

RISK FACTORS OF NON-COMMUNICABLE DISEASES IN THE REPUBLIC OF BELARUS AND THEIR REGIONAL FEATURES

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Abstract: The aim of the study is to determine the level of main risk factors for non-communicable diseases in the Republic of Belarus and to identify their features in all regions. **Materials and methods** are based on STEPS-investigation, which was conducted as a large scale national retrospective study, on multistage cluster sample, N=5010 respondents (households) of the target age category 18–69, equally distributed by gender, age and region of the Republic of Belarus. The information was collected through: a questionnaire survey (WHO STEPS tool), an anthropometric study, and biochemical studies. The author of the article was the coordinator of regional work group for the Brest region. **Results and conclusions.** The main seven risk factors for the development of non-communicable diseases are revealed for more than 60% of the Belarussian population. Based on the analysis, the expectation of an increase in the incidence of cardiovascular diseases among the female population aged 40–69 in the Brest region is justified. Among the male population, according to this criterion, men of the Grodno region are in the least favourable zone. According to the level of the proportion of persons with three or more risk factors from 18–69, contributing to negative prognosis for the development of such diseases as diabetes mellitus, coronary heart disease and its complications, both women and men were singled out in the Grodno region.

Key words: risk factors, non-communicable diseases, overweight, arterial hypertension, alcohol, hypercholesterolemia, blood glucose, cardiovascular diseases, diabetes mellitus, Belarus, STEPS.

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Introduction

Human health and well-being are interrelated issues. A healthy nation is a goal that ensures the sustainable development of each state. A healthy population forms a workforce capable of ensuring the sustainable socio-economic development of the country and an acceptable quality of life for its citizens.

On January 1, 2016, the 2030 Agenda for Sustainable Development, adopted by 193 countries under the auspices of the UN, entered into force. It identified 17 goals in the field of sustainable development, which are comprehensive and closely related to the level of health of the population. Goal 3 "Ensure healthy lifestyles and promote well-being for all at all ages" directly identifies this link and includes the fight against non-communicable diseases and their risk factors. In the decade preceding the COVID-19 pandemic, the European Region had made progress in the main areas of the fight against non-communicable diseases: mortality from cardiovascular diseases decreased, and the five-year survival rate of patients with cancer increased.

In the Republic of Belarus, as in other countries, non-communicable diseases are the main cause of premature mortality of the country's population, disability, and morbidity. More than 36 million people die annually in the world due to non-communicable diseases, of which about 40% are people under the age of 60, who could still make a signifi-

cant contribution to the socio-economic sphere of life [1]. At the same time, according to the World Health Organization, about 9.1 million deaths per year can be prevented: for example, tobacco smoking accounts for 6 million deaths annually, and mainly males die, since this behavioural risk factor contributes to 71% of cases of lung cancer, 10% of cardiovascular diseases and 42% of cases of diseases of the bronchopulmonary system [2]. Experts are particularly concerned about the level of alcohol consumption in the population [3]. The negative contribution of such a modifiable risk factor as arterial hypertension cannot be underestimated: about 50% of deaths due to cardiovascular diseases are associated with arterial hypertension, which in numerical terms corresponds to 9.4 million deaths per year with 17 million deaths from all cardiovascular diseases [4]. The level of morbidity, disability and mortality due to cardiovascular diseases significantly increases with a combination of the above risk factors with such as elevated levels of lipoproteins and cholesterol, overweight and a sedentary lifestyle, against which diabetes mellitus develops, increasing the risk of negative outcomes of cardiovascular diseases up to 50%. For example, in the Republic of Belarus about 75% of cases of cardiovascular diseases are caused by an imbalance in the lipid spectrum of the blood and high blood pressure, which have arisen in the increasingly overweight popula-

tion, formed due to unbalanced nutrition and a sedentary lifestyle [5].

Controlled risk factors for the development of non-communicable diseases account for about 60% [6–8]. Even a slight decrease in their level in the population significantly affects the level of morbidity and mortality [9–12]. Determining the level of prevalence of these factors to predict the further growth of non-communicable diseases in Belarus is very important, since the share of non-communicable diseases in our country accounts for 79.1% of deaths and 79.8% in the structure of total morbidity, and the overall mortality rate in the Republic of Belarus is higher than the European average. Population's and individuals' impact on behavioural risk factors for non-communicable diseases such as smoking, excessive alcohol consumption, excessive salt intake, unhealthy diet and overweight, combined with low physical activity, are becoming the most effective prevention measures for these diseases, including in the fight against the associated medical-demographic and socio-economic problems of the country.

For the development and implementation of state policy in the field of prevention of non-communicable diseases and the fight against risk factors for their development, the development of a strategy required high-quality data at the national level. From 2016–2020, the country implemented the project "Prevention of non-communicable diseases, promotion of a healthy lifestyle and modernization of the health care system in the Republic of Belarus" (BELMED), funded by the European Union as an international technical assistance project, within which, with the support of WHO, a national study of the prevalence of the main factors was carried out the risk of non-communicable diseases among the population of the republic in the 18–69 age group. This large-scale representative study was named STEPS, which means "steps" as a reflection of the principle of phasing (step-by-step) inherent in its organization, the results of which allowed obtaining reliable information about the current situation regarding the prevalence of risk factors for NCD development among the adult population in the Republic of Belarus, as well as comparing the level of indicators relative to other countries. The study was conducted in 118 countries of the world, 43 countries conducted it more than once in the period up to 2016.

The STEPS study aimed to investigate the prevalence of major risk factors for non-communicable diseases in order to assess the baseline situation and effectively plan prevention and control activities.

Regional working groups were formed to conduct a STEPS study. The author of the article and the Health Care Institution "Brest Regional Cardiological Dispensary" were the coordinators of the regional group in the Brest region.

The aim of the study is to determine the level of main risk factors for non-communicable diseases in the Re-

public of Belarus and to identify their features for regions to develop a set of preventive measures.

Materials and methods

STEPS was a large scale national retrospective study. A multistage cluster sample was formed, of 5760 respondents (households) of the target age category 18–69, equally distributed by gender, age and region of the Republic of Belarus. About 87% of the proposed population (5010 people) took part in the study. In general, 288 enumeration areas were formed in the republic – 144 each in urban and rural areas. When forming the sample, the method of two-stage probabilistic sampling was used with the use of stratification and selection procedures at each stage of sampling.

Table 1: Distribution of sample size in strata by region [13]

Republic of Belarus	Urban area	Countryside	Total
	2880	2880	5760
Regions:			
Brest region	380	540	920
Vitebsk region	360	380	740
Gomel region	420	440	860
Grodno region	300	360	660
Minsk	780	0	780
Minsk region	300	860	1160
Mogilev region	340	300	640

Information for the research was collected through:

STEP 1 – questionnaire survey (WHO STEPS tool), through which data was collected on the socio-demographic status of the respondent, on behavioural preferences, including attitudes towards the designated behavioural risk factors for NCD development.

STEP 2 – anthropometric study with the determination of height, weight, waist circumference, blood pressure and heart rate of each respondent (except for pregnant women).

STEP 3 – biochemical studies to determine the level of total cholesterol and high density lipoproteins, glucose in capillary blood on an empty stomach in all respondents who signed an informed consent, as additionally urine was analysed for creatinine and sodium in an accredited laboratory.

We analysed the prevalence of the main risk factors for non-communicable diseases in the Brest region in comparison with the regions of the Republic of Belarus, as well as in comparison with the national average values.

Results and discussion

The complete analysis and the main results of the study throughout the Republic of Belarus are presented by a team of authors and regional coordinators [14].

The main results for the country population were as follows.

Smoking

The share of smokers in the country is 29.6%, while 27.1% of them smoke daily, the proportion of smokers among men is 48.4%, among women – 12.6%. The rural population of men smokes less than in cities – 46.8% and 50.0% respectively, the proportion of women who smoke in the countryside is also slightly less than in the city – 11.7% versus 13.2%. An interesting fact is that there is a fairly high level of second-hand smoke in the workplace, which is 22.5% among men and 8.5% among women. Among the respondents, only 31.6% received recommendations from medical workers to stop or quit smoking, and among smokers, 63.6% were notified of the harmful effects of this factor. The study also established a fairly considerable volume of daily smoking – about 14.9 pieces. At the same time, against the background of a smaller proportion of daily smokers among the rural population relative to the urban population, the number of cigarettes smoked per day turned out to be higher in this category of the population (15.4 versus 14.4 cigarettes).

Alcohol consumption

The share of people who have consumed alcohol in the last 30 days in the Republic of Belarus is quite large and amounts to 52.8%, of which 64.9% are men and 41.8% are women. Only 21.5% of people did not drink alcohol during this time and 36.6% of them were women, while men accounted for 29.2%. The study did not reveal a significant difference between the urban and rural population for these results. It should be noted that 20.2% use alcohol according to the most unfavourable scheme – episodic drinking in large quantities (27.4% of men and 13.7% of women) and 6.6% (11.9% of men and 1.4% of women) of respondents had a need to drink alcohol in the morning to relieve hangover syndrome.

Vegetables and fruits, salt

Consumption of fruits and vegetables in the country is quite low – less than five servings of these products are consumed by 72.9% of the respondents (77.9% of men and 68.4% of women). According to this criterion, the study did not determine a significant difference between the urban and rural population. The level of consumption of salt per day by both sexes is almost two times over the norm, and the difference between men (12.4 g / day) and women (9 g / day) is significant.

Physical activity

A low level of physical activity was noted in 13.2% of respondents, while in females it was lower than in men (13.5% and 12.8%, respectively). The rural population has a higher level of physical activity than the urban population.

Anthropometric changes: overweight, high blood pressure

The average body mass index among all respondents was 27.0 kg / m², the average waist circumference for women was 86.9 cm and for men 92.1 cm, which also exceeds the established norms. About 60.6% of respondents are overweight. The rural population exceeded the level of this indicator relative to the urban (62.4% versus 58.9%). There are one and a half times more obese women than men. (30.2% and 20.2%, respectively).

About 44.9% of the respondents had high blood pressure (more than 140/90 mmHg) without significant differences between men and women. At the same time, 53.4% of them noted that they did not take antihypertensive drugs, the share of men in this category corresponded to 65.0%, women – 42.6%. In rural areas, the proportion of people with high blood pressure who do not take medication turned out to be less than in the city, due to the male population. Among rural women, this indicator slightly exceeded the figures obtained for urban women (42.9% and 42.3%).

Biochemical studies have shown that 3.6% of the respondents had an increased level of glucose (more than 7 mmol / litre in blood plasma); this group also included those taking antihyperglycemic drugs. There were no significant differences between men and women, nor among the rural and urban population. The study revealed a high (38.2%) proportion of persons with an excess (more than 5 mmol / litre) of total cholesterol in the blood, including those taking appropriate medications, in women the indicator was higher (42.6%) than among men (33.4%). The level of hypercholesterolemia among the rural inhabitants slightly exceeded the values obtained in the category of the urban population.

The combination of three or more risk factors, which significantly increases the risk of cardiovascular diseases, oncopathology, or diabetes mellitus, amounted to 40.5%, while higher in men (47.9%) and lower (33.7%) in women. Only 5.6% of respondents did not reveal any risk factor for non-communicable diseases. Only 2.5% of men and 8.4% of women live in Belarus without risk factors for non-communicable diseases.

The proportion of persons aged 18–69 with a ten-year risk of developing cardiovascular diseases of more than 30% was 13.4% in both sexes, 15.5% among men, 11.7% among women. For the rural population, the share of risks of cardiovascular diseases exceeds the indicators of the urban population: in terms of the level of risk of their development in 10 years more than 30% (15.0% versus 11.9%).

An interesting fact was revealed: about 98.8% of the population was examined by preventive medical examination (dispensarization), and only 40% of the respondents have been instructed by medical workers on the need to main-

tain a healthy lifestyle over the past three years and given recommendations on the methods and ways of doing it.

In the Brest region, within the framework of the study, which took place from September 2016 to March 2017, we covered 910 people of the adult population aged 18–69. This is the largest number among all regions of the country. All three phases of STEPS were completed by January 2017. The main results for adults in the studied age group were as follows.

The share of smokers was 28.6%, of which 26.7% smoke daily, which is lower than the national average. An interesting fact is that women in the Brest region smoke significantly less: 9.1% versus 12.6% for the whole country, respectively, while the number of cigarettes smoked per day exceeds the national average (14.9) and it is 16.7. The number of cigarettes smoked daily by women is also higher – 12.1 versus 10.3 cigarettes.

Significantly lower for the Brest region was the proportion of *people who consumed alcohol* in the last 30 days: 44.2% versus 52.8%, both men (60.5%) and women (27.4%).

In contrast to the data obtained on average in the republic (nutrition of 72.9% is not rational), the level of consumption of fruits and vegetables is slightly higher for the Brest region: 64.3% consume less than five servings of vegetables and fruits per day, with slight differences among women and men (60.7% and 67.8%). The amount of salt consumed and the ratio among both sexes was at the same level as the national average (11.0 g / day).

The level of people with *insufficient physical activity* (10.2% for region versus 13.2% for the republic) turned out to be slightly less than in the country as a whole. In this region, about 10.9% of men and 9.5% of women consider their physical activity to be insufficient.

Obesity among the residents of the region (body mass index more than 25 kg / m²) was registered in a larger number of residents (66.0%) than in the country as a whole (60.6%), and no significant differences between both sexes were determined. A greater number of examined people also suffer from obesity (body mass index more than 30 kg / m²), with a predominance of women.

The proportion of people with *high blood pressure* exceeded the national average and amounted to 51.7%, taking into account those who are taking antihypertensive treatment and 66.4% among those who did not take treatment, and among the male population this indicator was 73.9% against the background of 57.4% high blood pressure in women. The state indicator turned out to be an order of magnitude lower than the data obtained in the Brest region (44.9%).

The data obtained in terms of blood glucose and total cholesterol levels did not show significant differences with the national average.

It is alarming that in the Brest region, according to the results of the conducted research, in comparison with the national average data, there is a very large proportion of people aged 40–69 with the risk of developing cardiovascular diseases or with the presence of cardiovascular diseases within the next 10 years (24.7% versus 13.4% in the country). Among men it is 26.1% (15.5% in the country), among women 23.3% (11.7% in the country). The proportion of persons with three or more risk factors for the development of non-communicable diseases at the age of 18–69 in the Brest region did not differ significantly from the national average in terms of both the level and the presence of both sexes, and amounted to 40.2% (46.9% in men and 23.1% among women).

As seen from Table 2, the maximum values are almost three times higher than the minimum, which dictates the need to take this fact into account when developing preventive measures.

Table 2: Data about risk of cardiovascular diseases among men and women for regions in the Republic of Belarus

The proportion of people (%) with	Minsk		Brest region		Vitebsk region		Grodno region		Gomel region		Mogilev region		Minsk region	
	man	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man	woman
cardiovascular diseases or with the risk of cardiovascular diseases in 10 years more than 30%, aged 40-69 years	13.3		24.7		8.2		12.8		7.9		7.7		14.9	
three or more risk factors, aged 18-69 years	13.6	13.2	26.1	23.4	10.3	6.2	18.0	8.4	9.2	6.7	8.5	7.1	17.5	13.2
	36.5		40.2		42.8		49.6		40.9		28.9		43.3	
	46.2	29.6	46.9	33.1	54.2	31.2	58.4	41.8	45.1	36.7	32.3	25.7	51.9	36.9

For the Brest region, the highest (66.4%) proportion of persons with arterial hypertension were revealed. Also, among those taking antihypertensive drugs at the time of the study, the largest proportion of people with high blood pressure falls in the Brest region – 51.7% (Table 3).

Table 3: Anthropometric data in the context of regions of the Republic of Belarus in the STEPS study 2016–2017

	Minsk		Brest region		Vitebsk region		Grodno region		Gomel region		Mogilev region		Minsk region	
	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man	woman	
The proportion of obesity (body mass index over 30.%)	21.2		26.4		21.4		30.6		27.1		24.8		25.9	
The proportion of people with high blood pressure (more than 140/90 mmHg) or taking antihypertensive drugs (HBP), %	16.2	24.3	23.4	29.6	17.4	25.4	22.1	38.1	21.6	32.5	17.1	31.8	19.0	31.6
	34.0		51.7		51.4		41.1		41.3		40.9		51.7	
	33.2	34.5	55.3	47.9	52.2	50.6	39.9	42.3	41.3	41.3	37.2	44.2	53.5	50.2
	50.4		66.4		54.9		39.9		57.4		42.6		45.4	
The proportion of people with high blood pressure (more than 140/90 mmHg) who do not take antihypertensive drugs, % (from HBP)	68.8	37.9	73.9	57.4	67.4	41.9	47.2	33.8	67.0	48.0	54.2	33.8	59.5	34.5

It should be noted that the combination of three or more risk factors significantly increases the possibility of cardiovascular diseases developing, which is observed in most cases in the Grodno region (49.6%), both among men (58.4%)

and among women (41.8%). The minimum values of this indicator were noted in the Mogilev region (28.9%).

Regarding the prospects for the development of cardiovascular diseases, or diabetes mellitus, the indicator of the proportion of obese people when the body mass index exceeds 30 kg / m² is very interesting. The study showed, that the largest number of such people live in the Grodno region – 30.6%, where the indicator is the highest in the whole country among women (38.1%). Among men, the largest proportion of obese people are found in the Brest region.

In terms of the level of tobacco consumption, the Brest region has average state indicators and does not stand out either towards high or towards low values relative to data from other regions of the country (Table 4), with the exception of the largest number of cigarettes smoked daily (16.7) with a minimum quantity in the city of Minsk (11.6).

Table 4: Tobacco consumption by regions of the Republic of Belarus in the STEPS study 2016–2017

	Minsk		Brest region		Vitebsk region		Grodno region		Gomel region		Mogilev region		Minsk Region	
	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man
Proportion of current smokers (%)	47.3	18.4	47.7	9.1	51.2	11.9	51.6	11.4	50.9	12.8	36.6	10.8	50.2	13.1
Average number of cigarettes per day (ps.)	12.6	9.3	17.4	12.1	16.4	10.0	17.1	11.6	15.6	7.4	16.4	12.0	15.9	12.2

When analysing the diet of the population, the study showed the highest level of consumption of less than 5 servings of vegetables (88.3%) in the Gomel region. The highest level of salt consumption was noted in the Mogilev and Minsk regions (63.9%, 40.7%, respectively). The most favourable levels of diet according to these indicators were noted in the Vitebsk region (Table 5).

Table 5: The nutrition of the population in the regions of the Republic of Belarus in the STEPS study 2016–2017

	Minsk		Brest region		Vitebsk region		Grodno region		Gomel region		Mogilev region		Minsk Region	
	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man
Proportion of those who consume less than 5 servings of vegetables per day (%)	88.5	72.9	67.8	60.7	74.4	57.3	86.4	76.3	90.6	86.0	55.1	46.3	77.8	68.0
Proportion of those who always / often add salt or add salt (%)	40.8	22.1	49.3	38.0	42.5	9.8	39.0	21.7	22.9	21.2	65.3	62.7	29.7	26.6
Proportion of those who always / frequently eat foods high in salt (%)	44.8	33.6	47.4	33.3	45.2	23.7	49.1	30.1	38.4	22.9	31.6	16.2	47.2	35.5

The maximum proportion of non-drinkers was noted in the Mogilev region (15.1%), the minimum values in this category were shown in the city of Minsk, where the proportion of non-drinkers throughout life was only 1.0% (Table 6).

In terms of the level of physical activity, the Brest region has the lowest intensity indicators in comparison with other regions of the country. The best levels were noted in the Grodno region (Table 7).

Conclusions

Table 6: Alcohol consumption by regions of the Republic of Belarus in the STEPS research 2016–2017

	Minsk		Brest region		Vitebsk region		Grodno region		Gomel region		Mogilev region		Minsk Region	
	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man
Percentage of non-drinkers throughout life (%)	0.4	1.5	6.5	13.7	1.3	4.3	1.3	5.0	2.9	4.6	12.6	17.3	3.8	6.1
Proportion of current drinkers (last 30 days) (%)	80.5	64.7	60.5	27.4	76.8	41.9	72.0	52.5	65.0	43.5	34.0	24.7	62.3	35.9

Table 7: Physical activity of the population in the regions of the Republic of Belarus in the STEPS study 2016–2017

	Minsk		Brest region		Vitebsk region		Grodno region		Gomel region		Mogilev region		Minsk Region	
	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man	woman	man
Proportion of individuals with insufficient physical activity (less than 150 minutes of moderate intensity exercise per week) (%)	19.0	16.2	10.9	9.5	9.2	14.0	22.2	27.9	5.2	11.3	17.8	8.6	14.3	9.8
Proportion of those engaged in high-intensity physical activity (%)	68.7	86.4	64.1	87.2	67.2	92.2	76.6	95.7	75.1	94.2	70.8	92.5	59.7	91.3

The research data show the high risk of non-communicable diseases for the Belarussian population, mostly for rural regions. When developing prevention measures, it should be noted that for the population of Brest and Grodno the most relevant are increasing the level of physical activity and reducing the proportion of obese people, for Vitebsk – reducing the proportion of smokers in the region, for Minsk city – reducing the consumption of alcohol, for Mogilev, Minsk and Gomel regions – controlling salt consumption by the population. The largest proportion of people aged 18–69 with three or more risk factors for non-communicable diseases, both women and men, was identified in the Grodno region: for Grodno, the measures should be the most intersectoral and comprehensive. From the point of view of combating arterial hypertension among men, a set of measures is a priority in the Brest and Minsk regions, and among the female population – in the Vitebsk region. The analysis of these results shows that the main and primary emphasis in the development of a set of preventive measures for the population of the country should be placed on strengthening the control of arterial hypertension.

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