Здоровье и общество

УДК 614.2

***Amlaev K. R.*[1]*, Abdullah Alnizami*[2]**

THE RISK AND PROTECTIVE FACTORS FOR NONCOMMUNICABLE DISEASES

[1]The Abu Ali ibn Sino Bukhara State Medical Institute, Ministry of Health of Uzbekistan, Bukhara, Uzbekistan;
[2]The Sana Klinikum Berlin, Board Certified in Preventive Medicine, 10711 Berlin, Germany

The article presents modern data on non-communicable diseases (NCDs) and their risk factors. The tendency of increasing mortality from NCDs due to increase in the number and aging of the population is noted. The data is presented testifying that, in addition to biological risk factors, influence of environmental factors is increasing, including atmospheric and household air pollution, the levels of which are high in a significant number of countries. It is emphasized that "green spaces" (e.g., trees, grass, forests and parks) and "blue spaces" (e.g., lakes, rivers, ponds, etc.) provide beneficial effect on human health, being in fact protective factors for NCDs. The NCD risk factors are found to interact closely with each other: air pollution, depression, tobacco smoking, high blood pressure and obesity have been linked to all NCDs. The evidence is provided that presence of behavioral risk factors for NCDs exacerbates severity of infectious pathology, particularly COVID-19 and other infectious diseases (influenza, HIV, tuberculosis, hepatitis, etc.). Given that NCD risk factors can occur in early childhood, promoting healthy lifestyles among expectant mothers and adolescents should be a priority to reduce NCD risks, especially in low- and middle-income countries.

K e y w o r d s : non-communicable diseases; NCD risk factors; behavioral factors; infectious diseases.

For citation: Amlaev K. R., Abdullah Alnizami. The risk and protective factors for noncommunicable diseases. *Problemi socialnoi gigieni, zdravookhranenia i istorii meditsini.* 2025;33(3):445–447 (In Russ.). DOI: http://dx.doi.org/10.32687/0869-866X-2025-33-3-445-447

For correspondence: Amlaev K. R., doctor of medical sciences, professor, professor of the Chair of of Preventive Medicine, Public Health and Health Management of the Abu Ali ibn Sino Bukhara State Medical Institute, Ministry of Health of Uzbekistan. e-mail: karen.amlaev@bsmi.uz

Conflict of interests. The authors declare absence of conflict of interests.

Acknowledgment. The study had no sponsor support.

Received 05.08.2024
Accepted 30.10.2024

WHO data show that 71% of all deaths worldwide were caused by chronic noncommunicable diseases (CNCDs) [1]. CVDs are associated with several risk factors: overweight and obesity, smoking, alcohol consumption, unhealthy diet and physical inactivity, causing significant economic damage to the economy and society [2–4].

Currently, cardiovascular diseases (CVD) remain the leading cause of mortality and health care expenditure items. At the same time, mortality rates due to stroke, the second most important cause of death, have significantly decreased due to the effectiveness of preventive measures [5]. At the same time, the prevalence of hypertensive heart disease and the total number of deaths due to this disease have been increasing over the last three decades.

The list of modifiable risk factors for NCDs also includes high fasting plasma glucose levels (above 4.8 to 5.4 mmol/l) and high low-density lipoprotein cholesterol (LDL-C), the prevalence of which is also steadily increasing worldwide. A significant public health problem worldwide is the increasing number of overweight and obesity. Obesity exacerbates other risk factors such as hypertension, hyperglycemia, hypercholesterolemia and hypertriglyceridemia, which negatively affects the myocardium [6].

Lifestyle factors contribute to the prevalence of NCDs. Among them, nutritional quality is a risk factor for NCDs. The commercial interests of companies, which encourage the sale of unhealthy foods, hinder the implementation of healthy eating policies. Strategies aimed at reducing the use of sugar, salt and animal fats have not had the expected effect. Only the introduction of taxes on carbonated drinks, banning the use of artificial trans-fats in food products have partially demonstrated their effectiveness [7].

Hypodynamia, which has now become an epidemic, is a significant risk factor for a large number of cardiovascular, metabolic and cancer diseases. In recent years, a high mortality rate has been registered, caused by the effects of the COVID-19 pandemic. Respiratory and cardiovascular pathology along with social distancing, decreased accessibility of medical care have become additional factors that led to the growth of excess mortality [8].

In addition to biological risk factors, the incidence of NCDs is also influenced by environmental factors, including atmospheric and domestic air pollution, the levels of which are high in a significant number of countries. These factors can be classified as urban risk factors for NCDs, which have an enormous impact on the health of residents. Correlations between urban risk factors and human health have been identified [9].

According to the World Bank, in 2019, the world's urban population exceeded 55% of the total world population, and the impact of the urban environment on human health is a growing concern [7]. It is proved that residents of socially and economically disadvantaged areas have worse health indicators than residents of more prosperous areas, they show higher rates of cardiovascular morbidity [10], respiratory diseases [11], onychopathology [12], as well as a high mortality rate due to the lack of quality urban infrastructure, low accessibility of quality medical care [13].

Green spaces (e.g. trees, grass, forests and parks) and blue spaces (e.g. lakes, rivers, ponds, etc.) are important

The problems of social hygiene, public health and history of medicine. 2025; 33(3)
DOI: http://dx.doi.org/10.32687/0869-866X-2025-33-3-445-447

for human health. In turn, proximity to major roads, industrial plants and landfills can pose a serious threat to human health [14]. Fast food stores and cafes selling high-calorie junk food can also be attributed to urban risk factors that have a negative impact on the cardiovascular system.

The risk of dementia, diabetes mellitus, stroke, and cancer also increases with tobacco use [15]. Increased risk of these diseases plus Alzheimer's disease is also noted with obesity and excessive alcohol consumption. Arterial hypertension is associated with a high risk of diabetes mellitus, stroke, CHD and breast cancer [16].

In turn, some factors play a protective role against NCDs. The strongest protective factors were a healthy diet and adequate physical activity. For example, strict adherence to the Mediterranean diet reduces the risk of NCDs by 4-36%. Having a consistent and high physical activity also reduces the risk of NCDs by 13% to 45% [16]. Strong evidence has been presented for the protective effect of green and blue spaces on NCD outcomes, including atopic diseases, respiratory diseases, type 2 diabetes mellitus, stroke [17]. Their positive impacts are realized through their ability to regulate urban temperatures, reduce noise, improve air quality, mitigate climate extremes and other [18]. Green spaces and favorable walking environments also promote physical activity, social interaction, and psychological well-being, thereby improving the overall health of urban residents [19, 20]. Risk factors for NCDs interact closely with each other, for example, air pollution, depression, tobacco smoking, high blood pressure and obesity have been linked to all NCDs [17].

It was found that the presence of behavioral risk factors for NCDs exacerbates the severity of infectious pathology, in particular COVID-19, and increases the frequency of hospitalization of patients with this infection. Due to the prevalence of risk factors in vulnerable populations, the negative impact of COVID-19 was maximized in these communities, further exacerbating health inequalities. Although the risk factors for NCDs are ubiquitous, they are more prevalent in middle- and low-income countries [21]. Morbidity and mortality from NCDs have been found to correlate with those from COVID-19 [22].

A number of scientific studies have demonstrated associations between NCDs and other infectious diseases. Alcohol use has been shown to increase the chances of contracting tuberculosis, HIV, hepatitis C and pneumonia and exacerbate the course of these diseases, while injecting drug use also increases the risk of contracting tuberculosis and HIV, exacerbating their severity [23].

Obesity increases the risk of influenza infection and the severity of its outcomes and pneumonia [24]. Smoking is associated with a high risk of HIV infection, pneumonia and influenza, tuberculosis complications and COVID-19 [24].

Passive smoking also increases the risk of contracting infectious diseases, including tuberculosis, as well as the complicated course of acute lower respiratory tract infections by affecting immunity [25].

Behavioral risk factors for NCDs can themselves reduce risk awareness and patient compliance [25]. The combination of biological, social and behavioral risk factors increases the likelihood of infection and exacerbates the course of infectious disease [26].

Based on the above, it can be assumed that the elimination of behavioral risk factors should be included in the set of measures to prevent infectious diseases. It is worth noting that behavioral risk factors and related NCDs are more likely to affect vulnerable populations, which exacerbates social and economic inequalities in health. For example, in the UK, people in these groups are more than twice as likely to die from COVID-19 than those living in more affluent areas [27].

It is worth noting that increased risk factors for mortality from NCDs are formed not only during pregnancy, but also in the first years of life due to child nutrition and associated epigenetic factors [28]. Maternal risks such as over- or under-nutrition and gestational diabetes mellitus increase the risk of obesity and hypertension later in life. At the same time, nearly 35% of the global burden of disease occurs during adolescence, and more than 3000 adolescents die every day, mostly due to NCDs, injuries, and other preventable causes. Currently, more than 80% of the world's adolescent population is not physically active enough. However, measures to reduce hypodynamia are implemented in only 56% of WHO member states [29]. Risk factors for hypodynamia include: lack of access to recreational facilities, lack of open spaces (e.g. parks), inconvenient public transportation, and hindering social and cultural norms in the region. Meanwhile, the higher prevalence of overweight among women is likely related to their lower physical activity compared to men [30].

REFERENCES

1. Bennett J. E., et al. NCD Countdown 2030: worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4. *Lancet.* 2018;392(10152):1072–88. doi: 10.1016/S0140-6736(18)31992-5
2. Stanaway J. D., Afshin A., Gakidou E., Lim S. S., Abate D., Abate K. H., et al. Global, regional, and national comparative risk assessment of 84 behavioral, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392(10159):1923–94.
3. Vos T., Lim S. S., Abbafati C. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet.* 2020;396:1204–22.
4. Mensah G. A., Roth G. A., Fuster V. The global burden of cardiovascular diseases and risk factors: 2020 and beyond. *J. Am. Coll. Cardiol*. 2019;74:2529–32.
5. Roth G. A., Mensah G. A., Johnson C. O., et al Global Burden of Cardiovascular Diseases Writing Group. Global Burden of Cardiovascular Diseases and Risk Factors, 1990-2019: Update from the GBD 2019 Study. *J. Am. Coll. Cardiol*. 2020 Dec 22;76(25):2982–3021. doi: 10.1016/j.jacc.2020.11.010. Erratum in: *J. Am. Coll. Cardiol.* 2021 Apr 20;77(15):1958–9.
6. Lavie C. J., Laddu D., Arena R., Ortega F. B., Alpert M. A., Kushner R. F. Healthy weight and obesity prevention: the JACC health promotion series. *J. Am. Coll. Cardiol.* 2018;72:1506–31.
7. Zhang Y., Liu N., Li Y., Long Y., Baumgartner J., Adamkiewicz G., Bhalla K., Rodriguez J., Gemmell E. Neighborhood infrastructure-related risk factors and non- communicable diseases: a systematic meta-review. *Environ. Health.* 2023 Jan 5;22(1):2. doi: 10.1186/s12940-022-00955-8.

8. Vestergaard L. S., Nielsen J., Richter L. Excess all-cause mortality during the COVID-19 pandemic in Europe-preliminary pooled estimates from the EuroMOMO network, March to April 2020. *Euro Surveill.* 2020; 25:2001214.
9. Hartley K., et al. Effect of greenness on asthma in children: a systematic review. *Public Health Nurs*. 2020;37(3):453-60. doi: 10.1111/phn.1270161:310–324
10. Elo I. T. Social class differentials in health and mortality: patterns and explanations in comparative perspective. *Annu. Rev. Sociol.* 2009;35:553–72. doi: 10.1146/annurev-soc-070308-115929
11. Holmen J. E., et al. Relationship between neighborhood census-tract level socioeconomic status and respiratory syncytial virus-associated hospitalizations in US adults, 2015–2017. *BMC Infect. Dis.* 2021;21(1):1–9. doi: 10.1186/s12879-021- 05989-w
12. Ellis L., et al. Racial and ethnic disparities in cancer survival: the contribution of tumor, sociodemographic, institutional, and neighborhood characteristics. *J. Clin. Oncol*. 2018;36(1):25. doi: 10.1200/JCO.2017.74.2049
13. Pickett K. E., Pearl M. Multilevel analyses of neighborhood socioeconomic context and health outcomes: a critical review. *J. Epidemiol. Commun. Health*. 2001;55(2):111–22. doi: 10.1136/jech.55.2.111
14. Jephcote C., et al. A systematic review and meta-analysis of haematological malignancies in residents living near petrochemical facilities. *Environ. Health.* 2020;19(1):1–18. doi: 10.1186/s12940-020-00582-1
15. Peters S. A., Huxley R. R., Woodward M. Smoking as a risk factor for stroke in women compared with men: a systematic review and meta-analysis of 81 cohorts, including 3,980,359 individuals and 42,401 strokes. *Stroke*. 2013;44:2821–8.
16. Wang K., Li F., Zhang X., et al. Smoking increases risks of all-cause and breast cancer-specific mortality in breast cancer individuals: a dose-response meta-analysis of prospective cohort studies involving 39725 breast cancer cases. *Oncotarget*. 2016;7:83134–47.
17. Bellou V., Belbasis L., Tzoulaki I., et al. Risk factors for type 2 diabetes mellitus: an exposure-wide umbrella review of meta-analyses. *PLoS ONE*. 2018;13:e0194127.
18. Dendup T., et al. Environmental risk factors for developing type 2 diabetes mellitus: a systematic review. *Int. J. Environ. Res. Public Health*. 2018;15(1):78. doi: 10.3390/ijerph15010078
19. Salmond J. A., et al. Health and climate related ecosystem services provided by street trees in the urban environment. *Environ. Health.* 2016;15(1):95–111.
20. Twohig-Bennett C., Jones A. The health benefits of the great outdoors: a systematic review and meta-analysis of greenspace exposure and health outcomes. *Environ. Res.* 2018 Oct;166:628–37. doi: 10.1016/j.envres.2018.06.030
21. Uddin R., Lee E.-Y., Khan S. R., Tremblay M. S., Khan A. Clustering of lifestyle risk factors for non-communicable diseases in 304,779 adolescents from 89 countries: a global perspective. *Prev. Med. Int. J. Devot. Pract. Theory*. 2020;131:8. doi: 10.1016/j.ypmed.2019.105955
22. Azarpazhooh M. R., Morovatdar N., Avan A., Phan T. G., Divani A. A., Yassi N., Stranges S., Silver B., Biller J., Tokazebani Belasi M., Kazemi Neya S., Khorram B., Frydman A., Nilanont Y., Onorati E., di Napoli M. COVID-19 pandemic and burden of non-communicable diseases: an ecological study on data from 185 countries. *J. Stroke Cerebrovasc. Dis*. 2020;29(9):1–9. doi: 10.1016/j.jstrokecerebrovasdis.2020.105089
23. Peacock A., Tran L. T., Larney S., Stockings E., Santo T., Jones H., et al. All-cause and cause-specific mortality among people with regular or problematic cocaine use: a systematic review and meta-analysis. *Addiction*. 2021;116(4):725–42. doi: 10.1111/add.15239
24. Coleman B. L., Fadel S. A., Fitzpatrick T., Thomas S. Risk factors for serious outcomes associated with influenza illness in high- versus low- and middle-income countries: systematic literature review and meta-analysis. *Influenza Other Respir. Viruses*. 2018;12(1):22–9. doi: 10.1111/irv.12504
25. Andreasson S., Chikritzhs T., Dangardt F., et al. Alcohol and society 2021: alcohol and the coronavirus pandemic: individual, societal and policy perspectives. Stockholm: Medicine, SIGHT, Movendi International & IOGT-NTO; 2021.
26. Wood S., Harrison S. E., Judd N., Bellis M. A., Hughes K., Jones A. The impact of behavioral risk factors on communicable diseases: a systematic review of reviews. *BMC Public Health*. 2021 Nov 17;21(1):2110. doi: 10.1186/s12889-021-12148-y
27. Caul S. Deaths involving COVID-19 by local area and socioeconomic deprivation: deaths occurring between March 1 and July 31, 2020. UK Office for National Statistics. Deaths involving COVID-19 by local area and socioeconomic deprivation — Office for National Statistics (ons.gov.uk) between 1 March and 31 July 2020.
28. Marmot M., Bell R. Social determinants and non-communicable diseases: time for integrated action. *BMJ*. 2019;364:10–2. doi: 10.1136/bmj.l251
29. World Health Organziation. Noncommunicable Disease Prevention and Adolescents. 2017. Accessed 30 Aug 2021.
30. Abdalmaleki E., Abdi Z., Isfahani S. R., et al. Global school-based student health survey: country profiles and survey results in the eastern Mediterranean region countries. *BMC Public Health*. 2022 Jan 19;22(1):130. doi: 10.1186/s12889-022-12502-8

Поступила 05.08.2024
Принята в печать 30.10.2024