

Special Article

The Major Risk Factors that Increase the Frequency of Noncommunicable Diseases: A Review of Evidence-Based Research

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Abstract:

Cardiovascular diseases could be characterized as a modern-day epidemic; they rank first on the list of diseases which lead to fatality percentages in both developed and developing countries. On an international level, the medical research community carries out vigorous action concerning those diseases as well as concerning the ways of limiting their incidence and the attributed risk factors. It has been identified that the main risk factors increasing the appearance of cardiovascular diseases relate to people's lifestyle and daily habits such as smoking, alcohol consumption, diet, and exercise. These are also the cause of other effects, most commonly cerebrovascular episodes, and coronary artery disease. In this paper, we present the results of a literature review concerning the major risk factors outlined.

Keywords: noncommunicable, risk factors, lifestyle, diet, exercise, alcohol, smoking

Introduction

The predominant American definition of health now focuses on physical health and disease symptoms (Koplan et. al., 2009). To our view, Health is the highest human good and all citizens of all countries should have access to high-quality health services. These services should specifically be provided to citizens through the health system of the country where they live or reside temporarily. Both health and quality of life constitute multidimensional phenomena, which aligns with the satisfaction of a modern-day individual's needs (Efthymiou and Vozikis, 2017). Today chronic noncommunicable diseases are the main cause of death and disability. Yet the main risk factors associated with chronic diseases are largely preventable. In the year 2012, according to the World Health Organization (WHO), non-communicable diseases were responsible for 68% of all deaths globally. It should also be noted that in the year 2012 communicable, maternal, neonatal and nutrition conditions collectively caused 23% of global

deaths, while injuries caused 9% of all deaths. In general, according to WHO (2017), CVDs are the number 1 cause of death globally, and more people die annually from CVDs than from any other cause. As for the economic impact of NCDs, it has been found that it affects national income as they also pose a significant financial burden on health care budgets and nations' welfare, which is expected to rise. For example, the economic burden of life lost due to all NCDs ranges from US\$ 22.8 trillion in 2010 to US\$ 43.3 trillion in 2030 (Bloom et al, 2012). In Europe, 20% of health spending is due to socio-economic disparities. These health inequalities are expected to widen due to the economic crisis and pose a challenge for health systems (Divajeva et al., 2014). Given that lifestyle plays a determining role in cardiovascular diseases' prevention and combat, the World Health Organization (WHO) suggests mainly behavioral changes that can lead to a decrease in those diseases' incidence. Nowadays, we are starting to see actions to improve people's health by making their

behaviors and consumption choices healthier. Those actions are starting to receive more attention in European countries' public health policies.

NCDs, CVDs, and Health Risk Factors: The main types of NCDs are cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes (WHO, 2018) and affect citizens of all countries but mostly those in low- and middle-income countries, people of all age groups, and sex. According to WHO (2017), Cardiovascular Diseases (CVDs) are a group of disorders of the heart and blood vessels and they include, among others, diseases of the blood vessels that supply human organs such as the brain, legs, arms, etc., diseases that damage to the heart muscle and heart valves, malformations of heart structure existing at birth, blood clots in the leg veins, which can dislodge and move to the heart and lungs. Related to the above Health risk factors can be classified as genetic, demographic, environmental, behavioral, or physiological. The genetic factors are associated with genetic predispositions, the demographic concern individuals, namely gender, age, religion, income, the environment are the ones being developed within a broader social, economic, and political context. The latter category includes air pollution, access to clean water, and the hygiene conditions of a population. Behavioral factors are associated with the actions of an individual or a society, their lifestyle habits, such as dietary habits, smoking, alcohol consumption, exercise, etc. The physiological can result in obesity and/or high levels of cholesterol, glucose, and blood pressure, that is, the factors stemming from a mixture of genetic and behavioral risk factors (WHO, 2009). It should be noted that researchers are now starting to hypothesize that environmental factors (including social adversity, diet, lack of physical activity, and pollution) can become "embedded" in the biology of humans (Vineis et al., 2014).

Health risk factors can also be divided into modifiable and non-modifiable, with modifiable ones including factors, such as gender, age, and ethnicity, and non-modifiable including habits which are intrinsic in people's lifestyle. Major habitual behaviors are the following: smoking, overconsumption of alcohol, low intake of fruit and vegetables, lack of exercise, obesity, high levels of cholesterol and blood pressure, drug use, and unsafe sex. In this study, we attempted to review the extent to which major behavioral health risk factors affect the development of NCDs and

as a result the Quality of Life (QoL) and human health in general.

Methodology

A review is of high importance for evidence-based research. In order to effectively conduct the review, the following steps were addressed: (1) research question formulation, (2) search strategy development, (3) screening process definition (4) data extraction. The search was performed according to the guidelines recommended by the PRISMA statement for systematic reviews. Literature was searched for the appropriate studies from the online databases of PubMed, Cochrane, Science Direct, and Google scholar published from till February 2021. The combinations of keywords used for the search were as follows:

- (Noncommunicable Diseases OR Non-communicable Diseases) AND (Risk Factor OR Risk Factors)
- (Noncommunicable Diseases OR Non-communicable Diseases) AND (Exercise OR Exercises)
- (Noncommunicable Diseases OR Non-communicable Diseases) AND (Physical activity OR Physical activities)
- (Noncommunicable Diseases OR Non-communicable Diseases) AND sugar
- (Noncommunicable Diseases OR Non-communicable Diseases) AND alcohol
- (Noncommunicable Diseases OR Non-communicable Diseases) AND smoking
- (Noncommunicable Diseases OR Non-communicable Diseases) AND obesity does exercise, physical activity in general affect NCDs?

The searched articles were screened for the relevance of data according to the eligibility criteria. We included all studies that evaluated the factors that improved or lead to non-communicable diseases including exercise or physical activity, sugar, alcohol consumption, smoking, and obesity. The initial set of results was limited based on the following criteria. A 10-year restriction was applied; in addition, papers were selected based on the availability of the full text in English. Grey literature was not included to avoid reducing the result's validity. Moreover, publications exploring other risk factors than the one stated above as well as publications exploring aspects of the rehabilitation of patients recovering from NCDs have also not been included as they are out of the scope of the current research. A preliminary search in the above-mentioned

libraries concerning NCDs returned 6795 results. To those, the criteria of the methodology were applied. Analytically the research flow chart is given in Figure 1. Based on the above strategy and based on findings/research results published by well-known research groups, some of which were not included due to their nature in the above libraries, the results were narrowed down to the ones presented in the next section. The final selection from the above number was done based on relevance, originality, and added value for our research. Selected case studies based on experience that can provide valuable lessons for future use have also been included. It should be

noted that many publications take for granted the effect of the said parameters and additional ones, in cases, and proceed to measure the effectiveness of restrictive policies or other policies. Such publications have not been included in this analysis.

Results

The selected publications of studies concerning the questions addressed appear in Table 1.

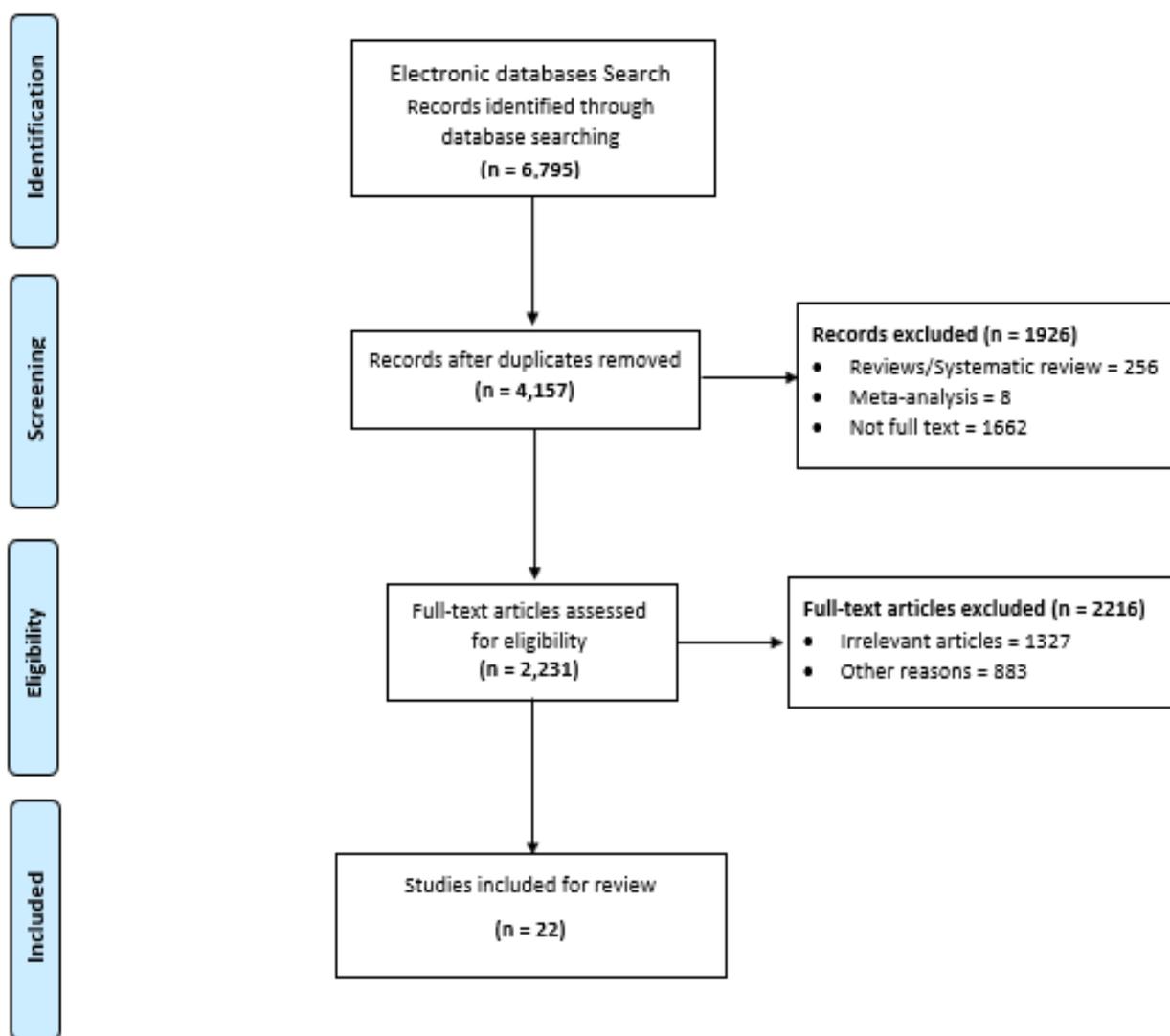


Figure 1: Research Flow Chart

Table 1: Selected papers

	Author	Year	Coutry / Region	Number of participants	Age (Mean or Range)	Risk Factor for NCDs
1	Wakabayashi et al.	2015	Japan	85.253	30.5 years	Alcohol
2	Katherine Sorsdahl et al.	2016	South Africa	4.271	39.0 years	Alcohol and stress
3	Jakkaew et al.	2019	Thailand	3.204	39.8 years	Alcohol
4	Sharma et al.	2020	Nepal	75	NA	Alcohol and tobacco
5	Ahmed et al.	2019	Somaliland	1.100	NA	Exercise, alcohol, diet, and smoking
6	Hartono et al.	2020	Malaysia	6.863	NA	Exercise
7	Lee et al.	2012	USA	NA	NA	Exercise
8	Onagbiye et al.	2019	South Africa	22	18 - 35 years	Exercise
9	Piernas et al.	2016	USA	663	7 - 12 years	Obesity
10	Webber et al.	2012	UK	NA	NA	Obesity
11	Webber et al.	2014	UK	NA	NA	Obesity
12	Hamadeh et al.	2016	Bahrain	222	30 - 49 years	Smoking/tobacco
13	Jamalizadeh et al.	2016	Iran	640	45 - 70 years	Smoking/tobacco
14	Agdeppa et al.	2020	Philippines	19.914	45.7 years	Sugar, salt, fat, and alcohol
15	Olatona et al.	2018	Nigeria	506	20.3 years	Sugar, salt, fat, and alcohol
16	Freisling, et al.	2020	Europe	291,778	mostly aged 43 to 58 years	Weight, alcohol. Physical activity, smoking, eating habits
17	Uddin et.al	2019	89 countries	304,779	11-17	Lifestyle factors, eating habits, smoking, physical activity
18	Marron Ponse et.al.	2019	Mexico		10,087	Sugar, ultra-processed foods
19	Bennet et. al.	2017	China	487.334	N/A	Physical activity
20	Jakkaew et al.	2017	China	3.204	N/A	alcohol
21	Nyberg et. al.	2018	Europe	137 503 participants	N/a	Obesity
22	Ayed et. al.	2019	France	8478	N/A	smoking

Discussion

In general, several results have been found that examine the effect of each one of the health risk factors in direct correlation with NCDs. Through our research, we located findings worth mentioning concerning the effects of exercise.

Hartono et al. (2020) conducted a retrospective cohort study and conclude that poor physical function can be assessed to identify risk for diabetes, heart disease, and stroke, but it is not a significant indicator for cancer risk in Indonesia. The authors advise that while they are still young and able, people should maintain their physical function as much as possible through routine physical activity to minimize the risk of NCDs while aging.

Lee et al. (2012) calculated population attributable fractions associated with physical inactivity for each of the major NCDs, by country, aiming to estimate how many diseases could be averted if physical inactivity were eliminated, and used life-table analysis to estimate gains in life expectancy of the population. Amongst their finding, they state that physical inactivity has a major health impact on the world and suggest that elimination of physical inactivity would remove between 6% and 10% of the major NCDs of CHD, type 2 diabetes, and breast and colon cancers, and increase life expectancy.

Onagbiye et al. (2019) explored the knowledge and perception of PA and NCDs risk factors among female youth of a low-resourced community in the Western Cape Province and revealed that the participants had little or no knowledge of PA and NCDs. Webber et al. (2012) explored the high rates of Obesity and NCDs across Latin America. Webber et al. (2014) mainly project the future burden of coronary heart disease (CHD), stroke, type 2 diabetes, and seven cancers by 2030 in 53 WHO European Region countries based on current and past body mass index trends, as well as test the impact of obesity interventions on the future disease burden. Amongst their findings is that a 5% fall in population BMI was projected to significantly reduce the cumulative incidence of diseases.

Piernas et al. (2016) also explore obesity and NCD factors as well as dietary factors among Chinese school-aged children and conclude that childhood overweight and cardiometabolic risk is prevalent in urban and rural areas of China and across different socioeconomic groups. Moreover,

several dietary factors such as sugars were significantly correlated to cardiometabolic risk.

Maron Ponce et. al. (2019) studied the 2012 Mexican National Health and Nutrition Survey (Encuesta Nacional de Salud y Nutrición [ENSANUT] 2012) conducted by the National Institute of Public Health of Mexico (Instituto Nacional de Salud Pública [INSP]) between October 2011 and May 2012 and found that in the Mexican population, an increased energy contribution from ultra-processed foods was associated with a lower dietary quality with regard to intake of nutrients related to chronic non-communicable diseases.

Nyberg et. al. (2018) studied obesity and loss of disease-free years owing to major non-communicable diseases in Europe and state that mild obesity was associated with the loss of one in ten, and severe obesity the loss of one in four potential disease-free years during middle and later adulthood. This increasing loss of disease-free years as obesity becomes more severe occurred in both sexes, among smokers and non-smokers, the physically active and inactive, and across the socioeconomic hierarchy.

Physical activity improves physiological, cognitive, and psychosocial functioning in chronic non-communicable diseases (NCDs) (Igwesi-Chidobe et al. 2018), and higher occupational or nonoccupational physical activity can be associated with significantly lower risks of major CVD (Bennet et al, 2017.) In addition, Ahmed et al. (2019) studied the prevalence of selected risk factors for NCDs among 20–69-year-old women and men in Hargeisa, Somaliland, and concluded that overweight and obesity and low physical activity needs intervention in women, while hypertension and low fruit and vegetable consumption needs intervention in both men and women. The authors also stress the need for Somaliland health authorities to develop and/or strengthen health services that can help in treating persons with hypertension and hyperlipidaemia and prevent a future burden of NCDs resulting from a high prevalence of NCD risk factors.

Concerning sugar consumption, as generally in nutrition as a health factor, research focuses mainly on the results of taxation policies and then measuring their effects rather than quantifying the prevalence (or not) of unhealthy habits/practices.

Olatona et. al. (2018) explored the dietary habits and metabolic risk factors for non-communicable

diseases in a university undergraduate population and found that unhealthy diets and metabolic risk factors of non-communicable diseases are prevalent in the undergraduate population studied.

On a similar note, Angeles-Agdeppa et al. (2020) study the dietary patterns and nutrient intakes in association with non-communicable disease risk factors among Filipino adults and found that meat and sweetened beverages and rice and sh patterns were associated with a higher risk of cardiometabolic NCD indices, while fruit, vegetables, and snack pattern was associated to lower risk.

Concerning alcohol Wakabayashi et al. (2015) conclude, after their study that, heavy alcohol consumption of 4 or more glasses per occasion, even if the occasions were infrequent, was associated with an elevated risk of NCDs in Thailand. These results highlight the need for strategies in Thailand to reduce the quantity of alcohol consumed to prevent alcohol-related disease. Thailand is fortunate that most of the female population is culturally protected from drinking and this national public good should be endorsed and supported.

Jakkaew et al. (2015), also add that throughout their research they detected the frequency and pattern of alcohol use by measurement of standard drinks to calculate the volume of alcohol use. Binge drinking has been shown to be associated with other NCD risk factors. Moreover, their findings support the idea that the association between risk of harm and other NCD risk factors differed by gender. In addition, the risk of harm from alcohol use correlated with a higher volume of alcohol use among men, which potentially translates to higher levels of NCD risk factors. However, a higher risk of harm from alcohol use in women did not correlate with volume and thus did not correlate with as many NCD risk factors as men. Factors that may contribute to that are biology and alcohol metabolism.

On the other side, Sorsdahl et al. (2016) examined the effect not only of alcohol consumption but that of stress as well. Specifically, they examined the associations between symptoms of mental disorders and diabetes and hypertension in a nationally representative sample of South Africans. Amongst their findings is that hazardous alcohol use was not significantly associated with either hypertension or diabetes. However, they state that it is important to include a more detailed assessment of alcohol use in studies to provide

more accurate information on the patterns of alcohol use.

Sharma et al. (2020) explored tobacco and alcohol use and their contribution to the rapid increase in NCDs in Nepal. They conclude that Tobacco and alcohol use facilitated interaction of the social determinants of NCDs. The socio-economic status of families was both driver and outcome of tobacco and alcohol use.

Concerning smoking Hamadeh et.al. (2016) study the effects of cigarette and waterpipe smoking among adult patients with severe and persistent mental illness in Bahrain and found that the severe and prevalence of smoking with patients that have persistent mental illness in Bahrain is twice that of the general population. Jamalizadeh et. al. (2015) study the prevalence of smoking and high blood pressure (two major risk factors for non-communicable diseases). The latter concludes that modifying risk factors, e.g., Hypertension, and smoking behavior through primary and secondary prevention programs by enhancing awareness and knowledge of laypeople, improving screening, and treatment interventions, particularly for the youth is highly recommended.

Ayed et. al. (2019) state that active smoking was a major risk factor in the occurrence of NCDs. After the analysis of the hospital data gathered, they propose that smoking cessation represents the cornerstone for preventing the spread of these diseases, especially in countries with limited resources.

Among other things, WHO has been helping the development of salt reduction strategies in Pacific Island Countries and areas (PICs) where Salt reduction consultations had been held in 14 countries. For a systematic review of the interested reader is referred to Christoforou A., et al. (2015), Trieu et. Al. (2015), Webster et. Al. 2011.

Generally, we could say, as Freisling et. al. (2020) state, pre-diagnostic healthy lifestyle behaviours were strongly inversely associated with the risk of cancer and cardiometabolic diseases, and with the prognosis of these diseases by reducing the risk of multimorbidity. It is very positive that the Implementation of WHO-recommended NCD policies is increasing over time and specifically those that involve dietary (nutrition-based policies) habits.

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