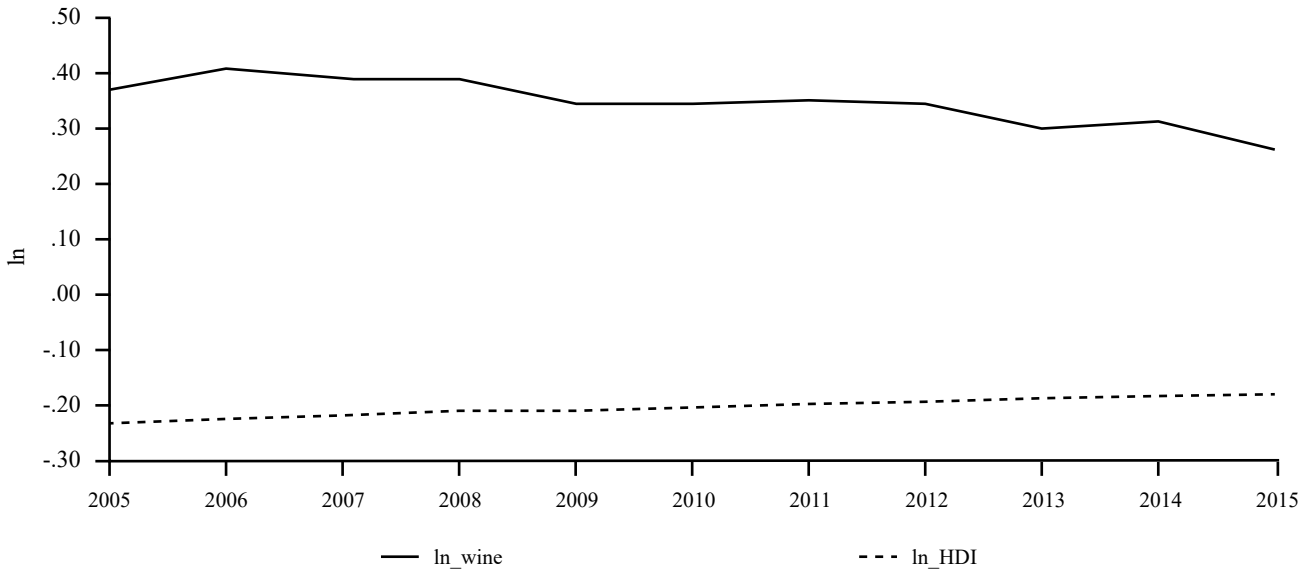

Figure 5: Trend of ln_HDI and ln_WINE in WHO European Region, from 2005 to 2015.
Source: our processing based on European Health Information Gateway

Therefore, random-effect panel data model is finally selected which functional form is as follows:

$$\ln\_WINE_{it} = \beta_{0i} + \beta_1 \ln\_HDI_{it} + \\ + \beta_2 Eu\_notEu_{it} + \beta_3 G\_D_{it} + v_i + \varepsilon_{it_0}, \quad (3)$$

Table 1 shows also the results of estimating the random-effect panel data model, confirming that the predictors taken into account are influential on wine consumption. In particular, there is a statistically significant reduction of -1.054 ($p < 0.05$) of *ln_WINE* for each unit of *ln_HD*.

The weak but statistically acceptable significance of HDI may be due to a variability within the countries analysed. The study was based on summary indices by each country which consequently lose information, but which have the advantage of providing results at level of panel data considered. Moreover, countries belonging to the European Community (i.e. *EU_not_EU*), show a positive and significant coefficient, in fact there is a statistically significant increase of 1,343 ($p < 0.001$) for *ln_WINE* in EU country. Furthermore, we detected a negative and significant coefficient (-0.834) for East and positive (0.585) for West, i.e. wine consumption increases from East to West, considering the centre geographical area as reference category (for both $p < 0.05$). Finally, *rho* value (0.926) shows that 92.6% is the proportion of the total variance that is between.

Discussion

This research represents the first study on a panel data of 45 countries belonging to the WHO European Region, over the period from 2005 to 2015, aimed at evaluating the relationship between wine consumption and HDI using all the three of WHO Europe large macro areas (west, centre, east) and subsequently of EU countries.

According to the descriptive results, the authors found that in the WHO European region the average wine consumption is 2.43 L per capita. However, this value is characterised by a wide variability in the region analysed. This is understandable considering that the WHO European region extends from the Pacific coast of the Russian Federation to the west coast of Greenland, from the Baltic Sea to the Mediterranean. The geographical vastness of the region implies a strong diversity of social, economic, cultural and health situations, which obviously are reflected in the different habits related to wine consumption.

In particular, the authors have noticed that the lowest values of wine consumption have been recorded in countries not belonging to the EU and mainly in the east area of the WHO European region. On the contrary, countries that belong to EU located in the western part of the region show the greatest wine consumption, although with greater variability. Clearly, this situation can be connected with the cultural heritage of this region, particularly in the south area where wine has been drunk since Roman times. Regarding the HDI, its average value in the WHO European region is 0.82, with a standard deviation of 0.08, over the period considered. In particular, the east area is characterised by the lowest values of HDI, while the western area records the highest values, and the central European area shows intermediate values. As to the EU membership, HDI on average is higher in EU countries than in non-EU countries.

According to the results of the descriptive statistics, *WINE* and HDI values increase from east to west and specifically in the EU countries, where these parameters are mainly characterised by high values (Figure 4). Indeed, French has over the time span analysed recorded the highest mean values of HDI and wine consumption compared to the other countries, at 0.89 and 7.25 L per capita, respectively. Moreover, also Portugal is well positioned in the chart (HDI=0.82 *vs WINE* = 7.26 L per capita), followed by Luxemburg (HDI = 0.89 *vs WINE* = 5.30 L per capita), Slovenia (HDI = 0.88 *vs WINE* = 5.06 L per capita) and Italy (HDI = 0.88 *vs WINE* = 4.82 L per capita) (Figure 4). Consequently, results confirm the "French paradox" and extend this phenomenon also to the other countries such as Luxemburg and Slovenia, which have a diet similar to the French. The high positioning in the chart for Portugal could be due to the high wine intake, even though the low HDI could be caused by the low income of population. Regarding Italy, its good positioning in the chart is probably due to the good quality of food, socialisation and income as well as to the high wine consumption. In addition, results seem also to show that the indicators examined have a spatial distribution that reflects the geopolitical characteristics of the WHO European Region. Although there are several aspects which can influence wine consumption in a country, HDI represents an important variable, which affects the quantity of wine drunk by consumers.

As already underlined, the findings have led authors to apply a panel data model to analyse the relationship between wine consumption and the HDI, considering also membership of the EU and macro geographical area. The Breuch-Pagan Lagrange multiplier test showed that random effects regression was more appropriate than a simple OLS regression, because, as already noted by the descriptive analysis, there is a significant difference among the countries, that is to say, there is a panel effect. Furthermore, the choice of the random effects model over a fixed effects model is confirmed by the Hausman test, since country error terms are unrelated to predictors. Therefore, a study of the relationship between the HDI and wine consumption is closely linked at country factor, in a panorama of great diversity, which, as already mentioned, characterises these regions. As already described in Figure 5, the results of the random model confirmed that in the observed time interval there was a significant reduction of wine consumption than the HDI growth. In addition, the model highlighted significant positive wine consumption in the EU countries.

In line with Fiore *et al.* (2019a), it is possible to stress an evocative role of the wine as a glue connecting well-being, health and culture. Since ancient times, both Greeks and Romans believed in the crucial role of wine to health and wellbeing and over the last decades, several studies have continued to highlight that moderate intake of wine decreases several kinds of disease, thereby improving quality of life and increasing longevity (Philippe, 1995; Samoggia, 2016; Snopek *et al.,* 2018). In agreement with other studies (Morozova *et*

al., 2016; Meiselman, 2016), food consumptions represent a significant indicator of the quality of life of a geographical region. Only a well-informed consumer can discern the advantages and disadvantages deriving from the wine consumption. Moderate intake is correlated to good health, general well-being and improved quality of life, whereas excessive intake can determine and cause disease and death. Higher levels of human development certainly correspond to higher culture's levels if considering that in the HDI, it is included the access to knowledge too. According to WHO (1997), quality of life is to be defined as individuals' perception in the context of the culture and value systems in which people live and other authors highlight the importance of subjective wellbeing, health and culture linked to food choices (Meiselman, 2016; Deshmuknh, 2018; Antonazzo *et al.,* 2018). In particular, we can observe that levels of wine consumption are linked to the country/area's culture and vice versa: culture may also determine consumption patterns and lifestyles.Regarding the wine consumption across the studied area, we have found a negative and significant coefficient in the east and a positive coefficient in the west. This trend means that wine consumption increases from east to west, namely the presence of a gradient from east to west geographical for the spatial distribution of wine consumption. Finally, the high *rho* value indicates that the repeated observations within the countries are highly correlated and that the proportion of the total variance among the countries is very large. This means that a strong characterisation of the phenomenon examined based on the country of origin always can be found, as further confirmation of this strong spatiality of the phenomenon.

Finally, the authors underline that the phenomenon of wine consumption, as well as other factors taken into consideration in this paper, is affected by many other important variables that change over time and among countries, such as the taste of consumers conditioned by advertising campaigns, or an ever greater consumption of wine by the young people (Ferretti, 2018) and less differentiated by sex than before. In addition, the increase in migratory movements and tourist flows influence wine consumption (Aizenman and Brooks, 2008). Moreover, in some Eastern European countries, wine is not, as in the past, a niche product sold at high prices but a mass-market product (Cicia, 2013). Instead, in countries where wine was part of the cultural model and was therefore a product sold at low prices, consumption patterns are changing from daily to occasional, but with better quality. In this article, wine has been considered as a homogeneous good, while there are different categories of wines (i.e. red, white, rosé) and therefore it would be necessary to study different consumption models.

Conclusions

The paper aimed at investigating how wine consumption patterns change according to geographical area's localisation, well-being and culture approach deriving from the level of human development. For these scientific purposes, the paper investigated the relationship between wine consumption, HDI and country geographical location. Findings highlight that wine consumption decreases as HDI increases and reveal the existence of a significant gradient from west to east and among EU and non-EU countries. However, the study also shows high values of HDI and wine consumption coinciding in an EU area, specifically in France. This result confirms the "French paradox" and these phenomena can be seen to extend to the other countries such as Luxemburg and Slovenia.

Far from being exhaustive, this work shows in an original and evocative way, the crucial importance of the link between the consumption choices, health and wellbeing of a population defined by the level reached of human development. National and international strategies and policies can address consumption choices and moving consumers towards a new cultural approach in buying quality and healthy food products.

It is necessary to highlight that HDI is a very useful tool to measure the development of a country but limited at three fundamental dimensions: a long and healthy life, access to knowledge and a decent standard of living. This index has the advantage of synthesising these three dimensions, while maintaining a good share of variance of the original dataset, but the HDI being a composite indicator could be negatively affected by some factors. These might include the presence of anomalous values, the sizes of the samples, or the minimisation of the contribution of an individual indicator that does not follow the behaviour of others (OECD/EC JRC, 2008). All these limitations are naturally also reflected in the model in which the HDI is incorporated, but in this regard, it is important to mention the thought of Mahbub ul Haq, the Pakistani economist who developed HDI. Although he recognises the limits of composite indicators, focusing on their potential, he argued "for any useful policy index, some compromises must be made" (Haq, 1995).

Future research steps could better investigate the variables of the trend moving toward replacement of quality consumption with quantitative consumptions, thus better addressing the link and investigating in depth the relationship between wine consumption, socio-cultural characterisation of countries and their geopolitical communities. All of these features are not enclosed or sufficiently contained in the HDI and are still not investigated in the literature. Lastly, we considered only the countries of the WHO European region, while it could be also interesting to study the trend of consumption in newly emerging markets such as Asia. Thus, further research could study the dynamics of consumption of specific categories of wines in different geographical areas of the world and according to other relevant socio-cultural factors.

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References

Alkire, S., Foster, J.E., Seth, S., Santos, M.E., Roche, J.M. and Ballon, P. (2015): Multidimensional poverty measurement and analysis. Oxford: Oxford University Press.

Annunziata, A., Pomarici, E., Vecchio, R. and Mariani, A. (2016): Health warnings on wine: a consumer perspective. British Food Journal, **118** (3), 647–659. https://doi.org/10.1108/BFJ-08-2015-0300

Antonazzo, A.P., Fiore, M., La Sala, P. and Contò, F. (2018): Assessing perceptions of wine tourists on organic wine. Economia Agro-Alimimentare, **17** (2), 57–76. https://doi.org/10.3280/ecag2015-002004

Apaolaza, V., Hartmann, P., D'Souza, C. and López, C.M. (2018): Eat organic – feel good? the relationship between organic food consumption, health concern and subjective wellbeing. Food Quality and Preference, **63**, 51–62. https://doi.org/10.1016/j.foodqual.2017.07.011

Ares, G., De Saldamando, L., Giménez, A. and Deliza, R. (2014): Food and wellbeing. Towards a consumer-based approach. Appetite, **74**, 61–69. https://doi.org/10.1016/j.appet.2013.11.017

Ares, G., Giménez, A., Vidal, L., Zhou, Y., Krystallis, A., Tsalis, G., Symoneaux, R., Cunha, L.M., Pintode Moura, A., Claret A., Guerrero, L., Cardello, A.V., Wright, A., Jefferies, L., Lloyd M., Oliveira, D. and Deliza, R. (2016): Do we all perceive food-related wellbeing in the same way? results from an exploratory cross-cultural study. Food Quality and Preference, **52**, 62–73. https://doi.org/10.1016/j.foodqual.2016.03.014

Artero, A., Artero, A., Tarín, J.J. and Cano, A. (2015): The Impact of Moderate Wine Consumption on Health. Maturitas, **80** (1), 3–13. https://doi.org/10.1016/j.maturitas.2014.09.007

Asheim, G. (2000): Green National Accounting: Why and How? Environment and Development Economics, **5** (2), 25–48. https://doi.org/10.1017/S1355770X00000036

Aizenman, J. and Brooks, E. (2008): Globalization and taste convergence: the cases of wine and beer. Review of International Economics, **16** (2), 217–233. https://doi.org/10.1111/j.1467-9396.2007.00659.x

Bailey, J.M., Hansen, V., Wye, P.M., Wiggers, J.H., Bartlem, K.M. and Bowman, J.A. (2018): Supporting change in chronic disease risk behaviours for people with a mental illness: a qualitative study of the experiences of family carers. BMC Public Health, **18**, 416. https://doi.org/10.1186/s12889-018-5314-z

Bell, A., Fairbrother, M. and Jones, K. (2019): Fixed and random effects models: making an informed choice. Quality & Quantity, **53**, 1051–1074. https://doi.org/10.1007/s11135-018-0802-x

Breusch, T.S. and Pagan, A.R. (1980): The Lagrange Multiplier Test and its Applications to Model Specification in Econometrics. The Review of Economic Studies, **47** (1), 239–253. https://doi.org/10.2307/2297111

Cicia, G., Cembalo, L., Del Giudice, T. and Scarpa, R. (2013): Country-of-origin effects on Russian wine consumers. Journal of Food Products Marketing, **19** (4), 247–260. https://doi.org/10.1080/10454446.2013.724369

Contò F., Fiore, M. and La Sala, P. (2012): Quality of Life and human isolation : the case of Rural area of Puglia. Romanian Journal of Regional Science, **6** (2), 31–52.

Cosmi, F., Di Giulio, P., Masson, S., Finzi, A., Marfisi, R.M., Cosmi, D., Scarano, M., Tognoni, G., Maggioni, A.P., Porcu, M., Boni, S., Cutrupi, G., Tavazzi, L. and Latini, R. (2015): Regular Wine Consumption in Chronic Heart Failure: Impact on Outcomes, Quality of Life, and Circulating Biomarkers. Circular Heart Failure, **8** (3), 428–437. https://doi.org/10.1161/CIRCHEARTFAILURE.114.002091

de Leiris, J. and Boucher, F. (2008): Does Wine Consumption Explain the French Paradox? Dialogues in Cardiovascular Medicine, **13** (3), 183–192.

de Lorgeril, M., Salen, P., Paillard, F., Laport, F., Boucher, J. and de Leiris, J. (2002): Mediterranean diet and the French paradox: Two distinct biogeographic concepts for one consolidated scientific theory on the role of nutrition in coronary heart disease. Cardiovascular Research, **54** (3), 503–515. https://doi.org/10.1016/S0008-6363(01)00545-4

Deshmuknh, A.S. (2018): Mushroom as food and medicine for wellness and wellbeing. Ecology, Environment and Conservation, **24** (4),1768–1771.

Dudley, J.I., Lekli, I., Mukherjee, S., Das, M., Bertelli, A.A.A. and Das, D.K. (2008): Does White Wine Qualify for French Paradox? Comparison of the Cardioprotective Effects of Red and White Wines and their Constituents: Resveratrol, Tyrosol, and Hydroxytyrosol. Journal of Agricultural and Food Chemistry, **56** (20), 9362–9373. https://doi.org/10.1021/jf801791d

Dumas, A., Toutain, S. and Simmat-Durand L. (2011): The French Paradox: Forbidding Alcohol during Pregnancy, but Making an Exception for Wine, 245–261. In Hoffman, J.D. (eds.): Pregnancy and Alcohol Consumption, New York: Nova Science Publishers Inc, USA.

Easterlin, R.A. (2001): Income and Happiness: Towards a Unified Theory. The Economic Journal, **111** (473), 465–484. https://doi.org/10.1111/1468-0297.00646

Fehér, J.G., Lengyel, G. and Lugasi, A. (2007): The Cultural History of Wine - Theoretical Background to Wine Therapy. Central European Journal of Medicine, **2** (4), 379–391. https://doi.org/10.2478/s11536-007-0048-9

Ferretti, F. (2015): Unhealthy Behaviours: An International Comparison. PloS One, **10** (10), e0141834. https://doi.org/10.1371/journal.pone.0141834

Ferretti, F., Pozza, A., Harri, P., Francalanci, C., Gualtieri, G., Coluccia, A. (2018): Drinking wine to "get high": The influence of awareness of the negative effects among young adults. Addictive Behaviors Report, **8**, 56–61. https://doi.org/10.1016/j.abrep.2018.07.002

Fiore, M., Alaimo, L. and Chkhartishvil, N. (2019a): The amazing bond among wine consumption, health and hedonistic well-being. British Food Journal, **122** (8), 2707–2723. https://doi.org/10.1108/BFJ-05-2019-0344

Fiore M., Contò, F. and La Sala, P. (2019b): Food: a medicine for a population's health and a country's economy. British Food Journal, **121** (6), 1186–1189. https://doi.org/10.1108/BFJ-06-2019-840

Fragopoulou, E., Choleva, M., Antonopoulou, S. and Demopoulos, C.A. (2018): Wine and its Metabolic Effects. A Comprehensive Review of Clinical Trials. Metabolism, **83**,102–119. https://doi.org/10.1016/j.metabol.2018.01.024

Galati, A., Moavero, P. and Crescimanno, M. (2019a): Consumer awareness and acceptance of irradiated foods: the case of Italian consumers. British Food Journal, **121** (6), 1398–1412. https://doi.org/10.1108/BFJ-05-2018-0336

Goldberg, D.M. and Soleas, G.J. (2011): Wine and health: A paradigm for alcohol and antioxidants. Journal of Medical Biochemistry, **30** (2), 93–102. https://doi.org/10.2478/v10011-011-0003-9

Haq, M. (1995): Reflections on Human Development, New York: Oxford University Press, USA.

Jackson, R.S. (2015): Wines: Wine and Health in Encyclopedia of Food and Health, pp. 562–570., Elsevier.

Jahan, S. (2019): The Human Development Index – what it is and what it is not, Human Development Report. Retrieved from: http://hdr.undp.org/en/HDI-what-it-is (Accessed in April 2020).

Kangmennaang, J. and Elliott, S.J. (2019): Wellbeing is shown in our appearance, the food we eat, what we wear, and what we buy': Embodying wellbeing in Ghana. Health & Place, **55**, 177–187. https://doi.org/10.1016/j.healthplace.2018.12.008

Kihlström, L., Burris, M., Dobbins, J., McGrath, E., Renda, A., Cordier, T., Song, Y., Prendergast, K., Serrano, A.K., Shannon, E. and Himmelgreen, D. (2019): Food insecurity and health-related quality of life: A cross-sectional analysis of older adults in Florida. Ecology of Food and Nutrition, **58** (1), 45–65. https://doi.org/10.1080/03670244.2018.1559160

Lerro, M., Vecchio, R., Nazzaro, C. and Pomarici, E. (2020): The growing (good) bubbles: insights into US consumers of sparkling wine. British Food Journal, **122** (8), 2371–2384. https://doi.org/10.1108/BFJ-02-2019-0139

Lippi, G., Franchini, M. and Guidi, G.C. (2010): Red Wine and Cardiovascular Health: The "French Paradox" Revisited. International Journal of Wine Research, **2** (1), 1–7. https://doi.org/10.2147/IJWR.S8159

Maizza, A., Fait, M., Scorrano, P. and Vrontis, D. (2017): Old, new and third wine regions: A consumer perspective. World Review of Entrepreneurship, Management and Sustainable Development, **13** (5-6), 521–541. https://doi.org/10.1504/WREMSD.2017.086300

Mancini, P., Marotta, G., Nazzaro, C. and Simonetti, B. (2015): Consumer behaviour, obesity and social costs. The case of Italy. International Journal of Business and Society, **16** (2), 295–324.

Marotta, G., Simeone, M. and Nazzaro, C. (2014): Product reformulation in the food system to improve food safety. Evaluation of policy interventions. Appetite, **74**, 107–115. https://doi.org/10.1016/j.appet.2013.12.003

Martínez-González, M.A., Gea, A. and Ruiz-Canela, M. (2019): The Mediterranean Diet and Cardiovascular Health. Circulation Research, **124** (5), 779–798. https://doi.org/10.1161/CIRCRESAHA.118.313348

Meiselman, H.L. (2016): Quality of life, well-being and wellness: Measuring subjective health for foods and other products. Food Quality and Preference, **54**, 101–109. https://doi.org/10.1016/j.foodqual.2016.05.009

Misso, R. and Andreopoulou, Z. (2017): Wine and Health: A sustainable governance for a responsible communication. Rivista di Studi sulla Sostenibilita, **1**, 91–105. https://doi.org/10.3280/RISS2017-001007

Morozova, E.A., Glushakova, O.V. and Fadeikina, N.V. (2016): Food consumption as an indicator of the quality of life of the population in regions. Foods and Raw Materials, **4** (1), 171–180.

Ndlovu, T., van Jaarsveld, F. and Caleb, O.J. (2019): French and Mediterranean-Style Diets: Contradictions, Misconceptions and Scientific Facts-A Review. Food Research International, **116**, 840–858. https://doi.org/10.1016/j.foodres.2018.09.020

Noel, J.K. (2020): Alcohol marketing policy and advertising exposure in low and middle income Latin American countries. Drugs: Education, Prevention and Policy, Published Online. https://doi.org/10.1080/09687637.2020.1733931

OECD/EC JRC (2008): Handbook on constructing composite indicators. Methodology and user guide. Retrieved from: http://www.oecd.org/sdd/42495745.pdf (Accessed in April 2020).

Opie, L.H. (2008): The French Paradox: Fact or Fiction? Dialogues in Cardiovascular Medicine, **13** (3), 155–158.

Parodi, P.W. (1997): The French paradox unmasked: the role of folate. Medical Hypotheses, **49** (4), 313–318. https://doi.org/10.1016/S0306-9877(97)90197-3

Philippe, B. (1995): Wine and health: Red wine in a balanced, healthy diet. British Food Journal, **97** (9), 41–43. https://doi.org/10.1108/00070709510100172

Roemer, J.E. (2014): Economic Development As Opportunity Equalization. The World Bank Economic Review, **28** (2), 189–209.

Rotondo, S., Di Castelnuovo, A. and de Gaetano, G. (2001): The relationship between wine consumption and cardiovascular risk: from epidemiological evidence to biological plausibility. Italian Heart Journal, **2** (1), 1–8.

Samoggia, A. (2016): Wine and health: faraway concepts? British Food Journal, **118** (4), 946–960. https://doi.org/10.1108/BFJ-07-2015-0267

Senasu, K., Sakworawich, A. and Russ-Eft, D.F. (2019): Developing Thai happiness index. Social Indicators Research, **146** (3), 425–448. https://doi.org/10.1007/s11205-019-02136-6

Snopek, L., Mlcek, J., Sochorova, L., Baron, M., Hlavacova, I., Jurikova, T. and Sochor, J. (2018): Contribution of red wine consumption to human health protection. Molecules, **23** (7), 1–16. https://doi.org/10.3390/molecules23071684

UNDP (1990): Human development Report 1990. New York: Oxford University Press, USA.

Veenhoven, R. (2000): Well-being in the welfare state, level not higher, distribution not more equitable. Journal of Comparative Policy Analysis, **2**, 91–125. https://doi.org/10.1023/A:1010058615425

Veenhoven, R. (2012): Cross-national differences in happiness: Cultural measurement bias or effect of culture? International Journal of Wellbeing, **2** (4), 333–353.

Vrontis D., Thrassou, A. and Czinkota, M.R. (2011): Wine marketing: A framework for consumer-centred planning. Journal of Brand Management, **18** (4-5), 245–263. https://doi.org/10.1057/bm.2010.39

WHO (2012): Why is the HIV epidemic in Eastern Europe and Central Asia the fastest growing in the world and what do we need to do to halt it?. Retrieved from: https://www.slideshare.net/who_europe/hiv-epidemic-in-eastern-europe-and-central-asia (Accessed in February 2020).

WHO (2019): Status report on alcohol consumption, harm and policy responses in 30 European countries 2019. Retrieved from: https://www.euro.who.int/en/health-topics/disease-prevention/alcohol-use/publications/2019/status-report-on-alcohol-consumption,-harm-and-policy-responses-in-30-european-countries-2019 (Accessed in July 2020).

WHO (2020a): "Wine consumed in pure alcohol, litres per capita, age 15+" European Health for All explorer. Retrieved from: https://gateway.euro.who.int/en/indicators/hfa_428-3052-wine-consumed-in-pure-alcohol-litres-per-capita-age-15plus/ (Accessed in February 2020).

WHO (2020b): UNDP Human Development Index (HDI). European Health for All explorer. Retrieved from: https://gateway.euro.who.int/en/indicators/hfa_42-0500-undp-human-development-index-HDI/ (Accessed in February 2020).

Wiciński, M., Socha, M., Walczak, M., Wódkiewicz, E., Malinowski, B., Rewerski, S., Górski K. and Pawlak-Osińska, K. (2018): Beneficial effects of resveratrol administration—Focus on potential biochemical mechanisms in cardiovascular conditions. Nutrients, **10** (11), E1813. https://doi.org/10.3390/nu10111813

Yarnell, J.W.G. and Evans, A.E. (2000): The Mediterranean diet revisited – towards resolving the (French) paradox. QJM: An International Journal of Medicine, **93** (12), 783–785. https://doi.org/10.1093/qjmed/93.12.783

Appendix

Table 2. Summary of the statistics of wine consumption and HDI for 45 WHO European countries from 2005 to 2015 in relation to their EU Membership and their geographical zone.

Geographical/political data			WINE				HDI			
Country	Geographical zone	Eu/not EU	Mean	Standard deviation	Min	Max	Mean	Standard deviation	Min	Max
Albania	West	not	1.24	0.09	1.17	1.33	0.74	0.02	0.70	0.76
Armenia	East	not	0.27	0.10	0.20	0.46	0.73	0.02	0.69	0.74
Austria	West	yes	4.02	0.30	3.60	4.10	0.88	0.01	0.85	0.89
Azerbaijan	Centre	not	0.14	0.03	0.05	0.13	0.73	0.02	0.68	0.76
Belarus	East	not	0.20	0.04	0.14	0.21	0.78	0.03	0.72	0.80
Belgium	West	yes	3.93	0.24	3.97	4.20	0.88	0.01	0.87	0.90
Bosnia Herzegovina	Centre	not	0.47	0.06	0.37	0.41	0.72	0.02	0.70	0.75
Bulgaria	Centre	yes	1.78	0.16	1.95	1.96	0.77	0.01	0.75	0.79
Cyprus	Centre	yes	2.73	0.16	2.71	2.79	0.85	0.01	0.83	0.86
Czechia	Centre	yes	2.52	0.15	2.23	2.67	0.86	0.01	0.85	0.88
Denmark	West	yes	4.45	0.26	4.21	4.44	0.91	0.01	0.90	0.93
Estonia	East	yes	1.27	0.12	1.23	1.42	0.85	0.02	0.82	0.87
Finland	West	yes	1.70	0.12	1.47	1.75	0.88	0.01	0.87	0.90
France	West	yes	7.20	0.15	7.09	7.40	0.88	0.01	0.87	0.90
Georgia	East	not	3.49	0.81	2.01	3.10	0.74	0.02	0.71	0.77
Germany	West	yes	3.35	0.22	3.13	3.84	0.91	0.01	0.89	0.93
Greece	West	yes	4.30	0.70	3.08	5.35	0.86	0.01	0.85	0.87
Hungary	Centre	yes	3.52	0.55	3.41	4.50	0.82	0.01	0.80	0.84
Iceland	West	not	1.99	0.09	1.95	2.15	0.90	0.01	0.88	0.92
Ireland	West	yes	3.00	0.20	2.75	3.06	0.91	0.01	0.90	0.92
Israel	West	not	0.19	0.04	0.11	0.22	0.89	0.01	0.87	0.90
Italy	West	yes	4.74	0.26	4.61	5.03	0.87	0.01	0.86	0.89
Kazakhstan	East	not	0.36	0.04	0.38	0.43	0.77	0.02	0.75	0.79
Kyrgyzstan	East	not	0.12	0.01	0.09	0.12	0.64	0.02	0.61	0.66
Latvia	East	yes	1.11	0.09	0.94	1.24	0.82	0.01	0.81	0.83
Lithuania	East	yes	1.08	0.18	1.03	1.40	0.83	0.01	0.81	0.85
Luxembourg	Centre	yes	5.22	0.19	5.12	5.47	0.89	0.01	0.88	0.90
Malta	West	yes	2.86	0.76	2.21	2.96	0.83	0.02	0.81	0.86
Montenegro	Centre	not	2.96	1.10	0.00	2.76	0.79	0.02	0.75	0.81
Netherlands	West	yes	3.23	0.18	2.88	3.30	0.91	0.01	0.89	0.92
Norway	West	not	2.21	0.11	2.00	2.22	0.94	0.01	0.93	0.95
Poland	Centre	yes	1.03	0.19	0.89	1.20	0.83	0.02	0.80	0.86
Portugal	West	yes	7.15	0.53	6.54	7.97	0.82	0.02	0.79	0.84
Romania	Centre	yes	2.97	0.33	2.33	2.92	0.79	0.01	0.76	0.80
Russian Federation	East	not	1.02	0.15	0.87	1.03	0.78	0.02	0.75	0.80
Serbia	Centre	not	3.32	0.65	2.38	3.89	0.76	0.01	0.74	0.78
Slovakia	Centre	yes	2.18	0.35	1.56	2.61	0.83	0.02	0.79	0.85
Slovenia	Centre	yes	4.79	0.47	4.90	5.22	0.88	0.01	0.86	0.89
Spain	West	yes	2.46	0.61	1.55	3.67	0.86	0.01	0.84	0.88
Sweden	West	yes	3.27	0.23	2.90	3.42	0.90	0.01	0.89	0.91
Switzerland	West	not	4.85	0.20	4.58	5.14	0.92	0.01	0.90	0.94
Tajikistan	East	not	0.07	0.09	0.01	0.29	0.61	0.02	0.58	0.63
Turkey	Centre	not	0.10	0.03	0.06	0.13	0.73	0.03	0.69	0.77
Ukraine	East	not	0.59	0.19	0.32	0.63	0.73	0.01	0.72	0.74
Uzbekistan	East	not	0.16	0.05	0.14	0.25	0.66	0.03	0.63	0.70
Geographical division	West	-	3.46	1.85	0.11	7.97	0.88	0.05	0.70	0.95
	Centre	-	2.31	1.71	0.00	5.47	0.80	0.06	0.68	0.90
	East	-	0.75	0.73	0.01	3.10	0.74	0.08	0.58	0.87
Membership EU	not	-	1.10	1.35	0.00	5.14	0.76	0.09	0.58	0.95
	yes	-	3.31	1.72	0.89	7.97	0.86	0.04	0.75	0.93
WHO European Region			2.43	1.87	0.00	7.97	0.82	0.08	0.58	0.95

Source: own composition based on European Health Information Gateway