Doctoral School of Medical Sciences

As a manuscript
C.Z.U.: 615.916/.917(043.2)

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HYGIENIC EVALUATION OF ACUTE NON-OCCUPATIONAL EXOGENOUS CHEMICAL POISONINGS

331.02. – HYGIENE

Abstract of the doctoral dissertation in medical sciences

Chisinau, 2026

The thesis was conducted at the Scientific Laboratory of Chemical Hazards and Toxicology, National Agency for Public Health.

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The defense will take place on May 6, 2026 at 14:00, at the premises of the "Nicolae Testemitanu" State University of Medicine and Pharmacy, 165 Stefan cel Mare şi Sfant Blvd., office 205, during the session of the Public Thesis Defense Committee, approved by the decision of the Scientific Council of the Consortium dated March 2, 2026 (Order No. 1 of March 2, 2026).

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CONTENTS

INTRODUCTION

Relevance and importance of the addressed issue. Acute non-occupational exogenous chemical poisonings (ANOECP) represent a current public health problem, with a major impact on morbidity and mortality worldwide. These poisonings are among the leading causes of admission to emergency departments, both in developed and developing countries, particularly affecting vulnerable groups such as children and adolescents [1–3].

According to the Global Report on Child Injury Prevention, acute chemical poisonings rank fourth in incidence, following road traffic injuries, burns, and drowning, and constitute the most frequent cause of non-traumatic coma in individuals under 35 years of age [4–8]. This condition is exacerbated by the increasing use of chemical substances or mixtures in various sectors, such as: industry, agriculture, and household chemical products [9]. Currently, over 3,000 chemical substances contribute to acute poisonings, out of a global pool of more than 350,000 synthetic compounds in use [10–13].

The World Health Organization (WHO) estimates over 345,000 deaths annually due to chemical poisonings, of which 13% are children [17–19]. Among the most common substances involved are medications, alcohol, combustion products (gases), pesticides, and household chemicals [9]. The situation is further aggravated by easy access to toxic substances, improper management, and the lack of adequate preventive measures [16, 27, 28].

In recent years, the expanded use of chemical substances has generated benefits, but it has also imposed a financial burden on the healthcare system and the economy [9]. The economic impact of these cases is considerable: for example, in France and Italy, annual costs range between euro 1.5–2.1 billion [9], while in the United States, pesticide-related poisonings alone generate approximately dollars 7.9 billion in annual costs [14, 15].

An alarming aspect is the use of chemical substances for suicidal purposes, which accounts for 10–36% of cases in developed countries and 65–79% in developing countries [20–23]. According to WHO, suicide by chemical poisoning is the second leading cause of death among young people aged 15–29 years [24–26].

In the Republic of Moldova, over 2,000 cases of ANOECP are reported annually, of which 40% occur in children, and 2% result in fatal outcomes [29–32]. The main chemical agents involved are medications (43%), followed by alcohol (17%), gases (16%), and pesticides (5%) [29–32].

At the national level, the absence of a functional Toxicological Information Center (TIC) and an automated information system affects the capacity for response, control, and prevention. Currently, research on ANOECP in the Republic of Moldova is limited and fragmented, lacking an integrated approach that reflects their distribution by etiology, age, sex, geographic region, exposure circumstances, and environmental characteristics. In this context, the present study aims to conduct a comprehensive epidemiological and toxico-hygienic assessment of ANOECP at the national level.

Research purpose: to identify and analyze of the causes and the hygienic risk factors of acute non-occupational exogenous chemical poisonings in the Republic of Moldova in order to develop response, control and prevention measures.

Research objectives:

1. Analysis of the epidemiological and toxico-hygienic characteristics of acute non-occupational exogenous chemical poisonings at the international and national levels.
2. Estimation of the incidence and mortality of acute non-occupational exogenous chemical poisonings in the population of the Republic of Moldova.

3. Evaluation and quantification of direct costs and years of life lost caused by acute non-occupational exogenous chemical poisonings, in order to assess the financial and social burden on the healthcare system and the population of the Republic of Moldova.
4. Development and scientific justification of response, control and prevention measures for ANOECP, based on epidemiological, toxico-hygienic data and analysis of direct medical costs, for the protection of public health.

General methodology of the scientific research. During the period 2017–2025, within the Scientific Laboratory of Chemical Hazards and Toxicology of the National Agency for Public Health (ANSP), three studies were conducted: descriptive-retrospective, cross-sectional and economic, with a multidisciplinary and intersectoral approach. These studies were based on the collection, analysis, and integrated interpretation of statistical data on ANOECP in children and adults, according to predefined inclusion and exclusion criteria. The research is characterized by a complex design, structured into four clear methodological stages, each focused on specific objectives. The data were systematically collected from official sources (F.18-health forms, statistical registers, NAPH National Reports), and electronic questionnaires were also applied and completed. The data were statistically processed using Microsoft Excel and the IBM SPSS software, version 26.

Scientific problem. The lack of a comprehensive and systematic analysis of chemical accidents under habitual conditions in the Republic of Moldova represents a significant gap in understanding the phenomenon and limits the substantiation of public health prevention measures.

Novelty and originality of the obtained scientific results. This research represents the first comprehensive assessment of ANOECP in the Republic of Moldova, conducted separately for children and adults, with a detailed analysis of distribution by etiology, age, sex, locality and circumstances. For the first time, a comparative analysis of ANOECP incidence and mortality was performed. The main causes and vulnerable groups were identified, providing a solid basis for targeted interventions. For the first time, complex economic calculations were carried out, estimating the direct costs of treatment and prevention, demonstrating the economic efficiency of preventive measures. The calculation of the YLL (years of life lost) indicator allowed the assessment of the public health burden. The results scientifically substantiated the strategic necessity of establishing a TIC to provide healthcare professionals and the population with information on the harmful effects of chemical substances, as well as guidance on diagnosis and first aid which was officially opened on November 11, 2025 within the National Agency for Public Health.

Theoretical importance. The research aligns with the priorities of the Ministry of Health and the national strategy “Health 2030”, as well as with the Action Plan on the implementation of the International Health Regulations, 2005, representing a scientific work on the identification and assessing the risk factors and causes of ANOECP. The results of the study will be integrated into university and postgraduate curricula, as well as into professional development programs for healthcare personnel.

Practical significance of the research. The results obtained in this study, including the developed scientific arguments, have served as the conceptual and methodological foundation for the inclusion of ANOECP in the informational surveillance system for communicable diseases and public health events, in accordance with Government Decision No. 885/2022. The analysis of statistical data and the conclusions of the cost–benefit report (1:4.8), which demonstrated the economic superiority of preventive measures over curative ones, as well as the results of the socio-economic impact analysis, provided the basis for developing scientific justifications and the Concept for the Establishment of the TIC. The identification of causal factors of ANOECP, including the multifactorial analysis of their incidence and mortality, provided essential scientific support for the development of effective measures for response, control, and prevention.

Implementation of scientific results. The implementation of the scientific results was carried out through their validation at national and international scientific conferences and invention and innovation exhibitions, forming the basis for the development of guidelines, practical methodologies, and a monograph dedicated to the prevention of ANOECP. The obtained results have been applied in the practical work of specialists from the NAPH, public healthcare institutions, and educational institutions, and are used in the teaching practice of the Hygiene Discipline, Department of Preventive Medicine at the "Nicolae Testemitanu" State University of Medicine and Pharmacy.

Approval of Thesis Results. The scientific results obtained were presented and discussed at the following scientific forums: Conference with international participation "Health and Environment," dedicated to the 90th anniversary of the Republican Unitary Enterprise "Scientific-Practical Hygiene Center," Minsk, 26–28.10.2017; Scientific Conference "Public Health Management: Achievements, Challenges, and Perspectives" (2018, 2019); National Scientific-Practical Conference with international participation "Health and the Environment," Minsk, Belarus (2018, 2020); National Conference with international participation "A safe environment – protected health," Chisinau, 12–13.11.2020; National Conference with international participation in occupational health, chemical safety, and toxicology "Health protection – for a safe future," Chisinau, 2022; Annual Conference "Contribution of young researchers in hygiene to the development of indigenous science," 19.02.2025; The 3rd International Conference on Non-Communicable Diseases "Health risk factors and prevention of injuries and diseases," Chisinau, 05–07.06.2019; The 1st National Conference with International Participation "One Health Approach in a changing world," 04–05.11.2021; International Invention Salon Pro Invent (Cluj-Napoca, Romania, 2017, 2019, 2020); Invention and Innovation Salon "Traian Vuia" (Timisoara, Romania, 2020); Euroinvent Salon (Iasi, Romania, 2020); International Specialized Exhibition Infoinvent (Chisinau, 2017); Euroinvent, 13th European Exhibition of Creativity and Innovation (Iasi, Romania, 20–21.05.2021); Third Annual BTRP Ukraine Regional One Health Research Symposium, 16–20.04.2018; IV Congress of family doctors in the Republic of Moldova with international participation, Chisinau, 16–17.05.2018; 38th Congress of the European Association of Poison Centres, Bucharest, 22–25.05.2018; VIII Congress of scientists and specialists in public health and health management "One Health," Chisinau, 24–25.10.2019; 75th anniversary Congress of SUMPh "N. Testemitanu," 21–23.10.2020. The research results were also presented and approved within the framework of national projects: 1. Project 15.817.04.07A "Assessment of the population's health status in relation to priority exogenous and psycho-social harmful factors and development of measures to reduce risks," period 2015–2019; 2. Project 20.80009.8007.35 "Assessment of human health risk attributed to exposure to priority chemical substances in the Republic of Moldova," period 2020–2023. Additionally, the research results were discussed and approved at the joint meeting of the Scientific Laboratory "Chemical Hazards and Toxicology" of the National Agency for Public Health (minutes from 04.07.2025) and at the Scientific Profile Seminar of SUMPh "Nicolae Testemitanu," profile 331 Public Health, specialties: 331.01 Epidemiology; 331.02 Hygiene; profile 333 Occupational Health and Biomedicine, specialty 331.01 Occupational Hygiene (minutes no. 5 from 17.12.2025).

Publications on the thesis topic. The scientific activity carried out within the framework of the thesis topic has been reflected in 48 scientific publications, including one monograph, and one chapter entitled *„Acute non-occupational exogenous chemical poisonings"* in the monograph *„Development of Experimental Toxicology in the Republic of Moldova"*, as well as 29 articles. Among these are one article with an impact factor published in an accredited national scientific journal, category A (*Chemistry Journal of Moldova*, SCOPUS Q4, IF: 0.5), five articles in category B journals (including one in the *Moldovan Journal of Health Sciences*), one article in a peer-reviewed international journal, 15 articles in the proceedings of international and national scientific conferences, five abstracts in international and national

journals, and two documentary scientific publications (National Reports on the activity of the State Public Health Surveillance Service, NAPH). In addition, two practical guidelines were developed, alongside 15 participations with presentations at scientific forums and exhibitions of inventions and innovations, including poster presentations, one invention patent, and three copyright certificates. At national and international exhibitions of inventions and innovations, three gold medals, three silver medals, and four Diplomas of Excellence were awarded. The body of work on ANOECP was also presented and recognized at both municipal and governmental levels, receiving the Municipal Award for Young Researchers and the Government Excellence Scholarship.

Structure of the thesis. The thesis comprises 186 pages and includes the title page, table of contents, list of abbreviations, list of figures and tables, introduction, four chapters, discussions, general conclusions and practical recommendations, bibliography with 167 references, 10 annexes, the declaration of responsibility, and the author's CV. For the elaboration of the doctoral thesis, a positive opinion was obtained from the Research Ethics Committee of Nicolae Testemitanu SUMPh (minutes no. 68 of 21.05.2018).

THESIS CONTENT

1. ACUTE NON-OCCUPATIONAL EXOGENOUS CHEMICAL POISONINGS – A CURRENT PUBLIC HEALTH ISSUE

An analysis of data on acute poisonings of chemical origin was conducted at both national and international levels, including socio-economic particularities with an impact on public health, the existing legislative framework, and prevention practices applied in different countries. The study highlighted gaps in the prevention, reporting, and control system of ANOECP, confirming the relevance of the topic and the need for in-depth research, as well as the imperative of implementing strategic intervention measures at the national level.

2. MATERIALS AND RESEARCH METHODS

In order to achieve the proposed aim and objectives, three studies were conducted: descriptive-retrospective, cross-sectional and economic, organized in four successive stages. The study aimed at a complex assessment of the incidence and mortality of ANOECP, as well as the estimation of direct costs and associated burden, with the purpose of quantifying their impact on public health and the national economy. The following research methods were applied: hygienic, epidemiological, sociological, and statistical. The data were collected, analyzed, and interpreted according to the study design presented in figure 1.

The **first** stage of the research focused on theoretical analysis and a review of specialized literature at both international and national levels regarding ANOECP, including key concepts, classifications, mechanisms of action, risk factors, and epidemiological and toxicological-hygienic characteristics. An in-depth review of scientific publications from the MEDLINE (PubMed), Google Scholar, CrossRef, and Scopus databases enabled the identification of the main aspects related to chemical poisonings, assessment of their socio-economic impact, and analysis of international experience in the organization of TIC. Subsequently, the aim and objectives of the research were established, and the research plan, methodology, and questionnaires administered to the individuals included in the study were developed.

The **second** stage of the thesis included a descriptive, retrospective study aimed at the epidemiological and hygienic analysis of ANOECP in the Republic of Moldova during the period 2012–2023. The study was based on a multidimensional process that included the collection, analysis, and generalization of statistical data on cases of acute poisonings caused by various chemical substances (medicines, alcohol, toxic gases, pesticides, nitrates, household chemicals, as well as liquid and solid chemical substances).

The information was extracted from statistical forms F.18-health "Report on State Public Health Surveillance in the district/municipality," ANOECP section, as well as from the Information System for surveillance of communicable diseases and public health events, the National Reports of the NAPH, and the National Registers on ANOECP records. These data were used to estimate the incidence and mortality of ANOECP among both children and the adult population.

The analysis included the description of annual trends in ANOECP incidence, distribution by age groups, etiological structure, geographical distribution, and seasonal trends. Data processing was performed using Microsoft Excel 2021, and statistical indicators such as the mean, median, standard deviation, 95% confidence intervals (95% CI), and p-value were calculated.

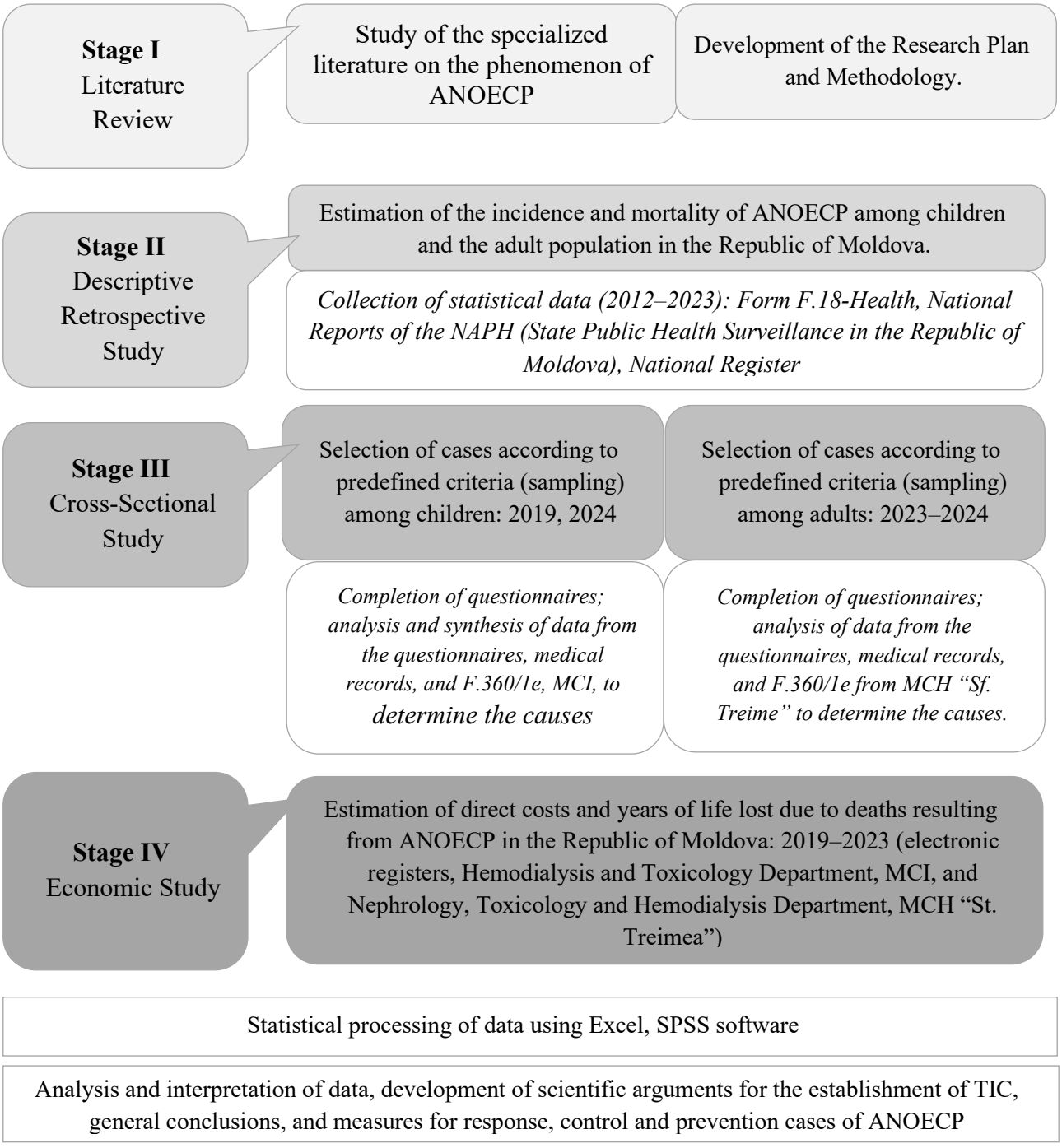

Figure 1. Research Design

Stage III. To achieve the second objective, particularly the identification of risk factors and main causes of ANOECP, questionnaires were administered during the period 2019–2024 to individuals diagnosed with poisonings from medications, alcohol, combustion products (gases), pesticides, and household chemicals. The questionnaires were developed as part of the research and approved by the Research Ethics Committee of Nicolae Testemitanu SUMPh (minutes no. 68 of 21.05.2018).

Two distinct versions of the questionnaires were designed: one for the pediatric population (completed by parents or caregivers) containing 41 questions, and the other for adults, containing 29 questions. The questionnaires, structured with both closed and open-ended questions, allowed the collection of detailed data regarding circumstances, risk factors, and causes of poisonings, providing valuable information for comprehensive analysis and the development of recommendations and preventive measures. No personal data were collected, and each questionnaire was coded to ensure respondent anonymity.

Sampling in Stage III included all individuals affected by ANOECP, reported daily by the Hemodialysis and Toxicology Department of the Mother and Child Institute and the Nephrology Department of MCH "Sf. Treime" through the Focal Point of the Public Health Emergency Management Directorate within the NAPH. However, only cases meeting the inclusion criteria were included in the study: individuals of any gender (male, female), from urban and rural areas, without ethnic restrictions; children under 18 years and adults ≥19 years; persons with acute poisonings from medications, alcohol, gases, pesticides, nitrates, drugs, and household chemicals; individuals with acute non-occupational poisonings of chemical etiology (occurring in habitual settings, on the street, and other non-occupational locations, and for children, also including educational institutions), who provided informed consent to participate.

The study included a sample of 351 participants, of whom 130 were children (37%) and 221 adults (63%), from both urban and rural areas, surveyed in the specialized toxicology departments of MCH "Sf. Treime" and MCI. The data, collected electronically, were analyzed statistically using SPSS and Microsoft Excel, which enabled the identification of causal factors, vulnerable population categories, and epidemiological and toxicological-hygienic characteristics.

The results provided a scientific basis for the development of a dedicated instrument for the registration and surveillance of ANOECP, integrated into the National Information System for the Surveillance of communicable diseases and public health events, approved by Government Decision no. 885/2022.

Stage IV involved an economic study focused on evaluating the direct costs associated with the treatment of patients with ANOECP during the period 2019–2023, both among children and adults, using data from the internal registers of MCH "Sf. Treime" and the MCI. Treatment costs were assessed using specific formulas, taking into account the length of hospitalization, the complexity of investigations, and the annual tariffs established by the National Health Insurance Company; for the pediatric population, the Medical Complexity Index (MCI) was applied. At this stage, the social impact of poisonings was also estimated by calculating the years of life lost (YLL), determining the potential life lost due to premature mortality. Expenditures for the prevention of ANOECP were quantified for the staff of the Public Health Protection Directorate, who provide information and educational services to the population on ANOECP prevention. The cost-benefit analysis demonstrated that prevention is nearly five times more financially efficient than treatment. The results support the need to establish a TIC within the NAPH, which would optimize resources and strengthen the capacity for prevention and response to ANOECP. Stage IV also included the formulation of corresponding conclusions and the development of measures for response, control, and prevention of ANOECP.

3. CHARACTERISTICS AND EVALUATION OF ACUTE NON-OCCUPATIONAL EXOGENOUS CHEMICAL POISONINGS AMONG THE POPULATION OF THE REPUBLIC OF MOLDOVA

3.1. Trends and structure of acute non-occupational exogenous chemical poisonings in the Republic of Moldova during 2012–2023.

The analysis of the obtained data highlights a concerning situation regarding the incidence of ANOECP, with a total of 36112 cases reported, corresponding to 1093,52 cases per 100.000 population in the country during 2012–2023. Of the total cases, 33% were reported among children (n = 11897 cases) and 67% among adults (n = 24215 cases). The average annual incidence was 143,5 cases per 100.000 children and 76,9 cases per 100.000 adults, with maximum values recorded in 2015 for children, at 236,03 per 100.000 or 14,6% (95% CI: 14,01–15,28), and in 2013 for adults, at 185,95 per 100.000 or 21,45% (95% CI: 20,94–21,98). Minimum values were recorded in 2020, at 100,21 per 100.000 children or 5,04% (95% CI: 4,66–5,45), and 43,72 per 100.000 adults or 3,69% (95% CI: 3,46–3,94).

After 2015, the analyzed data demonstrated a significant decreasing trend in ANOECP incidence. This downward trend is also confirmed by linear regression analysis, with a more pronounced decrease among adults (slope: -8.2365x + 130.49) compared to children (slope: -2.8884x + 162.26) (table 1).

$$Y_{\text{total ANOECP}} = -6.9841x + 136.52;\ R^2 = 0.4211$$

$$Y_{\text{children}} = -2.8884x + 162.26;\ R^2 = 0.0911$$

$$Y_{\text{adults}} = -8.2365x + 130.49;\ R^2 = 0.4238$$

This temporal trend coincides with the period of implementation of Ministry of Health Order no. 906/2015, later updated by Ministry of Health, Labour and Social Protection Order no. 348/2019, which introduced standardized procedures for the notification, investigation, and monitoring of cases, facilitating collaboration between the healthcare institutions and public health authorities.

Table 1. Incidence of ANOECP in the Republic of Moldova, according to statistical form F.18-Health "Report on State Public Health Surveillance," years 2012–2023

Years	Total					Children					Adults				
	N	%	Incidence per 100, 000	CI 95%	P	N	%	Incidence per 100, 000	CI 95%	p	N	%	Incidence per 100, 000	CI 95%	p
2012	3261	9,03	91,61	8,74-9,33	0,58	1003	8,43	127,93	7,94-8,94	0,89	2258	9,32	81,35	8,96-9,7	0,56
2013	6292	17,4	176,77	17,04-17,82	0,00	1097	9,22	143,27	8,71-9,75	0,24	5195	21,45	185,95	20,94-21,98	0,00
2014	5619	15,5	157,94	15,19-15,94	0,00	1278	10,74	170,55	10,2-11,31	0,01	4341	17,93	154,58	17,45-18,42	0,00
2015	4023	11,1	113,16	10,82-11,47	0,04	1741	14,63	236,03	14,01-15,28	0,00	2282	9,42	80,99	9,06-9,8	0,52
2016	2774	7,68	78,07	7,41-7,96	0,61	1101	9,25	151,10	8,75-9,79	0,23	1673	6,91	59,23	6,6-7,24	0,40
2017	2419	6,70	68,12	6,45-6,96	0,21	938	7,88	129,92	7,41-8,38	0,54	1481	6,12	52,35	5,82-6,42	0,20
2018	2145	5,94	60,46	5,7-6,19	0,08	787	6,62	110,05	6,18-7,08	0,04	1358	5,61	47,94	5,33-5,9	0,12
2019	2296	6,36	64,81	6,11-6,61	0,14	893	7,51	126,20	7,05-7,99	0,27	1403	5,79	49,49	5,51-6,1	0,15
2020	1494	4,14	56,51	3,94-4,35	0,01	600	5,04	100,21	4,66-5,45	0,00	894	3,69	43,72	3,46-3,94	0,02
2021	1954	5,41	74,39	5,18-5,65	0,04	854	7,18	144,13	6,73-7,66	0,14	1100	4,54	54,08	4,29-4,81	0,04
2022	1944	5,38	75,79	5,16-5,62	0,04	802	6,74	138,51	6,3-7,21	0,05	1142	4,72	57,50	4,46-4,99	0,05

2023	1891	5,24	75,87	5,01-5,47	0,03	803	6,75	143,88	6,31-7,21	0,05	1088	4,49	56,25	4,24-4,76	0,04
Total	**36112**	**100**				**11897**	**100**				**24215**	**100**			

Additionally, 997 deaths due to ANOECP were recorded, of which 44 were children (4.41%) and 953 were adults (95,59%), with a marked increase in 2013–2014 (n = 219 deaths), representing 21,97% (95% CI: 19,51–24,64, p = 0,00), and a significant decrease by 2023 (n = 23 deaths) or 2,31% (95% CI: 1,54–3,44, p = 0,02) (table 2).

Table 2. Mortality from ANOECP in the Republic of Moldova during 2012–2023

Years	Total deaths				Children (deaths)			Adults (deaths)		
	N	%	CI 95%	p	N	%	CI 95%	N	%	CI 95%
2012	185	18,56	16,26-21,09	0,00	7	15,91	7,93-29,37	178	18,68	16,33-21,28
2013	219	21,97	19,51-24,64	0,00	4	9,09	3,59-21,16	215	22,56	20,02-25,32
2014	219	21,97	19,51-24,64	0,00	4	9,09	3,59-21,16	215	22,56	20,02-25,32
2015	82	8,22	6,68-10,09	0,96	4	9,09	3,59-21,16	78	8,18	6,61-10,1
2016	61	6,12	4,79-7,78	0,34	3	6,82	2,35-18,23	58	6,09	4,74-7,79
2017	40	4,01	2,96-5,42	0,08	3	6,82	2,35-18,23	37	3,88	2,83-5,31
2018	34	3,41	2,45-4,73	0,05	8	18,18	9,51-31,96	26	2,73	1,87-3,97
2019	51	5,12	3,91-6,66	0,18	5	11,36	4,95-23,98	46	4,83	3,64-6,38
2020	21	2,11	1,38-3,2	0,02	1	2,27	0,4-11,81	20	2,10	1,36-3,22
2021	36	3,61	2,62-4,96	0,06	3	6,82	2,35-18,23	33	3,46	2,48-4,82
2022	26	2,61	1,79-3,79	0,03	1	2,27	0,4-11,81	25	2,62	1,78-3,84
2023	23	2,31	1,54-3,44	0,02	1	2,27	0,4-11,81	22	2,31	1,53-3,47
Total	**997**	**100**			**44**	**100**		**953**	**100**	

The analysis of ANOECP by etiological factors indicates a decreasing trend. For acute medication poisonings, linear regression analysis ($y = -0.9544x + 1957.8$) shows a slight decline; however, the coefficient of determination ($R^2 = 0.1416$) suggests a weak correlation between years and the incidence indicator (figure 2). Alcohol-related poisonings show a significant decrease ($y = -2.9782x + 6031.3$; $R^2 = 0.6985$), correlated with intensified prevention campaigns and the implementation of Ministry of Health Order no. 348/2019 (figure 3). Third in frequency are poisonings with potentially toxic gases, which remained at a constant level ($y = -0.0614x + 134.28$; $R^2 = 0.0091$), suggesting stagnation of the phenomenon during the analyzed period (figure 4). During the study period, pesticide poisonings demonstrated a moderate decrease ($y = -0.1681x + 342.87$; $R^2 = 0.2588$), reflecting the impact of regulations and educational measures, while also highlighting the need to strengthen preventive efforts (figure 5).

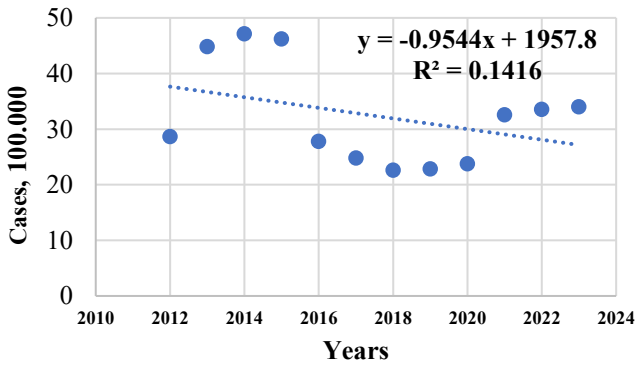

Figure 2. Trends in the incidence of acute medication poisonings and linear regression, 2012–2023

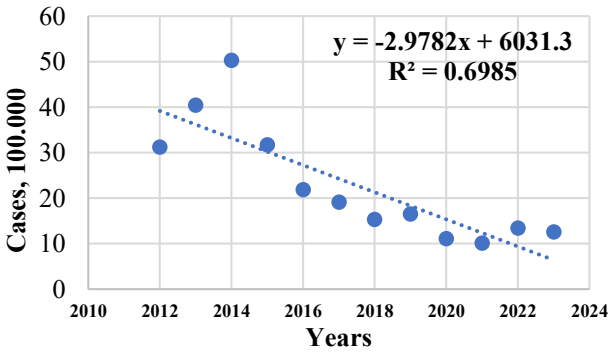

Figure 3. Trends in the incidence of acute alcohol poisonings and linear regression, 2012–2023

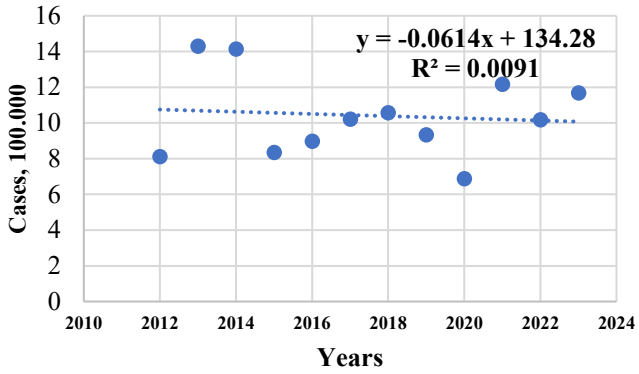

Figure 4. Trends in the incidence of acute gas poisonings and linear regression, 2012–2023

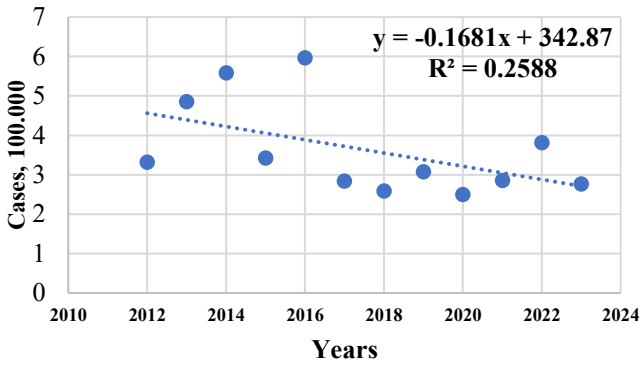

Figure 5. Trends in the incidence of acute pesticide poisonings and linear regression, 2012–2023

3.2. Toxicological and Hygienic Aspects of Acute Exogenous Chemical Poisoning in Children

Acute chemical poisonings in children in the Republic of Moldova during the period 2012–2023 were primarily caused by medications, alcohol, gases, and pesticides. Poisonings from medications ranked first, showing a significant decreasing trend ($y = -1.3042x + 72.061$; $R^2 = 0.0825$) and reaching a peak incidence in 2015 of 108,86 cases per 100000 children (figure 6). Alcohol-related poisonings exhibited a slight decline ($y = -0.3357x + 22.015$; $R^2 = 0.0352$), with the highest level also recorded in 2015 – 36,33 cases per 100000 children (figure 7). Gas poisonings were third in frequency, showing a moderately ascending trend ($y = 0.4406x + 13.303$; $R^2 = 0.1932$) with a peak in 2018 (figure 8). Poisonings from pesticides ranked fourth, with a relatively constant incidence ($R^2 = 0.0009$) and an annual average of 5 cases per 100000 children (figure 9).

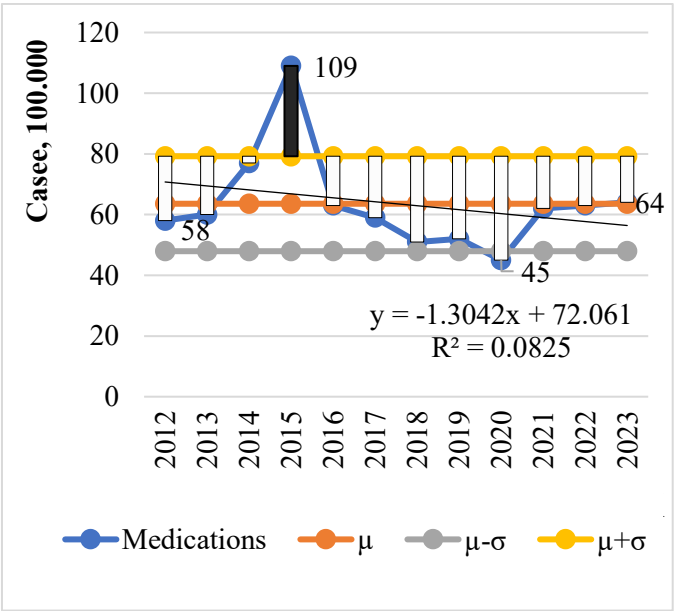

Figure 6. Incidence of acute drug poisonings (T36–T50) among children, 2012–2023, per 100.000

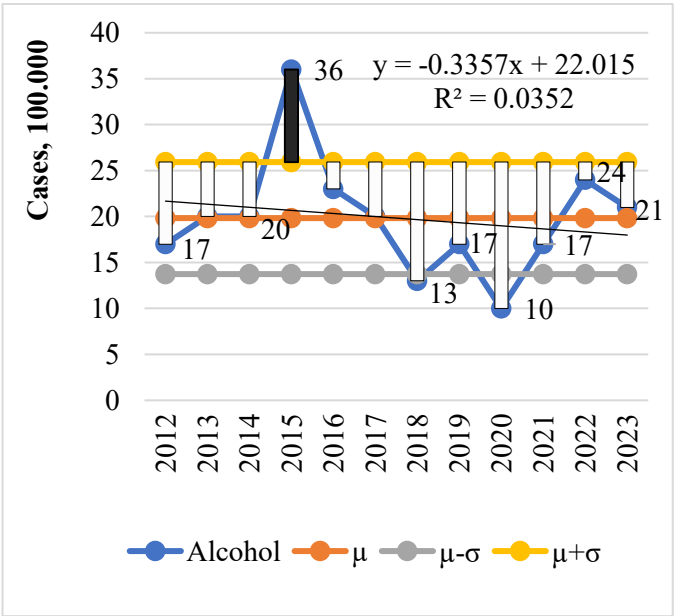

Figure 7. Incidence of acute alcohol poisonings (T51) among children, 2012–2023, per 100.000

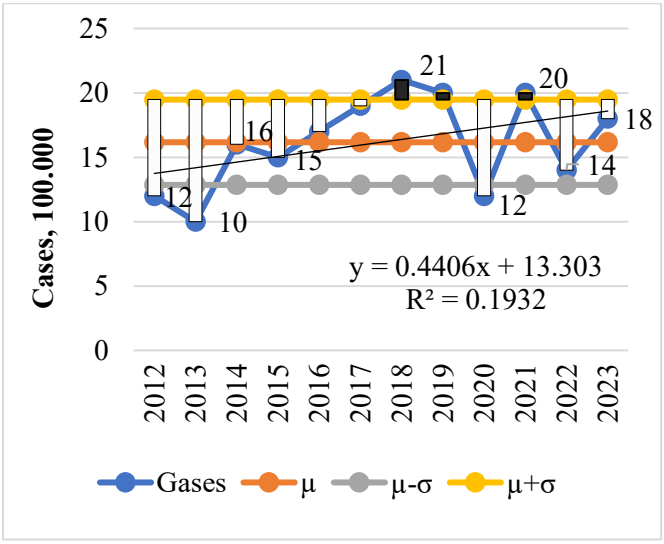

Figure 8. Incidence of acute gas poisonings (T58) among children, 2012–2023, per 100.000

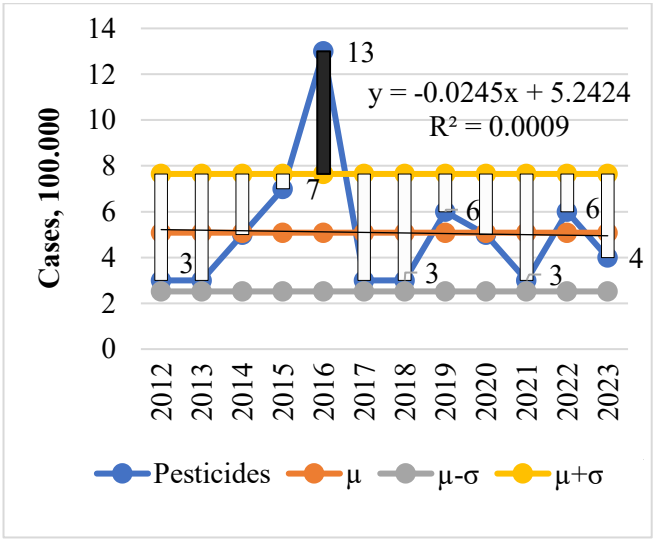

Figure 9. Incidence of acute pesticide poisonings (T60) among children, 2012–2023, per 100.000

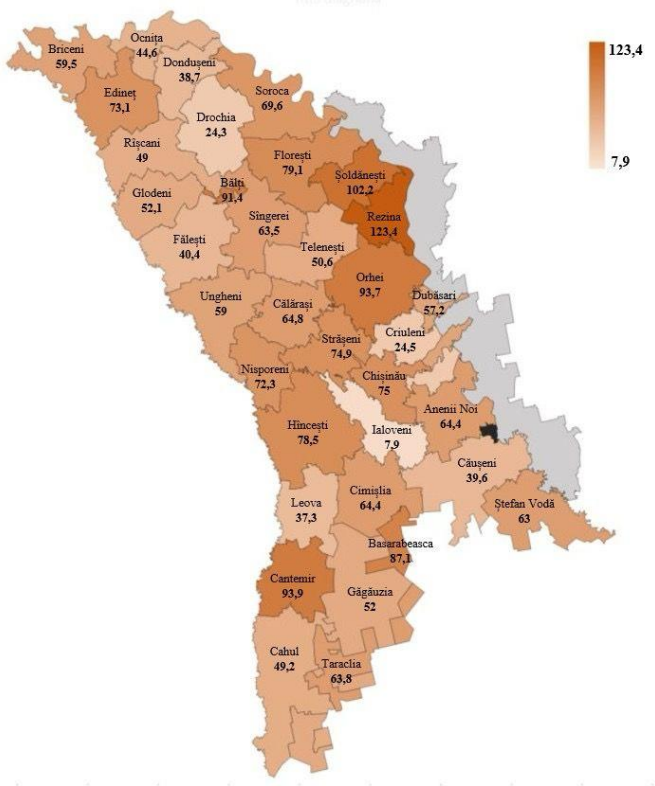

Figure 10. Mapping of the incidence of AECP in children in the Republic of Moldova, 2019–2023 (average), per 10.000 children

For a clear illustration of the distribution, the incidence of ANOECP in children across the country was mapped for the period 2019–2023 (annual average), in relation to the pediatric population of each district. According to the presented results, the highest incidence was recorded in Rezina district (123,4 cases per 10000 children), while the lowest value was observed in Ialoveni district (7,9 cases per 10000 children). At the same time, the Central region registered the highest average incidence (73 cases per 10000 children), with significant values in the districts of Șoldanesti (102,2) and Orhei (93,7 affected cases). The Northern region showed the lowest average incidence (59,6 cases per 10000 children) (figure 10).

3.3. Toxicological and hygienic particularities of acute non-occupational exogenous chemical poisonings among the adult population

The scientific evaluation of ANOECP cases among the adult population during 2012–2023 identified a clear distribution of the main chemical substances involved. In this age group, alcohol and medications remain the leading causes of poisonings, demonstrating persistent trends. Alcohol poisonings were the most

frequent, totaling 7624 cases or 31,5% of the total, with a peak incidence in 2014 of 58,4 cases per 100.000 inhabitants (n = 1640 affected individuals), representing 21,5% (95% CI: 20,6–22,45, p = 0,00). This was followed by a steady decrease until 2021, when the incidence dropped to 8,11 cases per 100000 population (n = 165 cases), accounting for 2,16% (95% CI: 1,86–2,52, p = 0,01), reflecting the impact of regulatory measures and prevention programs. The incidence of medication-related poisonings reached its peak in 2013, with a maximum incidence of 40,59 cases per 100000 inhabitants (n = 1134 cases), representing 15,46% (95% CI: 14,65–16,3, p = 0,00). This was followed by a gradual decline until 2020, when 360 cases were recorded (17,6 cases per 100000 inhabitants), accounting for 4,91% (95% CI: 4,44–5,43, p = 0,01). However, an upward trend was observed again during 2021–2023, reaching 492 cases in 2023 (incidence of 25,44 per 100000; 95% CI: 6,16–7,3, p = 0,14). Toxic gases, including carbon monoxide and other volatile substances, accounted for 2728 cases (107 cases per 100.000 or 11,3%), highlighting the major risks of accidental exposure in households and the importance of installing detection systems and ensuring adequate ventilation. Although nitrate poisonings represented a very small proportion (0,04%, n = 10 cases), they were reported only after 2015, following improvements in the reporting system in accordance with Ministry of Health Order No. 348/2019. The persistence of a small number of cases through 2023 suggests the existence of gaps in water and food quality control (table 3).

Table 3. Incidence of ANOECP among the adult population in the Republic of Moldova, 2012–2023

Years	Population number	Medications				Alcohol				Gas				Pesticide			
		N (%)	Incidence, per 100.000	CI 95%	p	N (%)	Incidence, per 100.000	CI 95%	p	N (%)	Incidence, per 100.000	CI 95%	p	N (%)	Incidence, per 100.000	CI 95%	p
2012	2775541	565 (7,7)	20,36	7,11-8,33	0,55	978 (12,83)	35,24	12,1-13,6	0,03	195 (7,15)	7,03	6,24-8,18	0,24	94 (9,32)	3,39	7,67-11,27	0,40
2013	2793786	1134 (15,46)	40,59	14,65-16,3	0,00	1288 (16,89)	46,1	16,07-17,75	0,00	432 (15,84)	15,46	14,5-17,25	0,00	147 (14,57)	5,26	12,53-16,88	0,00
2014	2808284	1097 (14,95)	39,06	14,16-15,79	0,00	1640 (21,51)	58,4	20,6-22,45	0,00	383 (14,04)	13,64	12,7-15,39	0,00	163 (16,15)	5,8	14,01-18,55	0,00
2015	2817547	839 (11,44)	29,78	10,73-12,19	0,01	858 (11,25)	30,45	10,56-11,98	0,13	190 (6,96)	6,74	6,07-7,98	0,18	71 (7,04)	2,52	5,62-8,78	0,27
2016	2824413	527 (7,18)	18,66	6,61-7,8	0,29	607 (7,96)	21,49	7,38-8,59	0,84	198 (7,26)	7,01	6,34-8,29	0,28	117 (11,6)	4,14	9,76-13,72	0,01
2017	2828843	456 (6,22)	16,12	5,69-6,79	0,07	534 (7)	18,88	6,45-7,6	0,47	228 (8,36)	8,06	7,38-9,46	0,98	77 (7,63)	2,72	6,15-9,44	0,55
2018	2832440	439 (5,98)	15,5	5,46-6,55	0,04	450 (5,9)	15,89	5,4-6,45	0,20	227 (8,32)	8,01	7,34-9,42	0,99	67 (6,64)	2,37	5,26-8,35	0,16
2019	2835111	443 (6,04)	15,63	5,52-6,61	0,05	464 (6,09)	16,37	5,57-6,65	0,23	192 (7,04)	6,77	6,14-8,06	0,20	70 (6,94)	2,47	5,53-8,67	0,24
2020	2044918	360 (4,91)	17,6	4,44-5,43	0,01	235 (3,08)	11,49	2,72-3,49	0,01	109 (4)	5,33	3,32-4,8	0,00	38 (3,77)	1,86	2,76-5,13	0,00
2021	2034053	488 (6,65)	23,99	6,1-7,25	0,13	165 (2,16)	8,11	1,86-2,52	0,01	202 (7,4)	9,93	6,48-8,45	0,35	55 (5,45)	2,7	4,21-7,03	0,03
2022	1986003	496 (6,76)	24,97	6,21-7,36	0,16	207 (2,72)	10,42	2,37-3,1	0,01	179 (6,56)	9,01	5,69-7,55	0,09	66 (6,54)	3,32	5,17-8,24	0,14
2023	1934162	492 (6,71)	25,44	6,16-7,3	0,14	198 (2,6)	10,24	2,26-2,98	0,01	193 (7,07)	9,98	6,17-8,1	0,21	44 (4,36)	2,27	3,26-5,8	0,00
	Total	**7336**				**7624**	**283,1**			**2728**	**107**			**1009**			

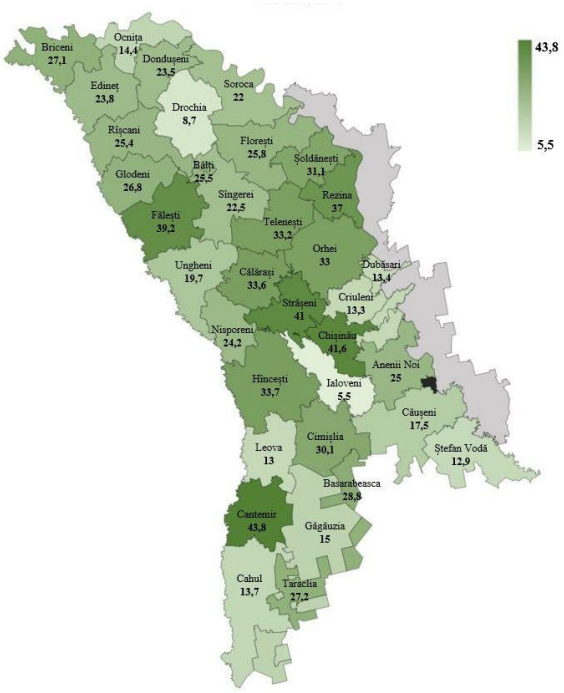

Figure 11. Geographic distribution of ANOECP among adults in the Republic of Moldova (average), per 10.000 population, 2012–2023

The geographical analysis of ANOECP incidence among the adult population highlighted differences across the country's regions. The highest incidence rates were recorded in Cantemir district (43,8 cases per 10000 inhabitants), followed by Chisinau mun. with 41,6 affected per 10000, and the districts of Falesti (39,2 cases), Rezina (37,0 affected), Calarasi (33,6 cases), Hancesti (33,7 cases), and Orhei (33,0 affected). Moderate incidence values, ranging from 22,5 to 32 cases per 10.000 inhabitants, were observed in Anenii Noi, Basarabeasca, Briceni, Cimislia, Glodeni, Nisporeni, Rascani, Singerei, Soldanesti, Soroca districts, and Balti municipality. Districts with low ANOECP rates (<15 per 10000 inhabitants) were also identified, including Ialoveni (5,5), Drochia (8,7 cases), Leova (13,0 cases), etc. (figure 11).

3.4. Identification and analysis of causal factors associated with acute non-occupational exogenous chemical poisonings by hospital healthcare utilization

The analysis of data obtained from a survey of 351 respondents during 2019–2024 showed that ANOECP are influenced by factors such as age, sex, circumstances, and level of knowledge regarding actual chemical risks. Among children, the most affected age groups were 13–18 years, representing 47,69% (95% CI: 39,24–56,25, p = 0,09), and 0–3 years, accounting for 31,54% (95% CI: 24,02–39,86, p = 0,53), with accidental cases predominating among boys (40,8%). The majority of poisonings occurred in apartments (53,1%) and private households (37,7%), primarily due to accidental ingestion of medications (over 70%). Among adults, the most vulnerable group was 19–29 years, representing 29,9% (95% CI: 24,12–36,13, p = 0,02) of the total cases surveyed, with suicidal poisonings predominating, more frequently among women – 69,7% (figures 12 and 13).

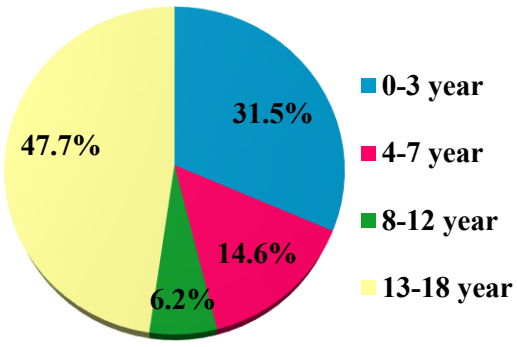

Figure 12. Structure of ANOECP in children by age group (%)

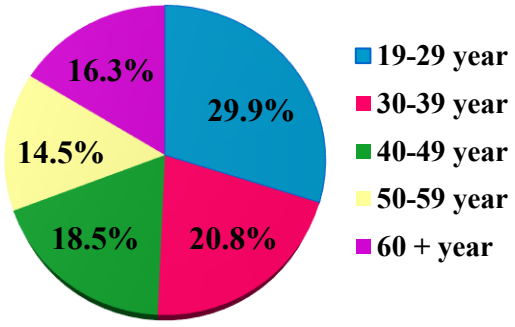

Figure 13. Structure of ANOECP in adults by age group (%)

The study identified the causal factors of ANOECP in order to clarify the mechanisms of occurrence and to develop effective response, control, and prevention measures.

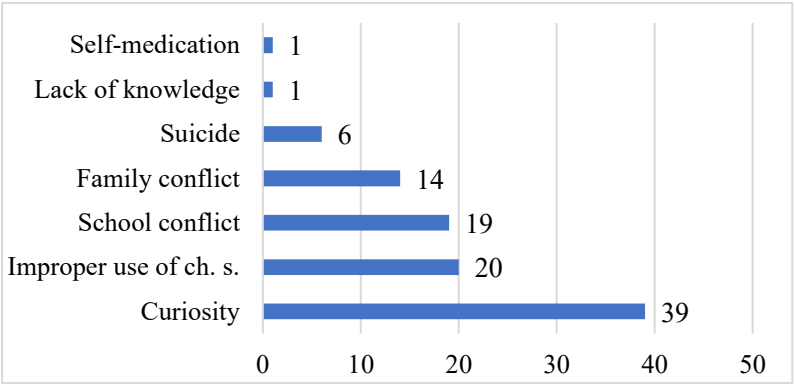

Figure 14. Distribution of causal factors of acute chemical poisonings in children (%)

These included, among children, age-specific curiosity (39%), improper use and storage of chemical products (20%), school failure (19%), etc. (figure 14). In contrast to children, in adults the causes of ANOECP are influenced by a combination of emotional, social, and behavioral factors. These factors are often exacerbated by a lack of proper education on handling such substances.

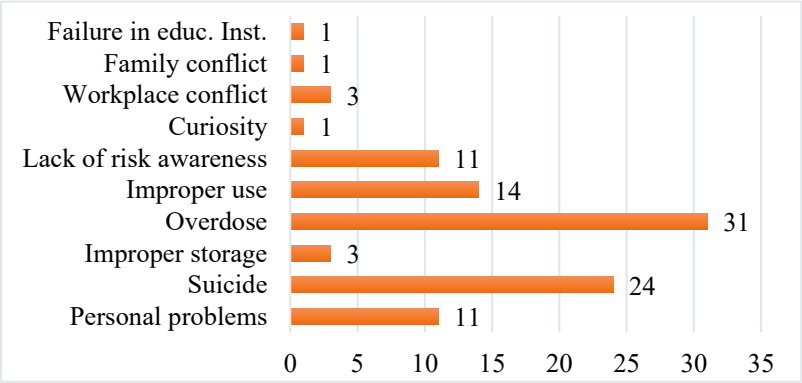

Figure 15. Distribution of ANOECP causes in the population aged over 18 years (%)

The survey results showed that chemical overdose was the most frequent cause of poisoning in adults (31%), often resulting from accidental administration of a higher dose than recommended. This was followed by suicidal poisonings (24%), low level of knowledge (11%), and improper use (14%), etc. (figure 15).

4. ESTIMATION OF DIRECT COSTS AND YEARS OF LIFE LOST CAUSED BY ANOECP AND DEVELOPMENT OF RESPONSE, CONTROL AND PREVENTION MEASURES

4.1. Quantification and analysis of direct costs for hospital healthcare provided to children and adults with acute non-occupational exogenous chemical poisonings for the period 2019–2023

The estimation of expenditures for treating patients hospitalized with a final clinical diagnosis of ANOECP in the Nephrology, Dialysis, and Toxicology Departments of MCH "Sf. Treime" and MCI during 2019–2023 revealed direct costs of 57991955,1 lei, of which 31191649,5 lei were allocated for the treatment of 3952 children and 26800305,56 lei for 5627 adults.

Medication poisonings were the most frequent, totaling 4.002 cases and expenses of 22436099,1 lei, representing 39% of total costs. Among children, 1723 cases generated expenses of 12578197 lei (40,3% of children's treatment costs). Among adults, 2279 cases resulted in 9857901,7 lei, accounting for 37% of total adult expenditures. In 2023, the highest annual medication costs were recorded, amounting to 5493425,36 lei, of which 3466208,24 lei was allocated for children and 2027217,12 lei for adults.

Alcohol poisonings were reported in 1798 cases, totaling 9.907.251,58 lei (17,1% of total costs). Children accounted for 529 cases, with expenses of 3511060,57 lei. Among adults, 1269 cases were reported, with costs of 6396191,01 lei (23,9% of total adult expenditures). The year 2019 had the greatest financial impact, with 3106194,39 lei spent, including 778765,75 lei for children and 2327428,64 lei for adults.

Gas poisonings accounted for 1385 cases, with expenditures of 8005908,77 lei (13,8% of total costs). The year with the highest costs was 2023, with 1958530,34 lei spent. The largest share of direct overall costs was attributed to hospitalization (ranging from 446188 lei in 2021 to 676302,9 lei in 2023) and medications (from 256710,8 lei to 388898 lei) (table 4).

Table 4. Distribution of direct costs by etiology of ANOECP, segmented by children and adults in the country, 2019–2023

Medications									
Years	**Total**			**Children**			**Adults**		
	n	**Total costs, lei**	**% of total costs**	**n**	**Total costs, lei**	**% of total for children**	**n**	**Total costs, lei**	**% of total for adults**
2019	810	4601666,60	20,5	367	2685518,83	21,4	443	1916147,77	19,4
2020	628	3518227,72	15,7	268	1961087,32	15,6	360	1557140,4	15,8
2021	856	3869016,56	17,2	368	1728507,04	13,7	488	2140509,52	21,7
2022	860	4953762,84	22,1	364	2736875,96	21,8	496	2216886,88	22,5
2023	848	5493425,36	24,5	356	3466208,24	27,6	492	2027217,12	20,6
Total	**4002**	**22436099,08**	**100,0**	**1723**	**12578197,4**	**100,0**	**2279**	**9857901,69**	**100,0**
Alcohol									
2019	583	3106194,39	31,4	119	778765,75	22,2	464	2327428,64	36,4
2020	293	1558328,85	15,7	58	379566,5	10,8	235	1178762,35	18,4
2021	265	1176493,05	11,9	100	520953	14,8	165	655540,05	10,2
2022	344	2034773,78	20,5	137	1077972,17	30,7	207	956801,61	15,0
2023	313	2031461,51	20,5	115	753803,15	21,5	198	1277658,36	20,0
Total	**1798**	**9907251,58**	**100,0**	**529**	**3511060,57**	**100,0**	**1269**	**6396191,01**	**100,0**
Gases									
2019	331	1958855,58	24,5	139	994086,3	27,5	192	964769,28	22,0
2020	182	1069781,66	13,4	73	522074,1	14,4	109	547707,56	12,5
2021	320	1522460,64	19,0	118	598597,48	16,5	202	923863,16	21,1
2022	261	1496280,55	18,7	82	516060,44	14,3	179	980220,11	22,3
2023	291	1958530,34	24,5	98	988705,34	27,3	193	969825	22,1
Total	**1385**	**8005908,77**	**100,0**	**510**	**3619523,66**	**100,0**	**875**	**4386385,11**	**100,0**
Pesticides									
2019	109	695593,33	26,5	39	369664,23	26,9	70	325929,1	26,1
2020	66	442332,90	16,9	28	265399,96	19,3	38	176932,94	14,2
2021	75	277832,20	10,6	20	97357,4	7,1	55	180474,8	14,5
2022	98	516211,86	19,7	32	237089,28	17,3	66	279122,58	22,4
2023	69	688117,35	26,3	25	403969,75	29,4	44	284147,6	22,8
Total	**417**	**2620087,64**	**100,0**	**144**	**1373480,62**	**100,0**	**273**	**1246607,02**	**100,0**
Other									
2019	463	3480529,86	23,2	229	2236473,54	22,1	234	1244056,32	25,3
2020	325	2497667,94	16,6	173	1689562,98	16,7	152	808104,96	16,4
2021	438	2188294,42	14,6	248	1232284,72	12,2	190	956009,7	19,5
2022	381	2003839,60	13,3	187	1137988,5	11,3	194	865851,1	17,6
2023	370	4852276,16	32,3	209	3813077,51	37,7	161	1039198,65	21,2
Total	**1977**	**15022607,98**	**100,0**	**1046**	**10109387,3**	**100,0**	**931**	**4913220,73**	**100,0**
Total for the country	**9579**	**57991955,1**		**3952**	**31191649,5**		**5627**	**26800305,56**	

4.2. Trends in deaths and years of life lost due to acute non-occupational exogenous chemical poisonings among children and the adult population in the Republic of Moldova

The comparative analysis of the impact of ANOECP in the Republic of Moldova during 2019–2023 highlighted significant differences between adults and children, both in terms of mortality frequency and years of life lost (YLL). In total, 148 deaths were reported among adults (93% of all fatal cases) and 11 deaths among children (7%). However, the relative loss of years of life was considerably higher among children, reflecting the severity of premature mortality. Among adults, the total YLL amounted to 3018,6 years, with an average of 26 years lost per death. In contrast, among children, cumulative losses reached 695,4 years, approximately 63 years lost per death, underscoring the disproportionate impact of poisonings at younger ages. The highest loss of years of life among adults was recorded in 2019 (1148 YLL), while the same year was critical for children, with 318 years of life lost. In the subsequent years (2020–2023), a general decline in the number of deaths was observed both among adults (from 46 to 25 cases) and children (from 4 to 1–2 cases annually), demonstrating improvements in prevention measures and public awareness. The analysis showed that although the number of cases is lower among children, the socio-economic and demographic impact is greater, as each death at a young age represents the potential loss of an entire productive lifetime (figures 16 and 17).

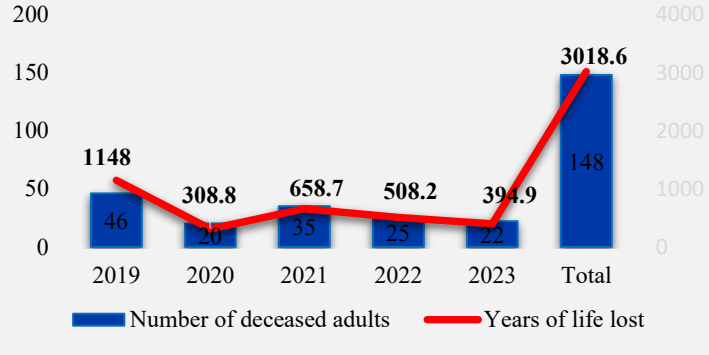

Figure 16. Years of life lost due to deaths resulting from ANOECP among adults, 2019–2023

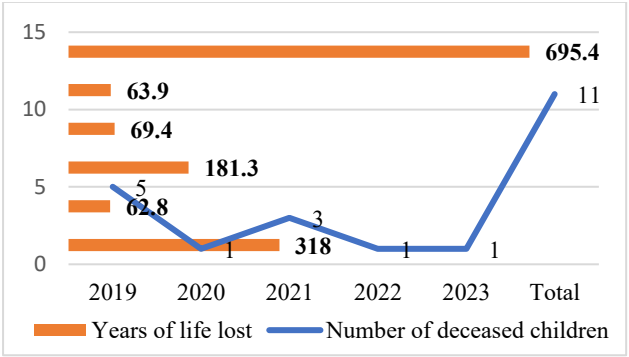

Figure 17. Years of life lost due to deaths resulting from ANOECP among children, 2019–2023

4.3. Scientific justification for the establishment and implementation of a toxicological information center with an electronic information system for monitoring acute non-occupational exogenous chemical poisonings

In many countries, the reduction of the economic impact of ANOECP is achieved through the establishment of TIC, which provide rapid and effective informational assistance, significantly contributing to the reduction of direct medical costs. Economic analysis has shown that preventing ANOECP in the Republic of Moldova, with an annual investment of 2419272 lei, is nearly five times more cost-effective than curative treatment, which generates direct annual expenditures of 11598391,01 lei, resulting in a cost–benefit ratio of 4.8:1 in favor of prevention. This efficiency demonstrates the need to redirect resources toward educational programs and awareness and information campaigns that can reduce both the incidence and severity of poisonings. In this context, the establishment of a specialized TIC focused on prevention and poisoning management would significantly contribute to reducing the economic burden and strengthening chemical safety at the population level. The absence of a functional TIC, as well as the lack of standardized protocols and a unified database, leads to additional costs and inefficient case management. Moreover, a significant proportion of current hospital admissions could be avoided through early toxicological counseling. The implementation of a TIC is supported by the national legal framework and international commitments (Law No. 10/2009 [33], National Health Strategy “Health 2030” [34], IHR

2005, Government Decision No. 222/2023 [35]), which provide for strengthening response capacities to public health emergencies of chemical origin.

4.4. Development of response, control, and prevention measures in cases of acute non-occupational exogenous chemical poisonings

The comprehensive analysis of morbidity, particularly the incidence and mortality of ANOECP during 2012–2023, demonstrated the urgent need to implement effective, evidence-based preventive measures. To this end, several practical guidelines and an educational monograph were developed, serving as useful tools for strengthening prevention capacities and promoting health within the community. Public education regarding the proper use, safe storage, and responsible disposal of chemical substances constitutes a fundamental pillar of poisoning prevention, contributing to the reduction of accidental exposure risks, especially among children. The implementation of appropriate personal protective equipment practices and the training of users, particularly in rural areas, significantly reduce the risk of exposure to pesticides, solvents, and other potentially toxic chemical substances used in households. National and international educational campaigns, such as "Acute chemical poisoning prevention week," have proven effective in reducing the incidence of poisoning cases by increasing public awareness and responsibility. Strengthening interinstitutional collaboration among the NAPH, the General Inspectorate for Emergency Situations, the National Food Safety Agency, the Ministry of Education and Research, NGOs, and the mass media, as well as applying the hygienic identification and diagnostic algorithm for ANOECP, ensures rapid, coordinated, and efficient intervention in chemical emergency situations. At the same time, the establishment and operation of a Toxicological Information Center represents an essential strategic measure that significantly contributes to reducing morbidity and mortality from chemical poisonings by ensuring continuous access to specialized assistance and professional consultation.

GENERAL CONCLUSIONS

1. The analysis of the specialized literature indicates that ANOECP represents a complex phenomenon with a significant impact on public health, the healthcare system, and the economy. The lack of comprehensive research limits the development of effective response, control, and prevention measures, thereby highlighting the relevance and timeliness of the present study.
2. During 2012–2023, ANOECP in Republic of Moldova showed a significant downward trend, with incidence decreasing by 68% and mortality by approximately 80%. Poisonings with medications predominated (34,9%), more frequent in urban areas, followed by alcohol (25,6%), gases (11,2%), and pesticides (4%), the latter occurring predominantly in rural areas.
3. The distribution of poisonings varies significantly by age, sex, and place of residence. Among children, accidental poisonings predominate (over 90%), more frequent among girls (59,2%) and in the 13–18 age group (17,7%). Among adults, suicidal poisonings predominate, with an almost equal distribution between men (50,7%) and women (49,3%), the most affected age group being 19–29 years (18,8%). These findings highlight the need for differentiated prevention and educational strategies tailored to each population group.
4. The study identified distinct causal factors of ANOECP in children and adults. In children, curiosity (39%) and improper handling of chemical substances (20%) predominated, whereas in adults, accidental overdose (31%), suicide attempts (24%), and inappropriate use of chemical products (14%) were most common. These factors, influenced by knowledge level, behavior, and social conditions, form the basis for developing targeted preventive measures.

5. The estimation of the direct costs of ANOECP in the Republic of Moldova (2019–2023) revealed a significant financial impact: 57,9 million lei for 9579 individuals, the majority being children (54%). Cost–benefit analysis indicates that prevention saves nearly 5 lei for every 1 lei invested. The health burden is reflected in 3714 years of life lost due to premature mortality.
6. The study demonstrated that preventing ANOECP requires a comprehensive approach based on modern institutional instruments and intersectoral cooperation. This enabled the development and scientific substantiation of response, control, and prevention measures. Their implementation was achieved through the inauguration of the Toxicological Information Center, which, together with public information campaigns, represents an effective instrument for reducing incidence, mortality, and the socio-economic impact of ANOECP, thereby strengthening the response capacity of the public health system in the Republic of Moldova.

PRACTICAL RECOMMENDATIONS

The set of recommendations developed in this study for the prevention and management of ANOECP was structured across five levels of intervention:

Recommendations for decision-makers and central authorities:

1. Development of a National Intersectoral Plan for the prevention, control, and response to ANOECP, involving the relevant ministries (Ministry of Health, Ministry of Education and Research, Ministry of Internal Affairs, National Food Safety Agency, General Inspectorate for Emergency Situations and local public authorities.
2. Initiation of mass public information programs, including for children, about the real risks of chemical products and their health impact, to prevent acute chemical poisonings. The Government of the Republic of Moldova could legally mandate media outlets to participate through social awareness campaigns in press, radio, and television.
3. Ensuring educational institutions are provided with medical and psychological staff to provide necessary support in cases of suicide attempts.
4. Ensuring sustainable public funding for prevention programs, information campaigns, digitalization of toxicological surveillance, and applied public health research.

Recommendations for executive and implementation authorities:

1. Continuous development of the Toxicological Information Center by the NAPH to strengthen the national capacity for ANOECP prevention and management and to ensure a rapid and effective response in cases of exposure to toxic substances.
2. Updating the national electronic registry of ANOECP cases in accordance with new requirements established by the national information system for surveillance of communicable diseases and public health events, regulated by Government Decision No. 885/2022.
3. Development of National Clinical Protocols for the diagnosis, treatment, and monitoring of acute exogenous chemical poisonings in adults.
4. Strengthening inter-institutional cooperation between the NAPH, NFSA, GIES, General Police Inspectorate, public medical and sanitary institutions, educational institutions for rapid intervention in ANOECP cases.
5. Organizing and continuously conducting National and International Weeks dedicated to ANOECP prevention and other events for informing and raising awareness among parents, children, teachers, healthcare workers, and other population groups.
6. Developing and distributing informative and educational materials (practical guides, brochures, leaflets, magazines, etc.) for the population, medical, and educational personnel regarding ANOECP prevention.

7. Implementing new laboratory diagnostic methods for ANOECP at the territorial level in hospitals to optimize early identification and effective therapeutic intervention.

Recommendations for the educational system and schools:

1. Integration of educational modules into continuing medical education programs and core curricula for initial training of medical and teaching staff, covering basic toxicology, exposure prevention, early intervention, and effective risk communication, in accordance with national specifics and international guidelines (e.g., WHO, ECDC).

Recommendations for the general population:

1. Store chemical substances/products exclusively in their original, clearly labeled containers, in safe places inaccessible to children and separated from food and beverages.
2. Avoid self-medication and take medicines only as prescribed by a doctor; keep them in secure places, away from children, and dispose of expired products.
3. Educate children and family members about chemical hazard symbols on labels and safe behaviors to avoid contact with hazardous substances.
4. Ensure continuous adult supervision of children in spaces where chemicals are present to prevent accidental exposure due to age-specific curiosity.
5. Strictly follow technical and safety instructions indicated on chemical product labels before use (dosage, duration of exposure, and conditions of use).
6. Do not mix chemical products, as this can generate toxic gases or cause dangerous reactions.
7. Use personal protective equipment when handling toxic products, including pesticides, especially in enclosed spaces.
8. Follow personal hygiene rules after contact with chemicals and avoid consuming food or drinks during handling.
9. Conduct periodic training of the rural population on the proper use of chemical products and personal protective equipment.
10. Be aware of lifestyle-associated risks by avoiding excessive consumption of alcohol and other psychoactive substances, which can increase the risk of accidental or intentional poisonings.
11. Actively participate in national and international campaigns for the prevention of acute chemical poisonings, organized by the NAPH, NFSA, educational and healthcare institutions, and other competent authorities.
12. Prevent intentional poisonings by facilitating access to psychological counseling, social support, and educational programs informing the population about the risks of overdose, self-medication, and improper use of hazardous chemical substances.
13. Know and apply first aid measures in case of accidental exposure—immediately stop contact, remove the chemical from the skin or environment, ventilate the area, wash the affected area, and call emergency services (112) immediately.

SELECTED BIBLIOGRAPHY

1. Bulut M., Alemda D., Bulut A., Tekin, E., Çelikkalka K. (2022). Evaluation of accidental and intentional pediatric poisoning: Retrospective analysis in an emergency Department of Turkey. *Journal of Pediatric Nursing*. 2022; 63: 44–49. doi: 10. 1016/j.pedn.2021.10.015
2. Rajabali F., Turcotte K., Zheng A., Purssell R., Buxton J. & Pike I. (2023). The impact of poisoning in British Columbia: A cost analysis. *CMAJ Open.* 2023; 11(1): 160-168.

3. Soave P.M, Curatola A., Ferretti S., Raitano V., Conto G., Gatto A., Chiaretti A. Acute poisoning in children admitted to pediatric emergency department: a five-years retrospective analysis. *Acta Biomed*. 2022; 93(1): 1-9, e2022004. doi: 10.23750/abm.v93i1.11602.
4. World report on child injury prevention. WHO, 2015. *Published online.* Disponibil la: https://iris.who.int/bitstream/handle/10665/43851/9789241563574_eng.pdf?sequence=1. [Accessed October 21, 2020].
5. **Tonu T.** Prevenirea riscurilor chimice pentru sănătatea populației prin desfășurarea Campaniilor de promovare a sănătății. *Arta Medica*. 2020; 4(77): 31-33. *Conferința Națională cu Participare Internațională "Un Mediu Sigur - Sănătate Protejată".* doi: 10.5281/zenodo.4173639.
6. Kyu H.H., Stein C.E., Pinto C.B., Rakovac I., et al. Causes of death among children aged 5-14 years in the WHO European region: a systematic analysis for the global burden of Desease study 2016. *Lancet Child Adolesc Health*. 2018; 2(5): 321–337. doi: 10.1016/S2352-4642(18)30095-6.
7. Mintegi S., Azkunaga B, Prego J., et al. International epidemiological differences in acute poisoning in pediatric emergency departments. *Pediatric Emergency Care*. 2019; 35(1): 50–57. doi: 10.1097/PEC.0000000000001031.
8. Zöhre E., Ayrik C., Bozkurt S., et al. Retrospective Analysis of Poisoning Cases Admitted to the Emergency Medicine. *Archives of Iranian Medicine*. 2015; 18(2): 117-122.
9. **Tonu T.** Impactul economic al intoxicațiilor acute de etiologie chimică la adulți în Republica Moldova pentru anii 2019-2023. *Arta Medica*. 2024; 3(92): 11-14. eISSN 1810-1879.
10. Global chemicals outlook II- From legacies to innovative solutions: Implementing the 2030 agenda for sustainable development, United Nations Environment Programme. 2019. Disponibil la: https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/policy-and-governance/global-chemicals-outlook [Accesat 30 mai 2021].
11. Wang Z., Walker G.W., Muir D.CG, Nagatani-Yoshida K. Toward a Global Understanding of Chemical Pollution: A First Comprehensive Analysis of National and Regional Chemical Inventories. Environmental Science & Technology. 2020; 54(5): 25-34.
12. Naidu R., Biswas B., Willett I.R., Cribb J., Singh B.K., Nathanail C.P., Coulon F., Kirk T. Semple K.T. et al. Chemical pollution: A growing peril and potential catastrophic risk to humanity. *Environment International.* 2021; 156: 1-12. doi: 10.1016/j.envint.2021.106616.
13. Хамидулила Х.Х. Задачи профилактической токсикологии в обеспечении безопасного регулирования химических веществ. *ФБУЗ "Российский регистр потенциально опасных химических и биологических веществ".* Москва. 2015: 280. [Khamidulina KhKh. Zadachi profilakticheskoi toksikologii v obespechenii bezopasnogo regulirovania khimicheskikh veshchestv. FBUZ. „Rossiiskii registr potentsial'no opasnykh khimicheskikh I biologicheskikh veshchestv". Moskva. 2015: 280 (In Russ.)].
14. Krajewsk A.K., Friedman L.S. Hospital outcomes and economic costs from poisoning cases in Illinois. *Clin Toxicol (Phila).* 2015; 53(5)**:** 433-445. doi: 10.3109/15563650.2015.1030677.
15. Fernando S.M., Reardon P.M., Ball I.M. et. al. Outcomes and Costs of Patients Admitted to the Intensive Care Unit Due to Accidental or Intentional Poisoning. *Journal of Intensive Care Medicine.* 2020; 35(4): 386-393. doi: 10.1177/0885066617754046.
16. Gummin D. Mowry J., Spyker D., et al. Annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 35th annual report. *Clinical Toxicoogyl (Phila).* 2018; 56(12): 1213–1415. doi.org/10.1080/15563650.2018.1533727.
17. Saikia D., Sharma R.K., Janardhan K.V. Clinical profile of poisoning due to various poisons in children of age 0–12 years. *Journal Fam Med Prim Care.* 2020; 9(5): 2291–2296. doi:10.4103/jfmpc.jfmpc_365_20.
18. Nguyen S.N., Vu L.T., Nguyen H.T., Nguyen L. Childhood Acute Poisoning at Haiphong Children's Hospital: A 10-Year Retrospective Study. *International Juornal of Pediatrics*. 2023 doi: 10.1155/2023/2130755.
19. Woyessa A., Palanichamy TH. Patterns, Associated Factors, and Clinical Outcomes of Poisoning among Poisoning Cases Presented to Selected Hospitals in Western Ethiopia: Hospital-Based Study. *Emergency Medicine International.* 2020; 6: 1-9. doi: 10.1155/2020/5741692

20. Yenew C., Shewaye M., Yeshiwas, A.G., Gebeyehu A.A. Burden of chemical poisoning and contributing factors in the case of the Amhara Region, Ethiopia. *BMC Public Health.* 2024; 24: 2650. doi: 10.1186/s12889-024-20190-9.
21. Jain P., Mehta R., Sharma A. Organophosphate poisoning: *Epidemiology, clinical features, and management. Clin Toxicol*. 2023; 61(5): 489–502.
22. Desai M.M., Patel KK, Gupta R. Risk factors and outcomes of chemical poisoning: an updated analysis. *Int J Environ Health Res.* 2023; 33(4): 556–70.
23. An implementation Guide for suicide prevention in countries. World Health Organization. 2021; p. 128.Available:https://iris.who.int/bitstream/handle/10665/341726/9789240026629-eng.pdf?sequence=1
24. Ramos-Martin J., Contreras-Peñalver M. A., Moreno-Küstner B. Classification of suicidal behavior calls in emergency medical services: a systematic review. *International Journal of Emergency Medicine*. 2023; 16:27. doi: 10.1186/s12245-023-00504-1.
25. World Health Organization. Suicide in the world. Global Health Estimates. Geneva: WHO; 2019. Available from: https://apps.who.int/iris/handle/10665/326948.
26. Stricka M., Jakubauskiene M. Suicide prevention: a case of Lithuania. *European Journal of Public Health. 2016; 26.* doi.org/10.1093/eurpub/ckw169.042
27. Dang T., Do Son N.Do. Caracteristici epidemiologice și agenți provocători de inoxicații acute la copii la Centrul de Toxicologie a Spitalului Bach Mai. *Revista de Medicină din Vietnam*. Đặc điểm dịch tễ và các tác nhân gây ngộ độc cấp ở trẻ em tại trung tâm chống độc bệnh viện bạch mai (în china). Tạp Chí Y học Việt Nam. 2021; 501 (2). https://tapchiyhocvietnam.vn/index.php/vmj/article/view/532
28. Dai Q., Wang Li., Gao X.Yu, Du D., Shuai P., Li L., Liu W. Clinical and Epidemiological Characteristics of Acute Poisoning in Children in Southwestern China: A Review of 1755 Cases from 2014 to 2020. *International Journal of General Medicine*. 2022; 15: 133-142. doi: 10.2147/IJGM.S342253.
29. Guștiuc V., Cumpănă V., Șalaru I., Spînu C., Pînzaru Iu., Crudu P., Tomșa A., Buzdugan L., Anisei A., Tonu T. ș.a. Supravegherea de Stat a Sănătăţii Publice în Republica Moldova. *Raport Național* 2021. Chișinău. 2022: 177.
30. Guștiuc V., Cumpănă V., Șalaru I., Crudu P., Tomșa A., Buzdugan L., Tabuncic N., Silitrari N., Pantea V., Calmic V., ș.a. Supravegherea de Stat a Sănătăţii Publice în Republica Moldova. *Raport Național.* 2022. Chișinău 2023: 141.
31. Șalaru I., Cumpănă M., Pânzaru Iu., Spînu C., Crudu P., Tomșa A., Buzdugan L., Anisei A., Gheorghița Șt., Silitrari N. Tonu T. ș.a. Supravegherea de Stat a Sănătăţii Publice în Republica Moldova. *Raport Național*, 2020. Chișinău, 2021: 192. ISBN 978- 9975-4027-7-4. 351.77:614(478)(047) S 95.
32. Pînzaru Iu., Manceva T., Sîrcu R., Sanduleac E., Țurcan Gh., Zavtoni M. 2017. Supravegherea de Stat a Sănătății Publice în Republica Moldova. *Raport Național*, 2017. Chișinău, 2018: 88-102. CZU:614 (478) (047) S 95.
33. Legea nr. 10 din 3 februarie 2009 privind supravegherea de stat a sănătății publice**.** *Monitorul Oficial* nr. 67, art. 183 din 03.04.2009. Disponibil la: https://www.legis.md/cautare/getResults?doc_id=136063&lang=ro#
34. Hotărârea Guvernului nr. 387 din 14.06.2023 cu privire la aprobarea Strategiei naționale de sănătate „Sănătatea 2030". Monitorul Oficial nr. 302-305, art. 700 din 11.08.2023. Disponibil la: https://www.legis.md/cautare/getResults?doc_id=138493&lang=ro
35. Hotărârea Guvernului nr. 222 din 19 aprilie 2023, cu privire la aprobarea Planului de acțiuni privind punerea în aplicare a Regulamentului Sanitar Internațional (2005) în Republica Moldova pentru anii 2023-2027. Monitorul Oficial nr. 165-167, art. 363 din 15.05.2023. Disponibil la: https://www.legis.md/cautare/getResults?doc_id=136932&lang=ru

INFORMATION ON THE DISSEMINATION OF RESEARCH RESULTS

List of publications and participation in scientific forums

by Dr. Tatiana Tonu (Manceva), public health hygienist, Occupational Health and Chemical Safety Section, Public Health Protection Directorate, National Agency for Public Health, conducted within the framework of her doctoral thesis in medical sciences entitled: **Hygienic Assessment of acute non-occupational exogenous chemical poisonings in the Republic of Moldova**, specialty 331.02 Hygiene, at the Nicolae Testemitanu State University of Medicine and Pharmacy, Republic of Moldova.

- **Monographs**

1. Pînzaru Iu.**, Manceva T.**, Oglinda A., Friptuleac G. *Intoxicațiile acute exogene de etiologie chimică la copii*. Chișinău: Tipografia *Sirius*, 2020, 184 p., ISBN 978-9975-57-285-9.
2. Pînzaru Iu., Țurcanu Gh., Sîrcu R., Jardan E., **Manceva T.** *Dezvoltarea toxicologiei experimentale în Republica Moldova*. Chișinău: Tipografia *Baștina-Radog*, 2016, 144 p., ISBN: 978-9975-3101-6-1.

- **Articles in international scientific journals:**
  - ✓ **articles in ISI, SCOPUS, and other international databases recognized by ANACEC**

3. Pinzaru Iu., **Manceva T.**, Sircu R., Bahnarel I., Sanduleac E. Acute chemical poisonings in the Republic of Moldova: 5 years review. In: *Chemistry Journal of Moldova*. Chișinău, 2017; 12(1): 29-36. **(IF: 0,5) SCOPUS**. doi: http://dx.doi.org/10.19261/cjm.2017.399

  - ✓ **peer-reviewed articles in international journals**

4. Сырку Р., Опополь Н., Пынзару Ю., Цуркану Г., **Манчева Т.** Дорожная карта о роли сектора здравоохранения в Республике Молдова в стратегическом подходе к международному регулированию химических веществ (СПМРХВ) до 2020 года и на последующее время. В: *Научно практический журнал здравоохранение Кыргыстана*, № 2: 2018; стр. 162-165. https://apps.who.int/gb/ebwha/pdf_files/wha70/a70_36-ru.pdf

- **Articles in accredited national scientific journals:**
  - ✓ **articles in category B magazines**

5. Pînzaru Iu., **Manceva T.** Unele aspecte privind intoxicațiile acute neprofesionale exogene de etiologie chimică în Republica Moldova. În: *Sănătate Publică, Economie și Management în Medicină*. 2016; 1(65): 41-44. ISSN 1729-8687. https://repository.usmf.md/bitstream/20.500.12710/1443/1/UNELE_ASPECTE.pdf
6. **Manceva** T., Pînzaru Iu. Datele analizei intoxicațiilor acute neprofesionale cu alcool în Republica Moldova în perioada anilor 2011-2015. În: *Buletinul Academiei de științe a Moldovei. Științe Medicale*. 2017; 1(53): 108-111. ISSN 1857-0011. https://bulmed.md/bulmed/article/view/2692/2692
7. **Tonu T.** Impactul economic al intoxicațiilor acute de etiologie chimică la adulți în Republica Moldova pentru anii 2019-2023. În: *Arta Medica*. 2024; 3(92): 11-14. eISSN 1810-1879. doi: https://doi.org/10.5281/zenodo.14530355
8. **Tonu T.** Intoxicațiile acute de etiologie chimică la copii în Republica Moldova: o analiză retrospectivă de cinci ani. În: *Arta Medica*. 2024; 3(92): 25-27. eISSN 1810-1879. doi: https://doi.org/10.5281/zenodo.14531280
9. **Tonu** T., Pinzaru Iu., Goma L., Daniliuc N. Toxico-hygienic and economic aspects of acute non-occupational chemical poisonings in the Republic of Moldova during the period 2019-2023. In: *Moldovan Journal of Health Sciences*. 2025; 12(4): 62-69 . ISSN 2345-1467. doi: https://doi.org/10.52645/MJHS.2025.4.09

- **Articles in scientific conference proceedings:**
  - ✓ **international events held abroad**

10. **Манчева Т.,** Пынзару Ю., Сандуляк Е. Анализ острых непрофессиональных отравлений пестицидами в Республике Молдова в период 2011-2016 годов. В: *сборнике материалов республиканской научно-практической конференции с международным участием «Здоровье и Окружающая среда», посвященной 90-летию Республиканского унитарного предприятия «Научно-практический центр гигиены»,* Том 2. 26-28 Октября. Минск, Беларусь: 2017; с. 71-73. https://rspch.by/Docs/v27_sbornik_2.pdf
11. **Манчева Т**. Острые бытовые отравления химической этиологии у детей в Республике Молдова в период 2012-2016 годов. В: *сборнике материалов республиканской научно-практической конференции с международным участием «Здоровье и Окружающая среда», посвященной 90-летию Республиканского унитарного предприятия «Научно-практический центр гигиены»,* Том 1. 26-28 Октября. Минск, Беларусь: 2017; с. 208-210. https://rspch.by/Docs/v27_sbornik_1.pdf
12. **Манчева Т.** Мониторинг острых непрофессиональных отравлений химической этиологии в Республике Молдова. В: *сборнике материалов международной научно-практической конференции «Здоровье и окружающая среда»,* Том 2. Минск, Беларусь: 2018. с. 150-153. https://rspch.by/Docs/sbornik_t2_2018.pdf
13. **Манчева Т.** Острые отравления у детей в Республике Молдова. В: *сборнике материалов международной научно-практической конференции «Здоровье и Окружающая среда».* 14-15 Ноября. Минск, Беларусь: 2019, с. 387-389. https://rspch.by/Docs/sbornik_2019.pdf
14. **Тону Т.** Предотвращение острых бытовых отравлений, вызванных химическими веществами. В: *сборнике материалов международной научно-практической конференции «Здоровье и окружающая среда».* 19-20 Ноября. Минск, Беларусь: 2020.
15. **Тону Т.** Эффективность мероприятий по информированию детей в профилактике острых бытовых отравлений, вызванных химическими веществами, в Республике Молдова. В: *сборнике материалов международной научно-практической конференции «Здоровье и Окружающая среда».* 19-20 Ноября. Минск, Беларусь: 2020, с. 494-497. https://rspch.by/Docs/12.pdf

✓ **national with international participation**

16. **Manceva T.**, Pînzaru Iu. Intoxicațiile acute neprofesionale cu pesticide în Republica Moldova, în perioada 2011-2015. În: *Materialele primei conferințe științifico-practice naționale cu participare internațională "Siguranța chimică și toxicologia la confluența dintre domenii". Chișinău: 24-25 Noiembrie.* În: *Sănătate Publică, Economie și Management în Medicină.* 2016; 6(70): pp. 47-49. https://repository.usmf.md/bitstream/20.500.12710/6869/3/INTOXICATIILE_ACUTE_NEPROFESIONALE.pdf
17. **Manceva T.**, Pînzaru Iu., Sîrcu R. Rolul medicului de familie în cazul intoxicațiilor acute neprofesionale exogene de origine chimică. În: *Materialele celui de al VI-lea Congres național al medicilor de familie din Republica Moldova cu participare internațională. Chișinău: 16-17 Mai.* În: *Sănătate Publică, Economie și Management în Medicină*. 2018; 1-2(75-76): pp. 114-117. https://repository.usmf.md/handle/20.500.12710/1291
18. **Manceva T.**, Lozan O., Gramma R., Pînzaru Iu. Caracteristica și consecințele intoxicațiilor acute de etiologie chimică la copii în Republica Moldova. În: *Materialele al VIII-lea Congres al specialiștilor din domeniul sănătății publice și managementului sanitar cu participare internațională. Chișinău: 24-25 Octombrie.* În: *Sănătate Publică, Economie și Management în Medicină.* 2019; 4(82), pp. 184-188. https://cyberleninka.ru/article/n/caracteristica-i-consecin-ele-intoxica-iilor-acute-de-etiologie-chimic-la-copii-n-republica-moldova/viewer
19. Stîncă K., Pînzaru Iu., **Manceva T.** Percepțiile despre intoxicațiile acute neprofesionale exogene cu pesticide în Republica Moldova. În: *Materialele al VIII-lea Congres al specialiștilor din domeniul sănătății publice și managementului sanitar cu participare internațională. Chișinău: 24-25 Octombrie.* În: *Sănătate Publică, Economie și Management în Medicină*. 2019; 4(82), pp. 219-223.

https://repository.usmf.md/bitstream/20.500.12710/9422/3/PERCEPTIILE_DESPRE_INTOXICATIILE_ACUTE.pdf

20. **Tonu T.** Prevenirea riscurilor chimice pentru sănătatea populației prin desfășurarea campaniilor de promovare a sănătății. În: *Materialele Conferinței naționale cu participare internațională „Un mediu sigur-sănătate protejată". Chișinău: 12-13 Noiembrie.* În: *Arta Medica*. 2020; 4(77), pp. 31-33. doi: https://doi.org/10.5281/zenodo.4173639
21. Pînzaru Iu., Corețchi R., **Tonu** T., Sîrcu R. Pericole chimice asociate cu gestionarea produselor de uz fitosanitar. În: *Materialele Conferinței naționale cu participare internațională „Un mediu sigur-sănătate protejată". Chișinău: 12-13 Noiembrie.* În: *Arta Medica*. 2020; 4(77), pp. 34-37. doi: https://doi.org/10.5281/zenodo.4173721
22. Pînzaru Iu., Stîncă K., **Tonu T.** Amenințări la adresa sănătății publice generate de spectrul substanțelor/amestecurilor chimice. În: *Materialele Conferinței naționale cu participare internațională „Un mediu sigur-sănătate protejată". Chișinău: 12-13 Noiembrie.* În: *Arta Medica*. 2020; 4(77), pp. 75-77. doi: https://doi.org/10.5281/zenodo.4174449
23. Capsamun N., Pînzaru Iu., Sîrcu R., **Tonu T.** Prevenirea efectelor adverse acute ale dezinfectanților asupra sănătății populației. În: *Materialele Conferinței naționale cu participare internațională „Un mediu sigur-sănătate protejată". Chișinău: 12-13 Noiembrie*. În: *Arta Medica*, 2020; 4(77), pp. 81-83.
doi: https://doi.org/10.5281/zenodo.4174544
24. **Tonu T.** Intoxicațiile acute de etiologie chimică la copii în Republica Moldova în perioada anilor 2012-2020. În: *Materialele Conferinței naționale cu participare internațională „Protecția sănătății – pentru un viitor sigur". Chișinău: 24-25 Noiembrie*. În: *Arta Medica*, 2022; 4(85), pp. 63-66. doi: https://doi.org/10.5281/zenodo.7328785

- **Summaries/abstracts/theses in the proceedings of national and international scientific conferences**

25. Pînzaru Iu., Stîncă K., **Tonu T.**, Sîrcu R. Estimation of alcohol poisonings in children. În: *Materialele Congresului consacrat aniversării a 75-A de la fondarea USMF "Nicolae Testemițanu. Chișinău;* 2020, p. 157.
26. **Tonu T.** Toxic and hygienic aspects of suicides by drug poisoning. În: *Materialele Congresului consacrat aniversării a 75-A de la fondarea USMF "Nicolae Testemițanu. Chișinău;* 2020, p. 160.
27. **Manceva T.**, Pînzaru Iu., Stînca K. The evolution of acute exogenous non-professional poisoning with pesticides in the Republic of Moldova. În: *Abstract Book. Health risk factors and prevention of injuries and diseases. A III-a Conferință internațională în supravegherea și controlul maladiilor netransmisibile cu genericul „Factorii de risc în prevenirea bolilor și traumatismelor". Chișinău;* 2019, p. 34.
28. **Manceva T.,** Pînzaru Iu., Țurcanu Gh., Sîrcu R., Sanduleac E. Estimation of acute chemical poisonings of children in the Republic of Moldova. În: *Third Annual RTRP Ukraine Regional One Health Research Symposum. Biological Treat Redaction Program (BTRP). Kiev, Ukraina; 2018,* p. 173.
29. Стынка К., **Тону Т.,** Пынзару Ю., Динамика летальности при острых непрофессиональных отравлений химической этиологии в Республике Молдова. В: *сборнике материалов международной научно-практической Конференции «Здоровье и Окружающая среда».* Минск, Беларусь; 2021, с. 64-65. https://rspch.by/Docs/12.pdf

- **Patents, registration certificates, materials at invention fairs:**

30. Pînzaru Iu., Gudumac V., **Tonu T.**, Stîncă K. Metodă de diagnostic al intoxicațiilor acute de etiologie chimică. Brevet de invenție de scurtă durată nr. depozit: s 2020 0009 din 13.02.2020 (Hotărârea nr. 9544 din 2020.06.27). BOPI, 8/2020, 31.08.2020.
31. Pinzaru Iu., Țurcanu Gh., Sîrcu R., Jardan E., **Manceva T.** Monografia. Dezvoltarea toxicologiei experimentale in Republica Moldova. Certificat de înregistrare a obiectelor, dreptului de autor și a drepturilor conexe, Seria OȘ nr. 5566 din 17.02.2017.

32. Pînzaru Iu., **Tonu T.,** Stîncă K. Certificat de înregistrare a obiectelor, dreptului de autor și drepturilor conexe. Algoritmul privind identificarea și diagnosticul igienic al intoxicațiilor acute neprofesionale de etiologie chimică. Seria O nr. 6391 din 10.07.2019.
33. Stîncă K., Bernic Vl., Friptuleac Gr., Pînzaru Iu., **Tonu T.** Ghid practic. Prevenirea și conduita accidentelor chimice în condițiile habituale. Adeverință privind înscrierea obiectelor dreptului de autor și alte drepturilor conexe. Seria OȘ nr.7344 din 10.11.2022.

- **Participation with communications at scientific forums:**

✓ **international**

34. **Manceva T.** Intoxicațiile acute neprofesionale exogene de etiologie chimică la copii din Republica Moldova în perioada anilor 2012-2016. *Conferința cu participare internațională „Sănătate și Mediu", Concurs de lucrări ale tinerilor cercetători*. Minsk, 26-28 octombrie 2017.
35. **Manceva T.,** Pînzaru Iu., Țurcanu Gh., Zavtoni M., Sanduleac E. Intoxicațiele acute habituale de origine chimică în rândul copiilor din Republica Moldova. *Simpozion științific regional în cadrul conceptului „Sănătate unică".* Kiev, 16-20 aprilie 2018.
36. **Manceva T.** Evoluția intoxicațiilor acute neprofesionale exogene cu pesticide în Republica Moldova. *Conferința a 3-a Internațională în prevenirea bolilor netransmisibile "Factorii de risc și prevenirea bolilor și traumatismelor".* Chișinău, 05-07 iunie 2019.
37. **Тону Т.** Prevenirea intoxicațiilor acute casnice cauzate de substanțe chimice. *Conferința științifica-practică internațională „Sănătate și Mediu".* Minsk, Belarus, 19-20 noiembrie 2020.

✓ **national**

38. **Manceva T.** Caracteristica și consecințele intoxicațiilor acute de etiologie chimică la copii în Republica Moldova. *Congresul VIII-lea al specialiștilor din domeniul sănătății publice și managementului sanitar "O Singură Sănătate".* Chișinău, 24-25 octombrie 2019.
39. **Tonu T.** Aspectele toxico-igienice a intoxoicațiilor suicidale cu medicamente. *Congresul consacrat aniversării a 75-A de la fondarea USMF "Nicolae Testemițanu". Chișinău,* 21-23 octombrie 2020.
40. **Tonu T.** Prevenirea riscurilor chimice pentru sănătatea populației prin desfășurarea Campaniilor de promovare a sănătății. *Conferința Națională cu participarea internațională „Un mediu sigur-sănătate protejată".* Chișinău 12-13 noiembrie 2020.

- **Participation with posters at scientific forums:**

✓ **international**

41. Pinzaru Iu., Țurcanu Gr., Sîrcu R., Jardan E., **Manceva T**. Dezvoltarea toxicologiei experimentale în Republica Moldova. *Inventica.* Iași, România, 28-30 iunie, 2017.
42. Pinzaru Iu., Țurcanu Gr., Sîrcu R., Jardan E., **Manceva T.** Dezvoltarea toxicologiei în Republica Moldova*. Pro Invent.* Cluj-Napoca, România, ediția a XV-a, 2017.
43. **Manceva T.,** Pînzaru Iu., Țurcanu Gh., Sîrcu R., Zavtoni M., Sanduleac E. Evaluarea intoxicațiilor acute de origine chimică la copii în Republica Moldova. *Al 3-lea Simpozion Regional Anual de Cercetare BTRP Ucraina „One Health".* Kiev, Ucraina, 16-20 aprilie 2018.
44. Pinzaru Iu., Gudumac V., **Tonu T**., Stinca K., Spinu C. Method of acut chemical poisonings diagnosis. *EuroInvent.* Iași, România, 23 mai 2020.
45. Pinzaru Iu., Gudumac V., **Tonu T**., Stinca K., Friptuleac Gr. Method of determination of methemoglobin, sulfhemoglobin and oxyhemoglobin level for acute chemical poisoning diagnosis. *Invenții și Inovații, „Traian Vuia".* Timișoara, România, 15 octombrie, 2020.
46. **Tonu T**., Pinzaru Iu., Stinca K., Metoda de organizare a activităților Centrului de Informare Toxicologică în Republica Moldova. *Invenții și Inovații, „Traian Vuia".* Timișoara, România, 15 octombrie, 2020.

47. **Tonu T.,** Pinzaru Iu., Gudumac V., Stinca Kristina, Friptuleac Gr. Implementation of detection method of methemoglobin, sulfhemoglobin and oxyhemoglobin level in acute chemical poisonings. *EuroInvent.* Iași, România, 22 mai 2021.
48. Pinzaru Iu., **Tonu T**., Stinca K., Friptuleac Gr., Oglinda A. The method of organizing activities of the Poison Control Center in the Republic of Moldova. *EuroInvent.* Iași, România, 22 mai 2021.

- **Practical guides**

49. Pînzaru Iu., **Tonu T.,** Stîncă K. *Metodologie privin organizarea activităților de comunicare și informare în prevenirea intoxicațiilor acute exogene de etiologie chimică*. Chișinău: Tipografia *Bons Offices*, 2021, 48 p., ISBN 978-9975-87-817-3.
50. **Tonu T.,** Pînzaru Iu., Stîncă K., Friptuleac Gr., Bernic Vl. Ghid practic *Prevenirea și conduita accidentelor chimice în condițiile habituale.* Chișinău: Tipografia *Prin-Caro*, 2022, 59 p. ISBN 978-9975-165-21-1.

- **Other national magazines:**

51. Pînzaru Iu., **Manceva T.**, Sîrcu R., Sanduleac E., Țurcanu Gh., Zavtoni M. Provocările și perspectivele siguranței chimice și toxicologiei. In: Supraveghere de stat a sănătății publice în Republica Moldova. Raport Național, 2017; p. 84-98. ISBN 978-9975-4027-8-1.
52. Șalaru I., Cumpănă M., Pînzaru Iu., Spînu C., Crudu P., Tomșa A., Anisei A., Tonu T. ș.a. In: Supravegherea de stat a sănătăţii publice în Republica Moldova (Raport Național, 2020). Chișinău: 2021. 192 p. ISBN 978- 9975-4027-7-4.

ANNOTATION

Tonu Tatiana

"Hygienic evaluation of acute non-occupational exogenous chemical poisonings"

Doctoral thesis in medical sciences, Chișinau, 2026

Relevance of the research: Acute non-occupational exogenous chemical poisonings (ANOECP) represent a public health problem, with a significant impact on incidence, mortality, and socio-economic burden, requiring the development and implementation of effective preventive measures in the context of widespread use of chemical substances and the lack of an operational TIC.

Purpose of the research: To identify and analyze of the causes and the hygienic risk factors associated with acute non-occupational exogenous chemical poisonings in the Republic of Moldova in order to develop response, control, and prevention measures.

Research objectives: Analysis of the epidemiological and toxico-hygienic characteristics of acute non-occupational exogenous chemical poisonings at international and national levels; Assessment of the incidence and mortality caused by ANOECP in the population of the Republic of Moldova; Evaluation and quantification of direct costs and years of life lost generated by ANOECP, in order to estimate the financial and social burden on the healthcare system and the population of the Republic of Moldova; Development and scientific argumentation of response, control, and prevention measures for ANOECP, based on epidemiological, toxico-hygienic data and direct medical costs, to protect the health of the population.

Scientific novelty and originality lie in the integrated hygienic approach to ANOECP, through estimating distribution, risk factors, causes, and circumstances of exposure, as well as evaluating the socio-economic impact, providing a scientific basis for developing effective response, control, and prevention measures.

The newly obtained results consist of conducting, for the first time, a comprehensive study of the characteristics of ANOECP through the comparative analysis of incidence and mortality, identification of determining causes, quantification and evaluation of direct treatment and prevention costs, as well as estimation of the years of life lost, and the developed prevention measures and the establishment of the TIC are aimed at reducing the incidence of ANOECI and the socio-economic burden on the healthcare system.

Theoretical significance is reflected in the fact that the present research aligns with the priorities of the Ministry of Health and the National Strategy "Health 2030," as well as with the Action Plan for the implementation of the International Health Regulations (2005).

Practical value consists in the development of scientific arguments and the concept for the creation and implementation of the TIC, as well as the development of preventive measures for ANOECP, thereby contributing to the improvement of response, control, and prevention strategies in the field of public health.

Implementation of scientific results was achieved through their validation at scientific conferences, as well as national and international invention and innovation exhibitions, forming the basis for the development of guidelines, practical methodologies, and a monograph dedicated to the prevention of ANOECT, which have been utilized in the academic environment and in the training of specialists. The research results served as scientific evidence for the integration of ANOECP into the information system for the surveillance of communicable diseases and public health events, approved by Government Decision No. 885/2022.

Thesis structure: Introduction, 4 chapters, discussions, general conclusions and recommendations, bibliography of 167 sources, 10 appendices, 186 pages of main text, 40 figures and 22 tables, 48 scientific papers, 3 copyright registration certificates, 1 invention patent, 3 gold medals, 3 silver medals and 4 Certificates of Excellence from invention and innovation exhibitions.

Keywords: intoxication, medicines, alcohol, pesticides, gases, socio-economic impact, incidence, mortality, prevention.

TONU, Tatiana

HYGIENIC EVALUATION OF ACUTE NON-OCCUPATIONAL EXOGENOUS CHEMICAL POISONINGS

331.02 – HYGIENE

Summary of the doctoral thesis in medical sciences

Approved for printing: 30.03.2026	Paper format: 60x84 1/16
Offset paper. Digital printing	Printing run: 50 copies
Printing sheets: 1.92	Order no. 34

IE „Covalciuc Maria”
Chisinau Municipality, Vl. Korolenco str. 61/3