

125 YEARS OF PASTEUR INSTITUTE NIŠ

57 Days of Preventive Medicine

International Congress

BOOK OF ABSTRACTS



CONTEMPORARY CHALLENGES IN PUBLIC HEALTH

23-26. September 2025.
Niš, Serbia

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57 Days of Preventive Medicine
International Congress



**INSTITUTE OF PUBLIC HEALTH OF NIŠ
FACULTY OF MEDICINE, UNIVERSITY OF NIŠ
SERBIAN MEDICAL SOCIETY NIŠ**

**57th DAYS OF PREVENTIVE MEDICINE
– INTERNATIONAL CONGRESS**

Contemporary Challenges in Public Health

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Contemporary Challenges in Public Health

New challenges in Social medicine

Preventive programs - from idea to measurable benefits

Perspectives of information and communication

technologies and health care

Theoretical and practical problems of non-communicable diseases

Theoretical and practical problems of communicable diseases

Nutrition and health

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Table of Contents

Session: New challenges in Social medicine	7
Invited lectures	7
Oral presentations	32
Poster presentations.....	54
Session: Preventive programs - from idea to measurable benefits.....	58
Invited lectures	58
Oral presentations	77
Poster presentation.....	86
Session: Perspectives of information and communication technologies and health care.	87
Invited lectures	87
Oral presentations	96
Poster presentations.....	101
Session: Theoretical and practical problems of non-communicable diseases.....	103
Invited lectures	103
Oral presentations	106
Poster presentations.....	108
Session: Theoretical and practical problems of communicable diseases.....	128
Invited lectures	128
Oral presentations	130
Poster presentations.....	135
Session: Nutrition and health.....	146
Invited lectures	146
Oral presentations	152
Poster presentations.....	155
Session: Environment and health	171
Invited lectures	171
Oral presentations	174
Poster presentations.....	176
Session: Microbiology today	190
Invited lectures	190
Oral presentations	195
Poster presentations.....	199



SESSION: NEW CHALLENGES IN SOCIAL MEDICINE

INVITED LECTURES

INNOVATIONS IN PREVENTIVE MEDICINE

Bosiljka Djikanović^{1,2}

¹ Institute of Social Medicine, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

² Center – School of Public Health, Faculty of Medicine University of Belgrade, Belgrade, Serbia

Abstract

Objective: The aim of this lecture is to outline global horizons of innovative approaches in preventive medicine; to provide an overview of the maturity level of the Serbian Health Information System and to present genomic-related initiatives and their relevance for preventive medicine, particularly early detection of cancer risks.

Methods: Literature review and narrative synthesis was used to identify global frameworks and initiatives related to innovative approaches in preventive medicine.

Results: The concept of "precision public health" emerged as a new paradigm applicable to preventive medicine at a large scale, equivalent to "precision (or personalized) medicine". Personalized primary, secondary, and tertiary prevention can be achieved through technologies such as genomics, artificial intelligence, wearable devices, telemedicine, and bioengineering, and there is significant potential for this in our country as well. Mature and interoperable health information systems, app-based technologies, genomics, and artificial intelligence-assisted big data analysis can help in identifying those at higher risk, provide interventions for healthier lifestyles, improve quality of life, and inform the natural course of disease.

Conclusion: Responsible use of innovative approaches, together with traditional public health measures related to creating healthy environments and strengthening health systems, is making a paradigm shift in the next generation of preventive medicine.

Keywords: innovations, preventive medicine, precision public health, personalized medicine, health information system, artificial intelligence, genomics, digital health

Public health is " *the science and art of preventing disease, prolonging life, and improving health, through the organized efforts of society* " (1), which clearly indicates that disease prevention, like preventive medicine, is part of the broader concept of public health. Prevention is one of the most important health promotion strategies, according to the well-known Health Promotion Model by *Downie* et al. (2). An important part in the above definition of public health is "organized efforts of society", and whenever "society" and its organized efforts are concerned, the activities become more complex and more complicated to plan and implement, but their effects are more long-term, stronger, more



sustainable, and more efficient. Communities and societies differ from each other in how much they are able to weave, adapt and apply "*science and art*" into interventions that lead to "*disease prevention, life extension, and health promotion*".

Innovations in preventive medicine have their place both in individual and in "organized efforts of society". They empower individuals to take control of their health by strengthening personal skills, which is again one of the fundamental pillars of health promotion, according to the Ottawa Charter (3).

Innovations and innovative approaches can be very useful tools for essential public health functions, which are, according to the World Health Organization (WHO): monitoring, evaluation and analysis of health status; Supervision of health risks and emergency situations; Health protection through regulation and application of laws; Health promotion and improvement of social determinants of health; Participation and empowerment of communities; Development and planning of health policies and institutional leadership; Provision and access to essential health services; Development of human resources for public health; Maintaining and improving the quality of public health services; Public Health Research and Innovation, and Public Health Systems and Finance Management (4).

Innovative approaches in preventive health care

We have witnessed that in the past 5-10 years there has been exponential technological progress, primarily in the field of information technology development and artificial intelligence, i.e. machine learning, but also in the field of genomics, thanks to advanced techniques for genome profiling, such as next-generation sequencing (NGS). Genome analysis of diseased tissues is today an almost inevitable part of profiling tumor changes (secondary prevention), which enables the determination of targeted therapy that is practically the only one directed at the cause of the disease, which forms the basis of "precision or personalized medicine".

Although there is no universally accepted definition of personalized medicine, the advisory group of the *Horizon 2020* program defines it as "*a medical model in which the characterization of phenotypes and genotypes of individuals (such as genetic profiling, medical imaging, but also lifestyle data) is used in order to adapt the therapeutic strategy to the person in a timely manner and/or to determine predispositions to the disease and/or timely and targeted prevention*" (5).

A similar principle applies to the population approach, where the characteristics of population groups, i.e. clusters of populations, are considered, and based on their personal characteristics, and predicted probabilities for the disease in accordance with age, lifestyle, family history of the disease, environmental conditions and circumstances in the family, at the workplace, and communities. Genomics is adding to that group of determinants, thanks to the availability of the cheaper technology for genome profiling such as NGS, in comparison to previous more than ten years ago. Successful precision medicine requires a population perspective, thus paving the road for the establishment of the concept of "precision public health".

Precision public health and artificial intelligence

Precise Public Health (PPH) can be defined as "*a means of improving population health by applying new technologies, especially genomics and digital technologies, which direct the practice of public health by generating more individually adapted forms of action and policies*" (6). Two most important drivers in Precision public health, as well as in precision medicine, are genome profiling (thanks to progress and greater availability, i.e. lower



cost of sequencing), and health information technology that can collect a large number of clinical and non-clinical data related to health, in a digital, machine-readable form, primarily in health information systems (HIS), but also geographic information systems (GIS), environmental data, as well as wearables, i.e. health applications that are installed on different mobile devices (7).

Precision public health refers to the integration of data collected thanks to the technologies mentioned above, and analyzed with the help of artificial intelligence (AI). Artificial intelligence (AI), according to the definition of the Organization for European Cooperation and Development OECD, is "*a machine-based system that, based on explicit or implicit goals, draws conclusions from received data, in order to generate output information such as predictions, content, recommendations or decisions that can affect the physical or virtual environment*" (8). Similarly, the Law on Artificial Intelligence adopted by the EU states that: "An artificial intelligence system is a machine-based system that, due to explicit or implicit goals, derives from the input it receives a way to generate outputs such as predictions, content, recommendations or decisions, which can affect physical or virtual reality" (9).

Artificial intelligence can be used to identify specific target groups in the population at increased health risk, in order to implement appropriate interventions and improve their health outcomes. In Serbia, the Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2025-2030 was adopted, which defines the strategic directions of the development of AI in various areas (10).

It is important to emphasize that artificial intelligence, new digital and "omics" technologies (genomics, epigenomics, proteomics...) are not ends in themselves, but rather tools for health promotion and disease prevention, if they are applied responsibly and sensibly, that is, when they are accompanied by appropriate infrastructure, normative framework, and risk management strategies (11, 12). Their application must be accompanied by the regulation of numerous methodological, ethical and organizational concerns, and in accordance with FAIR principles, which is an acronym that refers to *Findability* (possibility of finding); *Accessability*; *Interoperability*, and *Reusability* (13).

Digital Public Health

Digital public health as a term was first mentioned no more than 6 years ago, and it means the use of digital technologies and innovations to improve public health, through disease prevention, health promotion, improving access to health services, as well as strengthening the efficiency, equity and sustainability of health systems (14).

Digital public health implies the application of tools such as: mobile applications for health (mHealth), telemedicine, "*big data*" analytics, artificial intelligence, wearables, electronic health records, digital health promotion campaigns, and other (Figure 1). Digital public health is not only seen as a technical tool, but as a concept that slowly but surely leads to **the transformation of public health practice**, which requires an ethical framework, well-established data protection mechanisms and functional multi-sector cooperation (15-17).

Ten years ago, the World Health Organization (WHO) recognized the importance, potential, but also limitations regarding the expansion of the application of digital health, and adopted the Global Digital Health Strategy for the period from 2020-2025 (18-19).

Figure 1. Digital Health Technology Icons (produced by ChatGPT)

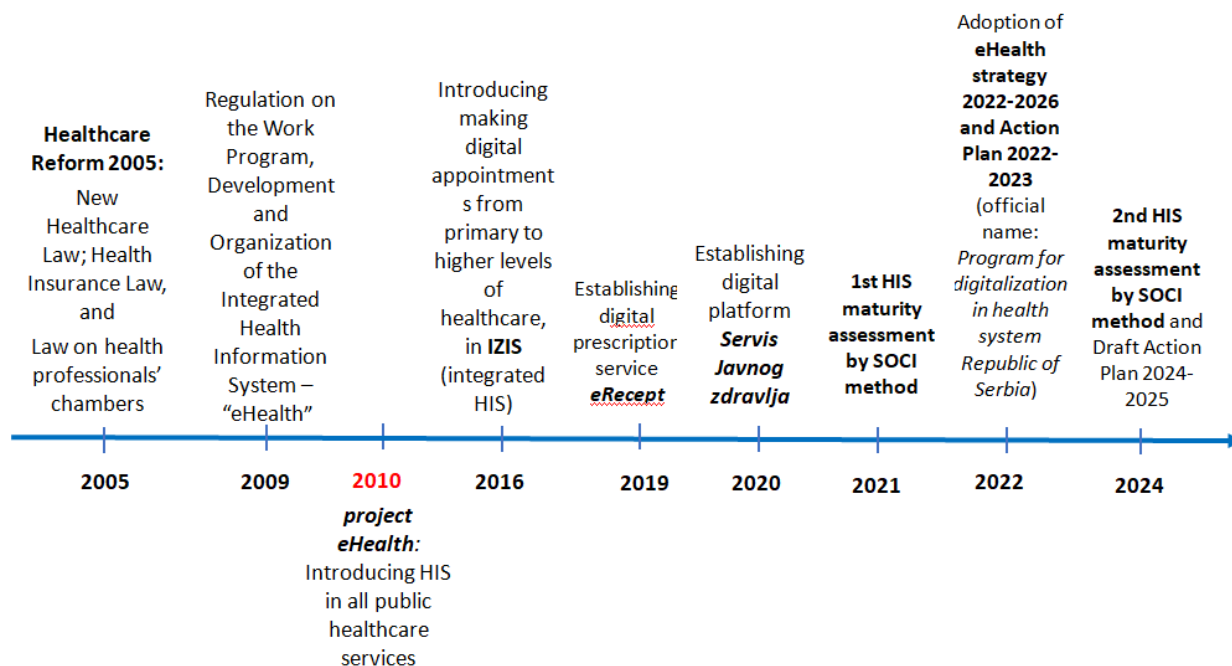


-  mHealth Apps
-  Telemedicine
-  Big Data Analytics
-  Artificial Intelligence
-  Wearable Devices
-  Electronic Health Record
-  Digital Health Campaigns

Digitization and development of the health information system in Serbia

The digitalization process in the health care system in the Republic of Serbia began in 2009, with the introduction of the Regulation on the program of work, development and organization of the integrated health information system - "eZdravlje" (20). It provided the framework for the introduction of computers and the health information system (HIS) in health care institutions from the Plan of the Network of Health Care Institutions, which began in 2010, thanks to the eZdravlje project (21). From that period until nowadays, various incremental changes and new functionalities have been introduced in HIS: electronic scheduling of appointments by the chosen physician in primary health care for check-ups by specialists at the secondary and tertiary level; establishing *eRecept*, an electronic ("paperless") prescription of medicine to be issued to patients in pharmacies, as well as the platform *Servis Javnog Zdravlja* (Public Health Service), for collecting mandatory routine statistical data from health institutions, in a machine-readable form, and not through individual tables in programs such as Excel, which had required additional work by professionals on integration and analysis (22) (Figure 2).

Figure 2. Development of Health Information System in Serbia: a timeline as of 2005 (22)



Source: adopted from Djikanovic et al, 2025

Maturity of Health Information System is an important prerequisite for innovations and digital development of health care services. The analysis of the maturity level of HIS in Serbia for the first time was conducted in 2021, and then three years later, in 2024, which coincide with the period before and after the adoption of the Strategic Program for Digitization in the Health System in Serbia 2022-2026, with the Action Plan for the two-year period 2022-2023 (21-24). The evaluation of the maturity of the HIS was realized using the methodology *Stages Of Continuous Improvement* (acronym SOCI), developed by the Measure Evaluation Center from Chapel Hill, United States of America, and whose application is described in detail in the publications of Ollis et al. and Djikanovic et al. (21, 22).

The SOCI method consists of assessing the state of HIS in five main domains: HIS leadership and management; HIS management and workforce; Infrastructure of HIS and information and communication technologies (ICT); Standards and interoperability of HIS, and Quality and use of data in HIS. These domains are further segmented into a total of 13 components, and the components into 39 subcomponents (25). The degree of development of each subcomponent was assessed on a continuum from a newly established HIS (first phase) to a strong, optimized ZIS (fifth phase), that is, on a scale of 1 to 5, with the given ratings corresponding to the following descriptions: (1) emerging/ad hoc; (2) repeatable; (3) defined; (4) managed, and (5) optimized (24).

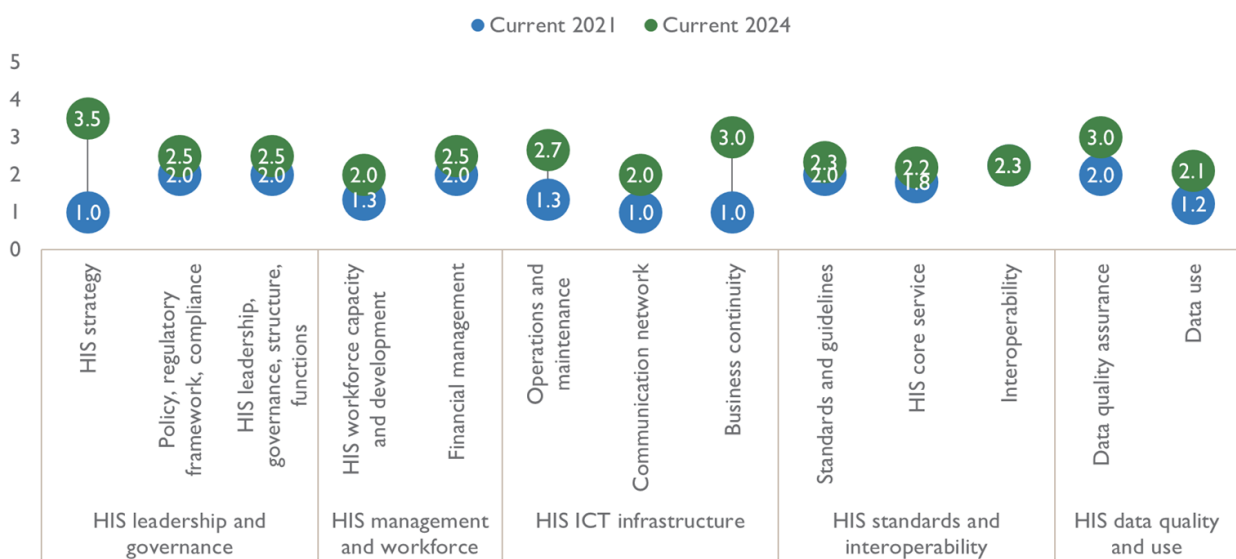
The results of the HIS maturity assessment in 2024 compared to 2021 showed that a certain step forward a higher degree of system maturity was achieved in the three-year period, on average by almost a whole point (more precisely, 0.9), or from average 1.6 to 2.5 points. Progress in the degree of maturity of HIS in 2024 compared to 2021 was recorded in all components, and ranged from 0.3 to 2.5 points (Figure 3). The greatest progress was achieved in the improvement of the HIS Strategic Plan components (improvement of 2.5 points, in the domain of HIS Leadership and Management) and Business Continuity (improvement of 2 points, in the domain of HIS Infrastructure and ICT) (22). This progress was achieved thanks to the adoption and launching of the strategic framework in this area - the Program for digitization in the health system of the Republic

of Serbia in 2022, thirteen years after the previous strategic document in this area from 2009 (20, 23). Business continuity is ensured by the planned migration of information systems to the state data center for data management and storage, and the connection of local information systems of health institutions to the unified ICT network of electronic administration (22).

The least progress was reported for a domain Standards and Interoperability of HIS and all its components, which is perhaps not a surprising fact given that these components were rated relatively high in the first assessment in 2021 (average rating 2.0), while in 2024 the average rating was 2.3 (22). In the meantime, a new Law on Health Documentation and Records was adopted, on the basis of which the Institute for Public Health of Serbia "Dr. Milan Jovanović Batut" develops unique methodological guidelines, standards and procedures for maintaining health documentation and records, as well as creating and submitting reports (26). The Rulebook is also being drafted, which should define the technical standards of the IT system for data exchange, which will impose the standards for local systems.

What remains as a challenge is to identify the optimal model for achieving information networking of different institutions within the entire health system (such as institutions responsible for financing, system management, data collection and analysis) (22).

Figure 3. Progress in the maturity of HIS in Serbia in a three-year period 2021-2024 (22)



Source: Djikanovic et al, 2025

Precision Public Health and Genomics

The development of genomics, as a science that studies the structure, function and interaction of genes within the entire genome, enabled the transformation of the public health paradigm towards already mentioned *Precision Public Health* (6). Thanks to the lower cost of genome sequencing and the application of NGS technology, genomics represents one of the central pillars of accurate public health in recent times, including pharmacogenomics, which considers the different genomic basis (gene polymorphism) of individually different responses to therapeutic protocols (27, 28). Connection between **genomics** and **precise public health** is essential and multilayer — genomics represents one of key factors that enable public health interventions become really *precise*. Genomics is a key component of precision public health because it enables identification of



population subgroups with increased genetic risk for certain diseases, optimization of preventive programs, and better targeting of public health interventions (29).

In its *Genomic Surveillance Strategy 2022–2032*, the World Health Organization (WHO) promotes the application of genomic technologies in the monitoring of infectious diseases, antimicrobial resistance and emerging pathogens, thus positioning genomics at the very center of global public health systems (30).

Globally, several initiatives are confirming the convergence of genomics and public health. The Centers for Disease Control and Prevention's (CDC) *Tier 1 Genomics Applications Toolkit* program defines genetic conditions with proven public health importance, such as **identifying individuals at high genetic risk in the population** - carriers of mutations in BRCA1/2 genes, associated with hereditary breast and ovarian cancer syndrome (HBOC), or individuals with Lynch syndrome and familial hyperlipidemia (FH) (31). When it comes to the consideration of systematic implementation of population screening that goes beyond testing individuals with a positive family history), there are more arguments against than for it. To be reminded, any population screening must fulfill the well-known, clearly defined criteria and robust evidences, as established by Wilson and Jugner in 1968, and it did not change over time, as emphasized by Turnbull et al, in the recent opinion published in the Lancet (33, 34).

A large number of countries around the world are synchronizing their efforts in establishing national genomic cohorts, as reported in the commentary of Manolio et al (35). For example, the global consortium *The International Hundred Thousand Plus Cohort Consortium* (IHCC) represents a global alliance that connects more than 100 large population cohorts from 43 countries, with a total of about 50 million participants (35). This international consortium aims to integrate large-scale longitudinal health and genomic data to enable analysis of rare genotypes, diverse population groups, and gene-environment interactions that individual cohorts cannot capture on their own. The consortium has developed a governance system, data sharing policies, and a standardized pathway to harmonize metadata among cohorts, thereby encouraging interoperability and collaboration in scientific research, thanks to the support from the US National Institutes of Health (NIH), the Wellcome Trust, and partners such as the Global Alliance for Genomics and Health (GA4GH) and the Global Collaborative Center for Genomic Medicine (G2MC) (35).

Scope and limitations of innovative approaches in oncology

The goal of genomic screening in the context of oncological diseases is to identify individuals with hereditary mutations that significantly increase the risk of developing cancer, such as the BRCA1/2 mutations mentioned above, which is the recommendation of the first category of the American CDC and the American College of Genomics and Genomic Medicine (31). Information about the presence of these high-risk mutations in individuals, together with a positive family history, may contribute to more diligent screening for secondary prevention. On the other hand, it is important to emphasize that the presence of a genetic mutation *is not a disease*, and that genetics is not a destiny. A large number of different factors from the external environment greatly influence gene expression i.e. the occurrence of disease (32). However, despite the knowledge about the risk factors for the occurrence of oncological diseases, knowledge about the natural course of the disease, that is, *what exactly, when and how* triggers the penetration of a genetic mutation, is still unknown.

In order to reduce the chance of the penetration of a high-risk genetic mutation for the development of oncological diseases, it is very important to implement primary and



primordial prevention measures, at the level of society, which are well-known, traditional public health measures, such as measures to ban smoking indoors, reducing or completely eliminating exposure to proven toxic substances in the environment: in the air, soil, water, and food; exposure to stress and toxic interpersonal relationships at the workplace, in the family, society or community (mobbing, domestic violence, lack of feeling of control in one's own work and family environment; armed conflicts); loneliness and lack of social support, as well as unhealthy lifestyles (lack of physical activity, unhealthy diet, excessive consumption of tobacco, alcohol, psychoactive substances) (32). Most of these risk factors are actually the responsibility of the community and society, and the presence (or absence) of a normative and/or strategic framework that regulates and limits them (i.e. taxes or penalties), or promotes and subsidizes those that have a positive impact on population health (either directly or more often indirectly) and their ability to achieve their full health potential.

Promoting the application of concepts of the World Health Organization such as "Health For All", "Health In All Policies" and the newer "One Health Approach" should be the basis of functioning and decision-making in the society, with the aim of improving public health (36). It must not be forgotten that innovative approaches in preventive medicine only represent modern tools that are *complementary* to traditional measures and activities in public health, and in no way competitive or exclusive.

Responsible promotion of the development of digital health, artificial intelligence and genomics

The development of digital health, artificial intelligence and genomics within the framework of precision public health and preventive medicine also carries significant ethical, legal and social implications, which must be carefully considered and addressed before their wider application at the population level. The issues of data privacy protection and regulation of data use are particularly important, as well as avoiding discrimination and bias in artificial intelligence models that are based on data sets originating from certain (but not all) population groups; preventing the increase of inequality in health based on unequal access to the use of digital technologies, and many others.

Conclusion

For an appropriate and responsible use of innovative approaches, such as artificial intelligence, genomics, data from electronic health records and other, an appropriate infrastructure is a must, which implies well defined regulatory framework and highly professional use of data, that would prevent any undesirable outcome or harm. Innovations are having a huge potential to improve population health and quality of life like never before, but only under the assumption that the same level of effort is invested in route causes of diseases, or in primordial and primary prevention public health measures that should minimize exposure to well known risk factors in communities and society. If that fail, all innovative efforts will address just secondary prevention, i.e. early detection and treatment of diseases.

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NUTRITIONAL RISK FACTORS FOR THE DEVELOPMENT OF CHRONIC NON-COMMUNICABLE DISEASES FROM COLLECTIVE NUTRITION OF PRESCHOOL CHILDREN

Nela Donović^{1,2}

¹ Faculty of Medical Sciences of University of Kragujevac, Kragujevac, Serbia

² Institute of Public Health of Kragujevac, Kragujevac, Serbia

Abstract

Introduction: Nutrition is the foundation of life and health. It is especially important in childhood and youth. Nutritional factors from food/meals are proven risk factors for the development of numerous health disorders. (cardiovascular diseases, diabetes, metabolic diseases, some malignant diseases). Prevention at the primary level is of the greatest importance for reducing the incidence, prevalence, morbidity and mortality rates of these chronic non-communicable diseases, which are at the forefront both in the world population and in our country. A well-balanced diet is the basis of the health of children and youth, and an inadequate one is a morbid factor. Regular and continuous monitoring of collective nutrition is the obligation of all preschool institutions and is regulated by law - the Regulation on the detailed conditions and methods of implementing child nutrition in preschool institutions.

Objectives: The main goal of the work is to analyze the content of macronutrients: fats, saturated fatty acids, proteins, carbohydrates, sugars, dietary fiber and table salt from the period of collective nutrition of preschool children. with the aim of primary prevention of chronic non-communicable diseases. Specific objectives are: analyze the macronutrient ratios in the collective diet of preschool children, analyze the diet in the private and public sector for preschool institutions, analyze the salt content in the private and public sector for preschool institutions and identify nutritional risk factors for chronic non-communicable diseases from the collective diet of preschool children.

Materials and methods: This research was designed as a retrospective cross-sectional study. The material used for this work was the documentation of the Center for Hygiene and Human Ecology of the Institute of Public Health Kragujevac, namely the results of the analysis of the energy values of meals for preschool institutions. The research period is 2019-2024. The research location is Šumadija District. The population being researched is children who are fed in collective feeding facilities in preschool institutions.

Results: The energy values of all-day meals for both 2019 and 2024 are not aligned with the norms of the Rulebook for any age category of children. The largest deviations are for boys aged 5.5-6.5 years and amount to 26.3% and 23%. For children aged 3-5.5 years, the average daily intake is 57.55% of the daily energy needs of children of this age. The results of the Student's T test for the analysis of the deviation of the mean energy values for 2019-2024 show that there is no statistically significant difference for these observed years, and there is also no statistically significant difference between public and private preschools (ANOVA). The results of the analysis of the percentage of individual meals show that they are not in line with the norms, but the average values for breakfast and lunch are lower and for snacks are higher. There is no statistically significant difference between the percentage of individual meals in relation to age and the observed years, ($\chi^2 = 0.984$, $p > 0.05$ and $N = 1.46$, $p > 0.05$). An analysis of the percentage deviations of macronutrients in a full-day meal in relation to the energy value of full-day meals showed that there was no statistically significant difference between the content of macronutrients in 2019 and 2024, nor between state and private institutions. The



analysis showed that for both years studied, the macronutrient content was not aligned with the energy value of the meal and that protein and fat were contained in excess in children's meals, while carbohydrates were in deficit. Salt analyses in meals show increased average salt content in both 2019 and 2024, but there is no statistically significant difference between these two years.

Conclusion: The collective nutrition of children is not appropriate and is not in line with applicable regulations. The quality of nutrition for preschool children is inadequate in both public and private preschools (there is no difference in relation to these types of preschools). The energy value of meals is not harmonized by gender or age of children. Deviations in terms of macronutrient content are present in all ages/age categories. The share of individual meals in daily meals is not harmonized in preschool institutions. The salt content for all tested categories is higher than recommendations and standards. The following nutritional risk factors for the development of chronic non-communicable diseases have been identified: inadequate daily energy intake, disturbed macronutrient ratios in the diet, disturbed ratio and distribution of energy from food in daily meals, increased fat content in the diet, reduced carbohydrate content and increased salt content (which exceeds the recommended norms many times over).

Keywords: children, nutrition, chronic non-communicable diseases, risk, prevention



MENTAL HEALTH IN ALL STRATEGIES AND POLICIES (RP/ MENTAL HYGIENE)

Marija Jevtić^{1,2}

¹ Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

Abstract

In 2023, the European Union adopted *A Comprehensive Approach to Mental Health*, highlighting the need for intersectoral action ranging from education, social protection, and employment to digital technologies and culture. Mental health cannot be viewed in isolation, but rather within the broader concept of health and well-being, as well as the social processes that are increasingly complex and multifaceted today.

There are strong arguments that mental health should not only be embedded in all public health and social development strategies and policies, but also implemented across all domains of our communities and societies. At the individual level, mental hygiene can be understood as a daily, personalized procedure of caring for mental (and physical) health designed to preserve balance and resilience and should be an integral part of everyday personal routines. At the group level, mental hygiene today carries particular importance as a component of collective social responsibility, both for the present and with a projection into the future, addressing challenges relevant to the mental health of future generations (*Foresight for Mental Health*).

Just as handwashing and vaccination have their public health significance, mental hygiene should evolve into a firm and consistent social norm (example: *Culture for Health – Culture on Prescription*). At the community level and beyond, it is essential that strategies do not remain merely declarative but are harmonized, implemented, and monitored in practice (examples: *CliMent COST Action CA23113*, *EARLY project* - Providing Data and Knowledge on Mental Health and Opportunities for Mental Health in Youth).

Individual approaches and population-based approaches to improving mental health require synchronization and integration; otherwise, the success of their targeted efforts cannot be expected. We are witnessing the fact that the mental health of societies has been seriously undermined by conflicts, crises, emergencies, and the pandemic crisis. Although this issue is gradually returning to the agenda, this is still insufficient. Moreover, internal organizational divisions within the public health framework divert us from the core task of preserving people's and communities' mental health. Public health must remain focused on solving problems and creating sustainable solutions, which often require action within other sectoral policies.

Therefore, the call for mental health to become an integral part of every public policy — from climate and health to education and culture — is imperative, because only in this way can we speak of a genuine European and global standard of health for all.

Keywords: mental health, mental hygiene, foresight



CHALLENGES AND BARRIERS IN MENTAL HEALTHCARE SYSTEMS

Svetlana Radević^{1,2}

¹ Institute of Public Health, Kragujevac, Kragujevac, Serbia

² Department of Social medicine, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

Abstract

Barriers to accessing mental health services can be defined as the impediments that prevent people with mental health illnesses from seeking, obtaining, or completing mental health treatment services. The mental health treatment gap remains wide across the world despite mental illness being a significant cause of disability globally. Barriers to mental health care include lack of access to mental health care, financial costs, limited mental health literacy, cultural and language barriers, insufficient insurance coverage, and structural issues like inadequate funding for services and lack of integration into primary care. People with mental health conditions often also experience stigma, discrimination and human rights violations. These factors prevent many people from seeking or receiving the mental health support they need. Untreated mental conditions have personal and social consequences and economic loss. Overcoming the barriers in mental healthcare systems is a challenge for politicians all over the world. Understanding barriers to treatment constitutes an important endeavor for planning mental health services, setting priorities in allocation of resources, and reducing the burden of mental illness.

Challenges and barriers in mental healthcare systems

Mental health is an integral part of general health and well-being and a basic human right. It represents the basis of the quality of life and productivity of the individual, family, community and nation, so investing in mental health is extremely important, both from the perspective of public health and economic and social stability. However, globally, a large number of people face poor mental health, which can also affect physical health, well-being and social interaction. Mental disorders affect a person's functioning and cause not only emotional suffering but also a lower quality of life, alienation, stigma and discrimination. They are often associated with prolonged treatment, absenteeism from work, unemployment, and reduced productivity, all of which affect the emotional and economic well-being of family caregivers, as well as increasing community costs. An increasing number of adolescents and young people, working-age people and the population over 65 are facing poor mental health. However, despite this knowledge, in many countries mental health is neglected, neglected and characterized as less important than physical health. This results in less investment in activities related to the improvement of mental health and prevention of mental disorders, which adversely affects the state of health as a whole and contributes to the isolation and discrimination of sufferers. Stigma and discrimination continue to be an obstacle to social inclusion and access to proper health care. At the same time, the provision of mental health services is not in line with the needs of people suffering from mental disorders, especially in low- and middle-income countries. In many countries, mental health does not find its proper place in public health policies and strategies in the field of public health, which are still more focused on physical health.



Mental health is a basic human right. Everyone, whoever and wherever they are, has the right to the highest possible standard of mental health. This includes the right to protection from mental health risks, the right to accessible, affordable, acceptable and quality health care and the right to freedom, independence and inclusion in the community.

Yet around the world, people with mental health problems continue to experience a wide range of human rights violations. Many are excluded from community life and discriminated against, while many more cannot access the health care they need. In many countries, people with mental disorders do not have access to quality services, are exposed to coercive procedures, inhumane treatment, and in some cases abuse - even in health care facilities, where they should be protected. It is also well documented that there is a shortage of mental health service providers, low levels of mental health education and literacy, and underutilization of mental health services. Untreated mental conditions have personal and social consequences and economic loss and can increase health care costs through a number of interrelated mechanisms. Identifying and understanding barriers to treatment is an important endeavor for planning mental health services, prioritizing resource allocation, and reducing the burden of mental illness.

Various studies have analyzed the existence of barriers and limitations in the use and access to mental health services. Recent studies have clearly pointed to multiple barriers to using mental health services in developing countries where three quarters of patients with mental disorders do not have access to mental health services. Barriers to seeking professional support can be very different and include structural barriers in the provision of services (difficulties resulting from institutional policies and procedures that limit the rights and opportunities of people with mental illnesses and their families), physical obstacles (e.g. distance from the place of residence, lack of transportation), lack of information about where help can be found, as well as psychological barriers such as fear of judgment and stigmatization by the community, but also personal attitudes towards people with mental disorders and mental disorders in general. Finally, barriers can also be of a socioeconomic nature (eg lack of money or free time due to work). Low health literacy and lack of mental health awareness A lack of knowledge and awareness of mental illness results in people underutilizing services, adopting the wrong behaviors and contributing to caregiver burden.

An individual's behavior and attitudes towards people with mental health problems may also depend on previous experience and contact with people with these problems. This experience can further influence the formation of attitudes towards people with mental disorders, as well as attitudes towards mental disorders in general and consequently influence the intention to seek professional help. In other words, in order to understand these attitudes, it is necessary to take into account not only the personal experiences of an individual with mental disorders, but also the direct contact and experience with people with mental disorders in his environment.

In addition to objective barriers to seeking professional help and social distance towards people with mental health problems, the willingness to seek professional help can also be shaped by the perception of social stigmatization of people with mental disorders in the given environment, as well as mental disorders in general, as well as the consequent internalization of these beliefs by the individual, which can result in self-stigma. In other words, society's negative attitudes towards mental disorders can become so pronounced and frequent, that the person who has symptoms of mental disorders begins to adopt these attitudes and consequently views himself and his mental disorder as undesirable, dangerous or shameful. Accordingly, perceived social stigmatization as



well as self-stigmatization can represent significant psychological barriers to seeking professional help.

The perception of public or social stigma is the degree to which individuals believe that other people will devalue or discriminate against someone with a mental disorder. The more pronounced this belief is in an environment, it can be assumed that the presence of devaluation or discrimination of persons with mental disorders in a given environment is greater. The risk of facing discrimination in cultural, social and professional circles creates a huge barrier to seeking treatment. People may fear being shunned or treated differently by family and friends, or that disclosing their mental health will lead to poor treatment and perception at work. Research shows that one-third of respondents (31%) expressed concern that others would judge them when they found out they had sought mental health services.

The research results show that perceived social stigmatization of persons with mental disorders is not related to age, ie. both younger and older people equally believe that the social environment stigmatizes these people. Also, it is shown that regarding the perceived stigmatization of persons with mental disorders, there are no differences between men and women.

Overcoming barriers in mental health systems is a challenge for decision makers around the world. Based on the results of the research, it is necessary to give recommendations for interventions that would lead to the improvement of the mental health of the population, and which primarily relate to improving the availability of support by developing free services in the community focused on mental health, as well as programs that would be aimed at reducing stigma related to mental health problems, strengthening resilience and reducing maladaptive coping styles.

Improving mental health can be achieved by intensifying the application of current legislation and strategic documents, which relate to the areas of information, education and counseling, with greater participation of service users and adaptation of the work of health services to the needs of particularly sensitive population categories. Enable more comprehensive preventive activities, primarily early diagnostics, as well as comprehensive assistance to the population at the level of primary health care. Primary prevention of mental disorders as well as improvement of mental health should be carried out through the educational system and forms of mass communication with additional continuous education of existing staff in the field of mental problems.

Provision of free services aimed at mental health throughout Serbia, which would enable overcoming financial barriers that are singled out as an important reason why people in need do not seek help. Then, the implementation of programs and interventions that would reduce the stigma related to mental disorders and mental disorders, including social distance towards people with these disorders, and the perception of the extent to which there is condemnation and discrimination by society towards people who have these disorders, but above all that would affect the reduction of self-stigmatization, i.e. the belief that seeking professional help due to mental disorders is an indicator of less personal value or personal failure, which turned out to be another important reason for reluctance to seek help when she needed. Finally, it is necessary to implement programs and interventions that would lead to the strengthening of resilience and less application of maladaptive coping mechanisms among the population in Serbia, such as an avoidant coping style characterized by denying and minimizing the importance of stressors or avoiding direct confrontation with stress, or a coping style focused on emotions, which have been shown to significantly contribute to psychological problems in the field of



mental health, and promote more adaptive ways of coping with stress among the population in Serbia.

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IMPLEMENTATION OF A BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM FOR NON-COMMUNICABLE DISEASES IN THE ADULT POPULATION OF AP VOJVODINA

Vesna Mijatović Jovanović^{1,2}

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia.

² Institute of Public Health of Vojvodina, Novi Sad, Serbia.

Abstract

Introduction: Non-communicable diseases (NCDs) are the most significant public health problem and the leading causes of death of the population of the Autonomous Province of Vojvodina. A substantial proportion of these deaths could be prevented or delayed through interventions targeting behavioral risk factors.

Methods: The surveillance designed as a cross-sectional study, was conducted annually during the period 2023–2025 by the Institute of Public Health of Vojvodina, in collaboration with six district institutes and 44 Primary Health Care Centers. A representative sample of 3,910 adults aged 18 years and older was stratified by sex, age, and type of settlement across 45 municipalities. A modified version of the CDC's BRFSS (Behavioral Risk Factor Surveillance System) questionnaire was used, including items on socio-demographic characteristics, behavioral risk factors, chronic diseases, depressive symptoms, and preventive health examinations. Interviews were conducted face-to-face, by trained health workers using mobile phones connected to a computer-based application.

Results: In Vojvodina in 2024, one-third of adults smoked cigarettes, while every tenth used e-cigarettes. Within the last 30 days, every second adult consumed alcohol, and nearly one-fifth reported episodes of binge drinking. When driving a car, 4.1% of respondents stated that they sometimes, rarely, or never use a seat belt. About one-third were physically inactive, while 3.4% reported symptoms of depression. Two-thirds of adults reported eating breakfast daily, whereas 5.4% never eat breakfast. One in three adults had two or more chronic diseases, and one in four had at least one. Less than half of the target female population underwent mammography screening within the last two years, while nearly one in five women had not had a Pap test within the past three years. Most of the examined risk factors were more prevalent among men and those with lower socioeconomic status.

Conclusion: Monitoring behavioral risk factors for NCDs is crucial for the design of public health programs and strategies aimed at reducing the prevalence of risk factors and increasing population coverage of preventive and screening services.

Keywords: behavioral risk factor surveillance system, non-communicable diseases, life style

Introduction

The epidemic of chronic non-communicable diseases (NCDs) imposes severe health consequences for individuals, families and communities, and threatens to overwhelm health systems. Heart disease, stroke, cancer, diabetes, chronic lung disease, and other NCDs are collectively responsible for 74% of all deaths worldwide (1).



NCDs are the most significant public health problem and the leading causes of death of the population of the Autonomous Province of Vojvodina (Vojvodina) (2). A substantial proportion of these deaths could be prevented or delayed through interventions targeting behavioral risk factors (smoking, physical inactivity, unhealthy diet, alcohol consumption, and many others). One of the most important ways of reducing mortality from NCDs is to control the risk factors that lead to their development. These involve reducing the use of tobacco consumption and harmful alcohol intake, staying physically active and consuming a healthy diet, as well as enhancing air quality (1,3).

Cigarette smoking is responsible for more than 7 million deaths annually worldwide, including 1.6 million deaths occurring among non-smokers as a result of exposure to second-hand smoke. In 2020, it was estimated that 22.3% of the global population smoked, with men (36.7%) significantly more than women (7.8%) (4). In recent years, there has been a decline in the prevalence of smoking in many countries worldwide, accompanied by an increase in the use of waterpipe tobacco, electronic cigarettes, and heated tobacco products (5). According to data from the Global Burden of Disease (GBD) Study, among the ten most common risk factors for premature mortality and disability in Serbia, smoking ranks second (6). From 2000 to 2019, smoking prevalence among adults in Vojvodina was consistently higher than in other regions of Serbia (7).

Globally, alcohol consumption was responsible for an estimated 2.6 million deaths, among these, 1.6 million deaths were attributable to noncommunicable diseases, 700,000 to injuries, and 300,000 to communicable diseases. Alcohol consumption increases the risk of several cancers, including breast, liver, head and neck, esophageal and colorectal cancers (8). According to data from the GBD Study, alcohol consumption in Serbia ranks eighth among the ten leading risk factors for premature mortality and disability (6). Traffic accidents represent a significant cause of morbidity and mortality. According to World Health Organization (WHO) data for 2020, the mortality rate due to traffic accidents in Serbia was 7.5 per 100,000 population (9). Driving under influence of alcohol increases the risk of road traffic crashes that result in serious injuries or death (10).

Physical inactivity is considered one of the major contributors to NCDs and significantly increases the risk of developing numerous diseases (11). Globally, physical inactivity is responsible for 6–10% of all deaths from leading NCDs, including coronary heart disease, type 2 diabetes, and breast and colon cancer. In Serbia, it is estimated that physical inactivity accounts for 18% of premature deaths (12).

Regular breakfast consumption is considered one of the indicators of a healthy diet (13). Several studies have shown an association between skipping breakfast and obesity, as well as an increased risk of developing cardiovascular diseases and type 2 diabetes (13,14,15). According to data from the Serbian National Health Survey (NHS) from 2019, 83.8% of the population in Serbia consumes breakfast daily, while this habit is least prevalent among residents of Vojvodina (73.9%) (16).

The NHSs from 2000 to 2019 in Serbia showed that the prevalence of numerous behavioral risk factors for NCDs, including smoking, was consistently higher in Vojvodina than in other regions of Serbia (16,17,18), indicating the need to develop a behavioral risk factor surveillance system for NCDs among the adult population in Vojvodina.



Objectives

Implementation of a surveillance system to monitor behavioral risk factors for NCDs among the adult population in Vojvodina, with the aim of identifying main risk factors and defining priorities for preventive interventions.

Materials and Methods

The Surveillance of behavioral risk factors for non-communicable diseases in the adult population of Vojvodina is a cross-sectional study first conducted in 2023 and repeated in 2024 and 2025 on a representative sample of the adult population of Vojvodina. The Surveillance was conducted by the Institute of Public Health of Vojvodina (IPHV), in collaboration with six regional Public Health Institutes and 44 Primary Health Centers, as part of the Special Public Health Program for the territory of Vojvodina (19). Participants were surveyed during visits to Health Centers in the departments of general medicine, occupational medicine, gynecology, child health care, and polyvalent patronage services. A modified version of the CDC's (Centers for Disease Control and Prevention, USA) BRFSS questionnaire (Behavioral Risk Factor Surveillance System) was used (20), and it included questions on participants' socio-demographic characteristics, behavioral risk factors, chronic diseases, depression symptoms, and preventive screenings. A representative sample of 3,910 participants aged 18 and older was stratified by sex, age, and settlement type for each of 45 municipalities. The questionnaire was developed as an electronic application, enabling direct data entry at the site of participant interviews, as well as real-time monitoring. Interviews were conducted face-to-face by trained physicians and nurses, using mobile phones connected to a computer-based application. The survey was conducted over 3.5 months, from May 20 to August 30, until the data plan was fulfilled. Exclusion criteria were persons with mental impairment and persons who in any phase refused interview. Ethical aspects of surveillance were considered by the Ethics Committee of the IPHV. The survey was anonymous and each respondent signed the Informed Consent for participation in the survey.

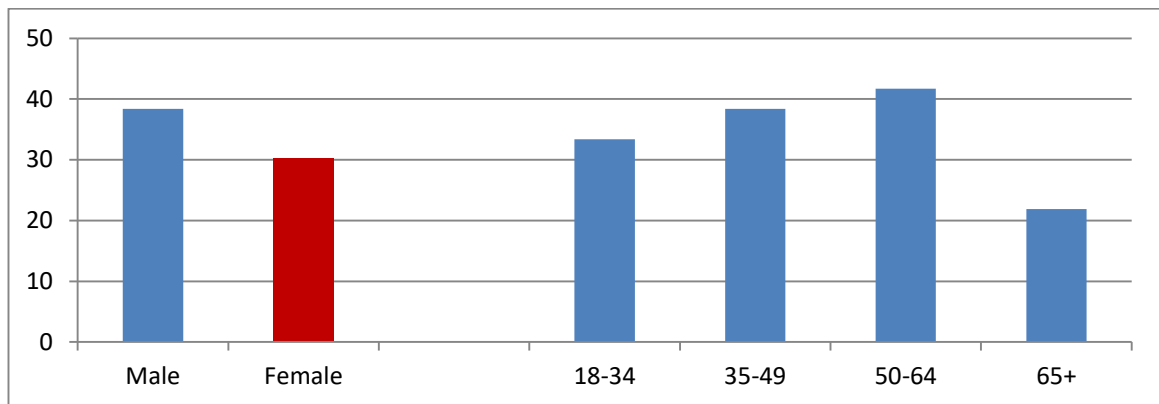
The primary database was transformed to SPSS (Statistical Package for the Social Sciences) version 21 for further statistical analysis of the data. Both descriptive and inferential statistical methods were used in the analysis.

Results

The 2024 survey included 3,910 participants (1,886 males and 2,024 females) aged 18 and older, with a mean age of 49.2 years (SD = 17.5, Min 18, Max 92). Among the seven districts of Vojvodina, one-third of participants were from South Bačka, while the smallest proportion was from North Banat (7.3%). The majority had secondary education (59.3%), less than one-third had higher education (28.8%), and most reported an average material status (46.2%), followed by good (37.7%) and poor/very poor (8.5%).

In 2024, 29.1% of participants smoked daily and 6.1% occasionally. Overall, 48.2% had smoked at least 100 cigarettes in their lifetime, and the prevalence of smoking (including participants who had smoked at least 100 cigarettes in their lifetime and currently smoke either occasionally or daily) was 34.2%. Smoking prevalence was higher among males than females (38.4% vs 30.2%, $p < 0.001$) and in the 50–64 age groups (41.7%, $p < 0.001$) (Fig. 1). The highest smoking prevalence was observed in the Srem and North Bačka districts (39.2% and 38.9%), while the lowest was in the North Banat district (27.7%) ($p < 0.001$). Overall, 9.7% of participants used e-cigarettes or other vaping products (2.5% daily, 7.2% occasionally). Usage was higher among women than men (10.8% vs. 8.6%, $p = 0.020$), and the highest in the 18–34 age group (17.9%, $p < 0.001$).

Fig. 1. Prevalence of cigarette smoking among adults in Vojvodina, by gender and age, 2024



In the 30 days preceding the survey, 45.8% of participants consumed alcohol, with the highest prevalence in the 35–49 age group (54.7%) and among men (61.7%) compared to women (31.3%) ($p < 0.001$). The Central Banat district had the highest proportion of drinkers (50.9%) ($p = 0.014$). Binge drinking (≥ 5 drinks for men, ≥ 4 drinks for women on a single occasion) was reported by 17.1% of adults. Among those who reported binge drinking, 45.9% did so once, 24.8% twice, 11.1% three times, and 18.2% more than three times in the past month.

In the past 30 days, 12.6% (out of 1,585 who answered this question) participants reported driving after consuming alcohol, more frequently among men (16.5%) than women (6.2%) ($p < 0.001$). On average, participants drove under the influence of alcohol 3.1 times (SD = 5.2, Min 1; Max 30). A total of 145 participants (3.9%) reported being involved in traffic accidents while driving, significantly more often among men than women (5.9% vs. 2.0%, $p < 0.001$), among younger adults aged 18–34 years (5.3%, $p = 0.003$), and among residents of the Srem district (5.1%, $p = 0.018$).

The majority of respondents reported that they always or almost always use a seat belt when driving a car (95.9%), while 4.1% reported using it only occasionally or never. Among those who reported occasional or no seat belt use, men predominated compared to women (4.9% vs. 3.3%), as well as individuals aged 50 years and older compared to younger respondents ($p = 0.015$), and those with lower levels of education (9.2%) ($p < 0.001$).

In Vojvodina, 31.3% of respondents were physically inactive in the month prior to the survey, more often women than men (33.3% vs. 29.2%, $p = 0.007$). Physical inactivity increased with age, from 25.1% in the 18–34 age group to 41.1% among those aged 65 and older ($p < 0.001$).

Breakfast regularity over the course of a week was analyzed as part of dietary habits. More than two-thirds of respondents reported eating breakfast every day (69.6%), while 5.4% stated they never eat breakfast, with no gender differences ($p > 0.05$). The highest proportion of those who never eat breakfast was observed among individuals aged 35–49 years (6.9%, $p < 0.001$) and among individuals of lower socioeconomic status, with approximately one in nine respondents in this group (10.6%) reporting that they never eat breakfast.



In Vojvodina, one-third of adults (34.6%) reported having two or more chronic diseases out of the 12 assessed. Additionally, 24.7% of respondents reported having at least one chronic disease, while 40.7% reported none, with no significant differences by gender. The prevalence of multiple diseases increased significantly with age and was the highest among individuals aged 65 years and older (71.5%).

The Patient Health Questionnaire (PHQ-9) was used to categorize the population with depressive symptoms. Based on this instrument, 3.4% of the population were identified as having symptoms of depression (PHQ-9 score 10–27). Depressive symptoms were significantly more prevalent among women (4.4%, $p < 0.001$), among individuals aged 65 years and older (4.9%, $p = 0.024$), and among respondents with the lowest level of education (7.3%). The highest prevalence was observed in the poorest socioeconomic group, where 13.5% reported depressive symptoms.

According to the study results, among the target population of women (aged 50–69 years), 40.6% had undergone a mammography within the past two years. Cervical cancer screening (Pap test) within the past three years was reported by 81.1% of women aged 25–64 years. Half of the women reported having the Pap test upon physician's recommendation (50.9%), 44.5% on their own initiative, and 4.6% following a physician's invitation within an organized screening program. At the district level, the lowest coverage for both types of preventive examinations was recorded in the North Bačka District ($p < 0.001$).

The results indicated a higher prevalence of risk factors among individuals with lower socioeconomic status, except for cigarette smoking, which remained most prevalent among those with a medium level of education, and e-cigarette and other vaping product use, as well as alcohol consumption, which were more common among individuals with higher levels of education and material status. Participants with the lowest levels of education and material status had a significantly higher prevalence of two or more chronic diseases and depressive symptoms, and the lowest participation in preventive health examinations.

Conclusion

The results indicate a high prevalence of behavioral risk factors among the adult population in Vojvodina, particularly in certain group (for most risk factors, men and individuals with lower socioeconomic status). Regional differences were also observed in the presence of several risk factors and the utilization of preventive health services. Monitoring behavioral risk factors for NCDs is crucial for the design of public health programs and interventions aimed at reducing the prevalence of risk factors and increasing population coverage of preventive and screening services.

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SESSION: NEW CHALLENGES IN SOCIAL MEDICINE

ORAL PRESENTATIONS

ENHANCING PUBLIC MENTAL HEALTH PREPAREDNESS: THE ROLE OF PSYCHOLOGICAL FIRST AID IN DISASTER RESPONSE

Sladana Jović¹, Jelena Milić², Dejana Jovanović Popović¹

¹ University of Belgrade, Faculty of Security Studies, Belgrade, Serbia

² Institute of Public Health of Serbia „Dr Milan Jovanović Batut”, Belgrade, Serbia

Abstract

Objectives: This paper aims to identify key global threats to public mental health in disaster settings and to examine the implementation and effectiveness of Psychological First Aid (PFA) as a preventive and early response tool, particularly in vulnerable populations.

Methods: A scoping review of literature from 2015 to 2024 was conducted using PubMed, Scopus, and WHO databases. Inclusion criteria focused on empirical studies, guidelines, and reports on mental health interventions in disaster-affected populations. Special attention was given to the role of PFA in community-based resilience strategies.

Results: Disasters such as pandemics, armed conflict, earthquakes, and large-scale displacement significantly disrupt mental health at the population level. Evidence indicates that early psychosocial interventions, including PFA, reduce long-term psychological distress when integrated into disaster response plans. Vulnerable groups, including children, the elderly, displaced persons, and frontline responders, are at elevated risk. Successful models of PFA delivery emphasize cultural adaptation, community-based support networks, and multi-sectoral cooperation between public health institutions, local governments, and NGOs.

Conclusion: Public mental health must be considered a core component of disaster preparedness and response. PFA is a low-cost, scalable intervention that can be delivered by trained non-specialists to support resilience and reduce trauma-related outcomes. Strengthening local capacity and intersectoral coordination is essential for building community resilience in the face of increasing global disasters.

Keywords: public mental health, disasters, psychological first aid, resilience, preparedness, vulnerable groups



ASSOCIATION BETWEEN OBESITY AND WEIGHT LOSS APPS ADVERTISED ON SOCIAL MEDIA

Aleksandar Višnjić^{1,2}

¹ Faculty of Medicine, University of Niš, Niš, Serbia

² Center of Analysis, Planning, and Organization of Health Care, Institute of Public Health of Niš, Niš, Serbia

Abstract

Introduction: Social media frames the public's perceptions about health issues. Obesity is a global public health problem and a prominent topic on social media, offering weight management programs.

Aim: This study aimed to explore the perception of obesity and overweight by analyzing content on social media.

Methods: A content analysis was conducted to assess a set of posts sampled from 11 weight loss apps advertised on social media—Facebook and Instagram. Descriptive statistics were used to evaluate the extent to which obesity and overweight were portrayed accurately.

Results: In our review study, a total of 11,234 posts were scanned in weight loss mobile apps. However, only 702 posts (6.25%) were related to obesity and overweight as precursors to more serious health conditions. None of the weight loss mobile apps on social media addressed any aspect of obesity as a disease or included warnings related to it. The posts in these apps primarily focused on healthy eating recipes, exercise regimes, and gym training tips.

Conclusions: The content analysis of weight loss apps revealed that these platforms did not adequately recognize obesity. To properly improve public perception of obesity as a disease, it is essential to involve professional associations, as well as prominent endocrinologists individually, in prompt communication regarding these issues.

Keywords: obesity, social media, applications, low weight



LAYPERSONS OR HEALTHCARE WORKERS? ENGAGEMENT ACROSS TIKTOK, YOUTUBE, AND INSTAGRAM ON HORMONAL CONTRACEPTION IN SERBIA

Lazar Petrović¹, Vida Jeremić-Stojković², Smiljana Cvjetković², Aleksandar Stevanović³, Stefan Mandić-Rajčević³

¹ University of Belgrade, Faculty of Medicine, Belgrade, Serbia

² University of Belgrade, Faculty of Medicine, Department of Humanities, Belgrade, Serbia

³ University of Belgrade, Faculty of Medicine, Institute of Social Medicine, Belgrade, Serbia

Abstract

Objectives: Nearly 50% of the general population consume health content on social media, while a third report influence from non-medical sources. Low trust in traditional media (44%) and high perceived ability to find (76%) and assess (71%) reliable information indicate a shift toward personal, informal sources, especially among younger audiences. Our study examined hormonal-contraception content on major Serbian platforms and relationships between platform, source type, and engagement.

Methods: We identified posts on YouTube, TikTok, and Instagram, recorded their engagement metrics and source authority, and analyzed them using R.

Results: Sixty posts were analyzed. Engagement differed across platforms ($p < 0.001$). Doctors spoke in 85% of YouTube videos vs. 35% on TikTok/Instagram. Overall, healthcare workers presented 90% of YouTube posts, 50% on TikTok, and 60% on Instagram ($p = 0.020$). Non-healthcare sources had higher median likes (1,351.5 vs. 55.5; $p = 0.001$) and comments (96.0 vs. 12.5; $p = 0.007$), with views trending higher (36,139 vs. 8,525.5; $p = 0.054$). Shares were higher for healthcare workers (2,336.5 vs. 679.0).

Conclusion: Laypersons drew more engagement (likes, comments) and a trend toward more views. Healthcare workers' posts, though less engaging, were shared more, suggesting higher perceived credibility. These patterns suggest two influence types: laypersons dominate reach/engagement, while healthcare workers exert smaller but potentially higher-quality, more shareable impact.

Keywords: information environment, social media, hormonal contraception, trust, engagement



ASSOCIATION OF SMOKING AND MULTIMORBIDITY IN THE ADULT POPULATION OF SERBIA

Ivana Radić^{1,2}, Snežana Ukropina^{1,2}, Sanja Harhaji^{1,2}, Sonja Čanković^{1,2}, Zorana Ostojić², Dragana Milijašević^{1,2}, Vesna Mijatović Jovanović^{1,2}

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

Abstract

Objective: The aim is to estimate the association of smoking and multimorbidity in the adult population of Serbia.

Material and methods: The research is part of the National Health Survey of Serbia, a cross-sectional study carried out in 2019 on a representative, stratified, two-stage sample. For this paper, data for 12,755 individuals aged 18 years and older were analyzed. Multimorbidity was defined as the presence of two or more out of 13 chronic diseases. Information on chronic diseases and smoking status was self-reported. The association between smoking and multimorbidity was assessed using multivariable logistic regression analysis.

Results: Multimorbidity prevalence was 21.80%, while nearly half of the adult population were smokers or former smokers (48.0%). Former and current smokers had higher odds of multimorbidity compared to never smokers (OR = 1.32, 95% CI: 1.18–1.49). This association was stronger among women (OR = 1.49, 95% CI: 1.27–1.75) than among men (OR = 1.29, 95% CI: 1.09–1.53).

Conclusion: Since smoking is associated with an increased risk of developing multimorbidity, it is necessary to intensify health promotion activities aimed at reducing the smoking prevalence, which would, in turn, contribute to a decrease in the prevalence of multimorbidity in our population.

Keywords: multimorbidity, smoking, non-communicable diseases, health surveys



IMPACT ON PARENTAL AND CHILDREN'S MENTAL HEALTH AND PERCEPTIONS OF SAFETY AFTER THE MASS SCHOOL SHOOTING

Miodrag Stanković^{1,2}

¹ Faculty of Medicine, University of Niš, Niš, Serbia

² Center of Mental Health Protection, University Clinical Center of Niš, Niš, Serbia

Abstract

Background: On May 3rd, 2023, the first school shooting in Serbia occurred at an elementary school in Belgrade, with nine deaths, and the following day, in an unrelated event, a mass shooting took place in the schoolyards of a rural school, also with nine deaths.

Objective: We explore Serbian parents' experiences before and after the two mass shootings: impact on parental and children's mental health and preparedness.

Methods: A 50-item online survey was administered to parents/caregivers in two phases. Last was 12 months later. We excluded parents who were directly or indirectly connected to the events from further analysis.

Results: After two mass shootings, much more parents expressed concern for their children's safety in general, they had extremely difficulties to send their children back to school, and maintaining daily routines. About 50% parents noticed no behavioral changes in their children.

Conclusions: Our research, which excluded direct and indirect involvement in the events of them and their children, confirms that the school massacre leaves deep psychological consequences on parents and the community as a whole even though there is no direct involvement in the events.

Keywords: school shooting, mental health



ATTITUDE TOWARD FATHERS' ENGAGEMENT IN EARLY PARENTHOOD AMONG UNIVERSITY STUDENTS IN BELGRADE

Tatjana Gazibara ¹, Jelena Sindic ², Felicia Kieren Wanda ², Jelena Dotlic ^{2,3}

¹ Institute of Epidemiology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

² Faculty of Medicine, University of Belgrade, Belgrade, Serbia

³ Clinic for Obstetrics and Gynecology, Clinical Center of Serbia, Belgrade, Serbia

Abstract

Objective: To identify factors associated with a stronger positive attitude of university students toward fathers' involvement in parenting.

Methods: This cross-sectional study was conducted in January 2024. The study population was recruited from the Student Primary Health Center. Data were collected using an anonymous questionnaire. The study outcome was the response to the statement "Fathers should regularly change diapers, push strollers, feed and bathe their kids" which was graded on a 5-point Likert scale from 1 - strongly disagree to 5 - strongly agree.

Results: Of 361 students, most were female (74.8%) and on average 22.8 ± 1.8 years old. Females scored significantly higher compared to males (4.6 vs. 4.2; $p=0.001$). Being female ($B=0.47$, 95% confidence interval [CI] 0.24-0.71, $p=0.001$), having higher grade point average at university ($B=0.14$, 95%CI 0.03-0.26 $p=0.015$) and living in cities over 50,000 inhabitants ($B=-0.14$, 95%CI -0.26-0.03 $p=0.023$) were independently associated with positive attitude toward fathers' involvement in changing diapers, pushing baby strollers, and feeding and bathing their kids.

Conclusion: While students overall have a positive attitude toward fathers' involvement in child-rearing, females who had higher school achievements and lived in larger urban settlements were more likely to express a stronger positive attitude toward this notion.

Keywords: parenthood, fathers, child rearing



FACTORS ASSOCIATED WITH HEALTH-RELATED QUALITY OF LIFE AMONG ELDERLY IN VOJVODINA

Sonja Čanković^{1,2}, Tanja Tomašević^{1,2}, Ivana Radić^{1,2}, Vesna Mijatović Jovanović^{1,2}, Dušan Čanković^{1,2}, Snežana Ukropina^{1,2}, Sanja Harhaji^{1,2}, Dragana Milijašević^{1,2}, Nataša Dragnić², Kristina Stamenković²

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

Abstract

Objectives: To analyze the association of socioeconomic and social and emotional support (SaES) factors with HRQoL among elderly in Vojvodina.

Materials and methods: A questionnaire based on the Behavioral Risk Factor Surveillance System was used. The study included 924 examinees aged 65+, interviewed in 2024. To assess HRQOL a set of four questions was used: self-reported general health (GH), number of days during which physical health (PH) and mental health (MH) were not good, and number of days with activity limitation (AL). Multivariable logistic regression models were developed.

Results: 54.1% assessed their GH as fair or poor, higher odds of being in this category had widowed (OR=1.7), one with the lowest educational level (OR=2.2), who assessed their material status as average (OR=2.2) or poor/very poor (OR=6.4), and who rarely or never got SaES (OR=2.7). The higher odds of reporting PH impairment had aged 75-79 (OR=1.8), one with poor material status (OR=2.4) and rarely or never got SaES (OR=2.2). In the MH domain, only SaES was significantly associated. Males were two times and adults in category 80+ three times more likely to report having AL.

Conclusion: The low SaES was found to be a significant predictor in three domains, while socioeconomic factors were predictors of poor HRQOL in two or only one domain.

Keywords: quality of life, aging, socioeconomic factors, social support



NATURAL POPULATION CHANGE IN EUROPEAN UNION AND NON-EUROPEAN UNION COUNTRY - THE CASE OF NORTH MACEDONIA AND SLOVENIA

Monika Stojčevska¹, Hristina Vasilevska¹, Aleksandra Stamenova¹, Fimka Tozija¹

¹Faculty of Medicine, Ss. Cyril and Methodius University, Skopje, North Macedonia

Abstract

Objectives: The aim of this paper is to present the natural population change in North Macedonia and in Slovenia for the period 1981 - 2023

Method and materials: Public health approach was applied using data from State Statistical Office of North Macedonia and Slovenia.

Results: The birth and mortality rate, and the natural growth of the two countries have been presented. In 1986, Macedonia had a high infant mortality rate (IMR) of 43.6 compared to Slovenia with 11.9 per 1,000 live births. The IMR in Macedonia has decreased significantly in recent years, reaching the rate of 1.8 per 1,000 in 2023 same as in Slovenia. In the 1980s Macedonia had a positive natural growth with an average rate of 12 per 1000 inhabitants and Slovenia 3.4 per 1000 inhabitants. In Macedonia, negative natural growth began in 2019, while in Slovenia, it was recorded for the first time in 1993. In both countries, there is a negative natural growth in 2023, in Macedonia -1.9 per 1000 inhabitants while in Slovenia, -2.1 per 1000 inhabitants.

Conclusion: While Slovenia has a stronger economy and better social support systems, both are experiencing demographic decline typical for many European countries.

Keywords: North Macedonia, Slovenia, natural population change



PREVENTION OF PROFESSIONAL RISKS IN THE HEALTH PROFESSION

Dragan Nikolić¹, Katarina Nikolić², Aleksandar Višnjic^{1,3}

¹ Public Health Institute of Niš, Niš, Serbia

² University Clinical Center Niš, Niš, Serbia

³ Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Aim: Prevention of psychosocial hazards in health activities that can cause bad psychological and physical effects.

Method and materials: The analysis determined: ANOVA and Tukey's test showed that healthcare workers have significantly higher score values for 9 domains from the COPSOQ questionnaire: opportunity for improvement, predictability, rewards, role-definition, quality of leadership, social support, job satisfaction, trust in leadership, as well as justice and reputation. In contrast, healthcare workers have significantly lower scores for 4 domains: emotional demands, work-family conflict, job burnout, and stress.

Results: All domains of the COPSOQ questionnaire, except cognitive demands, are significantly related to IRS values. Each increase in the scores of the following domains by 1 was associated with a significant increase in IRS values: job impact by 0.062 (0.008 to 0.116; $p=0.025$), opportunities for improvement by 0.154 (0.090 to 0.218; $p<0.001$), job meaning by 0.205 (0.133 to 0.278; $p=0.001$). $p<0.001$), workplace commitment by 0.205 (0.141 to 0.269; $p<0.001$), predictability by 0.170 (0.114 to 0.226; $p<0.001$), reward by 0.182 (0.126 to 0.237; $p<0.001$), role-definition by 0.244 (0.175 to 0.313; $p<0.001$), quality of leadership by 0.137 (0.088 to 0.186; $p<0.001$), social support by 0.137 (0.087 to 0.187; $p<0.001$), job satisfaction by 0.492 (0.337 to 0.646; $p<0.001$), trust in management by 0.208 (0.148 to 0.269; $p<0.001$), justice and reputation by 0.162 (0.109 to 0.216; $p<0.001$) and self-rated health by 0.622 (0.521 to 0.722; $p<0.001$).

Conclusion: Solving the problem of psychosocial factors in the workplace is a continuous process that first of all requires a good knowledge of them. Practical significance of the research is reflected in program activities of an organizational nature based on concrete prevention measures, which reduce safety and psycho-social risks of the workplace, improve work ability and improve the quality of life.

Keywords: professional risks, psychosocial hazards, healthcare workers, prevention



UNDERSTANDING AGE-SPECIFIC POISONING PATTERNS TO GUIDE PREVENTIVE STRATEGIES

Maja Vujović^{1,2}, Ana Kundalić¹, Emilija Kostić¹

¹ University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia

² Toxicological laboratory, Institute of Forensic Medicine of Niš, Niš, Serbia

Abstract

Objectives: Poisonings in children and adults differ in terms of causes, exposure patterns, and severity of clinical presentation. The aim of this study was to identify similarities and differences in poisonings between these populations during 2024.

Materials and methods: All toxicological-chemical analysis results obtained in the Toxicology Laboratory of the Institute of Forensic Medicine in Niš during 2024 were analyzed. Data were processed using descriptive statistics in Google Sheets.

Results: Of 221 cases, 21.27% occurred in children and 78.73% in adults. Single-substance poisoning was predominant in children (51.35%), whereas adults more frequently exhibited multiple-substance exposure (72.85%). Central nervous system (CNS) drugs and analgesics were the leading agents in both groups; however, ethanol (13.51%) and illicit drugs (16.21%) were more frequently detected in children, while cardiovascular drugs (21.20%) and pesticides (2%) were more common in adults.

Conclusion: While CNS drugs and analgesics dominate in both populations, differences exist regarding the type of additional substances and exposure patterns. Children more often experience single-substance poisonings associated with psychoactive substances, whereas adults frequently present with multiple-substance poisonings, including higher involvement of cardiovascular drugs and pesticides. These distinctions may guide preventive strategies and clinical management.

Keywords: poisoning, adults, children, prevention, pattern



RISK BEHAVIORS AND AWARENESS OF PSYCHOACTIVE SUBSTANCES AMONG PHARMACY STUDENTS: INSIGHTS FOR PREVENTIVE STRATEGIES

Emilija Kostić¹, Aleksandar Jovanović^{1,2}, Aleksandra Catić Đorđević¹, Maja Vujović^{1,3}

¹ University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia

² University of Belgrade, Faculty of Pharmacy, Department of Social Pharmacy and Pharmaceutical Legislation, Belgrade, Serbia

³ Toxicological laboratory, Institute of Forensic Medicine of Niš, Niš, Serbia

Abstract

Objectives: Pharmacists and pharmacy students are crucial in promoting healthy lifestyles and raising awareness of psychoactive substance risks. This study examined the prevalence of tobacco, alcohol, energy drink, sedative, and marijuana use among pharmacy students, and differences by gender and year of study at the Faculty of Medicine, University of Nis.

Methodology: With Ethics Committee approval, data were collected via an online questionnaire (Google Forms) and processed in Google Sheets. A total of 225 students participated.

Results: Overall, 14.16% smoked cigarettes, peaking in the third year (37.50%). About 70% consumed alcohol on special occasions; weekly use was more common in males (21.62%) than in females (9.57%). Monthly energy drink consumption was reported by ~20%. Sedative use was found in 4.84% of first-year and 10.81% of fifth-year students, all female. Marijuana had been tried by 10.91%; recreational use occurred in 2.70% of males and 0.55% of females. Nearly 45% knew more than one marijuana user. Awareness of “new psychoactive substances” was reported by 31.56%, increasing from 21.88% in the first year to 56.76% in the fifth year.

Conclusion: These results indicate the presence of various substances among pharmacy students, with increasing awareness of new psychoactive substances throughout their education.

Keywords: pharmacy students, prevention, psychoactive substance, misuse



CASE-MIX CHILDBIRTH INDEX IN SERBIA: HOW MUCH MORE COMPLICATED IS THE AVERAGE CHILDBIRTH THAN THE STANDARD ONE?

Petar Đurić¹, Ana Vukša¹, Danijela Dukić, Miljan Ljubičić¹, Olivera Ninković¹

¹Institute of Public Health of Serbia "Dr. Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: Understanding the childbirth complexities is crucial for assessing obstetric care and resource planning. Serbia uses the Australian Refined Diagnosis-Related Groups (AR-DRGs) for patients' classification based on their diagnoses and the resources required during hospitalization. This study aimed to identify regional differences in average birth weight in Serbia's general hospitals (GHs) using DRG weights, regulated by the Rulebook on healthcare contracting.

Methods: We analyzed five childbirth DRG groups, using their weights as specified in the Rulebook. At the district level, the number of births from each DRG was multiplied by the corresponding weight, and the sum of these values was divided by the total number of births to obtain the case-mix index (CMI) with its 95% Confidence Interval (CI).

Results: During 2024, we registered 56,845 deliveries in Serbia, with 26,369 deliveries (46.4%) in GHs. The most frequent DRGs are O60Z - vaginal delivery, VD (55.9%), and 001B - Cesarean section, CS (37.0%), showing district variations of 40.4-70.5% and 17.9-57.1%, respectively. The national CMI was 2.06 (95% CI: 2.059-2.061), with a district-level variation (1.94-2.19).

Conclusion: CMI 2.06 indicates that childbirth in Serbia is more complex than VD (1.66) but less than CS (2.51), encompassing both uncomplicated and higher-complexity deliveries, and reflecting various clinical challenges. We observed regional variations in clinical practices and resource needs, emphasizing the need for adequate resources and obstetric care planning.

Keywords: cesarean section, pregnancy, diagnosis-related groups, health resources



FACING THE BASIC ROLE - THE WAY TO YOURSELF

Ivajlo Ilijev ¹

¹ Anima Plus Polyclinic, Niš, Serbia

Abstract

During early childhood, the so-called basic roles that we carry and build upon throughout our lives are "delegated". They are installed by our closest, primarily primary objects (parents) in two ways: by direct individual relations towards us or by introjection of themselves and their mutual and external relations. At the same time, in the later stages, the environment complements and enriches the contents of the basic roles.

Over time and through growing up, we anchor ourselves in the roles with which we merge and choose, through a series of maneuvers, precisely the environments, circumstances, choices of friends, partners, positions that serve to nourish and superstructure deeply installed basic roles. Those roles can be of a wide spectrum - from loser, neglected, victim, protective object, despot, dictator, frozen infante...

In a large number of cases, that role is also the revitalization of those aspects of parents, which we consciously or unconsciously despised, and that is exactly the most incriminated light motives. Therefore, the deep unconscious rooting for the contents of the basic roles is stronger than the conscious constructive intentions, because the majority of the population has no knowledge of the etiology of either the basic conflict or the basic role.

The search for personality more often goes in the direction of overcompensation through Jung's "personas" (emotional and social masks, which protect us from internal and external noxes), but actually recognizing the content, deciphering, demystifying and relaxing the religious roles while releasing anger and resentment, which arise due to being stuck and imprinted in them, enable a fundamental change in the course of things. It is also a path of repositioning, getting out of neurosis, but also out of danger zones, bad positioning (somatic diseases, interpersonal conflicts, emotional and social stuckness).

Modern psychotherapy, by confronting unconscious mechanisms, has the ability to encourage and bring to constructive heights the transformation of the frozen roles of girls and boys, despite all internal resistance to constructive mature personalities, individualized and amplified to the level that they look at their frustrations, conflicts and unresolved issues from childhood, affectively and cognitively directly, relaxed and non-neurotic.

Keywords: basic role, revitalization



MOTIVATION OF EMPLOYEES AND BEHAVIOUR MODIFICATION IN HEALTH CARE ORGANISATIONS

Snežana Miljković^{1,2}

¹ Faculty of Medicine, University of Niš, Niš, Serbia

² University Clinical Center Niš, Niš, Serbia

Abstract

All health care organisations deal with proposed actions for achievement of the goals with the best use of human resources. In that respect, close attention must be paid to motivation of individuals by means of initiative, rewards, leadership, and organisational context within which the work is being organised. The goal is to develop organisational processes and workplace environment that will help them to show the expected results. Motivation is process of initiation an activity aimed to achieving specific goals. Employees who do not have clear aims work slowly, execute given tasks poorly, show lack of interest and complete fewer tasks than the employees who have clear and challenging goals. Employees with clearly defined goals are energetic and more productive. Behaviour modification includes use of four means to achieve this aim, known as “intervention strategies”. These strategies are: positive incentive, negative incentive, punishment and lack of reaction.

Keywords: health care organisation, management, motivation, intervention strategies



USER SATISFACTION WITH HOSPITAL HEALTH CARE IN 2024 – REVIEW OF KEY RESULTS

Olivera Ninković¹, Mirjana Živković Šulović¹, Danijela Dukić¹, Dragica Bukumirić¹, Miljan Ljubičić¹, Petar Đurić¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanovic Batut", Belgrade, Serbia

Abstract

Introduction: Examining user satisfaction provides important insights into patients' experiences during treatment and care.

Objective: To determine the level of user satisfaction with hospital health care in 2024.

Methods: The study was conducted at the end of 2024 at 99 institutions of secondary and tertiary health care in the Republic of Serbia, across internal medicine, surgical, gynecological-obstetric, psychiatric, pediatric, and physical medicine and rehabilitation departments. A standardized questionnaire developed by the Institute "Dr Milan Jovanović Batut" was used, covering three groups of questions: services and organization of health care, work of nurses, and work of doctors. Responses were rated on a scale from 1 (very poor) to 5 (excellent).

Results: A total of 11,509 patients from 99 institutions of secondary and tertiary health care participated with a mean age of 54.1 years; 57.4% were women. The highest ratings were given to the organization and speed of diagnostic and therapeutic services, discharge information (4.7), work of doctors (4.7), and work of nurses (4.8). Overall satisfaction was rated excellent by 68.0% of respondents, good by 25.4%, average by 5.5%, and poor or very poor by 1.1%.

Conclusion: Users are highly satisfied with all aspects of provided hospital health care, with minimal variations between departments, and slightly higher average ratings compared to the previous year.

Keywords: patient satisfaction, health services research, quality of health care



HUMAN RESOURCE IMBALANCE IN THE HEALTHCARE SYSTEM OF TUZLA CANTON – BETWEEN STANDARDS AND REALITY

Tatjana Krdžalić¹, Sandra Osmanbegović¹, Majda Sarihodžić¹

¹ Institute of Public Health of Tuzla Canton, Tuzla, Bosnia and Hercegovina

Abstract

Objective: To present the status of human resources in the public health sector of Tuzla Canton for the year 2024, with a focus on compliance with current standards and regulations.

Materials and Methods: For the purposes of this study, data were drawn from the Healthcare Protection Program and evaluation report templates on workforce engagement in the public health sector. The analysis also included reports from professional oversight of healthcare institutions, aiming to assess the alignment of staffing capacities with applicable standards. Descriptive statistics were applied, and the results were compared with actual field conditions. The study encompassed thirteen health centers, one general hospital, and one clinical center.

Results: In 2024, a deficit of 45 family medicine teams was identified according to the official program. By engaging 87 medical doctors without specialization or PAT education, a staffing surplus of 46 teams was recorded. In the field of community nursing, a shortage of 158 nurses was observed, caused by suboptimal distribution of human resources.

Conclusion: Human resource management in the healthcare system of Tuzla Canton is burdened by political influence and legal misalignment. A revision of standards and regulations is recommended, along with harmonization of legislation with modern treatment practices and population needs, sustainable system financing, and reduced political influence on human resource management.

Keywords: healthcare workforce, staff deficit, standards and normatives



FACING DEMOGRAPHIC TRENDS IN THE REPUBLIC OF SRPSKA - PUBLIC HEALTH CHALLENGE AND RESPONSE

Dijana Strkić¹

¹ Public Health Institute of the Republic of Srpska, Banjaluka, Republic of Srpska

Abstract

Objectives: Along with technological development, ageing is the greatest achievement of the 21st century. On the other hand, population ageing imposed a new public health challenge for the whole society. The aim of this work is to get a glimpse of the situation with reference to strategic response.

Materials and methods: The source of demographic and vital data is Institute of Statistics.

Results: The Republic of Srpska has been facing rapid population ageing. According to current estimates, population is very old, with 22.04% of elderly and median age 43.9 years. Life expectancy at birth is 78.85 years. These trends with broad public health implications were recognized a few years ago. Therefore, The Ministry of Health and Social Welfare developed the Strategy for Improving the Position of the Elderly in the Republic of Srpska 2019 - 2028. The vision of the Strategy is a sustainable system of integrated services that support healthy and active ageing with primary goal to improve the quality of life of elderly.

Conclusion: Caring for the elderly, their health and well-being, speaks for the whole society. The increase in life expectancy should be accompanied by the quality of life.

Keywords: ageing, population, public health, elderly, strategy



DEMOGRAPHIC ALARM: BIRTH RATE IN CRISIS

Sandra Osmanbegović¹, Tatjana Krdžalić¹

¹ Institute of Public Health of Tuzla Canton, Tuzla, Bosnia and Herzegovina

Abstract

Objective: To analyze birth rate trends in the Tuzla Canton during the period from 2020 to 2024.

Materials and Methods: A retrospective-descriptive analysis was conducted using data from legally mandated individual reporting forms titled “Birth Notification,” submitted to the Institute of Public Health by public and private healthcare institutions with maternity wards. Demographic projections were based on data provided by the Federal Institute of Statistics.

Results: Tuzla Canton, the most populous canton in the Federation of Bosnia and Herzegovina, is facing significant demographic changes. During the analyzed period, the average number of live births was approximately 3,000 per year. A decline of 9.35% in the number of live births was recorded. The lowest birth rate was observed in 2024, at 6.8 per 1,000 inhabitants.

Conclusion: Birth rate is a vital demographic indicator that directly influences the structure and dynamics of a society, with implications for key sectors such as the economy, healthcare, and education. The recorded birth rates are statistically considered extremely low and unfavorable, indicating a trend of depopulation. A comprehensive strategy for demographic revitalization is urgently needed to mitigate negative demographic trends and achieve long-term demographic stability.

Keywords: birth rate, depopulation



THE POTENTIAL SIGNIFICANCE OF ELECTRO-ACUPRESSURE IN THE SECONDARY PREVENTION OF ACCIDENTALLY DETECTED ARRHYTHMIAS IN A PRIVATE MEDICAL PRACTICE: A CASE REPORT

Goran Golubović ¹, Slovenka Savić ²

¹ Academy of Educational and Medical Studies Kruševac, Čuprija, Serbia

² Higher School of Professional Studies Medika, Belgrade, Serbia

Abstract

In the paper, the authors, through a case report, highlight the importance of electro-acupressure in the treatment of an accidentally diagnosed serious rhythm disorder, with the simultaneous application of conventional medication and phytotherapy. In this way, they affirm the integration of school and traditional medicine, especially in conditions when conventional health care is more difficult to access due to subjective or objective circumstances. The importance of propaedeutic knowledge, necessary for all healthcare workers, and the availability of portable EKG devices in all medical and dental offices, as well as simple devices for electromagnetic acupressure, which can be useful to any doctor, regardless of narrow professional orientation, are emphasized.

Keywords: electro-acupressure, accidentally detected arrhythmias, prevention



RELIGIOUS MATURITY AS A PROTECTIVE FACTOR AND POSITIVE PREDICTOR IN MALIGNANT DISEASES

Slovenka Savić¹, Goran Golubović²

¹ Higher School of Professional Studies Medika, Belgrade, Serbia

² Academy of Educational and Medical Studies Kruševac, Čuprija, Serbia

Abstract

In an effort to investigate the connection between the psyche and cancer, the authors of this paper wanted to answer the question of whether religious maturity can positively influence the outcome of malignant disease, specifically breast cancer. The study was conducted on 60 women, 30 of whom had been treated for breast cancer and had been in clinical remission for five or more years (some had been in complete clinical remission for decades), while the other 30 women were cancer-free. These two groups of women were matched in terms of sociodemographic variables and age (35 to 80). All of them lived in Timočka Krajina, and the women in the main group (patients in remission) were registered at the Oncology Institute in Kladovo, as well as in the oncology departments of the General Hospitals in Bor and Zaječar. The research is field-based and was conducted between May and November 2016. The following instruments were used: the standardized Religious Maturity Scale (MRS) and the Occasional Scale for Assessing Sociodemographic Data. The initial assumption that patients treated for breast cancer in prolonged clinical remission have a higher level of religious maturity than conditionally healthy women (without malignant disease) has proven to be correct. For this reason, this research confirms the importance of a general psychological-supportive approach to this category of patients. In oncology patients, religious maturity should be strengthened through psychotherapy procedures, and before serious illnesses occur, it should be encouraged in the general population as a non-specific preventive (protective) factor.

Keywords: religious maturity, psycho-oncology, primary and secondary prevention



THE INFLUENCE OF PSYCHOSOCIAL FACTORS OF PATIENTS IN AESTHETIC SURGERY

Bojan Ćirić¹

¹ Clinic of Plastic and Reconstructive Surgery Dr Bojan Ćirić, Belgrade, Serbia

Abstract

A detailed review of available research (PubMed, Scopus, Google Scholar) on psychosocial factors associated with aesthetic surgery has shown that patients who undergo procedures such as breast augmentation, facelift and rhinoplasty have expressed affections that can be characterized as a certain degree of borderline dependence. Depression and anxiety in particular can occur after these procedures. Patient history (anamnesis) is an important factor to consider when evaluating candidates for surgery. Pre-existing mood disorders are more common in people undergoing aesthetic procedures and may predispose such people to worsening mood symptoms after surgery. This review paper aims to provide doctors with a better understanding of the common psychosocial factors seen in the field of aesthetic surgery, so that patients can be better supported during all parts of the surgical process.

Keywords: psychosocial factors, aesthetic surgery



PUBLIC MENTAL HEALTH IMPORTANCE OF ORTHODONTIC TREATMENT IN GROWING INDIVIDUALS

Milena Zajić¹

¹ Health Center of Aleksandrovac, Aleksandrovac, Serbia

Abstract

Objective: For public health purposes, an assessment of dental malocclusion of the follow-up population is necessary, which would include etiological factors, as well as the treatment regimen and social factors associated with it.

Methods: Eleven manuscripts were selected for this quantitative synthesis. Two interventions were analyzed: Rapid Maxillary Expansion (RME), and Mandibular Advancement (MAA). Clear reporting of previous examination and transparent criteria concerning inclusion/exclusion of data extract were recognized. A comprehensive analysis of this problem was done in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol.

Results: It has been shown that early screenings and accompanying interventions have a significantly better impact on the development of a person, especially in terms of reducing the symptoms of mental disorders. Rapid Maxillary Expansion (RME) showed significant improvement of all analyzed parameters within 2 years from the beginning of the therapy. Mandibular Advancement (MAA) provided positive effects after 12 months of therapy. Certainly, in terms of the examined papers on this topic, orthodontic treatments showed favorable effects on mental health status.

Conclusion: Nowadays, orthodontic treatment is very common in preschool children, as well as in adolescents. Patients with mental health disorders should perform regular consultation with an orthodontic specialist.

Keywords: mental health, orthodontic treatment, rapid maxillary expansion, mandibular advancement



SESSION: NEW CHALLENGES IN SOCIAL MEDICINE

POSTER PRESENTATIONS

SPECIAL EXAMINATION OF PRE-OBESE AND OBESE CHILDREN IN THE PRIMARY HEALTH CARE OF PRESCHOOL AND SCHOOL CHILDREN IN 2024.

Danijela Dukić¹, Aleksandra Jelić¹, Ivona Katrina¹, Petar Đurić¹

¹ Center for Analysis, Planning, and Organization of Health Care, Institute of Public Health of Serbia, Belgrade, Serbia

Abstract

Objectives: Excessive nutrition and obesity in the population of children and adolescents represent a condition of exceptional public health and clinical importance. This condition is considered a risk factor for various associated diseases. This article aims to investigate and compare differences in the number of special examinations of obese and pre-obese children (SE) at the primary healthcare centers (PHC) in Serbia.

Methods: We collected reports from a regional Public Health Institutes Network (PHIN) about the performance of pediatricians, including SEs of obese and pre-obese pre-school and school-aged children in the PHC in the 2022-2024 period.

Results: Out of a thousand preschool children, on average, seven of them performed SEs in the 2022-2024 period. Among the school-aged population, we observed overall SE rates of nine, 18, and 17 SEs per 1,000 schoolchildren in the same period, respectively. Additionally, in both groups, we identified regional and district-level variations in the SE rate.

Conclusions: We observed a higher SE coverage among school-aged children in Serbia. This could be explained by specific biological changes during adolescence that favor weight gain in this particular group. This suggests a need for intensive primary and secondary prevention of obesity among children within the PHCs and PHIN.

Keywords: nutrition, basic health care services, health needs



PROGRESS IN INDICATORS OF CHILD POVERTY AND SOCIAL EXCLUSION IN BALKAN COUNTRIES

Milos Stepović¹, Jovana Radovanović², Viktor Selaković³, Olgica Mihaljević⁴, Nevena Folić⁵, Snežana Ćorović⁶, Katarina Janićijević⁷, Slavica Djordjević⁸

¹ Department of Anatomy, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

² Department of Epidemiology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

³ Department of Communication Skills, Ethics, and Psychology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁴ Department of Pathophysiology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁵ Department of Pediatrics, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁶ Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁷ Department of Social Medicine, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁸ Department of the High School of Health, Academy of Applied Studies Belgrade, Belgrade, Serbia

Abstract

Objectives: Child poverty and social exclusion remain pressing challenges in Balkan countries, driven by economic instability, high unemployment, weak social protection, and regional and ethnic disparities. This study examines changes in child poverty and social exclusion indicators across Balkan countries from 2014 to 2023.

Materials and methods: This is an epidemiological study based on data taken from publicly available data set from Eurostat. The data was analyzed using descriptive statistics, and linear regression to assess the type of progress during the observed period. Analyses were conducted using the IBM SPSS software package Version 26.0.

Results: Except for Albania, which showed stagnation, all other countries recorded a declining trend. Romania achieved the largest reduction in the at-risk-of-poverty rate for children under 18 (1.3 times lower; $y = -1.2727x + 39.6$; $R^2 = 0.8617$). Croatia had the largest drop in children living in households with very low work intensity (2.9 times; $y = -0.9967x + 13.039$; $R^2 = 0.9412$), while Greece led in reducing severe material and social deprivation (1.5 times; $y = -1.26x + 25.878$; $R^2 = 0.9093$).

Conclusion: From 2014 to 2023, most Balkan countries significantly reduced child poverty and social exclusion, highlighting the importance of tracking trends to identify needs, evaluate policies, allocate resources effectively, and ensure timely action to improve children's well-being.

Key words: poverty, social exclusion, children, Balkan countries



DIGITALIZATION AND HEALTH EQUITY: NEW CHALLENGES IN HEALTHCARE ACCESSIBILITY

Tamara Jovanović^{1,2}, Aleksandar Višnjić^{1,2}, Roberta Marković^{1,2}, Jovana Milošević³

¹ Faculty of Medicine, University of Niš, Niš, Serbia

² Public Health Institute of Niš, Niš, Serbia

³ Department of Preventive Medicine, Faculty of Medicine, University of Priština – Kosovska Mitrovica, Kosovska Mitrovica, Serbia

Abstract

Objective: Digital health technologies offer significant opportunities to expand access to healthcare services. Yet, growing evidence shows that these innovations may also reinforce or even exacerbate existing inequities.

Material and method: This paper presents a narrative review of the literature searched in the PubMed and Google Scholar databases on the topic of digital health technologies and their accessibility. The selected papers were analyzed thematically, with the aim of identifying the main trends, challenges and recommendations in this field.

Results: Unequal access to devices, reliable broadband, and electricity creates a digital divide. In many countries, rural and low-income groups have significantly less access to digital health resources.

Older adults, women, and rural residents are relying more on telephone consultations instead of video-based services. Younger, wealthier, and more educated populations disproportionately benefit from digital health interventions. Urban areas adopt telehealth more quickly than rural regions, as shown in both the U.S. and Japan. Limited infrastructure and regulatory frameworks contribute to these divides. Artificial intelligence systems risk perpetuating existing inequities if trained on biased datasets. Marginalized groups may be underdiagnosed or excluded from benefits of AI-driven care.

Conclusion: Globally and in Serbia, digitalization demonstrates a double-edged effect: it can reduce inequalities by expanding access to telemedicine and e-health, yet it may reinforce disparities if digital divides persist. Success will depend on addressing infrastructure and literacy barriers.

Keywords: digitalization, health equity, healthcare accessibility, public health



DIGITAL HEALTH AND TELEMEDICINE AS A NEW DIMENSION OF SOCIAL MEDICINE

Aleksandra Mačkaški ¹, Aleksandar Višnjić ^{2,3}, Roberta Marković ^{2,3}, Tamara Jovanović ^{2,3}

¹ Zaječar Health Center, Zaječar, Serbia

² Faculty of Medicine, University of Niš, Niš, Serbia

³ Public Health Institute of Niš, Niš, Serbia

Abstract

Objective: To analyze the potential and challenges of digital health and telemedicine in improving social medicine and public health, with a particular focus on accessibility, equity, and equality in healthcare, as well as on prevention, treatment, and control of certain diseases.

Materials and Methods: A literature review was conducted using PubMed, including original articles, review papers, WHO reports, and publications of the European Observatory on Health Systems and Policies, published between 2010 and 2024. The keywords used were: telemedicine, social medicine, public health.

Results: The digitalization of healthcare has brought significant changes in the way health services are delivered, while telemedicine has proven to be particularly useful in the prevention of chronic non-communicable diseases such as diabetes, cardiovascular and oncological diseases, as well as in patients with mental health disorders, by ensuring adequate disease control, reducing hospitalizations, comorbidities, mortality, and providing psychological support. In rural areas, telemedicine has enabled easier access to healthcare services. During the COVID-19 pandemic, telemedicine ensured continuity of therapy, disease monitoring, and reduced the risk of infection. In EU countries, telemedicine is legally regulated, financially supported, and widely implemented in primary and secondary healthcare, while in Serbia it is still in the pilot phase and partially applied, with limited regulation and infrastructure. Challenges include limited digital literacy, unequal infrastructure, and concerns regarding data privacy and security.

Conclusion: Digital health and telemedicine represent a new dimension of social medicine by improving accessibility, equity, and equality, as well as influencing disease prevention and, consequently, reducing healthcare system costs.

Keywords: telemedicine, digital health, social medicine, public health



SESSION: PREVENTIVE PROGRAMS - FROM IDEA TO MESURABLE BENEFITS

INVITED LECTURES

PREVENTION AND EARLY DIAGNOSIS OF HEARING LOSS

Mila Bojanović^{1,2}, Emilija Živković Marinkov^{1,2}, Roberta Marković^{2,3}, Mihajlo Bojanović⁴
Natalija Milisavljević¹

¹ ENT Clinic University Clinical Center Niš

² Medical Faculty of Niš

³ Institute for Public Health Niš

⁴ Clinic for Cardiology University Clinical Center Niš

Introduction:

Newborn hearing screening, as a first-line in early diagnostic procedures is a constantly evolving field, with new technologies and guidelines emerging to improve the accuracy and efficiency of early hearing loss detection. (1,2,3,4) Here are some of the key innovations and trends:

1. Advanced Screening Technologies

While the core screening methods (OAE and AABR) remain the standard, the technology behind them is becoming more sophisticated.

- **Faster and More Reliable Devices:** Newer screening devices are designed to be faster, more portable, and less susceptible to environmental noise. This is crucial for a hospital setting, where a quiet room isn't always available. Devices are also being developed that can test both ears simultaneously, reducing the overall test time.
- **Combined OAE and AABR Systems:** Some manufacturers are now offering integrated devices that can perform both OAE and AABR tests within a single unit. This allows for a more comprehensive initial screening and can reduce the number of false-positive results that require a second test.
- **Improved Signal Processing:** Advanced algorithms and signal processing techniques are being used to improve the quality of the AABR test. For example, some systems use a unique stimulus (like the "CE-Chirp") that can elicit a stronger and more synchronized neural response, leading to faster and more accurate results.

2. Genetic Screening and Personalized Medicine

A significant portion of congenital hearing loss has a genetic cause, and this is an area of growing focus.(1,3)



- **Routine Genetic Screening:** Some healthcare systems are beginning to incorporate genetic screening, particularly for the **GJB2 gene**, as a part of the standard newborn hearing screening. This is the most common gene associated with non-syndromic hearing loss.
- **Enhanced Diagnosis:** Identifying a genetic cause early on can provide valuable information for parents and healthcare providers. It can help explain why the hearing loss occurred, inform family planning decisions, and sometimes even guide treatment options, particularly as gene therapy for certain types of hearing loss is an active area of research.

3. Integrated Data and Telemedicine

Managing the vast amount of data from newborn screenings and ensuring timely follow-up is a critical part of a successful program.(4)

- **Automated Data Management:** New software platforms are being developed to automate the recording and tracking of screening results. This helps to ensure that no baby who requires a follow-up test is missed.
- **Telehealth for Follow-up:** Telemedicine is increasingly being used to facilitate follow-up appointments, especially for families in rural or remote areas. Specialists can analyze a baby's audiological data remotely and provide guidance to local healthcare providers, improving access to care and reducing barriers for families.

4. Updated Guidelines and Protocols

Medical and audiology organizations are regularly updating their guidelines to reflect the latest evidence and technology.(4)

- **Targeted AABR for High-Risk Infants:** The **Joint Committee on Infant Hearing (JCIH)** and other professional bodies are recommending that infants with specific risk factors (e.g., NICU stay, low birth weight, certain infections) should have an AABR screening, even if their initial OAE test is normal. This is because AABR is more effective at detecting certain types of hearing loss that may not be picked up by OAE alone.(4)
- **Emphasis on the "1-3-6" Benchmarks:** The importance of the "1-3-6" benchmarks (screening by 1 month of age, diagnosis by 3 months, and intervention by 6 months) is being continually reinforced. Efforts are being made to streamline the entire process to ensure that these critical timelines are met, as early intervention is key to a child's successful development.(1,2,3,4)

These innovations show a clear trend towards more comprehensive, integrated, and personalized approaches to newborn hearing screening, with the ultimate goal of improving outcomes for all infants with hearing loss.

Universal neonatal hearing screening (UNHS) does not prevent hearing loss itself, but it has a profound **preventive impact on the negative developmental consequences of hearing loss**. By identifying hearing loss in newborns and facilitating early intervention, UNHS programs prevent delays in a child's speech, language, cognitive, and social development.



Here's a breakdown of the preventive impact of UNHS:

1. Early Detection and Timely Intervention

- **Breaking the Cycle:** The primary goal of UNHS is to identify hearing loss as early as possible. Traditional methods of detecting hearing loss, which relied on parental observation of a child's lack of response to sound, often led to diagnoses around 2-3 years of age or even later. By that time, the child would have already missed out on a critical period for language and speech development. (1,2,4)
- **Brain Plasticity:** The first few years of life are a sensitive period for brain development, particularly for language acquisition. Early identification of hearing loss through UNHS allows for interventions to begin by six months of age. This aligns with the brain's peak receptivity to auditory and linguistic input, maximizing a child's potential to develop communication skills.(2,4)
- **Technological Tools:** UNHS uses objective, non-invasive screening methods like otoacoustic emissions (OAE) and automated auditory brainstem response (AABR) testing to quickly and accurately screen a newborn's hearing, regardless of their behavior or cooperation.(4)

2. Preventing Developmental Delays

- **Language and Speech:** The most significant preventive impact of UNHS is on language and speech development. Research consistently shows that children with hearing loss who receive intervention by six months of age often achieve language and speech skills comparable to their hearing peers. Without this early intervention, children with undiagnosed hearing loss can experience severe and lasting delays in these areas.(1)
- **Cognitive and Educational Outcomes:** Language is a prerequisite for cognitive development. By preventing language delays, UNHS also helps to prevent or mitigate delays in cognitive abilities. Studies have found that early identification and intervention are associated with better long-term literacy and academic outcomes, including improved reading comprehension in the teenage years.
- **Social and Emotional Development:** Undiagnosed hearing loss can lead to social isolation and emotional challenges. A child who cannot communicate effectively may struggle to form relationships and interact with peers. By enabling a child to communicate, UNHS helps them integrate socially and fosters their emotional well-being.(4)

3. Empowerment of Families

- **Informed Decisions:** UNHS empowers families to make informed decisions about their child's care and future. When a hearing loss is identified early, parents can work with audiologists and other specialists to choose the best intervention path, which may include hearing aids, cochlear implants, or a focus on sign language or other communication methods.(4)
- **Access to Support Systems:** Early detection connects families with the support systems they need, such as early intervention programs, speech-language pathologists, and support groups. This network helps families navigate the



challenges of raising a child with hearing loss and provides them with the resources to help their child thrive.(1,2,3)

In summary, while UNHS does not physically prevent the hearing loss from occurring, it is a crucial public health measure that prevents the devastating developmental cascade that can result from late diagnosis. By ensuring timely intervention, it gives children with hearing loss the opportunity to develop communication skills and reach their full cognitive and social potential, thereby preventing the long-term negative consequences of the condition.

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PUBLIC HEALTH EMERGENCY PREPAREDNESS AND RESPONSE PLANNING - APPROACHES AND CHALLENGES

Miljan Rančić¹

¹ Belgrade Office of World Health Organization, Belgrade, Serbia

1. Introduction

"Time spent in contingency planning equals time saved when a disaster occurs."

(Contingency planning guide. Geneva: International Federation of Red Cross and Red Crescent Societies, IFRC, 2012.)

In modern times, a wide range of both natural and man-made emergencies and disasters are threatening public health. Every year, over 170 million people will be affected by conflict, and another 190 million by disasters; yet the full impact on people's health is far greater than this (1). It is impossible to absolutely prevent the occurrence of emergencies, and that is why society, at all levels – from local through national to international – must be prepared and ready to effectively respond to all kinds of emergencies. When we are prepared, responses are more timely and effective, and we can limit the human, economic and societal consequences (2). The devastation caused by the pandemic of COVID-19 has brought urgency to efforts to strengthen the way countries and the world prevent, prepare for, detect and respond to health emergencies.

1.1 Definition of Public Health Emergency Preparedness and Response

Emergency preparedness is defined as: ...the knowledge and capacities and organizational systems developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent, emerging, or current emergencies (3).

2. Aim

This article aims to provide a brief overview and insight into the currently existing dominant approaches to public health emergency preparedness and response planning.

3. Methodology

The methodology applied in this article is mainly a literature review, with a theoretical synthesis.

4. International Framework

4.1 Importance of emergency preparedness in public health and its relevance to global health security

Good Health and Wellbeing is UN Sustainable Development Goal 3, while its Target 3.d. is Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks, and its Indicator 3.d.1 is International Health Regulations (IHR) capacity and health emergency preparedness (4).



4.2 Global legal framework – International Health Regulations (IHR) and Pandemic Agreement

There have been only three global legally binding documents in the area of health and two of them are related to health security, or to countries' preparedness for health emergencies and their containment. Those two are the International Health Regulations (IHR) (2005) (5) and the newly adopted WHO Pandemic Agreement (adopted on 20 May 2025, at the 78th World Health Assembly) (6).

The IHR (5) is older and more comprehensive, defining the countries' obligation to constantly strengthen their capacities to prevent, early detect, properly prepare for and rapidly respond to all kinds of health threats and emergencies (all-hazard and one-health approaches implemented) – and in particular, to their international spread. During the response to COVID-19, upon the initiative launched by several WHO member states, the IHR amendment process started and it was completed in 2024, by the adoption of several IHR amendments, at the 77th World Health Assembly. These amendments are coming into force in September 2025, and are aimed at enhancing the global legal framework for health emergency response. They introduce a new subcategory of "pandemic emergency," a greater focus on financial and technical support for developing countries, and a stronger emphasis on equitable access to health products. They also allow for broader scope of health emergencies (not only spread of infectious diseases), reinforced and strengthened WHO role and mandate in coordinating health emergency response globally, increased accountability and transparency of both member states and the WHO, mandatory reporting requirements for members states, increased responsibility for health emergencies preparedness, research and development commitments (to speed up development of most needed vaccines, medicines and other health emergency countermeasures).

WHO Pandemic Agreement presents the international instrument aimed at strengthening global preparedness, prevention, and response to future pandemics, addressing the broader systemic gaps, including those in equity, solidarity and access to health products, which arose during the response to COVID-19 pandemic. This document respects the sovereignty of states, human rights, inclusivity, transparency, and accountability. WHO is a custodian of both of these documents.

5. Public Health Emergency Management Methodology

Health Emergency and Disaster Risk Management (HEDRM) is derived from the disciplines of risk management, emergency management, epidemic preparedness and response, and health systems strengthening (7).

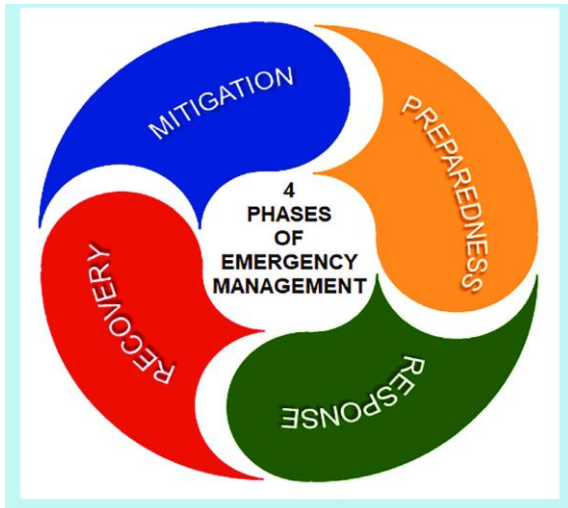


Diagram 1: FEMA's four phases of emergency management (Adams H et al. Emergency Preparedness; 2021) (8)

It is fully consistent with and helps to align policies and actions for health security, disaster risk reduction, humanitarian action, climate change and sustainable development (1). Effective implementation of HEDRM is therefore critical to achieve universal health coverage (UHC) in all country contexts.

5.1. WHO and health emergency management

WHO established its Health Emergencies Programme (WHE) on July 1, 2016, following a decision by the World Health Assembly (9). Since the WHE was established, one of its primary functions was to produce guiding documents, norms and standards in the area of health emergency management, to fulfill one of WHO's original core function – a normative one. In exerting this function, WHE has been leveraging on member states' capacity, knowledge and experience, but in particular on its collaborative centers and centers of excellence around the world, In 2019 WHO developed HEDRM Framework as a comprehensive approach aimed at strengthening the management of health emergencies and health risks associated with other emergencies and disasters (1). In public health emergency management, all-hazards, whole-of-government, whole-of-society, dual-track (responding to health emergency while maintaining to the maximum possible extent the health system's service delivery) and One Health approaches are largely promoted and advocated for.

5.2 WHO's competencies in health emergency management

WHO sets norms and standards and national health agencies, including the most prominent ones (such as ECDC, US CDC, *Роспотребнадзор*, etc.), follow and adjust them, based on their specific contexts. Actually, there is a two-way collaboration and mutual influence. Given the WHO's high participativeness and its true member states-driven way of functioning, all member states contribute to shaping these evidence- and science-based norms and standards in all areas, including health emergency preparedness. WHO strategic and policy documents are being adopted at the annual World Health Assembly, by the vote of all member states.

Relevance of WHO policies and methodological approaches in the area of public health emergency management also comes from its close collaboration and knowledge exchange with other UN agencies and bodies that are specialized in setting standards and directly dealing with disasters, humanitarian and other crises and emergencies (United

Nations Office for the Coordination of Humanitarian Affairs – OCHA, United Nations Disaster Assessment and Coordination – UNDAC, United Nations Office for Disaster Risk Reduction – UNDRR, United Nations High Commissioner for Refugees – UNHCR, UN Inter-Agency Standing Committee – IASC, etc.).

5.3 IHR and public health emergency preparedness cycle

IHR's strategic approach and perspective on the emergency preparedness cycle are shown in Diagram 2.



Diagram 2: IHR perspective on the health emergency preparedness cycle (Watson KE et al. Pharmacy Practice and Emergency Preparedness, Resilience, and Response; 2023) (10)

5.4 WHO's public health emergency management cycle

When it comes to the operational public health emergency management cycle promoted by WHO in its policies and publications, it generally contains the above-mentioned universal elements, although it is pretty inconsistent, varying slightly across different publications over time.

So, applying the integrative approach and theoretical synthesis and systematization, the following proposed public health emergency management cycle contains all of the elements listed in various WHO publications over the past several years.



Diagram 3: WHO's health emergency management cycle, synthesized using diverse WHO sources

Between and along with the main elements and phases of the health emergency management cycle, there are several complementary segments, such as contingency and business continuity planning, after- and intra-action reviews, maintenance and revision of plans. Elaborating health emergency recovery phase is considered the least important for this overview, as it is not seen as the preparedness and response planning. All of these elements are supported by the WHO's own tools for each of them.

5.4.1 WHO's All-hazards health emergency risk assessment

Risk assessment is the very first step in the entire health emergency management. It informs the next step – preparedness and response planning, providing the focus of the planning primarily on the dominant risks, and addressing the main identified vulnerabilities and gaps in the existing response capacities.

In 2021, WHO launched the 3rd edition of the Strategic Toolkit for Assessing Risks (11). This is a comprehensive toolkit for all-hazards health emergency risk assessment. It is a digital application in the form of an Excel file that automatically calculates and determines the health emergency risk level of different types of hazards in a certain territory, based on the input entered, as per the defined elements and structure. Through the implementation of the Tool, public health emergency risks coming from different hazards are identified, quantified and prioritized, taking into account the type and severity of expected health consequences (it provides algorithms for assessment of the level of consequences severity), exposed population, seasonality and likelihood of the hazard, vulnerabilities, and available capacities for coping with the hazard, and level of confidence in the datasets used for the assessments.



Risk Assessment		South Sudan										date of Assessment 4-5 July 2017										
#	hazard	Hazard and Exposure			Likelihood												Severity and Coping Capacity			Impact	Risk level	
		with Consequer	Scale	Exposure	Freque	J	F	M	A	M	J	J	A	S	O	N	D	Likelihood	Severity			Vulnerability
1	Floods	Displacements	1000 to 20,000 would be the normal scenario, this occurs in former Jonglei, Unity and Upper Nile. Both Urban and rural Popo affected.	Unity Upper Nile Jonglei NBEG Abeyi, est pop 500K - 1 million.	Recurrent					x	x	x	x	x	x	x	Likely	Low severity	High	Partial	Moderate	Moderate
2	Floods	Malaria	Anything more that 50% of the flood affected population. Doubling of proportionate morbidity from the past three weeks	Unity Upper Nile Jonglei NBEG Abeyi under 5 YO and	Perennial					x	x	x	x	x			Very likely	High severity	Partial	High	Moderate	High
3	Floods	AWD/Waterborne Diseases	cholera attack rate >5-8% camp setting, non-camp setting >0.2-3% 20-30 cases/10000	unity upper Nile Jonglei NBEG Abeyi, under 5	Perennial					x	x	x	x				Very likely	Very high severity	High	High	Severe	High
4	Floods	Pneumonia	children under 5, proportionate morbidity > 50%.	Unity, Upper Nile, Jonglei, Abeyi, under 5	Perennial					x	x	x	x				Likely	Moderate severity	High	High	Moderate	Moderate
5	Floods/Droughts/Armed conflict	Disruption of Health services - maternal deaths	50% health services not functional.	Unity Upper Nile NBEG Jonglei, Abeyi,	Perennial	x	x	x	x	x	x	x	x	x	x	x	Very likely	Low severity	Very high	Low	Severe	High
6	Floods/Droughts/Armed conflict (Financial crisis)	Damage to crops/livelihoods/ restricted access	QAM - 15% children under 5; MAM - 20% children US;	Unity, Upper Nile, greater Equatoria, US,	Perennial	x	x	x	x	x	x	x	x	x	x	x	Very likely	Moderate severity	High	High	Moderate	High
7	Storms	Injuries	10-100 injured in any 1 event. Likely fractures, internal injuries, schools barracks settings	storms can occur over the country, all population at	Random	x	x	x	x	x	x	x	x	x	x	x	Unlikely	Low severity	Low	Low	Moderate	Low

Picture 1: Strategic Toolkit for Assessing Risks – STAR Tool
(Strategic toolkit for assessing risks: a comprehensive toolkit for all-hazards health emergency risk assessment. Geneva: World Health Organization; 2021) (11)

5.4.2 Health emergencies’ risks prevention and mitigation

Emergency health risks prevention entails stopping hazards from becoming emergencies. Typical examples of health emergency prevention are the implementation of widespread vaccination programs/campaigns to prevent disease outbreaks, sanitation and provision of safe drinking water and water for maintaining personal and other forms of hygiene. On the other hand, risk mitigation aims to reduce the impact of an emergency that is expected to occur or is unavoidable. Apart from the most common definition of risk as a result of the assessed/expected severity and likelihood of the potentially disastrous event, there is also the one saying that the risk is directly proportional to the intensity of hazard and level of vulnerability, and inversely proportional to the existing coping capacities.

The latter implies that the risk can be reduced (**mitigated**) either by deluting hazard and/or reducing vulnerability, or improving/strengthening coping capacities (1,12-14). In this regard, an efficient public health emergency risks’ mitigation measures can be strengthening surveillance and monitoring – an early warning system, community engagement and education on public health emergencies, developing health emergency preparedness plans and conducting simulation exercises, stockpiling essential supplies, establishing and maintaining multisectoral and international cooperation and collaboration in the area of public health emergency prevention, mitigation, preparedness and response, etc.

5.4.3 Health emergency preparedness planning

It is strongly recommended for countries to develop, adopt and implement three- or five-year National Action Plan for Health Security (NAPHS) (15), to systematically address and fill the capacity gaps for strengthening their preparedness for public health emergencies, that were identified through both internal and external capacity assessments.



5.4.4 Health emergencies response planning

Under the International Health Regulations (2005), Annex 1, Article 6, WHO Member States are required to “establish, operate and maintain a national public health emergency response plan, including the creation of multidisciplinary/multisectoral teams to respond to events that may constitute a public health emergency of international concern”. The methodology for the development of such plans is defined in two WHO publications: **WHO Guidance on Preparing for National Response to Health Emergencies and Disasters** (16), and **Health Emergency and Disaster Risk Management Framework** (1). It is worth mentioning the **Emergency Response Framework (ERF): Internal WHO Procedures (2.1 edition, published in 2024)** (17), which outlines the WHO approach to managing public health emergencies. It provides detailed guidance on assessment, grading, and response to emergencies, emphasizing WHO's obligations under the International Health Regulations (IHR) and its role in the global humanitarian system.

The National Health Emergency Response Plan (NHEROP) (16) describes how the health sector structures and organizes itself for emergency response. It sets out the roles, responsibilities, systems and mechanisms for emergency response within the health sector and documents the linkages to other sectors and authorities that are necessary for the response. The health emergency response plan covers all phases of an emergency response, including activation, grading, operations and de-escalation.

NHEROP has the following functions:

links the national response actions to subnational and local response actions, including those of communities as the first responders builds on health sector and health system capacities for managing emergencies establishes and strengthens national coordination mechanisms for health emergency response, engaging the whole of society in a multisectoral approach under government leadership is aligned to and coordinated with any other sectoral emergency response plans provides the basis for contingency planning. NHEROP should be a generic, all-hazard plan, to be activated and used in all public health emergencies. It is known that most of the general (all-hazard) plan's provisions (structure and content) are applicable in all emergencies. WHO guidance for developing NHEROP provides the proposed generic NHEROP template.

Apart from presenting the desirable structure and elements (content) of NHEROP, this guiding document also provides full guidance on the best way to develop and adopt this document. It is step by step instruction – from how to compose the working group (WG) for NHEROP development, through proposed terms of reference for the WG, division of tasks, optimal timeline, what to prepare in advance, to the final stage – how to advocate for the official adoption of the draft version, once it is completed. There is also guidance on how to maintain, test and revise it, once it is adopted.

The proposed NHEROP structure is pretty much universally applicable.

5.4.4.1 Public health contingency planning

One smaller part of the health emergency response is hazard-specific. To address these specificities of health emergencies caused by different hazards. These hazard-specific plans are called contingency plans. Contingency plans should be developed and adopted for dominant risks/hazards, based on the public health emergency risk assessment.

(Strategic toolkit for assessing risks: a comprehensive toolkit for all-hazards health emergency risk assessment: World Health Organization; 2021) (11).



5.4.4.2 Event-specific health emergency response plan - operational incident plan

The smallest part of the health emergency response will be unique to a particular event and will be tailored throughout the response, based on the event's dynamics and unpredictable aspects.

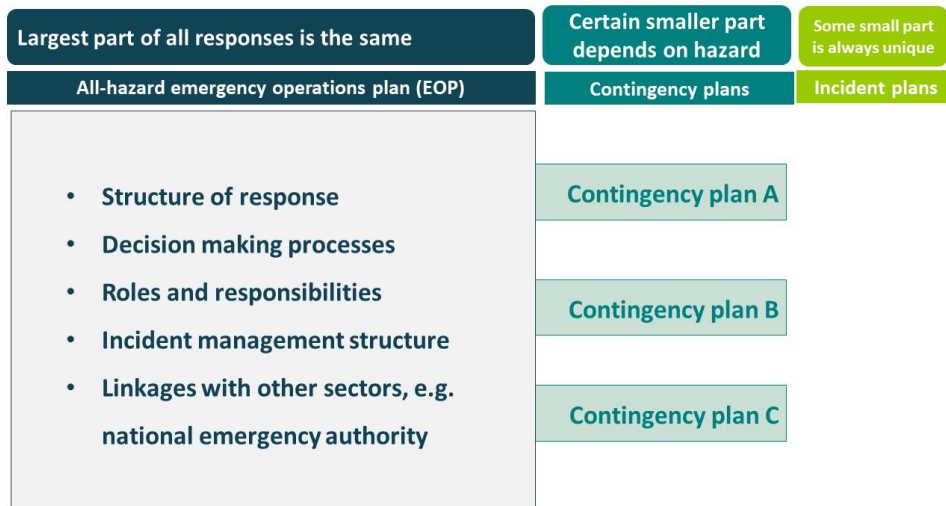
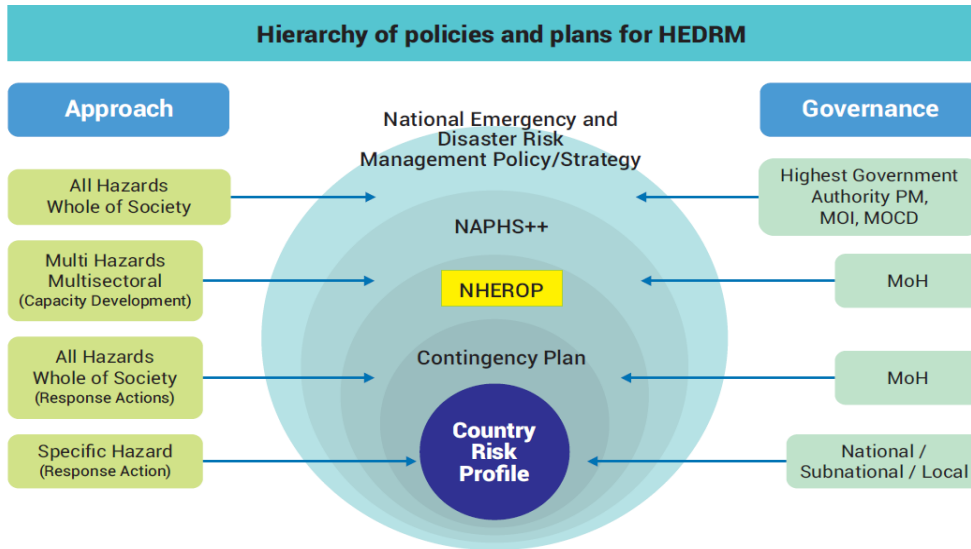


Diagram 5: Different levels and scopes of health emergency response plans



Legend:

NAPHS++: National Action Plan for Health Security | ++ Other Capacity Development Plans
NHEROP: National Health Emergency Response Operations Plan
MoH: Ministry of Health
MoI: Ministry of Interior
MOCD: Ministry of Civil Defence
PM: Office of the Prime Minister

Diagram 6: Hierarchy of different public health emergency management documents (WHO guidance on preparing for national response to health emergencies and disasters. WHO guidance for developing national health emergency response operations plan (NHEROP) for all hazards, 2021) (16).

5.4.4.3 US CDC approach to health emergency response planning

Instead of addressing the elements of the health emergency cycle separately, through publishing multiple guiding documents, US CDC establishes 15 capabilities that serve as national standards for public health preparedness planning (18). These capability standards serve as a vital framework for multiple administrative/governmental levels – state, local, tribal, and territorial preparedness programs as they plan, operationalize, and evaluate their ability to prepare for, respond to, and recover from public health emergencies.

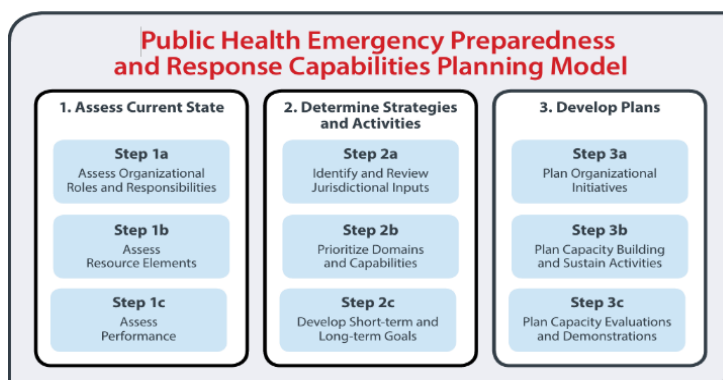


Diagram 7: US CDC's Public health emergencies preparedness and response planning model (Public Health Emergency Preparedness and Response Capabilities: National Standards for State, Local, Tribal, and Territorial Public Health. Centers for Disease Prevention and Control, 2019) (18)



The whole system is the operationalization of the National Health Security Strategy. This national strategy also determines that if the public health threat poses a potential risk of national concern, the jurisdiction goes to the federal level and then the response is governed by the highest national bodies, in the area of both health and emergency management (19).

5.4.4.4 ECDC approach to health emergency preparedness and response planning

As an agency serving 27 independent countries united in the EU, when it comes to public health emergency preparedness and response planning, ECDC is rather oriented towards regular systematic assessments of national health emergency preparedness in EU/EEA countries (which is mandated by Regulation (EU) 2022/2371), then in providing precise guidance for the development of the health emergency planning and operational documents such as the health emergency preparedness and response plan.

5.4.5 Testing health emergency preparedness and response plans

Two ways to test the functionality of the emergency operations plans are to utilize them in a real emergency and to conduct a simulation exercise (SimEx). SimEx is preferable, as it provides a safe environment and does not involve huge material and other costs, unlike the real event. It can be conducted in different formats – from the so-called table-top one to a full-scale field exercise. Methodology for preparing and conducting SimEx is similar across the organizations and agencies. WHO published the manual in 2017, which is being widely used around the world (20).

Another reliable way to test the functionality of the health emergency response plan is to conduct a systematic, structured review of the actions taken during the response to a real event or in the SimEx. WHO provides the meticulously structured tool for reviewing emergency responses. It is called After Action Review (21).

6. New emerging approaches to emergency management

In recent times, there are voices, mostly coming from academia, saying that the traditional disaster and emergency management model has become insufficient when responding to the new, complex and very dynamic environment, and that it partially fails in addressing the dynamic, non-linear, and unpredictable nature of contemporary disasters, due to its rigid and non-flexible military-based model (22-25).

7. Conclusions

There is an abundance of available guiding documents for public health emergency preparedness and response planning. As expected and in line with its role and mandate, WHO provides relevant, science- and experience-based, adjustable, widely applicable tools and guidance, covering not only preparedness and response planning, but all segments of public health emergency management – from risk assessment to recovery phase. This represents a powerful, publicly available asset that enables countries to easily develop their respective planning and operational documents in this area, and hence build, strengthen and upgrade their capacities to successfully cope with public health threats and emergencies, as well as natural and man-made disasters. Approaches in public health emergency preparedness and response planning are largely aligned across different relevant agencies in the world, relying on traditional models and mechanisms.



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THE SLOVENIAN EXPERIENCE: CREATING RESILIENT COMMUNITIES AND CARE FOR VULNERABLE POPULATION GROUPS

Jože Hren¹, Anže Trček¹

¹ Ministry of Health of the Republic of Slovenia

Abstract

In the presentation we will focus on the ongoing challenges and strategies for improving public health system in Slovenia. This presentation aims to provide an overview of the current health landscape in Slovenia, offering a general epidemiological snapshot of the population's health and the strengths and weaknesses of the Slovenian healthcare system. Specifically, the focus will shift to drug-related health issues, highlighting the country's prevention programs and measures aimed at reducing substance abuse. By exploring current preventive activities and innovative approaches in the drug prevention field, this presentation will provide valuable insights into Slovenia's ongoing efforts to improve public health and prevent drug-related harm.

Epidemiological data on the health status of the Slovenian population were sourced from national health registries and public health reports. An analysis of Slovenia's healthcare system was conducted using government publications and international evaluations. Comparative analysis was used to evaluate the impact of Slovenia's health status. Data on drug prevention efforts, including national strategies and community-based interventions, were gathered from the Ministry of Health. The effectiveness of these prevention programs was assessed through a review of available reports and statistical analysis of trends in drug use.

The epidemiological data revealed key health trends in Slovenia, including a decline in certain chronic diseases resulting in prolonged life expectancy and lower levels of comorbidity with people over 65 years¹. Yet, we are facing persistent challenges in mental health and substance use disorders^{4,5,6,10}. Life expectancy has increased, but health disparities remain, particularly among different regions and lower socioeconomic groups^{2,5}. Regarding Slovenia's drug prevention efforts, the analysis showed that while national strategies have led to stabilization or even a decrease of problematic drug use⁶, prevalence of drug use continues to be a significant issue, particularly among youth^{6,9,10}. While the number of preventive programs is on the rise and are shifting towards evidence-based programs⁶, a growing social acceptance of drug use as well as a growing drug availability of drugs result in higher drug use, especially amongst youth^{6,10}. While a coherent preventive strategy, including multiple sectors is resulting in a better public health, the results highlight the importance of continued innovation and targeted interventions in drug policy including prevention.

The findings from Slovenia's health and drug prevention data highlight both progress and ongoing challenges. While improvements in general health indicators and a reduction in certain drug-related harms have been observed, significant work remains, particularly in addressing mental health and more severe substance use disorders. The effectiveness of Slovenia's drug prevention programs underscores the importance of early intervention and community-based approaches, although these efforts need to be continuously adapted to meet emerging trends and challenges in substance abuse. Strengthening the coordination between public health authorities, NGOs, and communities, alongside sustained investment in prevention strategies, is essential for long-term success. Finally,



fostering a culture of prevention through education and public engagement will be critical to reducing the burden of drug abuse and improving overall public health outcomes in Slovenia.

Key words: epidemiology, health system, public health, drug prevention

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SESSION: PREVENTIVE PROGRAMS - FROM IDEA TO MESURABLE BENEFITS

ORAL PRESENTATIONS

ASSESSMENT OF BARRIERS TO HUMAN PAPILLOMAVIRUS IMMUNIZATION AMONG PARENTS OF SCHOOL-AGED CHILDREN

Ivana Simić Vukomanović^{1,2}, Snežana Radovanović^{1,2}, Sanja Kocić^{1,2}, Nataša Mihailović¹, Svetlana Radević^{1,2}

¹ Institute of Public Health of Kragujevac, Kragujevac, Serbia

² University of Kragujevac, Faculty of Medical Sciences, Department of Social Medicine, Kragujevac, Serbia

Abstract

Objectives: Human papillomavirus (HPV) infection is one of the most common sexually transmitted infections among young people. The aim of this study was to assess barriers to HPV immunization uptake among parents of school-aged children.

Methods: A cross-sectional survey was conducted on a random sample of approximately 600 parents of school-aged children residing in Kragujevac, Serbia. A structured questionnaire was developed based on variables identified in studies on similar topics published within the last five years.

Results: Findings indicated that 6.4% of respondents had never heard of HPV, while 8.4% were unaware of its association with cervical cancer. Moreover, 25.2% did not know that HPV can cause other cancers, and 22.2% were unaware of its potential to cause urogenital infections in both sexes. Additionally, 19.5% had never heard of the HPV vaccine, and among those aware, 33.1% stated they would not vaccinate their child even if recommended by a pediatrician, most commonly citing insufficient information, doubts regarding efficacy and safety, and concerns about side effects.

Conclusion: The findings emphasize the need for targeted community-based interventions to improve parental health literacy and address identified barriers, thereby increasing HPV vaccination coverage among school-aged children.

Keywords: human papillomavirus immunization, barriers, parents of school-aged children



DETERMINANTS OF SMOKING CESSATION AMONG HEALTH INSURANCE BENEFICIARIES IN SERBIA, 2024

Snežana Ukropina^{1,2}, Sonja Čanković^{1,2}, Tanja Tomašević^{1,2}, Ivana Radić^{1,2}, Sanja Harhaji^{1,2}, Dušan Čanković^{1,2}, Dragana Milijašević^{1,2}

¹ Institute of Public Health of Vojvodina, Novi Sad, Serbia

² Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia

Abstract

Objectives: This study aimed to identify key factors influencing smoking cessation and to highlight population groups with health insurance who are at greater risk of continued smoking.

Materials and methods: A cross-sectional study was conducted among 3,910 adult healthcare users from May to November 2024, across 44 Primary Healthcare Centres in the Autonomous Province of Vojvodina, Serbia. The sample was selected proportionally to Census data. A multinomial logistic regression model was used to analyze the association between current and former tobacco smoking (daily or occasional) and eight socioeconomic and health-related factors. Odds ratios (OR) with 95% confidence intervals (CI) were calculated.

Results: Of all participants, 14.1% were former smokers, 34.1% were current smokers, and 51.8% were non-smokers. The odds of being a former smoker were significantly higher among males (OR=2.15; 95%CI:1.75–2.64) than females. Older age was also associated with greater likelihood of cessation: ages 65+ (OR=2.47), 50–64 (OR=2.61), and 35–49 (OR=2.05) compared to 18–34. Being married or living with a partner (OR=2.23) or divorced/separated (OR=1.92) was also positively associated with quitting smoking.

Conclusion: Male gender, older age, and being married or previously married significantly predict smoking cessation. Other socioeconomic factors, including education, material status, type of settlement, and self-assessed health, were not significant.

Keywords: smoking cessation, tobacco use, socioeconomic factors, health surveys, primary health care



MENTAL HEALTH AND MALIGNANT DISEASES

Roberta Marković^{1,2}, Čedomir Šagrić², Ana Stefanović², Aleksandar Višnjić^{1,2}, Tamara Jovanović^{1,2}, Ana Todorović^{1,3}

¹ Faculty of Medicine of University of Niš, Niš, Serbia

² Institute of Public Health of Niš, Niš, Serbia

³ Clinic of Dental medicine of Niš, Niš, Serbia

Abstract

Mental health is an integral part of general health, which the WHO defines as "a state of well-being in which each person realizes his potential, copes with everyday stress, can work productively and is able to contribute to his community". Based on the research conducted at the University of Belgrade "Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Social protection services for vulnerable groups", from 2022, a third of the population of Serbia can be considered psychologically vulnerable. One quarter of Serbian citizens needed professional support due to psychological problems. According to the latest estimates, Serbia ranks among the 40 European countries in the group of countries with a medium risk of contracting malignant diseases, but in terms of the ratio of the number of new cases and deaths, Serbia ranks first in Europe. Within the Program for the Improvement of Cancer Control in RS, the field of psycho-oncology is defined, which "deals with the study of psychological, social, behavioral, spiritual and ethical problems of persons suffering from various malignant diseases. In developed countries, it is integrated into oncology as an important segment of multidisciplinary work with oncology patients and their families". The need for the implementation of comprehensive mental health care systems, as a prerequisite for good overall health, which are based on evidence, which are effective, acceptable and sustainable, is recognized. The results of many studies indicate that psychosocial factors such as depression, life adversity and low social support increase the risk of cancer. A meta-analysis (Chida Y., 2008) of the published literature showed that depression, psychosocial factors related to a stress-prone personality or poor coping style with various life circumstances, and psychosocial factors related to emotional stress or poor quality of life increased the risk for all cancer outcomes, especially for lung cancer. Many studies have recognized the mediating role of health behaviors in the relationship between psychosocial factors and cancer. A large study (Lonneke A van Tuijl LA, 2021) that included over 40 researchers studied the relationship between psychosocial factors (depression, recent loss, anxiety, life adversity, neuroticism, low social support) and cancer incidence (PSI-CA) and reached the following results: Health behavior, exposure to risk factors (smoking, alcohol use, weight, physical activity, sedentary behavior, sleep) could explain the relationship between psychosocial factors and cancer, i.e. health behavior as a mediator (example: depressed, anxious people are more often exposed to the mentioned risk factors). Health behavior, demographic and somatic factors that are recognized as cancer risk factors may interact with psychosocial factors to represent a further risk for cancer. Preventive activities should be carried out with an integrated approach of all subjects of society.

Keywords: mental health, malignant diseases



EDUCATION OF HEALTH CARE PROFESSIONALS, HEALTH ASSOCIATES, AND EXPERT ASSOCIATES ON SEXUAL AND REPRODUCTIVE HEALTH

Katarina Boričić¹, Mirjana Tošić¹, Tamara Tomašević¹

¹Center for Health Promotion, Institute of Public Health of Serbia “Dr Milan Jovanovic Batut”, Belgrade, Serbia

Abstract

Objective: This paper aims to determine the quality of accredited continuing education on sexual and reproductive health intended for health professionals, health care, and professional associates in the Republic of Serbia in 2024 and in 2014.

Method: A search of the Health Council of Serbia's database for accredited continuing education programs in 2024 and 2014 identified relevant programs using keywords related to sexual and reproductive health. The χ^2 test was applied to analyze differences between independent and dependent variables.

Results: In 2014, twice as many programs were accredited as in 2024, with the Medical Chamber leading. Most accreditations were for primary health institutions in 2014 and tertiary institutions in 2024. Professional meetings comprised the majority of accredited programs (62% in 2014; 44% in 2024), while international symposiums were the least common. Most programs were free, mainly for health professionals (92% in 2014; 90% in 2024). The most common accredited topic was malignant diseases of the reproductive system, while topics like abortion and sexual rights were less represented.

Conclusion: There is potential to enhance continuing education in sexual and reproductive health by improving interactive training sessions, targeting diverse health professionals, and enriching thematic content, despite a downward trend in accredited programs.

Keywords: sexual health, reproductive health, education



GENDER-BASED VIOLENCE AND HEALTHCARE SYSTEM RESPONSES IN SERBIA, 2024

Mirjana Živković Šulović¹, Milena Vasić¹, Biljana Kilibarda¹

¹ Institute of Public Health of Serbia “Dr Milan Jovanović Batut”, Belgrade, Serbia

Abstract

Objectives: Gender-based violence (GBV) reflects power inequalities between women and men. Its forms include domestic, physical, sexual, psychological, emotional and economic violence, isolation, the use of children, and threats of harm. GBV has a profound impact on women’s health and represents a major public health challenge.

Materials and methods: Analysis of data from 124 healthcare facilities was conducted using the online Public Health System.

Results: A total of 1,638 GBV cases were registered in Serbia. The police were informed in 83% of cases, the Prosecutor’s Office in 4%, and the Center for Social Work in 57%. Violence most often occurred in the family environment (80%). The perpetrator was known in 98% of cases; in 60% it was a current or former spouse/partner, and in 17% another family member. Physical violence was reported by 95% of women, sexual violence by 6%, while 86% were exposed to some form of emotional violence.

Conclusion: A woman’s contact with a healthcare provider may represent her only opportunity to receive support, care, and a path to safety. Addressing GBV should be systematically integrated into healthcare services.

Keywords: gender-based violence, health care



THE CORRELATION BETWEEN BULLYING AND MENTAL HEALTH

Mirjana Tošić¹, Katarina Boričić¹, Tamara Tomašević¹

¹Institute of Public Health of Serbia “Dr Milan Jovanović Batut”, Belgrade, Serbia

Abstract

Objectives: Bullying has become a growing problem among school-age children in Serbia. Globally, one in five children is exposed to some form of bullying. School-age children who have experienced bullying have an additional very negative impact on mental health and their lives as a whole.

Methods: A secondary analysis is performed on the original data of the 2021/22 HBSC study, which was conducted on 3.713 students in a nationally representative sample of primary and high schools in Serbia.

Results: The statistical significance of the difference in frequency of exposure to bullying and student sentiment variables exposure was calculated using the HI-square test. The results of the research showed that students who suffered from bullying most often never felt cheerful and in a good mood (34.5%), always felt lonely (43%), and rated their life satisfaction as the worst possible (66.7%). Every third student who was exposed to peer violence felt depressed, irritable, nervous and had difficulty sleeping almost every day.

Conclusion: It is necessary to create appropriate programs and health education interventions to solve the problem of school children's exposure to violence and prevent mental health disorders.

Keywords: bullying, mental health, school-aged children, recommendations



REINTEGRATING COUNSELING SERVICES INTO SERBIA'S PUBLIC HEALTH NETWORK: BALINT GROUPS AS A PREVENTIVE STRATEGY AGAINST BURNOUT

Rosa Sapić¹, Jelena Milić²

¹Faculty of Health Studies, University of Bjeljina, Bjeljina, Bosnia and Herzegovina

²Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: This review proposes the reintegration of counseling services within Serbia's public health network and explores the implementation of Balint groups as a strategic intervention to prevent burnout among healthcare professionals. Recognizing the emotional demands placed on practitioners in public health settings, this work aims to offer a sustainable, system-level solution grounded in reflective practice.

Materials and methods: A qualitative, theory-driven model was developed through a synthesis of empirical literature on burnout prevention, Balint group methodology, and health systems design. Implementation pathways were outlined for both existing and newly established counseling centers. The model emphasizes multidisciplinary participation, protected time for group work, trained facilitators, and alignment with the public health mission.

Results: The proposed integration model demonstrates high theoretical compatibility between Balint groups and the mission of public health institutions. Key preventive mechanisms include emotional processing, peer support, perspective-shifting, and professional meaning-making. Evidence from comparable settings shows significant reductions in emotional exhaustion and staff turnover, along with improved patient satisfaction. The model also anticipates common barriers such as resource limitations and cultural resistance and provides scalable solutions.

Conclusion: Reintroducing counseling services into Serbia's public health infrastructure, with Balint groups as a central support mechanism, can address a critical gap in workforce well-being. Beyond burnout prevention, this approach strengthens the relational competencies essential for holistic care and reinforces the human infrastructure of public health. Investment in this model is not only ethically imperative but strategically beneficial for the sustainability of health services.

Keywords: Balint groups, public health workforce, counseling services, burnout prevention, health systems strengthening



THE IMPACT OF PATIENT LIFESTYLE FACTORS ON CHRONIC VENOUS ULCER DEVELOPMENT

Sanja Stojanović¹, Ivana Damnjanović², Zoran Damnjanović^{3,4}, Nemanja Stepanović^{3,4}, Milan Lazarević⁵

¹University of Niš, Faculty of Medicine, Department of Biology with Human Genetics, Niš, Serbia

²University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia

³University of Niš, Department of Surgery and Anesthesiology with Reanimatology, Niš, Serbia

⁴University Clinical Center Niš, Clinic for Vascular Surgery, Niš, Serbia

⁵University of Niš, Faculty of Medicine, Department of Immunology, Niš, Serbia

Abstract

Objectives: Chronic venous ulcers (CVUs) represent a significant public health issue, impacting quality of life and imposing a substantial burden on healthcare systems. While genetic predisposition is a known risk factor, lifestyle choices, particularly those related to occupation and physical activity, are increasingly recognized as critical contributors to their development. This study aimed to investigate the impact of lifestyle factors, particularly occupational habits involving prolonged standing or sitting, on the development and healing of CVUs. Additionally, the study explored the correlation between a positive family history of venous diseases (VDs) and the presence of CVUs.

Materials and methods: A cross-sectional study was conducted involving a cohort of 30 patients diagnosed with CVUs. Data were collected through a structured questionnaire and medical history review. The questionnaire focused on occupational duration, daily activity levels, and a detailed family history of VDs, specifically asking if parents had a history of VDs.

Results: The majority of patients reported that their occupation required either long periods of standing or sitting. A significant proportion of the cohort also reported a family history of VDs in one or both parents. These two factors, a sedentary or standing-based occupation and a positive family history, were found to be highly prevalent within the studied group of patients. The findings suggest a strong association between these lifestyle and genetic factors and the development of CVUs.

Conclusion: The results indicate that a combination of a sedentary or standing-based occupation and a positive family history of VDs are significant contributing factors to the development of CVUs. These findings highlight the importance of preventive measures, such as regular movement, exercise, and lifestyle modifications, particularly for individuals with a family predisposition to VDs. Further research with a larger sample size is warranted to confirm these associations and explore other potential factors.

Keywords: lifestyle, chronic venous ulcers, genetic factors, occupational habits

Acknowledgment: This research was supported by the Science Fund of the Republic of Serbia, #7617, Multilevel approach to study chronic wounds based on clinical and biological assessment with development of novel personalized therapeutic approaches using in vitro and in vivo experimental models – CHRONOWOUND and by the Ministry of Science, Technological Development and Innovation (Contract No. 451-03-137/2025-03/200113).



UNIVERSAL CASCADE SCREENING PROGRAM, POSSIBLE RESPONSE ON BURDEN OF HYPERCHOLESTEROLEMIA IN SERBIA

Marina Pantić¹; Dragana Atanasijević¹

¹ Center for Analysis, Planning, and Organization of Health Care, Institute of Public Health of Serbia, Belgrade, Serbia

Abstract

Objectives and Methods: We conducted a literature review on the results of familial hypercholesterolemia (FH) screening in different countries with an aim of determining whether the establishment of a national cascade screening program can enable timely intervention and reduce the burden of cardiovascular diseases associated with FH.

Results: In countries with developed healthcare systems, diseases that make highest healthcare burden are recognized as priorities. Hypercholesterolemia is a risk factor for most of the chronic noncommunicable diseases, especially for cardiovascular ones. Early diagnosis and treatment with statins and/or other therapies can significantly reduce the risk of heart attacks and other complications.

In Serbia, hypercholesterolemia, particularly FH, is a significant health concern with estimate of around 35,000 affected people, but only a small percentage of them are identified.

A pilot study conducted as a preparation for the very first Population Health Survey, 2000 showed that about 11.9% of the school population had elevated total cholesterol values. After that, not a single population study dealt with the assessment of the prevalence of hypercholesterolemia either in the general population or in the child population.

Conclusion: EU Best Practice Portal on Public Health recognizes cascade screening programs for FH as a best practice for countries to adopt.

Keywords: familial hypercholesterolemia, cardiovascular diseases, cascade screening, pediatrics, preventive program



SESSION: PREVENTIVE PROGRAMS - FROM IDEA TO MESURABLE BENEFITS

POSTER PRESENTATION

THE IMPACT OF TEMPORARY REDUCTION IN DIGITAL MEDIA USE ON THE MENTAL HEALTH OF YOUTH: A PILOT STUDY IN URBAN AREAS OF SERBIA

Tamara Tomašević¹, Katarina Boričić¹, Mirjana Tošić¹

¹ Institute of Public Health of Serbia „Dr Milan Jovanović Batut“, Belgrade, Serbia

Abstract

Introduction: The increasing use of digital devices among young people has been linked to a rise in mental health issues, including anxiety, depression, and sleep disturbances. There is a growing need for effective, low-cost interventions that could help preserve the mental health of this population.

Objectives: The aim of this pilot study was to examine the impact of short-term reduction in digital media use on the mental health of young people in urban areas of Serbia.

Methods: The study was conducted on a sample of 60 participants aged 18 to 25, who limited their use of digital devices to essential activities (e.g., studying, work) over a 7-day period. Mental health was assessed before and after the intervention, with participants completing standardized questionnaires PHQ-9 (for depression) and GAD-7 (for anxiety).

Results: After the intervention, a statistically significant decrease in the average scores on both the PHQ-9 and GAD-7 scales was observed. Participants also subjectively reported improved sleep quality, better concentration, and more frequent in-person social interactions.

Conclusion: Temporarily reducing digital media exposure may have a positive effect on the mental health of young people and represents a potentially beneficial, easily applicable public health measure. Further research on larger samples and over longer timeframes is needed to determine the sustainability and scope of such effects.

Keywords: digital media, youth, mental health



SESSION: PERSPECTIVES OF INFORMATION AND COMMUNICATION TECHNOLOGIES AND HEALTH CARE

INVITED LECTURES

REDEFINING CLINICAL AND BIOMEDICAL RESEARCH THROUGH ARTIFICIAL INTELLIGENCE

Vangelis D. Karalis ¹

¹ Department of Pharmacy, National and Kapodistrian University of Athens, Athens, Greece

Abstract

Objectives: This work aims to explore the transformative role of in silico clinical trials (ISCT) and artificial intelligence (AI) in redefining clinical and biomedical research, addressing the limitations of conventional human-based trials.

Materials and Methods: The presentation introduces ISCT as a simulation-based approach that integrates pharmacokinetic/pharmacodynamic modeling, disease progression, and trial design to predict clinical outcomes virtually. Emphasis is placed on AI-driven methods, including machine learning, variational autoencoders (VAEs), and generative adversarial networks (GANs), for the synthesis of virtual patient populations. These tools are evaluated against classical trial and bioequivalence study frameworks.

Results: ISCT provides reliable insights into trial outcomes while reducing costs, time, and ethical constraints. AI-powered models successfully generated synthetic patient data that closely resembled real populations, preserving statistical power and performance. The use of VAEs and GANs demonstrated high accuracy in simulating inter- and intra-subject variability, optimizing dose selection, and improving trial design efficiency.

Conclusion: AI-enabled ISCT holds significant promise in supplementing or partially replacing traditional trials. By creating realistic virtual populations and optimizing experimental parameters, these approaches enhance reliability, efficiency, and ethical compliance in drug development. The integration of ISCT with AI paves the way for a paradigm shift in clinical and biomedical research.

Keywords: artificial intelligence, clinical trials, data augmentation; generative algorithms



Clinical and biomedical research has long relied on human-based clinical trials as the gold standard for assessing the safety, efficacy, and overall impact of new drugs, medical devices, and therapeutic procedures. While indispensable, conventional trials remain constrained by high costs, long timelines, and significant logistical and ethical challenges. Patient recruitment, dropout rates, adherence issues, and confounding factors frequently complicate trial execution, while the large sample sizes needed to achieve statistical power increase both expense and complexity. Moreover, real-world variability introduces bias and uncertainty, which can undermine the reliability of results. Collectively, these limitations underscore the urgent need for innovative methodologies that can supplement, and in some cases transform, the traditional trial paradigm [1,2].

In this context, *in silico* clinical trials (ISCT) have emerged as a promising alternative. Coined in 1989 as a computational analogue to *in vivo* and *in vitro* experimentation, “*in silico*” refers to computer-based simulations that model biological and clinical processes. ISCT enable researchers to design virtual patient populations, simulate disease progression, and test pharmacological or interventional strategies entirely within a computational framework [2,3]. Key components include the generation of virtual subjects that reflect demographic and physiological diversity, pharmacokinetic/pharmacodynamic (PK/PD) modeling of therapeutic agents, and simulation of clinical outcomes such as drug concentrations, therapeutic efficacy, and adverse events. These capabilities allow optimization of dosing regimens and trial designs, facilitate the exploration of ethically or practically untestable scenarios, and enable the quantification of inter- and intra-subject variability [2,3].

While ISCT already represent a major advance, their integration with artificial intelligence (AI) promises to further expand their scope and impact. Traditional ISCT are largely driven by mechanistic models, such as systems of ordinary differential equations or physiologically based pharmacokinetic (PBPK) models, which capture absorption, distribution, metabolism, and elimination processes. These models are interpretable and grounded in physiology but often struggle to capture nonlinear and high-dimensional variability in real populations. AI methods, by contrast, excel at learning complex, nonlinear relationships directly from data, making them a natural complement to mechanistic modeling [5].

Among AI approaches, variational autoencoders (VAEs) and generative adversarial networks (GANs) stand out for their capacity to generate synthetic yet realistic datasets. VAEs, introduced in 2013, encode clinical data into a lower-dimensional latent space and then reconstruct it with controlled variability, producing synthetic samples that preserve the statistical structure of the original dataset. GANs, introduced in 2014, employ a generator–discriminator framework in which synthetic data are iteratively refined until they become indistinguishable from real data. These models have already demonstrated utility in biomedical applications, including clinical trial simulation and bioequivalence studies [5,6].

The application of AI-generated virtual subjects to clinical and bioequivalence research has shown considerable promise. Models trained on patient-level datasets can generate new “virtual patients” whose demographic, physiological, and pharmacological characteristics mirror those of real populations. This allows researchers to augment small sample sizes, thereby increasing statistical power without requiring additional human recruitment [4,5]. In bioequivalence studies, where highly variable drugs pose challenges due to intra- and inter-subject variability, AI-synthesized cohorts can stabilize outcomes and improve reproducibility [4,6,7]. Comparative analyses have demonstrated that AI-generated virtual populations exhibit strong concordance with real cohorts



across both distributional characteristics and performance metrics such as statistical power and acceptance rates. Importantly, AI often outperforms scaled or adjusted classical approaches in handling variability, further highlighting its disruptive potential [6,7].

The broader implications of combining ISCT with AI are profound. By reducing reliance on traditional trials, these methods can lower costs, accelerate timelines, and mitigate ethical concerns associated with exposing patients to experimental interventions. Regulatory bodies have already begun cautiously exploring this space. For example, the U.S. Food and Drug Administration (FDA) has endorsed the use of modeling and simulation in drug development, while the European Medicines Agency (EMA) has recognized ISCT in limited contexts such as medical device testing and pediatric trials. Initiatives such as the Avicenna Alliance in Europe are also driving international efforts to establish standards for ISCT adoption.

Despite these advances, several challenges remain. The transparency and interpretability of AI models are critical, as black-box predictions may not satisfy regulatory scrutiny. Ensuring data quality and representativeness is equally essential to avoid propagating bias into virtual cohorts. Finally, the harmonization of regulatory guidelines for AI-augmented ISCT is necessary for broader adoption, requiring consensus on model validation, reporting standards, and reproducibility [8]. Addressing these issues will demand close collaboration between computational scientists, clinicians, regulators, and industry stakeholders.

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MINING THE LITERATURE ON INTERNET ADDICTION USING ARTIFICIAL INTELLIGENCE MODELS

Kıvanç Kök^{1,2}

¹ Department of Biostatistics and Medical Informatics, International School of Medicine, Istanbul Medipol University, Istanbul, Turkey

² Research Institute for Health Sciences and Technologies (SABITA), Istanbul Medipol University, Istanbul, Turkey

Abstract

Internet addiction (IA) is a behavioral addiction, characterized by excessive use of the internet-related content (e.g. social media) and compulsive use of the Internet applications (e.g. online shopping, online gaming), resulting into a prolonged, problematic and uncontrollable online activity. Despite the growing body of research towards unravelling the complexity of this social and public health problem, many aspects remain largely unknown. Importantly, recent studies increasingly link IA with mental health issues. Due to the rapid expansion of this research field, it is becoming increasingly challenging to keep up with the pace of the accumulating literature. Hence, certain features, such as emerging trends, novel findings and elusive aspects can be overlooked. Therefore, it is of utmost importance to be able to practically extract maximum actionable insights and effectively generate informative summaries from the existing knowledge on IA. To this end, recent advancements in automated extraction and algorithm-driven mining of text data presents an unprecedented potential to aid experts and accelerate discoveries. Since implementation of text mining in the field of IA is scarce, there is a need for studies designed to bridge this research gap. As an initial step, the power of text mining algorithms can be leveraged to uncover textual patterns in IA literature based on PubMed abstracts. In this regards the dataset can be searched, downloaded and compiled as a text corpus for in-depth analysis. Conventional text mining methodology is instrumental but limited to quantitative analysis of the content using standard statistical methods, such term frequency analysis (to identify keywords and hot topics), word co-occurrences analysis, topics modelling and word cooccurrence analysis, which collectively reflect the key aspects, trends and interrelations in the corpus. Remarkably, the advent and adaptation of Deep Neural Networks (DNNs), which constitute a form of Artificial Intelligence (AI), have emerged as the transformative technology in the field of text mining. For example, these deep learning models have facilitated semantic analysis and became a new driving force in mining big biomedical data. Furthermore, more recent technologies, in the form Generative AI (GenAI) models, such as Variational Autoencoders (VAEs), Large Language Models (LLMs) and Retrieval-Augmented Generation (RAG), offer a path for breakthroughs in text mining. For example, GenAI enables data augmentation, extraction of key findings, automatic summarization and generation of novel research hypotheses. Collaboration between disciplines is requires to navigate this new frontier and harness the full potential of these frameworks in the field of IA. Overall, mining the literature on IA using Artificial Intelligence models is anticipated to expand the current knowledge with complementary results and yield valuable insights. Consequently, comprehensive efforts by multidisciplinary teams in this research direction are largely needed.

Keywords: internet addiction, artificial intelligence



SMART TOOLS IN SCIENTIFIC WRITING: WHERE IS THE LINE BETWEEN HELP AND THREAT?

Vedrana Pavlović¹

¹ Institute of Medical Statistics and Informatics, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

Abstract

The integration of artificial intelligence (AI) into scientific workflows is fundamentally reshaping academic writing practices. Through large language models (LLMs) and algorithmic tools, researchers now benefit from a growing ecosystem of “smart tools” that assist in drafting, editing, reference management, and language enhancement. These tools offer substantial gains in efficiency and linguistic precision, particularly for non-native English speakers. However, their integration into scholarly workflows raises complex ethical questions regarding authorship, originality, transparency and research integrity. As smart tools evolve, concerns rise that they may not only rephrase scientific writing but begin to alter their substantive content, potentially undermining the trust at the core of scientific integrity. Issues such as hallucinated citations or inconsistent disclosure highlight the urgent need for transparent ethical frameworks in the integration of AI into academic research. AI tools in scientific writing bring both promise and peril. The real question is not whether to use them, but how to use them responsibly.

Keywords: artificial intelligence, scientific writing, smart tools, academic integrity

The integration of artificial intelligence (AI) into scientific workflows, particularly through large language models (LLMs) and algorithm-driven tools, has profoundly reshaped the landscape of academic writing. These “smart tools” assist researchers in drafting, structuring, and editing manuscripts, managing references, and synthesizing literature with greater ease and efficiency. Their capacity to improve linguistic clarity, especially for non-native English speakers, and to automate labor-intensive tasks such as formatting and citation, offers undeniable benefits. However, as these tools become increasingly embedded within research practices, they also raise pressing questions concerning authorship, intellectual ownership, and the preservation of critical thinking within scholarly communication.

Unlike traditional software, smart tools are characterized by their capacity to perform context-sensitive and adaptive functions, capabilities that previously required expert human input. Their designation as “smart” stems from their reliance on large-scale training datasets composed of published scientific articles, peer-reviewed manuscripts, and domain-specific corpora. This foundation allows them to recognize linguistic patterns, adhere to field-specific stylistic conventions, and tailor suggestions to the scientific context in which they are deployed.

Through techniques such as machine learning and natural language processing, these applications dynamically adjust to the user’s writing style, disciplinary standards, and the rhetorical norms of various publication outlets. They offer context-aware refinements in argumentation, suggest thematically aligned literature, and streamline processes such as abstract summarization and paraphrasing. In this sense, the “intelligence” of such tools



does not indicate autonomy, but rather their function as integrated aids that draw upon previously assimilated knowledge to enhance human reasoning. Smart tools, therefore, should not be viewed as replacements for human authorship, but as cognitive extensions that reshape the conditions under which scientific knowledge is produced, refined, and disseminated. This transition, from passive utilities to active, assistive systems, marks a significant evolution in how scientific texts are composed. Examples of such technologies include ChatGPT, Writefull, Scite.ai, and Rayyan. These tools demonstrate the diverse capabilities of AI in augmenting academic labor. In particular, Rayyan’s use in systematic reviews illustrates how AI-assisted screening can substantially accelerate the identification of relevant studies. Similarly, literature exploration platforms such as ResearchRabbit and Connected Papers empower researchers to trace citation networks and uncover research gaps with a level of efficiency previously unattainable through manual search methods. Collectively, these tools underscore the need for a nuanced understanding of AI’s potential to both enhance and complicate scientific authorship.

Smart Tools in Scientific Writing

Category	Example	What They Do
AI Writing Assistants	ChatGPT, Claude, SciNote Manuscript Writer	Help draft or rephrase sections of a scientific manuscript
Reference Managers	Zotero, EndNote, Mendeley, Paperpile	Smart citation suggestions, metadata extraction, integration with databases
Grammar & Style	Grammarly, Writefull, DeepL Write	Context-aware grammar correction, discipline-specific suggestions
Plagiarism Checkers	iThenticate, Turnitin, Copyleaks	Use AI to detect overlap, even in paraphrased content
Paraphrasing Tools	Quillbot, Wordtune, Scite.ai	Suggest alternative phrasing based on meaning and tone
Figure/Graph Generators	BioRender, SmartFigure	Automatically generate scientific illustrations from templates or text
Journal Match Tools	Elsevier Journal Finder, Springer Journal Suggester	Analyze manuscript content and suggest suitable journals
Citation AI Tools	Scite.ai, ResearchRabbit, Connected Papers	Suggest citations with context, show citation networks and trends
Language Correction for Scientists	Writefull for Overleaf, Trink AI	Trained on academic/scientific corpora; improves fluency, clarity, style
Translation + AI	DeepL Translate, Google Translate (scientific mode)	Translate and adapt scientific language with high contextual accuracy
Systematic Review Tools	Rayyan	AI-assisted screening and collaboration platform for systematic reviews



However, the growing capabilities of smart tools raise concerns. When AI begins to rewrite not just the language but the substance of scientific arguments, without clear oversight and ethical guidelines, we risk eroding the very trust on which science relies. Are we just enhancing productivity, or compromising the integrity of scientific work?

Among the foremost concerns is the issue of transparency. Although many researchers now employ AI tools in drafting and editing, disclosures of such usage remain inconsistent. The lack of acknowledgment not only diminishes accountability but may also conflict with established journal policies. In response, major publishers such as Elsevier have instituted guidelines mandating that authors declare how AI tools were used in manuscript preparation, explicitly prohibiting AI from being credited as an author. Detection tools for identifying AI-generated content are under active development, though their efficacy remains challenged by the rapid evolution of generative models.

Equally troubling is the phenomenon of "hallucination" in LLMs like ChatGPT, wherein the system fabricates plausible-sounding but inaccurate or non-existent references. Recent analyses have shown that up to 93% of AI-generated citations fall into this category, threatening the epistemic reliability of the scientific record. It also introduces complexities related to authorship, originality, and plagiarism, especially when AI is used to rephrase or reproduce existing content without appropriate attribution. Many journals now require disclosure of AI usage. A Wired article outlines how AI-generated content is increasingly present in academic submissions, often undetected. These developments underscore the need for critical reflection on how smart tools are integrated into scholarly workflows, not only in terms of efficiency but also in preserving the principles of responsible research conduct.

Beyond questions of authorship and citation integrity, the integration of AI tools into scientific research introduces the additional risk of encoding and reproducing biases present in their training data. These biases can manifest in outputs that reflect existing systemic inequities, potentially distorting the direction or conclusions of scholarly work. Scholars such as David Resnik and Zhicheng Lin have offered complementary perspectives on responsible AI use. Resnik emphasizes normative guidelines, such as disclosing AI use and prohibiting AI from being credited as an author. In contrast, Lin offers a pragmatic framework that emphasizes researchers' responsibility to understand the operational mechanisms of AI systems, ensure compliance with privacy and copyright laws, and apply these tools only when their contribution demonstrably enhances the quality and rigor of scientific output.

Concerns regarding the consequences of AI adoption in academic contexts have also been articulated across disciplines. Yale anthropologist Lisa Messeri warns that the proliferation of AI tools may lead to a growing disconnection between content production and deep conceptual engagement. She emphasizes the risk that scientists may rely on AI to produce more, while engaging less, thereby highlighting a broader concern that the acceleration of output could come at the expense of cognitive and interpretive depth. From this perspective, the challenge is not to resist AI innovation outright, but to encourage its reflective and purposeful integration into research practice, promoting tools that guide inquiry rather than replace it.

Reinforcing a note of caution echoed across the scientific community, Professor Geoffrey Hinton, widely recognized as one of the pioneering figures in the development of AI, has articulated both optimism about AI's transformative potential and deep concern over its unintended consequences. Through numerous public engagements, Hinton has emphasized the urgent need for ethical oversight and regulatory frameworks capable of



keeping pace with the rapid evolution of AI technologies. His appeals for caution reflect a broader tension within the scientific community: while AI offers the promise of accelerating research and innovation, it simultaneously poses risks to the foundational principles of scientific integrity and accountability.

This ambivalence becomes especially apparent in the context of peer review. In their critical examination of AI-mediated peer review, Schintler and colleagues explore the implications of delegating core evaluative functions to algorithmic tools, traditionally performed by human experts. While AI has the potential to expedite the review process, its application in this context is far from unproblematic. They express particular concern about the risks of algorithmic bias, the opacity of AI-generated evaluations and the potential erosion of human responsibility when reviewers defer to automated systems. These issues challenge the foundational ethical norms of scientific publishing, which rest on integrity. Schintler et al. argue that while AI may support certain procedural aspects of peer review, it must never be permitted to displace the moral and intellectual responsibility that underpins this essential mechanism of academic quality control.

AI tools in scientific writing bring both promise and peril. The real question is not whether to use them, but how to use them responsibly. By combining critical oversight and ethical frameworks, the scientific community can harness the benefits of AI without sacrificing trust and credibility.

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SESSION: PERSPECTIVES OF INFORMATION AND COMMUNICATION TECHNOLOGIES AND HEALTH CARE

ORAL PRESENTATIONS

FUNDAMENTALS OF AI APPLICATION IN RATIONAL PHARMACOTHERAPY

Nikola Stefanović¹, Ivana Damnjanović¹, Aleksandra Catić-Đorđević¹

¹ Department of Pharmacy, Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Objectives: Population pharmacokinetic, pharmacokinetic/pharmacodynamic models or pharmacometric (PMX) models support clinical decision-making by promoting rational pharmacotherapy and optimizing drug dosing considering patient-specific characteristics. This approach can significantly improve the efficacy and safety, particularly for drugs with narrow therapeutic indices and high interindividual variability. However, over the years, PMX models have become increasingly complex, requiring significant computational power to process large patient populations, whereas the identification of covariates remains the most time-consuming and challenging step. Therefore, integrating PMX with advanced tools such as artificial intelligence (AI) and machine learning (ML) can efficiently process large and diverse datasets, improving models by supplementing small sample sizes and more precisely estimating model parameters of interest (e.g., drug clearance).

Materials and methods: A review of recent literature and clinical applications was conducted to analyze the contribution of AI and ML to rational pharmacotherapy and precision drug dosing.

Results: ML algorithms are computationally efficient, have strong predictive capabilities, and enable learning in environments with large-scale datasets. These algorithms have been explored in various applications, including predicting drug concentrations or exposure, dose optimization, population pharmacokinetics and pharmacodynamics, and the development and support of model-informed precision dosing (MIPD) systems, etc.

Conclusion: Although AI and ML have gained considerable popularity in recent years, their application in rational pharmacotherapy and precision dosing is still in its early stages, yet shows great promise for the future.

Keywords: pharmacotherapy, precision dosing, pharmacometric models, artificial intelligence, machine learning

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UTILIZATION OF THE POWER OF GENERATIVE ARTIFICIAL INTELLIGENCE IN NEUROLOGY

Stevo Lukić ^{1,2}, Nataša Krstić ¹

¹ University Clinical Center of Niš, Niš, Serbia

² Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Objectives: To review current applications of generative artificial intelligence (GenAI) in neurology and to outline potential translational pathways for their integration into clinical practice.

Materials and methods: This work synthesizes recent findings from leading institutions and peer-reviewed studies, complemented by preliminary results from an ongoing Horizon project investigating the adoption of GenAI in healthcare systems within widening countries.

Results: Emerging evidence shows that GenAI can perform at, or in some cases beyond, the level of expert neurologists in complex diagnostic tasks, providing scalable solutions for resource-limited and overburdened healthcare systems. Nevertheless, significant ethical, regulatory, and infrastructural challenges remain. A robust human-centred evaluation framework is essential to ensure that clinician expertise continues to guide the development, validation, and safe deployment of AI-driven tools.

Conclusion: While large language models and other GenAI applications cannot replace clinicians, they are positioned to become indispensable collaborators in neurological care- enhancing diagnostic precision, clinical efficiency, and patient access. When guided by professional expertise, ethical oversight, and compassion, GenAI has the potential to help reestablish core ideals of healthcare: quality, affordability, and humane care for all.

Keywords: generative AI, large language models, neurology, healthcare



PERSPECTIVES ON ARTIFICIAL INTELLIGENCE AS A STUDY TOOL IN MEDICAL EDUCATION: INSIGHTS FROM SOLVING BIOSTATISTICAL PROBLEMS

Aleksandra Ignjatović^{1,2}, Lazar Stevanović³, Nikola Krstić¹, Marija Anđelković Apostolović^{1,2}, Miodrag Stojanović^{1,2}

¹ University of Niš, Faculty of Medicine, Niš, Serbia

² Public Health Institute of Niš, Niš, Serbia

³ University Clinical Centre of Niš, Niš, Serbia

Abstract

Objectives: Numerous studies have consistently demonstrated that artificial intelligence (AI) tools in medical education are an expanding pedagogical necessity rather than a fleeting novelty. A meaningful approach to the intentional integration of AI in medical education requires a systematic analysis of its functional characteristics across distinct educational domains. The aim of this paper is to present recent findings related to the application of AI tools in biostatistics, with particular emphasis on the identified functional characteristics and reported AI tool advancements.

Materials and methods: This study combined a narrative literature review with a descriptive analysis of the functional characteristics of artificial intelligence tools used to solve biostatistical problems in medical education.

Results: The results document the AI tools' ability to automate problem-solving in statistics, data visualisation, and the generation of educational content. Significant advancements have been made in solving biostatistics problems, resulting in reduced errors in result interpretation and faster statistical analyses.

Conclusion: AI tools demonstrate consistent progress within a short development period, suggesting additional potential for improving understanding, accuracy, and efficiency in solving statistical problems. Recent insights suggest that AI tools have great potential for transforming the teaching process into more interactive and personalised learning experiences. Despite all, the educator position remains essential in providing pedagogical guidance, ensuring ethical oversight, and maintaining academic relevance. The observed methodological shifts indicate a need for further exploration of the pedagogical value of AI tools, as well as for educating students on their application.

Keywords: medical education, artificial intelligence, ChatGPT, biostatistics

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ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION: PROS, CONS, AND RECOMMENDATIONS FOR RESPONSIBLE USE

Marija Anđelković Apostolović^{1,2}, Aleksandra Ignjatović^{1,2}, Miodrag Stojanović^{1,2}

¹ Department of Medical Statistics and Informatics, University of Niš, Faculty of Medicine, Niš, Serbia

² Public Health Institute of Niš, Niš, Serbia

Abstract

Background: The integration of Artificial Intelligence (AI) tools into higher education has accelerated in recent years, particularly with the emergence of large language models. However, their adoption also raises concerns regarding academic integrity, equity, and the long-term impact on critical thinking.

Objective: This study aims to provide a balanced overview of the benefits and drawbacks of AI in higher education, as well as to propose evidence-informed recommendations for its responsible use by students, educators, and academic institutions.

Methods: A narrative review was conducted, synthesising recent literature, institutional guidelines, and empirical case examples of AI use in university settings. The analysis focused on five key domains: teaching and learning, student support, faculty workload, academic integrity, and digital equity.

Results: AI enables adaptive learning, automated feedback, and multilingual support, contributing to more inclusive and personalised education. Conversely, risks include misuse for plagiarism, superficial engagement with content, and increased reliance on algorithmic tools. Disparities in access to AI technologies further exacerbate existing educational inequalities.

Conclusions: AI should be embraced as a complementary tool rather than a substitute for human-led education. Institutions must adopt clear policies on the ethical use of AI, promote AI literacy among stakeholders, and integrate AI thoughtfully into their educational programs.

Keywords: artificial intelligence, higher education, digital literacy, educational policy, AI ethics

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A DECADE OF HEALTH TRENDS IN SERBIA: ANALYSIS OF NATIONAL INDICATORS WITHIN THE WORLD HEALTH ORGANIZATION'S "HEALTH FOR ALL" DATABASE (WHO HFA-DB)

Jelena Milić^{1*}, Mirjana Živković-Šulović^{1*}, Margarita Dodevska¹, Ivan Ivanović¹

*equal share

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: Data from Serbia's annual reporting to the "Health for All" database (HFA-DB) were used. The analysis was conducted using a simple descriptive method—comparing trends over the ten-year period without the use of statistical modeling.

Materials and methods: Data from Serbia's annual reporting to the HFA-DB were used. The analysis was conducted using a simple descriptive method—comparing trends over the ten-year period without the use of statistical modelling.

Results: The total population decreased by more than half a million. The number of live births declined, but fertility slightly increased (from 1.4 to 1.6). There was a decrease in abortions, especially among youth (<20 years), while the number of births among women aged 35+ increased. Perinatal mortality is decreasing, while the prevalence of breastfeeding is declining. The number of new cancer and diabetes cases shows a slight increase. Risk factors such as smoking and foodborne diseases show downward trends. The share of health expenditure in gross domestic product is decreasing, primarily due to high pharmaceutical costs.

Conclusion: Regular and high-quality reporting by Serbia to the HFA-DB enables the timely identification of public health challenges and the allocation of resources to priority areas. The national contribution also holds international significance, as it facilitates comparative analysis and supports a joint response to regional health challenges.

Keywords: HFA database, health indicators, public health, descriptive analysis.



SESSION: PERSPECTIVES OF INFORMATION AND COMMUNICATION TECHNOLOGIES AND HEALTH CARE

POSTER PRESENTATIONS

DAGS, SWIGS, AND AMWN: A PRAGMATIC COMPARISON FOR EPIDEMIOLOGIC CAUSAL QUESTIONS

Vladica Veličković¹, Aleksandar Višnjić^{2,3}, Tamara Jovanović^{2,3}

¹ Institute of Public Health, Medical Decision Making and Health Technology Assessment, University for Health Sciences, Medical Informatics and Technology (UMIT), Hall in Tirol, Austria

² University of Niš, Faculty of Medicine, Niš, Serbia

³ Public Health Institute of Niš, Niš, Serbia

Abstract

Objectives: Compare Directed Acyclic Graphs (DAGs), Single World Intervention Graphs (SWIGs), and Ancestral Multi-World Networks (AMWN) for common epidemiologic targets, highlighting when each is sufficient and where extensions are needed.

Materials and methods: Conceptual review across three axes: (i) representation, observational vs. interventional vs. multi-world counterfactuals; (ii) identification tools, associational rules, do-calculus/SWIG semantics, and counterfactual-calculus on AMWN; (iii) applicability under interference and system dynamics.

Results: DAGs succinctly encode confounding structures for associational and interventional questions but cannot express cross-world contrasts. SWIGs keep single-world clarity for $E[Y(a)]$ and dynamic regimes, aligning with g-methods; however, they become ad-hoc for attribution (PN/PS), treatment-on-the-treated, and path-specific effects. AMWN minimally extends SWIG logic to represent multiple counterfactual worlds, enabling rule-based identification of these targets while remaining backward-compatible (when worlds do not mix, AMWN reduces to a SWIG). Under interference and evolving networks, AMWN can be paired with simple design constraints (finite-speed reach and lag-aware sampling) to keep assumptions transparent.

Conclusion: Use DAGs for confounding control, SWIGs for single-world interventions, and AMWN when the estimand inherently mixes counterfactual worlds. This division clarifies assumptions and streamlines identification without changing familiar estimation workflows.

Keywords: directed acyclic graphs, single world intervention graphs, ancestral multi-world networks, counterfactual calculus, interference



ARTIFICIAL INTELLIGENCE IN HEALTHCARE: THE BORDER BETWEEN ASSISTANCE AND CYBERCHONDRIA

Jovana Milošević¹, Momčilo Mirković¹, Slađana Đurić¹, Danijela Ilić¹, Tamara Jovanović^{2,3}, Tatjana Bošković Matic⁵, Nenad Milošević^{6,7}

¹ Department of Preventive Medicine, Faculty of Medicine, University of Priština – Kosovska Mitrovica, Kosovska Mitrovica, Serbia

² Department of Social Medicine, Faculty of Medicine in Nis, University of Nis, Serbia

³ Institut of Public Health, Nis

⁴ Department of Neurology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁵ Clinic of Neurology, University Clinical Center of Kragujevac, Kragujevac, Serbia

⁶ Clinic of Neurology, Clinical Hospital Center Priština, Gračanica, Serbia

⁷ Department of Neurology, Faculty of Medicine, University of Priština – Kosovska Mitrovica, Kosovska Mitrovica, Serbia

Abstract

Objectives: This analysis examines the impact of artificial intelligence (AI) applications in healthcare on the development of cyberchondria, with a focus on its psychological, social, and medical implications in Serbia and developed countries.

Materials and methods: The framework of the work is based on a qualitative analysis of available sources, as well as relevant scientific and professional literature in the fields of AI, digital health, and cyberchondria.

Results: In developed countries (the USA, Great Britain, Germany), AI is already integrated into healthcare systems. It is precisely in these societies that cyberchondria is more pronounced, because digitally literate patients often independently interpret data, thereby increasing their sense of anxiety. Around 20% of people worldwide experience an increase in health anxiety after browsing the internet, while differences in groups, such as students, especially medical students and employees in the IT sector, show significantly higher rates of cyberchondria (from 50% to as much as 85%). In Serbia, AI is primarily used in the field of radiology and in the digitization of medical records.

Conclusion: AI in healthcare carries a dual potential. The key challenge is finding a balance between benefits and risks. Educational programs for patients need to be developed and the limitations of AI tools need to be clearly emphasized to prevent misunderstandings.

Keywords: artificial intelligence, cyberchondria, healthcare



SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF NON-COMMUNICABLE DISEASES

INVITED LECTURES

PREVENTION OF CARDIOVASCULAR DISEASES THROUGH UROLOGICAL PRACTICE

Goran Arandelović ¹

¹ Santi Giovanni e Paolo hospital, Venice, Italy

Abstract

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality, affecting over 523 million people globally. Half of the CVD deaths are attributed to ischemic heart disease (IHD) a quarter to ischemic stroke and another quarter to another events. The global increase in CVDs events inevitably increased the absolute burden for health systems and resource availability, with the impact of the COVID-19 pandemic on longer-term trends in CVD yet to be clearly established.

Thus, the prevention of CVD is of essential importance in medicine nowadays. Other medical specialities, as urology, could be of the highest importance in this field. The link between erectile dysfunction and (ED) and CVD is well established given that two pathologies share the same risk factors, positioning the ED as a very potent predictor of subclinical and clinical CVD events.

Keywords: cardiovascular disease, urology, prevention



CONTEMPORARY APPROACH AND CHALLENGES IN PRIMARY AND SECONDARY PREVENTION OF MELANOMA

Danica Todorović^{1,2}

¹ Faculty of Medicine, University of Niš, Niš, Serbia

² University Clinical Center Niš, Niš, Serbia

Abstract

Melanoma is the most aggressive malignant tumor of the skin, the incidence of which has increased significantly in recent years. If the diagnosis is made at an early stage, 90% of the patient survives for 5 years, but if the disease has spread regionally, this percentage is 60% and only 15% if distant metastases are initially diagnosed. While in developed countries 80% of melanomas are diagnosed at an early stage, due to well-organized campaigns for the prevention and early diagnosis of melanoma, in Serbia, although the number of early diagnosed melanomas has increased significantly, 30% to 40% of patients are still diagnosed with high-risk melanomas. Primary prevention includes strategic measures to improve the protection of the population from UV radiation, such as avoiding unnecessary and excessive exposure to the sun without adequate protection, increasing the possibility of protection in open spaces, as well as reducing or eliminating the risk of using a solarium. Secondary prevention involves early diagnosis of melanoma. It includes education of the population about regular self-examination of the skin, education of health workers about melanoma recognition and referral for dermoscopy, as well as education of dermatologists about the correct application of dermoscopy. Today, dermoscopy is an indispensable part of every dermatological examination. It is a non-invasive diagnostic method that represents the link between clinical dermatology and dermatopathology and is indispensable in the evaluation of both pigmented and a pigmented skin lesions. A dermatologist experienced in dermoscopy can diagnose melanoma in situ, when simple surgical excision is the only form of therapy, which is the dermatologist's goal. By implementing primary and secondary prevention, as well as by overcoming challenges, the occurrence of melanoma can be prevented, and at the same time, the incidence of early diagnosed melanomas can be increase

Keywords: melanoma, primary and secondary prevention



PREVENTION OF TYPE 1 DIABETES-CURRENT PERSPECTIVES

Vojislav Ćirić^{1,2}

¹ University of Niš Medical Faculty of Medicine, Niš, Serbia

² University Clinical Center of Niš, Niš, Serbia

Abstract:

Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease associated with numerous complications, reduced quality of life, and shortened life expectancy. The incidence and prevalence of T1DM are increasing globally. T1DM has clearly defined stages of development before the onset of clinically manifest diabetes, so potential preventive measures according to the stages of the disease can be divided into primary, secondary, and tertiary. Due to many years of unsuccessful attempts to prevent T1DM, screening for T1DM is still not widely implemented in the general population, but is primarily focused on first-degree relatives of people with type 1 diabetes, who represent the population at the highest risk of developing T1DM. A turning point in this field came in 2022, when the first drug (teplizumab) was approved that can delay the onset of clinically manifest T1DM in individuals in stage 2 prediabetes. Many other immunomodulatory drugs are still in the investigational phase. Another area of development in T1DM prevention is broad population-based screening using genetic and immunological markers of T1DM through public health and research projects. Identified high-risk individuals and their family members are educated about the symptoms of diabetes and regularly monitored. In this way, they can be included in prevention programs, achieve earlier detection of manifest diabetes, improve glycemic control, and reduce complications and disease burden. The proposed **Program for the Prevention and Control of Diabetes in the Republic of Serbia 2025–2029** includes some elements of early detection of T1DM.

Keywords: type 1 diabetes, prevention, screening



SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF NON - COMMUNICABLE DISEASES

ORAL PRESENTATIONS

DEPRESSION AND CANCER – A LITERATURE REVIEW

Snežana Živković Perišić¹, Dragan Miljuš¹, Nataša Mickovski Katalina¹, Ivana Rakočević¹, Snežana Plavšić¹, Aleksandra Radomirović¹, Zorica Božić¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: This paper aims to explore the prevalence of depression among cancer patients, identify the psychological and biological mechanisms linking the two conditions, and highlight the importance of early diagnosis and an integrated treatment approach.

Materials and methods: A review of relevant scientific literature in the fields of psychiatry, oncology, and health psychology was conducted. The analysis included clinical studies, systematic reviews, and meta-analyses published over the past ten years. Special attention was given to the prevalence of depression in oncology, diagnostic tools, and therapeutic strategies.

Results: Depression affects between 20% and 40% of patients diagnosed with cancer and is frequently underdiagnosed and untreated. Risk factors include cancer type and stage, chronic pain, disability, social isolation, and low levels of support. There is a strong association between depression and poorer treatment outcomes, lower adherence to therapy, and reduced quality of life.

Conclusion: Depression and cancer are inter-related through complex psychological and biological pathways. Timely recognition and appropriate psychosocial and pharmacological interventions can significantly improve treatment outcomes and quality of life. A multidisciplinary approach involving oncologists, psychiatrists, and psychologists is essential in comprehensive cancer care.

Keywords: depression, cancer, health psychology



REGISTRATION OF PSYCHOSIS IN SERBIA

Snežana Živković Perišić¹, Dragan Miljuš¹, Nataša Mickovski Katalina¹, Ivana Rakočević¹, Snežana Plavšić¹, Aleksandra Radomirović¹, Zorica Božić¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: The aim of this paper is to provide insight into the psychosis registration system in Serbia through analysis of available data and incidence trend, with the purpose of identifying existing challenges and proposing measures to improve the registration system.

Materials and methods: The study analyzed data from the psychosis register, hospitalization reports from the Institute of Public Health "Dr Milan Jovanović Batut," and professional literature in the fields of psychiatry and public health. The analysis covers data collected during 2024, including detailed descriptive data processing and comparison with previous relevant data.

Results: Data from 2024 show a slight increase in reported psychosis cases, especially in urban areas. However, there is evidence that a significant number of cases remain unregistered, which can be attributed to multiple factors, such as limited diagnostic capacity and unequal availability of psychiatric care across different regions.

Conclusion: The psychosis registration system in Serbia requires improvement through better integration of primary, secondary, and tertiary healthcare, continuous education of healthcare professionals, and intensified efforts to combat stigma. Accurate and timely registration is essential for planning effective mental health interventions.

Keywords: psychosis, mental health



SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF NON-COMMUNICABLE DISEASES

POSTER PRESENTATIONS

CHILDREN WITH MODERATE MENTAL RETARDATION IN THE REPUBLIC OF SERBIA

Dragan Miljuš¹, Snežana Plavšić¹, Snežana Živković Perišić¹, Nataša Mickovski Katalina¹, Ivana Rakočević¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: Analysis of some epidemiological characteristics of children with Moderate Mental Retardation (MMR) in the Republic of Serbia.

Materials and methods: Data from the Register of children with disabilities in Serbia, for children aged up to 19 with a diagnosis of MMR (ICD-10: F71) for the period 2015-2024, were analyzed. Proportions and χ^2 test were used.

Results: In this period, a total of 245 children with MMR were recorded, double times more boys (164) than girls (81). On average, the diagnosis of MMR was made at the age of 8, and the most common diagnoses were MMR -With no or minimal impairment of behavior (83.3%) and MMR -Significant impairment of behavior requiring attention or treatment (15.1%). The fewest children (0.8%) had MMR -With other impairments of behavior and without mention of impairment of behavior. Most of these children ($p < 0.05$) had severe and complete difficulties in the domain of cognitive (58.1%) and socioemotional functions (37.6%), while the aforementioned difficulties in the sensory domain were not recorded. One in four children with MMR ($p < 0.05$) had epilepsy (18.8%) and/or some congenital disease (7.3%).

Conclusion: Early inclusion of children with MMR in educational and social settings enables better outcomes in later life.

Keywords: children, moderate mental retardation



PREMATURE MORTALITY RATES FROM THE LEADING NON-COMMUNICABLE DISEASES, REPUBLIC OF SERBIA, 2014– 2023

Snežana Plavšić¹, Dragan Miljuš¹, Ivana Rakočević¹, Snežana Živković Perišić¹, Nataša Mickovski Katalina¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: Analysis of the premature mortality rates from the leading non communicable diseases (NCDs) in the Republic of Serbia.

Materials and methods: The rates of premature (30-69 years) mortality from the leading NCDs (cardiovascular diseases, cancer, diabetes and chronic obstructive pulmonary diseases) in Serbia in the period 2014-2023.

Results: Premature mortality is defined (WHO) as death occurring at a younger age than expected, with the usual reference value of 30-69 years of age. In the observed period, the greatest reduction in premature mortality was observed in the group of malignant tumors (12.1%), followed by chronic obstructive pulmonary diseases (5.2%) and cardiovascular diseases (3.9%). In the same period, an increase in premature mortality from diabetes was observed by 1.1%. This indicates that national NCDs prevention strategies and programs implemented over the past decade have been effective. Although progress has been made, significant challenges in the prevention and control of NCDs remain.

Conclusion: Premature mortality is an indicator of the state of public health and reflects the harmful consequences of population aging, inequalities in health, as well as the burden of NCDs, thus emphasizing the need to improve the health care system. Reducing premature mortality contributes to the long-term value of society and improves the quality of life of citizens.

Keywords: premature mortality, non-communicable diseases



BURDEN OF BLADDER CANCER AMONG MEN IN THE REPUBLIC OF SERBIA

Snežana Plavšić¹, Snežana Živković Perišić¹, Dragan Miljuš¹, Nataša Mickovski Katalina¹, Ivana Rakočević¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: Analysis of the burden of bladder cancer among men in the Republic of Serbia.

Materials and methods: Data on new cases and deaths from bladder cancer in the Cancer Registry in Serbia for the period 2014-2023 were analyzed. Age-standardized incidence and mortality rates per 100,000 men, were calculated using the direct method in the world population.

Results: Bladder cancer in men was the fourth (7.4%) leading localization in incidence and the sixth (4.6%) leading localization in mortality in Serbia. In 2023, 1,628 new cases and 505 deaths from these malignant tumors were registered. The standardized incidence rate in our country was 22.4, and the mortality rate was 6.0. These rates were at the level of the average standardized incidence and mortality rates in Europe. In the last ten years, the incidence of bladder cancer increased by 16.1%, while mortality rates remained the same. In the next 20 years, the incidence of this cancer is expected to increase by 4%, while mortality will remain at the same level.

Conclusion: According to estimates by the International Agency for Research on Cancer, men in Serbia are in the group of countries with an average burden of bladder cancer in Europe.

Keywords: burden, bladder cancer



THE INCIDENCE OF BRAIN, CENTRAL NERVOUS SYSTEM CANCER IN THE REPUBLIC OF SERBIA AND EUROPE

Dragan Miljuš¹, Snežana Živković Perišić¹, Snežana Plavšić¹, Nataša Mickovski Katalina¹, Ivana Rakočević¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: Analysis of the incidence of brain cancer in the Republic of Serbia and Europe counties.

Materials and methods: Data from the Cancer registries in Serbia and Europe counties on the age-standardized incidence (ASR-W) of brain and central nervous system cancer - BCNC (ICD10: C70-72) for the year 2023 were used.

Results: In terms of frequency, brain cancer (BCNC) was the 10th localization (2.2%) in Serbia and the 15th (1.6%) in the European region. In 2023, almost 68,000 new diagnoses of these malignant tumors were registered in Europe and 921 new cases in Serbia. The ASR was 4.3/0000 in Serbia, and the average was 5.6/0000 in Europe. Brain cancer accounted for 92.5% of new BCNC cases. ASR in Serbia were higher in men (4.6) than in women (3.7). In the last ten years in Serbia, the incidence of BCNC has increased by 9.1%. The incidence of BCNC varies in European countries. The lowest ASR were recorded in Luxembourg (3.2), and the highest in Iceland (13.9).

Conclusion: In the next two decades, a slow increase in the incidence of BCNC is expected in Serbia, while a faster and greater increase in the incidence of these malignant tumors is expected in the north and south of Europe.

Keywords: incidence, brain cancer



TEMPORAL TRENDS IN ACS MORTALITY IN REGIONS OF SERBIA, 2009-2023

Nataša Mickovski Katalina¹, Aleksandar Medarević¹, Dragan Miljuš¹, Ivana Rakočević¹, Snežana Plavšić¹, Snežana Živković Perišić¹, Aleksandra Radomirović¹, Zorica Božić¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

This observational study analyzed acute coronary syndrome (ACS) mortality data by gender and age in regions of Serbia from 2009-2023. Age-adjusted mortality rates (AAMRs) from ACS (ICD 10: I21, I22, I20.0) for people 20+ ages were calculated using European population as standard and expressed per 100,000 person-years by gender and age group in regions. Mortality trends were assessed using joinpoint regression analysis by calculating the average annual percentage change (AAPC). Belgrade had the largest ACS mortality drop, with a slightly larger decrease for women. Vojvodina and South-Southeast saw larger AAMR decreases in men. Šumadija-West had the smallest AAMR decreases for both sexes. The largest AAMRs decrease in men aged 30-39, 40-49 (AAPC = -7.7%; $p < 0.05$), 50-59 (AAPC = -6.0%; $p < 0.05$) and 70+ (AAPC = -5.3%; $p < 0.05$) was recorded in Belgrade. The biggest decrease in AAMRs for the 60-69 age group was seen in Vojvodina (AAPC = -6.3%; $p < 0.05$). For women, Belgrade saw the largest AAMR decrease in all but the 60-69 age group. For this age group, the largest decline was in South-Southeast (AAPC = -6.8%; $p < 0.05$). Šumadija-West had the smallest AAMR decrease. The causes of regional differences are multicausal and require further research.

Keywords: temporal trends, acute coronary syndrome, mortality



MORTALITY FROM CEREBROVASCULAR DISEASES BY GENDER IN DISTRICTS OF SERBIA, 2023

Nataša Mickovski Katalina¹, Dragan Miljuš¹, Ivana Rakočević¹, Snežana Plavšić¹, Snežana Živković Perišić¹, Aleksandra Radomirović¹, Zorica Božić¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

This observational study analyzed cerebrovascular mortality data by gender in districts of Serbia in 2023. Age-adjusted mortality rates (AAMRs) from cerebrovascular diseases (ICD X revision: I60-I69) for all ages were calculated using European population as standard and expressed per 100,000 person-years (PY) by gender in districts of Serbia in 2023. The districts in Serbia were ranked by AAMRs height, stratified by gender. Men had slightly higher rates on average than women. Total number of cerebrovascular deaths in men was 3885, with AAMR of 74.0/100,000 PY. The rate range was 57/100,000 PY. Districts with low cerebrovascular AAMRs of 50.0-64.0/100,000 PY were Kolubara, Moravica, South Backa, Bor and Belgrade. Districts with the highest AAMRs exceeding >94.1/100,000 PY were Zlatibor, Rasina, North Banat, Pirot, and West Backa. The situation is slightly different in women. Total number of cerebrovascular deaths in women was 4299, with AAMR of 56.7/100,000 PY. The rate range was 49/100,000 PY. Districts with the lowest cerebrovascular AAMRs of 46.0-50.0/100,000 PY were Belgrade, Moravica, South Backa, Bor, Zajecar, Srem and Danube. Districts with AAMRs higher than 80.0/100,000 PY were Rasina and Pirot. When planning preventive activities, always look at local circumstances and adapt them to the existing situation.

Keywords: cerebrovascular diseases, mortality, gender, district



EXCESS MORTALITY AND DECLINING BIRTHS DURING THE COVID-19 PANDEMIC IN EUROPE: A P-SCORE ANALYSIS FROM 40 COUNTRIES

Aleksandar Medarević¹, Nataša Mickovski Katalina¹, Maja Stošić¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

The aim of the study was to analyse birth and their correlation with excess mortality in 40 European countries during the pandemic, compared to the period 2010-2019.

P-scores (percentage change from the 2010-2019 average) were calculated for 2020-2022 deaths and live births, categorizing countries as EU or non-EU. P-score is expressed as a percentage. Linear regression was used to analyse the relation between excess mortality and subsequent fertility decline ($p < 0.05$).

Non-EU countries' median excess mortality P-scores were 17.5%, 23.6%, and 10.7% (2020, 2021, 2022) respectively, versus 14.1%, 18.3%, and 14.3% in EU countries. Live birth P-scores for non-EU states were -9.2, -5.3 and -11.8, and -6.9, -6.4 and -9.2 in EU states. Higher excess mortality in one year often correlated with fewer births the next year.

Scandinavian countries had less pronounced negative consequences, with birth rates often being preserved.

The findings of this study support the thesis that the pandemic has had a significant impact on demographic trends but also point to inequalities in the impact of the pandemic between EU and non-EU countries.

Keywords: COVID-19, p score, excess mortality, live births



ENHANCEMENT OF DIABETES SELF-MANAGEMENT THROUGH PHARMACIST SUPPORT

Ana Kundalić¹, Andrijana Perić¹, Aleksandar Jovanović¹, Branka Mitić^{2,3}, Radmila Veličković Radovanović^{2,3}, Aleksandra Catić Đorđević¹

¹ Department of Pharmacy, Faculty of Medicine, University of Niš, Niš, Serbia

² Faculty of Medicine, University of Niš, Niš, Serbia

³ Clinic of Nephrology, University Clinical Center of Niš, Niš, Serbia

Abstract

Objectives: To evaluate the impact of a standardized, pharmacist-led diabetes mellitus (DM) service on self-management behaviors among patients with poorly controlled DM in Southeastern Serbia.

Materials and methods: Adults aged ≥ 18 years with type 1 or type 2 DM and HbA1c $\geq 7\%$ were included. Self-management behavior was assessed at baseline and after a four-month pharmacist-led service using a culturally adapted Diabetes Self-Management Questionnaire (DSMQ). The total score ranged from 0–10, with higher scores indicating better self-care. A cut-off score of ≤ 5 identified suboptimal practices across five subscales: medication taking, glucose monitoring, eating behaviour, physical activity, and cooperation with the diabetes team.

Results: A total of 105 patients were included. The total DSMQ score increased significantly at follow-up ($p < 0.001$), with improvements across all subscales. The proportion of participants with suboptimal self-care decreased in every domain. Medication-taking adherence improved notably, with nonadherent patients decreasing from 43.8% to 22.9% ($p < 0.001$), and the mean number of missed medication days reduced from 0.82 ± 1.01 to 0.46 ± 0.73 ($p < 0.05$). Greater improvements were observed in patients with a family history of DM, type 2 DM, oral antidiabetic therapy, and > 2 comorbidities.

Conclusion: A structured, pharmacist-led DM service significantly improved self-management behaviors, particularly medication adherence, underscoring the role of pharmacists in supporting sustained behavioral change in primary care.

Keywords: diabetes mellitus, pharmacist-led intervention, self-management, DSMQ, medication adherence

Acknowledgements: This research was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, Grant No: 451-03-137/2025-03/200113.



MORTALITY FROM MALIGNANT NEOPLASMS IN NORTH MACEDONIA (2010 - 2023)

Hristina Vasilevska¹, Martina Markova Juzevska¹, Monika Stojchevska², Aleksandra Stamenova²

¹ Center of Public Health of Bitola, Bitola, North Macedonia

² Institute of Social Medicine, Faculty of Medicine, University Ss Cyril and Methodius, Skopje, North Macedonia

Abstract

Objectives: The aim of the paper is to present the mortality rate of malignant neoplasms in the Republic of North Macedonia for the period 2010-2023.

Materials and methods: Data from the malignant neoplasms registry of the Institute of Public Health - Skopje were used. A retrospective work method was used.

Results: In the specified period, the mortality rate ranges from 180.3 per 100,000 population in 2010 to 205.0 per 100,000 population in 2023. The mortality rate from malignant neoplasms is higher in male population. In men, the most common cause of death is malignant neoplasm of the bronchus and lungs, and in women, malignant neoplasm of the breast.

Conclusion: Many health systems around the world are ill-equipped to manage this burden. In countries where health systems are strong, survival rates are improving thanks to the availability of early detection, quality treatment, and survivorship care.

Keywords: malignant neoplasms, mortality



THE NEGATIVE IMPACT OF MEDICATIONS ON CHRONIC WOUND HEALING

Ivana Damnjanović¹, Zoran Damnjanović^{2,3}, Sanja Stojanović⁴

¹ University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia

² University of Niš, Department Surgery and Anesthesiology and reanimatology, Niš, Serbia

³ University Clinical Center Niš, Clinic of Vascular Surgery, Niš, Serbia

⁴ University of Niš, Faculty of Medicine, Department of Biology and Human Genetics, Niš, Serbia

Abstract

Objectives: Patients with chronic wounds often have multiple comorbidities and are frequently on polypharmacy, with medications that can either support or impair different phases of wound healing. The aim of this study is to evaluate the presence of medications that may affect the chronic venous ulcer healing.

Materials and methods: This prospective study included 33 patients with venous ulcers who were treated at the Clinic for Vascular Surgery of the University Clinical Center in Niš, between January 1, 2024, and July 1, 2025. All patients underwent a thorough medical review, which included an assessment of commonly used medications known to significantly impact wound healing, such as antibiotics, anticoagulants, nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and chemotherapeutic agents, as part of the study protocol.

Results: Out of 33 patients (16 males, 17 females; mean age 65.55), 21 had nonhealing wounds after three months. These patients, all treated according to the standard wound care protocol, were additionally administered NSAIDs (80%), antibiotics (66.67%), and oral anticoagulants (26.67%).

Conclusion: The use of NSAIDs, antibiotics, and oral anticoagulants may negatively impact the healing of venous ulcers. Therefore, it is important to consider additional therapies alongside the standard wound healing treatment.

Keywords: medications, healing, chronic venous ulcer

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CHRONIC KIDNEY DISEASE IN THE TERRITORY OF PHI CENTER FOR PUBLIC HEALTH BITOLA, 2020–2024

Jovan Todorovski¹, Svetlana Popovska Kljuseva¹, Katarina Vidoeska², Marija Torkovska Petrovska³, Liljana Todorovska³

¹ Public Health Institute of Bitola, Center for Public Health, Bitola, North Macedonia

² Public Health Institute of Tetovo, Center for Public Health, Tetovo, North Macedonia

³ Clinical Hospital "Dr Trifun Panovski" Bitola, Bitola, North Macedonia

Abstract

Objectives: To analyze the number of patients, treatment methods, and causes of Chronic Kidney Disease (CKD) in the region covered by the Public Health Center Bitola during 2020–2024.

Materials and methods: Data from the "Moy Termin" system and reports from the Public Health Center Bitola were analyzed. The dataset included 152,284 residents from six municipalities (Bitola, Kičevo, Resen, Demir Hisar, Novaci, and Mogila). Cases were classified by sex, year, and ICD-10-AM codes. Statistical analysis was performed using SPSS version 27.

Results: A total of 1918 CKD cases were reported (57.1% men, 42.9% women, $p < 0.001$). Hemodialysis was performed on 371 patients, with men accounting for 69.3%. The annual percentage of patients on dialysis varied from 14.3% to 44.5%, with an average of 19.3%. Hemodialysis rates per 100,000 population was from 31.5 in 2020 to 60.5 in 2024. The main causes of CKD included genitourinary diseases (38.3%), diabetes (30.9%), and hypertension (25.3%).

Conclusion: Between 2020 and 2024, about one in five CKD patients began hemodialysis, predominantly men. These findings emphasize the importance of targeted prevention, early diagnosis, and effective treatment strategies to reduce CKD burden in the region.

Keywords: chronic kidney disease (CKD), hemodialysis, epidemiology



RIISING BURDEN OF LUNG CANCER AMONG WOMEN IN THE AUTONOMOUS PROVINCE OF VOJVODINA, SERBIA: REGIONAL DISPARITIES AND TRENDS (2010-2021)

Marijana Srećković^{1,2,3}, Tihomir Dugandžija^{1,4}, Daliborka Bursać^{1,5}, Branko M. Vujković³, Igor Dragičević³, Nataša Čapo^{1,6}, Jelena Đekić Malbaša^{1,5}

¹ Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia

² Academy of Applied Studies of Šabac, Šabac, Serbia

³ Institute of Public Health of Šabac, Šabac, Serbia

⁴ Oncology Institute of Vojvodina, Novi Sad, Serbia

⁵ Institute of Pulmonary Diseases of Vojvodina, Novi Sad, Serbia

⁶ Pasteur Institute of Novi Sad, Novi Sad, Serbia

Abstract

Objectives: To examine lung cancer (LC) incidence and mortality among women in the Autonomous Province (AP) of Vojvodina and Central Serbia (CS) from 2010 to 2021, assessing gender differences, regional disparities, and temporal trends.

Materials and methods: Data from the Cancer Registries of AP Vojvodina and Serbia were analyzed. Age-standardized incidence and mortality rates were calculated, and trends assessed.

Results: Women in AP Vojvodina had significantly higher LC incidence (27.3 ± 5.9 vs. 22.5 ± 3.4 ; $p=0.03$) and mortality (21.5 ± 1.5 vs. 17.4 ± 1.0 ; $p=0.001$) than in CS. From 2010 to 2021, incidence rose by 5.04% annually and mortality by 1.28%. Male-to-female incidence and mortality ratios decreased from 3.3 to 2.2 and from 3.6 to 2.2, respectively, in AP Vojvodina. The highest incidence growth occurred in West Bačka (6.5%) and Srem (7.1%). Regional rates ranged from 24.8 (North Banat) to 31.2 (North Bačka) for incidence, and from 18.9 (Srem) to 25.1 (North Bačka) for mortality.

Conclusion: The burden of LC among women in AP Vojvodina is increasing, with pronounced regional disparities. These findings highlight the urgent need for targeted public health interventions, including smoking cessation, reduction of environmental risk factors, promotion of LC screening, and strengthening of the Cancer Registry to improve surveillance and support the development of a nationwide screening program.

Keywords: lung cancer, women, incidence, mortality



THE ROLE OF THE MEDITERRANEAN AND BLACK SEA PROGRAMME FOR INTERVENTION EPIDEMIOLOGY TRAINING (MEDIPIET) IN THE STRENGTHENING OF PUBLIC HEALTH COMPETENCIES IN THE AREA OF FIELD EPIDEMIOLOGY, 2013-2024

MediPIET Alumni Network Collaborating Group. The list of collaborators*: Milena Baiduri, Hind Bouguerra, Sonia Dhaouadi, Alina Druc, Petar Đurić, Zeina Farah, Lika Karichashvili, Molka Osman, Mariam Pashalishvili, Ayham Sawalmeh, Anisa Xhaferi

Abstract

Introductions: Launched in 2013, MediPIET aims to strengthen field epidemiology competencies for the prevention and control of infectious diseases across the region. To sustain its long-term impact, the MediPIET Alumni Network (MediAN) was established. This communication highlights the Program's results and the role of MediAN in maintaining and expanding its benefits.

Methods: Quantitative and qualitative data from 2013 to 2024 were compiled from ECDC and national-level sources. Quantitative indicators included the proportion of fellows who graduated and the number of countries participating in the fellowship. Qualitative information summarized key achievements in capacity building, cross-border collaboration, and institutional development.

Results: From 2013 to 2024, five MediPIET cohorts trained 71 fellows from 14 countries, with 49 (69.0%) graduated fellows to date. Professionals from seven other countries attended individual modules as external participants. Alumni have delivered cascade field epidemiology training programs at national and regional levels, contributing to emergency responses, notably during the COVID-19 pandemic. MediAN supports mentorship, collaboration, sharing of field experience, and professional networking.

Conclusion: The first five MediPIET cohorts have substantially enhanced national and regional epidemiological capacity, generating a spillover effect through alumni-led cascade training. MediAN unites graduates to promote continued networking, collaboration, and knowledge exchange, thereby supporting regional public health resilience.

Keywords: field epidemiology, training program, capacity building, alumni network



QUALITY OF LIFE IN WOMEN WITH INFERTILITY

Milena Zlatanović¹, Svetlana Radević², Milena Despotović², Nikola Savić³, Christos Alexopoulos¹

¹ The Academy of Applied Preschool Teaching and Health Studies of Kruševac, Department of Medical Studies, Čuprija, Serbia

² Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

³ Faculty of Business Valjevo, Department of Healthcare, Singidunum University, Valjevo, Serbia

Abstract

Objectives: The aim of this study was to evaluate the quality of life of women facing infertility and to identify the factors influencing its different domains. The findings are intended to contribute to a better understanding of women's needs and to guide more comprehensive approaches in infertility treatment.

Methodology: The study was conducted in four specialized infertility treatment centers and included 378 women aged 21–48 years (mean 35.2±5.5). The FertiQoL questionnaire was used to evaluate quality of life.

Results: The mean overall FertiQoL score was 69.3±11.1, indicating a reduced quality of life. The mean score on the Core FertiQoL subscale was 72.8±14.4, while the Treatment FertiQoL domain scored 63.1±11.1. The lowest values were observed in physical, emotional, and social functioning. The psychosocial burden was significant: 27.2% of women reported behavioral changes after starting treatment, 4.1% felt diminished self-worth, and 2.8% reported family violence due to infertility. Women from rural areas had higher quality of life scores in the treatment domain (p=0.018), while women over 40 years had lower scores in the treatment impact subscale. Better financial status was associated with higher scores in social relationships and support (p=0.020).

Conclusion: Women facing infertility experience reduced quality of life, particularly in emotional and social domains. These results highlight the need for integrated support that combines medical, psychological, and social interventions.

Keywords: infertility, women, quality of life, FertiQo



FACTORS ASSOCIATED WITH THE OCCURRENCE OF DEPRESSIVE SYMPTOMS AMONG PRIVATE SECURITY SECTOR WORKERS IN THE REPUBLIC OF SERBIA

Dejan Veljković¹, Slobodanka Milovanović²

¹ Ministry of Internal Affairs, Gendarmerie Detachment in Kraljevo, Kraljevo, Serbia

² Institute of Occupational Safety and Health of Serbian Railways' Employees, Niš, Serbia

Abstract

Introduction. Depression is one of the most prevalent mental health disorders worldwide, affecting around 350 million people and the World Health Organization (WHO) predicts that by 2030, depressive disorders will become the leading cause of disability worldwide. The objective of the paper was to identify factors associated with appearance of depressive symptoms among security officers of the professional private security sector in Serbia.

Methods. A multicenter cross-sectional study on a representative sample in seven cities in Serbia was performed. Epidemiological questionnaire, The Patient Health Questionnaire-9 (PHQ-9) and were used for collecting data and a Spearman's correlation was done.

Results. A total number of responders was 373 (330 males and 23 females) and the response rate was 80%. Men represented 93.5% of all participants, and they were significantly older than women: 44.09 ± 11.44 vs. 36.91 ± 7.92 years ($F=8.752$; $p=0.003$). According to our study data one third-33.5% out of all responders had depressive symptoms and 76.5% of employees had no depressive symptoms. Subclinical depression was observed in 71 (20.1%), while 9 (2.6%) had mild depressive episodes and less than 1% had moderate to severe depression. By applying Spearman's correlation to the PHQ-9 scores and the participants' age, a significant positive correlation was found ($r=0.185$; $p=0.001$). As the participants' age increases, the level of depression measured by the PHQ-9 score also increases. A significant positive correlation was also found between the values of the PHQ-9 score and the length of employees' work experience, with (r_s)= 0.187 ; $p=0.001$). As the years of work experience increased, the level of depression on the PHQ-9 also increased. A significant positive correlation was found between the PHQ-9 scores and the length of participants' work tenure in their current agency ($r=0.120$; $p=0.025$). As the number of years spent working in the same agency increases, the PHQ-9 score also tends to increase.

Conclusion. An increase in the number of years of employment, longer work experience, and longer work experience at the same security agency were significantly correlated with an increase in the prevalence of depressive symptoms among employees.

Keywords: depressive symptoms, security employees, professional private sector



SOCIO-DEMOGRAPHIC AND PSYCHOSOCIAL PREDICTORS OF IMPAIRED QUALITY OF LIFE IN PSORIASIS PATIENTS: IMPLICATIONS FOR PREVENTIVE MEDICINE

Ardea Milidrag¹, Ana Ravić-Nikolić¹, Mile Despotović², Nikola Savić³, Medo Gutić¹

¹ University of Kragujevac, Faculty of Medical Sciences, Kragujevac, Serbia

² Department of Medical Studies, The Academy of Applied Preschool Teaching and Health Studies of Kruševac, Čuprija, Serbia

³ Department of Healthcare, Faculty of Business of Valjevo, Singidunum University, Valjevo, Serbia

Abstract

Objectives: To determine the impact of socio-demographic variables and psychosocial stress on quality of life (QoL) in psoriasis patients and identify predictors relevant for preventive strategies.

Materials and methods: A cross-sectional study included 183 patients with PASI \geq 10. QoL was assessed with the Dermatology Life Quality Index (DLQI), and psychosocial stress with the Psoriasis Life Stress Inventory (PLSI). Variables analyzed were gender, age, education, employment, income, and residence.

Results: Women reported poorer QoL than men (DLQI 13.2 \pm 8.4 vs. 11.8 \pm 8.2; $p=0.029$). Age correlated with QoL impairment ($r=0.100$; $p=0.007$). Patients with secondary education had worse outcomes than those with university degrees (13.4 \pm 7.8 vs. 9.7 \pm 8.9; $p=0.001$). Low income predicted the highest impairment (15.5 \pm 7.5 vs. 11.7 \pm 7.8 in high-income; $p=0.001$). Unemployed patients had significantly higher DLQI scores than employed (13.4 \pm 7.4 vs. 11.8 \pm 8.8; $p=0.003$). Psoriasis-related stress was high at baseline (PLSI 35.4 \pm 8.8) and decreased after 16 weeks (12.8 \pm 12.8). A strong correlation was found between PASI and PLSI ($r=0.702$; $p<0.001$), while the correlation between PASI and DLQI was moderate ($r=0.683$; $p<0.001$).

Conclusion: Socio-demographic determinants and psychosocial stress significantly impair QoL in psoriasis patients, often independent of clinical severity. Recognizing vulnerable groups and incorporating stress management into standard care should be priorities of preventive medicine.

Keywords: psoriasis, quality of life, psychosocial stress, sociodemographic factors, preventive medicine



PREVALENCE OF MULTIMORBIDITY AMONG THE ADULT POPULATION OF THE REPUBLIC OF SERBIA

Ognjen Djordjevic¹, Gordana Djordjevic¹, Jovana Radovanovic¹, Viktor Selakovic², Milos Stepovic³, Snezana Radovanovic⁴, Svetlana Radevic⁴, Ivana Simic Vukomanovic⁴, Dejana Rakic⁵, Tatjana Boskovic Matic⁶

¹ Department of Epidemiology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

² Department of Communication Skills, Ethics, and Psychology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

³ Department of Anatomy, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁴ Department of Social Medicine, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁵ Department of Department of Gynecology and Obstetrics, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁶ Department of Neurology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

Abstract

Objectives: Multimorbidity is a significant challenge for modern healthcare, being associated with complex health needs, poorer outcomes, lower quality of life, and higher mortality. This study aimed to determine the prevalence of multimorbidity among adults in Serbia and examine its association with sociodemographic and health factors.

Materials and methods: Research is secondary analysis that was conducted using data from the fourth National Health Survey of Serbia (2019) conducted by the Statistical Office of the Republic of Serbia, the Institute of Public Health of Serbia “Dr Milan Jovanović Batut,” and the Ministry of Health of the Republic of Serbia, and included 12.439 respondents aged 20 years and older. Statistical analyses were performed using SPSS 20.0.

Results: Multimorbidity was present in 35.2% of respondents. Significant differences were found by gender, age, marital status, region, education, employment, and material status ($p < 0.001$). Associations were also observed with nutritional status and degree of obesity ($p < 0.001$). Mean body mass index was higher in participants with multimorbidity compared to those without ($27.93 \pm 5.55 \text{ kg/m}^2$ vs. $25.91 \pm 4.72 \text{ kg/m}^2$, $p < 0.001$).

Conclusion: These findings highlight the public health importance of multimorbidity in Serbia. Targeted interventions for prevention, risk factor modification, and early management may reduce its occurrence, complications, disability, reduced quality of life, and premature mortality.

Keywords: epidemiology, multimorbidity, prevalence



INTERRELATIONSHIP BETWEEN CARDIOVASCULAR RISK AND IMPAIRED HEALING IN CHRONIC VENOUS ULCERATION

Zoran Damnjanović^{1,2}, Nemanja Stepanović^{1,2}, Milan Jovanović^{1,2}, Ivana Damnjanović³, Sanja Stojanović⁴

¹ University of Niš, Faculty of Medicine, Department of Surgery and Anesthesiology with Reanimatology, Niš, Serbia

² University Clinical Center of Niš, Clinic of Vascular Surgery, Niš, Serbia

³ University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia

⁴ University of Niš, Faculty of Medicine, Department of Biology and Human Genetics, Niš, Serbia

Abstract

Objectives: There is a strong association between advanced stages of chronic venous disease and cardiovascular risk factors, comorbidities, and increased mortality. The aim of this study was to assess the prevalence of cardiovascular diseases in patients with venous ulcers and their impact on wound healing.

Materials and methods: This prospective study included 33 patients with venous ulcers who were treated at the Clinic for Vascular Surgery of the University Clinical Center in Niš, between January 1, 2024, and July 1, 2025.

Results: The study included 16 male (48.48%) and 17 female (51.52%) participants, with a mean age of 65.55 years. The most common cardiovascular comorbidities were arterial hypertension (54.55%), cardiac arrhythmias (12.12%), and diabetes mellitus (12.12%), while stroke was the least represented (3.03%). Among the group of 21 patients (63.64%) whose wounds had not healed after three months, the most prevalent cardiovascular comorbidities were arterial hypertension (71.43%), cardiac arrhythmias (19.05%), and diabetes mellitus (19.05%).

Conclusion: Cardiovascular comorbidities are frequently present in patients with venous ulcers and have a significant impact on the wound healing process.

Keywords: wound healing, venous ulceration, cardiovascular comorbidities

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THE IMPACT OF CAFFEINE CONSUMPTION ON THE EFFICACY OF DRUG THERAPY IN PATIENTS WITH PERIPHERAL ARTERIAL DISEASE

Zoran Damnjanović^{1,2}

¹ University of Niš, Faculty of Medicine, Niš, Serbia

² Vascular Surgery Clinic, University Clinical Center of Niš, Niš, Serbia

Abstract

Objectives: The aim of the study was to determine the effect of caffeine consumption on the efficacy of drug therapy in patients with peripheral arterial disease (PAD).

Materials and methods: The study included 82 patients with diagnosed PAD (Fontaine IIa, IIb), treated at the Clinic for Vascular Surgery of the University Clinical Center in Nis, starting from January 2020 to December 31, 2020.

Results: In the group of respondents who do not consume coffee, as well as in the group who consumes ≤ 3 caffeinated drinks/day, there was no statistically significant difference in PDK compared to the applied therapy at control examinations. At the control examination after 6 months, a statistically significant difference was found in the extension of the claudication distance in the group consuming caffeinated beverages ($p < 0.05$) and the group consuming > 3 caffeinated beverages/day ($p < 0.05$), with a note that it was greater efficiency achieved in the group of subjects who applied cilostazol compared to the group of patients who applied pentoxifylline.

Conclusion: Consumption of caffeinated beverages and intake of more than 3 caffeinated beverages/day was associated with greater therapeutic efficacy of cilostazol compared to pentoxifylline in patients with PAD.

Keywords: drug therapy, caffeine, peripheral arterial disease



KNOWLEDGE, ATTITUDE AND PRACTICE IN RELATION TO THE MOTHER'S LEVEL OF EDUCATION AS A RISK FACTOR FOR CERVICAL CANCER AMONG FIRST-YEAR FEMALE STUDENTS AT THE UNIVERSITY OF NIŠ

Mirko Ilić¹, Biljana Kocić^{1,2}, Nataša Rančić^{1,2}

¹ Public Health Institute of Niš, Niš, Serbia

² University of Niš, Faculty of Medicine, Niš, Serbia

Abstract

Objectives: A large number of studies conducted worldwide have demonstrated that, above all, mothers with higher levels of education exert a greater influence on their children's education and on the acquisition of adequate knowledge regarding elementary facts related to risk factors responsible for the development of cervical cancer.

Aim: Among first-year female students at the University of Niš, the objective was to determine the level of knowledge, attitude and practice concerning the influence of specific risk factors on the occurrence of cervical cancer, in relation to the educational attainment of their mothers.

Materials and methods: The study included all first-year female students at the University of Niš in 2008, and a cross-sectional design was applied. The research instrument was a structured questionnaire.

Results: In the examined population, the majority of mothers had completed secondary education (61.9%), while 5% had primary education and 33.1% higher education. Students whose mothers had higher education demonstrated better knowledge that the following represent risk factors for the development of cervical cancer: higher number of childbirths ($p=0.005$), greater number of sexual partners ($p=0.002$), presence of sexually transmitted infections in women ($p=0.003$), presence of sexually transmitted infections in sexual partners ($p<0.001$), infection with human papillomavirus ($p=0.001$), weakened immunity ($p=0.011$), obesity ($p=0.048$), smoking ($p=0.030$), and heredity ($p=0.020$). They also recognized that healthy nutrition ($p=0.003$) and regular physical activity ($p=0.003$) act as protective factors. Furthermore, students whose mothers had higher education displayed greater knowledge regarding the appropriate intervals for preventive gynecological examinations, the timing of Pap smear testing ($p=0.013$), and the appropriate age for HPV vaccination ($p=0.016$).

Students whose mothers had secondary education demonstrated better knowledge regarding the role of psychoactive substance use as a risk factor for cervical cancer ($p=0.002$). Students whose mothers had only primary education were statistically significantly more likely to use condoms exclusively as a contraceptive method ($p=0.035$). Statistically significant differences were also observed regarding the number of concurrent sexual partners, with students whose mothers had higher education more frequently reporting two or more partners in the same period ($p=0.045$). Regarding the performance of gynecological examinations, a significant difference was noted in favor of students whose mothers had higher education ($p=0.023$). Students whose mothers had higher education also more frequently reported having experienced memory lapses after episodes of intoxication ($p=0.003$), engaging in sexual activity while under the influence of alcohol ($p<0.001$), and using psychoactive substances ($p=0.017$). Conversely, they were also significantly more likely to engage in regular physical activity ($p<0.001$).

Conclusion: The student population belongs to the youth age group, that is, individuals aged 15–24 years. This period of life represents a transition between childhood and adulthood. In addition to reproductive capacity, it is of even greater importance that individuals at this age assume the responsibilities of adulthood. Mothers, therefore, must possess a comprehensive understanding of the numerous processes of physical, intellectual, and emotional maturation and be prepared to face the crises their children undergo until they have fully established their own identity.

Keywords: education, mother, knowledge, attitude, practice, cervical cancer, risk factors

Acknowledgement: The work was supported by funds from the project of the Ministry of Education, Science and Innovation of the Republic of Serbia (Contract No.451-03-137/2025-03/200113).



SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF COMMUNICABLE DISEASE

INVITED LECTURES

VACCINE-PREVENTABLE INFECTIOUS DISEASES TODAY: IMPACT OF COVID-19 PANDEMICS

Nataša Rančić, Biljana Kocić^{1,2}

¹ Institute of Public Health of Niš, Niš, Serbia

² University of Niš, Faculty of Medicine, Niš, Serbia

Abstract

Introduction. The main objective of the study was to explore incidence of vaccine-preventable diseases among children aged 0 to 14 years in the Republic of Serbia from 2019 to 2023 and to present vaccine coverage.

Methods. A descriptive study was used and data from annual reports on communicable diseases and immunization coverage were retrospectively analyzed. As only publicly available data from the website of the Institute of Public Health of Serbia were used, approval from the Ethics Committee was not required.

Results. A total of 1529 new cases of VPDs (without TBC cases) in pediatric population were reported from the 2020 to 2023. In 2020, 75 cases of four viral infectious diseases were reported, including mumps (2), pertussis (55), hepatitis B (17), and rubella (1). The highest number of cases was reported for pertussis, with 55 cases (70.3% of the total). Of these, 44 cases (80%) were reported in the Autonomous Province (AP) of Vojvodina. In AP Vojvodina, pertussis was recorded in all age groups, with the highest incidence among those under 20 years of age. In 2020, active immunization against hepatitis B in the first year of life was carried out with 86.7% coverage, marking the first time in the past decade that coverage fell below 90%. In the same year, a decrease was recorded in the coverage of all vaccines included in the National Immunization Schedule for pediatric population. Notably, there was a decline in the first revaccination coverage against diphtheria, tetanus, pertussis, poliomyelitis, and *Haemophilus influenzae* type b, as well as the revaccination against *Streptococcus pneumoniae* in the second year of life. In 2022, BCG vaccine coverage dropped to 90.5%. Three pertussis outbreaks were reported, involving 317 cases, along with six outbreaks of other respiratory infections.

Conclusion. Mandatory vaccine uptake in the pediatric population aged 0 to 14 years decreased significantly during the COVID-19 pandemic. The greatest difference was observed in pertussis while the incidence of mumps and rubella remained at pre-pandemic levels. Additional strategies, such as immunization tracking, reminder systems, and recall for missed vaccinations, especially during virtual visits are essential to improve vaccine coverage.

Keywords: COVID-19, vaccine-preventable diseases, mandatory immunization, pediatric population

Acknowledgement: The work was supported by funds from the project of the Ministry of Education, Science and Innovation of the Republic of Serbia (Contract No.451-03-137/2025-03/200113).



EPIDEMIOLOGICAL CHARACTERISTICS OF Q FEVER IN MONTENEGRO

Sanja Medenica^{1,2}

¹ University of Montenegro, Faculty of Medicine, Podgorica, Montenegro

² Institute of Public Health of Montenegro, Podgorica, Montenegro

Abstract

Introduction: Q fever is an infection caused by the intracellular, gram-negative bacterium *Coxiella burnetii* and is distributed worldwide.

Objective: To investigate the epidemiological characteristics of Q fever in Montenegro in the period 2015-2024.

Method: A descriptive epidemiological method was used. Proportions and rates were used in statistical data processing.

Results: In the last decade, Q fever has been registered in 11 municipalities, a total of 43 patients, an average incidence rate of 0.69/100,000. The average incidence rate ranged from 0.16/100,000 (2019 and 2022) to 3.69/100,000 registered in 2024. In 2020, 2021 and 2023, there were no registered cases. The average incidence rate ranged from 0.22/100,000 inhabitants recorded in Bar to 3.2/100,000 registered in Nikšić. The highest average incidence rate was recorded in the age group of 20-59 years, in the working and professionally exposed population, 0.8/100,000. The disease was registered equally in males and females, and the largest number of cases was registered in September. In 2024, family epidemics were registered in the municipalities of Nikšić and Danilovgrad in households where an epizootic of coxiellosis in cattle was registered.

Conclusion: Close cooperation of the veterinary and humane sectors through the ONE HEALTH approach and taking adequate preventive measures reduces the risk of disease.

Keywords: epidemiological surveillance, zoonoses, one health



SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF COMMUNICABLE DISEASES

ORAL PRESENTATIONS

STRENGTHENING BIOSAFETY AND BIOSECURITY AT THE BORDER IN THE SEE REGION: PRESENTATION OF PROJECT ACTIVITIES AND POTENTIAL IMPLICATIONS FOR THE INSTITUTE OF PUBLIC HEALTH OF SERBIA "MILAN JOVANOVIĆ BATUT"

Hristina Gospodinovic¹, Jelena Milić¹, Margarita Dodevska¹, Jakov Boban¹

¹ Institute of Public Health of Serbia "Dr Milan Jovanović Batut", Belgrade, Serbia

Abstract

Objectives: The objective of this paper is to provide members of the regional public health network with a comprehensive and practical overview of Project P100 — Strengthening Biosafety and Biosecurity Measures at the Frontline in the Region of Southeast and Eastern Europe. This key initiative aims at enhancing the capacity of countries in the region to effectively respond to biological threats at national borders and customs checkpoints. The project is being implemented in partnership with the Institute of Public Health of Serbia "Dr Milan Jovanović Batut" and relevant institutions from the region. Special emphasis is placed on strengthening institutional and technical capacities in Serbia and neighboring countries through the training of frontline personnel, fostering regional cooperation, enhancing technical infrastructure, and transferring acquired experiences within the public health context

Materials: and methods: The methodology includes a descriptive analysis of key project activities through a retrospective review of events and initiatives. The analysis is based on a narrative overview of the results, with a focus on identifying strategic elements that can be implemented within the national hospital and public health systems.

Results: The results show that Project P100 has facilitated the implementation of several national and cross-border training sessions and exercises, established and strengthened relationships among regional partners, and developed standard protocols for identifying and responding to biological threats. Key challenges have been identified, along with lessons learned, which provide a foundation for adapting public health protection measures in Serbia.

Conclusion: The conclusion highlights that Project P100 serves as an important support mechanism for enhancing technical and institutional biosafety capacities. Active participation of members of the regional public health network is crucial for the effective implementation of innovative solutions and for safeguarding public health and safety at the regional level.

Keywords: biosafety, Project P100, public health, protection



INFECTIONS AMONG CONTACT OF COVID-19 CASES IN THE HEALTHCARE SETTING: EXPERIENCE OF ONE UNIVERSITY HOSPITAL

Milica Brajkovic¹, Ljiljana Markovic-Denic^{1,2}

¹ Clinical Hospital Center of Bežanijska kosa, Belgrade, Serbia

² University of Belgrade, Faculty of Medicine, Institute of Epidemiology, Belgrade, Serbia

Abstract

Objectives: To identify patients with infections close to COVID-19 index cases in a tertiary-level hospital when it was not a COVID-19 hospital.

Materials and methods: Prospective study was conducted from March, 15th 2022 to December 31th 2024 in the University Clinical Hospital Center Bežanijska kosa. Community-associated or healthcare-associated (HAI) COVID-19 infections were confirmed using a real-time PCR test or antigen SARSCoV-2 test. Patients who were in the same room as the index case were surveilled in the hospital during the incubation period, or reached out by telephone if they were discharged before the end of incubation.

Results: A total of 997 patients were exposed to 389 COVID-19 index cases. Out of all index cases, there were 38.6% community-acquired, 29.3% possible and 32.1% HA-COVID-19 cases. The total number of contact tracing episodes was 309 (81, 163 and 65 during the period 2022-2024, respectively). The highest number of COVID-19 contact tracing episodes occurred in July 2022 (18 episodes), when the BA.2 (stelt) sub variant of the Omicron virus emerged, followed by 29 episodes in February 2023 in line with the emergence of XBB-kraken, and 27 episodes in December 2023, which coincided with the increase in the number of cases in the population of our country. The average secondary attack rate was 15.8%; 16.9% in 2022, 18.7% in 2023 and 5.9% in 2024.

Conclusion: Identifying close contacts is essential to prevent SARS-CoV-2 hospital transmission.

Keywords: COVID-19, index cases, contacts, surveillance



PREVALENCE AND FACTORS ASSOCIATED WITH BOTANICALS USE AMONG PEOPLE LIVING WITH HIV IN SERBIA

Tatjana Gazibara¹, Zoran Milosavljević², Jovan Ranin³, Jelena Jevtović⁴, Bratislav Prokić⁴

¹ Institute of Epidemiology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

² Institute of Public Health of Serbia “Dr Milan Jovanović Batut”, Belgrade, Serbia

³ Clinic for Infectious and Tropical Diseases, University Clinical Centre of Serbia, Belgrade, Serbia

⁴ National Center for Sexual and Reproductive Health – Potent, Belgrade, Serbia

Abstract

Objective: To examine the prevalence and factors associated with the use of botanicals among people living with HIV in Serbia (PLWH).

Methods: From March and April 2024 people living with HIV were surveyed at the Clinic of Clinic for Infectious and Tropical Diseases, University Clinical Centre of Serbia, and National Center for Sexual and Reproductive Health – Potent. Participants provided information on their demographic data, duration of having HIV, viral load, alcohol intake, use of vitamins and minerals, smoking and health status concerning chronic illnesses. Two adjusted logistic regression models were evaluated: one focusing on health behaviors and another focusing on chronic illnesses.

Results: Of 326 PLWH, 87 (26.7%) reported botanicals use. The behavior model suggested that having a higher body mass index (BMI), using minerals and vitamin supplements were associated with botanicals use. The chronic illness model suggested that being female, not being in a relationship, having sexual dysfunction and hypertension, but not hyperlipidemia, were associated with botanicals use among PLWH.

Conclusion: Around one-quarter of PLWH reported use of botanicals. Botanicals use was more likely among women, people who had higher BMI and were single, those who took minerals and vitamin supplements, and people who had sexual dysfunction and hypertension.

Keywords: botanicals, diet, supplements, HIV



CONFERENCE PRESENTATION OF PUBLISHED WORK: "SEASONAL MORTALITY PATTERNS ANALYZING EPIDEMIOLOGICAL IMPACT OF COVID-19 ON OVERALL MORTALITY RATES IN BELGRADE, SERBIA OVER THREE-YEAR PERIOD (2020-2023): MENTAL HEALTH CONSEQUENCES AND PUBLIC HEALTH IMPLICATIONS"

Jelena Milić¹, Sonja Novak^{2,3}, Zoran Kokić⁴, Nadežda Popović³, Vuk Marušić⁵

¹ Institute of Public Health of Serbia "Dr. Milan Jovanović Batut", Belgrade, Serbia

² Department of Epidemiology, Faculty of Medicine, University of Niš, Serbia

³ University Clinical Center of Niš, Serbia

⁴ Community Health Centre of Voždovac, Belgrade, Serbia

⁵ Institute of Epidemiology, Faculty of Medicine, University of Belgrade, Serbia

Abstract

Background/Objectives: Seasonal variations in mortality rates are well-documented, particularly during the winter months when mortality typically increases. This rise in mortality, ranging from 5% to 25%, is often associated with chronic cardiovascular and respiratory diseases. Understanding these seasonal fluctuations is essential for guiding public health interventions. This study analyzes mortality rates and excess mortality in Belgrade from March 2020 to May 2023, focusing on the impact of the COVID-19 pandemic on overall mortality trends. The primary objective of this study is to assess the impact of the COVID-19 pandemic on mortality rates in Belgrade during the study period. The first secondary objective is to evaluate seasonal variations in mortality, with a focus on the 10.57% overall increase in mortality, and to highlight the 34.23% rise in winter mortality recorded in 2020. The second secondary objective is to assess the effectiveness of public health measures in mitigating excess mortality during this period.

Methods: A descriptive epidemiological approach was used to analyze monthly mortality data from the City Bureau of Statistics. Mortality rates were standardized using direct standardization and compared winter (December-February) and non-winter (March-November) periods. Trends, percentage increases, and age-specific mortality were analyzed based on the 2011 census methodology.

Results: Mortality rates in Belgrade ranged from 1115.67 to 1267.19 deaths per 100,000 inhabitants, with an average of 1205.62. Standardized mortality rates ranged from 936.49 to 1111.67, averaging 1021.64. The winter months showed higher mortality, averaging 1716 deaths per 100,000, compared to 1558 in the non-winter months.

Conclusions: The winter months exhibited significantly higher mortality rates, likely exacerbated by the COVID-19 pandemic. Targeted public health policies and interventions are necessary to reduce seasonal mortality risks during future public health crises.

Keywords: population health, health promoting community design, seasonal mortality, respiratory diseases, public health, epidemiology



CONFERENCE PRESENTATION OF PUBLISHED WORK: "EFFECTIVENESS OF VACCINATION IN PREVENTING CORONAVIRUS DISEASE 2019 SIX MONTHS OR MORE AFTER THE SECOND DOSE AND UP TO FIVE MONTHS AFTER THE THIRD DOSE IN THE MUNICIPALITY OF VOŽDOVAC (BELGRADE, SERBIA): A REAL-LIFE COMPARISON OF FOUR VACCINES"

Jelena Milić¹, Zoran Kokić², Predrag Kon³

¹ Institute of Public Health of Serbia "Dr. Milan Jovanović Batut", Belgrade, Serbia

² Community Health Centre Voždovac, Belgrade, Serbia

³ Belgrade City Institute of Public Health, Belgrade, Serbia

Abstract

Background: Availability of vaccines less than a year after the beginning of the coronavirus disease 2019 (COVID-19) pandemic, followed by the widest vaccination campaign in history, significantly altered the global course of the pandemic. Data on Vaccine Effectiveness (VE) are important for immunization policies, as well as vaccine acceptance, especially among populations susceptible to severe infection.

Aims: To assess the relative risk of COVID-19 in the vaccinated vs. unvaccinated population and compare the effectiveness of four vaccines (BBIBP-CorV, BNT162b2, Gam-COVID-Vac, ChAdOx1) against symptomatic infection.

Study Design: Retrospective, cross-sectional observational study.

Methods: We examined the incidence of SARS-CoV-2 infection and clinically overt COVID-19 in a five-month period (November 1st, 2021 – March 31st, 2022) in the Belgrade municipality of Voždovac. Data on vaccinal status were retrieved from the National Registry for Immunization against COVID-19 at the Institute of Public Health of Serbia, while information on vaccine type was obtained by telephone interview in people with polymerase chain reaction (PCR)-confirmed infection. Only those who received two or three vaccine doses were included in the study.

Results: Of the total population of Voždovac (169,567), 88,870 people (52.4%) were vaccinated with two or three doses by the end of the study period. Two doses of BBIBP-CorV were received by 28.8% of the total population, while 14.9% received BNT162b2, 5.8% Gam-COVID-Vac, and 2.7% ChAdOx1. People vaccinated with three doses comprised 13.9%, 14.9%, 3.1%, and 0.4% of the population for BBIBP-CorV, BNT162b2, Gam-COVID-Vac, and ChAdOx1, respectively. Importantly, none of the vaccinated individuals exhibited any side effects other than transient reactogenicity, and no adverse events requiring medical assistance were reported to the Medicines and Medical Devices Agency of Serbia. The relative risk (RR) of infection for two-dose vaccination against the unvaccinated population was 0.93 (95% CI 0.88–0.99), while the overall VE was 7%. When analyzed by age group, RR was statistically significant only for people older than 75 (0.45; CI 0.34–0.61; VE 55%). For three doses, overall RR was 0.65 (CI 0.61–0.69; VE 35%), decreasing from 0.71 in the 18–49 age group to 0.69 in the 50–64 group and 0.46 in people above 75, corresponding to a VE of 29%, 31%, and 54%, respectively.

Conclusion: Taken together, our real-world data attest to a modest overall effectiveness of three-dose COVID-19 vaccination against symptomatic infection in the observed population and time period, with considerable effectiveness of both three- and two-dose regimes among the elderly.

Keywords: coronavirus disease, vaccines, pandemic



SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF COMMUNICABLE DISEASE

POSTER PRESENTATIONS

PATTERNS AND ACCEPTABILITY OF ANTIBIOTIC USE WITHOUT PRESCRIPTION

Aleksandar Jovanović^{1,2}, Ana Kundalić¹, Emilija Kostić¹, Dušanka Krajnović²

¹ University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia

² University of Belgrade, Faculty of Pharmacy, Department of Social Pharmacy and Pharmaceutical Legislation, Belgrade, Serbia

Abstract

Objectives: The objectives were to assess antibiotic availability in households, examine patterns of self-medication, and evaluate public attitudes towards non-prescription antibiotic use.

Materials and methods: This cross-sectional study was conducted in Serbia during January and February 2025 among citizens over 18 years of age, using a structured questionnaire.

Results: The study included 269 respondents, with a mean age of 37.07. Most were female (82.2%), lived in urban areas (75.5%) and held a university degree (57.2%). Half of the respondents (50.9%) reported having some antibiotics at home. Additionally, 34.9% considered them easy to obtain without a prescription, and 11.2% had purchased them in the past month. More than half (55.4%) practiced self-medication with antibiotics, and 26.4% had shared them with others. Overall, 59.5% viewed non-prescription use as acceptable, most often in emergencies (23.8%), when previously used for similar symptoms (21.9%), or milder illnesses (10.8%). Nearly one-third (29.7%) supported such use by other people.

Conclusion: High household antibiotic availability, easy non-prescription access, and acceptance of self-medication promote misuse and antimicrobial resistance. Community support for such use highlights the need for targeted education and stricter regulation to curb this trend and promote antibiotic responsible use.

Keywords: antibiotic, availability, self-medication, non-prescription use, public attitudes

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QUERCETIN AS A MULTI-TARGET MODULATOR IN ACNE PATHOPHYSIOLOGY: *IN SILICO* INSIGHTS VIA DOCKING AND NETWORK PHARMACOLOGY

Nevena Guberinić^{1,2}, Jovana Veselinović^{1,2}, Nataša Jovanović Lješević², Dragana Stojilković², Hristina Kocić³, Višnja Milošević²

¹ Pharmacy Institution “Remedia“, Niš, Serbia

² Faculty of Pharmacy Novi Sad, University of Business Academy, Novi Sad, Serbia

³ University of Niš, Faculty of Medicine, Niš, Serbia

Abstract

Objective: To investigate the multi-target therapeutic potential of quercetin in acne vulgaris by integrating molecular docking data with network-based protein interaction analysis. Antibiotic resistance and side effects highlight the need for safer multitarget options.

Methods: Thirty-seven proteins associated with acne pathophysiology were selected from DisGeNET and literature. Binding affinities (ΔG values) and interaction types were extracted from peer-reviewed molecular docking studies and grouped for descriptive comparison. Functional associations among targets were analyzed using STRING to identify biological clusters and pathway-level interactions.

Results: Quercetin exhibited high predicted binding affinity ($\Delta G < -8.0$ kcal/mol) with acne-related targets, particularly in immune signaling, sebocyte activity, microbial recognition, and transcriptional control (e.g., TNF- α , IL-6). Moderate binding was observed for proteins linked to keratinocyte differentiation, keratinization, and oxidative stress. STRING analysis revealed dominant clustering within immunometabolic and endocrine pathways. Interactions involved hydrogen bonding and hydrophobic contacts near key binding interfaces relevant to protein function.

Conclusion: This predictive, integrative *in silico* analysis suggests that quercetin may act as a pleiotropic agent within acne-associated biological networks. The findings support further investigation in inflammatory, hormone-sensitive, and treatment-resistant phenotypes, and provide a rationale for *in vitro* and *in vivo* validation, with potential relevance in early-stage or subclinical acne translational models.

Keywords: quercetin, acne vulgaris, molecular docking, network pharmacology



PRESENCE OF CERTAIN ZONOTIC AGENTS IN TICKS COLLECTED FROM MILITARY RELEVANT LOCALITIES IN BELGRADE

Milena Krstić^{1,3}, Jovan Mladenović¹, Elizabeta Ristanović^{2,3}, Ana Bakračević¹, Sonja Atanasievska Kujović², Vesna Protić Djokić², Nikoleta Djordjevski², Sonja Marjanović³, Maja Živić¹

¹ Institute of Epidemiology, Sector for Preventive Medicine, Military Medical Academy, Belgrade, Serbia

² Institute of Microbiology, Sector for Preventive Medicine, Military Medical Academy, Belgrade, Serbia

³ Faculty of Medicine of the Military Medical Academy, University of Defence, Belgrade, Serbia

Abstract

Objectives: In May 2024, the Institute of Epidemiology of the Military Medical Academy conducted a study to determine the presence of certain zoonotic agents in ticks at four military relevant localities in Belgrade. The study also aimed to assess the entomological risk index (ERI), potential risk (PR) and actual risk (AR).

Methods: Ticks were collected using the flag-hour method, identified to the species level, and analyzed using the Viasure RT-PCR assay at the Institute of Microbiology. For each study site, the ERI, PR and AR were calculated to assess the level of epidemiological risk.

Results: A total of 143 ticks were collected, with *Ixodes ricinus* identified as the predominant species. Pathogens from the genera *Borrelia*, *Rickettsia* and *Anaplasma* were detected, including instances of coinfection. The ERI values varied depending on the location and the detected causative agent, ranging from 0.01 to 0.3. The PR was classified as moderate risk at three of the four study sites, while the AR was predominantly assessed as possible risk across the study sites.

Conclusion: The detection of *Borrelia*, *Rickettsia* and *Anaplasma* species in ticks confirms a zoonotic infection risk in Belgrade. Continuous vector surveillance, along with the implementation of adequate preventive measures, is essential for effectively reducing the risk of zoonotic diseases.

Keywords: ticks, infection, risk, surveillance



CHALLENGES IN PREVENTING INFECTIOUS DISEASES DURING PEACEKEEPING OPERATIONS IN THE CENTRAL AFRICAN REPUBLIC

Jovan Mladenović¹, Nenad Ljubenović¹, Milena Krstić¹, Maja Živić¹, Sonja Atanasievska Kujović², Nikola Djordjevski², Elizabeta Ristanović², Biljana Milojković³

¹ Institute of Epidemiology, Sector for Preventive Medicine, Military Medical Academy, Belgrade, Serbia

² Institute of Microbiology, Sector for Preventive Medicine, Military Medical Academy, Belgrade, Serbia

³ Faculty of Medicine of the Military Medical Academy, University of Defence,

Abstract

Objectives. To evaluate risk for infectious diseases among members of the Serbian Armed Forces participating in the United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA).

Methods. A total of 131 participants from two rotations of the UN peacekeeping mission, disengaged in 2024, took part in the study. The health status of the participants was monitored during deployment and after returning from the peacekeeping mission for 21 days. Ten days after their return, a blood sample was taken from each individual for further microbiological testing, including screenings for HIV, Hepatitis B, Hepatitis C, Dengue, Zika, West Nile, and Chikungunya viruses, as well as *Treponema pallidum* infections and syphilis.

Results. The average age of participants was 45.7 ± 9.72 years, ranging from 25 to 64. Participants spent an average of 195.8 ± 22.09 days in deployment, ranging from 102 to 384 days. There were 71 male and 60 female participants. All participants tested negative for HIV, Hepatitis B, Hepatitis C, *Treponema pallidum*, and syphilis. Serological tests for Dengue virus were positive in 38 participants (29%), for Chikungunya virus in 12 (9%), for Zika virus in 3 (2%), and for West Nile virus in 18 participants (14%). A total of 7 participants (5%) had a malaria infection during deployment.

Conclusion. Preventing vector-borne diseases is highly challenging and depends on the personal behavior of peacekeeping mission participants and their compliance with chemoprophylaxis.

Keywords: peacekeeping operations, prevention, infectious diseases



VACCINATION AGAINST HUMAN PAPILLOMAVIRUS IN THE TERRITORY OF THE MAČVAN DISTRICT IN THE PERIOD 2022. - 2025. YEAR

Dragana Radojičić¹, Pajičić A¹, Vujković B¹, Hadživuković Stojanović S¹, Gladović J¹

¹ Institute of Public Health of Šabac, Šabac, Serbia

Abstract

Introduction: Human papilloma virus (HPV) infection is a serious public health problem that can develop significant health consequences, such as cancers of the cervix, vulva, colon, penis, lungs, throat, genital warts and other complications. The HPV virus is extremely widespread and is transmitted by an intimate (skin-to-skin) route. These viruses are among the most common causes of sexually transmitted pathogens. Over 200 types of HPV have been identified so far.

Objective: To show how the vaccination of girls and boys in the Mačvan district with the recommended vaccine Gardasil 9, which began in June 2022, is progressing.

Method: In this retrospective study, data related to the coverage of Gardasil vaccination in the territory of Mačvan district, in the period from June 2022 to June 2025, were analyzed. Analyses of vaccination coverage by year and by municipality for all three years were performed.

Result: A total of 1.830 children were vaccinated in a period of three years in a total of eight municipalities located on the territory of the Mačvan district (Šabac, Loznica, Vladimirci, Koceljeva, Krupanj, Ljubovija, Mali Zvornik, Bogatić). Girls and boys from 9 to 14 years old receive two doses of the vaccine at an interval of 6 months, and from 15 to 19 years old they receive it in three doses (0,2,6). The largest coverage during the observed period was in the territory of the Šabac municipality.

Conclusion: The most effective way to prevent infection is vaccination. The vaccine against diseases caused by the human papillomavirus does not have a therapeutic effect on an existing infection or disease. It stimulates the creation of long-lived cells of the immune system (memory B-lymphocytes) which, after re-contact with the appropriate antigen, lead to a strong immune response and prevent infection.

Keywords: HPV, vaccination coverage



EPIDEMIOLOGY OF MEASLES IN SLOVENIA BETWEEN 2005 AND 2024

Martina Juder Kogler¹, Sandra Simonović¹, Zoran Simonović¹

¹ National Institute of Public Health of Slovenia, Ljubljana, Slovenia

Abstract

Objectives: The aim of the article is to present the epidemiological characteristics of measles cases and outbreaks in Slovenia between 2005 and 2024.

Methods: Using reported case data, the incidence of measles in Slovenia from 2005 to 2024 was estimated. The data analysed included gender, age group, region, country of infection, and number of deaths. Data on reported outbreaks, persons exposed, and infected patients during outbreaks was also analyzed.

Results: A total of 187 measles cases were reported between 2005 and 2024 (57.2% male, 42.8% female) in Slovenia. Most cases occurred in the 35-44 years age group (37.4%). The annual reported incidence ranged from 0.00 to 2.52 cases per 100,000 inhabitants. There were 6 outbreaks involving 66 infected patients. 45 imported cases from 17 countries and no deaths were recorded.

Conclusion: Achieving the 95% herd immunity threshold for measles is essential to prevent outbreaks. This has been reached in Slovenia in the last years partly due to the requirement mandating a measles vaccination certificate for kindergarten enrolment. Maintaining sufficient vaccination coverage can be supported by raising awareness among healthcare professionals and the general public about vaccine effectiveness and safety. Continuous epidemiological monitoring, proper case management, and rapid outbreak response are also needed.

Keywords: measles, reported cases, outbreaks, epidemiology



MENINGOCOCCAL CONJUNCTIVITIS AND PUBLIC HEALTH MEASURES IN SLOVENIA

Sandra Simonovič¹, Martina Juder Kogler¹, Ines Kebler¹, Zoran Simonovič¹

¹ National Institute of Public Health of Slovenia, Ljubljana, Slovenia

Abstract

Objectives: *Neisseria meningitidis* is a gram-negative bacterium that can cause meningococcal conjunctivitis (MC), a rare form of bacterial conjunctivitis. MC is considered a form of invasive meningococcal disease (IMD) requiring a public health response.

Methods: In this retrospective study, we reviewed data on reported cases of IMD in Slovenia from January 1, 2019, to June 30, 2025. The presented data included all IMD diagnoses, as classified by the 10th revision of the International Classification of Diseases and Related Health Problems (ICD-10), since these disease forms are subject to mandatory reporting. MC falls under the diagnostic code A39.8, which also includes other meningococcal infections.

Results: During the observation period, 46 cases of IMD were recorded in Slovenia. Two cases were classified under code A39.8 – one case of meningococcal pneumonia in 2024 and one case of meningococcal conjunctivitis in 2025. In the latter, serogroup W was confirmed through typing.

Conclusion: There are no universal global guidelines for managing MC contacts. Slovenia recommends public health action, but it may be reasonable to consider waiving such measures, given the often overlooked form of the disease and the low risk of transmission.

Keywords: meningococcal conjunctivitis, chemoprophylaxis, close contacts, public health measures



INVASIVE MENINGOCOCCAL DISEASE IN SLOVENIA IN 2024: EPIDEMIOLOGICAL MONITORING AND OVERVIEW OF MEASURES TO PREVENT THE SPREAD OF INFECTION

Sandra Simonovič¹, Martina Juder Kogler¹, Tamara Popovič², Ines Kebler¹, Zoran Simonovič¹

¹ National Institute of Public Health, Ljubljana, Slovenia

² Community Health Centre Ljubljana, Ljubljana, Slovenia

Abstract

Objectives: The aim of this paper is to present the epidemiological characteristics of invasive meningococcal disease (IMD) cases in Slovenia in 2024.

Methods: Based on reported cases, we assessed the incidence of IMD in Slovenia in 2024. The data source was the national database of communicable diseases. The data included sex, age group, serogroup, and region of notification.

Results: In 2024, the annual incidence of IMD was 0.52, compared to between 0.14 and 0.33 in the years 2020 to 2023. In most of the typed cases, the isolate of *N. meningitidis* was identified as serogroup Y (54.5%). The highest number of cases was in the age group 0-4 years (36.4%). In 2024, the majority of reported cases were in the Celje region.

Conclusion: In 2024, Slovenia recorded 11 cases of IMD, more than in the previous four years. To prevent further spread, several measures were implemented: identification and chemoprophylaxis of close contacts, vaccination to prevent secondary infections, guidance for contacts, and public and healthcare professional awareness. Vaccination is the most effective preventive measure, but in Slovenia, it is not part of the mandatory program. It is recommended for high-risk individuals and travelers to endemic areas according to the annual vaccination plan.

Keywords: epidemiology, invasive meningococcal disease, reported cases



ONE HEALTH APPROACH TO LEPTOSPIROSIS - DOGS AS ENVIRONMENTAL SENTINELS FOR IDENTIFICATION AND MONITORING OF HUMAN RISK AREAS

Sonja Obrenović¹, Jelena Marić², Marija Stoiljković³

¹ Faculty of Veterinary Medicine, University of Belgrade, Belgrade, Serbia

² Veterinary Institute of the Republic of Srpska “Dr Vaso Butozan”, Banja Luka, Bosnia and Herzegovina

³ Veterinary Specialized Institute of Niš, Niš, Serbia

Abstract

Leptospirosis has been a neglected and reemerging disease of global importance for public health with high morbidity and mortality in humans and animals and is considered the most widespread zoonotic disease worldwide. Leptospirosis has been considered an underdiagnosed infection mostly due to asymptomatic and nonpathognomonic initial symptoms, similar to other febrile-hemorrhagic-icteric illnesses such as the flu, hepatitis, Dengue fever and hantaviruses, making the clinical diagnosis a challenge and leading to case underreporting. Thus, despite the estimative annual worldwide incidence of 1.03 million cases, 58,900 deaths these numbers should be actually even higher. Leptospirosis is a disease with a complex epidemiology, and some determinants in their appearance are the interaction among the bacteria, reservoir hosts, susceptible animals and the environment in which they all coexist. A wide variety of mammals can act as reservoirs of *Leptospira* and then shedding them through urine, thus contaminating the environment. As human-to-human transmission has been rarely reported, the One Health approach has been mandatory to better understanding the animal and environmental role in the maintenance of *Leptospira* spp., as well as indicating risk areas for the monitoring and prevention of new human and animal case. Dogs play an important role in the epidemiology of *Leptospira* infection as they can act as both incidental and maintenance hosts with or without clinical symptoms, shedding leptospires in their urine contaminating the environment, which is a serious risk to public health. Direct transmission of leptospires from dogs to humans is rather uncommon. Earlier works using a One Health approach to study canine leptospirosis demonstrated the potential for dogs to act as sentinels for leptospirosis and to detect early risk of disease in humans. Given increasing global temperatures and frequency and intensity of precipitation events, the prevalence of canine and human leptospirosis is expected to increase. Studying canine leptospirosis using a One Health approach presents a unique opportunity to improve understanding of leptospirosis in animals and humans, surpassing its singular impact on canine health. Differences in human and dog serology may reflect distinct infection patterns according to host species. Higher prevalence of seropositive dogs in a specific area may indicate spirochete circulation among animal populations, occasionally leading to human infection. Such large-scale research can provide experts in human and veterinary medicine with significant data on the eco-epidemiology of leptospirosis and develop effective prevention strategies and control measures, especially in certain areas considered to be at higher risk and with reduced financial resources.

Keywords: public health, sentinel dog, eco-epidemiology, zoonoses



EPIDEMIOLOGY OF HEPATITIS B IN THE AUTONOMOUS PROVINCE OF VOJVODINA, SERBIA

Tatjana Pustahija^{1,2}, Medić S^{1,2}, Ristić M^{1,2}, Lozanov Crvenković Z³, Rajčević S^{1,2}, Ilić S², Petrović V^{1,2}

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

³ Department of Mathematics and Informatics, Faculty of Science, University of Novi Sad, Serbia

Abstract

Objectives: To analyze epidemiological characteristics and incidence trends of hepatitis B (HB) in the Autonomous Province of Vojvodina (APV), Serbia, in the period 1978-2024 and HB immunization coverage in the period 2006-2024.

Materials and methods: In this retrospective study, surveillance data of acute and chronic HB were analyzed chronologically, demographically and topographically.

Results: During the observed period, a decreasing trend in incidence rate of HB was observed. The average incidence rates of acute and chronic HB in APV were 5.60/100,000 (range: 0.00-19.41/100,000) and 2.51/100,000 (range: 0.05-6.10/100,000), respectively. Hepatitis B was reported in all APV municipalities. Higher incidence rates of acute and chronic HB were registered in males (M/F=1.17:1; M/F=3.43:1, respectively). Acute HB peaked in the 20-29 age group (8.10/100,000), while chronic HB peaked in the 50-59 age group (5.67/100,000). Declining mandatory HB immunization coverage rates of infants in the period 2006-2024 (range: 88.6-97.3%) and 12-year-olds in the period 2006-2017 were recorded (range: 55.00-96.00%).

Conclusion: Considering the decreasing HB incidence rate trend and low mortality rate, HB seems to be a well controlled in APV, especially among the younger population. Improvements in the quality of surveillance and repeated serosurveys may provide a comprehensive assessment of the HB burden in the future.

Keywords: hepatitis B, epidemiology, HB incidence rate trend, HB vaccine, APV



IMMUNIZATION OF PERSONS AT INCREASED RISK FOR THE PERIOD 2023-2024

Marko Jovanović¹, Zorana Deljanin¹, Biljana Kocić, Nataša Rančić^{1,2}

¹ Institute of Public Health of Niš, Niš, Serbia

² University of Niš, Faculty of Medicine, Niš, Serbia

Abstract

Introduction: Immunization remains one of the most effective public health interventions for preventing infectious diseases. This paper analyzes the implementation of immunization among persons at increased risk in Nišava District during the period 2023–2024. Special focus is placed on vulnerable groups, vaccination coverage, challenges in vaccine delivery, and strategies for improvement.

Vaccination programs in Serbia, as part of the National Immunization Schedule, prioritize not only children but also adults and individuals at increased risk. Persons considered at higher risk include healthcare workers, the elderly, patients with chronic diseases, immune compromised individuals, pregnant women, and institutionalized populations.

Materials and methods: The paper relies on data collected from the Institute for Public Health Niš, for the period 2023–2024. Data were analyzed regarding vaccine coverage, types of vaccines administered, and specific interventions directed at risk groups.

Results: People with anatomic or functional asplenia (absence of the spleen, either due to surgical removal or loss of function) have a significantly increased risk of severe and invasive bacterial infections, especially those caused by encapsulated bacteria. Therefore, active immunization is mandatory for them, according to the recommendations of the immunization calendars: Prevenar13 and 1st dose of Act-HiB; MenQuadfi at any interval after the previous two vaccines; 2nd dose of Act-HiB after at least 4 weeks from the 1st dose of vaccine; Pneumovax 23 at least 8 weeks after giving Prevenar 13. After at least 5 years from the administration of Pneumovax 23 revaccinations.

Conclusions: Immunization of persons at increased risk in Nišava District during 2023–2024 shows positive trends, especially in influenza and COVID-19 vaccination. Nevertheless, additional efforts are required to ensure higher uptake among pregnant women, chronically ill individuals, and healthcare workers.

Keywords: epidemiology, public health, immunization, asplenia

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SESSION: NUTRITION AND HEALTH

INVITED LECTURES

NUTRIGENOMICS – POTENTIALS AND PERSPECTIVES

Sonja Marjanović¹

¹ Medical Faculty of the Military Medical Academy, University of Defence, Belgrade, Serbia

Abstract

Nutrients may act as dietary signals that are picked up by cellular biological sensors and alter the activity of genes/proteins which in turn affects the creation of metabolites. Serious mass illnesses are largely influenced by genetics and nutrition: malignancies, diabetes, obesity, osteoporosis, heart diseases. The nutrigenomics should answer two questions: how genes influence nutrition (how a person interacts to nutrient intake) and how nutrients influence genes (expression and function).

Current science is linking genetic variation to nutritional or supplemental needs with a focus on health and sport performance. Personalized nutrition is the design of tailored nutritional recommendations to improve direct and indirect factors that influence health and sport performance. Genetic testing for personalized nutrition may be an additional tool that can be implemented health and sport performance.

Personalized nutrition based on genotype starts with identification of genetic variants (genetic testing) and then planning tailored nutrition related to gender, age, anthropometrics, health status, current nutritional status, family history, socioeconomic status, dietary preferences, presence of food intolerances/allergies.

Keywords: nutrition, genetic testing, athletic performance



THE EFFECTS OF CALORIC RESTRICTION AND ITS MIMETICS ON CARDIOVASCULAR DISEASE: TARGETS, MECHANISMS, AND THERAPEUTIC POTENTIAL

Dijana Stojanović¹

¹ Department of Pathophysiology, Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Cardiovascular diseases (CVD) remain the major cause of morbidity and mortality globally, accounting for 17.9 million deaths per year or almost one-third of all deaths worldwide. Additionally, CVD is closely associated with the global pandemics of obesity and metabolic syndrome, as the majority of CVD patients are either overweight or obese. Thus, CVD is acknowledged as an age-associated disease, and aging appears to actively contribute to its pathogenesis and prognosis. Emerging evidence from human and experimental studies indicates that mechanisms such as disabled macroautophagy, loss of proteostasis, genomic instability, epigenetic alterations, mitochondrial dysfunction, dysregulated neurohormonal signalling, cell senescence, and inflammation are particularly relevant for the cardiovascular system and might serve as potential entry points for the treatment of cardiovascular diseases. It has been widely acknowledged that caloric restriction, the gold-standard metabolic and anti-aging intervention, may attenuate cardiovascular aging, improve metabolic risk factors, and thus ameliorate the progression of CVD.

Caloric restriction (CR) is a dietary pattern characterized by the reduction in total daily caloric intake below energy requirements. A major component of maintaining optimal nutritional status with CR is avoiding deficiency of essential nutrients that result in malnutrition. This can be implemented by reducing meal sizes without prolonged fasting periods, aiming for a CR of around 20–30%, or with time-restricted eating periods (intermittent fasting [IF]), such as: alternate day fasting, with eating only every other day; periodic fasting, with two consecutive or dispersed fasting days per week; or time-restricted eating, with defined daily eating windows. Irrespective of the regimen of CR or fasting, dietary restriction remains the gold standard to increase lifespan and promote healthy aging, since it is validated, that CR may increase life span by 1-5 years with improvements in quality of life and overall health. This mechanism represents an effective autophagy inducer. Autophagy is an evolutionary conserved mechanism aimed at the removal of damaged intracellular cargoes, such as dysfunctional organelles and misfolded proteins. Autophagy acts as a self-defense process against cellular stress, in particular, energy stress. In addition, the physiological activation of autophagy during cardiac stress limits myocardial injury. For these reasons, it has been hypothesized that the beneficial effects of CR on the cardiovascular system are primarily mediated by autophagy activation. Indeed, CR has been shown to modulate cellular and molecular processes that lead to the reduction in the development of cardiovascular and metabolic diseases. Indeed, the most widely explored mechanisms related to the beneficial effects of CR include improving the cardiovascular risk factor profile, reducing superoxide production and vascular oxidative stress, lowering circulating inflammatory cytokines, and upregulating sirtuin 1 (SIRT1) expression. Caloric restriction in humans has also been shown to attenuate signs of cardiovascular aging, including reduced ventricular and



vascular stiffness, lowered blood pressure, and improved cardiac function in the form of alleviated diastolic dysfunction. Its beneficial effects on body composition, vascular, endothelial, and cardiometabolic health make it an intriguing candidate for a non-pharmacological therapy to prevent CVD.

Mechanistically, downstream activation of autophagy is especially important in the clearance of dysfunctional mitochondria (mitophagy). Enhanced production of reactive oxygen species in aged mitochondria, or accumulating mitochondrial DNA released from leaky organelles, can trigger inflammatory responses or, in the case of released caspases or nucleases, can even lead to cell death. Besides autophagy, chronic low-grade inflammation in aging, known as inflammaging, is also improved upon CR and fasting. Specifically, the polarization to pro-inflammatory M1 macrophages is redirected towards anti-inflammatory M2, as well as reduced neutrophil migration into peripheral tissues and attenuated pro-inflammatory signalling (TNF- α , IL-1 β , IL-6) in calorically restricted animals. Prolonged 25% CR has also been shown to lower the increase in circulating pro-inflammatory cytokines, an effect that correlates with improved diastolic dysfunction in humans. Nutrient deprivation during CR and fasting induces a metabolic switch towards catabolic pathways, particularly autophagy induction, *via* several nutrient-sensing pathways, such as AMP-activated kinase (AMPK). Active phospho-AMPK inhibits the mechanistic target of rapamycin (mTOR) by direct phosphorylation of the mTORC1 subunit, which is crucial in the regulation of cell growth by integrating anabolic signals like insulin or IGF-1. Inhibition of the mTOR signalling pathway has been shown to promote longevity in animal models. Besides attenuated mTORC1 activation, reduced IGF-1 signalling during CR or fasting exerts pro-autophagic actions by activating transcriptional activators of autophagy, including TFEB and forkhead-box O. Alternatively, autophagy can be initiated through the nicotinamide adenine dinucleotide (NAD⁺)-dependent deacetylase SIRT-1, which is activated by CR. In fact, CR upregulates SIRT-1 expression, thereby activating autophagic flux through the deacetylation of essential autophagy machinery proteins (ATG5, ATG7, or ATG8).

However, low adherence to CR renders this stringent dietary intervention challenging to adopt as a standard practice for CVD prevention. Hence, some alternative strategies have been offered, such as caloric restriction mimetics. Caloric restriction mimetics (CRMs) are natural or pharmaceutical compounds with intrinsic pro-autophagic action. They achieve this by promoting the deacetylation of proteins, either by depleting the acetyl-CoA donor, inhibiting the activity of protein acetylating enzymes (acetyltransferases), or stimulating the activity of protein deacetylases (like sirtuins). Several agents may be considered as CRMs since they cause protein deacetylation deriving in autophagy induction, including aspirin (willow bark, synthetic), resveratrol (fruits, plants, and skin of grapes), spermidine (wheat germs, soybeans, and nuts), hydroxycitric acid (diverse tropical plants, *Garcinia cambogia*, and *Hibiscus sabdariffa*), *metformin* (*Galega officinalis*), NAD⁺ (sardines, salmons, tuna, green vegetables), etc. New data suggest that CRMs could represent a valid alternative to CR for the prevention and treatment of CVDs. Since autophagy is a fundamental mechanism for maintaining the homeostasis of the cardiovascular system, the activation of autophagy may contribute to the beneficial effects of CRMs on the heart and blood vessels.

Caloric restriction represents a promising intervention for cardiovascular health, supported by robust evidence in animal models and emerging data in humans. By improving metabolic regulation, reducing inflammation, and enhancing vascular function, CR may contribute to reduced cardiovascular risk and increased healthspan. Accordingly, by promoting autophagy, CRMs can provide health benefits similar to those



of caloric restriction, including the potential to extend lifespan and improve health in various conditions, such as cardiovascular diseases and age-related disorders. However, practical application in the general population requires careful consideration of sustainability, safety, and individual variability.

Keywords: caloric restriction, fasting, cardiovascular disease, autophagy, caloric restriction mimetics

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FUEL, FIX, OR FAD? AMINO ACIDS IN DIET AND SUPPLEMENTS

Aleksandra Catić Đorđević¹

¹ Faculty of Medicine, University of Niš, Niš, Serbia

Introduction: Amino acids are fundamental building blocks essential for muscle growth and maintenance, tissue repair, and the synthesis of hormones and neurotransmitters. Regular consumption of protein-rich foods ensures a balanced intake of both essential and non-essential amino acids, contributing to overall health and physical performance. The rising popularity of amino acid and protein-based supplements—especially among young adults—raises important questions about their rational use, efficacy, and safety. A particular concern is the expanding market of functional foods and protein-enriched products now readily available not only in pharmacies but also in supermarkets, online platforms, and even cafes. These products often fall under other regulatory frameworks, which increases the risk of inconsistent quality, and potential misuse.

Furthermore, the World Anti-Doping Agency (WADA) has issued warnings regarding possible contamination in such products, highlighting the health risks they may pose—especially in sports contexts. Irrational or uninformed use of amino acid supplements may, in fact, be harmful.

Given these issues, healthcare professionals have a critical role in evaluating both the benefits and risks of amino acid supplementation through the lens of evidence-based medicine and pharmacy.

Objectives: The primary objective was to present available information regarding effects of amino-acids, creatin and hydrolyzed proteins, which include risk-benefit ratio, but not quality of products on the market and contamination with harmful substances. Additionally, the study was aimed to explore local attitudes, habits and trends between population of young adults.

Materials and methods: The evaluation of risk-benefit ratio of amino-acids, creatin and proteins was conducted through literature review of open-access papers published on PubMed and ScienceDirect in last ten years.

Regarding better understand local trends and attitudes toward supplement use, we conducted a prospective cross-sectional study in Serbia in spring 2024, focusing on young adults aged 18 to 35. The study voluntarily included 132 participants, with an average age of 23.5 years. Data were collected using a 20-question survey, distributed via the Google platform. The questionnaire explored physical activity levels, dietary habits, use of protein-based dietary supplements (PBDS), and levels of trust in sources of information and points of purchase for these products. Statistical analysis was performed using SPSS 20 softver, with statistical significance $p < 0.05$.

Results: Evidence-based scientific evaluation of the literature showed increasing trend in supplementation, particular use of creatin, branched -chain amino acids (BCAA) and hydrolyzed (Whey) protein. Inappropriate use, overuse and contaminations of the products can lead to health issues.

While generally safe when used as directed, excessive consumption of amino acid and hydrolyzed protein-based supplements and foods can lead to various health issues: gastrointestinal distress, kidney problems, and potential imbalances in other amino acids or nutrient levels. High doses of amino acids, particularly when consumed at once, can cause nausea, vomiting, diarrhea, or abdominal pain. This is often due to the osmotic



effect of these substances in the gut, drawing water into the digestive tract. Also, excessive protein intake, including from supplements, can overwhelm the digestive system, leading to bloating and discomfort. As responsible organ for biotransformation and excretion of proteins, kidneys could be strained and damaged during excessive protein intake, especially in dehydrated individuals. Consuming large amounts of specific amino acids, without balancing them with others, can disrupt the natural balance of amino acids in the body and affect metabolism. There is theoretical additive nephrotoxicity when creatine is co-administered with NSAIDs, or ACE inhibitors or other nephrotoxic drugs (aminoglycosides, cyclosporin, tacrolimus). Valine (and likely other BCAAs) may compete for absorption and reduce bioavailability of levodopa, potentially decreasing its efficacy. BCAAs, including valine and isoleucine, can impact blood glucose regulation. They may alter absorption or efficacy of drugs, so during insulin or oral antidiabetic therapy closer monitoring is needed. Excessive BCAA supplementation may exacerbate insulin resistance, stress liver and kidneys, and risk amino acid imbalance. Certain groups, such as individuals with kidney or liver disease, pregnant women, and children, may be more susceptible to adverse effects from excessive amino acid consumption.

Our findings from prospective study among young adults revealed several key trends:

- Physical activity levels differed significantly by gender, with men being more active than women ($p < 0.05$).
- Participants who exercised regularly reported higher satisfaction with their physical appearance ($p < 0.05$).
- Educational level was a significant factor influencing daily activity ($p < 0.05$).
- Those who exercised regularly were more likely to believe that PBDS can be used safely without health risks ($p < 0.05$).
- Interestingly, trust in advice regarding dietary supplements did not depend on the advisor's professional background; however, pharmacies were most frequently identified as the safest place to purchase supplements.

Conclusion: In recent years, dietary supplements have become increasingly popular tools for achieving specific health and fitness goals—particularly in enhancing athletic performance, accelerating recovery, and supporting muscle development. However, it is important to note that amino acids obtained from whole foods and those found in dietary supplements can differ significantly in terms of bioavailability, composition, intended use, safety, and regulatory oversight. A balanced diet that includes a variety of protein sources (including plant-based sources) is generally recommended.

Our findings highlight the need for targeted education among young adults regarding the role of physical activity in maintaining health and building self-confidence. At the same time, the increasing use of supplements and functional products aimed at boosting vitality and performance calls for clear, evidence-based guidance to ensure their rational use and to mitigate potential health risks. Health professionals should be more involved in supplementation's management.

Keywords: amino-acid based dietary supplements, creatin, BCAA, hydrolyzed protein, risk-benefit ratio, safety



SESSION: NUTRITION AND HEALTH

ORAL PRESENTATIONS

KETOGENIC DIET

Jelena Jović¹, Aleksandar Ćorac¹, Danijela Ilić¹, Branislav Đorđević²

¹ Faculty of Medicine, Department of Preventive Medicine, University of Priština - Kosovska Mitrovica, Kosovska Mitrovica, Serbia

² Institute of Occupational Safety and Health of Niš, Niš, Serbia

Abstract

Objectives: A ketogenic diet (KD) is a high-fat, very low-carbohydrate, and moderate-protein nutritional approach that shifts energy metabolism from carbohydrates to fat. Through carbohydrate restriction, the body enters ketosis, wherein the liver generates ketone bodies as an alternative fuel for the brain and peripheral tissues. This metabolic adaptation has attracted considerable attention as a potential therapeutic strategy across a range of chronic conditions.

Materials and methods: We reviewed evidence from recent meta-analyses and randomized controlled trials (RCTs) evaluating the efficacy of KD in neurological, metabolic, and oncological contexts.

Results: Meta-analyses of RCTs demonstrate that KD significantly reduces the frequency of epileptic seizures compared with standard dietary approaches. Preliminary findings suggest a potential role in modulating tumor metabolism via glucose restriction, although clinical effectiveness in oncology remains under investigation. Emerging evidence also indicates that KD may provide therapeutic benefits in neurodegenerative diseases when incorporated into broader treatment strategies. Additionally, KD has shown efficacy in addressing various metabolic disorders. Recent studies further suggest a positive association between adherence to KD principles and improved outcomes in assisted reproductive technologies (ART).

Conclusion: KD represents a promising nutritional intervention with applications in neurology, oncology, and metabolic medicine. While robust evidence supports its efficacy in epilepsy and metabolic disorders, further clinical studies are warranted to define its therapeutic value in oncology, neurodegeneration, and reproductive medicine.

Keywords: ketogenic diet, metabolic disorders, epilepsy, ART



POTENTIAL ANTI-MELANOGENIC ACTIVITY OF PROCYANIDIN B2 AND EPICATECHIN FROM WILD APPLE FRUIT - MOLECULAR DOCKING ANALYSIS

Dragana Stojiljković¹, Jovana Veselinović^{1,2}, Milena Ivković¹, Nevena Guberinić^{1,2}, Vanja Tadić³, Ivana Nešić⁴

¹ Faculty of Pharmacy, Novi Sad, University of Business Academy, Novi Sad, Serbia

² Pharmacy Institution "Remedia", Niš, Serbia

³ Institute for Medicinal Plant Research "Dr Josif Pančić", Belgrade, Serbia

⁴ Department of Pharmacy, Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Introduction: Wild apple fruit, a rich source of polyphenols such as procyanidin B2 and epicatechin, provides nutritional benefits and supports human health. These compounds have been identified as effective tyrosinase inhibitors, targeting a key enzyme involved in melanin synthesis and food browning.

Objective: Study evaluates the inhibitory potential of procyanidin B2 and epicatechin through molecular docking, comparing their binding affinity and interaction profiles with the tyrosinase active site.

Methods: A homology model of human tyrosinase (UniProt ID: P14679) was generated using SWISS-MODEL. Ligand structures (procyanidin B2 and epicatechin) were retrieved from PubChem and geometry-optimized using the MMFF94 force field, while docking was performed in Molegro Virtual Docker.

Results: Molecular docking revealed that procyanidin B2 binds more strongly to tyrosinase than epicatechin, with significantly lower binding energy (-127.46 vs. -76.40 kcal/mol), stronger hydrogen bonding, and enhanced steric interactions. It formed hydrogen bonds with five active site residues (Asp125, Asp454, Asp456, Ser450, Ser459), indicating broader and more stable binding.

Conclusion: The structure-activity relationship highlights the importance of both molecular conformation and interaction density in the rational design of tyrosinase inhibitors. Procyanidin B2 and epicatechin might be used as potential tyrosinase inhibitors in food preservation and skin-hyperpigmentation lightening cosmetic products.

Keywords: wild apple fruit, procyanidin B2, epicatechin, anti-melanogenic activity, molecular docking

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PERCEPTION AND PRACTICE ON DIETARY SUPPLEMENT USE AMONG FEMALE STUDENTS IN NIŠ, SERBIA

Bojana Vuković Mirković^{1,2}, Dušica Stojanović^{1,2}, Maja Nikolić^{1,2}, Aleksandra Stanković^{1,2}, Ljiljana Stošić^{1,2}

¹ Faculty of Medicine, University of Niš, Niš, Serbia

² Public Health Institute of Niš, Niš, Serbia

Abstract

Objectives: Dietary supplements (DS) have gain popularity among young people, but there is not enough knowledge about their usage and associated risks. The study aimed to assess the perception and practice of female students of Medicine in Niš, Serbia regarding dietary supplements use.

Methods: Cross-sectional study was conducted using a questionnaire-based survey. The study included 112 participants aged 23-26 years at the Faculty of Medicine University of Niš. The collected data were entered in Microsoft Excel and analyzed.

Results: The prevalence of DS use among female medical students was high; as many as 90.9% (n=102) of respondents use them. The reasons for use are general health improvement (n=51, 50%), deficits correction (n=21, 20.58%) and disease prevention (n=21, 20.58%), and the most frequent supplements are taken on one's own initiative (n=65, 63.4%). They mostly found information about the type and method of use of DS by themselves (n=56, 55%). 36.2% of respondents (n=37) believe that the use of DS without consultation with an expert is justified, while 45% (n=46) believe that they should be recommended by an expert.

Conclusion: The findings reveal a significant prevalence of dietary supplements use with more than 90% of female medical students reporting current usage. This aligns with previous research of a growing trend of dietary supplements consumption among young adults.

Keywords: dietary supplements, students, female



SESSION: NUTRITION AND HEALTH

POSTER PRESENTATIONS

ANALYSIS OF DIETARY HABITS IN CHILDREN IN NOVI SAD AND POTENTIAL PUBLIC HEALTH RISKS

Jelena Bjelanović^{1,2}

¹ Institute of Public Health of Vojvodina, Novi Sad, Serbia

² University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

Abstract

Objectives:

The aim was to examine the dietary habits of elementary school students, with a particular focus on the frequency of consumption of foods important for proper growth and development, as well as the intake of foods that may have an unfavorable impact on health.

Materials and methods:

The research was conducted during 2021–2023. A total of 238 first-grade students from selected elementary schools in Novi Sad participated. Dietary habits were analyzed using a questionnaire specifically designed for the purposes of this study.

Results:

Among all surveyed students, 54.20% did not drink milk on a daily basis. As many as 19.75% of students did not consume at least one fruit per day, while 52.52% did not include at least one salad in their daily meals.

On the other hand, 61.76% of students consumed sweets daily, 43.70% consumed salty snacks every day, and 21.85% drank sugar-sweetened carbonated beverages daily.

Conclusion:

The results indicate an insufficient frequency of consumption of foods important for proper growth and development, accompanied by excessive intake of foods with negative health effects, which corresponds with the prevalence of inadequate nutrition in this region. These findings emphasize the need for additional educational programs on healthy eating habits, with the aim of improving the health of school-aged children.

Keywords: dietary habits, children, elementary schools, public health



NUTRITIONAL QUALITY OF FOOD IN ELEMENTARY SCHOOL IN NORTH MACEDONIA: 10-YEAR REVIEW

Jansun Bukovetz¹, Martina Markova Juzevska², Marija Andonovska³, Marjan Veljanovski², Zorica Ivanovska², Emilija Bogoevska², Elena Tortevska Danilov⁴, Natalija Miloradovska⁴, Vecka Arabadjieva⁵, Sanja Nakova-Ordeva⁵, Snezhana Petrova⁶, Darko Kotev⁶, Ivana Gjorgjievaska⁶, Julijana Kitanovska Spasev⁶, Marie Gjetaj Jakovski⁷, Biljana Dzikovska⁷, Berun Mustafa⁸, Ilija Ilijoski⁸, Ratko Davidovski⁸, Arta Alili-Ramadani⁹, Blerta Shahini Azizi⁹, Lidija Simonoska¹⁰, Kristi Disho¹⁰, Tomislav Haji Tosev¹¹, Petar Ohanesjan¹², Mihail Kochubovski¹², Igor Spiroski^{1,13}

¹ Institute of Public Health of North Macedonia, Skopje, North Macedonia

² Center of Public Health of Bitola, Bitola, North Macedonia

³ Faculty of Dental Medicine, Ss. Cyril and Methodius University in Skopje, Skopje, North Macedonia

⁴ Center of Public Health of Kočani, Kočani, North Macedonia

⁵ Center of Public Health of Štip, Štip, North Macedonia

⁶ Center of Public Health of Veles, Veles, North Macedonia

⁷ Center of Public Health of Skopje, Skopje, North Macedonia

⁸ Center of Public Health of Tetovo, Tetovo, North Macedonia

⁹ Center of Public Health of Kumanovo, Kumanovo, North Macedonia

¹⁰ Center of Public Health of Ohrid, Ohrid, North Macedonia

¹¹ Center of Public Health of Strumica, Strumica, North Macedonia

¹² Center of Public Health of Prilep, Prilep, North Macedonia

¹³ Faculty of Medicine, Ss. Cyril and Methodius University in Skopje, North Macedonia

Abstract

Objectives: Early childhood nutrition shapes lifelong health. School meals improve diet quality, reduce obesity, and support well-being, especially for children from low-income families. This study examined the nutritional quality of elementary school meals (macronutrients) from 2014 to 2023 in North Macedonia.

Methods: As part of the National Annual Public Health Program, Centers of Public Health analyzed the macronutrient content of menus for 7-9-year-old children using digital nutritional assessment tools. The Institute of Public Health collected and analyzed national data. Results were interpreted according to the Rulebook on Nutrition and Meal Standards in Primary Schools (2020), which recommends that 70% of daily intake should be consumed during school time.

Results: From 2014 to 2023 with no data available for 2020. The average daily energy intake was 1,058 kcal (range 934–1,216 kcal), below the recommended 1,260 kcal for boys and 1,120 kcal for girls by 16% and 5.5%, respectively. Saturated fats constituted 13.8% of total fats and monosaccharides 15.4% of carbohydrates, exceeding the recommended 10% of total energy. Protein intake averaged 14.7% of energy (41 g/day), fats 30.1% (36 g/day), and carbohydrates 55.1% (146 g/day), all within standards.

Conclusion: Findings reveal insufficient energy intake and excessive saturated fat and sugar consumption, highlighting the need for targeted strategies to improve school meals in line with the Rulebook on Nutrition and Meal Standards in Primary Schools (2020).

Keywords: macronutrients, children nutrition, nutritional quality, nutrition requirements



ASSESSMENT OF MICRONUTRIENT INTAKE IN STUDENT DORMITORY MEALS IN NORTH MACEDONIA (2014-2024)

Martina Markova Juzevska¹, Jansun Bukovetz², Marie Gjetaj Jakovski⁵, Biljana Dzikovska⁵, Kristi Disho³, Lidija Simonoska³, Sanja Nakova-Ordeva⁴, Vecka Stefanova Arabadjieva⁴, Hristina Vasilevska¹, Igor Spiroski^{2,6}

¹ Center of Public Health of Bitola, Bitola, North Macedonia

² Institute of Public Health of North Macedonia, Skopje, North Macedonia

³ Center of Public Health of Ohrid, Ohrid, North Macedonia

⁴ Center of Public Health of Štip, Štip, North Macedonia

⁵ Center of Public Health of Skopje, Skopje, North Macedonia

⁶ Faculty of Medicine, Ss. Cyril and Methodius University of Skopje, Skopje, North Macedonia

Abstract

Objective: Although required in small amounts, micronutrients are essential for maintaining health and supporting proper physiological function. The aim of this study was to evaluate the nutritional quality of the meals provided in the student dormitories in North Macedonia between 2014 and 2024.

Methods: As a part of the National Annual Public Health Program, monthly assessments were conducted by three Centers of Public Health (Skopje, Štip and Ohrid). Meals were analyzed over three consecutive days each month using standardized digital tools. The Institute for Public Health collected and analyzed the overall national data to determine energy and nutrient composition.

Results: The average daily energy intake was 2,367 kcal, exceeding the WHO adult recommendation (2,300 kcal) by 2.91%. Notable micronutrient deficiencies were identified in magnesium (-60%), calcium (-49%), copper (-33%), and vitamin B1 (-14%). Conversely, excessive intakes were observed for sodium (+121%), phosphorus (+94%), and vitamin A (+189%). Other nutrients, including vitamin B2, niacin, vitamin C, and iron, were within recommended ranges.

Conclusion: These results underscore the need to enhance meal quality through increased use of fresh produce, whole grains and fortified food. Targeted interventions are recommended to address specific micronutrient imbalances and support student health.

Keywords: micronutrients, nutritional quality, nutritional monitoring, nutritional assessment



MEDITERRANEAN DIET AS A PREVENTION MODEL: FROM POPULATION-LEVEL APPROACH TO PERSONALIZED STRATEGY

Svetlana Stojkov^{1,2}, Jasmina Arsić¹, Dragana Stojiljković¹, Jovana Veselinović^{1,3}

¹ Faculty of Pharmacy, Novi Sad, University of Business Academy, Novi Sad, Serbia

² College of Vocational Studies for the Education of Preschool Teachers and Sports Trainers, Subotica, Serbia

³ Pharmacy Institution "Remedia", Niš, Serbia

Abstract

Introduction: The Mediterranean diet (MD) is widely recognized as an effective model for preventing chronic non-communicable diseases, particularly cardiovascular and metabolic disorders. Its anti-inflammatory and antioxidant properties have positioned it as a foundation in preventive medicine and nutrition guidelines. Recent scientific advances have enabled the personalization of MD, tailoring dietary recommendations to an individual's genetic, metabolic, and microbiota profiles.

Objective: This paper summarizes the latest evidence on the health effects of MD and discusses its dual application as a public health measure and a personalized intervention strategy.

Methods: A comprehensive literature review was conducted, covering clinical trials, cohort studies, and research in nutrigenomics and public health.

Results: Extensive data confirm the significant benefits of MD at the population level. Additionally, incorporating individual genetic variability and gut microbiota considerations may further enhance its preventive and therapeutic outcomes in specific individuals.

Conclusion: The MD should be viewed not only as a broad public health tool but also as a flexible framework for personalized nutrition. Integrating both approaches into clinical practice and counseling offers a unique opportunity to improve preventive healthcare, presenting new roles and challenges for pharmacists and physicians in modern health systems.

Keywords: mediterranean diet, prevention, public health, personalized nutrition, nutritional intervention



MEDITERRANEAN DIET AND CLINICAL OUTCOMES IN WOMEN WITH POLYCYSTIC OVARY SYNDROME: THE ROLE IN MANAGING INSULIN RESISTANCE BEFORE AND DURING PREGNANCY

Jasmina Arsić¹, Svetlana Stojkov^{1,2}, Dragana Stojiljković¹

¹ Faculty of Pharmacy, Novi Sad, University of Business Academy, Novi Sad, Serbia

² College of Vocational Studies for the Education of Preschool Teachers and Sports Trainers, Subotica, Serbia

Abstract

Introduction: Polycystic ovary syndrome (PCOS) is a common endocrine disorder among women of reproductive age, frequently associated with insulin resistance (IR) and chronic inflammation. IR prior to pregnancy reduces fertility and, during pregnancy, increases the risk of gestational diabetes and other complications.

Objective: To analyze scientific evidence on the effects of the Mediterranean diet (MD) on clinical outcomes and the management of IR in women with PCOS before and during pregnancy, and to evaluate its potential as a preventive and therapeutic strategy.

Methods: A systematic literature review was conducted using PubMed, Scopus, and Web of Science databases (2010–2024). Included studies were randomized controlled trials, prospective studies and systematic reviews, with critical appraisal of evidence quality.

Results: The MD improves insulin sensitivity, reduces inflammation, and enhances glycemic control, thereby lowering the risk of gestational diabetes and improving both metabolic and reproductive outcomes.

Conclusion: The MD represents a promising holistic approach to managing IR in women with PCOS. However, further clinical trials are needed to establish definitive recommendations.

Keywords: polycystic ovary syndrome, insulin resistance, pregnancy, mediterranean diet, clinical outcomes



MEDITERRANEAN DIET AND FERTILITY

Kristina Stamenković^{1,2}, Radmila Velicki^{1,2}, Vesna Mijatović Jovanović^{1,2}

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

Abstract

Objectives: The objective of this paper is to compile and analyze data from previously published clinical studies and scientific articles related to the role of nutrition, particularly elements of the Mediterranean diet, in the prevention, development, and treatment of infertility.

Materials and methods: The databases used in this research include MEDLINE, PubMed, and KOBSON.

Results: A diet based on Mediterranean dietary patterns-rich in dietary fiber, omega-3 fatty acids, plant-based proteins, vitamins, and minerals, has a positive impact on both female and male fertility. Plant-derived antioxidants, along with omega-3 fatty acids, may improve sperm motility and enhance their capacity to fertilize the oocyte. Replacing animal protein sources, particularly poultry and red meat, with plant-based proteins may reduce the risk of anovulation and subsequent infertility. Furthermore, a correlation has been established between the concentration of 25-hydroxyvitamin D in follicular fluid and both implantation and clinical pregnancy rates.

Conclusion: Dietary modifications have been shown to significantly influence reproductive function. Adherence to a balanced and nutrient-rich diet prior to and during attempts to conceive may play a critical role in optimizing fertility outcomes and overall reproductive health.

Keywords: mediterranean diet, fertility, reproductive health



NUTRITIONAL STRATEGIES IN THE MANAGEMENT OF POLYCYSTIC OVARY SYNDROME

Milena Zlatanović^{1,4}, Milka Popović^{2,3}, Ardea Milidrag⁴, Tijana Stojković⁵

¹ Academy of Applied Preschool Teaching and Health Studies Kruševac, Department of Medical Studies, Čuprija, Serbia

² Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia

³ Institute of Public Health of Vojvodina, Novi Sad, Serbia

⁴ Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

⁵ General Hospital of Čuprija, Čuprija, Serbia

Abstract

Objective: The aim of this paper is to emphasize the role of dietary interventions in managing polycystic ovary syndrome (PCOS), focusing on their effects on metabolic regulation, hormonal balance, and reproductive outcomes.

Methodology: A review of the available literature on nutritional approaches in PCOS was conducted, including publications from medical and nutritional journals, as well as professional and scientific papers. Sources were identified through electronic databases (PubMed/MEDLINE, Google Scholar, KoBSON).

Results: Low-carbohydrate (LCD) and low-glycemic index (LGI) diets were found to reduce body weight, insulin resistance, and testosterone levels, with LGI diets also improving appetite control and lipid profiles. The ketogenic diet enhances menstrual regularity and glycemic control, while the Mediterranean diet, rich in anti-inflammatory nutrients, supports fertility and metabolic balance. In contrast, the Western dietary pattern worsens PCOS symptoms. A balanced intake of proteins, fiber, and healthy fats, along with restricted refined carbohydrates and sweetened drinks, is recommended. Micronutrients such as zinc, selenium, and folate may provide additional benefits, though evidence remains insufficient for routine clinical guidelines.

Conclusion: Nutrition represents the basis of non-pharmacological therapy in PCOS. Personalized dietary plans, based on low glycemic load, Mediterranean or ketogenic patterns, promote hormonal and metabolic stabilization and contribute to improved reproductive outcomes in women with PCOS.

Keywords: PCOS, nutrition, insulin resistance, reproductive health, mediterranean diet



KNOWLEDGE, BELIEFS AND PRACTICES ABOUT NUTRITION AND PHYSICAL ACTIVITY AMONG PREGNANT WOMEN IN NIŠ, SERBIA

Aleksandar Anđelković¹, Maja Nikolić², Nada Stanković³, Katarina Simonović¹

¹ University Clinical Center of Niš, Niš, Serbia

² Faculty of Medicine, University of Niš, Niš, Serbia

³ Institute of Occupational Safety and Health of Niš, Niš, Serbia

Abstract

Introduction: Pregnancy represents a sensitive period in which nutrition and physical activity can affect the health and nutritional status of both mother and child. However, there is limited published research that demonstrates pregnant women's knowledge and practices of the nutritional and physical activities during pregnancy in Serbia.

Objectives: To assess the knowledge and beliefs about nutrition and physical activities among women during pregnancy in Niš, Serbia.

Materials and methods: The pilot cross-sectional study was conducted at University Clinical Center Niš from May -June 2025 and 25 pregnant women were invited to complete the self-administered questionnaire addressing dietary habits and physical activity. The standardized questionnaire was adapted from similar international studies and applied with permission from the original author.

Results: The mean maternal age was 30.6 years (range 19–41), with an average gestational age of 12.7 weeks (range 6–19). Only 44% of participants reported having adequate knowledge about healthy nutrition during pregnancy. Family, healthcare professionals, and online sources were the most frequent channels of information. Walking was the most frequently reported physical activity (24.0%), and a third participants (32.0%) reported no physical activity at all, reflecting barriers and misconceptions regarding exercise in pregnancy.

Conclusion: These findings highlight a gap between dietary and physical activities guidelines and real-life practices of pregnant women in Serbia. The results underline the importance of designing targeted educational interventions to promote healthy lifestyle choices in pregnancy.

Keywords: diet, physical activity, knowledge, practice, pregnancy



INNOVATIVE MICROBIOTA - TARGETED NUTRITIONAL STRATEGY FOR PREVENTING INSULIN RESISTANCE

Ardea Milidrag¹, Milka Popović^{2,3}, Milena Zlatanović^{1,4}, Irzada Taljić⁵, Arzija Pašalić⁶

¹ University of Kragujevac, Faculty of Medical Sciences, Kragujevac, Serbia

² Department of Hygiene, Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia.

³ Center for Hygiene and Human Ecology, Institute of Public Health of Vojvodina, Novi Sad, Serbia.

⁴ Department of Medical Studies, The Academy of Applied Preschool Teaching and Health Studies Kruševac, Čuprija, Serbia

⁵ Faculty of Agriculture and Food Sciences, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

⁶ Faculty of Health Studies, University of Sarajevo, Sarajevo, Bosnia and Herzegovina.

Abstract

Objectives: Present an integrated strategy for preventing insulin resistance (IR) by combining gut microbiota modulation (high fiber, omega-3 fatty acids, fermented foods), SCFA (short-chain fatty acid) quantification, chrononutrition, and personalization via microbiome profiling.

Methods: We synthesized recent findings (2023–2025) on diet–microbiota–metabolism interactions. Key molecular pathways (AMPK, PI3K/Akt, NF-κB, GLP-1, PYY, gut barrier integrity) were examined in relation to these nutritional interventions in populations at elevated metabolic risk.

Results: High-fiber, omega-3-rich, fermented diets foster SCFA-producing gut taxa (e.g., *Faecalibacterium*, *Akkermansia*), boosting SCFA production. These SCFAs activated AMP-activated protein kinase and enhanced insulin signaling (PI3K/Akt), while suppressing NF-κB-mediated inflammation. Omega-3 fatty acids further broadened the gut microbiota's anti-inflammatory potential. Fermented foods strengthened the intestinal barrier and increased incretin release (GLP-1, PYY). Aligning food intake with circadian rhythms (chrononutrition) improved insulin sensitivity by restoring beneficial microbial diurnal oscillations. Incorporating individual microbiome profiles and fecal SCFA measures enabled personalized dietary adjustments for maximal efficacy.

Conclusion: A multifaceted approach targeting the gut microbiota, SCFAs, and circadian-aligned nutrition is a promising strategy to improve insulin sensitivity and prevent metabolic disorders. This innovative concept, grounded in molecular evidence, is clinically applicable for personalized prevention in high-risk populations.

Keywords: insulin resistance, gut microbiota, short-chain fatty acids, chrononutrition, personalized nutrition



THE LOW FERMENTABLE OLIGO-, DI-, MONO-SACCHARIDES AND POLYOLS (FODMAP) DIET-NEW INSIGHTS

Maja Nikolić^{1,2}, Aleksandra Stanković^{1,2}, Biljana Kocić^{1,2}, Bojana Vuković Mirković^{1,2}

¹ Public Health Institute of Niš, Niš, Serbia

² University of Niš, Faculty of Medicine, Niš, Serbia

Abstract

Introduction: In recent years, there has been a growing interest in FODMAPs (Fermentable Oligo-, Di-, Mono-saccharides, And Polyols). A low FODMAP diet is increasingly suggested for irritable bowel syndrome (IBS) treatment, but how it works is still not completely understood.

Objective: This review aims to present recent advances in the understanding of the mechanisms by which the low FODMAP diet impacts evidence for its efficacy and recommendations for areas for future research.

Methods: The sources we analyzed in the paper were PubMed, Web of Science and Google Scholar through to 1 June 2025.

Results: As indigestible carbohydrates, FODMAPs may provoke abdominal pain, bloating, flatulence, and alterations in bowel habits and can cause constipation, diarrhea, or a combination of both. FODMAP food make luminal distension induced by gas and water, modulates visceral hypersensitivity and microbiota, increases in intestinal permeability, and the production of short-chain fatty acids, as well as metabolomics and alterations in motility. A low FODMAP diet was superior to all other interventions in IBS, specially for abdominal pain severity, abdominal bloating or distension severity and bowel habit.

Conclusion: This review aims to serve as a valuable resource for public healthcare practitioners, researchers, and patients with IBS.

Keywords: low FODMAP diet, nutrition, irritable bowel syndrome



TRADITIONAL USES OF MEDICINAL PLANTS IN DIGESTIVE DISORDERS AMONG GERIATRIC POPULATION IN CITY OF NIŠ

Mila Andonov¹, Dragana R. Pavlović², Tijana Ivanović², Danica Savić², Jelena S. Matejić²

¹ Gerontological Center of Niš, Niš, Serbia

² University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia

Abstract

Background and Aim: Ethnobotanical research is essential for the preservation of traditional plant knowledge, especially in the elderly population. The geriatric population acquired their knowledge of medicinal plants primarily through personal experience and the exchange of information within the community.

Methods: Semi-structured ethnobotanical interviews were conducted with 20 informants (4 men and 16 women) aged 60–91 years about the treatment of digestive disorders at the Gerontology Centre in Niš.

Results: A total of 26 usage reports were recorded, identifying 16 plant taxa used for traditional digestive problems. In addition, informants reported the use of medicinal plants for abdominal pain (34.48%), appetite (20.69%), gargling (13.79%), stomach pain (6.90%), Crohn's disease (6.90%) and irritable bowel syndrome (3.45%). The most frequently mentioned species were *Mentha x piperita* L. (19.23%, 5 usage reports), *Salvia officinalis* L. (19.23%, 5 usage reports), *Malus sylvestris* L. (Mill) (7.69%, 2 usage reports), *Thymus* spp. (7.69%, 2 usage reports).

Conclusion: The preservation of this knowledge is crucial for the protection of traditional practice and its application in modern phytotherapy.

Keywords: traditional plant knowledge, ethnobotanical interview, medicinal plants, use-reports

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HYPOTENSIVE AND CARDIODEPRESSANT ACTIVITIES OF BLACK CURRANT (*RIBES NIGRUM* L.) JUICES

Bojana Miladinović¹, Suzana Branković², Milica Kostić¹, Milica Milutinović¹, Nemanja Kitić², Miloš Jovanović¹, Katarina Šavikin³ and Dušanka Kitić¹

¹ Department of Pharmacy, Faculty of Medicine, University of Niš, Niš, Serbia

² Department of Physiology, Faculty of Medicine, University of Niš, Niš, Serbia

³ Institute for Medicinal Plants Research "Dr. Josif Pančić", Belgrade, Serbia

Abstract

Objectives Cardiovascular diseases (CVDs) stand as the foremost cause of global mortality, claiming an estimated 17.9 million lives annually. Over 80% of CVD deaths stem from heart attacks and strokes, with one-third occurring prematurely in individuals under 70 years of age. The aim of this research was to evaluate the effects of two black currant juices (*Ribes nigrum* L.), on the blood pressure and frequency of cardiac contractions.

Methods Black currant juices were made from varieties Triton and Ometa berries. Arterial blood pressure was directly measured from the carotid artery of the anaesthetized rabbits. Juices were added in increasing logarithmic concentrations (0.33, 1.66, 3.33, 16.65, 33.33 and 166.5 mg/kg) in 15-20 minutes interval. The results are expressed as % reduction in blood pressure and heart rate.

Results An intravenous injection black currant juice induced significant dose-dependent decrease of the arterial blood pressure and heart rate of rabbits. Triton decreased mean arterial blood pressure by $35.12 \pm 1.54\%$ and heart rate by $28.68 \pm 1.32\%$. Ometa juice also induced significant decline in blood pressure ($33.48 \pm 3.32\%$) and heart rate ($29.89 \pm 2.11\%$).

Conclusion The hypotensive effect of black currant juice may be due to its inhibitory activity on the heart contraction rate and vasorelaxant effects.

Keywords: black currant, juices, hypotensive activity, cardiodepressant activity, heart frequency

Acknowledgements

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THE RELAXANT EFFECTS OF SALVIA SCLAREA L. HYDROETHANOLIC EXTRACT ON SPONTANEOUS AND INDUCED RATS ILEAL CONTRACTIONS

Milica Randjelović¹, Suzana Branković², Bojana Miladinović¹, Milica Milutinović¹, Miloš Jovanović¹, Nemanja Kitić³, Dušanka Kitić¹

¹ Department of Pharmacy, Faculty of Medicine, University of Niš, Niš, Serbia

² Department of Physiology, Faculty of Medicine, University of Niš, Niš, Serbia

³ Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Objectives: Numerous Lamiaceae species have long been used in traditional medicine to manage digestive and respiratory disorders, owing to their spasmolytic activity. In this study, the effects of *Salvia sclarea* L. hydroethanolic extract on spontaneous, KCl-induced, and acetylcholine-induced contractions of rat ileal smooth muscle were evaluated.

Materials and methods: The extract was prepared from the above-ground parts of *S. sclarea* collected in Malča, Niš, Serbia, using 60% ethanol and ultrasound-assisted extraction. Its spasmolytic effects were assessed on isolated *Wistar* rat ileum in *in vitro* conditions.

Results: Earlier chemical analyses of the extract showed a high concentration of phenolic compounds, with rosmarinic acid being the major constituent. The maximum concentration of the extract (1.5 mg/ml) inhibited spontaneous contractions by 40.60±1.22% with an EC₅₀ value of 1.68±0.15 mg/ml. In the KCl-induced model, the same concentration of the extract reduced contractions to 70.63±2.96%, with an EC₅₀ value of 3.39±0.23 mg/ml. Acetylcholine-induced contractions were reduced to 61.50±5.74%, with a significant increase in the EC₅₀ value of acetylcholine before and after the addition of the extract.

Conclusion: The investigated extract demonstrated notable spasmolytic effects on rat ileal smooth muscle, suggesting its potential for future use in managing gastrointestinal disorders associated with smooth muscle spasms.

Keywords: salvia sclarea L, hydroethanolic extract, rat, ileum contractions

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ANTIOXIDANT ACTIVITY OF UNENCAPSULATED AND MICROENCAPSULATED EXTRACTS FROM THE UNDERGROUND PARTS OF *GENTIANA ASCLEPIADEA* L. WITH *IN SILICO* ADME PROFILING

Miloš S. Jovanović¹, Milica Milutinović¹, Suzana Branković², Milica Randjelović¹, Bojana Miladinović¹, Nemanja Kitić³, Nada Čujić Nikolić⁴, Katarina Šavikin⁴, Dušanka Kitić¹

¹ Department of Pharmacy, Faculty of Medicine, University of Niš, Niš, Serbia

² Department of Physiology, Faculty of Medicine, University of Niš, Niš, Serbia

³ Faculty of Medicine, University of Niš, Niš, Serbia

⁴ Institute for Medicinal Plants Research “Dr. Josif Pančić”, Belgrade, Serbia

Abstract

Objectives: This study evaluated the antioxidant activity of unencapsulated and microencapsulated extracts from the underground parts of *Gentiana asclepiadea* L., along with *in silico* absorption, distribution, metabolism, and excretion (ADME) analysis of their main compounds.

Materials and methods: The extract was microencapsulated by spray drying using 20% whey protein as a carrier. Antioxidant activity was assessed *in vitro* by the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay and the β -carotene bleaching assay for lipid peroxidation inhibition. The results were expressed as IC₅₀ values, representing the concentration required to inhibit 50% of the oxidative process.

Results: The unencapsulated extract showed significantly lower IC₅₀ values than the microencapsulated form in both assays (2569.58 vs. 4270.15 μ g/mL in DPPH; 29.50 vs. 31.41 μ g/mL in β -carotene). ADME analysis was conducted for swertiamarin, gentiopicroside, isoorientin, isovitexin, and isogentisin using SwissADME software. Only isogentisin had high predicted gastrointestinal absorption, while none of the evaluated compounds were predicted to cross the blood-brain barrier. Among the evaluated substances, gentiopicroside was identified as a potential substrate for P-glycoprotein, and isogentisin showed potential interactions with cytochrome isoenzymes (CYP1A2, CYP2D6, and CYP3A4).

Conclusion: Overall, these *in vitro* antioxidant and *in silico* ADME results provide a foundation for further *in vivo* and clinical studies of *G. asclepiadea* bioactive compounds.

Keywords: Willow gentian, antioxidant, microencapsulation, computational pharmacokinetics

Acknowledgements: This research was supported by the Ministry of Science, Technological Development and Innovation of Republic of Serbia (contract numbers 451-03-137/2025-03/200113, 451-03-136/2025-03/200113 and 451-03-136/2025-03/200003).



ANTIOXIDANT ACTIVITY OF GEL WITH DIAMINOBUTYROYL BENZYLAMIDE DIACETATE (SYN®-AKE) DIPEPTIDE

Ana Paunović¹, Vesna Savić², Milica Martinović², Snežana Zlatković Guberinić¹, Nevena Guberinić¹, Anđela Dragičević¹

¹ “Remedia“ Pharmacy Niš, Niš, Serbia

² Department of Pharmacy, Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Objectives: Dipeptide diaminobutyroyl benzylamide diacetate (SYN®-AKE), a synthetic snake venom peptide, is a bioactive peptide used in anti-age dermocosmetics, that acts as an antagonist of the muscular nicotinic acetylcholine receptor on the postsynaptic membranes. By reducing the frequency of facial muscle contractions, it decreases mechanical stress on the skin and reduces the appearance of wrinkles. The aim of this study was to evaluate whether this peptide incorporated in the gel may also show antioxidant activity as additional anti-aging mechanism.

Methods: For the purpose of the study, placebo and active carbomer gel with SYN®-AKE dipeptide (0.01%) were prepared. Antioxidant activity of gels was determined using DPPH assay, spectrophotometric method based on measuring free radical scavenging activity. The results were expressed as mmol Trolox equivalents per gram of sample (mmol TE/g).

Results: The active gel demonstrated a significantly higher antioxidant activity (846.59 ± 11.09 mmol TE/g) compared to placebo gel (716.38 ± 9.14 mmol TE/g), with statistically significant difference at $p < 0.05$.

Conclusion: The results of the study show that SYN®-AKE dipeptide increased antioxidant activity of placebo gel, indicating its potential as a bioactive component for formulating dermocosmetics designed to combat oxidative stress and support youthful skin appearance.

Keywords: dipeptide diaminobutyroyl benzylamide diacetate, SYN®-AKE, antioxidants, DPPH, dermocosmetics



PREVALENCE AND FACTORS ASSOCIATED WITH DIETARY SUPPLEMENTS USE AMONG UNIVERSITY STUDENTS IN BELGRADE

Tatjana Gazibara ¹, Dragana Plavša ², Maja Stošić ², Vladan Šaponjić ², Marija Milić ^{2,3}, Verica Jovanović ²

¹ Institute of Epidemiology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

² Institute of Public Health of Serbia “Dr Milan Jovanović Batut”, Belgrade, Serbia

³ Department of Preventive Medicine, Faculty of Medicine, University of Priština temporarily seated in Kosovska Mitrovica, Kosovska Mitrovica, Serbia

Abstract

Objective: To evaluate the prevalence and factors associated with dietary supplements intake in a sample of university students.

Methods: Students at the University of Belgrade were surveyed from February to April 2023. All of them who visited the Student Health Center for health checks were invited to participate. Data were collected through face-to-face interviews using a structured questionnaire. Students were asked whether they used supplements such as vitamins, minerals and botanicals. Data were analyzed using the adjusted logistic regression model.

Results: Out of 1,307 university students who were enrolled in the study, 469 (35.9%) reported dietary supplements use. The adjusted logistic regression suggested that being female (odds ratio [OR]=2.09, 95% confidence interval [CI] 1.55-2.82), having lower body mass index [BMI] (OR=0.96, 95% CI 0.92-0.99), studying health sciences (OR=1.33, 95% CI 1.03-1.72), bedtime until 10 pm (OR=1.35, 95% CI 1.10-1.66) and having multiple COVID-19 infections (OR=1.24, 95% CI 1.06-1.45) were independently associated with dietary supplements use.

Conclusion: About one third of university students used dietary supplements such as vitamins, minerals and botanicals. Females who have lower BMI, study health sciences, go to sleep by 10 pm and had several COVID-19 infections were more likely to use dietary supplements.

Keywords: diet, supplements, students



SESSION: ENVIRONMENT AND HEALTH

INVITED LECTURES

COMMUNITY BASED PREVENTION: TRAJECTORIES TOWARDS SUSTAINABLE HEALTH

Gianfranco Damiani¹, Lia Olivo¹, Anna Nisticò¹, Maria Teresa Riccardi²

¹ Department of Health Sciences and Public Health, Section of Hygiene, Università Cattolica del Sacro Cuore, Rome, Italy.

² Local Health Authority "Roma 2", Rome, Italy

Abstract

Objectives: This presentation explores the strategic role of community-based prevention in advancing Universal Health Coverage (UHC) by contributing to health system sustainability and promoting interventions that are both cost-effective and demonstrate a favorable return on investment (ROI). It highlights how multicomponent, population-level strategies can prevent disease and foster well-being by targeting social and environmental determinants of health within local community settings.

Methods: A comprehensive review of key public health frameworks and core health system functions was conducted, with a focus on community-based prevention as a structured, participatory approach that integrates individual-level and environmental interventions across diverse settings. Additionally, a qualitative comparative analysis was carried out to assess the distinguishing features, strengths, and limitations of the main conceptual models identified, with particular attention to their applicability in complex, community-based public health contexts.

Results: The review identified seven models for planning, implementation, and evaluation of community-based prevention programs. These models are generally characterized as cyclical (i.e. progressing through successive phases, except for one model) and iterative (i.e. aiming for continuous improvement in both processes and outcomes). They are also marked by a high degree of flexibility, allowing adaptation across various intervention areas and community contexts.

Common phases include: (1) assessment of community needs and health determinants; (2) priority setting and goals definition; (3) program planning, development, and implementation; and (4) evaluation (process, impact, and outcome measures). Some models place strong emphasis on the analysis of existing policies and programs, while others highlight community engagement—through tools for education, coaching and counselling at population level—as a critical element for program development and long-term sustainability through local ownership (community building).

The analysis also revealed several challenges. First, limiting evaluation to cost-effectiveness analyses and health outcomes for the target population is insufficient. Broader impacts—such as changes in the social and physical environment (e.g., employment and education levels), local leadership development, and community empowerment—should be systematically considered. Second, program evaluation is



often hindered by the lack of standardized metrics and inadequate data infrastructure. Lastly, equity must be integrated both as a core priority and an evaluation criterion, embedded across all phases and dimensions of program design and assessment.

Conclusions: In the context of designing and implementing community-based prevention programs, six strategic trajectories are proposed to enhance efficiency and promote long-term sustainability of health systems:

1. Adoption of scientifically validated approaches and methodologies, to ensure evidence-based planning and evaluation;
2. Robust community and stakeholder engagement, fostering participatory governance and local ownership;
3. Inter-institutional agreements and systematized program design, to promote continuity, coordination, and scalability;
4. Integration of digital technologies, to support data collection, monitoring, and cross-sectoral collaboration;
5. Incentivization of virtuous individual and collective behaviors, through inclusive and transparent reward mechanisms;
6. Diversified recruitment and outreach strategies, to enhance equity, inclusion, and representation within communities.

These trajectories could represent an emerging framework for strengthening the impact, adaptability, and sustainability of community-based prevention initiatives in diverse public health settings.

Keywords: community-based prevention, health system sustainability, public health frameworks, equity, cost-effectiveness, ROI



ASSESSMENT OF HOSPITALS' SAFETY AND VULNERABILITIES BY HOSPITAL SAFETY INDEX

Mihail Kočubovski ¹

¹ Faculty of Medicine, University Ss. Cyril and Methodius-Skopje, Skopje, North Macedonia

Abstract

Introduction: Hospitals represent more than 70% of public health expenditure in most countries. Most of these costs are for specialized personnel and sophisticated and expensive equipment. It is of particular importance that hospitals continue to operate in the event of a disaster or emergency, because then people immediately go to the nearest health facility seeking medical assistance without considering that these facilities may be out of business due to the impact of the disaster. Republic of North Macedonia is prone to earthquakes, as well to floods, wildfires, heatwaves etc.

Materials and methods: The World Health Organization (WHO) Country office in North Macedonia in cooperation with the Regional Office for Europe (EURO), and the Ministry of Health of North Macedonia organised a training and expert assessment on the Hospital Safety Index (HSI) to evaluate hospital safety using the HSI tool and use the results to improve safety standards of 5 hospitals. The incorporation of the WHO tool was an outcome of the initial Hospital Safety Index training made from 5-11 November 2024, where participants and the Ministry of Health (MoH) were particularly interested in the safety of hospitals to earthquakes and other natural and technological hazards.

Results: The training was attended by 19 participants mostly from clinical and management backgrounds, including health professionals and support professions (e.g. doctors, nurses, management, emergency managers and technical professionals) at 5 hospitals from different regions. The training program covered a range of topics related to hospital safety and resilience, including the modules of the HSI tool, which are hazards, structural, non-structural assessments, and emergency management. On-site visits to 5 hospitals in North Macedonia were organised and included HSI practical assessment and enhanced the learning of the participants. The HSI training and assessment in North Macedonia was a great success, giving participants a thorough understanding of hospital safety, the HSI tool, and the preparation of hospitals for multi hazards mirrored in the end-of-the training evaluation by the participants. STAR has provided a good risk information for Hospital Emergency Response Plans that have been previously developed in organization with the Ministry of Health and supported by WHO. With the climate change and more days with heatwaves and extreme weather events, it is important to plan for unexpected types of hazards such as floods, storms and drought, as well earthquakes and technological hazards. This should build stronger and more resilient healthcare facilities. Infrastructure, in some cases, is old and poorly maintained which made it at risk of further deterioration. A detailed investigation by relevant Civil Engineering & Architectural Engineer from the Institute of Earthquake Engineering and Engineering Seismology (IZIIS) - Skopje helped to collect further information and evidence about the structural safety of the assessed hospitals. This helped to develop recommendations for improvement of structural safety for each hospital. Critical supplies such as electric power, water, gas need to have alternative sources that can be accessed immediately and able to cover demand for at least 72 hours. Each hospital has the Hospital emergency response plan that should be regularly updated and exercised.

Conclusion: There is a good cooperation between the health sector and Crisis Management Centre, Ministry of Interior and Protection and Rescue Directorate to support the hospitals with technical and legal information to promote disaster resilience. Other hospitals in North Macedonia should be assessed, and relevant actions need to be taken to enhance their resilience.

Keywords: hospital safety index, structural, non-structural assessments, emergency management



SESSION: ENVIRONMENT AND HEALTH

ORAL PRESENTATIONS

AIR POLLUTION AND PUBLIC HEALTH IN BANJA LUKA: AN AIRQ+ BASED ASSESSMENT OF PM-RELATED MORTALITY (2015-2018)

Milkica Grabež^{1,2}, Ivana Tepić Bubić¹, Vesna Rudić Grujić^{1,2}

¹ Faculty of Medicine University of Banja Luka, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

² Public Health Institute of Republic of Srpska, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

Abstract

Objectives: AirQ+, developed and designed by the WHO, is a tool for assessing health risks associated with exposure to air pollution in the population. This research aims to evaluate the long-term impacts attributed to exposure to particulate matter (PM₁₀ and PM_{2.5}) on the adult population in the Banja Luka region.

Materials and methods: The AirQ+ software was used to estimate the proportion of total and cause-specific mortality attributable to air pollution exposure, with a particular focus on long-term exposure to PM₁₀ and PM_{2.5}. The analysis covered the period from 2015 to 2018 and included an assessment of premature mortality associated with these pollutants, as well as the impact of air pollution on years of life lost (YLL).

Results: The attributable proportions (AP) of total mortality was highest in 2015, estimated at 5.88% (95% CI: 4.48%-6.56%). Furthermore, the AP for ischemic heart disease was estimated at 20.47% (95% CI: 12.73%-26.39%). The analysis projected that the highest YLL among adults over the next 10 years would be 5,080 (3,865-5,675).

Conclusion: This study identifies a strong correlation between air pollution and public health in Banja Luka. It emphasizes the health risks from prolonged exposure to particulate matter (PM_{2.5} and PM₁₀) and suggests that long-term planning is needed to actively reduce PM pollution in the Banja Luka region.

Keywords: air pollution, human health, particulate matter, AirQ+ softver, mortality



BASELINE WATER, SANITATION AND HYGIENE SURVEY AT PRIMARY SCHOOLS IN THE REPUBLIC OF SRPSKA, BOSNIA AND HERZEGOVINA

Vesna Rudić Grujić^{1,2}, Borka Kotur¹, Vesna Petković¹, Milkica Grabež^{1,2}, Mirjana Đermanović^{1,2}

¹ Public Health Institute of Republic of Srpska, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

² Faculty of Medicine University of Banja Luka, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

Abstract

Objectives: The overarching goal of school-based WASH (WATER, Sanitation and Hygiene) is to enhance the sustainability of hygiene, sanitation, and water supply services, which are essential components of infection prevention and control.

Aim: To assess the current WASH conditions in the Republic of Srpska primary schools.

Materials and methods: The research is a cross-sectional study conducted from September 2019 to March 2020 in the Republic of Srpska. WASH conditions were assessed in 67 primary schools, including both urban and rural sites. The survey questionnaire developed by the WHO and UNICEF to monitor WASH in schools was used for this study.

Results: Almost all schools (95.5%) had access to drinking water, from improved public sources, and approximately 67% were regularly monitored water quality. Local water supply sources were at greater risk for contamination. All schools had sanitation facilities, but almost half of them (45.4%) have no central wastewater disposal. The lack of soap (38.8% schools) indicates a limited service for hand hygiene.

Conclusion: The results highlight gaps in basic sanitation and hygiene emphasizing the need for improved infrastructure and monitoring. Strengthening WASH conditions in schools is essential for protecting children's health and achieving the Sustainable Development Goals by 2030.

Keywords: hygiene, sanitation, schools, water, WASH



SESSION: ENVIRONMENT AND HEALTH

POSTER PRESENTATIONS

FIVE-YEAR ASSESSMENT OF DRINKING WATER QUALITY FROM PUBLIC FOUNTAINS IN MAKEDONSKA KAMENICA

Elena Tortevska Danilov ¹, Mihail Kočubovski ^{2,3}

¹ Center of Public Health Kochani, North Macedonia

² Institute of Public Health of North Macedonia, Skopje, North Macedonia

³ Faculty of Medicine, Ss. Cyril and Methodius University in Skopje, North Macedonia

Abstract

Objectives: The aim of this study was to assess the drinking water quality from public fountains in the municipality of Makedonska Kamenica.

Materials: The study was conducted from 2019 to 2024. A total of 541 samples were collected from 3 locations, monthly sampling. Physicochemical and microbiological analyses of water quality were performed according to accredited methods.

Results: Bacteriological contamination was the highest in 2021, with 4 (4.1 %) non-conforming samples, in 2022, with 2 (2 %) samples and 1 non-conforming sample in 2024. In 2019, 2020 and 2023, there were no non-conforming samples. Microbiological contamination in 2021 was mainly due to Total coliform bacteria 3 (3.1%) samples and *Pseudomonas aeruginosa* in 2 (2 %) samples. All tested samples in this period were physicochemical compliant.

Conclusion: Most public fountains in M. Kamenica provide water that meets safety requirements. The identified microbiological deviations highlight the need for regular monitoring, sanitary maintenance, and public awareness to prevent waterborne diseases.

Keywords: water quality, public fountains, public health



DRINKING WATER SAFETY FROM ALTERNATIVE WATER SUPPLY SOURCES IN THE TERRITORY OF AP VOJVODINA DURING 2017–2023

Emil Živadinović², Sanja Bijelović^{1,2}, Nataša Dragić^{1,2}, Marija Jevtić^{1,2}, Dejana Stojanac²

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

Abstract

Objectives: The aim of study is to present the drinking water safety from alternative water supply sources (public wells, springs, catchments, „eco-fountains“) available to the population of Vojvodina, and also to determine is there microbiological (MH) or physicochemical hazards (PCH).

Materials and methods: The study used aggregated data from public health institutes, based on 6.636 drinking water samples from public wells and 4.934 samples from eco-fountains, analyzed in accordance with standard/accredited methods during 2017–2023.

Results: Drinking water safety from public wells, in terms of overall, microbiological, and physico-chemical quality, ranged 34%-54%, 71%-83%, 46%-57%. For eco-fountains, the ranges were 57%-78%, 69%-89%, 68%-89%. In some districts, alternative water sources are not even under the supervision of the public health institutes. Drinking water from public wells is safety in 51% samples, MH are present in 25%, arsenic in 13%, nitrates in 4%. Drinking water from „eco-fountains“ (719 samples) is safety in 68% samples, MH are present in 5%, arsenic in 8%, nitrites in 1%.

Conclusion: Drinking water from alternative sources is available to around 50% of the population and is safe in 58% of samples. Considering climate change and emergencies, existing alternative water sources are insufficient, highlighting the need for new ones.

Keywords: public health, drinking water safety, alternative water supply sources, hazards



CONSUMER PREFERENCES FOR TAP AND BOTTLED WATER AMONG ADULT POPULATION OF THE AUTONOMOUS PROVINCE OF VOJVODINA, SERBIA

Dejana Stojanac², Dragić N^{1,2}, Velicki R^{1,2}, Popović M^{1,2}, Živadinović E², Crvenković ZL³, Bijelović S^{1,2}

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

³ University of Novi Sad, Faculty of Sciences, Novi Sad, Serbia

Abstract

Objective: The objectives of the study were to investigate differences in water drinking habits among adult population of the Autonomous Province of Vojvodina (APV), Serbia.

Methods: Data for this cross-sectional study (June–August 2025) were collected using a customized online validated questionnaire. Water intake data (type: tap, still bottled, carbonated bottled, flavored), quantity, and frequency of use among 482 adults (18-65 years) were analyzed by gender, age, and APV district. For statistical analysis, Pearson chi-square was used.

Results: Women were more likely than men to avoid bottled carbonated water (43.0% vs. 32.5%, $p=0.00354$) and bottled flavored carbonated water (71.7% vs. 65.8%, $p=0.00502$). Among women, those aged 45–54 were more likely to avoid tap water ($p=0.01972$), while those aged 18–24 were more likely to avoid bottled still water ($p=0.0477$). Tap water avoidance was highest ($p=0.04503$) in North Banat (63.2%) and Central Banat (58.3%). In South Banat, 21.2% avoided bottled still water, while all respondents in Central Banat consumed it ($p=0.00042$).

Conclusion: Women showed higher avoidance of certain bottled water types than men. Age-specific patterns among women indicated greater tap water avoidance in midlife and bottled still water avoidance in younger adulthood. Central and North Banat residents most frequently avoid tap water.

Keywords: water intake, adult, questionnaire



DEVELOPMENT AND PRESENTATION OF A LOCAL AIR QUALITY INDEX

Nataša Dragić^{1,2}, Živadinović E², Stojanac D², Velicki R^{1,2}, Jovanović M², Stanojković N²,
Bobić S², Bijelović S^{1,2}

¹ University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

² Institute of Public Health of Vojvodina, Novi Sad, Serbia

Abstract

Objectives: The main objective of this study is to evaluate methodological approaches for Air Quality Indices (AQI), development and propose methodology for a locally adapted AQI for the City of Novi Sad.

Materials and methods: The methodology is based on European AQI, United States Environmental Protection Agency AQI, national legislation, World Health Organization guidelines, and results from over 10 epidemiological studies conducted in Novi Sad. These studies examined associations between air pollution and health outcomes (mortality, respiratory and cardiovascular morbidity, lung cancer, acute respiratory infections, and pneumonia). A stepwise approach was applied to construct the AQI, supported by real-time data and visualized through an interactive map to reduce public misinterpretation.

Results: The analysis identified key differences in existing AQIs and emphasized the need for consistency in air pollutant selection, reliability of source of air pollution data, subindex threshold concentrations, averaged period of exposure and presentation format. The proposed local AQI with subindex threshold concentrations for several key pollutants enables reliable comparisons with other national and international indices.

Conclusion: An adequately developed local AQI improves possibility for the public understanding of air quality health effects within a specific area and individual protective measures.

Keywords: air pollution, air quality, index, public health, environmental health



HEALTH IMPACT ASSESSMENT OF PM₁₀ AND PM_{2,5} IN PANČEVO:

A MULTI-STATION ANALYSIS

Dubravka Nikolovski¹, Jelena Zec¹, Sanja Božović¹, Dejan Blagojević¹, Jasmina Pavlović Stojanović¹, Aleksandra Perović¹, Ljiljana Lazić¹, Tamara Stajić¹, Snežana Đurić¹, Dušan Stošić¹

¹ Institute of Public Health of Pančevo, Pančevo, Serbia

Abstract

Objectives: This study evaluates the health impact of PM₁₀ and PM_{2.5} over a three-year period using multiple cut-off thresholds and data from several monitoring stations. The specific aim was to assess statistical significance between the target data set (Strelišće and Nova Misa) and two comparative sets.

Materials and Methods: Health impact was assessed using AirQ+ v.2.2.4. Annual mean PM₁₀ concentrations from five stations, converted to PM_{2.5} along with PM_{2.5} data from three stations, were analyzed across three data sets with different cut-off values. Mortality from all natural causes among adults aged 30+ was observed.

Results: Median annual PM₁₀ concentration was 33,37 µg/m³ (range: 26,62-41,58); PM_{2,5} was 23,84 µg/m³ (range: 23,13-25,68). Results of Friedman test show that there is no statistically significant difference in the number of attributable cases between three data sets, calculated for different cut-off values. Posthoc Wilcoxon test show that there is no statistically significant difference between group of automatic and manual stations for PM_{2,5} calculations.

Conclusion: PM_{2,5} – related health impact estimated across groups of stations were generally consistent and comparable. Therefore, calculated PM_{2,5} values can be considered statistically robust and suitable for further processing in the AirQ+ software. Further research on specific pollutants (e.g., metals, benzo[a]pirene) is recommended.

Keywords: air pollution, health impact assessment, PM₁₀, PM_{2.5}, AirQ+



AIR QUALITY ASSESSMENT IN ŠABAC, SERBIA: RESULTS OF AUTOMATIC AIR QUALITY MONITORING IN 2024. AND MONITORING OF PM10 WHICH IS PERFORMED BY THE PUBLIC HEALTH INSTITUTE OF ŠABAC

Igor Dragičević¹, Branko M. Vujković¹, Marijana Srečković^{1,2,3}

¹ Institute of Public Health of Šabac, Šabac, Serbia

² Academy of Applied Studies Šabac, Šabac, Serbia

³ Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia

Abstract

Objectives: Air quality in the city of Šabac during 2024 was automatically monitored on one place and semi-automatically of PM 10 on additional tree places. Automatically monitored pollutants were: carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, BTEX, PM10, PM2,5, ammonia. Benzo(a)pyrene and metals in deposited dust and hydrofluoric acid, soot in air were measured by standard methods.

Methods: Data were collected through automatic monitoring station, calculating the Air Quality Index hourly and publishing results on the Šabac EKO portal. Pollutant concentrations were compared with national regulatory limits, target values, and previous year's data.

Results: Annual average concentrations of sulfur dioxide, nitrogen dioxide, soot, ammonia, and hydrofluoric acid remained below permissible limits. PM10 levels were below the threshold at two sites but significantly exceeded annual and daily limits at the Čavić site, with 111 days above the daily limit. Benzo(a)pyrene concentrations in PM10 exceeded the target value (2.9 ng/m³ vs. 1 ng/m³ allowed), metal concentrations remained below regulatory limits.

Conclusion: All data regarding increased air pollution in Šabac, were published via the Šabac EKO portal and social networks. Long-term, alongside short-term measures, regarding air pollution have to be undertaken. Continuous AQI monitoring and health recommendations are crucial to protect public health.

Keywords: air quality, PM10, benzo(a)pyrene, soot



INFLUENCE OF NOISE ON THE HEALTH OF RESIDENTS IN THE CITY OF PANČEVO

Maja Miloradović¹, Jelena Dotlić², Katarina Paunović¹, Snežana Đurić³, Dušan Stošić³,
Tamara Stajić³

¹ Institute of Hygiene and Medical Ecology, University of Belgrade, Faculty of Medicine, Belgrade, Serbia

² Clinic of Gynecology and Obstetrics, Clinical Center of Serbia, Belgrade, Serbia

³ Institute of Public Health Pančevo, Pančevo, Serbia

Abstract

Objectives: The study aimed to determine the noise level in Pancevo and to assess the noise threat/disturbance for the residents.

Methods: The research was conducted from July 4 until August 8, 2024. at the 25 measuring points grouped into six acoustic zones. The measurement was carried out at 4m from the ground using portable noise monitoring system Brüel&Kjaer 3655/B. Measurements were performed under favorable meteorological conditions 24 hours a day with a reference time of 15 minutes. The daytime, evening, night and all-day noise level (Lden) were measured.

Results: Permissible noise levels were exceeded by 1-13dB during day and 1-18dB during night. The highest Lden value was measured at MM 16 in zone 4 (commercial-residential areas and children's playgrounds). The lowest Lden value was measured at MM 4 in zone 2 (tourist areas and school zones). In five acoustic zones percentage of noise threat/disturbance was above the limit, except in Zone V (city center and zones along traffic roads) where it is under the limit.

Conclusion: The noise level in Pancevo is generally higher than the recommended, except in the city center and along the roads. Different sources of noise should be considered to prevent population endangerment/disturbance.

Keywords: noise level, threat, disturbance, residents



HYGIENIC AND SANITARY CONDITIONS IN PRIMARY AND SECONDARY SCHOOLS IN TUZLA CANTON

Selma Azabagi¹, Nadina Mokayes¹

¹Institute of Public Health of Tuzla Canton, Tuzla, Bosnia and Herzegovina

Abstract

Introduction: The school environment plays a crucial role in preserving and promoting the health of children and adolescents. Adequate hygienic and sanitary conditions in schools have a direct impact on students' safety, development, and educational outcomes.

Methodology: Hygienic and sanitary conditions were assessed through an online survey conducted in 2024, using a questionnaire consisting of 88 questions grouped into nine thematic areas: general information, school infrastructure and land, classrooms and cabinets, furniture and equipment, sanitary facilities, spaces for physical activity, teaching organization, student nutrition, and student health care. The questionnaire was distributed to all primary and secondary schools (89 central, 130 branch primary schools, and 33 secondary schools). The survey was completed by 42% (38) of central, 19% (24) of branch primary schools, and 48% (16) of secondary schools.

Results: School buildings in 84% (52) of primary and 75% (12) of secondary schools were built more than 30 years ago. A total of 52% (32) of primary schools and 100% of secondary schools are connected to the public water supply and sewage system. Local or individual water supply systems and septic tanks are used by 48% (30) of primary schools. Facilities for physical activity were lacking in 26% (16) of primary and 13% (2) of secondary schools. None of the surveyed primary schools had an operational kitchen or provided organized meals for students. One secondary school has its own kitchen where meals are prepared for students. A space for providing basic healthcare to students, in the form of a health office, does not exist in 95% (59) of primary and 87% (14) of secondary schools, while the remaining schools did not provide this information.

Conclusion: These results indicate a clear need to improve the hygienic and sanitary conditions in schools, as well as to involve the wider public and local authorities through concrete ideas, projects, and plans. It is necessary to enhance the construction and sanitary infrastructure and to upgrade the current hygiene and sanitation standards in line with European guidelines, in order to support and protect the health of the school population.

Keywords: hygienic conditions, primary and secondary schools, school environment, child health



BELGRADE SCHOOLS – RESULTS OF SANITARY-HYGIENIC SURVEILLANCE

Dunja Koprivica¹, Vesna Pantić Palibrk¹, Maja Ristić¹, Vinka Novaković¹, Danica Stošić¹, Stefanija Nikolić¹

¹ City Institute of Public Health of Belgrade, Belgrade, Serbia

Abstract

Objectives Overview of school environment in Belgrade public primary schools with emphasis on sanitary-hygienic conditions.

Methods Data were collected via questionnaire of the Institute of Public Health Belgrade designed on the basis of WHO WASH questionnaire. Data were gathered from 2021 to 2025. (altogether 276 schools).

Results Piped water supply was predominantly available (88,76%). Around 10% of schools (all in suburban municipalities) had limited water supply - pupils bring water from home or use water dispensers. 60% of schools are connected to sewer. Toilet facilities are generally separated by gender (89,49%) and student/staff (85,15%). The ratio of pupils to toilets is in accordance with WHO standards in 60,5% and 80% schools for girls and boys, respectively. Designated space for physical education is either not available or not in function in 40% of schools. Meals are provided in almost 50% of schools, mainly by caterings.

Conclusion Current state shows the need for further and in some cases in depth improvement of sanitary-hygienic conditions and overall school environment.

Keywords: sanitary-hygienic conditions



ENVIRONMENTAL APPROACHES IN EDUCATION

Biljana Gligorova¹, Sanja Dimovska²

¹ Pedagogical faculty "St. Kliment Ohridski", Skopje, North Macedonia

² Confucius Institute at Ss. Cyril and Methodius University in Skopje, Skopje, North Macedonia

Abstract

Introduction: The environmental approach in education involves integrating environmental content, activities and values throughout the teaching processes, with the aim of creating aware, active and informed citizens.

Objective: The aim is to investigate and evaluate the implementation of the environmental approach in formal education in the Republic of Macedonia, to identify the advantages and obstacles to its implementation and to offer recommendations for its improvement.

Methodology: The research used a Student Questionnaire, Curriculum Analysis and Semi-structured Interview with Teachers. The research was conducted in three primary schools in different municipalities in the Republic of Macedonia. The survey was conducted on 50 students and 10 teachers. The students are of different ages, gender and educational context, which allows for greater representativeness of the results.

Results: Of the students surveyed:

- 80% responded that they participate in school environmental activities (recycling, cleaning the environment, planting trees and flowers) at least once a year.
- 20% stated that they have never participated in such activities.

Conclusion: Students show a high level of interest in environmental topics, especially related to climate factors and climate change. Young generations have great potential to become change agents, but their motivation is conditioned by the support of the school and teachers.

Keywords: environment, student, measures



PHYSICAL ACTIVITY LEVEL AND ITS PERCEIVED HEALTH INFLUENCE IN PERSONS WITH OPTIMAL WEIGHT, OVERWEIGHT AND OBESITY IN SERBIA

Dragana Škorić¹, Katarina Paunović², Dragana Davidović², Verica Jovanović¹, Nadja Vasiljević²

¹ Institute of Public Health of Serbia „Dr Milan Jovanovic Batut“, Belgrade, Serbia

² Institute of Hygiene and Medical Ecology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

Abstract

Objectives: We aimed to examine the relationship of physical activity level and its perceived health influence with nutritional status, and to determine whether they are mutually associated according to nutritional status.

Materials and methods: Data obtained through the 2019 Serbian National Health Survey were secondarily analysed. The study included 10146 adults with available data regarding body weight and height (excluding the underweight). Physical activity was categorized as low/high based on the self-reported amount of time spent in moderate physical activity. Perceived health influence of physical activity was assessed by a 5-point Likert-scale question (response range: 'very low' - 'very high').

Results: Physical activity level was significantly associated with nutritional status ($\chi^2(2) = 50.049$, $p < 0.001$), persons with obesity most commonly reported low physical activity level. Physical activity's perceived health influence was significantly associated with nutritional status ($\chi^2(6) = 70.177$, $p < 0.001$), persons with obesity tended to minorize it compared to persons with optimal weight. Adjusted for the socio-economic variables, physical activity level and its perceived health influence were associated only in individuals with overweight (OR=1.157, 95% CI 1.042-1.286).

Conclusion: Awareness should be raised on health impact of physical activity, especially in persons with overweight where it might lead to higher physical activity level.

Keywords: physical activity, nutritional status, obesity, overweight



GREEN SPACE AND COGNITIVE FUNCTION IN OLDER ADULTS

Aleksandra Stanković^{1,2}, Maja Nikolić^{1,2}, Bojana Vuković Mirković^{1,2}

¹ Institute of Public Health of Niš, Niš, Niš, Serbia

² Faculty of Medicine, University of Niš, Niš, Serbia

Abstract

Objectives: The aim of this work is to present the current knowledge related to effect of green space on cognitive function in older adults.

Methods: The consulted literature as well as the latest research on green space as a factor of the community and the entire society was used as a working method. Data from the available domestic and foreign literature related to the objective of the work on the given topic were analyzed. The published material and researches were selected for inclusion in the work from the point of view of importance, availability, appropriateness as well as from the point of view of future possibility of use.

Results: Analyzing the studies, green space has a positive effect on cognitive function in older adults. Residences with a higher proportion of green space were associated with a reduced risk of dementia compared to a low proportion of green space. The authors found that greenness surrounding during childhood was correlated positively with improvements in memory and a reduction in inattentiveness.

Conclusion: Green space has many health benefits, but the cognitive effects of green need more investigations. Future research could usefully investigate how exposure to a wider set of green space across the life course affect health and wellbeing in later life.

Keywords: green space, older adults, cognitive functions



OPINION AND INTEREST IN HYGIENE SPECIALIZATION AMONG MILITARY MEDICAL STUDENTS AND YOUNG MILITARY DOCTORS

Sanja Lepić^{1,2}, Jelena Stojićević^{1,2}

¹ Institute of Hygiene, Military Medical Academy, Belgrade, Serbia

² Faculty of Medicine, Military Medical Academy, University of Defence, Belgrade, Serbia

Abstract

Objectives: This study explored the attitudes of military medical students and young military doctors toward the hygiene specialty and examined factors influencing their interest.

Materials and methods: An online survey was conducted among 62 participants (59.7% female; 45.2% students, 54.8% young doctors). Data collected included demographics, academic performance, awareness level (1–5 scale), and motivational factors. Group comparisons were made using non-parametric tests, and correlations were assessed between interest and motivational domains.

Results: Mean interest score was 1.94 and mean awareness score 2.21. Young doctors reported higher awareness (2.50) than students (1.86; $p=0.015$), while the interest difference was not significant ($p=0.090$). Females reported greater interest than males ($p=0.032$). Interest was strongly correlated ($p<0.01$) with perceived broad applicability of knowledge, potential impact on population health, and stable working hours. Awareness was not significantly related to the number of information sources.

Conclusion: Promoting the specialty's broad scope and a variety of professional pathways, public health relevance, and work–life balance, particularly among students, together with improving visibility and highlighting career opportunities, could increase engagement and attract future candidates.

Keywords: hygiene specialization, medical students, young doctors



REGULATORY CHANGES IN PEST MANAGEMENT: TRANSITION TOWARD SUSTAINABLE APPROACHES IN THE SLOVENIAN AND EUROPEAN CONTEXT

Aleš Krulec¹, Stanka Vadnjal², Sara Tajnikar¹, Andrej Ovca³

¹ Institute of Public and Environmental Health of Slovenia, Ljubljana, Slovenia

² Faculty of Veterinary of University of Ljubljana, Ljubljana, Slovenia

³ Faculty of Health Sciences, University of Ljubljana, Ljubljana, Slovenia

Abstract

Objectives: This paper aims to present key regulatory changes in Slovenia and the European Union that are increasingly steering pest management toward humane, legally compliant, and sustainable approaches. Particular emphasis is placed on the connection between legal requirements, ethical standards, and the development of food safety culture.

Methods: A content analysis was conducted of relevant and emerging legislation, including the EU Sustainable Use of Pesticides proposal, Slovenia's 2025 Biocidal Products Regulation and the public notice on the proper use of biocidal products issued by the Ministry of Health of the Republic of Slovenia (April 2025). International guidelines on humane pest control practices were also reviewed.

Results: Tighter conditions for biocide registration, the prohibition of continuous anticoagulant use without SPC compliance, mandatory electronic reporting of pesticide use, and restrictions on certain methods (e.g., glue traps) were identified. These measures increasingly require ethically acceptable and traceable solutions that reinforce a robust food safety culture.

Conclusion: Legal and ethical developments jointly support a shift away from traditional pest control practices toward modern pest control strategies that emphasize transparency, sustainability, and responsibility in the food sector, contributing to the advancement of food safety culture.

Keywords: IPM, humane methods, biocides, ethics, food safety culture



SESSION: MICROBIOLOGY TODAY

INVITED LECTURES

EUKARYOTES OF OUR MICROBIOTA: NEGLECTED BUT SIGNIFICANT MEMBERS OF HEALTHY GUT

Özgür KURT¹

¹ Acibadem University School of Medicine, Department of Medical Microbiology, Istanbul, Turkey

Abstract

The human gut contains a dense and diverse microbial community, traditionally investigated almost exclusively through the prism of bacteria. Indeed, bacterial populations play critical role in digestion, nutrient production, and immune regulation. However, bacteria are not alone in the gut; viruses, archaea, protists, fungi, and helminths are all integral members of this complex ecosystem. For decades, the literature has focused on bacteria, largely due to technical limitations, and the contribution of eukaryotic organisms have been neglected. These eukaryotic organisms are nowadays recognized as key modulators of human health.

Keywords: microbiota, eukaryotes, health

Eukaryotic organisms, long considered minor or clinically irrelevant, are increasingly recognized as key modulators of gut ecology and human health (1,2,3). New evidence indicates that the lack of eukaryotes can be associated with reduced diversity and dysbiosis, probably due to their relatively bigger genomic sizes (4). Fortunately, advancements in next-generation sequencing (NGS), metagenomics, and culturomics have proven that eukaryotes are not only widespread in the intestinal ecosystem but also contribute significantly to immune modulation, metabolic processes, and microbial diversity (5,6).

So, how critical is the role of protists and fungi in maintaining eubiosis? Among these, two protists - *Blastocystis spp.* and *Dientamoeba fragilis* - have emerged as central figures in the ongoing debate about whether they are commensals, pathogens, or context-dependent pathobionts (4,7-9). Studies on *Blastocystis* and *D. fragilis* have shifted the discussion from “pathogen or commensal?” toward the concept of “pathobionts”—organisms that may contribute to disease under certain contexts while supporting eubiosis under others (7-11). Regarding the fungi, mycobiota has been a hot topic as well. Although fungi constitute a small proportion of the gut microbiome, they play disproportionately important roles in shaping host-microbe interactions. Studies indicated that fungi have a profound effect on T helper 17 (Th17) cell responses, and thus on mucosal immunity (12). Dysregulation of the gut mycobiota, or fungal dysbiosis, has been linked to disorders such as inflammatory bowel disease and colorectal cancer.



Certain fungal species are more abundant in colorectal cancer patients, with profiles correlating to disease stage, suggesting a possible role as diagnostic biomarkers (12-14). Furthermore, fungi participate in cross-kingdom interactions, modulating bacterial communities and affecting microbial balance. Rather than passive colonizers, they function as dynamic contributors to gut homeostasis (13, 14). These observations underscore the critical role of the mycobiome in educating the immune system and maintaining systemic homeostasis. Moreover, fungal-bacterial interactions appear pivotal, with significant translational potential for therapeutic strategies. In oncology, the diagnostic and prognostic value of fungal signatures is increasingly recognized, particularly in colorectal cancer studies (12-14).

Neglected Protists: *Blastocystis spp.* and *Dientamoeba fragilis*

Protists, particularly *Blastocystis spp.* and *Dientamoeba fragilis*, are prevalent eukaryotes in the human gut. Initially, both were considered non-pathogenic but molecular studies and clinical case series have challenged this notion, revealed their ubiquity and raised questions about their pathogenic potentials (7-11). *Blastocystis spp.* is probably the most common intestinal protist globally, colonized in more than one billion individuals. Its prevalence varies from 30% in developed nations to almost 100% in some rural African populations. Genetic diversity is striking, with more than 40 recognized subtypes (STs), nine of which infect humans. Subtypes ST1–ST4 dominate human cases, but ST7 and possibly ST4 have been implicated in symptomatic disease (15-17).

Dientamoeba fragilis is another protozoan of the gut which was considered non-pathogenic after its first description in 1918. In addition to case series reported from different regions of the world after 1980s, inclusion of PCR-based surveys on *D. fragilis* revealed high prevalence, with reports of up to 43% positivity in some European cohorts. Clinical manifestations range from asymptomatic carriage to gastrointestinal disturbances such as diarrhea, abdominal pain, and bloating (18-20).

Current evidence suggests that the presence of *Blastocystis* may be associated with increased bacterial diversity and favorable cardiometabolic profiles, whereas for *D. fragilis*, parasite load and clinical symptoms may interact in a dose- and context-dependent manner (7,9, 11, 15-20). Pathogenicity of *Blastocystis spp.* and probably *D. fragilis* relies on many factors including genotypic differences, immune status of the host, parasite load and presence of certain (pathogenic) microorganisms in the gut.

In addition to these protists, others were also examined for their interactions with gut microbiota. In a recent study, it was shown that *Giardia* infection can alter short-chain fatty acid profiles and bacterial diversity, affecting the host's metabolism and inflammatory responses (21). Regarding *Entamoeba histolytica*, unlike the largely commensal *E. dispar*, may act as a context-dependent pathobiont, with microbiota composition influencing disease manifestation (22). *Cryptosporidium* colonization similarly shifts microbial community structure and epithelial barrier function, illustrating the complex triad of protozoa-bacteria-host immune interactions (23).

Helminths: Immunomodulators of the Gut Ecosystem:

Helminths including *Ascaris lumbricoides*, *Trichuris trichiura*, and *Necator americanus* are increasingly recognized for their immunomodulatory potentials. *Ascaris* infections can reshape bacterial composition and metabolic activity in the gut, influencing host immune tone (24). *Trichuris* infection has been shown to enhance microbiota diversity while modulating inflammatory responses, highlighting its role as a context-dependent pathobiont or eobiont (25). The hookworm, *Necator americanus*, induces anti-



inflammatory cytokine production, potentially mitigating systemic inflammation and metabolic dysregulation (26).

Conclusion

Eukaryotic members of the gut microbiota—including *Blastocystis*, *Dientamoeba fragilis*, and other protozoa such as *Giardia*, *Entamoeba*, and *Cryptosporidium*, as well as helminths and fungal communities—should all be considered in microbiota research in general. Current evidence indicates that their pathobiont behavior depends on subtype/genotype, parasite load, host immunity, and co-existing microbial communities, highlighting the context-dependent nature of their effects. Addition of an “eukaryotic module” in microbiota research to bacteria will improve the quality of assessments, enhance the translational relevance of microbiota research, while acknowledging the diverse roles these organisms in gut homeostasis, immune modulation, and systemic health.

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TRUTHS AND MISCONCEPTIONS ABOUT THE IMPORTANCE OF THE IMMUNE SYSTEM IN IMPROVING HEALTH, PREVENTING AND TREATING DISEASE

Borislav Kamenov ¹

¹ Imuno Kamenov, Specialist doctor's office in the field of pediatrics and immunology, Niš, Serbia

Abstract

For a long time, it was believed that genetics completely controls the functions of the organism, including the mechanisms of disease development. At one point, we believed that when the genetic code is defined completely, everything will be clear to us regarding the functioning of the organism, but also regarding the development of diseases and ultimately their treatment. In the end, we realized that actually epigenetic factors are mostly decisive and that they control gene expression, and that the direct influence of genes is less than 10%. This completely changes our position on regulatory mechanisms, regardless of whether it is the nervous, endocrine system, and especially the immune system, which is now recognized as an intermediate factor that controls and modifies the impact of the epigenome on genes, and therefore on the functions of the organism, especially in the sphere of health control, the development of diseases and their treatment.

Keywords: immune system, health



SESSION: MICROBIOLOGY TODAY

ORAL PRESENTATIONS

IMPORTANCE OF MULTIPLEX REAL-TIME PCR METHOD IN DIAGNOSTICS OF RESPIRATORY INFECTIONS

Marina Malbaški¹, Branko Vujković¹, Dragana Radojičić¹, Željka Ninković¹

¹Center for Microbiology, Institute of Public Health of Šabac, Šabac, Serbia

Abstract

Objective: The aim of the study was to examine and demonstrate the prevalence and seasonal distribution of respiratory pathogens using multiplex RealTime PCR diagnostics in outpatient and inpatient patients treated in the Mačva District, and to highlight the importance of rapid and accurate diagnostics of infectious diseases.

Material and methods: From 1.12.2024. to 1.6.2025. The Institute of Public Health Šabac tested 1050 nasopharyngeal samples. We analyzed the prevalence of positive analyses, as well as the distribution in relation to the causative agent, type of health institution, age and gender of the patient.

Results: Of 1050 tested, 619 (59%) were positive. The lowest frequency was recorded in April and May (38%), the highest in December (86%). One pathogen was detected in 533 (51%), most often influenza virus 290 (54%), RSV 39 (7%). Co-infection was observed in 86 (8%) patients, most often with adenovirus in combination.

Conclusion: ARI represent a public health problem with a significant impact on morbidity, irrational use of antibiotics, and burden on health institutions during the winter months. The importance of timely diagnostics is adequate treatment, prevention of ARI complications, and prevention of antimicrobial resistance. Investments in epidemiological surveillance, laboratory diagnostics contribute to earlier detection and more efficient suppression of the spread of ARI.

Keywords: respiratory infections, diagnostics, multiplex pcr



BIOFILM AS A POTENTIAL VIRULENCE FACTOR OF GENITAL CANDIDIASIS RECURRENCE IN WOMEN

Marina Randelović^{1,2}, Zorica Stojanović-Radić³, Marina Dimitrijević³, Aleksandra Ignjatović⁴, Snežana Mladenović Antić^{1,2}, Milica Đorđević^{1,2}, Suzana Otašević^{1,2}

¹ Department of Microbiology and Immunology, Faculty of Medicine, University of Niš, Niš, Serbia

² Centre of Microbiology, Public Health Institute of Niš, Niš, Serbia

³ Department of Biology, Faculty of Science and Mathematics, University of Niš, Niš, Serbia

⁴ Department of Medical Statistics and informatics, Faculty of Medicine, University of Niš, Niš, Serbia

⁵ Department of Microbiology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

Abstract

Objectives: Vulvovaginal candidiasis (VVC) is one of the most common infections in women. Since biofilm formation plays a crucial role in the persistence of this infection, leading to recurrent forms of VVC, the aim of this study was to determine the prevalence of vulvovaginal yeast isolates with biofilm production ability.

Materials and methods: After standard mycological analysis, for the identification of yeast species, Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) was used. Biofilm production was assessed using the crystal violet assay, classifying the strains as non-producers, weak, moderate, or strong biofilm producers.

Results: Among 300 tested strains, 138 (46%) demonstrated the ability to produce biofilm. Out of 150 *Candida albicans* isolates, 68.84% were biofilm producers: 12% weak, 18.66% moderate, and 32.67% strong. Of 124 non-*albicans Candida* strains, 29.03% formed biofilms (4.03% strong, 9.68% moderate, 15.32% weak). Among 26 *Saccharomyces cerevisiae* isolates, 26.91% were biofilm producers—15.38% moderate and 11.53% weak.

Conclusion: The high percentage of biofilm-producing yeast isolates in this study suggests a significant presence of virulent strains among the causative agents of VVC. Determining the prevalence of this virulence factor can contribute to more effective therapeutic strategies and consequently reduce the incidence of chronic and recurrent forms of VVC.

Keywords: yeasts, candida spp, biofilm, vulvovaginal candidiasis



DETECTION OF ECHINOCOCCUS MULTILOCULARIS IN ANIMALS IN SERBIA

Aleksandra Uzelac¹, Jelena Karanović², Katarina Breka³, Milica Kuručki³, Nikola Betić⁴, Tijana Kukurić⁵, Ivana Klun¹

¹ Institute for Medical Research, University of Belgrade, Belgrade, Serbia

² Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Belgrade, Serbia

³ Faculty of Biology, University of Belgrade, Belgrade, Serbia

⁴ Institute of Meat Hygiene and Technology, Belgrade, Serbia

⁵ Faculty of Agriculture, University of Novi Sad, Novi Sad, Serbia

Abstract

Objectives: Alveolar echinococcosis (AE) caused by the fox tapeworm *Echinococcus multilocularis* is an emerging disease in Serbia, with two confirmed cases in humans. One objective of the **Worm_Profiler** project is the detection and mapping of the occurrence of *E. multilocularis* in different animal species in order to gain a better understanding of the distribution and major reservoirs.

Materials and methods: Adult worms were collected from the intestines of golden jackals (*Canis aureus*) while Taeniid eggs were collected from jackal feces using a flotation and mesh filtration technique. Tissue and cyst fluid, if present, were collected from condemned livers of various livestock. The *Echinococcus* tapeworm species was identified using a multiplex PCR for *E. multilocularis*, *E. granulosus* and *E. canadensis*.

Results: *E. multilocularis* was detected in 6,9 % of golden jackals (7/101) and one pig liver (1/31). In terms of geographical distribution, *E. multilocularis* was detected near Belgrade (Ub and Donji Tovarnik), Čajetina, Svilajnac (Grabovac), Požarevac (Ljubinja) and Niš (Vinik).

Conclusion: In Serbia, golden jackals are major reservoirs of *E. multilocularis* and their presence near towns and major cities should be regarded as a concern to public health.

Keywords: tapeworm, zoonosis, echinococcus multilocularis, public health, golden jackal

Acknowledgements: This research was supported by the Science Fund of the Republic of Serbia, #10841, Worm Profiler: Surveillance and population genetics of *Echinococcus* in Serbia - WORM_PROFILER.



DOGS AS RESERVOIRS OF ECHINOCOCCUS SPP. TAPEWORMS AND RELEVANCE FOR TRANSMISSION TO HUMANS

Nikola Betić¹, Tijana Kukurić², Milica Kuručki³, Aleksandra Penezić³, Neda Bogdanović³, Jelena Karanović⁴, Aleksandra Uzelac⁵

¹ Institute of Meat Hygiene and Technology, Belgrade, Serbia

² Faculty of Agriculture, University of Novi Sad, Novi Sad, Serbia

³ Faculty of Biology, University of Belgrade, Belgrade, Serbia

⁴ Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Belgrade, Serbia

⁵ Institute for Medical Research, University of Belgrade, Belgrade, Serbia

Abstract

Objectives: Dogs are definitive hosts for *Echinococcus* spp. tapeworms. To assess the relevance of hunting and stray dogs as reservoirs of *Echinococcus* spp. eggs, which are infective for humans, feces samples were collected from several locations in Serbia with a confirmed presence of *Echinococcus* spp. in other animals. None of the dogs received anticestodal treatment prior to feces collection.

Materials and methods: Taeniid eggs were isolated using a combined flotation and mesh filtration technique. Total gDNA was extracted from the collected eggs and multiplex nested PCR, based on detection of specific *Cox1* sequences of *E. multilocularis*, *E. granulosus* and *E. canadensis*, was performed.

Results: Thus far, n = 30 samples of hunting dog and n = 120 samples of stray dog feces were collected. *Echinococcus* spp. eggs were not present in any of the hunting dog samples. Further molecular screening for other cyclophyllidean tapeworms revealed two positive dogs.

Conclusion: Despite the absence of regular anticestodal treatment and distinct possibility of exposure to *Echinococcus* spp., none of the hunting dogs were shedding tapeworm eggs. These preliminary findings suggest that hunting dogs may not be relevant reservoirs of *Echinococcus* spp. for human infection. Processing of additional samples is underway.

Keywords: tapeworm, dogs, echinococcosis, public health

Acknowledgements: This research was supported by the Science Fund of the Republic of Serbia, #10841, Worm Profiler: Surveillance and population genetics of *Echinococcus* in Serbia - WORM_PROFILER.



SESSION: MICROBIOLOGY TODAY

POSTER PRESENTATIONS

WORM_PROFILER: THE ECHINOCOCCUS SPP. DATABASE FOR SERBIA

Jelena Karanović¹, Katarina Breka², Milica Kuručki², Nikola Betić³, Tijana Kukurić⁴, Aleksandra Uzelac⁵

¹ Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Belgrade, Serbia

² Faculty of Biology, University of Belgrade, Belgrade, Serbia

³ Institute of Meat Hygiene and Technology, Belgrade, Serbia

⁴ Faculty of Agriculture, University of Novi Sad, Novi Sad, Serbia

⁵ Institute for Medical Research, University of Belgrade, Belgrade, Serbia

Abstract

Objectives: *Echinococcus* spp. tapeworms are endemic in Serbia. Reporting of human and animal cases is mandatory, but the records are maintained in separate databases. Records on wildlife echinococcosis are scarce. To facilitate the development of systematic monitoring of *Echinococcus* spp. transmission and strategies for targeted control, a unified database of all confirmed cases is necessary.

Materials and methods: GPS data was used to map the origin of the tapeworm host by Geographic Information System (GIS) software. Multiplex PCR has been used for the detection and speciation of the tapeworm (*Cox1* and/or *Nad1* gene).

Results: Thus far, n = 170 samples of individual animals, representing two definitive host species and three intermediate, were screened for the presence of the tapeworm. Eleven samples were positive. The database displays a map of confirmed cases, the host species, tapeworm species and haplogroup. Entry of the *Cox1* sequences is pending. A search function for all parameters has been enabled, a data retrieval function is pending.

Conclusion: The **Worm_Profiler** database will facilitate a One Health approach to echinococcosis in Serbia, by providing a platform for accessing information on confirmed animal cases, focusing particularly on wildlife, to the scientific community, veterinarians, physicians and the general public.

Keywords: tapeworm, zoonosis, online database, public health

Acknowledgements: This research was supported by the Science Fund of the Republic of Serbia, #10841, Worm Profiler: Surveillance and population genetics of *Echinococcus* in Serbia - WORM_PROFILER.



RISK OF TRICHINELLOSIS IN WILD BOARS IN SOUTHEASTERN SERBIA: PRESENCE ANALYSIS AND THE IMPORTANCE OF CONTINUOUS MONITORING

Marija Stojiljković ¹, Miloš Arsić ¹, Ilija Jovanović ¹, Marko Stojiljković ¹, Vladimir Marjanović ¹, Miloš Petrović ¹

¹ Veterinary Specialized Institute of Niš, Niš, Serbia

Abstract

Objectives: Given the increasing consumption of game meat and the rising popularity of recreational hunting, it is necessary to thoroughly consider the risk of zoonotic transmission of *Trichinella* spp. to humans. The aim of this study was to assess the potential public health risk, with particular emphasis on the occurrence of *Trichinella* spp.

Materials and methods: During 2024, samples of diaphragm muscle portions (*crura diaphragmatica*) from wild boars hunted in southeastern Serbia (Pčinja, Jablanica, Pirot, Nišava, and Toplica districts) were analyzed. The presence of *Trichinella* spp. larvae was examined using the artificial digestion method, in accordance with international guidelines. All positive samples were further analyzed by molecular methods using multiplex PCR for species identification.

Results: The results indicated a low prevalence (below 1%), suggesting sporadic circulation of *Trichinella* spp. within the wild boar population in the investigated area. The detection of *Trichinella* larvae confirms the active presence of the pathogen in its natural reservoir. Such findings highlight the ongoing potential risk to human health, especially in the context of consuming undercooked game meat.

Conclusion: Despite the relatively low prevalence, the detection of *Trichinella* spp. emphasizes the need for continuous monitoring of game meat, education of hunters, and strengthening of multisectoral collaboration to prevent trichinellosis in humans.

Keywords: wild boar, trichinellosis, zoonoses, food safety, monitoring



RISK FACTORS FOR HUMAN HEALTH FROM ENDOPARASITES OF THEIR PETS

Marko Ristić¹

¹ Faculty of Agriculture of University of Niš, Kruševac, Serbia

Abstract

Objectives: The study presents a social-medical approach to the problem of contamination of public urban areas in Niš city with intestinal parasites from dog feces.

Methods: A survey was conducted on the attitudes, behavior and level of education of dog owners and people who stay in city parks. A total of 350 dog owners were interviewed.

Results: The largest number of respondents take their dog to a veterinarian in case they have doubts about their dog's health (22.3%). The most common reason for visiting a veterinarian is vaccination. The largest number of owners administer tablets against internal parasites every six months (29%), 22% of owners every 3 months, and 21% of owners once a year. The largest number of owners treat their dogs against fleas and other external parasites every 6 months (22%), while 21% of owners do so once a year. Regular fecal examinations of dogs are performed by only a fifth of the surveyed owners. More than half of the surveyed dog owners regularly treat their dogs with both anti-endoparasitics and anti-ectoparasitics.

Conclusion: Public areas in urban areas are sources of zoonotic parasites. It is important to comprehensively consider this public health problem through prevention, control and surveillance of parasite transmission in the environment.

Keywords: dog, zoonoses, public health



DETECTION OF HIGH-RISK HPV GENOTYPES USING REAL-TIME PCR AMONG YOUNG WOMEN DURING THE PERIOD JULY 2024-JULY 2025

Maja Čabrilo¹, Jovana Ivanović¹, Edita Grego¹, Nataša Simić¹, Milica Ivanović¹, Ljiljana Pavlović¹

¹ Institute of Public Health of Serbia “Dr Milan Jovanović Batut”, Belgrade, Serbia

Abstract

Objectives: Human papillomavirus (HPV) is a double-stranded, non-enveloped DNA virus that infects cutaneous and mucosal epithelial cells and is recognized as a major etiological agent in the development of cervical cancer.

Materials and methods: The study was conducted at the Department for Molecular Microbiology, Institute of Public Health of Serbia “Dr Milan Jovanović Batut”, in cooperation with the Institute for Student Healthcare, Belgrade. Cervical smears were collected from women aged 19-26 using Amies medium (COPAN Diagnostics, Inc.). DNA from 14 high-risk HPV (hrHPV) genotypes (HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, and 68) was detected and identified by real-time PCR using VIASURE High-Risk Human Papilloma Virus (CerTest Biotec, S.L.).

Results: Out of 1189 collected cervical smears, 482 (40.54%) were hrHPV-positive. The genotyping results for positive hrHPV types showed: 28.28% (31,39,56); 17.35% (33,45,51); 17.10% (35,58,66); 16.45% (52,59,68); 15.04% HPV 16; 5.78% HPV 18.

Conclusion: This analysis showed that the prevalence of hrHPV infection among analyzed women was high. Greater attention should be directed toward assessing awareness levels and ensuring appropriate follow-up of HPV-positive women, as well as emphasizing the importance of vaccination.

Keywords: real-time PCR, hrHPV, human papillomavirus



HIGH-RISK HPV PREVALENCE AND GENOTYPE DISTRIBUTION AMONG WOMEN - A SINGLE CENTER EXPERIENCE

Milica Đorđević^{1,2}, Milica Lazarević², Marina Randelović^{1,2}, Aleksandra Ignjatović^{1,2},
Milena Bogdanović², Suzana Otašević^{1,2}

¹ Faculty of Medicine, University of Niš, Niš, Serbia

² Institute of Public Health of Niš, Niš, Serbia

Abstract

Objectives: Genital *Human papillomavirus* (HPV) is one of the most prevalent causes of sexually transmitted infections, with a tendency of constant increase. It is known that certain genotypes could lead to malignant alteration, particularly cervical cancer. The goal of this study was to determine the prevalence and high risk HPV genotype distribution pattern in women from the territory of the city of Niš.

Materials and methods: Cervical swabs from 2,641 women (patients and women on control examination) were analyzed using the High-risk Human Papillomavirus DNA (Genotype) Diagnostic Kit (PCR- Fluorescence Probing) by Sansure Biotech inc (Changsha, Hunan, China). Statistical analysis was performed using the SPSS 16.0 software package.

Results: HPV was detected in a high percentage of women (38.1%) with findings of HPV 16 (29.3%), HPV 31 (19.7%), HPV 52 (13,9%) as the most frequent genotypes of high risk. Additionally, possibly carcinogenic HPV 53 (19.6%) and HPV 66 (10,1%) were found in high percentages. The highest prevalence of infection was detected in a group of women aged 20-30 years with HPV 59, HPV 51, and HPV 52 as the most commonly diagnosed.

Conclusion: High prevalence of HPV infection among examined women highlights the importance of routine gynecological screening and mandatory monitoring of HPV positive women, as well as vaccination at an early age.

Keywords: HPV infection, cervical cancer, Real-TM PCR



PREVALENCE AND IDENTIFICATION OF BACTERIAL ISOLATES FROM WOUND SPECIMENS - A THREE - YEAR STUDY AT THE CENTER OF PUBLIC HEALTH OF BITOLA

Jasmina Nikolovska¹, E. Krstevska Kelepurovska¹, A. Delova¹, S. Popovska Kljuseva¹

¹Center of Public Health of Bitola, Bitola, North Macedonia

Abstract

Objectives: The aim of this study was to determine the most prevalent microorganisms isolated from wound specimens during a three year period.

Materials and methods: A total of 1188 wounds samples in a period of three years, from (2022-2024), were processed in the Department of Microbiology at the Center for Public Health Bitola. All samples were processed using standard microbiology techniques for isolation and identification of the microorganisms.

Results: Out of 1188 total samples, positive were 794 (66.8%) with 1119 isolated bacteria. Among them 543 were gram positive, 494 gram negative, 62 yeast and 20 strains were anaerobs. 394 (33.2%) specimens were negative by culture. The most frequently isolated bacteria were: Staphylococcus aureus 308 (27.5%), Enterococcus spp. 176 (15.7%), E. coli 153 (13.7%), Pseudomonas aeruginosa 89 (8%), Proteus mirabilis 51 (4.5%), Streptococcus β haemolyticus 51 (4.5%). Of all positive specimens, monobacterial were 67.1% (533/794), while 32.9% (261/794) were polymicrobial.

Conclusion: The study revealed a high prevalence of bacterial isolates in wound samples, with Staphylococcus aureus being the most frequently isolated pathogen. The correct microbiological wound investigation is necessary and is of great importance for a successful and effective management and treatment of infected wounds.

Keywords: wound specimens, staphylococcus aureus.



EPIDEMIOLOGICAL AND DIAGNOSTIC ASSESSMENT OF LYME DISEASE IN SOUTH BAČKA DISTRICT, VOJVODINA: A FIVE-YEAR SEROLOGICAL STUDY

Ivona Martinović¹, Milica Devrnja^{1,2}

¹Institute of Public Health of Vojvodina, Novi Sad, Serbia

²Faculty of Medicine, University of Novi Sad, Serbia

Abstract

Objectives: Lyme borreliosis is a multisystem inflammatory disease caused by the *Borrelia burgdorferi* sensu lato complex, transmitted to humans through the bite of infected *Ixodes* ticks. As the most common vector-borne disease in the Northern Hemisphere, it represents a significant public health concern. This study aimed to determine the frequency of seroreactivity to *Borrelia burgdorferi* and analyze epidemiological characteristics of patients tested in the South Bačka District from 2019 to 2024.

Methods: A retrospective analysis was conducted using serological data from the Institute for Public Health of Vojvodina. Patients were tested via physician referral or personal request. A two-tiered testing algorithm was applied: initial ELISA screening, followed by Western blot confirmation for positive or equivocal samples.

Results: Among 9991 tested by ELISA, 1052 were positive (444 males, 608 females). Western blot was performed on 3458 samples, confirming 147 positive (53 males, 94 females), with 674 equivocal result, mostly in the 50–70 age group. Seroreactivity varied among municipalities, with no significant gender-related differences.

Conclusion: The findings highlight the importance of confirmatory testing, as Western blot substantially reduced false-positive ELISA results. Serological testing should be based on clinical suspicion, especially in nonspecific or late-stage manifestations, while early Lyme disease is best diagnosed clinically through signs such as erythema migrans.

Keywords: lyme borreliosis, western blot, ELISA seroreactivity, confirmatory testing



BARTONELLA HENSELAE SEROPREVALENCE IN HUMAN SAMPLES – OUR EXPERIENCE

Sonja Atanasievska Kujović¹, Nikoleta Đorđevski¹, Vesna Protić-Đokić¹, Elizabeta Ristanović¹

¹ Institute of Microbiology, Department of Microbial Genetics and Immunology, Military Medical Academy, Belgrade, Serbia

Abstract

Objectives: *Bartonella henselae* is a zoonosis that causes cat scratch disease. The bacterium could be transmitted mainly by cats, although ticks are also potential vectors. Fever, skin manifestations, lymphadenopathies, endocarditis and neuropathies are the most common human symptoms. The aim of this study is to determine the bacterial seroprevalence in our patients.

Materials and methods: We analysed samples from 925 patients with clinical manifestations of lymphadenitis and/or cardiomyopathy over a two year period (2023-2024). The indirect immunofluorescence test (IIF) was used to detect specific IgM and IgG antibodies in the patients' serum. The tests were performed at the Department of Microbial Genetics and Immunology, Institute of Microbiology, Military Medical Academy.

Results: IgM antibodies were detected in 46 (4.97%) samples, 106 (11.47%) samples were IgG positive. Borderline IgM antibodies were present in 72 (7.78%) patients, while borderline IgG antibodies were found in 98 (10.61%) of them.

Conclusion: The results of the study indicate a relatively high seroprevalence of *Bartonella henselae*, which emphasises the importance of this pathogen in the context of diagnosis and treatment. Further multidisciplinary studies are needed to understand the epidemiological, clinical and epizootological characteristics of this bacterium.

Keywords: *bartonella henselae*, indirect immunofluorescence test, seroprevalence



TRENDS IN SALMONELLA GROUP C1 INFECTIONS: A DETAILED RETROSPECTIVE STUDY (2019-2023)

Aleksandra Jovanović¹, Selma Habibović², Snežana Ribis³

¹ Institute for laboratory diagnostic “BioMedica”, Belgrade, Serbia

² Department of Microbiology, Public Health Institute Novi Pazar, Novi Pazar, Serbia

³ Laboratory for Clinical Microbiology, General hospital “Dr. Franca Derganca”, Nova Gorica, Slovenia

Abstract

Objectives: To investigate epidemiological trends of Salmonella Group C1 infections from 2019 to 2023, with emphasis on seasonal variation, age and gender distribution, and predominant serovars, with aim to guide public health strategies.

Methods: A retrospective study was conducted on 1,340 Salmonella Group C1 cases (2019–2023) at the Institute for Laboratory Diagnostics “Biomedica,” Belgrade, Serbia. Data on year, month, gender, and age were collected, and serovar identification was performed using standard microbiological methods.

Results: Annual case counts ranged from 187 (2020) to 380 (2023). The highest proportion was in 2021 (13%) and the lowest in 2023 (2%). Seasonal peaks occurred in August–September. A slight male predominance was observed. Children (0–20 years) and adults (40–60 years) were most affected. *S. Infantis* was the dominant serovar, with *S. Thompson* emerging in recent years.

Conclusion: Salmonella Group C1 infections showed seasonal summer peaks and higher incidence among children. The emergence of *S. Thompson* highlights evolving epidemiology. Continuous surveillance, understanding the patterns of disease outbreaks and targeted interventions are crucial for reducing disease burden and protecting vulnerable populations.

Keywords: salmonella group C1, retrospective study, epidemiology, public health



PERIODONTOPATHOGENIC MICROORGANISMS - REVIEW PRESENTATION

Jana Pešić Stanković^{1,2}, Predrag Stojanović^{1,2}, Milena Kostić^{3,4}, Snežana Mladenović Antić^{1,2}, Vukica Djordjević², Nevena Miličić¹, Ana Pejčić^{3,4}

¹ Department of Microbiology and Immunology, Medical Faculty, University of Niš, Niš, Serbia

² Centre of Microbiology, Public Health Institute of Niš, Niš, Serbia

³ Faculty of Medicine, University of Niš, Niš, Serbia

⁴ Clinic of Dental Medicine of Niš, Niš, Serbia

Abstract

Periodontal diseases are complex inflammatory conditions affecting the supporting structures of teeth, primarily caused by specific anaerobic bacteria residing in subgingival plaque. This review outlines methods for sampling, isolating, and identifying these microorganisms using both classical culture techniques and modern molecular diagnostics such as PCR and 16S rRNA sequencing. Periodontopathogenic microorganisms show the ability to form biofilms, which additionally has an impact on the course of the disease and the success of therapy. Accurate identification of pathogens is essential for diagnosis, treatment planning, and monitoring of periodontal disease progression.

Keywords: periodontal diseases, microorganism, pathogenicity, isolating



MICROBIOLOGICAL PROFILE OF BLOOD CULTURES IN THE ERA OF ANTIMICROBIAL RESISTANCE: PREVALENCE OF MULTIDRUG RESISTANT STRAINS

Snežana Mladenović Antić¹, Marina Randelović^{1,2}, Biljana Vavić¹, Miloš Randelović¹,
Vukica Đorđević¹

¹ Centre of Microbiology, Public Health Institute of Niš, Niš, Serbia

² Department of Microbiology and Immunology, Medical Faculty, University of Niš, Niš, Serbia

Abstract

Objective: To determine the antimicrobial susceptibility of the most common bacteria isolated from blood cultures.

Methods: At the Center for Microbiology, Public Health Institute Niš, between July 2023 and July 2025, a total of 1,174 non-duplicate isolates from blood cultures obtained from patients hospitalized at the Clinical Center Niš were analysed. Bacterial isolates were identified using the VITEK2 System (bioMérieux, France) and MALDI-TOF mass spectrometry. Antimicrobial susceptibility testing was performed according to EUCAST standards.

Results: A total of 1174 non-duplicate facultative and anaerobic bacterial isolates were recovered. The majority of isolates originated from patients hospitalized at the Clinic of Anesthesiology, Reanimatology and Intensive Therapy (55%) and the Clinic of Nephrology (15.72%). Among all isolates, 68.42% were Gram-positive and 31.58% Gram-negative. The most frequent Gram-positive isolates were *Staphylococcus epidermidis* (29.48%), *Enterococcus* spp. (10.56%), and *Staphylococcus aureus* (5.1%). Among Gram-negative bacteria, the most common were *Klebsiella* spp. (9.95%), *Serratia* spp. (5.6%), *Escherichia coli* (5.2%), and *Acinetobacter baumannii* (4.66%). All staphylococci were susceptible to vancomycin and linezolid, while 2% of *S. aureus* isolates were MRSA and 16.81% MRSE. Among Gram-negative isolates, 59% were multidrug resistant (MDR), with carbapenem resistance detected in 16.46%. Only 1.98% of *A. baumannii* isolates were susceptible to carbapenems, while all remained susceptible to colistin. The proportion of MDR isolates was found to be 98% for *Acinetobacter baumannii*, 91% for *Serratia marcescens*, 79.5% for *Klebsiella pneumoniae*, 71.2% for *Enterococcus faecium*, 45.5% for *Pseudomonas aeruginosa*, and 41.9% for *Escherichia coli*.

Conclusion: This study highlights the predominance of Gram-positive bacteria, particularly coagulase-negative staphylococci, as the leading causes of bloodstream infections in our hospital setting, while also underscoring the significant contribution of Gram-negative pathogens such as *Serratia* spp., *Klebsiella* spp., and *E. coli*. Data on local antimicrobial susceptibility patterns are crucial for optimizing both empirical and targeted therapy of bloodstream infections.

Keywords: blood culture, antimicrobial susceptibility, multidrug resistance patterns



ERRATA AND CORRIGENDA

This section documents corrections to abstracts published in the Book of Abstracts of the 56th Days of Preventive Medicine, 2024.

Correction to:

DISPERSION WITH SUPERCRITICAL EXTRACT OF THYME (THYMUS VULGARIS L.) AND LACCASE

Jelena V. Živković¹, Ivana Nešić¹, Svetolik Maksimović², Maja Grigorov¹, Vanja M. Tadić³, Milica Martinović¹, Vesna Savić¹

¹University of Niš, Faculty of Medicine, Niš, Serbia

²University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia

³Institute for Medicinal Plant Research „Dr Josif Pančić - Belgrade, Serbia

Page 23

Error: the title was listed incorrectly as: **DISPERSION WITH SUPERCRITICAL EXTRACT OF THYME (THYMUS VULGARIS L.) AND LACCASE**

Correction: the correct title was: **EVALUATION OF ANTIOXIDATIVE PROPERTIES OF LIPOSOMAL DISPERSION WITH SUPERCRITICAL EXTRACT OF THYME (THYMUS VULGARIS L.) AND LACCASE**

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