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**SYSTEMATIC ANALYSIS OF NATIONAL AND REGIONAL BURDEN
OF DISEASES FOR ADULTS 70 YEARS AND OLDER**

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Since 2010, for the first time in the history of independent Ukraine, life expectancy at birth has exceeded 70 years. Formally, this is a positive phenomenon, but if added years are spent in poor health, health care system will face increased healthcare expenses due to increased demand. Statistical data indicate that people aged ≥ 70 being the fastest growing segment in Ukraine as well as Europe, Asia, and the United States. In 2009, older (70 y.o. and more) adults represented 8.6% of the Ukraine' population; this percentage in 2020 was raised to 11.7%. The health and wellbeing of ageing populations have become important public health issues with wide reaching economic implications that affect medical care, in-home care and assistance, and healthcare staff activity.

From 2000 to 2021, the size of the Ukrainian population aged ≥ 70 increased from 4724 thsd. in 2000 to 4841 thsd. of people in 2021 and this despite the loss of Crimea and parts of the Donetsk and Luhansk regions in 2014. During 2000-2013 the size of the inhabitants aged ≥ 70 increased to 5248 thsd., and during 2014-2021 (excluding the temporarily occupied territory of the Autonomous Republic of Crimea and the city of Sevastopol and part of the temporarily occupied territories

in the Donetsk and Luhansk regions) increased from 4605 thsd. to 4841 thsd. of people.

The overall prevalence of diseases among the elderly population of Ukraine amounted to 248,990.9 cases per 100 thsd. people of this age. In other words, every person over 70 years old has about 3 diseases that require medical attention. An analysis of the prevalence of diseases among older people showed that it was mainly formed by diseases of the circulatory system (50.2%) as well as diseases of the digestive system (10.1%), respiratory diseases (8.1%).

Such a most severity burden of population morbidity leads to high mortality of the inhabitants and very short life expectancy during elder age. The average life expectancy after 65 is 14.57 years. In this case, we cannot speak of such a concept as "healthy life expectancy at age 70", although this is a common occurrence in many countries.

Understanding and reducing the burden of disease among older people is critical to mitigate the economic burden of ageing and build sustainability within the global health system for the next generations.

Key words: population aging, elderly people, morbidity, mortality, life expectancy.

СИСТЕМАТИЧНИЙ АНАЛІЗ НАЦІОНАЛЬНОГО ТА РЕГІОНАЛЬНОГО ТЯГАРЯ ХВОРОБ СЕРЕД НАСЕЛЕННЯ, СТАРШОГО ЗА 70 РОКІВ

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Починаючи з 2010 року вперше в історії незалежної України очікувана тривалість життя при народженні перевищила 70 років. Формально це – позитивне явище, однак якщо додаткові роки будуть проведені в поганому стані здоров'я, система охорони здоров'я зіткнеться зі збільшенням витрат на охорону здоров'я через збільшення попиту, відтак спостереження за станом здоров'я людей похилого віку має важливе значення для визначення стану їх старіння. Статистичні дані показують, що люди віком ≥ 70 років є сегментом, який найшвидше зростає в Україні, а також у Європі, Азії та

США. У 2009 році літні люди (70 років і більше) становили 8,6% населення України; у 2020 році цей відсоток було підвищено до 11,7%. Здоров'я та благополуччя старіючого населення стали важливими проблемами громадського здоров'я з широкомасштабними економічними наслідками, які впливають на медичне обслуговування, догляд і допомогу вдома, а також діяльність медичного персоналу.

З 2000 по 2021 рік чисельність населення України віком ≥ 70 років зростає з 4724 тис. осіб у 2000 році до 4841 тис. осіб у 2021 р., і це незважаючи на втрату Криму та частини Донецької та Луганської областей у 2014 р. Протягом 2000-2013 рр. чисельність жителів віком ≥ 70 років зростає до 5248 тис., а протягом 2014-2021 рр. (без урахування тимчасово окупованих території АР Крим, м. Севастополя та частини тимчасово окупованих територій у Донецькій та Луганській областях) зростає з 4605 тис. до 4841 тис. осіб.

Загальна поширеність захворювань серед літнього населення України склала 248 990,9 випадків на 100 тис. людей цього віку. Іншими словами, кожна людина старше 70 років має приблизно 3 захворювання, які потребують медичної допомоги. Аналіз поширеності захворювань серед людей похилого віку показав, що її переважно формують хвороби системи кровообігу (50,2%), а також хвороби органів травлення (10,1%), органів дихання (8,1%).

Важкий тягар захворюваності населення призводить до високої його смертності та дуже короткої тривалості життя в літньому віці. Середня тривалість життя після 65 років становить 14,57 років. У цьому випадку ми не можемо говорити про таке поняття, як «здорова тривалість життя в 70 років», хоча це звичайне явище в багатьох країнах.

Розуміння та зменшення тягаря захворювань серед людей похилого віку має вирішальне значення для пом'якшення економічного тягаря старіння та створення сталого розвитку глобальної системи охорони здоров'я для наступних поколінь.

Ключові слова: старіння населення, люди похилого віку, захворюваність, смертність, очікувана тривалість життя.

Introduction. In 2010, for the first time in Ukrainian independence history, most newborns might live into their 70s and beyond [11]. With the Ukrainian population experiencing extra years of life, the health and wellbeing of older adults is paramount so that they can continue to be actively engaged in society. However, if added years are spent in poor health, health care system will face

increased healthcare expenses due to increased demand [5]. To conceptualise years of life spent in good health, a variety of ageing indicators have been developed. Healthy and successful ageing, and frailty, project high or low wellbeing in older people, respectively [2, 3, 8]. Surveillance of the older population's health is essential to capture its ageing status. Statistical data indicate that people aged ≥ 70 being the fastest growing segment in Ukraine as well as Europe, Asia, and the United States [Global]. In 2009, older (70 y.o. and more) adults represented 8.6% of the Ukraine' population; this percentage in 2020 was raised to 11.7% [11, 13]. The health and wellbeing of ageing populations have become important public health issues with wide reaching economic implications that affect medical care, in-home care and assistance, and healthcare staff activity [1]. Understanding and reducing the burden of disease among older people is critical to mitigate the economic burden of ageing and build sustainability within the global health system for the next generations [1].

The main aim of the present study was to describe levels and trends in death and disability burden in the population aged ≥ 70 using morbidity, mortality and expectancy data. We approached this with several new metrics and assessments that leverage the above-mentioned indicators.

Material and research methods. To carry out an assessment of burden of the diseases among the adults 70 years and older of Ukraine the data from annual statistical reports were analyzed. First of all, the "Tables of Population Fertility, Mortality and Average Life Expectancy 2020 (TPMALE) [14] were used. TPMALE study provides annually updated all-Ukrainian and regional population data on birth rate, population reproduction, mortality and average life expectancy in Ukraine and regions. Therefore, it provides an excellent opportunity for global and regional systematic analysis of causes of fatal and non-fatal health loss and risk factors in older adults.

As caused of deaths the following groups of diseases in accordance of the ICD-10 for Mortality and Morbidity Statistics (A00–Y89) were analyzed: infectious and parasitic diseases (A00–B99), incl. tuberculosis (A15–A19); diseases caused by human immunodeficiency virus (B20–B24); neoplasms (C00–D48); diseases of the circulatory system (I00–I99), incl. coronary heart disease (I20–I25), cardiovascular diseases (I60–I69); respiratory diseases (J00–J98); diseases of digestive system (K00–K92); external death causes (V01–Y89). incl. road traffic deaths (V01–V99), accidental drowning and submersion (W65–W74); accidental poisoning by and exposure to noxious substances (X40–X49), intentional self-harm (X60–X84); assault with intent to kill or injure (X85–X99, Y00–Y09), and event of undetermined intent (Y10–Y34) [12].

Other sources of data include statistical yearbooks "Natural population movement of Ukraine for 2021", "Population of Ukraine for 2020", Statistical Yearbooks of Ukraine. According to the medical statistics obtained since 2014 the study has been conducted without taking into account the temporarily occupied territories of the Autonomous Republic of Crimea, the city of Sevastopol and the temporarily occupied territories of Donetsk and Luhansk regions.

The work used a systematic approach, comparative geographical, statistical, cartographic, analytical, and other research methods. All calculations, figures and graphic images were obtained using SPSS Statistic 17.0 computer software by SPSS Inc. and Microsoft Excel 2010. Statistical processing was carried out according to the generally accepted methods of variation statistics.

Results and discussion

Demographics and morbidity trends

From 2000 to 2021, the size of the Ukrainian population aged ≥ 70 increased from 4724 thsd. in 2000 to 4841 thsd. of people in 2021 and this despite the loss of Crimea and parts of the Donetsk and Luhansk regions in 2014. During 2000-2013 the size of the inhabitants aged ≥ 70 increased to 5248 thsd., and during 2014-2021 (excluding the temporarily occupied territory of the Autonomous Republic of Crimea and the city of Sevastopol and part of the temporarily occupied territories in the Donetsk and Luhansk regions) increased from 4605 thsd. of people to 4841 thsd. (fig. 1).

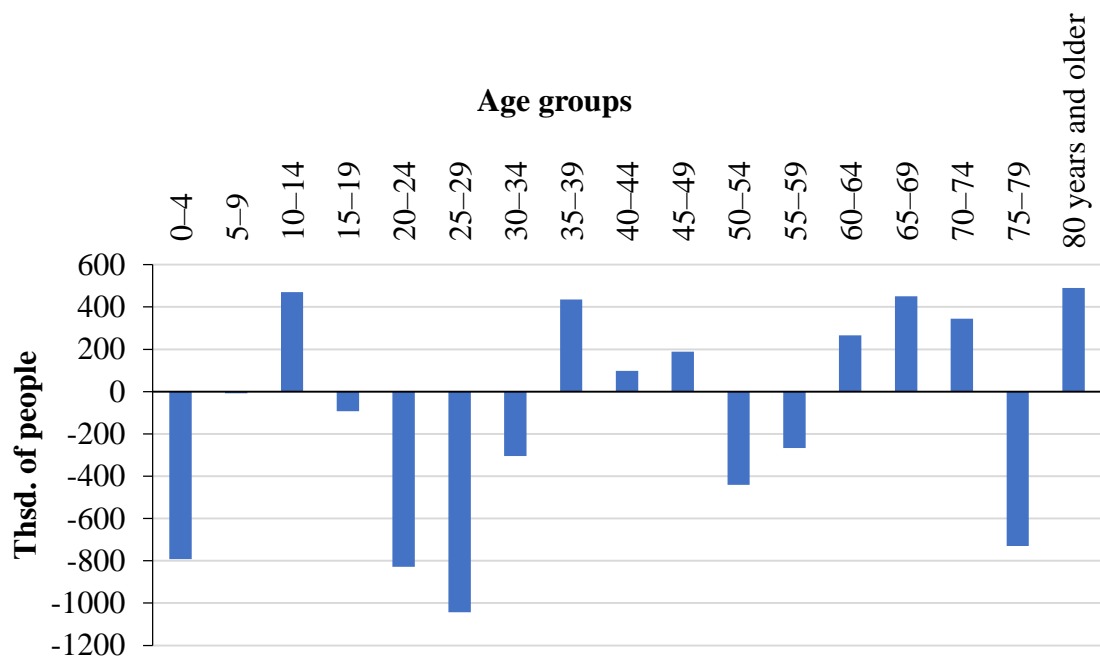


Fig. 1. Distribution of total population of Ukraine by age group estimated as difference from 2015 to 2021 [11, 12]

As can be seen (fig. 2), the population 70-74 year old age group grew 22.0%, while the proportion of adults aged 75-79 decreased by 42.2%, and 80 years and older increased by 34.0%. The total population aged ≥ 70 grew during 2015-2021 by 13.8%. In other words, we have demographics ageing of population albeit uneven across age groups.

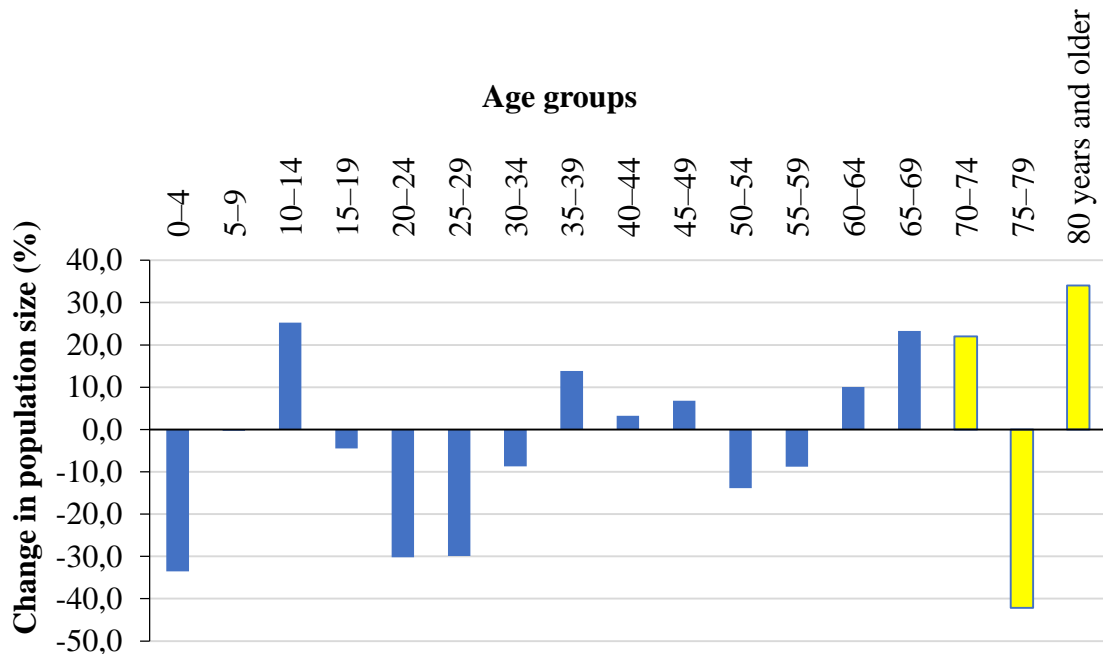


Fig. 2. Distribution of total population of Ukraine by age group estimated as percentage change from 2015 to 2021 (Own edition)

Obviously, that an increase the proportion of the elderly population will lead to an increase in morbidity rates. Nevertheless, it is interesting what diseases older people come to hospitals for the first time. According to [10] these are: diseases of the respiratory system (26.1%), diseases of the skin and subcutaneous tissue (21.6%), diseases of the circulatory system (17.9%), diseases of the eyes and its adnexa (8.8%), connective tissue diseases (7.4%), external causes of deterioration in health, including injuries 7.0%), diseases of the genitourinary system (6.1%), diseases of the ear and mastoid process (4.9%) and diseases of the digestive system (4,6%).

Among the elderly of Ukraine the incidence of diseases of the nervous system was increasing most rapidly. The growth rate of neurological pathology over a four-year period [9] was 204.5%, and the annual increase in the indicator reached an average of 51.1%. The increase in the incidence of diseases of the musculoskeletal system and connective tissue during the study period was 180.2% with an average annual increase of 45.1%. The frequency of appeals of the older population to a healthcare institution as a result of newly diagnosed of respiratory

diseases increased by 78.8% over four years, diseases of the genitourinary system – by 36.7%, diseases of the skin and subcutaneous tissue – by 31.3%.

Burden of diseases

The overall prevalence of diseases among the elderly population of Ukraine amounted to 248,990.9 cases per 100 thsd. people of this age. In other words, every person over 70 years old has about 3 diseases that require medical attention. An analysis of the prevalence of diseases among older people showed that it was mainly formed by diseases of the circulatory system (50.2%) as well as diseases of the digestive system (10.1%), respiratory diseases (8.1%), diseases of the musculoskeletal system and connective tissue (6.2%), eating disorders, metabolic disorders (5.6%), diseases of the eye and its adnexa (5.0%), diseases of the genitourinary system (3.7%) and neoplasms (3.4%) [10].

The increase of the overall prevalence of diseases among the older age groups of the Ukrainian population is due to a significant increase of prevalence of the respiratory diseases, which amounted to 66.0%. At the same time, the prevalence of diseases of the endocrine system, eating and metabolic disorders increased by more than half (by 54.7%). The increase in the prevalence of injuries, poisoning and other consequences of external causes among the elderly reached 39.6% over a four-year period. The prevalence of neoplasms among older people was increased by more than a quarter (by 25.2%). The prevalence of diseases of the musculoskeletal system and connective tissue (by 22.4%), diseases of the blood and hematopoietic organs (by 20.8%), and diseases of the genitourinary system (by 16.5%) among the studied contingent were also increased significantly. Only the prevalence of mental and behavioral disorders was characterized by positive dynamics towards reduction, which decreased by 8.9% over the study period [9].

Mortality and life expectancy

Such a most severity burden of population morbidity leads to high mortality of the inhabitants and very short life expectancy during elder age. The average life expectancy after 65 is 14.57 years, incl. 11.89 years for men and 16.43 years for women (fig. 3), and differs a little by the regions of Ukraine. Only residents of Kyiv city have a somewhat higher life expectancy, possibly due to so better medical care. Statistical data indicate that among the people aged ≥ 70 mortality is increasing rapidly. In the age group of 70-74 years, the mortality rate is 3213.7 deaths per 100 thsd. of population, in the age group of 75-79 years – 5773.8, 80–84 years – 10153.7, and 85 years and older 20535.7 deaths per 100 thsd. of population. In this case, we cannot speak of such a concept as "healthy life expectancy at age 70", although this is a common occurrence in many countries [4].

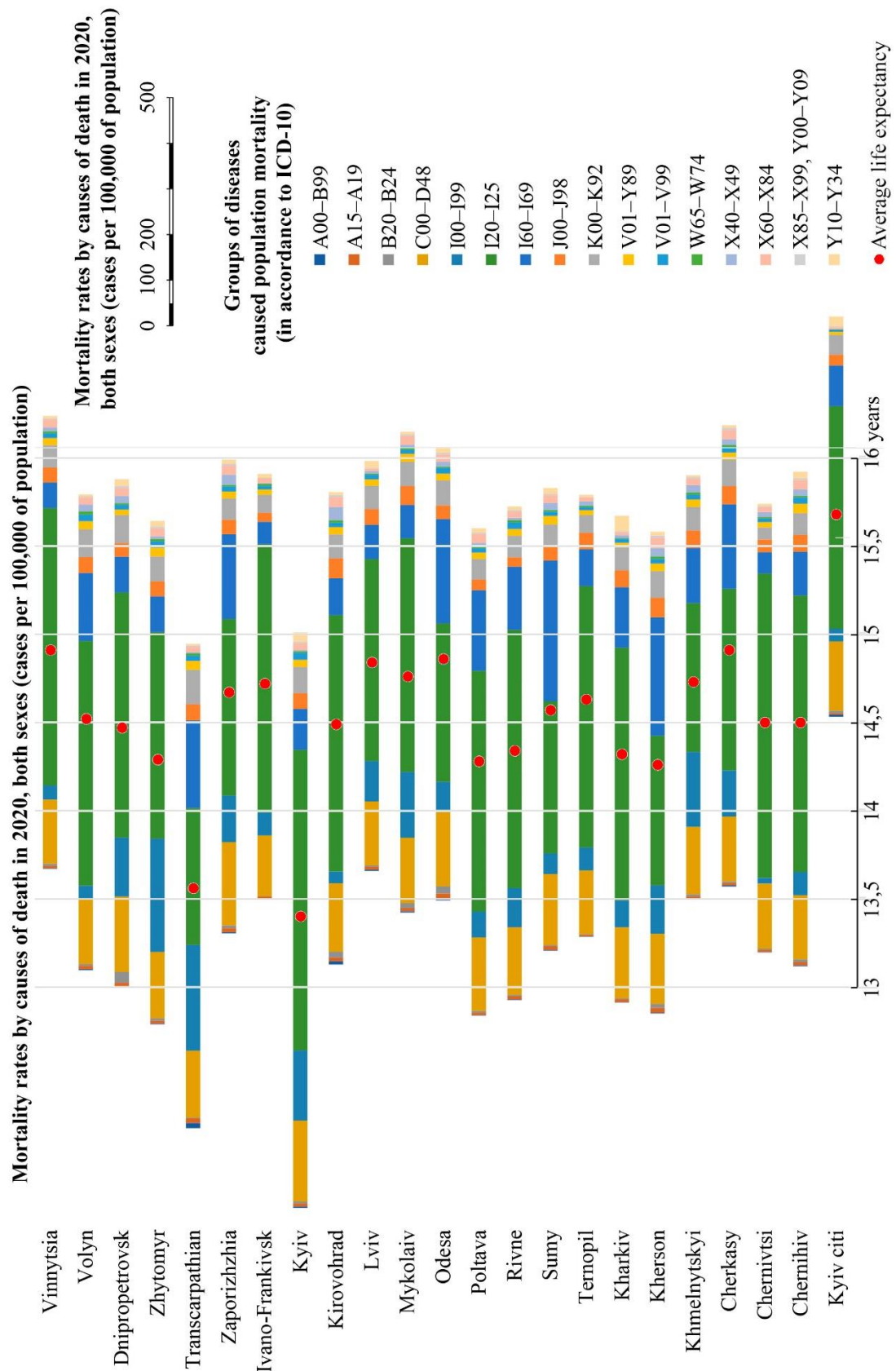


Fig. 3. Population mortality and average life expectancy by the regions of Ukraine (Own edition from [12, 14])

The forecasted ageing demographics are linked to increased duration and burden of diseases. TPMALE data analysis established that the major causes of mortality for adults aged ≥ 70 in Ukraine were diseases circulatory system, neoplasms (main part of it have a chronically form) and external death causes [14] (it is known, a high proportion of deaths due to external causes is typical for underdeveloped countries).

The diseases of circulatory system are main cause of mortality of Ukrainians. The percentage of deaths caused by these diseases is about 62% of total mortality cases. The highest mortality rates from diseases of the circulatory system are in Kyiv, Rivne and Zhytomyr regions, where it is in the range of 790-903 cases per 100 thsd. of population, while in Khmelnytskyi and Lviv regions as well as in the city of Kyiv, mortality from this cause is significantly lower – 605-610 cases per 100 thsd. of population.

Second place among the diseases causing death is occupy by neoplasms. Second place among the diseases causing death is occupy by neoplasms. Due to these diseases about 13.5% of population is dying yearly. The highest mortality rate by neoplasms is in Zaporizhzhia, Kyiv, Dnipropetrovsk, Odesa i Poltava regions, where it is in range from 160.8 to 183.0 cases per 100 thsd. of inhabitants, while in Volyn, Vinnytsia, Chernihiv, Lviv, Ternopil, and Ivano-Frankivsk regions mortality from this cause is less than 140 cases per 100 thsd. of population.

The deaths caused by external death causes are on third place among main causes of mortality of Ukrainians. The percentage of deaths caused by external causes is about 6% of total mortality cases, first of all, due to road traffic accidents [6]. The highest mortality rates from these causes are in Zaporizhzhia, Kherson, Chernihiv, and Kirovograd regions, where it is in the range of 85-93 cases per 100 thsd. of inhabitants, while in Ternopil and Ivano-Frankivsk regions where mortality from these causes is 45-46 cases per 100 thsd. of population, as well as in the city of Kyiv, where it is less than 40 cases per 100 thsd. of inhabitants.

These causes of mortality are typical for the entire population of Ukraine [7].

Conclusions. All-Ukraine adults aged ≥ 70 were found to live so longer in 2020 than in 1990. However, morbidity and disability burden rates are following a stable pattern mostly attributable to functional decline, injuries due to falls, hearing loss, and back pain. A monitoring mortality and morbidity risk factors is crucial to sustain and advance research and health policy among older adults. Ukraine's regions with shorter and longer life expectancy were detected, as well as the regional structure of death causes. Our findings show we should develop and implement targeted public health strategies. Will require a coherent ageing health policy, targeted data coverage, and consistent collaboration among stakeholders to

succeed. The present estimates could serve to focus ageing policies on key risk factors and determinants, improve healthcare access and quality, and lower healthcare costs.

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