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Epidemiology of gastric cancer in Ukraine from 2014–2022: Rate, sex and age

Introduction. Gastric cancer remains a significant global health concern, with 1.09 million cases and 769,000 deaths reported in 2020. Its prevalence is influenced by *Helicobacter pylori* infections, dietary habits, and healthcare disparities. Preventive measures have reduced incidence and mortality, although regional differences persist. East Asia has achieved progress through national screening programs, while lower-income regions, such as Eastern Europe, face ongoing challenges.

Research aims. This study examined gastric cancer trends in Ukraine from 2014 to 2022, focusing on the total number of cases, gender distribution, and age demographics. Comparisons with global trends highlight areas for intervention.

Materials and methods. Data were obtained from the National Cancer Registry of Ukraine. Cases classified under ICD-10 were analysed for rate, sex and age. Trends were assessed using exponential regression and R^2 calculations with MedCalc® Software version 22.009.

Results and discussion. The number of cancer cases in Ukraine fluctuated, peaking in 2019 before falling in 2020 due to the COVID-19 pandemic, which disrupted screenings. Gastric cancer cases declined from 8,350 in 2014 to 5,401 in 2022, reflecting global trends driven by dietary improvements and reduced *H. pylori* infections. However, progress in Ukraine was slower due to limited screening access. Men consistently accounted for 61% of cases, mirroring global risk factors such as smoking and occupational exposure, while oestrogen may have offered women some protection. Patients over 45 comprised more than 94% of cases, consistent with global data showing an increased risk among older adults due to prolonged carcinogen exposure. Late diagnoses and limited access to specialised care worsened the outcomes for older patients.

Conclusion. Gastric cancer trends in Ukraine show global progress as well as local challenges. Although incidence is declining, gender disparities and late-stage diagnoses persist. Expanding early detection, addressing healthcare inequalities and promoting preventive measures are vital to further reduce incidence and mortality.

Key words: combined-fixed dise drugs, Helicobacter pylori, eradication, gastric cancer, incidence rate.

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Епідеміологія рака шлунка в Україні у 2014–2022: рівень захворюваності, стать та вік

Вступ. Рак шлунка залишається значною глобальною проблемою охорони здоров'я, із зареєстрованими 1,09 мільйона випадків і 769 тисячами смертей у 2020 році. Поширення захворювання залежить від інфекцій *Helicobacter pylori*, харчових звичок та нерівного доступу до медичних послуг. Профілактичні заходи зменшили рівні захворюваності та смертності, проте регіональні відмінності залишаються. Значний прогрес досягнуто в країнах Східної Азії завдяки національним програмам скринінгу, тоді як у регіонах із низьким рівнем доходу, таких як Східна Європа, проблеми зберігаються.

Мета дослідження. Це дослідження аналізує тенденції захворюваності на рак шлунка в Україні у період з 2014 по 2022 рік, зокрема його частку серед усіх випадків онкології, гендерний розподіл та демографію за віком. Порівняння з глобальними тенденціями вказує на області, що потребують втручання.

Матеріали та методи: Дані отримані з Національного канцер-реєстру України. Аналізувалися випадки, класифіковані за МКХ-10, за рівнем захворюваності, розподілом за статтю та віком. Тенденції оцінювалися за допомогою експоненційної регресії та коефіцієнта детермінації (R^2) з використанням програмного забезпечення MedCalc® версії 22.009.

Результати та обговорення. Кількість випадків онкологічних захворювань в Україні коливалася, досягнувши піку в 2019 році, а потім знизилася у 2020 році через пандемію COVID-19, яка порушила проведення скринінгу. Випадки раку шлунка зменшилися з 8 350 у 2014 році до 5 401 у 2022 році, що відображає глобальні тенденції, спричинені покращенням харчових звичок та зменшен-

ням інфекцій *H. pylori*. Проте в Україні прогрес був повільнішим через обмежений доступ до скринінгових програм. Чоловіки стабільно складали 61% випадків, що відображає глобальні фактори ризику, такі як куріння та професійна експозиція, тоді як естроген може надавати жінкам певний захист. Пацієнти старше 45 років становили понад 94% випадків, що узгоджується зі світовими даними, які свідчать про підвищений ризик серед літніх людей через тривалу дію канцерогенів. Пізня діагностика та обмежений доступ до спеціалізованої допомоги погіршували результати лікування.

Висновки. Тенденції раку шлунка в Україні відображають як глобальний прогрес, так і місцеві проблеми охорони здоров'я. Незважаючи на зниження захворюваності, зберігаються гендерні диспропорції та пізня діагностика. Розширення програм раннього виявлення, подолання медичних нерівностей та запровадження профілактичних заходів є важливими для подальшого зниження рівня захворюваності та смертності від раку шлунка.

Ключові слова: комбіновані фіксовано дозовані препарати, Helicobacter pylori, ерадикація, рак шлунка, захворюваність.

Introduction. Gastric cancer, commonly known as stomach cancer, remains a significant public health concern despite advancements in prevention, early detection and treatment. Between 2010 and 2025, both the incidence and mortality rates for gastric cancer showed an overall decline, although the trends varied considerably across regions and demographic groups. According to GLOBOCAN data, in 2020, there were approximately 1.09 million new cases of gastric cancer globally, making it the fifth most commonly diagnosed cancer and the fourth leading cause of cancer-related deaths. Mortality was high, with around 769,000 reported deaths. Improvements in food safety measures, such as refrigeration, a decline in *Helicobacter pylori* (*H. pylori*) infections and changes in dietary habits, have contributed to this reduction in incidence worldwide [1, 2].

In Europe, gastric cancer incidence shows moderate declines, particularly in Western European countries, where improvements in public awareness, healthcare access and dietary practices have led to reductions. However, Eastern European countries, such as Ukraine, lag in progress due to healthcare disparities and higher rates of *H. pylori* infections. In Ukraine, epidemiological data indicate that between 2003 and 2020, the structure of cancer diagnoses revealed gastric cancer as a major concern, although improvements in screening and early diagnosis contributed to some stabilisation of trends [3, 4]. According to Chernov, Haysanovska and Makarenko, early efforts aimed at enhancing cancer prevention infrastructure have only begun to address longstanding barriers in this region [4].

Gastric cancer predominantly affects older adults, with approximately 70% of cases diagnosed globally in patients over 50 years of age. The median age of diagnosis varies between regions but typically falls between 65 and 70 years. This trend is closely tied to prolonged exposure to risk factors, particularly chronic inflammation caused by *H. pylori* [4, 5].

Globally, gastric cancer contributes to approximately 5% of all cancer diagnoses [1]. In East Asia, the disease has historically made up a larger proportion of cancer cases, accounting for up to 12% of all cancers in 2010 before decreasing to around 8–10% by 2020. In contrast, in Western countries, gastric cancer comprises only 1–3% of total cancer cases, although the rates can be higher among recent immigrants and ethnic minorities [5, 6].

A persistent gender disparity in gastric cancer incidence has been observed across all regions. Men are consistently likelier than women to develop the disease, with a male-to-female ratio ranging from 2:1 to 3:1. This gender disparity is particularly pronounced in East Asia, where men account for up to 70% of gastric cancer cases [3]. Efforts to reduce modifiable risk factors, such as smoking and alcohol use, have shown some success in narrowing the gap in developed regions. However, in many developing regions, limited data and underreporting may obscure the true extent of gender-specific trends [6, 7].

Research aims. This study aimed to investigate the epidemiological situation in Ukraine from 2014–2022 with respect to its rate among the total number of cancer cases in Ukraine, distribution of sexes and people older than 45 years among gastric cancer patients.

Materials and Methods. Epidemiological data were obtained from the National Cancer Registry of Ukraine. For the analysis, only cases where the primary cancer site was identified as the stomach were selected, with diagnoses classified as gastric cancer according to the ICD-10 [8]. The gastric cancer rate, sex distribution and proportion of patients, aged over 45 years, among the patients with gastric cancer were calculated. To evaluate trends, exponential regression analysis was performed, and the coefficient of determination (R^2) was calculated [9]. Data analysis was conducted using MedCalc® Statistical Software version 22.009 (MedCalc Software Ltd, Ostend, Belgium; https://www.medcalc.org; 2023).

Results and Discussion. Between 2014 and 2022, the total number of cancer cases in Ukraine experienced significant fluctuations. The number of cases rose from 135,307 in 2014 to a peak of 138,509 in 2019 before a sharp decline to 113,368 in 2020. This drop is largely attributed to the COVID-19 pandemic, which disrupted health care services worldwide. Routine cancer screenings and non-emergency medical visits were postponed or cancelled, leading to a temporary decline in reported diagnoses. Similar trends were seen in other regions, with delayed cancer diagnoses and reductions in screening rates during the pandemic [10]. In 2021, cancer cases rebounded to 120,055 as health care services resumed, but the number fell again to 106,151 in 2022, indicating the pandemic's lasting impact on healthcare infrastructure and cancer control measures in Ukraine.

Gastric cancer cases in Ukraine demonstrated a steady decline over the same period, decreasing from 8,350 cases in 2014 to 5,401 cases in 2022. This trend is consistent with global patterns, where improvements in dietary habits, reductions in *H. pylori* infections and advancements in early detection programs have contributed to declining incidence rates [1, 3]. High-income countries, including those in Western Europe and East Asia, have benefited from targeted public health initiatives that promote healthier diets and access to regular screenings. Japan and South Korea, for example, have implemented nationwide endoscopy screening programs, which have led to significant reductions in gastric cancer mortality [2]. In Ukraine, however,

such programs are not yet fully implemented, particularly in rural areas where healthcare access is limited. As a result, the decline in gastric cancer incidence has been slower than in Western Europe, where comprehensive cancer control measures have been more successful [1, 4]. Gastric cancer rate was stable over the period (Table 1).

The gender distribution of gastric cancer cases in Ukraine remained stable between 2014 and 2022, with men consistently comprising around 61% of cases. In 2014, men accounted for 5,104 cases compared to 3,246 cases among women. By 2022, these numbers had dropped to 3,329 for men and 2,072 for women, maintaining a similar gender ratio. This male predominance is well documented globally and is linked to both behavioural and biological factors. Men are likelier to engage in high-risk behaviours, such as smoking and alcohol consumption, both of which increase the risk of gastric cancer [11]. Additionally, occupational exposure to carcinogens is more common in male-dominated industries, such as mining and manufacturing. The potential protective role of oestrogen in women has also been cited as a contributing factor to the lower incidence of gastric cancer among women [12]. Efforts to reduce these gender disparities through targeted interventions, such as smoking cessation programs and alcohol reduction initiatives, have proven effective in some high-income countries but remain underdeveloped in many Eastern European nations [5, 7]. Dender distributions remained stable over the period (Table 1).

The proportion of gastric cancer patients older than 45 years remained consistently high, accounting for over 94% of cases throughout the study period (Table 1). This finding is consistent with global trends, as gastric cancer predominantly affects older adults due to the long latency period between exposure to risk factors and the development of malignancy [3]. Worldwide, the median age at diagnosis ranges from 60–70 years. In regions with strong healthcare systems, early detection programs have improved survival rates for older patients by enabling earlier diagnosis and treatment. However, in Ukraine, limited access to specialised care and late-stage diagnosis pose significant challenges to improving outcomes for older patients. Thus, expanded screening efforts and increased investment in healthcare infrastructure could help reduce mortality rates in this high-risk age group [3, 4].

The percentage of gastric cancer among total cancer cases showed a gradual decline, from 1.49% in 2014 to 1.46% in 2019. However, this proportion rose to 1.78% in 2020, likely due to the effects of the COVID-19 pandemic, which led to the decreased detection of other cancer types. This temporary increase in the relative share of gastric cancer was followed by stabilisation at 1.68% in 2021 and another rise to 1.90% in 2022. Similar fluctuations have been observed in other countries, underscoring the impact of the pandemic on healthcare systems and efforts to control cancer [10].

Comparing Ukraine's data to other regions reveals both progress and areas for improvement in cancer control. In East Asia, gastric cancer historically accounted for up to 12% of all cancer diagnoses before declining to around 8–10% by 2020 due to comprehensive screening programs and risk factor reduction efforts [2, 7]. In contrast, gastric cancer represents a smaller proportion of total cancer cases in Western Europe, typically around 1–3%, reflecting differences in healthcare access and prevention strategies. The fact that gastric cancer accounts for a higher percentage of cancer cases in Ukraine than in Western Europe suggests that additional preventive measures, including improved screening and public health campaigns, are needed to achieve similar reductions in disease burden [4, 5].

One area of emerging interest in gastric cancer prevention is the role of medications, such as cysteine derivatives, metformin, statins and nonsteroidal anti-inflammatory drugs. Metformin, commonly prescribed for type 2 iabetes, has demonstrated potential anticancer effects by improving insulin sensitivity and reducing systemic inflammation. Statins, which are used to lower cholesterol, may also inhibit cancer cell growth by targeting inflammation and cellular proliferation pathways. Additionally, the long-term use of NSAIDs, including aspirin, has been associated with reduced gastric cancer risk through the inhibition of cyclooxygenase enzymes and decreased chronic inflammation. As the usage of these medications has increased globally, particularly in high-income countries, their protective effects may contribute to the observed decline in gastric cancer incidence [13]. Cysteine derivatives, such as erdosteine and N-acetylcysteine, have recently been shown to prevent *H. pylori* binding to and improve its eradication from gastric mucosa [14]. However, further research is needed to determine the extent of these benefits across different populations.

Conclusion. In summary, the trends in gastric cancer cases in Ukraine between 2014 and 2022 reflect the impact of global progress in cancer control, as well as the unique challenges faced by the country's healthcare system. While the overall number of cases has declined, gender disparities, late-stage diagnoses and fluctuations caused by external factors, such as the COVID-19 pandemic, highlight areas where targeted interventions are required. Expanding

Table 1

Epidemiological indexes of gastric cancer in Ukraine, 2014–2022

Gastric cancer rate	**1,49%**	**1,48%**	**1,49%**	**1,47%**	**1,46%**	**1,46%**	**1,78%**	**1,68%**	**1,90%**
Prevalance of people older than 45 years	97,43%	97,37%	97,41%	97,44%	97,42%	97,72%	97,15%	97,38%	94,61%
Prevalence of men	61,13%	61,22%	59,91%	60,59%	60,17%	59,27%	60,62%	61,84%	61,64%
Prevalence of women	38,87%	38,78%	40,09%	39,41%	39,83%	40,73%	39,38%	38,16%	38,36%

access to early detection, addressing socioeconomic barriers to healthcare and promoting risk-reduction behaviours will be critical to further reducing gastric cancer incidence and improving long-term outcomes for patients in Ukraine.

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