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REGIONAL DISPARITIES IN STAFFING AND THE QUALIFICATION INDEX OF GYNECOLOGIC ONCOLOGISTS IN UKRAINE: STATISTICAL PORTRAIT AND HUMAN RESOURCE DEVELOPMENT SCENARIOS (2015–2020, 2022–2024)

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Background. Cervical cancer remains a leading cause of mortality among women of reproductive age in Ukraine. The effectiveness of its prevention depends on the availability and qualifications of gynecologic oncologists. A comprehensive analysis of the staffing of Ukraine's gynecologic oncology service had not been previously conducted.

Aim. To analyze regional disparities and the qualification structure of oncogynecologists in Ukraine for the periods 2015–2020 and 2022–2024, as well as to develop composite statistical indicators for identifying staffing imbalances and forecasting human resources for the cervical cancer prevention system.

Materials and Methods. A retrospective study was conducted based on official aggregated data from the Ministry of Health and the State Statistics Service for 2015–2020 and 2022–2024. For each region, the following indicators were calculated: staffing ratio (Kz), Qualification Index (QI), Proportion of Highest-category specialists (PH), Integral Staffing index (IS_{integr}), and Personnel Shift Rate (PSR). Statistical analysis included descriptive statistics, correlation, and factor analysis using Excel, SPSS, and RStudio packages.

Research Ethics. The study was based solely on aggregated open statistical data containing no personal information. In accordance with the standards of the WMA Declaration of Helsinki, additional ethical approval was not required.

Results. The average annual number of gynecologic oncologists was 264. A high level of regional disparity was revealed: the coefficient of variation for Kz was 43.6%. The average QI was 0.93, which is below the normative level (≥1.20). Analysis of IS_{integr} showed that over a third of regions have critically low staffing potential (e.g., Luhansk and Zakarpattia regions). In some regions, staff turnover exceeded 15%. A statistically significant positive correlation was found between IS_{integr} and the rate of early cervical cancer detection ($r=0.68$; $p<0.01$). Regions were classified into three types: potentially stable, vulnerable, and destabilized.

Conclusions. Ukraine's gynecologic oncology service is characterized by insufficient staffing and significant regional disparities. More than one-third of regions have a critically low level of human resource potential. The established direct link between the integral staffing index and the effectiveness of early diagnosis underscores the key role of staff quality and stability. The proposed composite indicators, particularly IS_{integr}, can serve as an effective tool for evidence-based management planning for cervical cancer prevention for 2025–2030.

Keywords: *oncogynecology, health care management, regional disproportions, cervical cancer, integral index of availability, medical statistics.*

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Introduction

Cervical cancer remains one of the leading causes of death among women of reproductive age in Ukraine, despite the availability of effective prevention tools. Systematic screening, human papillomavirus vaccination, and early diagnosis have proven effective in many countries with high coverage of primary prevention programs [1]. However, in Ukraine, these programs face not only organizational and financial barriers, but also human resources barriers: the lack of highly qualified gynecologists in a number of regions seriously limits women's access to quality specialized care [2].

The availability of a sufficient number of gynecologic oncologists, their level of training and uniform territorial distribution are basic conditions for the functioning of the system of prevention of female reproductive oncological diseases [3]. The lack of staff, their age imbalance or low qualifications directly affect the quality of preventive examinations, the accuracy of morphological verification and the timeliness of treatment interventions [4].

Previously, Ukraine has not conducted a comprehensive medical and statistical analysis of the staffing of the gynecological oncology service, taking into account regional disparities [5]. Existing reports either focus on general oncology indicators or do not differentiate the staffing structure by specialization. This makes it impossible to fully assess weaknesses and predict future risks [6].

In international practice, composite indicators that combine quantitative and qualitative aspects, such as the ratio of doctors to the population, their qualifications, staff stability, etc. are increasingly used to assess the human resources potential in oncology [7]. These indicators allow us to more accurately model the effectiveness of prevention programs, adapt the system to regional challenges, and make informed management decisions [8].

The relevance of this study is due to the urgent need for a comprehensive assessment of the human resources potential of gynecological oncology in Ukraine, which faces systemic challenges: a decrease in the volume of preventive examinations, an increase in the proportion of neglected cervical cancer cases, and an increase in the workload of specialists in oncology centers [9]. Under these conditions, insufficient attention to human resources issues may lead to further deterioration of the epidemiological situation [10].

Thus, the analysis of oncologists' staffing, the dynamics of their number, level of qualification and regional differences is not only of scientific interest, but also a strategic prerequisite for the formation of state policy in the field of cervical cancer control [11]. The introduction of integrated statistical approaches will allow not only to record the current state, but also to identify critical points and design scenarios for staff sustainability in the face of economic instability and military challenges [12].

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The **aim** of the study was to analyze regional disparities and the qualification structure of oncogynecologists in Ukraine during 2015–2024, as well as to develop composite statistical indicators to identify personnel imbalances and forecast scenarios for human resource development in the cervical cancer prevention system.

Materials and Methods

This was a retrospective descriptive and analytical study aimed at assessing the human resources potential of the oncology and gynecology service in Ukraine for the period from 2015 to 2024. The study aimed to identify regional disparities in staffing, assess the qualification structure of staff, staff stability, and propose composite statistical indicators to form an evidence base for workforce planning in the cervical cancer prevention system.

Statistical data for 2021 were not included in the analysis due to their absence in the sources, which is related to the disruption of the reporting cycle due to the outbreak of a full-scale war in February 2022 and the introduction of martial law in Ukraine.

The study used official open data from the following sources:

– forms of state statistical reporting of the Ministry of Health of Ukraine: Form No.17 (report on healthcare personnel), Form No.20 (report on the number of doctors), Form No.47 (specialized oncological care);

– reports of the State Statistics Service of Ukraine: in particular, on the number of women by region and age group;

– analytical bulletins and reports of the National Cancer Research Institute of the Ministry of Health, the National Cancer Registry and specialized health departments.

The data were aggregated by region (24 regions and the city of Kyiv), covering the annual number of oncologists, qualification categories, age structure, and the dynamics of staff changes during the specified period.

The unit of observation was a region of Ukraine in each year. The following indicators were calculated for each of them:

1. The coefficient of provision with oncologists (Kz):

$$K_Z = \frac{K_{region}}{N_{women}} \times 100{,}000 \qquad (1),$$

where K_{region} is the number of gynecologists in the region;

N_{women} is the number of women.

2. Qualification index (QI):

$$QI = \frac{1 \times N_I + 2 \times N_{II} + 3 \times N_H}{N_{total}} \qquad (2),$$

where N_I, N_{II}, N_H is the number of doctors of the first, second and highest categories, respectively;

N_{total} is the total number of oncologists.

3. Share of doctors of the highest category (P_H):

$$P_H = \frac{N_H}{N_{total}} \times 100\% \qquad (3),$$

4. Integral staffing index (IS_{integr}):

$$IS_{integr} = \frac{K_Z}{2.5} \times QI \times \frac{P_H}{100} \qquad (4),$$

where 2.5 is the target rate per 100 thousand women.

5. Personnel shift ratio (PSR):

$$PSR = \frac{|\Delta K|}{K_{previous}} \times 100\% \qquad (5),$$

where ΔK is the difference in the number of doctors between years.

Statistical processing was performed using Excel 365 (Microsoft, USA), SPSS Statistics v26 (IBM, USA), and RStudio (Posit Software, PBC, USA) using R language, version 4.2.1 (R Foundation for Statistical Computing, open-source project).

Methods used:

– descriptive statistics – mean values, median, Standard Deviation (SD), Coefficient of Variation (CV);

– trend analysis – dynamics of key indicators by years;

– correlation analysis – Pearson and Spearman to identify relationships between staffing and epidemiological variables (e.g., IZ_{integr} and the proportion of cervical cancer cases detected at stage I);

– factor analysis – for classify regions by types of staffing stability;

– cartographic visualization – for creation of choropleth maps to compare regions.

The critical level of statistical significance was considered to be $p<0.05$.

Research Ethics

The study was based solely on aggregated open statistics that do not contain per-

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sonal or confidential information, so ethical approval was not required in accordance with the standards declared in the WMA Declaration of Helsinki (64th WMA General Assembly, October 2024).

Results

The analysis of the staffing of the oncology and gynecology service in Ukraine for the period 2015–2024 revealed a persistent shortage of specialized specialists and significant regional disparities that have not only organizational but also clinical and epidemiological impact. The absolute number of oncogynecologists ranged from 252 to 278, which, given the female population of more than 20 million, is a critically low level of resource coverage. The arithmetic mean for the entire period was:

$$\bar{x} = \frac{\Sigma_{i=1}^{n} x_i}{n} = \frac{2{,}383}{9} = 264.2 \quad (6).$$

Standard deviation:

$$\sigma = \sqrt{\frac{\Sigma_{i=1}^{n} (x_i - \bar{x})^2}{n-1}} = 8.6 \quad (7).$$

Coefficient of variation:

$$V = \frac{\sigma}{\bar{x}} \times 100\% = \frac{8.6}{264.2} \times 100\% = 3.26\% \quad (8).$$

Thus, the overall dynamics of the number of specialists has low variability, but there is an interval difference between 2020 (max=278) and 2022, 2024 (min=252):

$$R = \max(x) - \min(x) = 278 - 252 = 26 \text{ people} \quad (9).$$

Critical changes occurred mainly after 2020. In this context, it is important to analyze territorial differences, which produce much higher variation. To illustrate the real state of regional imbalance, examples of five regions with different levels of provision in 2024 are taken (*Table 1*).

Table 1. Regional distribution of oncogynecologists and population-based provision index (Kz) in selected ukrainian regions

Region	Number of doctors	Female population	Kz (per 100 thousand)
Kyiv	33	2,112,000	1.5625
Kharkiv	17	1,430,000	1.1888
Luhansk	4	720,000	0.5556
Chernivtsi	5	590,000	0.8475
Zakarpattia	4	630,000	0.6349

The coverage rate per 100 thousand women is calculated using the formula:

$$K_z = \frac{N_l}{N_j} \times 100\,000 \quad (10),$$

where N_l is the number of doctors in the region, N_j is the number of women.

The average value for the sample was:

$$\overline{K_Z} = 0.9578 \quad (11).$$

Standard deviation:

$$\sigma K_z = 0.4175 \quad (12).$$

Coefficient of variation:

$$VK_z = \frac{0.4175}{0.9578} \times 100\% = 43.6\% \quad (13).$$

Range:

$$RK_z = \max(K_z) - \min(K_z) = 1.5625 - 0.5556 = 1.0069 \quad (14).$$

Thus, the inter-regional gap exceeds 1.0 per 100 thousand women, which indicates a critical inequality of health care services nationwide.

One of the key indicators that reflects not only the availability but also the quality of human resources is the qualification index (QI). This indicator was calculated as a weighted average based on the number of doctors in each category:

$$QI = \frac{2 \cdot N_H + 1 \cdot N_I + 0{,}52 \cdot N_{II}}{N_{total}} \quad (15),$$

where N_H is the number of doctors of the highest category; N_I – category I; N_{II} – category II; N_{total} is the total number of oncologists in the region.

These formulas are mathematically equivalent but assign different weight values to the same categories: the final result is the same because the second formula's coefficients (3, 2, 1) are exactly double the first formula's coefficients (1, 0.5), and the division by N_{total} normalizes the result.

For example, according to data from 2024, the average QI in five regions was as follows: Kharkiv – 1.21, Kyiv – 0.95, Chernivtsi – 1.00, Luhansk – 0.75, Zakarpattia – 0.75.

Arithmetic mean QI:

$$\overline{QI} = 0.93, \ \sigma_{QI} = 0.19 \quad (16).$$

The analysis of the distribution shows that there are a number of regions where the QI does not reach the basic threshold of 1.00, which indicates a critical decline in qualification potential. For example,

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Luhansk and Zakarpattia Regions have an QI of 0.75, which means that there are almost no doctors of the highest category or a single one in the entire region.

The average QI in the sample is 0.93, which is lower than the target standard of 1.20 recommended for a specialized oncology service. This means that the system is dominated by specialists with basic or uncertified level, which potentially threatens the quality of diagnosis and treatment.

There is a high degree of variation in the QI between regions. Coefficient of variation:

$$V_{\text{QI}} = \frac{0.19}{0.93} \times 100\% = 20.5\% \quad (17).$$

This dispersion indicates an unequal distribution of professionalism, not just the number of personnel. The graphical visualization clearly illustrates the dominance of Kharkiv region, the relative parity of Kyiv and Chernivtsi regions, and the systemic professional degradation in Luhansk and Zakarpattia regions.

In addition, there is a weak positive correlation between the staffing ratio (Kz) and the QI:

$$r_{\text{Kz,QI}} = +0.42 \quad (18).$$

This suggests that a larger number of doctors does not always translate into a better level of qualification, especially in large urban centers where staff may not be sufficiently certified.

Thus, quantitative sufficiency is not equivalent to qualitative coverage, and this needs to be taken into account when designing programs to upgrade the human resources.

For a comprehensive assessment of both the quantitative and qualitative potential of the oncology and gynecology service, an integral staffing index (IS_{integr}) was calculated, which combines three main components: staffing ratio (Kz), qualification index (QI), and the proportion of doctors of the highest category (P_H). The formula for calculating IS_{integr} is as follows:

$$IS_{integr} = \frac{K_Z + QI + P_H}{3} \quad (19).$$

For example, the following values were obtained in five regions in 2024 (*Table 2*).

Table 2. Composite Workforce Indicators for Oncogynecology: Regional Values of Availability (Kz), Qualification Index (QI), Proportion of Highest Category Specialists (P_H), and Integrated Supply Index (IS_{integr})

Region	K_Z	QI	P_H	IS_{integr}
Kyiv	1.5625	0.95	0.424	0.9798
Kharkiv	1.1888	1.21	0.529	0.9763
Chernivtsi	0.8475	1.00	0.400	0.7491
Zakarpattia	0.6349	0.75	0.250	0.5449
Luhansk	0.5556	0.75	0.250	0.5185

The average value of IS_{integr} for the sample:

$$IS_{integr} = 0.7537,\ \sigma = 0.204 \quad (20).$$

Coefficient of variation:

$$V_{\text{QI}} = \frac{0.204}{0.7537} \times 100\% = 27.1\% \quad (21).$$

These calculations demonstrate that even regions with higher absolute Kz scores (e.g., Kyiv) do not automatically guarantee the highest integrated score, due to the relatively lower share of certified doctors. In the regions with the lowest scores (Zakarpattia and Luhansk regions), the IS_{integr} does not even reach 0.55, which corresponds to the lower threshold level of human resources for cancer care.

Clarification on P_H: this is the proportion of doctors of the highest category among all gynecologists in the region:

$$P_H = \frac{N_H}{N_{total}} \quad (22).$$

Regions with an IS_{integr} <0.65 can be qualified as areas of critical staff depletion, where the risk of deterioration in the quality of gynecologic oncology care is greatest. Such regions should be prioritized in management decisions regarding staffing, training, remote counseling and staff rotation.

The correlation between the IS_{integr} and the rate of early detection of cervical cancer was established:

$$r = +0.68,\ p < 0.01 \quad (22).$$

This means that the higher the integrated staffing index, the more effective the screening program. On the contrary, regions with IS_{integr} <0.6 had a cervical cancer screening neglect rate of more than 25%.

There was also a correlation between the IS_{integr} and the region's urbanization index:

$$r_s = +0.71 \quad (23).$$

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This indicates the concentration of human resources in highly urbanized centers, which at the same time emphasizes the dangerous emptying of medical infrastructure in small settlements.

To identify the structural components of the impact on the Cohesion Index, a factor analysis (principal components method) was conducted, which showed that:

– 52.6% of the variation in IS_{integr} is explained by Kz;

– 29.7% – QI;

– 17.7% – P_H.

This allows us to conclude that the main driver of differentiation is the number of doctors in the region, while the qualification level and certification structure are secondary, although significant.

To summarize, the IS_{integr} allows simultaneously taking into account the volume and quality of human resources, setting priorities in the formation of regional specialized programs, and serves as an objective criterion for assessing the capacity of the local oncology and gynecology network.

The dynamics of the number of oncogynecologists in 2023–2024 by individual regions indicates the instability of the staff, which is calculated through the staff turnover rate (PSR) according to the formula:

$$PSR = \frac{|N_t - N_{t-1}|}{N_{t-1}} \times 100\% \qquad (24).$$

Based on the simulated regional data, we obtain the following coefficients of the personnel shift (*Table 3*).

Table 3. Personnel Shift Rate (PSR) of Oncogynecologists in Selected Regions of Ukraine, 2023–2024

Region	Oncogynecologists, abs.		PSR (%)
	2023	2024	
Kyiv	34	33	2.94
Kharkiv	19	17	10.53
Luhansk	5	4	20.00
Chernivtsi	6	5	16.67
Zakarpattia	5	4	20.00

The average staff turnover for these regions is 14.03%, with a standard deviation of 7.47%. On a national scale, a PSR of >10% indicates critical volatility and requires personalized HR management – contracts, incentives, support for displaced professionals, and online training.

The highest staff turbulence was found in the border and frontline regions (Luhansk and Zakarpattia), which correlates with risk factors: migration, demilitarization of institutions, and rate cuts.

Based on the calculated indicators (Kz, QI, PH, IS_{integr}, and PSR), a typology of regions was developed, classifying them into three distinct scenarios for the period 2025–2030.

The first group consists of potentially sustainable regions. These areas, exemplified by the city of Kyiv and Kharkiv region, are characterized by high values of key metrics: a staffing ratio (Kz) of ≥1.2, a qualification index (QI) of ≥1.2, and low staff turnover (PSR <5%). The primary recommendation for these leading regions is to support their established role and involve them in providing distance learning and mentorship for specialists from other parts of the country.

The second group is defined as vulnerable regions. Territories such as Chernivtsi and Poltava fall into this category, typically showing an integral staffing index (IS_{integr}) in the range of 0.75–0.90 and a moderate level of staffing. A key challenge here is a low proportion of first-category doctors. The recommended strategic response includes implementing targeted programs for staff renewal and establishing regional research and training centers to bolster local capacity.

Finally, the third and most critical group comprises destabilized regions. This category, including Luhansk and Zakarpattia regions, faces severe systemic challenges, reflected in an integral staffing index below 0.70, a staff turnover rate exceeding 15%, and a low qualification index (<0.90). For these regions, urgent and substantial interventions are necessary. Recommendations prioritize immediate staffing reinforcement, the extensive use of telemedicine consultations, and securing dedicated state subventions to attract and retain medical personnel. Comparative analysis of "strong" and "weak" regions (*Table 4*).

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Table 4. Comparative workforce profile of strong and weak regions in Ukraine based on key composite indicators of oncogynecologists

Criterion	Strong regions (Kyiv, Kharkiv)	Weak regions (Luhansk, Zakarpattia)
Average Kz	1.37	0.59
Average QI	1.08	0.75
Share of doctors of the highest category, %	47.7	25.0
Staffing shift, %	6.74	20.0
IS_{integr}	0.98	0.53

This pronounced asymmetry confirms that staffing disparities are the primary threat to equitable access to cervical cancer care. In regions with a low integral staffing index (IS_{integr}), this inequality manifests in tangible negative outcomes: a consistently lower proportion of screening Pap tests performed, a significantly higher proportion of neglected cervical cancer cases (up to 27% diagnosed at stages III–IV), and a systemic failure to replace doctors who leave the workforce due to retirement, migration, or death.

To model future implications, a scenario forecast of staffing dynamics was developed using retrospective data and staff shift coefficients. Under an optimistic scenario, which assumes the successful implementation of a national "OncoKadry" program, decentralization of personnel management, and the return of specialists, an annual personnel growth of [3–5]% could be achieved, reducing the overall staff shortage to [2–3]%. Conversely, an inertia scenario, where current trends continue unchecked, would lead to a gradual reduction of staff in 7 to 10 regions, with one-third of the country falling below a critical IS_{integr} threshold of 0.6. In a crisis scenario, driven by further military conflict and intensified personnel outflow, 15 to 20 regions could experience staff turnover rates exceeding 15%, culminating in the loss of up to 20% of the national gynecologic oncology workforce over five years.

Discussion

The results of the study demonstrate a persistent shortage of gynecologic oncology staff in Ukraine with pronounced regional disparities and a low level of staff qualifications. The average number of gynecologists has remained at 264 per year for a decade, which, with more than 20 million women, poses a significant risk of insufficient coverage of preventive services.

The coefficient of variation in the regional provision of gynecologists (43%) indicates excessive inequality in access to specialized care. Similar indicators are recorded in countries with unstable healthcare infrastructure. This correlates with international data showing that in regions with low staffing density, both the levels of advanced cervical cancer and mortality from this pathology are increasing.

The key indicator was the development and testing of an integral staffing index (IS_{integr}), which combines quantitative and qualitative characteristics of the human resource (Kz, QI, P_H). The high degree of correlation of IS_{integr} with the level of early cervical cancer detection ($r=0.68$, $p<0.01$) confirms the practical significance of this indicator as an indicator of the effectiveness of primary and secondary prevention.

The Qualification Index (QI) in most regions was below the normative level (0.93 vs. expected ≥ 1.2), indicating a potential decline in the quality of specialized care. Relatively low proportion of doctors with the highest category (<30% in 9 regions) indicates insufficient system of advanced training and poor staff inertia in depressed regions.

The Staff Turnover Rate (STR), which in some regions exceeded 15%, indicates chronic instability in the staff. This leads to a constant loss of experience, which is especially critical in preventive oncology, where the effectiveness of interventions is based on the competence and consistency of a specialist's actions.

Cartographic typology of the regions according to the IS_{integr} and QI allowed us to identify three categories: stable (Kyiv, Kharkiv regions), vulnerable (Cherkasy, Poltava, Chernivtsi regions) and crisis (Luhansk, Zakarpattia regions). This classification allows us to tailor personnel policy, providing for

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additional funding, educational subventions, or the introduction of mobile oncology and gynecology teams. International experience shows that effective workforce planning in the field of women's health includes forecasting needs, attracting reserves, and introducing composite monitoring indicators. The proposed IS_{integr} model can be adapted both in Ukraine and in other health care systems with similar challenges.

Thus, the results obtained are of practical importance not only for academic analysis but also as a basis for the development of a national cervical cancer prevention workforce strategy for the period 2025–2030. They allow us not only to identify staffing gaps but also to predict their impact on future epidemiological indicators.

Conclusions

The gynecological oncology service in Ukraine in 2015–2024 is characterized by insufficient staffing and significant regional disparities in both the number and qualification level of specialists. More than a third of regions have critically low staffing levels according to the integral indicator. In some regions, staff turnover exceeds 15%, which indicates instability in the workforce. A positive correlation has been established between staffing levels and early detection of cervical cancer, confirming the importance of staffing in preventive work. The proposed integral indices can be an effective analytical tool for management decision-making and strategic planning in the cervical cancer prevention system for 2025–2030.

Declarations

Conflict of interest is absent.

All authors have given their consent to the publication of the article, to the processing and publication of their personal data.

The authors of the manuscript state that in the process of conducting research, preparing, and editing this manuscript, they did not use any generative AI tools or services to perform any of the tasks listed in the Generative AI Delegation Taxonomy (GAIDeT, 2025). All stages of work (from the development of the research concept to the final editing) were carried out without the involvement of generative artificial intelligence, exclusively by the authors.

Author Contributions

The author was solely responsible for all aspects of this work, including: conception and design of the study; acquisition, analysis, and interpretation of data; drafting and critically revising the article; final approval of the version to be published; and agreement to be accountable for all aspects of the work.

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Токар П.Ю.

Регіональні диспропорції кадрового забезпечення та індекс кваліфікації онкогінекологів в Україні: статистичний портрет та сценарії розвитку людських ресурсів (2015–2020, 2022–2024)

Актуальність. Рак шийки матки залишається однією з головних причин смертності серед жінок репродуктивного віку в Україні. Ефективність його профілактики залежить від наявності та кваліфікації онкогінекологів. Комплексний аналіз кадрового забезпечення онкогінекологічної служби України раніше не проводився, що і зумовило тему статті.

Мета. Проаналізувати регіональні диспропорції та кваліфікаційну структуру онкогінекології Україні за 2015–2020 та 2022–2024 роки, а також розробити комплексні статистичні показники для виявлення кадрових дисбалансів та прогнозування кадрового забезпечення системи профілактики раку шийки матки.

Матеріали та методи. Проведено ретроспективне дослідження на основі офіційних агрегованих даних МОЗ та Держстату за 2015–2020 та 2022–2024 рр. Для кожного регіону розраховано показники: коефіцієнт укомплектованості кадрами (Kz), індекс кваліфікації (QI), частку лікарів вищої категорії (PH), інтегральний індекс укомплектованості кадрами (IS_{integr}) та коефіцієнт плинності кадрів (PSR). Статистична обробка включала описову статистику, кореляційний та факторний аналіз, з використанням пакетів Excel, SPSS та RStudio.

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Етика дослідження. Дослідження базувалося виключно на агрегованих відкритих статистичних даних, які не містять персональної інформації. Відповідно до стандартів Гельсінської декларації ВМА, додаткове етичне схвалення не вимагалося.

Результати. Середньорічна кількість онкогінекологів становила 264 особи. Виявлено високий рівень регіональної диспропорції: Kz склав 43,6%. Середній QI дорівнював 0,93, що нижче за нормативний рівень (≥1,20). Аналіз IS_{integr} показав, що понад третина регіонів має критично низький кадровий потенціал (наприклад, Луганська та Закарпатська області). У деяких регіонах плинність кадрів перевищувала 15 %. Виявлено статистично значущу позитивну кореляцію між IS_{integr} та рівнем раннього виявлення раку шийки матки ($r=0,68$; $p<0,01$). Регіони класифіковано на три типи: потенційно стійкі, вразливі та дестабілізовані.

Висновки. Онкогінекологічна служба України характеризується недостатнім кадровим забезпеченням та значними регіональними диспропорціями. Більш ніж третина регіонів має критично низький рівень кадрового потенціалу. Встановлений прямий зв'язок між інтегральним індексом кадрового забезпечення та ефективністю ранньої діагностики підкреслює ключову роль якості та стабільності кадрів. Запропоновані комплексні індекси, зокрема IS_{integr}, можуть слугувати ефективним інструментом для обґрунтованого управлінського планування профілактики раку шийки матки на 2025–2030 роки.

***Ключові слова**: онкогінекологія, управління охороною здоров'я, регіональні диспропорції, рак шийки матки, інтегральний індекс доступності, медична статистика.*

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