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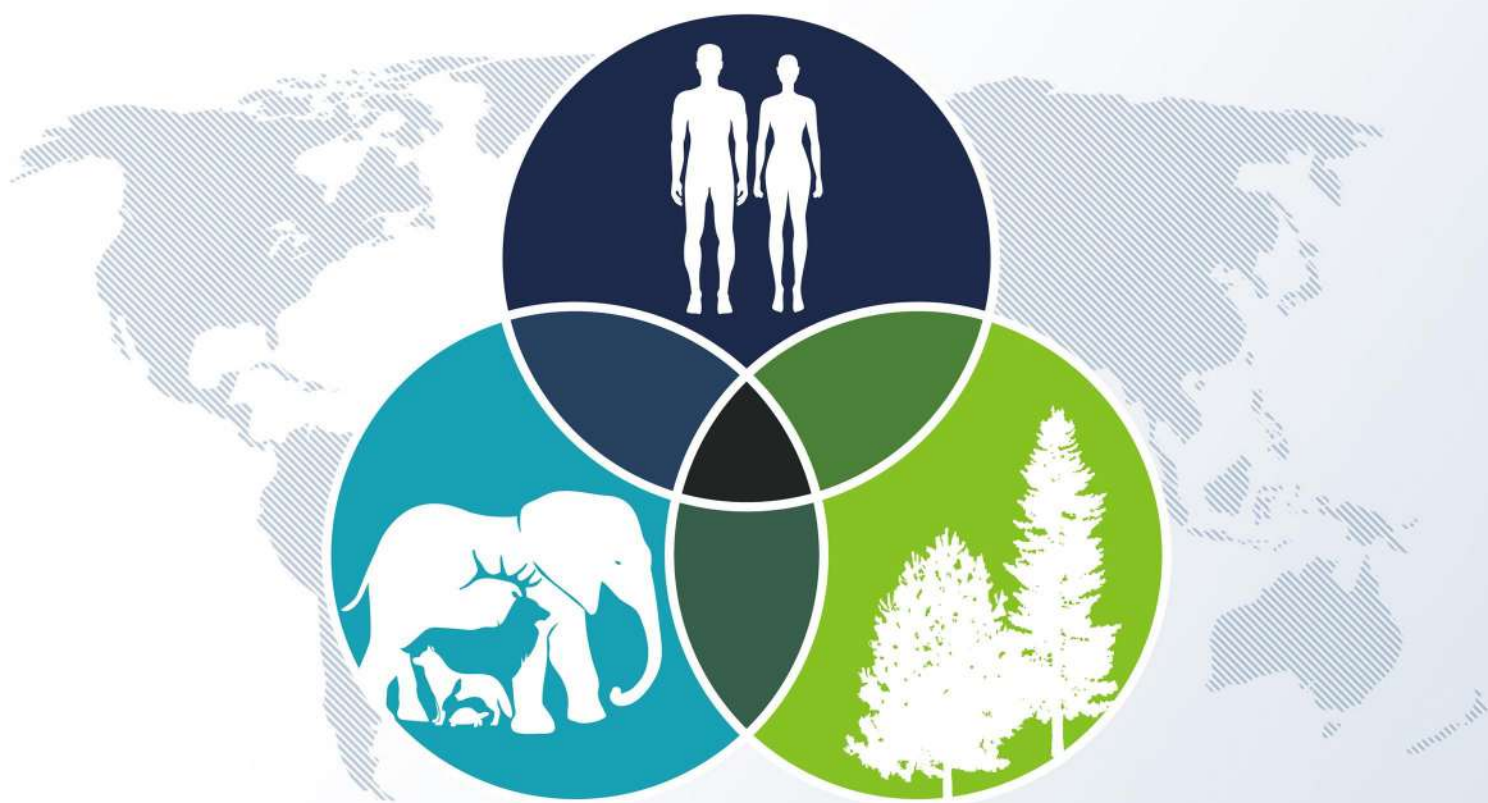
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# OH<sub>&</sub>RM ONE HEALTH & RISK MANAGEMENT

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The Moldovan Association for Biosafety and Biosecurity (MDBBA) is a scientific and practical, instructive and educational, non-governmental, apolitical and non-profit professional organization, created in 2017.

The main objective of the association is the development of good practices and culture in the field of biosafety and biosecurity and the promotion of knowledge within professional and research-innovation groups.

**Biosafety** – includes security principles, technologies and rules to be followed to prevent unintended exposure to pathogens and toxins or their accidental release/leakage.

*"Protection of personnel, population from unintended exposure to pathogens/biohazardous material".*

**Biosecurity** - includes a wide spectrum of measures (biosecurity policies, regulatory regime, scientific and technical measures) applied in an organized framework, necessary to minimize risks (prevention of actions, terrorist attacks by the intentional release of pathogens or toxins as well as loss, their theft or misuse).

*"Protection and prevention of theft, intentional misuse of pathologies/biohazardous material".*

**Risk management** – is a decision-making process in which the results of risk assessment (the process of estimating workplace hazards) are integrated with economic, technical, social and political principles to generate strategies for risk reduction.

## CHANGES IN YOUNG PEOPLE'S ATTITUDES TO THE PROBLEM OF COVID-19, FLU, AND OTHER UPPER RESPIRATORY INFECTIONS DURING THE WAR IN UKRAINE

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### Keywords:

COVID-19, pandemic, war, antiepidemic measures, Ukraine.

**Introduction.** The population of all countries of the world was affected by the COVID-19 pandemic, but the most severe consequences were for low- and middle-income countries (LMICs). Following Russia's invasion of Ukraine, there have been changes in people's attitudes to the challenges posed by the COVID-19 pandemic. The aim is to study the attitude of young people to the problem of COVID-19, influenza, and other upper respiratory infections (URI) during the war in Ukraine. **Material and methods.** The materials consist of the results of an online survey of young people in Chernivtsi and neighboring regions of the western part of Ukraine in 2023/2024 (N=269). The methods of sociological analysis, descriptive statistics, pair correlation, and logistic regression using PIVOT and SPSS were applied. **Results.** According to the results, 65.1% of respondents suffered from COVID-19, with 70.3% of them being vaccinated. During the pandemic, only 4.2% of respondents admitted that they did nothing to prevent infection. Since the beginning of the war, this percentage increased to 43.2%, with an additional 8.2% citing a lack of opportunity for prevention. At the end of the second year of the war, only 25.7% of respondents expressed concern about COVID-19, influenza, and other URIs. A direct correlation was found between this concern and the problem of restricting men's travel abroad during the pandemic ( $r=0.239$ ), psychological issues ( $r=0.198$ ), and financial problems ( $r=0.224$ ) among females. Female anxiety was also influenced by job loss ( $r=0.152$ ) and engagement in activities such as volunteering in aid delivery to the front ( $r=0.288$ ) and cooking food for soldiers ( $r=0.152$ ). Significance was established at the 95% CI,  $p<0.05$ . **Conclusions.** At the end of the second year of the war, the situation with COVID-19, influenza and other URIs was a concern of only one in four respondents (25.7%), which was also associated with vaccination (70%) and a transmitted disease (65%).

### Cuvinte-cheie:

COVID-19, pandemie, război, măsuri antiepidemice, Ucraina.

### SCHIMBĂRI ÎN ATITUDINEA TINERILOR FAȚĂ DE COVID-19, GRIPĂ ȘI ALTE INFECȚII ALE CĂILOR RESPIRATORII SUPERIOARE ÎN TIMPUL RĂZBOIULUI DIN UCRAINA

**Introducere.** Populația tuturor țărilor lumii a fost afectată de pandemia COVID-19, îndeosebi cea din țările cu venituri mici și mijlocii. Invazia Rusiei în Ucraina a indus schimbări în atitudinea oamenilor față de provocările pandemiei COVID-19. Scopul prezentului studiu constă în elucidarea atitudinii tinerilor față de COVID-19, gripă și alte infecții ale căilor respiratorii superioare în timpul războiului din Ucraina. **Material și metode.** Rezultatele unui sondaj online al tinerilor din Cernăuți și din regiunile învecinate din vestul Ucrainei din perioada 2023/2024 (N269) au fost analizate aplicând metode de sociologie, statistici descriptive, corelație de perechi, regresie logistică folosind PIVOT, SPSS. **Rezultate.** Sondajul a arătat că 65,1% dintre respondenți au suferit de COVID-19, dintre care 70,3% au fost vaccinați. În timpul pandemiei, doar 4,2% dintre respondenți au recunoscut că nu au făcut nimic pentru a nu se infecta, iar de la începutul războiului – 43,2%, 8,2% din respondenți motivând inactivitatea de prevenție prin faptul că „nu există posibilitate”. La sfârșitul celui de-al doilea an de război, situația privind COVID-19, gripa și alte URI-uri a provocat îngrijorare doar pentru 25,7% dintre respondenți. În cazul bărbaților, o corelație directă a fost stabilită între această preocupare și restricționarea călătoriilor bărbaților în străinătate în timpul pandemiei ( $r=0,239$ ). Pentru femei mai acute sunt problemele psihologice ( $r=0,198$ ) și financiare ( $r=0,224$ ). Anxietatea femeilor a fost determinată și de pierderea locului de muncă ( $r=0,152$ ), de livrarea de ajutoare pe front ( $r=0,288$ ) și gătitul mâncării pentru soldați ( $r=0,152$ ). Semnificația a fost aleasă la nivelul de 95% CI,  $p<0,05$ . **Concluzii.** La sfârșitul celui de-al doilea an de război, situația privind COVID-19, gripa și alte infecții ale căilor respiratorii superioare era o preocupare doar pentru unul din patru respondenți (25.7%), fapt determinat de vaccinare (70%) și de caracterul transmisibil al acestor afecțiuni (65%).



## INTRODUCTION

Previously, it was believed that low- and middle-income countries (LMICs) faced a triple problem in healthcare, namely, major non-communicable diseases and road traffic accidents were added to the traditional infectious disease burden (1). However, the COVID-19 pandemic, against the background of the socio-economic crisis it caused, has made its own adjustments. It has deepened existing disparities between countries, posed challenges for management at various levels, and exacerbated the adverse effects of both communicable and non-communicable diseases (2, 3).

The WHO has emphasized that, although the COVID-19 pandemic has affected the populations of all countries around the world, the most severe consequences have been felt by those who were already in a vulnerable state, such as those with poorer health and less access to necessary quality healthcare. This group has suffered the most due to anti-epidemic restrictions, particularly in LMICs (4). Despite the fact that the COVID-19 pandemic is no longer considered a public health emergency of international concern, the disease continues to pose a serious threat to human health globally. With the pandemic now spanning four years, new strains of the virus are emerging, and WHO experts predict that it will persist for a significant period of time (5). The latest Human Development Report 2021/22 has highlighted the “stunning reality” of a two-year decline in the global Human Development Index (HDI) due to the COVID-19 pandemic, which has led to an unprecedented synchronized multidimensional crisis (6). Ukraine, despite belonging to the LMICs in terms of per capita income, has demonstrated an almost steady increase in the HDI since 1996. However, in 2020, progress gave way to regression, with the main factor being a reduction in life expectancy, primarily as a result of the pandemic (7).

The situation in the country worsened significantly when, amidst the COVID-19 pandemic, the Russian armed forces launched a large-scale invasion of Ukraine on February 24, 2022. Civilian casualties increased, and large areas came under occupation. More than 15 million civilians were displaced within Ukraine or abroad (8). Military shelling of civilian objects continues in Ukraine. The humanitarian and psychological crises in areas near and far from the war zone worsened during the winter of 2023 due to repeated bombard-

ments of civilian infrastructure (9).

Against the backdrop of military operations, the public's attitude toward disease prevention, compliance with anti-epidemic measures, and their implementation face significant challenges. *The purpose* of our study was to examine the attitudes of young people toward COVID-19, influenza, and other upper respiratory infections (URIs) during the period of martial law in Ukraine.

## MATERIAL AND METHODS

The materials were based on the results of an online survey of young people in Chernivtsi and nearby regions of the western part of Ukraine. The participants included students (3-6 years), graduates of Bukovinian State Medical University (BSMU), and individuals from other educational institutions. The survey, titled “Let’s summarize,” was conducted through a Google form from December 20, 2023, to January 03, 2024, and involved 269 respondents, comprising 68 males and 201 females. For comparative analysis, the results of an online survey conducted by the Ptukha Institute of Demography and Social Studies of the National Academy of Sciences of Ukraine in May 2022 were utilized. This survey encompassed 523 respondents (130 males and 393 females) from 16 educational institutions across various regions of Ukraine, aiming to investigate the impact of the COVID-19 pandemic and the Russo-Ukrainian war on the lives and health of students. The specifically designed “Let’s summarize” questionnaire included questions about the most significant challenges young people encountered during the COVID-19 pandemic (2020/21), the full-scale invasion (from 02/24/2022), and at the end of the second year of the war (2023/24). A separate section addressed whether the current situation with COVID-19, influenza, and other upper respiratory infections as of early 2024 is a cause for concern. Respondents could choose multiple answers, and open-ended questions were also included. The research employed sociological methods, descriptive statistics using PIVOT, as well as the method of pairwise correlation, logistic regression, with the determination of the probability of an event (P) using the SPSS statistical program. Reliability was set at the 95% confidence interval with  $p < 0.05$ . To compare the frequency of individual responses among males and females, the *Student's t-test* was used for relative values.

## RESULTS

The respondents were requested to outline their individual challenges over the past 4 years in light of the COVID-19 pandemic and Russia's full-scale invasion with the outbreak of hostilities in Ukraine. The socio-demographic characteristics of the respondents and significant events that occurred in their lives during the war are detailed in Table 1. A majority of the respondents, constituting 92.2%, were young. Changes in the educational process (start/completion) were reported by 28.3% of respondents, while changes in employment were noted by 42.5%. Among those who found employment, 18.8% either lost their jobs or changed their field of activity. Additionally, one in ten respondents initiated a family, and 7.5% of female respondents gave birth to a child. According to the survey, a significant proportion of young people, up to 65.1% (64.7% males, 65.2% females) had contracted COVID-19, as confirmed by testing and clinical examination. For comparison purposes, in the 2022 survey, 36.3% (37.7% of males, 35.9% of females) reported having had the disease, confirmed by testing. At the time of the survey, 70.3% of respondents were vaccinated against COVID-19.

In addition to health problems, the pandemic has also caused financial difficulties, as indicated by more than a quarter of respondents in both the 2023/24 survey, with 25.3% (20.6% males;

26.9% females), and in the 2022 survey with 25.8% (23.1% males, 26.7% females). Financial problems associated with the spread of coronavirus disease were found to be less significant than the same problems caused by the war, as reported by 49.5% and 35.7% of respondents, respectively. A correlation was found between financial problems during the pandemic (2020-2021) and feelings of anxiety about the situation with COVID-19, influenza, and other URIs in early 2024 among females ( $r=0.224$ ,  $p<0.01$ ).

A correlation was observed between the presence of psychological health complaints, encompassing mood swings, stress, and depression, at the time of the survey and the financial problems that existed at the beginning of the war among males ( $r=0.286$ ,  $p<0.05$ ) and females ( $r=0.174$ ,  $p<0.05$ ). Financial problems during the 2020-2021 pandemic were found to be important for females' psychological health ( $r=0.289$ ,  $p<0.01$ ).

According to the results of the 2023/24 survey, 82.5% of respondents reported significant problems during the COVID-19 pandemic (2020-2021). The structure of these problems was predominantly associated with the restriction of usual communications, movement within the country, and foreign travel, accounting for 47.7% in total. A slightly smaller share (40.8%) was attributed to psychological problems, including fear of death, safety, and the health of relatives (fig. 1).

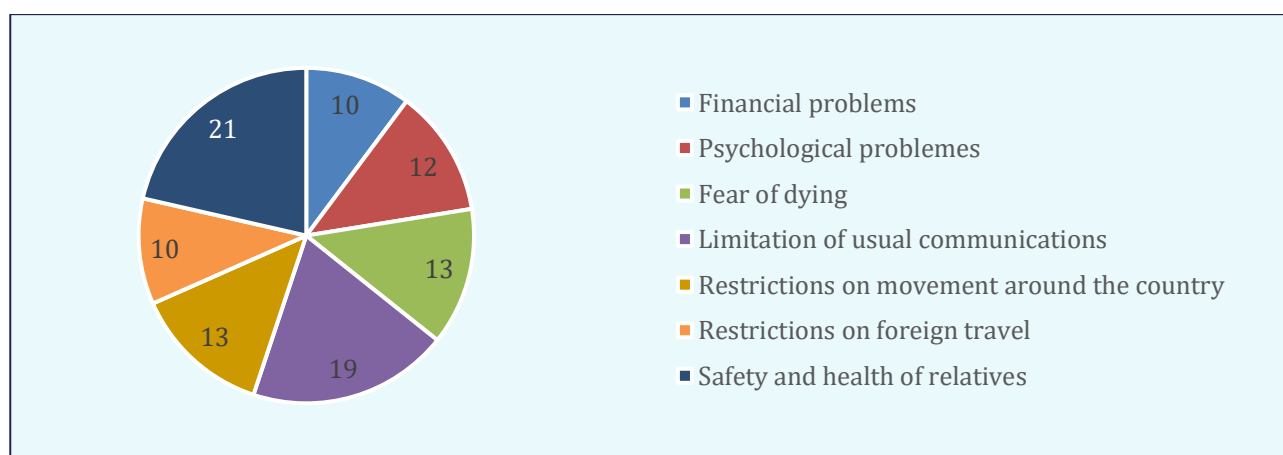


Figure 1. The structure of problems that occurred during the COVID-19 pandemic (2020-2021) according to respondents (survey 2023/24).

Psychological problems during the war were more relevant than during the pandemic and accounted for 58.5% of the structure. At the same time, the share of problems related to the restri-

ction of usual communications and movement decreased from the beginning of the pandemic to 29.2% during the war (fig. 2).

Table 1. Socio-demographic characteristics of respondents.

Determinants		Quantity	Percentage (%)
<b>Total</b>		<b>269</b>	<b>100</b>
Males		68	25.3
Females		201	74.7
<b>Age</b>	18-24	209	77.7
	25-44	39	14.5
	45 and older	21	7.8
<b>Education</b>	Higher	85	31.6
	Incomplete higher	126	46.8
	Secondary specialized	32	11.9
	Secondary	26	9.67
<b>Studying</b>	<b>Total</b>	<b>211</b>	<b>78.4</b>
	Males	52	26.5
	Females	159	79.1
<b>Working</b>	<b>Total</b>	<b>133</b>	<b>49.4</b>
	Males	40	58.8
	Females	93	46.3
<b>Working with those who are studying</b>	<b>Total</b>	<b>88</b>	<b>41.7</b>
	Males	25	48.1
	Females	63	39.6
<b>During the period of martial law</b>	<b>Total</b>	<b>46</b>	<b>17.1</b>
	Males	6	8.8
	Females	40	19.9
<b>Completed studying</b>	<b>Total</b>	<b>30</b>	<b>11.2</b>
	Males	4	5.9
	Females	26	12.9
<b>Started a family</b>	<b>Total</b>	<b>28</b>	<b>10.4</b>
	Males	5	7.4
	Females	23	11.4
<b>Found employment</b>	<b>Total</b>	<b>69</b>	<b>25.7</b>
	Males	16	23.5
	Females	53	26.4
<b>Lost a job</b>	<b>Total</b>	<b>19</b>	<b>7.1</b>
	Males	6	8.8
	Females	13	6.5
<b>Changed their field of activity</b>	<b>Total</b>	<b>26</b>	<b>9.7</b>
	Males	10	14.7
	Females	16	8.0

Financial problems had almost the same share in the structure of complaints – 11.5% during the pandemic and 12.3% at the beginning of the war, with no statistically significant difference between males and females.

Among all COVID problems (593), each respondent named an average of two (2.2), while since the beginning of the war, 780 have been named, with an average of three (2.9).

The frequency of psychological problems differed

significantly. During the war, they were reported more often than during the 2020-21 pandemic, with more than twice as many females (77.1% vs. 34.8%) and three times as many males (52.9% vs. 17.6%). The concern for the safety and mental health of relatives during the war was also twice as significant to respondents (51.7% vs. 26.4%) compared to during the pandemic. During the pandemic, psychological problems in various manifestations, including the fear of death, safety, and mental health of relatives, affected the vast

majority of respondents (59.5%, comprising 42.6% males and 65.2% females), but the impact

of the war surpassed this, affecting 84.8% of respondents (66.2% males and 91.0% females).

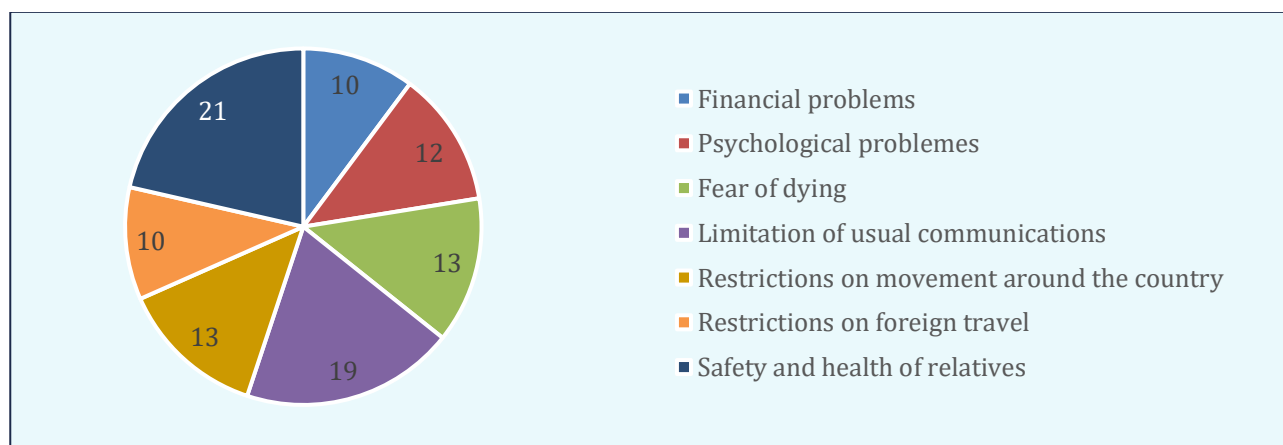


Figure 2. The structure of problems that occurred during the full-scale Russian invasion (from 02/24/2022) according to respondents (survey 2023/24).

According to a survey of students in higher education institutions in Ukraine at the beginning of the war in 2022, the vaccination rate was 69.6% (with 70% among males and 69.5% among females). Trust in vaccines and vaccination was observed in 51.6% of respondents, with an additional 18.0% being immunized on demand. Prior to the war, students were meticulous in following anti-epidemic measures against COVID-19: 89.1% (87.7% males, 89.6% females) used masks in public places, 73.4% (68.5% males, 75.1% females) frequently and thoroughly washed their hands or regularly disinfected them, 36.5% (35.4% males, 36.9% females) limited their movements and avoided unnecessary outings. Students often ventilated the room they were in for an extended period (44.7%, with 36.9% males and 47.3% females), maintained social distance (49.3%, with 44.6% males and 50.9% females), avoided crowds and public events (55.3%, with 55.4% males and 55.2% females), and did not use public transport, preferring to walk when possible (40.0%, with 40.0% males and 39.9% females). Only 4.2% of respondents (4.6% males, 4.1% females) admitted to doing nothing to prevent infection.

With the outbreak of war, the attitude towards the implementation of anti-epidemic measures has changed: 43.2% (44.6% males, 42.7% females) answered “no action.” Another 8.2% (10.8% males, 7.4% females) added “no possibility.” Partial measures could be taken by 35.0% of respondents, with fewer males (22.3%) than fe-

males (39.2%) ( $t=3.84$ ,  $p<0.001$ ). However, 13.2% of respondents did not change their infection prevention actions since the beginning of the war, with more males (22.3%) than females (10.2%) ( $t=3.06$ ,  $p<0.01$ ).

As a result, at the end of the second year of the war (1 year and 10 months), the situation with COVID-19, influenza, and other URIs was a concern for only one in four respondents (25.7%), with females (27.9%) expressing this concern more often than males (19.1%) ( $t=2.13$ ,  $p<0.05$ ). A direct correlation was found between male anxiety about the situation with COVID-19, influenza, and URIs and the problem of restricting travel abroad during the 2020/21 pandemic ( $r=0.239$ ,  $p<0.05$ ) and an inverse correlation with continuing education during this period ( $r=-0.259$ ,  $p<0.05$ ). Male anxiety was also influenced by the reassessment of the importance of preserving their own health and that of their loved ones during the war ( $r=0.238$ ), with an error probability of 5.1%.

There was a correlation between female anxiety about the situation with COVID-19, influenza, and other URI and psychological problems that arose during the 2020/21 pandemic ( $r=0.198$ ,  $p<0.01$ ), except for financial problems, which have already been discussed. Female anxiety was also influenced by job loss ( $r=0.152$ ,  $p<0.05$ ), volunteering in the form of participation in the delivery of aid to the front ( $r=0.288$ ,  $p<0.01$ ), and cooking ( $r=0.152$ ,  $p<0.01$ ). A correlation was found bet-



ween the presence of psychological complaints in females at the time of the survey and anxiety about COVID-19, influenza, and other upper respiratory infections ( $r=0.163$ ,  $p<0.05$ ). When applying logistic regression, a statistically significant inverse characteristic was found to be mastery of first aid skills. Thus, with a high probability ( $P=0.99\%$ ), the concerns of female respondents about the current situation can be described as follows:  $Z = -8.220 + 1.21a - 0.728b + 2.030c$ , where  $a$  - financial problems during the 2020/21 pandemic;  $b$  - mastering first aid;  $c$  - participation in the delivery of aid to the front line.

## DISCUSSIONS

The online survey of young people in Chernivtsi and nearby regions of the western part of Ukraine successfully complements the previous 2022 study of students studying at higher education institutions in various regions of Ukraine. The aim is to explore the most significant challenges faced by young people during the COVID-19 pandemic (2020/21) and Russia's full-scale invasion of Ukraine. This study aligns with a survey conducted by the independent think tank Cedos in Ukraine among the civilian population (10, 11, 12).

The research results revealed that in Ukraine (across most of its regions), unlike other LMICs, challenges arising from the war distort commonly accepted strategies for combating infectious diseases. The population, particularly young people, struggle to adhere fully to anti-epidemic measures across all territories. During the war, psychological concerns displaced fears of the pandemic. Psychological issues during the pandemic may lose their relevance in retrospect, potentially impacting the survey results in late 2023 and early 2024. Challenges related to communication

and transportation decreased to 29.2% due to adaptation to the current situation. The smaller proportion of financial issues in the survey conducted among students and graduates of BSMU was attributed to the survey being conducted in the relatively less war-affected territory of Bukovyna.

At the time of the survey, 70.3% of respondents were vaccinated against COVID-19, which could have reduced the fear of getting sick, but was not statistically significant. This may be due to the fact that a significant number of students had already had these infections at the time of the survey. For example, the inverse correlation showed that male students were less likely to be concerned about the situation with COVID-19, influenza, and other URI. Young people seemed to have moved on from COVID-19 as an experience. In the comments to the questionnaire, we read: "Why ask about COVID-19? Are you looking to resume it?" Female anxiety regarding the situation with COVID-19, influenza, and Upper Respiratory Infections (URI) was influenced by job loss (effectively a financial problem) and volunteering, manifested through participating in delivering aid to the front lines and cooking (effectively demonstrating concern for the health and safety of soldiers). Studies among Czech university students [12] associated the female gender with higher levels of anxiety and depressive symptoms. Logistic regression identified an additional stress reduction factor: mastering first aid skills. Among males, this supportive component could be characterized as a reassessment during the war of the importance of preserving their own health and that of their loved ones. Consequently, more males (22.3%) than females (10.2%) did not alter their actions to prevent COVID-19 since the beginning of the war ( $p<0.01$ ).

## CONCLUSIONS

1. At the end of the second year of the war, the situation with COVID-19, influenza, and other URIs concerned only one in four respondents (25.7%), and no statistically significant relationship was found between experiences and vaccination (70%) or past illnesses (65%).
2. The psychological challenges faced by young people in Ukraine during the war (84.8%) overshadowed those caused by the pandemic (59.5%), leading to adverse changes in compliance with COVID-19 anti-epidemic measures in the initial months of the war. Notably, 43.2% of respondents reported engaging in no preventive activities.
3. A weak direct correlation was observed between the concerns of males about the situation with COVID-19, influenza, and URIs during the war (2023/24 survey) and the problem of restricting travel abroad during the 2020/21 pandemic ( $r=0.239$ ,  $p<0.05$ ). Additionally, there was an inverse



correlation with the pursuit of continuing education during the survey period.

4. There is a weak direct correlation between females' concerns about the situation with COVID-19, influenza, and other URIs and various factors, which include psychological issues ( $r=0.198$ ,  $p<0.01$ ), financial problems ( $r=0.224$ ,  $p<0.01$ ) arising during the 2020/21 pandemic, job loss ( $r=0.152$ ,  $p<0.05$ ), volunteering in the form of participation in the delivery of aid to the front ( $r=0.288$ ,  $p<0.01$ ), cooking ( $r=0.152$ ,  $p<0.01$ ), and the presence of psychological complaints at the time of the survey ( $r=0.163$ ,  $p<0.05$ ).

## CONFLICT OF INTEREST

The authors declare no conflict of interest regarding the study and this paper.

## ETHICAL APPROVAL

The study was approved by the Ethics Committee of Bukovinian State Medical University (approval

number 4 from 21.12.2023).

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