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# THE ROLE OF ECOLOGICAL CULTURE IN PRESERVING THE HEALTH OF THE POPULATION

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**Annotation.** The article analyses the role of ecological culture as a factor in preserving and strengthening public health. Ecological culture is considered as an integrative quality of the personality and society that unites ecological knowledge (cognitive component), values and motives (value-motivational component) and environmentally responsible practice (behavioural component). The study combined an analysis of secondary data of the World Health Organization, the Lancet Commission on pollution and health, the World Bank and the National Statistics Committee of Uzbekistan with a questionnaire survey of 386 adults in Tashkent city, Samarkand region and the Republic of Karakalpakstan. Globally, about 23% of all deaths are attributable to modifiable environmental risks, and in Uzbekistan life expectancy ranges from 76.8 years in Tashkent city to 72.2 years in the Republic of Karakalpakstan. The survey revealed a pronounced value–action gap: the value-motivational component of ecological culture (68.4 points) substantially exceeded the behavioural component (47.4 points). After adjustment for age, gender, education, income and region, respondents with a high level of ecological culture were more likely to rate their health as good (aOR = 3.10; 95% CI 1.54–6.24) and to be sufficiently physically active (aOR = 4.24; 95% CI 2.14–8.40), and were less likely to report frequent respiratory symptoms (aOR = 0.34; 95% CI 0.17–0.68). It is concluded that ecological culture acts as a resource of population health through three pathways – reduction of environmental exposure, adoption of health-promoting “co-benefit” behaviours and responsible participation in improving the living environment.

**Keywords:** ecological culture; public health; environmental health; health-promoting behaviour; self-rated health; air pollution; value–action gap; Uzbekistan.

## Introduction

Human health has always depended on the state of the natural environment, but in the twenty-first century this dependence has become particularly obvious. Air, water and soil pollution, climate change, loss of biodiversity and rapid urbanisation have turned environmental factors into one of the leading causes of disease and premature death. According to the World Health Organization, 12.6

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million deaths a year – nearly a quarter of global mortality – are attributable to modifiable environmental risks [1]. Pollution in all its forms remains responsible for about 9 million deaths annually [2, 3], and climate change is already increasing heat-related mortality, the spread of infections and food insecurity [4]. The planetary-health approach summarises these facts in one thesis: the health of human civilisation depends on the state of the natural systems on which it relies [5, 6].

In this situation, technological and legal measures – cleaner production, emission standards, water treatment – are necessary but not sufficient. A large share of environmental risks is generated and experienced at the level of everyday life: in the choice of transport, in heating and cooking practices, in the handling of household waste, in nutrition and consumption, in the attitude towards green spaces and water. Whether these everyday practices protect or damage health depends on the ecological culture of the population. The Ottawa Charter for Health Promotion already identified the creation of supportive environments and the strengthening of community action as key strategies of public health [7], and socio-ecological models of health emphasise the interaction between personal behaviour and physical and social surroundings [8–10].

In the scientific literature, ecological culture is usually interpreted as an integrative characteristic of the individual and society that includes ecological knowledge and thinking, a system of values and attitudes towards nature, and the practical skills of environmentally responsible behaviour [11, 12]. This structure corresponds to the goals of environmental education formulated at the Tbilisi Intergovernmental Conference – awareness, knowledge, attitudes, skills and participation [13] – and to modern models of environmentally significant behaviour, such as the value–belief–norm theory [14] and the theory of planned behaviour [15]. The New Ecological Paradigm scale [16] and measures of connectedness to nature [17, 18] are widely used to assess the value component. At the same time, many studies have documented the so-called value–action gap: people may declare concern for the environment without translating it into consistent behaviour [19, 20].

The health dimension of ecological culture has been studied much less. There is convincing evidence that contact with nature and green spaces is associated with lower cardiovascular and all-cause mortality, better mental health and improved well-being [21–24], and that diets and transport choices that are good for the planet are also good for human health [25, 26]. However, whether the ecological culture of a person as a whole – not only knowledge or attitudes separately – is associated with health indicators remains an open question, especially for the countries of Central Asia.

For Uzbekistan the question is of practical importance. The country combines a high burden of noncommunicable diseases, which account for more than 80% of deaths [27], with serious environmental challenges: the annual $PM_{2.5}$ concentration in Tashkent exceeds the WHO guideline more than six-fold [28, 29], and the Aral Sea crisis continues to affect the health of the population of the Republic of Karakalpakstan [30, 31]. State policy increasingly treats ecological culture as a national priority: the Constitution guarantees the right to a favourable environment [32],

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environmental education is regulated by a special concept [33], and the nationwide projects "Yashil makon" and "Eco-culture" are aimed at forming an environmentally responsible society [34, 35].

The aim of the study was to substantiate the role of ecological culture in preserving the health of the population on the basis of an analysis of global and national statistical data and an empirical assessment of the relationship between the level of ecological culture and health indicators of the adult population. The objectives were: (1) to summarise the evidence on the environment-related burden of disease at the global and national levels; (2) to assess the level and structure of the ecological culture of the population; (3) to determine the association between ecological culture and self-rated health, health-promoting behaviour and respiratory morbidity; (4) to propose directions for using ecological culture as a resource of public health.

**Materials and Methods**

The study was carried out in two stages. At the first stage**, se**condary data were analysed: the WHO global assessment of the burden of disease from environmental risks [1], the WHO air-quality guidelines and fact sheets [29, 36], the progress report of the Lancet Commission on pollution and health [2], the World Bank air-quality assessment for Tashkent [28], the national state-of-the-environment report [37] and demographic data of the National Statistics Committee of the Republic of Uzbekistan on life expectancy at birth by region for 2024 [38]. Methods of comparative analysis, grouping and generalisation were used.

At the second stage, a cross-sectional questionnaire survey was conducted in March–June 2026 in three regions with different environmental conditions: Tashkent city (a large metropolis with high traffic and heating-season air pollution), Samarkand region (a predominantly agricultural region with a historical urban centre) and the Republic of Karakalpakstan (the Aral Sea ecological disaster zone). Respondents aged 18–70 years were selected by quota sampling taking into account gender and age; the sample size (386 persons) exceeds the minimum required for a 5% margin of error at a 95% confidence level [39]. Participation was voluntary and anonymous; informed consent was obtained from all respondents, and the protocol was approved by the institutional ethics committee [name, protocol No., date].

The Ecological Culture Index (ECI) was calculated from a 36-item questionnaire consisting of three 12-item scales, each converted to 0–100 points: (1) the cognitive component – knowledge of environmental problems and of how they affect health; (2) the value-motivational component – environmental values, sense of personal responsibility and connectedness to nature (items adapted from the revised NEP scale and the Nature Relatedness scale [16, 18]); (3) the behavioural component – frequency of environmentally responsible practices (saving water and energy, waste sorting, refusal to burn waste, use of public or active transport, participation in tree planting and community clean-ups). The ECI was calculated as the mean of the three components and classified as low ($< 50$), medium (50–69.9) or high ($\geq 70$). The questionnaire was translated and adapted according to

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international guidelines [40]; Cronbach's α [41] was 0.78, 0.82 and 0.80 for the three scales and 0.88 for the index as a whole.

Health indicators included self-rated health on a five-point scale (a validated predictor of mortality [42]), recoded as poor/fair, good and very good; the presence of frequent respiratory symptoms (three or more episodes of cough, bronchitis or acute respiratory infection during the previous 12 months); physical activity of at least 150 minutes per week in accordance with WHO recommendations [43]; daily consumption of at least five portions of fruit and vegetables; and a preventive medical check-up during the previous 12 months.

Statistical processing was performed in IBM SPSS Statistics 26.0; charts were built in Microsoft Excel. Mean values are presented as M ± SD. Differences between regions were assessed by one-way ANOVA, and differences between components by the paired t-test. The distribution of categorical variables was compared with the $\chi^2$ test. The association between the ECI level and health indicators was estimated using multivariable logistic regression adjusted for age, gender, education, income and region; results are presented as adjusted odds ratios (aOR) with 95% confidence intervals (CI). A linear trend across the three ECI levels was tested by entering the level as an ordinal variable. Differences were considered significant at $p < 0.05$.

**Results and Discussion**

**Environment-related burden of disease: global and national evidence**

**Table 1** summarises key indicators that characterise the contribution of environmental factors to population health. Globally, the burden is dominated not by infectious diseases, as is often assumed, but by noncommunicable diseases: of 12.6 million environment-related deaths, 8.2 million are due to stroke, ischaemic heart disease, cancers and chronic respiratory diseases [1]. Air pollution is the most important single environmental risk factor, while nearly the entire world population is exposed to concentrations above the WHO guideline levels [36]. For Uzbekistan, the most significant environmental risk is also air pollution: in Tashkent, the average annual $PM_{2.5}$ level exceeds the guideline value more than six-fold, and the main sources are windblown dust, heating, transport and industry [28].

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**Table 1.** Key indicators of the environment-related burden on population health

| Indicator | Value | Year | Source |
|---|---|---|---|
| **Global level** | | | |
| Deaths attributable to modifiable environmental risks | 12.6 million (≈ 23% of all deaths) | 2012 | WHO [1] |
| – of which noncommunicable diseases | 8.2 million | 2012 | WHO [1] |
| Environment-related deaths of children under 5 years | 1.7 million | 2012 | WHO [1] |
| Deaths attributable to pollution (all forms) | ≈ 9 million (1 in 6 deaths) | 2019 | Lancet Commission [2] |
| Premature deaths from ambient and household air pollution | 6.7 million per year | 2019 | WHO [36] |
| Population living where WHO air-quality guidelines are not met | 99% | 2019 | WHO [36] |
| **Uzbekistan** | | | |
| Life expectancy at birth (national) | 75.1 years | 2024 | NSC [38] |
| Range between regions | 72.2–76.8 years | 2024 | NSC [38] |
| Share of noncommunicable diseases in total mortality | > 80% | 2019 | [27] |
| Prevalence of hypertension, adults aged 30–79 | 38% | 2019 | WHO [44] |
| Annual $PM_{2.5}$ in Tashkent vs WHO guideline (5 μg/m³) | > 6 times higher | 2024 | World Bank [28] |
| Sources of $PM_{2.5}$ in Tashkent | dust 36%, heating 28%, transport 16%, industry 13% | 2024 | World Bank [28] |
| Health costs of $PM_{2.5}$ pollution | ≈ 0.7% of GDP | 2024 | World Bank [28] |

Note: NSC – National Statistics Committee of the Republic of Uzbekistan. Source: compiled by the author from the cited publications.

The structure of environment-related mortality by cause is shown in Figure 1. Stroke (2.5 million deaths) and ischaemic heart disease (2.3 million) occupy the first places, followed by unintentional injuries, cancers and chronic respiratory diseases. It follows that environmental factors act largely

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through the same diseases that dominate the mortality structure in Uzbekistan. This is a fundamental point for understanding the role of ecological culture: the prevention of cardiovascular and respiratory diseases cannot be limited to traditional risk factors such as smoking or unhealthy diet; it must also include the reduction of environmental exposure – which directly depends on the everyday behaviour of people and communities [3, 45].

Figure 2 presents life expectancy at birth by region of Uzbekistan in 2024. The national average reached 75.1 years, having increased from 66.4 years in 1991 and 73.0 years in 2010 [38]. The regional gap nevertheless remains considerable: 4.6 years separate Tashkent city (76.8 years) from Syrdarya region and the Republic of Karakalpakstan (72.2 years each). Life expectancy is determined by a complex of socio-economic, medical and behavioural factors, and these data do not allow a direct causal attribution to the environment. It is significant, however, that the lowest value is observed in the region most affected by the Aral Sea crisis, where the literature documents elevated rates of respiratory, renal and anaemic conditions, especially among children [30, 31]. The regional differences underline the need to take environmental conditions into account when planning health-promotion programmes.

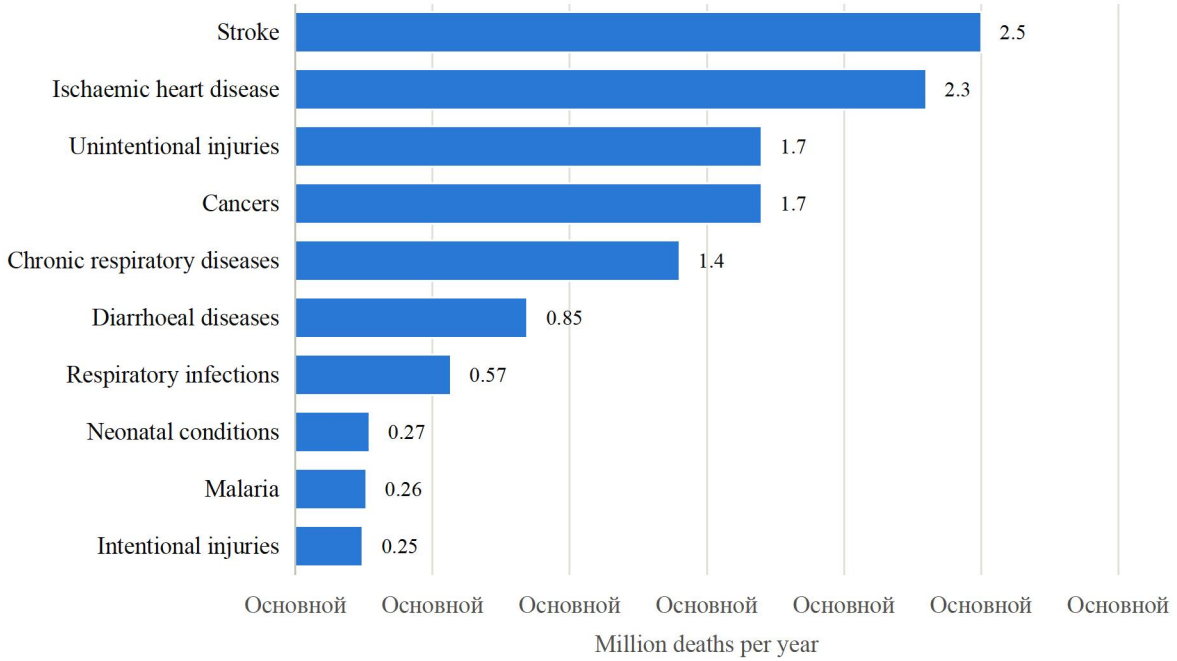
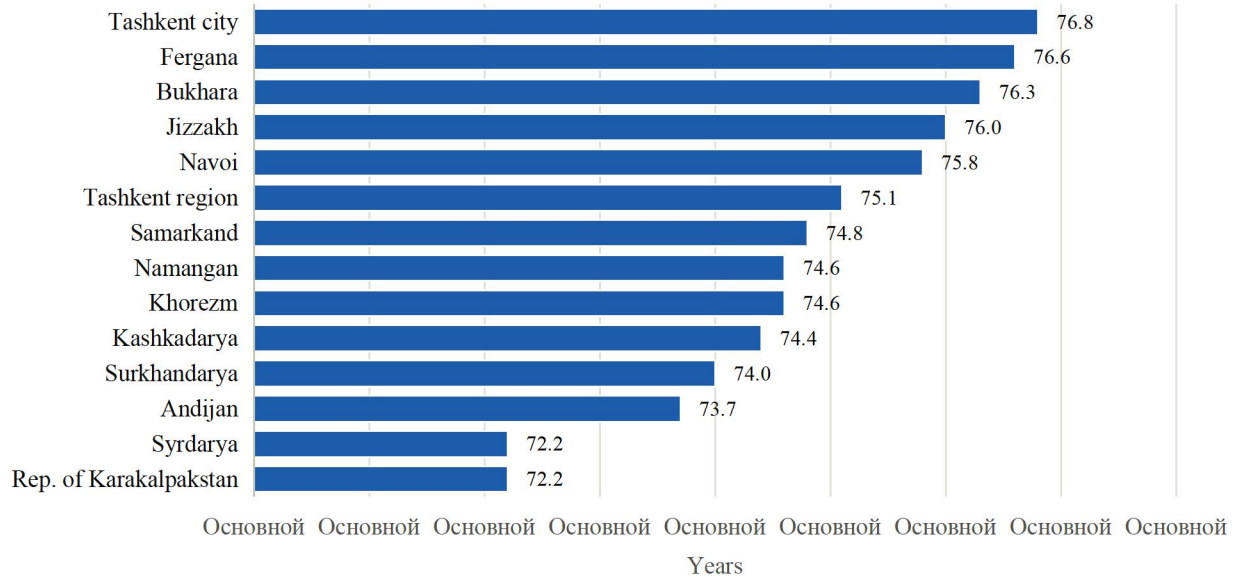



**Figure 1.** Top ten causes of death attributable to the environment, world (million deaths per year)
Source: compiled by the author from WHO data [1].

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**Figure 2.** Life expectancy at birth by region of Uzbekistan, 2024 (years)

Source: compiled by the author from data of the National Statistics Committee of the Republic of Uzbekistan




[38].

**Level and structure of the ecological culture of the population**

The mean Ecological Culture Index of the respondents was 57.4 ± 12.8 points. According to the classification adopted, 28.0% of respondents had a low level, 54.4% a medium level and 17.6% a high level of ecological culture. As shown in Table 2, the structure of ecological culture is markedly uneven. The value-motivational component received the highest score (68.4 ± 12.6), the cognitive component occupied an intermediate position (56.3 ± 17.1), and the behavioural component was the lowest (47.4 ± 16.2). The difference between the value and behavioural components was highly significant (paired $t = 27.68$, $p < 0.001$).

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**Table 2.** Components of ecological culture by region (points, 0–100; M ± SD)

| Component | Tashkent city (n = 132) | Samarkand region (n = 128) | Rep.of Karakalpakstan (n = 126) | Total (n = 386) | F; p |
|---|---|---|---|---|---|
| Cognitive component | 62.4 ± 16.4 | 53.7 ± 15.5 | 52.6 ± 17.7 | 56.3 ± 17.1 | 13.68; p < 0.001 |
| Value-motivational component | 67.7 ± 12.1 | 69.9 ± 12.1 | 67.7 ± 13.4 | 68.4 ± 12.6 | 1.30; p = 0.273 |
| Behavioural component | 51.5 ± 16.1 | 47.4 ± 14.8 | 43.1 ± 16.5 | 47.4 ± 16.2 | 9.10; p < 0.001 |
| Ecological Culture Index | 60.5 ± 12.7 | 57.0 ± 11.8 | 54.5 ± 13.3 | 57.4 ± 12.8 | 7.51; p < 0.001 |

Note: F – one-way ANOVA across the three regions. Source: author's survey data.

Regional comparisons revealed significant differences in the cognitive ($F = 13.68$, $p < 0.001$) and behavioural ($F = 9.10$, $p < 0.001$) components, which were highest in Tashkent city and lowest in the Republic of Karakalpakstan. At the same time, the value-motivational component did not differ between regions ($F = 1.30$, $p = 0.273$) and was even slightly higher in Karakalpakstan. In other words, residents of the Aral Sea region value nature and are concerned about its state no less than residents of the capital, but they have less knowledge and fewer opportunities to act. The value–action gap described in the international literature [19, 20] is thus clearly present in the population studied. The behavioural component correlated more strongly with the cognitive ($r = 0.64$) than with the value component ($r = 0.48$), which suggests that knowledge of concrete ways of acting is an important link between environmental values and actual behaviour [46, 47].

**Ecological culture and health indicators**

Self-rated health differed significantly depending on the level of ecological culture ($\chi^2 = 17.59$, df = 4, $p = 0.001$). As shown in Figure 3, the share of respondents who rated their health as poor or fair decreased from 58.3% in the group with a low level of ecological culture to 38.6% in the medium and 29.4% in the high group, while the share of "very good" ratings increased from 11.1% to 20.6%. Since self-rated health is an independent predictor of mortality [42], this gradient is of considerable public-health interest.

The results of the multivariable analysis are presented in Table 3. After adjustment for age, gender, education, income and region, a high level of ecological culture was associated with a three-fold higher likelihood of good or very good self-rated health (aOR = 3.10; 95% CI 1.54–6.24) and a four-fold higher likelihood of sufficient physical activity (aOR = 4.24; 95% CI 2.14–8.40). Respondents with a high ECI were also more likely to consume at least five portions of fruit and

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vegetables daily (aOR = 2.90; 95% CI 1.41–5.96). The likelihood of frequent respiratory symptoms was about three times lower in the high-ECI group (aOR = 0.34; 95% CI 0.17–0.68). For all outcomes a significant linear trend across the three levels was observed, i.e. the relationship has a dose–response character. The association with preventive check-ups was weaker and reached significance only for the medium level (aOR = 2.01; 95% CI 1.21–3.33).

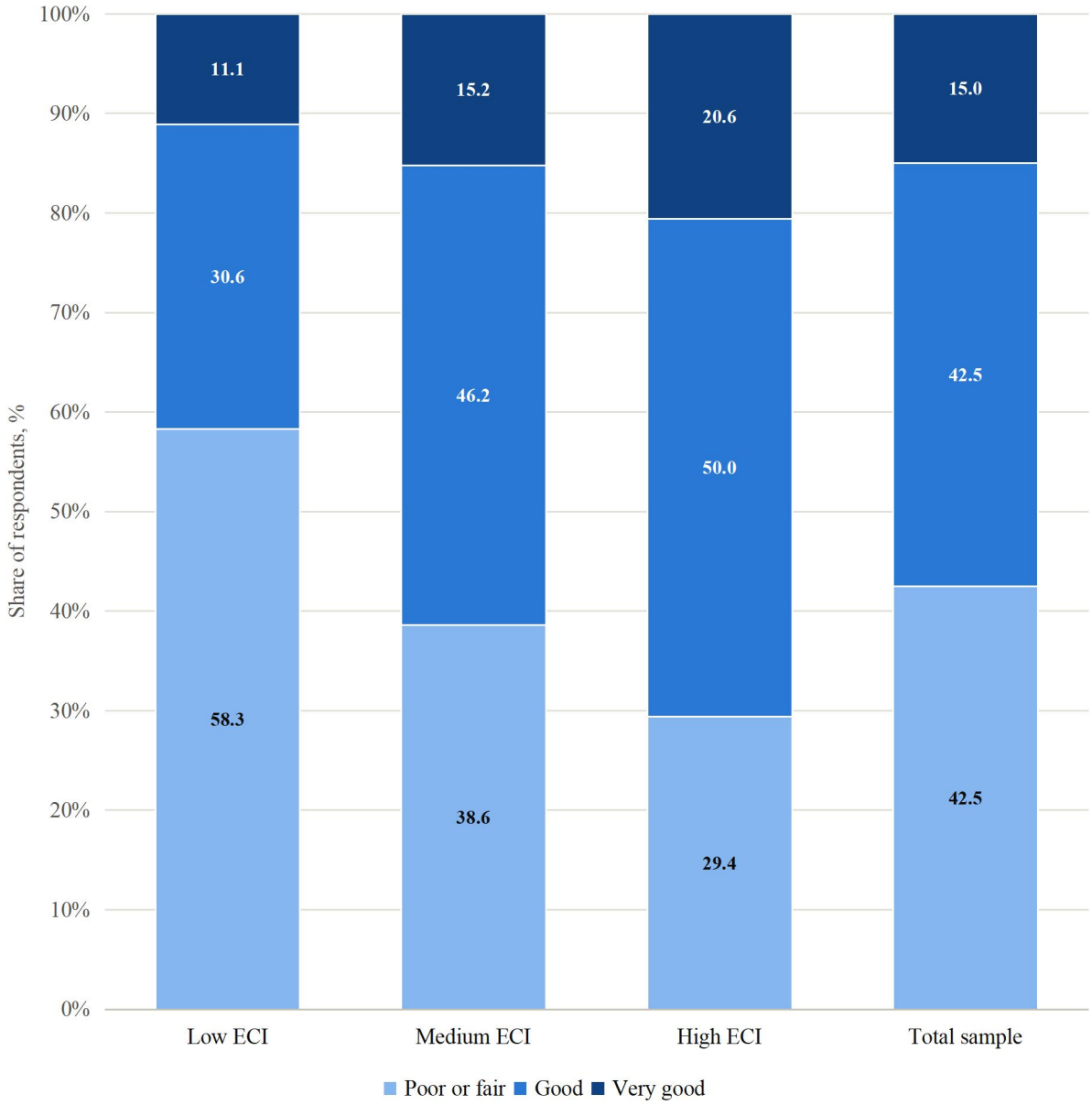



**Figure 3.** Distribution of self-rated health by level of ecological culture (%)
Source: author's survey data (n = 386). ECI – Ecological Culture Index.

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**Table 3.** Health indicators by level of ecological culture: prevalence and adjusted odds ratios

| Health indicator | Low ECI, % | Medium ECI, % | High ECI, % | aOR medium vs low (95% CI) | aOR high vs low (95% CI) | p for trend |
|---|---|---|---|---|---|---|
| Good or very good self-rated health | 41.7 | 61.4 | 70.6 | 2.19 (1.32–3.64)** | 3.10 (1.54–6.24)** | p < 0.001 |
| Physical activity ≥ 150 min/week | 25.0 | 42.9 | 58.8 | 2.23 (1.31–3.80)** | 4.24 (2.14–8.40)*** | p < 0.001 |
| Fruit and vegetables ≥ 5 portions/day | 17.6 | 26.7 | 39.7 | 1.62 (0.89–2.93) | 2.90 (1.41–5.96)** | p = 0.004 |
| Preventive check-up in the past 12 months | 30.6 | 48.1 | 48.5 | 2.01 (1.21–3.33)** | 1.85 (0.96–3.58) | p = 0.037 |
| Frequent respiratory symptoms (≥ 3 episodes/year) | 50.9 | 39.0 | 25.0 | 0.64 (0.40–1.05) | 0.34 (0.17–0.68)** | p = 0.002 |

Note: aOR – odds ratio adjusted for age, gender, education, income and region (logistic regression); reference – low ECI. * p < 0.05; ** p < 0.01; *** p < 0.001. Source: author's calculations.

**Mechanisms linking ecological culture and health**

The results allow us to identify three interrelated pathways through which ecological culture contributes to the preservation of health. The first pathway is the reduction of personal and household exposure to environmental hazards. A person with a developed ecological culture does not burn waste, ventilates the home properly, ensures the safety of drinking water, and limits outdoor activity on days of high pollution. The lower prevalence of respiratory symptoms in the high-ECI group is consistent with this mechanism; exposure to fine particulate matter is causally linked with respiratory and cardiovascular disease [2, 29].

The second pathway is the adoption of "co-benefit" behaviours, which are simultaneously good for the environment and for health. Walking and cycling instead of short car trips, a diet rich in plant foods, seasonal local products and less processed food, moderate consumption and spending time in green spaces reduce the ecological footprint and at the same time lower the risk of obesity, hypertension, diabetes and depression [21, 25, 26, 48]. The strong association between ecological culture and physical activity found in our study is particularly important for Uzbekistan, where insufficient physical activity is one of the leading behavioural risk factors [49].

The third pathway is social and psychological. Ecological culture includes a feeling of connection with nature and responsibility for the common living environment. Participation in tree planting,

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clean-ups of mahalla territories and care of parks strengthens social cohesion, gives a sense of meaning and self-efficacy, and increases contact with nature, which has a well-documented positive effect on mental health [22–24]. At the community level, an ecologically cultured population also creates demand for cleaner air, safe water and green infrastructure, i.e. it influences the environmental determinants of health through civic participation [7, 9].

Our findings are consistent with international studies showing that knowledge combined with connectedness to nature predicts ecological behaviour better than either factor separately [50, 51], and with the socio-ecological understanding of health as the result of interaction between the person and the environment [8, 52]. At the same time, the pronounced value–action gap identified in the study indicates that the potential of ecological culture as a health resource is currently realised only partially. Values are already present in society; what is lacking is practical knowledge and accessible infrastructure – safe pedestrian and cycling routes, separate waste collection, air-quality information and public green spaces.

On this basis, the following directions for strengthening ecological culture as a factor of public health can be proposed: (1) incorporation of environmental health topics into health-promotion programmes of primary health-care facilities and into the activities of mahalla institutions; (2) development of practice-oriented ecological education focused on concrete actions, not only on the description of problems [53, 54]; (3) priority support for the Republic of Karakalpakstan and other environmentally disadvantaged areas, where values are high but knowledge and behavioural opportunities are limited; (4) integration of health indicators (physical activity, respiratory morbidity, self-rated health) into the monitoring of the “Yashil makon” and “Eco-culture” nationwide projects [34, 35]; (5) public communication that presents environmental information together with specific recommendations on protective behaviour.

**Conclusion**

Environmental factors are responsible for about a quarter of global mortality, acting mainly through cardiovascular, oncological and chronic respiratory diseases – the same diseases that determine the mortality structure of Uzbekistan. In these conditions, ecological culture – the unity of ecological knowledge, values and responsible practice – becomes an important resource for preserving the health of the population.

The study showed that the ecological culture of the adult population in the surveyed regions is predominantly at a medium level and has an uneven structure: environmental values are well developed, whereas knowledge and especially behavioural practice lag behind. A higher level of ecological culture was independently associated with better self-rated health, higher physical activity, healthier nutrition and fewer respiratory symptoms, with a clear dose–response relationship. Ecological culture influences health through the reduction of environmental exposure, the adoption of co-benefit behaviours and the strengthening of social and psychological resources.

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The formation of ecological culture should therefore be considered as a component of public-health policy. Combining environmental education with health promotion, focusing on practical skills, supporting environmentally disadvantaged regions and creating infrastructure that makes responsible behaviour easy will allow the high environmental values of society to be converted into real gains in the health and longevity of the population.

**References**

1. Prüss-Üstün A, Wolf J, Corvalán C, Bos R, Neira M. Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks. Geneva: World Health Organization; 2016.
2. Fuller R, Landrigan PJ, Balakrishnan K, Bathan G, Bose-O'Reilly S, Brauer M, et al. Pollution and health: a progress update. Lancet Planet Health. 2022;6(6):e535–e547. doi:10.1016/S2542-5196(22)00090-0
3. Landrigan PJ, Fuller R, Acosta NJR, Adeyi O, Arnold R, Basu NN, et al. The Lancet Commission on pollution and health. Lancet. 2018;391(10119):462–512. doi:10.1016/S0140-6736(17)32345-0
4. Romanello M, di Napoli C, Green C, Kennard H, Lampard P, Scamman D, et al. The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms. Lancet. 2023;402(10419):2346–2394. doi:10.1016/S0140-6736(23)01859-7
5. Whitmee S, Haines A, Beyrer C, Boltz F, Capon AG, de Souza Dias BF, et al. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. Lancet. 2015;386(10007):1973–2028. doi:10.1016/S0140-6736(15)60901-1
6. Myers SS. Planetary health: protecting human health on a rapidly changing planet. Lancet. 2017;390(10114):2860–2868. doi:10.1016/S0140-6736(17)32846-5
7. World Health Organization. Ottawa Charter for Health Promotion. First International Conference on Health Promotion, Ottawa, 21 November 1986. Geneva: World Health Organization; 1986.
8. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. Health Educ Q. 1988;15(4):351–377. doi:10.1177/109019818801500401
9. Stokols D. Establishing and maintaining healthy environments: toward a social ecology of health promotion. Am Psychol. 1992;47(1):6–22. doi:10.1037/0003-066X.47.1.6
10. Bronfenbrenner U. The ecology of human development: experiments by nature and design. Cambridge, MA: Harvard University Press; 1979.
11. Orr DW. Ecological literacy: education and the transition to a postmodern world. Albany: State University of New York Press; 1992.

12. McBride BB, Brewer CA, Berkowitz AR, Borrie WT. Environmental literacy, ecological literacy, ecoliteracy: what do we mean and how did we get here? Ecosphere. 2013;4(5):art67. doi:10.1890/ES13-00075.1
13. UNESCO. Intergovernmental Conference on Environmental Education, Tbilisi (USSR), 14–26 October 1977: final report. Paris: UNESCO; 1978.
14. Stern PC. Toward a coherent theory of environmentally significant behavior. J Soc Issues. 2000;56(3):407–424. doi:10.1111/0022-4537.00175
15. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process. 1991;50(2):179–211. doi:10.1016/0749-5978(91)90020-T
16. Dunlap RE, Van Liere KD, Mertig AG, Jones RE. Measuring endorsement of the New Ecological Paradigm: a revised NEP scale. J Soc Issues. 2000;56(3):425–442. doi:10.1111/0022-4537.00176
17. Mayer FS, Frantz CM. The connectedness to nature scale: a measure of individuals' feeling in community with nature. J Environ Psychol. 2004;24(4):503–515. doi:10.1016/j.jenvp.2004.10.001
18. Nisbet EK, Zelenski JM, Murphy SA. The nature relatedness scale: linking individuals' connection with nature to environmental concern and behavior. Environ Behav. 2009;41(5):715–740. doi:10.1177/0013916508318748
19. Kollmuss A, Agyeman J. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? Environ Educ Res. 2002;8(3):239–260. doi:10.1080/13504620220145401
20. Gifford R, Nilsson A. Personal and social factors that influence pro-environmental concern and behaviour: a review. Int J Psychol. 2014;49(3):141–157. doi:10.1002/ijop.12034
21. 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;166:628–637. doi:10.1016/j.envres.2018.06.030
22. Hartig T, Mitchell R, de Vries S, Frumkin H. Nature and health. Annu Rev Public Health. 2014;35:207–228. doi:10.1146/annurev-publhealth-032013-182443
23. Bratman GN, Anderson CB, Berman MG, Cochran B, de Vries S, Flanders J, et al. Nature and mental health: an ecosystem service perspective. Sci Adv. 2019;5(7):eaax0903. doi:10.1126/sciadv.aax0903
24. Frumkin H, Bratman GN, Breslow SJ, Cochran B, Kahn PH Jr, Lawler JJ, et al. Nature contact and human health: a research agenda. Environ Health Perspect. 2017;125(7):075001. doi:10.1289/EHP1663
25. Willett W, Rockström J, Loken B, Springmann M, Lang T, Vermeulen S, et al. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Lancet. 2019;393(10170):447–492. doi:10.1016/S0140-6736(18)31788-4
26. World Health Organization. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: World Health Organization; 2018.

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

27. Alonge O, Homsi M, Rizvi MS, Malykh R, Geffert K, Kasymova N, et al. Design and implementation of brief interventions to address noncommunicable diseases in Uzbekistan. Glob Health Sci Pract. 2024;12(4):e2300443. doi:10.9745/GHSP-D-23-00443
28. World Bank. Air quality assessment for Tashkent and the roadmap for air quality management improvement in Uzbekistan. Washington, DC: World Bank; 2024.
29. World Health Organization. WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Geneva: World Health Organization; 2021.
30. Micklin P. The Aral Sea disaster. Annu Rev Earth Planet Sci. 2007;35:47–72. doi:10.1146/annurev.earth.35.031306.140120
31. Crighton EJ, Barwin L, Small I, Upshur R. What have we learned? A review of the literature on children's health and the environment in the Aral Sea area. Int J Public Health. 2011;56(2):125–138. doi:10.1007/s00038-010-0201-0
32. Constitution of the Republic of Uzbekistan (new edition adopted by referendum of 30 April 2023). Tashkent; 2023. Article 49. Available from: https://lex.uz/en/docs/6451070
33. Cabinet of Ministers of the Republic of Uzbekistan. Resolution No. 434 of 27 May 2019 “On approval of the Concept for the development of environmental education in the Republic of Uzbekistan”. Available from: https://lex.uz/docs/-4354743
34. United Nations Development Programme in Uzbekistan. UNDP and UNECE step forward to support Yashil Makon / Green Nation initiative [press release]. Tashkent: UNDP; 2022. Available from: https://www.undp.org/uzbekistan
35. President of the Republic of Uzbekistan. Resolution No. PQ-110 of 25 March 2026 “On comprehensive measures to accelerate environmental education, science and awareness-raising activities within the nationwide project ‘Eco-culture’”. Available from: https://lex.uz/docs/8100115
36. World Health Organization. Ambient (outdoor) air pollution [fact sheet]. Geneva: World Health Organization; 24 October 2024. Available from: https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health
37. Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan; International Institute for Sustainable Development. National state of the environment report: Uzbekistan. Winnipeg: IISD; 2023.
38. National Statistics Committee of the Republic of Uzbekistan. Life expectancy at birth by region, 2024 [statistical release]. Tashkent: National Statistics Committee; 2025. Available from: https://stat.uz
39. Krejcie RV, Morgan DW. Determining sample size for research activities. Educ Psychol Meas. 1970;30(3):607–610. doi:10.1177/001316447003000308

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

40. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25(24):3186–3191. doi:10.1097/00007632-200012150-00014
41. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika. 1951;16(3):297–334. doi:10.1007/BF02310555
42. Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. J Health Soc Behav. 1997;38(1):21–37. doi:10.2307/2955359
43. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020;54(24):1451–1462. doi:10.1136/bjsports-2020-102955
44. World Health Organization. Hypertension country profile: Uzbekistan. In: Global report on hypertension: the race against a silent killer. Geneva: World Health Organization; 2023.
45. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1223–1249. doi:10.1016/S0140-6736(20)30752-2
46. Frick J, Kaiser FG, Wilson M. Environmental knowledge and conservation behavior: exploring prevalence and structure in a representative sample. Pers Individ Dif. 2004;37(8):1597–1613. doi:10.1016/j.paid.2004.02.015
47. Steg L, Vlek C. Encouraging pro-environmental behaviour: an integrative review and research agenda. J Environ Psychol. 2009;29(3):309–317. doi:10.1016/j.jenvp.2008.10.004
48. Lee ACK, Maheswaran R. The health benefits of urban green spaces: a review of the evidence. J Public Health (Oxf). 2011;33(2):212–222. doi:10.1093/pubmed/fdq068
49. World Health Organization Regional Office for Europe. Prevalence of risk factors for noncommunicable diseases in the Republic of Uzbekistan, 2019 (STEPS survey). Copenhagen: WHO Regional Office for Europe; 2022. (In Russian.)
50. Otto S, Pensini P. Nature-based environmental education of children: environmental knowledge and connectedness to nature, together, are related to ecological behaviour. Glob Environ Change. 2017;47:88–94. doi:10.1016/j.gloenvcha.2017.09.009
51. Liefländer AK, Fröhlich G, Bogner FX, Schultz PW. Promoting connectedness with nature through environmental education. Environ Educ Res. 2013;19(3):370–384. doi:10.1080/13504622.2012.697545
52. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education: theory, research, and practice. 4th ed. San Francisco: Jossey-Bass; 2008. p. 465–485.
53. Hungerford HR, Volk TL. Changing learner behavior through environmental education. J Environ Educ. 1990;21(3):8–21. doi:10.1080/00958964.1990.10753743

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

54. Jensen BB, Schnack K. The action competence approach in environmental education. Environ Educ Res. 1997;3(2):163–178. doi:10.1080/1350462970030205