APPROVED
at a meeting of the Academic Council of
NJSC «KazNU named after al-Farabi»
Protocol № 11 from 23. 05. 2025 y.

The program of the entrance exam for applicants to the PhD for the group of educational programs D139 - «Public health»

I. General provisions

1. The program was drawn up in accordance with the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 «On Approval of the Model Rules for Admission to Education in Educational Organizations Implementing Educational Programs of Higher and Postgraduate Education» (hereinafter referred to as the Model Rules).

2. The entrance exam for doctoral studies consists of an writing exam in the profile of a group of educational programs.

Block	Points
1.Public Health	30
2.Epidemiology	30
3.Biostatistics	40
Total admission score	100/75

3.The duration of the entrance exam is 2 hours 30 minutes, during which the applicant writes the answers the electronic examination ticket. The interview is conducted at the university premises before the entrance exam.

II. Procedure for the entrance examination

The examination card consists of 3 questions.

Topics for exam preparation according to the profile of the group of the educational program:

Discipline: «Public Health»

Theoretical foundations of public health and healthcare as a scientific and academic discipline. Legal and organizational foundations of public health: Constitution of the Republic of Kazakhstan; Code of the Republic of Kazakhstan "On Public Health and Healthcare System"; Principles of state policy in the field of healthcare; Structure of the healthcare system; Guaranteed volume of free medical care. Methodology for studying public health. Quantitative and qualitative assessments of population health. Evaluation of the impact of social and economic factors on various

health indicators. Monitoring the population's health status. Health indicators. Medical and social aspects of demography. Morbidity and methods of its study. Importance of morbidity statistics for a comprehensive assessment of population health. Concept of socially significant diseases and diseases posing a danger to others. Disease prevention and the promotion of a healthy lifestyle (HLS).

Questions:

1. Define the concept of "Public Health" and describe the main principles of public health theory and practice.
2. Identify and give examples of the main operational functions of public health.
3. (Missing)
4. Explain the concept of the "New Public Health."
5. Define prevention. Describe how the levels of prevention influence health status.
6. Describe the key milestones in the development of public health.
7. Assess the role of global health systems in public health.
8. Define the concept of "health promotion." Describe the main principles of health promotion as defined in the WHO Constitution.
9. Provide definitions of health. Explain the interrelation between the mechanisms of health and disease development.
10. Identify the main determinants of population health.
11. Distinguish between the concepts of health promotion and disease prevention.
12. Explain key concepts regarding the health of socially vulnerable groups and issues of health inequality.
13. Name the major international documents on health promotion and their significance.
14. Describe the basic principles of intersectoral collaboration (levels, status, focus) and evaluate the role of the intersectoral approach in the public health system.
15. List the main priorities for the development of primary healthcare (PHC).
16. Interpret and provide examples of healthcare system management under mandatory health insurance conditions.
17. Assess the role of prevention and formulate strategies to combat noncommunicable diseases (NCDs).
18. Explain the concept of "health promotion, including addressing social determinants and reducing health inequalities."
19. Justify the role of disease prevention, including early detection of health disorders.
20. Formulate the principles of the WHO Strategy "Health for All."
21. Describe the main social inequalities in health. Explain disease as a social process.
22. Define the subject, objectives, and principles of biomedical ethics. Formulate the main principles and norms of bioethics.
23. Justify the historical significance of the Alma-Ata Declaration.
24. Critically assess health threats according to WHO.
25. What are the principles of state policy in the field of healthcare?

26. List the structures involved in public health and explain the contribution of each to public health.
27. What is the role of non-governmental organizations in public health? Provide examples.
28. Characterize the socio-economic aspects of access to medical care and the health status of the population in the Republic of Kazakhstan.
29. Define mechanisms for changing attitudes and increasing population responsibility for their health.
30. What are the principles of state policy in the field of healthcare? Name the foundations of state regulation in the healthcare sector.

List of References

1. *Public Health: Textbook* / A.A. Akanov, K.A. Tulebayev, M.A. Kamaliev et al. – Moscow: Litterra, 2017. – 496 pages.
2. Lisytsin, Y.P. *Public Health and Healthcare: Textbook* / Y.P. Lisytsin, G.E. Ulumbekova. – 3rd ed., revised and expanded. – Moscow: GEOTAR-Media, 2015. – 544 pages.
3. V.A. Medik, V.K. Yuriev. *Public Health and Healthcare.* 3rd ed., revised and expanded. – GEOTAR-Media, 2014.
4. *Public Health and Healthcare, Health Economics: Textbook. Vol. 1* / Edited by V.Z. Kucherenko. – Moscow: GEOTAR-Media, 2013. – 688 pages.
5. *Public Health and Healthcare: Practical Training Manual* / V.A. Medik, V.I. Lisytsin, M.S. Tokmachev. – 2nd ed., revised and expanded. – Moscow: GEOTAR-Media, 2018. – 464 pages, illustrated.
6. Law of the Republic of Kazakhstan No. 405 *On Mandatory Social Health Insurance* (as amended and supplemented as of 01.01.2020).
7. *On the Approval of the Rules for Screening Organization*: Order of the Minister of Health of the Republic of Kazakhstan dated September 9, 2010 No. 704. Registered with the Ministry of Justice of the Republic of Kazakhstan on September 15, 2010 No. 6490.

Discipline: «Epidemiology»

Definition of epidemiology as a science. The purpose and main tasks of epidemiology. The role of epidemiology in medicine and public health. Epidemiological research methods. Basic concepts and areas of application for descriptive and analytical studies. Experimental studies. The epidemiological approach to studying population diseases. Collection of epidemiological data. Standard case definition. Measures of disease frequency and prevalence. Problem assessment and hypothesis formulation. Analysis of epidemiological research data. Visual representation of epidemiological data. Clinical epidemiology. Epidemiological aspects of screening. Causal relationships in epidemiology. Application of epidemiological methods in public health. Outbreak investigation of infectious diseases. Evaluation of intervention methods in medicine and public health.

Epidemiological surveillance of population morbidity. Evidence-based medicine. Clinical trials. Clinical guidelines. Systematic reviews and meta-analyses. Electronic medical databases based on evidence-based literature.

Questions:

1. Define the science of epidemiology and describe the key concepts such as distribution, determinants, health-related events, applications, population groups, and public health.
2. Identify the features of descriptive studies and their application in public health.
3. Identify the features of analytical studies and their application in public health.
4. Identify the features of experimental studies and their application in medicine and public health.
5. Demonstrate knowledge and skills in calculating and interpreting disease prevalence measures.
6. Discuss the measures of disease frequency.
7. Describe the visual representation of data in an epidemiological study.
8. Explain the differences between incidence and prevalence indicators.
9. Formulate research hypotheses and explain the differences between null and alternative hypotheses.
10. Explain the differences between diagnostic and screening tests, and critically assess the concepts of sensitivity and specificity.
11. Critically assess the analytical method “case-control study” and justify its applications.
12. Critically assess the analytical method “cohort study” and justify its applications.
13. Justify the application of experimental studies and critically assess the results of randomized controlled trials.
14. Critically assess the investigation of new viral infection outbreaks.
15. Define epidemiological surveillance, compare its various types, and describe its components.
16. Define research design. What types of research design do you know?
17. Demonstrate research errors. Types of research errors. Provide three examples of systematic errors from your own experience.
18. Define health technology assessment (HTA). Purpose of HTA, key principles.
19. Provide an overview of review studies. Meta-analysis. Systematic review.
20. Assess the role and purpose of descriptive research methods in evaluating population health.
21. Assess the role of analytical studies in identifying and evaluating risk factors for disease occurrence and spread.
22. Explain why randomized controlled trials are the “gold standard” of evidence-based medicine.
23. Identify and formulate the need for clinical trials. Explain the 4 phases of clinical trials.
24. Explain the significance of clinical research and guidelines in medical practice.
25. Describe the types of clinical guidelines and their development stages.
26. Demonstrate the main steps of conducting systematic reviews.

27. Define review studies: systematic review, meta-analysis. Provide a critical assessment of a systematic review.
28. Describe electronic medical databases based on evidence-based literature: Medline, PubMed, Cochrane Collaboration.
29. Define sensitivity and specificity of laboratory tests. Using a formula, provide your own example of calculating the predictive value of a positive and negative test result.
30. Define the key elements of screening, provide a definition of screening, describe the screening algorithm, and explain when screening is necessary.

List of References

1. *Principles of Epidemiology in Public Health: An Introduction to Applied Epidemiology and Biostatistics* / R. Dicker, Office of Epidemiologic Programs, CDC, USAID, 2012 – 457 p.
2. *Principles of Epidemiology in Public Health Practice*, 3rd Edition, CDC, US Department of Public Health, 2012 – 457 pages.
3. *General Epidemiology with Basics of Evidence-Based Medicine: A Practical Guidebook* / Edited by V.I. Pokrovsky, N.I. Briko – M.: GEOTAR-Media, 2008 – 400 pages.
4. Beaglehole R., Bonita R., Kjellström T. *Basic Epidemiology: WHO* – Geneva, 1994 – 259 pages.
5. Fletcher R., Fletcher S., Wagner E. *Clinical Epidemiology: The Essentials of Evidence-Based Medicine*, M., 2001.
6. Greenhalgh T. *How to Read a Paper: The Basics of Evidence-Based Medicine*, M., 2006.
7. Vlasov V.V. *Introduction to Evidence-Based Medicine*. M.: Media Sfera, 2001 – 392 pages.
8. *Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice* / Evidence-Based Medicine Working Group, Edited by Gordon Guyatt, Drummond Rennie, M., 2003.
9. *Evidence-Based Medicine: Annual Handbook*, M.

Discipline: Biostatistics

Biostatistics in Public Health. Objects, subject, and tasks of biostatistics. Main types of measurement scales used in medical and biological research. Quantitative and qualitative variables. Reliability and validity of measurements in biostatistics. Estimation of population parameters. Basics of analysis of variance (ANOVA). Concepts and application of ANOVA in public health. Statistical methods in epidemiological analysis. Correlation and regression. Planning and organization of statistical research. Basic statistical methods. Stages of a biomedical experiment. Choosing a statistical method for data processing. Use of modern information and computing technology in biostatistics. Statistical software for biomedical data analysis. Classification of statistical packages. Modern requirements for statistical software operating on personal computers.

Questions:

1. Justify the importance of medical statistics for public health and healthcare.
2. Define and describe types of statistical populations. Indicate methods for determining the required sample size for different study designs. Explain the concept of "sample representativeness."
3. Describe the types of variables (measurement scales) in a statistical population. Provide an example.
4. Define variation series. Name the ways of graphical data representation.
5. Formulate the properties of the normal distribution. What parameters characterize the distribution?
6. Explain the differences between measures of central tendency: mode, median, and arithmetic mean. Describe the calculation procedure and their application in healthcare.
7. Explain the use of standard error of relative value and arithmetic mean. Describe the relationship between the standard error value and the population size.
8. Interpret the concept of a confidence interval. Explain the application of this indicator.
9. What descriptive statistics methods are preferable to characterize qualitative variables? Justify your choice.
10. What descriptive statistics methods are preferable to characterize quantitative variables? Justify your choice.
11. Formulate the concept of a statistical hypothesis. What are the null and alternative hypotheses? What is the p-value?
12. Formulate the concept of the level of statistical significance. Explain accepted significance levels in biomedical research.
13. Indicate the differences between correlation and functional dependence. Explain the difference between positive and negative correlations.
14. Explain the essence of linear (simple and multiple) regression. Explain the significance of regression equation coefficients.
15. Explain the essence of binary logistic regression. Explain the significance of regression equation coefficients.
16. Justify the application of analysis of variance (ANOVA) in healthcare research.
17. Justify the application of survival analysis in healthcare research.
18. Explain the differences between dependent and independent samples/variables. Justify the choice of statistical tests for dependent and independent samples/variables.
19. Present a statistical analysis method used to determine the relationship between quantitative variables with a normal distribution. Provide an example.
20. Present a statistical analysis method used to determine the relationship between quantitative variables with a non-normal distribution. Provide an example.
21. Present a statistical analysis method used to determine the relationship between qualitative variables with independent samples. Provide an example.
22. Present a statistical analysis method used to determine the relationship between qualitative variables with dependent samples. Provide an example.

23. Present a statistical analysis method used to assess the statistical significance of differences within one group compared to a test value (standard), under normal distribution. Provide an example.
24. Present a statistical analysis method used to assess the statistical significance of differences between two independent groups, under normal distribution. Provide an example.
25. Present a statistical analysis method used to assess the statistical significance of differences between two dependent groups, under normal distribution. Provide an example.
26. Present a statistical analysis method used to assess the statistical significance of differences between three or more independent groups, under normal distribution. Provide an example.
27. Present a statistical analysis method used to assess the statistical significance of differences between two independent groups, under non-normal distribution. Provide an example.
28. Present a statistical analysis method used to assess the statistical significance of differences between two dependent groups, under non-normal distribution. Provide an example.
29. Present a statistical analysis method used to assess the statistical significance of differences between three or more independent groups, under non-normal distribution. Provide an example.
30. Present a statistical analysis method used to assess the statistical significance of differences between three or more dependent groups, under normal distribution. Provide an example.

List of References

1. Petri, A. *Visual Medical Statistics: A Textbook.* 2nd ed., revised and supplemented. — Moscow: GEOTAR-Media, 2010.
2. Koichubekov, B.K. *Biostatistics: A Textbook.* — Evero, 2014.
3. Koichubekov, B.K. *Introduction to Biostatistics: A Coursebook.* — Evero, 2014.
4. Ramankulova, A.A. *Biostatistics.* — Ak-Nur, 2013.
5. (Note: Source 5 is missing in the original list.)
6. *Biostatistics in Examples and Problems: A Teaching and Methodological Guide* / B.K. Koichubekov et al. — Almaty: Evero, 2012.
7. *Application of Statistical Analysis Methods for the Study of Public Health and Healthcare.* Edited by corresponding member of RAMS, Professor V.Z. Kucherenko. — M.: GEOTAR-Media, 2011.
8. *General Epidemiology with Basics of Evidence-Based Medicine: A Practical Guidebook* / Edited by V.I. Pokrovsky, N.I. Briko. — 2nd ed., revised and expanded. — M.: GEOTAR-Media, 2017. — 496 pages.
9. *Methods of Scientific Research in Medicine and Public Health* / Elizabeth DePoy, Laura N. Gitlin; translated from English under the editorship of V.V. Vlasov. — M. GEOTAR-Media, 2017. — 432 pages, illustrated.
10. *Biostatistics* / V.F. Moskalenko [et al.], 2017.