

Global Epidemiological and Demographic Characteristics of Acute Poisoning: A Narrative Review

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What's Known

- Acute poisoning remains a major global public health challenge, with substantial morbidity and mortality, especially in low- and middle-income countries.
- Existing studies indicate that poisoning patterns differ across regions and are influenced by demographic characteristics, socioeconomic conditions, and access to toxic substances.

What's New

- By synthesizing 72 recent studies across multiple continents, this review identified young adults aged 18 to 30 years as the most consistently affected group worldwide.
- It demonstrated that pesticides were the leading cause of poisoning globally, with cases peaking in summer and occurring most frequently at night, informing targeted prevention strategies.

Abstract

Acute poisoning is considered one of the major challenges to healthcare systems, annually leading to substantial mortality, disability, and extensive consumption of medical resources. The diversity of toxic agents, along with geographical, social, and age-related differences in poisoning patterns, highlights the necessity of conducting epidemiological investigations. This study aimed to analyze the epidemiological characteristics of acute poisoning with a focus on demographic features, prevalence, and temporal and seasonal patterns of occurrence.

Unlike many previous studies that focused on specific regions or populations, this narrative review provided a comprehensive global overview of acute poisoning by integrating multiple epidemiological dimensions. This narrative review synthesized evidence from 72 studies published between 2015 and 2025. Relevant literature was identified through searches of major international databases, including MEDLINE, Web of Science, and Scopus, as well as selected national Persian databases. Google Scholar was also consulted to identify additional relevant publications. Studies were included based on their relevance to the epidemiological and demographic characteristics of acute poisoning.

Based on the reviewed literature, acute poisoning was most frequently reported among individuals aged 18–30 years, married individuals, and during warmer seasons (spring and summer). Non-pharmaceutical agents, particularly pesticides, household chemicals, and illicit drugs, constituted the most common causes of poisoning. Additionally, sex-specific analyses revealed a higher incidence of poisoning among males than females, with a notable contribution from nighttime occurrences. Identifying epidemiological patterns and demographic characteristics of acute poisoning could aid in recognizing high-risk groups and designing effective preventive interventions. Continuous monitoring and broader epidemiological studies are essential to reduce the prevalence and mortality associated with acute poisoning.

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Introduction

Poisoning is defined as the exposure of body organs to toxic substances via ingestion, inhalation, injection, or dermal contact,

which may result in organ damage, disability, or even death.¹ Acute poisoning has emerged as a major public health challenge worldwide, contributing not only to increased emergency department (ED) visits but also imposing substantial financial burdens on healthcare systems.^{2,3} In many developing countries, acute poisoning remains a leading cause of morbidity and mortality and continues to exhibit a rising trend.⁴

Acute poisonings may be either intentional or unintentional. Unintentional poisoning is more commonly reported among children, whereas intentional cases predominantly involve adults and are often associated with suicidal motives, posing serious threats to life.^{2,5} The incidence, severity, and outcomes of poisoning are influenced by factors such as age, sex, socioeconomic status, access to toxic substances, and cultural conditions.⁶ Globally, more than half a million poisoning-related deaths are reported annually, with approximately one third occurring in developing countries.⁷ Mortality rates in low- and middle-income countries (LMICs) are up to four times higher than those in high-income nations.^{8,9}

In recent years, lifestyle changes, industrial technological growth, increased medication consumption, and widespread use of agricultural pesticides have contributed to shifts in the epidemiological patterns of poisoning.⁷ Poisoning due to pharmaceuticals, illicit drugs, household chemicals, pesticides, and envenomations represents some of the most common causes of hospitalization in Iran and other countries.¹⁰⁻¹⁴ Understanding poisoning patterns and identifying high-risk groups are pivotal for prevention, clinical management, and health system planning.¹⁵

Evidence indicates that poisoning patterns vary across different regions of the world, influenced by cultural factors, availability of toxic agents, and social behaviors.^{16,17} For instance, a study conducted within the pre-hospital emergency system of Tehran Province between 2022 and 2024 reported 76,113 poisoning cases, highlighting the substantial community burden of this issue.¹⁸ Given the continuously evolving nature of poisoning patterns, reviewing and analyzing existing scientific evidence is essential for developing effective preventive strategies.

Since poisoning patterns vary by region, the management and prevention systems also differ accordingly. Understanding regional poisoning trends can aid in designing interventions to prevent poisoning events, particularly in reducing suicide attempts. Numerous studies are conducted annually worldwide to assess

poisoning patterns and related parameters, including toxic agents, underlying causes, and clinical outcomes, to inform necessary actions to reduce poisoning incidence. This review comprehensively synthesized and analyzed the current evidence on acute poisoning, intending to provide an updated and accurate depiction of demographic characteristics, prevalence, and temporal and seasonal trends. Moreover, the findings of this study might help identify research gaps and guide future investigations in this field.

This study was conducted as a narrative review to provide an overview of the global epidemiological characteristics of acute poisoning. The aim was to synthesize available evidence on demographic patterns, types of toxic agents, routes of exposure, and temporal variations across different regions. Relevant literature was identified through searches of major international databases, including MEDLINE, Web of Science, and Scopus, as well as selected national Persian databases, such as Irandoc, Magiran, and SID. Google Scholar was also consulted to identify additional relevant publications. In this review, the term “global epidemiological characteristics” refers to variations in the incidence, prevalence, mortality rates, and temporal and seasonal patterns of acute poisoning across different regions of the world. “Demographic characteristics” encompass variables such as age, sex, marital status, employment status, educational level, and poisoning intent (suicidal versus accidental), all of which significantly influence poisoning risk profiles and clinical outcomes. The review focused on studies published between 2015 and 2025 to reflect contemporary epidemiological trends and recent changes in toxic exposures and healthcare systems.

Articles published in English or Persian were considered, with emphasis on studies providing accessible and relevant epidemiological data. Studies were selected based on their relevance to the objectives of this review, particularly those reporting epidemiological and demographic data on acute poisoning. Both retrospective and prospective studies, as well as cross-sectional and descriptive investigations, were included. As this study was designed as a narrative review, no formal systematic review protocol, structured screening framework, or meta-analytic statistical procedures were applied. The findings were synthesized qualitatively to summarize global patterns and highlight regional variations.

Global Distribution of Acute Poisoning

Of the 72 studies included in this review on the epidemiology of acute poisoning, 50% of

poisoning cases were reported from Asia, with India, Iran, China, and Saudi Arabia contributing the highest volume of data. Europe accounted for 25% of poisoning cases, represented by studies conducted in Norway, Spain, Belgium, and Switzerland. North America (United States and Canada) contributed 15%, whereas Africa accounted for 7% of cases. Australia and South America together represented the remaining 3%. Regarding the study design, 45% of the studies were retrospective, 30% were cross-sectional, 15% were prospective, and 10% were descriptive or observational. Most data were extracted from hospital medical records or national poison information centers. Detailed characteristics of the included studies are presented in table 1.

The conceptual framework (figure 1) demonstrates that acute poisoning occurrence

is shaped by risk factors, such as intentionality and exposure route, which directly impact clinical outcomes including mortality, morbidity, and healthcare service utilization.

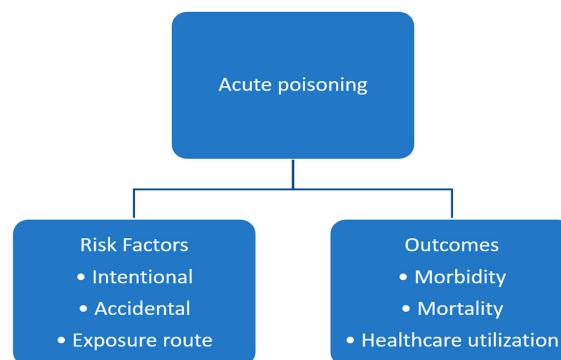


Figure 1: This figure illustrates the conceptual framework of acute poisoning, including its risk factors and outcomes.

Table 1: Included acute poisoning studies

No	Author/Year of publication	Tool used	Study type	Location	Results
1	Shazia et al., 2020 ¹⁹	Retrospective review of hospital records	Retrospective study	Ayub Teaching Hospital, Abbottabad, Pakistan	Promote poisoning awareness, first aid training, ensure antidote availability, and establish 24.7 poison control centers.
2	Chaudhary et al., 2024 ²⁰	Retrospective chart review	Retrospective study	The Emergency Department of Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow	Timely reporting to tertiary care centers, establishing poison information centers, and educating the public on proper management are essential to reduce morbidity and mortality from poisoning.
3	Barbieri et al., 2018 ²¹	Hospital records, questionnaires, face-to-face interviews, BAC test, statistical analysis (SAS)	Observational retrospective study	University Hospital of Padova, Italy	Targeted prevention through education, monitoring trends, and social media awareness is essential. Expand epidemiological research to develop better prevention strategies.
4	Eizadi-Mood et al., 2022 ²²	Medical records, SPSS 15	Cross-sectional study	Khorshid Hospital, Isfahan, Iran	There is a need for a toxico-vigilance system and further investigation into poisoning as a public health issue. Key factors for poisoning severity include loss of consciousness, antidote use, abnormal ECG, and hospital delays. These should be used in scoring systems for better outcome evaluation.
5	Arıkan et al., 2022 ²³	Patient medical records and medical records from a hospital's emergency department, NPIC, IBM SPSS Statistics 23	Retrospective study	İzmir, Turkey	Improving public awareness of poisoning risks and the importance of timely medical treatment. More nationwide studies are required to improve prevention and awareness.
6	Marks et al., 2018 ²⁴	Telephonic consultations made to TPIC, Microsoft Excel spreadsheet	Retrospective study	South Africa	Caution is advised when children are stung or if the consultation occurs more than 6 hours after the sting. Healthcare professionals should remain vigilant, especially in semi-arid regions, where high-risk populations are present.
7	Sánchez et al., 2023 ²⁵	Electronic health records (SAP 740), GC-MS, ELISA	Retrospective study	Barcelona, Spain	Public health policies should account for sex differences and tailor prevention campaigns accordingly to effectively address drug abuse in different populations.

No	Author/Year of publication	Tool used	Study type	Location	Results
8	Pawer et al., 2021 ²⁶	NACRS, Poisson regression models	Retrospective study	British Columbia, Canada	Policies and prevention (focused on safe alcohol consumption) efforts should target high-risk demographic groups, particularly teenagers and young adults.
9	Chuang et al., 2019 ²⁷	Taiwan National Health Insurance Research Database, Cox regression model	Retrospective cohort study	Taiwan	Physicians should consider prior exposure to organophosphates when diagnosing seizures, especially in young adults. Further mechanistic studies are needed to understand the link between organophosphate exposure and seizures.
10	Antunovic et al., 2023 ²⁸	Patient's medical records, SPSS	Retrospective cohort study	Serbia	Clinicians should exercise caution when prescribing pregabalin, especially to patients at risk of abuse. Co-ingestion with other psychoactive substances leads to more severe poisoning. Future studies should focus on gabapentinoid-related deaths and incorporate gabapentinoids in toxicological screenings.
11	Tekin et al., 2023 ²⁹	Patient's medical records and laboratory results, POP severity scale	Prospective cross-sectional and observational study	Turkey	The POP severity scale can predict prognosis for poisoning patients. Extracorporeal methods can improve survival rates. Clinicians should consider early interventions for these patients.
12	Hurtado et al., 2024 ³⁰	Patient's medical records, Institutional poisoning registry (LILITOX)	Retrospective cross-sectional descriptive study	Colombia	The findings contribute to a better understanding of acute poisoning in southwestern Colombia and suggest the need for multicenter studies to further analyze the issue.
13	Waktola et al., 2023 ³¹	Structured questionnaire, laboratory results, Hospital records, logistic regression analysis	Cross-sectional study	Ethiopia	Both the presence of medical comorbidities and a hospital stay of less than 48 hours were linked to poorer outcomes. It is recommended to enhance management strategies for these patients to mitigate mortality and complications.
14	Liakoni et al., 2016 ³²	Electronic patient chart database, gas chromatography–mass spectrometry, enzymatic test assay	Retrospective case series	University Hospital of Basel, Switzerland	Future studies should focus on GHB mono-intoxication cases to better understand the relationship between clinical symptoms, lab results, and define critical GHB concentration limits.
15	Odakha et al., 2022 ³³	Prospective data collection forms: patient demographics, vital signs, initial assessment, and management records	Prospective observational longitudinal study	Mbarara Regional Referral Hospital, Uganda	A multi-center study is needed to develop a risk stratification tool. Patients with acute pesticide poisoning should receive intensive monitoring regardless of triage category.
16	Supervía et al., 2021 ³⁴	Hospital Emergency Department Records	Descriptive observational study	Catalonia, Spain	Understanding age-related poisoning patterns can improve clinical management.
17	Adinew et al., 2017 ³⁵	Retrospective chart review, hospital emergency center logs, patients' records, SPSS version 20.0	Retrospective study	Northwest Ethiopia	Clinicians lack standardized treatment guidelines. The government should develop these protocols across health institutions. Preventive strategies, including public awareness campaigns on chemical safety and improved mental health service accessibility, are highly recommended.
18	Ingebrigtsen et al., 2022 ³⁶	Retrospective data review, electronic patient records, IBM SPSS analysis	Observational retrospective study	Oslo, Norway	Future studies should incorporate toxicological laboratory analyses to accurately identify the specific stimulant drugs involved.

No	Author/Year of publication	Tool used	Study type	Location	Results
19	Mbarouk et al., 2017 ³⁷	Structured CRF, patient medical records, Excel, STATA version 13	Prospective observational study	Dar es Salaam, Tanzania	Future studies should focus on larger multicenter patient populations and laboratory confirmation of the suspected poisoning agents.
20	Rezaei Orimi et al., 2023 ³⁸	Patients' medical records, SPSS	Cross-sectional study	Qaemshahr City, Iran	Educating pre-hospital staff, training on toxicology, and reducing the use of narcotics. Additional training for parents, farmers, and factory workers was recommended.
21	Graabak et al., 2024 ³⁹	Data obtained from the Akuttdatabasen system and DocuLive electronic patient records. Manual review of intoxication cases.	Retrospective study	Trondheim, Norway	Ensure antidotes and interventions are available for a wide range of poisoning agents. Prepare for clinical challenges.
22	Bereda et al., 2021 ⁴⁰	Medical charts using a structured checklist and questionnaire. Data entry and analysis with SPSS software, version 25.0.	Retrospective cross-sectional study	Mettu Karl Referral Hospital, Ethiopia	Focus on prevention of pesticide poisoning, especially in the summer. Increase use of antidotes and improve management protocols for acute poisoning in emergency departments.
23	Chun-Kuei Chen et al., 2020 ⁴¹	Taiwan's Taiwan NHIRD	Observational cohort study	Taiwan	Prioritize intensive care for severe intoxication, especially for males, the elderly, and patients with psychiatric conditions. Continuously monitor intoxication trends for better clinical response.
24	Bamathy et al., 2017 ⁴²	Patients' medical records using (structured case proforma)	Retrospective observational study	Chennai, India	Restrict hazardous chemicals, improve healthcare provider training, and establish poison centers.
25	Descamps et al., 2021 ⁴³	Survey, medical records, hospital referrals data, cost analysis	Retrospective observational study	Belgium	Low compliance with hospital referrals. Improve follow-up and monitoring of referrals for better compliance.
26	Moe et al., 2019 ⁴⁴	Linked ED visit data, mortality database, ICD-10 diagnostic codes, Alberta Health Services Data	Retrospective cohort study	Alberta, Canada	Frequent ED visits are associated with long-term mortality in substance users; recommend targeted interventions and flagging frequent users in ED systems.
27	Vallersnes et al., 2016 ⁴⁵	Electronic patient records, AUDIT, DUDIT, Norwegian National registry, motivational interviewing, SPSS	Comparative cohort study	Oslo, Norway	Focusing on opioid-poisoned patients for further interventions, aiming to reduce long-term morbidity and mortality.
28	Vallersnes et al., 2018 ⁴⁶	Patient records, electronic medical records, Norwegian Patient Register, physician assessments, SPSS statistical analysis	Prospective observational cohort study	Oslo, Norway	Enhanced follow-up measures for high-risk groups.
29	Rezaee et al., 2022 ⁴⁷	Patients' medical records, hospital admission data, STATA 14	Retrospective cross-sectional study	Qaemshahr, Mazandaran, Iran	There is a need for further research on post-discharge mortality and the socioeconomic burden of poisoning in older adults.
30	Shah et al., 2018 ⁴⁸	Case record forms, Poisoning severity scale, demographic profile	Prospective observational study	Gujarat, India	Early treatment and good transport facilities are crucial for reducing mortality.
31	Torkashvand et al., 2015 ⁴⁹	Self-made checklist, patient interviews, medical records review	Cross-sectional study	Rafsanjan, Iran	Focus on suicide prevention in high-risk groups and better training for methadone distribution.

No	Author/Year of publication	Tool used	Study type	Location	Results
32	Fernández-Ibáñez et al., 2021 ⁵⁰	Laboratory results, laboratory software (GestLab), Clinical and analytical data from the Emergency Department	Retrospective study	Asturias, Spain	Addresses the increasing incidence of voluntary acute intoxication and suicide attempts, with a focus on preventive measures for ethanol and benzodiazepine abuse.
33	Aleid et al., 2023 ⁵¹	Medical records, a structured questionnaire, SPSS version 28.0	Cross-sectional study	Saudi Arabia	Need for improved education, awareness, and training in poisoning management. Calls for targeted interventions and further research.
34	Pu et al., 2022 ⁵²	Registered cases from Shanghai health information system; demographic and clinical data, SPSS and GeoDa 1.20	Descriptive epidemiological study	Shanghai, China	Implement targeted prevention strategies based on age and drug type; enhance surveillance and interventions in high-incidence areas.
35	Mehrpour et al., 2018 ⁵³	Patients' medical records	Cross-sectional study	Birjand, Iran	Distribute naloxone, control drug availability, and enforce drug trafficking regulations to reduce poisoning.
36	Kehayova et al., 2022 ⁵⁴	Patient's medical records.	Retrospective study	Varna, Bulgaria	Increase control in prescribing psychotropic drugs, improve psychological support for patients, train psychologists and doctors for suicide prevention, and monitor drug access for teenagers.
37	Kant et al., 2025 ⁵⁵	Clinical records, toxicology consultations, PSS, RCF scores	Retrospective cohort study	Singapore	Improve prediction models and healthcare planning based on common poisoning agents, particularly for CNS and CVS-related toxins.
38	Asari et al., 2016 ⁵⁶	Hospital records, case papers, generic/drug information from Indian Drug Review, NLEM	Prospective cross-sectional study	Vadodara, India	Antimicrobial use should be rationalized, hospital stockpiles of antivenom should be regularly monitored, and public awareness programs focused on the prevention of toxic exposures should be implemented.
39	Kim et al., 2023 ⁵⁷	Health administrative data, CITS analysis, cohort creation from OHIP, 5-year depression diagnosis period	Observational, retrospective study	Ontario, Canada	Screening for cannabis use in individuals with depression is recommended. Monitoring cannabis market expansion's impact on acute care.
40	Pradhananga et al., 2024 ⁵⁸	A preset proforma sheet, STATA version 14, Microsoft Excel.	Descriptive, cross-sectional study	KIST Medical College and Teaching Hospital, Nepal	Regular studies on poisoning trends to aid in antidote stocking and improved management of poisoning cases.
41	Eizadi-Mood et al., 2020 ⁵⁹	Patient records, urine screening tests, clinical examination, SPSS	Cross-sectional study	Isfahan, Iran	Age, addiction, and somatic disease are key factors in predicting outcomes of opioid poisoning.
42	Hossain et al., 2017 ⁶⁰	Patient records, clinical examination, lab tests (CBC, RBS, liver function, etc.)	Prospective study	Dhaka, Bangladesh	Raise public awareness, improve first aid, regulate toxins, and establish a national poison center to prevent and better manage poisoning cases.
43	Jain et al., 2024 ⁶¹	Hospital records, patient history, lab results, SPSS	Cross-sectional study	Kota, Rajasthan	Raise public awareness on timely hospital transfer for poisoning cases, address delay in seeking treatment, and establish specialized poison units in hospitals.
44	George et al., 2023 ⁶²	Patient history, clinical data, GCS, qSOFA, routine tests	Cross-sectional study	Western Rajasthan	Raise awareness about the dangers of organophosphates and drug poisonings. Focus on preventive education, especially in high-risk groups such as young, male, and psychiatric patients. Establish better patient care protocols for early intervention and management.

No	Author/Year of publication	Tool used	Study type	Location	Results
45	Soltaninejad et al., 2021 ⁶³	Patient history, clinical manifestations, lab parameters, ICU vs. ward comparison, SPSS (version 15)	Cross-sectional study	Isfahan, Iran	Consider additional factors such as toxic agent, sex, and time to admission for ICU decision. Early intervention improves outcomes.
46	Wani et al., 2024 ⁶⁴	Medical records, clinical signs, eyewitness evidence	Descriptive cross-sectional	Srinagar, India	Antidotes such as naloxone should be readily available. Increase awareness of poisoning risks, establish a poison control center, and set up addiction treatment services, especially for opioid abuse.
47	Samaria et al., 2022 ⁶⁵	A data collection form from patients and relatives, patients' medical records, hospital records	Prospective observational study	Raipur, India	Maintaining a toxicology registry for early identification of rising trends, improving mental health support, ensuring safer pesticide use, limiting over-the-counter medications, and hiring toxicologists at the district level.
48	Pujo et al., 2024 ⁶⁶	Hospital records, patients' medical records, laboratory test results, PSS, Excel and IBM SPSS.	Retrospective cross-sectional study	Cayenne, French Guiana	Urgent need for a toxicovigilance system, suicide prevention, and further regional studies
49	Resiere et al., 2020 ⁶⁷	Hospital records, patient medical records, ICD-10 codes, SAPS II, PSS, statistical analysis using Excel and IBM SPSS	Retrospective, multicenter study	Martinique	Further multicenter studies are required. Clinicians should be alert to toxicity from non-authorized drugs and environmental agents.
50	Descamps et al., 2019 ⁶⁸	Patient medical records, hospital invoices, UREG, EPD, financial department	Retrospective study	Belgium	Governments should restrict alcohol availability and improve reporting with a uniform template for data collection, similar to other emergency medical registration systems, to improve monitoring, prevention, and cost reduction.
51	Britch et al., 2023 ⁶⁹	Hospital billing data (2017–2019) from 107 Kentucky facilities; ICD-10-CM codes, CCI, mental illness, and polydrug toxicity, SPSS and SAS	Retrospective, observational study	Kentucky, USA	Include polydrug cases in future research; use surveillance data to guide cannabis-related health policies. Improving the accuracy, completeness, and timeliness of data reporting is essential for guiding policies on cannabis access and understanding health consequences, such as cardiac complications.
52	Shannon et al., 2018 ⁷⁰	CIHI hospital data and ED records, ICD-10-CA codes	Retrospective cross-sectional study	Canada	Emphasizes the need for national surveillance, improved prescribing, expanded naloxone access, and support for opioid agonist therapy
53	Van Wijck et al., 2021 ⁷¹	Trauma registry and electronic medical records, CCI, Rotterdam CT Score, SPSS	Retrospective cohort study	Academic level I trauma center, USA	Alcohol is not likely to provide therapeutic options for improving outcomes in TBI patients. The focus should be on other strategies for improving outcomes.
54	Yamin et al., 2024 ⁷²	Pre-designed questionnaire and ER records, SPSS and MS Excel	Prospective observational study	Karachi, Pakistan	There is a need to improve medical management and emergency care, restrict the use of toxic pesticides, and establish a poison information and management center to enhance prevention and care, ultimately reducing mortality.

No	Author/Year of publication	Tool used	Study type	Location	Results
55	Sharma et al., 2024 ⁷³	Face-to-face interview using pretested questionnaire, MS Excel, SPSS	follow-up study	Jabalpur, India	Implement strict regulations, promote mental health support and education to reduce poisoning cases, ensure safe labeling and storage of toxic agents to prevent accidents, and enhance public awareness via poison control programs to inform about safe practices and emergency response.
56	Zhang et al., 2018 ⁷⁴	Data from Shengjing Hospital's HIS, including demographics, toxic agents, exposure types, and outcomes.	Retrospective and descriptive study	Shengjing Hospital, Shenyang, China	Focus on public health education on safe drug use, early psychiatric consultation for suicidal patients, and stricter policies on access to toxic substances.
57	Thapa et al., 2020 ⁷⁵	Patient records in the Emergency Department of Nepal Medical College, SPSS.	Descriptive cross-sectional study	Nepal	Conduct multi-center studies with larger sample sizes for more comprehensive data. Initiate preventive measures and formulate practical guidelines for managing acute poisoning.
58	Caballero-Bermejo et al., 2022 ⁷⁶	Electronic medical records	Retrospective cohort study	Madrid, Spain	Monitoring changes in poisoning patterns post-pandemic is crucial, especially regarding suicidal poisonings and recreational activities. Healthcare management should prepare for a potential rise in cases, especially among young people during the summer.
59	Alva et al., 2024 ⁷⁷	Patient medical records, SPSS version 16	Retrospective cross-sectional study	Karnataka, India	There is a need for public awareness programs focusing on prevention and further research on poisoning patterns. Highlights the financial burden of ICU treatment on families.
60	Nadeem et al., 2020 ⁷⁸	A structured proforma, Microsoft Excel	Prospective observational study	Hyderabad, India	Educational campaigns on the safe handling of insecticides, the establishment of poison information centers, and calls for a multicenter study with a longer duration to accurately assess poisoning trends.
61	Reddy et al., 2018 ⁷⁹	Patient interviews, case records, medication charts, lab data, medico-legal registers; SPSS 22.0	Prospective observational study	Bangalore, India	Restrict over-the-counter sales of toxic agents, establish poison information centers, introduce anti-poison ambulances, and implement suicide prevention strategies including psychiatric counseling.
62	Jawarkar et al., 2022 ⁸⁰	Bedside interviews, clinical examination, and patient records	Observational study	Amravati, India	Promote organic farming and natural pest control to reduce organophosphorus compound use. Upgrade primary health centers for immediate poisoning treatment and train medical staff. Conduct safety camps by insecticide manufacturers and agricultural departments. Encourage further research into safer pesticides.
63	Saravani et al., 2019 ⁸¹	Emergency medical services records	Cross-sectional study	Zabol, Iran	Focus on preventive strategies for common poisoning causes. Improve awareness and training for emergency response teams. Conduct further research on effective treatment protocols for poisoning.
64	Wahba et al., 2021 ²	Patient files from the medical records department of King Khalid Hospital, GraphPad InStat 3	Retrospective observational study	Najran, Saudi Arabia	Implement public health education on the risks of drug abuse and household chemicals. Focus on prevention of overdose, especially in at-risk groups such as those over 35.

No	Author/Year of publication	Tool used	Study type	Location	Results
65	Vallersnes et al., 2015 ³	Electronic medical records, patient registration form	Observational cross-sectional study	Oslo, Norway	Addressing weekend drinking patterns and target prevention for adolescents and young adults.
66	Simonova et al., 2023 ⁴	Hospital records, urine toxicology (immunochromatographic and GC-MS), blood phenazepam levels, statistical analysis (SPSS)	Retrospective cohort study	Russia	Enhanced monitoring and targeted interventions for elderly patients are needed.
67	Parekh et al., 2019 ⁶	Medical records, autopsy, and chemical analysis	Retrospective study	Gujarat, India	Increase awareness of agricultural poisoning, emphasize gender-specific approaches, and implement suicide prevention strategies.
68	Adam et al., 2016 ⁸	Alcohol use disorder assessments, Follow-up surveys, Interviews, AUDIT, MINI, PHQ, substance use tracking	Observational cohort study	Emergency Department, Switzerland	Long-term follow-up is essential for patients with alcohol intoxication to prevent future health and social issues. Implementation of secondary prevention strategies for young patients with alcohol intoxication, focusing on substance abuse, mental health, and social challenges
69	Klein et al., 2018 ⁹	Clinical evaluation, diagnostic tests	Observational study	Emergency Department, USA	Critical illnesses might be missed in alcohol intoxication cases, requiring thorough evaluation.
70	Liu et al., 2023 ¹⁰	Hospital records information management system, Patient's medical records, IBM SPSS version 26	Retrospective cross-sectional study	Kunshan	Focus on addressing mental health issues, particularly depression, to prevent suicide-related poisoning, and considering urban-rural disparities to guide targeted public health initiatives.
71	Panda et al., 2015 ¹¹	Standard proforma, hospital records	Prospective study	Chitradurga, Karnataka, India	Raising awareness about poison identification and the proper storage and use of pesticides. Educational campaigns and social interventions are required to reduce mortality, especially from insecticides.
72	Salas-Wright et al., 2019 ¹⁵	The 2016 NEDS, HCUP, AHRQ, ICD-10-CM diagnostic code, the US Census Bureau, STATA 14	Cross-sectional study	United States	Cannabis poisoning is more common in young, male, uninsured individuals with economic hardship and mental health issues. Screening for mental health should be standard for these patients. Future research should examine the link with other psychoactive drugs.

AUDIT: Alcohol use disorders identification test; MINI: Mini international neuropsychiatric interview; PHQ: Patient health questionnaire; BAC: Blood alcohol concentration; NPIC: National poison information center; SAP 740: System applications and products 740; GC-MS: Gas chromatography–mass spectrometry; ELISA: Enzyme-linked immunosorbent assay; NACRS: National ambulatory care reporting system; PSS: Poisoning severity score; POP: Peradeniya organophosphate poisoning; LILITOX: the institutional poisoning registry of the Fundación Valle del Lili University Hospital; NED: Nationwide emergency department database; HCUP: Healthcare cost and utilization project; AHRQ: Agency for healthcare research and quality; ICD-10-CM: International classification of diseases, 10th revision, clinical modification; ICD-10-CA: International classification of diseases, 10th revision, Canada; CRF: Case report form; NHIRD: National health insurance research database; DUDIT: Drug use disorders identification test; STATA 14: Stata statistical software version 14; GCS: Glasgow coma scale; qSOFA: Quick sequential organ failure assessment; SAPS II: Simplified acute physiology score II; UREG: Urgency registration system; EPD: Electronic patient dossier; CCI: Charlson comorbidity index; CIHI: Canadian institute for health information; RCF: Relative citation factor; NLEM: National list of essential medicines; CITS: Clinical information tracking system; OHIP: Ontario health insurance plan; CBC: Complete blood count; RBS: Random blood sugar; HIS: Hospital information system; MS Excel: Microsoft excel; IBM SPSS: International business machines statistical package for the social sciences; ECG: Electrocardiography; ED: Emergency department; Rotterdam CT score: Rotterdam computed tomography; TBI: Traumatic brain injury; ER records: Emergency room records; NEDS: Nationwide emergency department sample; CNS: Central nervous system; CVS-related toxins: Cardiovascular system

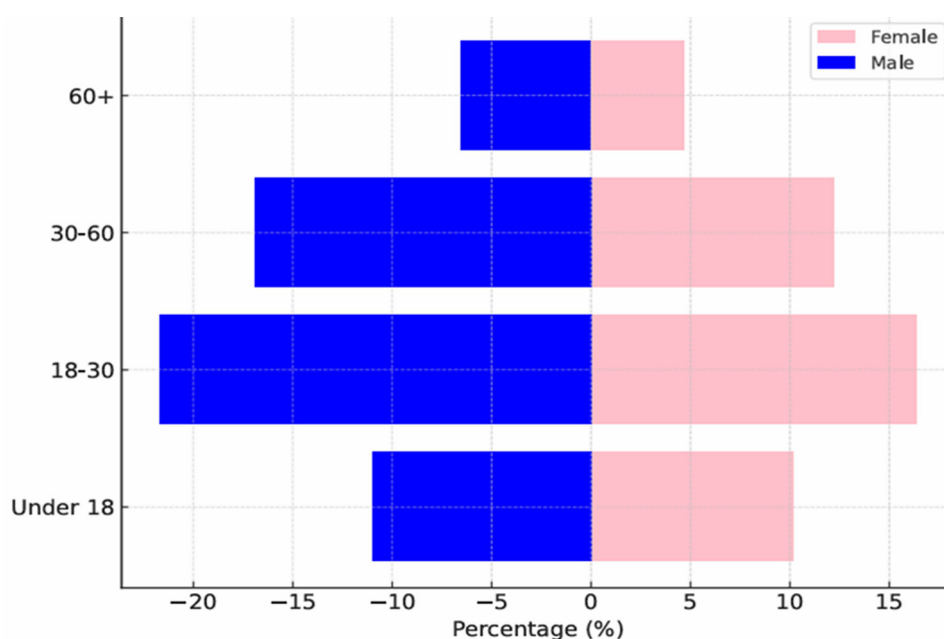


Figure 2: This figure illustrates the age- and sex-specific distribution of acute poisoning cases, comparing the percentage of male and female patients across different age groups, including under 18 years, 18–30 years, 30–60 years, and over 60 years.

The demographic and epidemiological characteristics of patients presenting with acute poisoning are summarized in detail in table 2. Analysis of 72 studies revealed that the prevalence of acute poisoning was higher in males (56.9%) than in females (43%). This sex difference was most notable in the 18–30-year age group, with 21.7% of males and 16.4% of females affected. The next highest prevalence occurred among individuals aged 30–60 years (16.9% in males and 12.2% in females). Among individuals younger than 18 years, poisoning rates were nearly equal between males and females, whereas the lowest incidence was recorded in those older than 60 years (figure 2).

Regarding marital status, 54.1% of poisoned women and 52.2% of poisoned men were married. In terms of occupational status, employed individuals accounted for the highest proportion of poisoning cases: 38% of men and 15.7% of women. Students and unemployed individuals demonstrated lower percentages, although males still represented the majority in both groups. Concerning educational level, the highest prevalence occurred among individuals with a high school education (20.3% in men, 16.5% in women), followed by university graduates. Illiteracy rates were similar between sexes, and the lowest prevalence was observed in individuals with primary-level education.

Intentional poisoning (primarily suicide attempts) accounted for 26.9% of cases in women and 26.7% in men. Unintentional poisoning was

more common among men (27.7%) than among women (18.6%). Overall, non-pharmaceutical poisonings accounted for 62.3% of cases, whereas pharmaceutical-related poisonings constituted 37.7%. Among non-pharmaceutical agents, pesticides represented the leading cause (41.9%), followed by substance abuse (9.4%; figure 3).

The most frequent route of exposure was oral ingestion, accounting for 76.9% of cases, including ingestion of drugs, pesticides, detergents, and other chemical compounds. Inhalational exposure constituted 3.4%, involving toxic gases and volatile chemicals. Other routes such as injection, dermal contact, and bites or stings collectively accounted for approximately 5% of cases. Due to overlapping exposure routes in some studies, precise stratification of all cases was not possible, and reported percentages represent pooled averages.

Seasonal analysis showed that poisoning occurred most frequently in summer (32.5%), followed by spring (25.2%), autumn (22.4%), and winter (21%). About the time of day, most poisoning incidents occurred at night (42.1%), followed by morning (28.2%) and evening (27.7%; figure 4).

The epidemiology of poisoning varies markedly across the globe, and even within individual countries, patterns of occurrence, underlying causes, and clinical outcomes may differ depending on geographical, cultural, and socioeconomic characteristics. This heterogeneity underscores the need for regional and local investigations, not only to more

Table 2: Demographic and epidemiological characteristics of acute poisoning cases

Category	Female n (%)	Male n (%)
Age distribution		
Under 18 years	113676 (10.2)	122592 (11.0)
18-30 years	182773 (16.4)	241840 (21.7)
30-60 years	135965 (12.2)	188345 (16.9)
Older than 60 years	52380 (4.7)	72440 (6.5)
Marital status		
Married	315875 (54.1)	184208 (52.2)
Single	267998 (45.9)	168680 (47.8)
Employment status		
Employed	146960 (15.7)	355699 (38.0)
Unemployed	49610 (5.3)	87988 (9.4)
Student	34633 (3.7)	60843 (6.5)
Housewife	198442 (21.2)	-
Educational level		
Illiterate	769 (11.6)	776 (11.7)
Primary	610 (9.2)	729 (11.0)
High school	1094 (16.5)	1347 (20.3)
University	491(7.4)	816 (12.3)
Suicide and mortality		
Suicide	289693 (26.9)	287540 (26.7)
Accident	200308 (18.6)	298309 (27.7)
Mortality	2251 (2.5)	4592 (5.1)
Poisoning cases		
Drug-related poisoning	421552 (37.7)	
Non-drug poisoning	696623 (62.3)	
Non-drug poisoning breakdown		
Insecticides	291885 (41.9)	
Alcohol	38314 (5.5)	
Substance abuse	65482 (9.4)	
Bite	17415 (2.5)	
Rodenticides	43190 (6.2)	
Household items	46673 (6.7)	
Corrosives	27168 (3.9)	
Kerosene	13932 (2.0)	
Gas	23685 (3.4)	
Seasonal distribution		
Spring	2193 (25.2)	
Summer	2828 (32.5)	
Fall	1949 (22.4)	
Winter	1827 (21.0)	
Temporal distribution		
Morning	3074 (28.2)	
Evening	3020 (27.7)	
Night	4590 (42.1)	

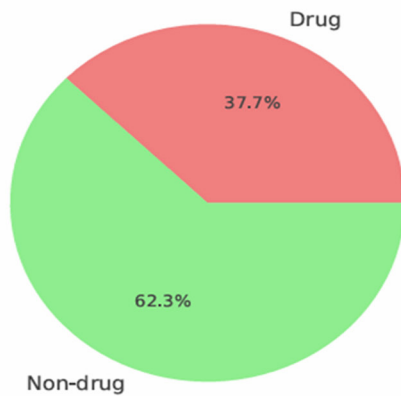
Percentages may exceed or not sum to 100% due to rounding and/or overlapping or unrecorded data.

accurately identify the risk factors and behavioral determinants of poisoning but also to design targeted preventive interventions and optimize therapeutic strategies. Synthesizing data from the included studies indicated that nearly half of all poisoning cases occurred in Asia, and that mortality rates in LMICs were approximately four times higher than those in high-income nations.¹ These disparities might be attributed to limited access to healthcare services, inadequate diagnostic and educational resources, and

widespread use of toxic substances in domestic and occupational environments. Furthermore, factors such as age, sex, marital status, education level, occupational status, and climatic conditions play a significant role in shaping variations in poisoning patterns.

It should be noted that the findings discussed below primarily reflect associations reported in observational studies and should not be interpreted as establishing direct causal relationships.

Panel A: Drug vs Non-drug Poisoning



Panel B: Non-drug Poisoning Breakdown

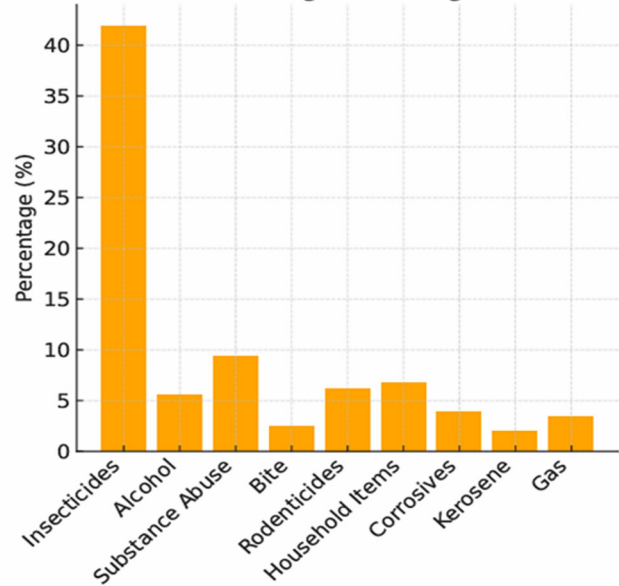


Figure 3: This figure illustrates the distribution of acute poisoning cases by type, distinguishing between drug-related and non-drug-related poisoning (Panel A), and the percentage breakdown of major subcategories of non-drug poisoning, including insecticides, alcohol, substance abuse, household items, and other agents (Panel B).

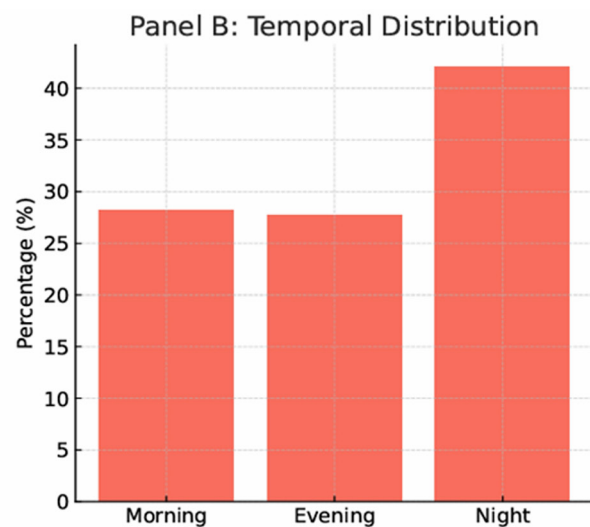
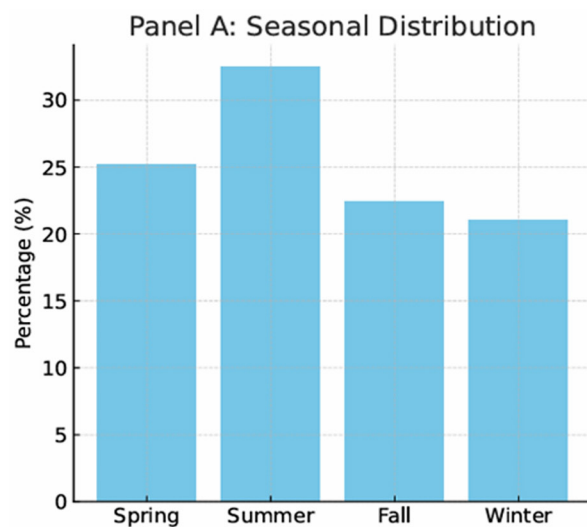


Figure 3: This figure illustrates the distribution of acute poisoning cases by type, distinguishing between drug-related and non-drug-related poisoning (Panel A), and the percentage breakdown of major subcategories of non-drug poisoning, including insecticides, alcohol, substance abuse, household items, and other agents (Panel B).

Demographic Characteristics

The predominance of poisoning among individuals aged 18–30 years suggested that young adulthood might represent a particularly vulnerable life stage across diverse settings.² This age group was consistently identified across the majority of the included studies as the most affected category. Young men within this group accounted for a substantial proportion of cases, with substance use, alcohol consumption, and occupational chemical exposure frequently reported in association with these events.³ Among middle-aged men, workplace and environmental exposures were more frequently

associated with poisoning events,⁴ whereas in women, domestic and psychosocial factors were more prominent. The results further showed a higher proportion of poisoning among married women than among married men, likely due to frequent exposure to household cleaning agents and toxic compounds. Additionally, intentional poisoning was reported more frequently in women and was associated in several studies with psychosocial stressors, marital conflict, and depressive symptoms.^{5,6} The results of the present review were consistent with the findings reported by Mesgarpour and colleagues in Iran, which reported that unintentional poisoning was

more common among men, whereas intentional poisoning occurred more frequently in women, with the highest mortality observed among young men under 40 years.¹⁶ However, a study by Chelkeba and colleagues in Ethiopia reported a contrasting pattern, with higher poisoning rates among young women, attributed to cultural norms, sex-based disparities in healthcare access, and increased exposure to household toxicants.⁷ Similarly, Adam and colleagues found that men were primarily affected by alcohol- and stimulant-related poisoning, whereas women more often experienced poisoning due to psychotropic medications.⁸ These discrepancies reflect the influence of cultural, economic, and behavioral contexts on poisoning trends.

In addition to sex-related differences, important age-stratified variations are evident. Although individuals aged 18–30 years represent the peak incidence group in many regional reports,^{2, 3} poisoning in early childhood follows a distinct epidemiological pattern. Pediatric-focused studies consistently demonstrated that the highest frequency of poisoning occurs among children aged 1–5 years, largely due to exploratory behavior, accidental ingestion, and unsafe storage of household chemicals and pesticides.^{1, 82, 83} In this age group, boys are often more affected than girls, a pattern attributed to higher levels of physical activity and risk-taking behavior during early developmental stages.⁸⁴ In contrast, poisoning among adolescents, particularly girls over the age of 10 years, is more frequently associated with intentional exposure and underlying psychological vulnerability, including depressive symptoms and emotional distress.^{1, 85}

At the other end of the age spectrum, poisoning among older adults occurs less frequently in absolute numbers, while it is often associated with greater clinical severity. Studies focusing on elderly populations indicated that polypharmacy, chronic comorbidities, and increased physiological susceptibility contribute to higher complication and mortality rates in this group.^{4, 47, 86} Delayed presentation and atypical symptom manifestation might further worsen outcomes. Taken together, these findings suggested that while young adulthood represents the highest-risk period in terms of overall incidence,^{2, 3} the underlying intent, exposure patterns, and clinical consequences differ substantially across age groups.^{1, 4, 82} Accidental domestic exposures predominate in early childhood,^{82, 83} psychosocial and substance-related factors are more prominent in adolescents and young adults,^{1, 63} and medication-related toxicity is more characteristic of the elderly.^{47, 86, 87} These

age-stratified differences underscore the need for prevention strategies tailored to specific developmental stages rather than uniform public health approaches.

Klein and colleagues also reported findings aligned with the reviewed evidence, indicating that young men are at the highest risk of poisoning, particularly those engaged in high-risk occupations and under psychological stress.⁹ Conversely, a recent study by Liu and colleagues emphasized that young women were more susceptible to intentional poisoning, with strong associations with depressive disorders and psychological distress.¹⁰ Panda and colleagues similarly reported that unmarried men and married women were at greater risk, men due to occupational exposure to pesticides and women due to the use of sedatives or household chemicals.¹¹ Collectively, these studies suggested that sex differences in poisoning patterns arise from a complex interplay of biological, psychological, and sociocultural factors.

Educational and Occupational Factors

Secondary-level education emerged as the most frequently reported educational category among poisoning cases across the reviewed studies. This pattern may reflect limited awareness of toxic substance risks and inadequate training in preventive safety measures. Insufficient public education regarding the safe storage, handling, and combination of chemical agents has been frequently described in association with these events.¹² Individuals with higher education levels represented the second most common group, which might be related to broader social engagement, occupational exposures, and the use of medications for stress or sleep disturbances.¹³

In contrast, a study by Al-Mahbashi and colleagues in Yemen reported that the highest rates of poisoning occurred among illiterate individuals and rural residents. This pattern was attributed to easy access to pesticides, lack of knowledge about safe handling practices, and the absence of personal protective equipment.⁸⁸ Moreover, Aleid and colleagues reported an increased tendency among undergraduate students, particularly during examination periods, to misuse sedatives and hypnotic medications, increasing the risk of poisoning.⁵¹ These findings underscored the critical need for educational and awareness-raising programs in schools, universities, and community settings.

The reviewed evidence consistently indicated an association between occupational status and patterns of acute poisoning. Employed men represented the largest proportion of cases,

which might be explained by frequent exposure to chemicals, pesticides, and industrial substances in the workplace. Contributing factors include lack of proper protective equipment, long working hours, and insufficient employer oversight.¹⁵

Non-employed women (housewives) represented a substantial proportion of poisoning cases in several studies. Reports frequently described improper handling of cleaning agents, unsafe storage practices, and the mixing of multiple chemical products in association with these incidents.¹⁷ These patterns indicated that the household environment might constitute an important context for exposure to hazardous substances, highlighting the need for community-based safety education initiatives. International studies further supported these observations. Salas-Wright and colleagues reported that urban populations facing economic hardship and poor housing conditions exhibited higher substance use and poisoning rates.¹⁵ Pawer and colleagues similarly demonstrated a direct association between material deprivation and increased rates of acute poisoning.²⁶ Collectively, these findings indicated that socioeconomic conditions such as poverty, unemployment, and psychological stress were consistently associated with higher rates of substance misuse and poisoning. In this context, employment might have a dual effect: On one hand, unemployment is associated with increased psychological distress, reduced coping capacity, diminished social support, and consequently a higher likelihood of substance misuse and related poisoning. On the other hand, employment in industrial or high-exposure environments carries its own risks, particularly due to repeated contact with chemicals or environmental toxic agents, making occupational poisoning a potential hazard.

Suicide and Intentional Poisoning

One of the most notable findings of this review is the substantial proportion of intentional poisonings for suicide, which occurred at similar rates in both sexes. This pattern reflects the high prevalence of self-harm behaviors among adults and aligns with World Health Organization (WHO) reports identifying poisoning as one of the most frequent methods of suicide in developing countries. Despite similar incidence across sexes, outcomes differ markedly.⁵⁰ Higher poisoning-related mortality among men was consistently reported across the included studies, with important implications for healthcare systems.¹⁰ This pattern aligned with previous research on suicidal poisoning in adults, in which multiple associated factors have been described.⁵⁷ Biological differences, including

variations in toxin metabolism and the tendency of men to select more lethal agents, particularly pesticides, have been proposed as possible explanations for this disparity. In addition, psychosocial stressors have been consistently reported in association with suicidal poisoning.⁵⁰ Among young individuals, WHO demonstrated elevated rates of suicidal behavior; factors such as economic stress, unemployment, and mental health disorders including depression and anxiety have frequently been documented in association with these events.⁴⁹

Married individuals accounted for a considerable proportion of cases, potentially reflecting family conflicts or increased psychosocial responsibilities. Easy access to non-pharmaceutical poisons such as pesticides in rural and agricultural regions, particularly in Asia, which accounts for a major share of global cases, has been frequently associated with higher rates of suicidal poisoning.⁸⁹ The clinical consequences of suicidal poisoning are severe and costly.⁹⁰ Many of these patients are referred to healthcare centers, while some decline transfer or refuse to complete treatment due to stigma, denial, or family resistance.¹⁸

Preventive efforts must therefore include suicide screening in EDs using standardized psychiatric assessment tools, restricting the availability of highly hazardous pesticides, and expanding mental health services such as free counseling and crisis hotlines. Community-based educational campaigns, particularly targeting young men and married individuals, may substantially reduce suicide rates, as demonstrated in successful European models.^{91, 92}

A study by Olfson and colleagues reported that individuals with functional disabilities, the unemployed, and divorced persons had the highest suicide rates.⁹³ These findings were consistent with the patterns observed across the reviewed literature. Socioeconomic challenges such as unemployment, marital dissolution, financial instability, and psychiatric comorbidities, including substance use disorders, might serve as major risk factors for suicide. In another study by Azizpour and colleagues, the highest rates of suicide occurred among individuals aged 15–24 years, predominantly via medication overdose and substance consumption,⁹⁴ which aligned with the patterns observed in the reviewed studies. Contributing factors may include inadequate awareness among youth, unmarried status, unemployment, and impulsivity in younger age groups.

Types and Routes of Exposure

Non-pharmaceutical poisonings, particularly

those involving pesticides and chemical agents, represented the predominant category across the reviewed studies.³⁷ Oral ingestion emerged as the most frequently reported route of exposure,⁶⁷ a pattern observed in both intentional and unintentional poisoning contexts. Limited public awareness regarding the appropriate use, storage, and interaction of chemical substances has been consistently reported in association with these events.² Moreover, the lack of need for specialized equipment and the ability to conceal ingestion until late in the process may explain the predominance of this route.¹⁸ These findings differed from those of Waleed Salem and colleagues in Qatar, who reported that medication poisonings were more common.⁹⁵ Similarly, studies by Naseri and colleagues in Birjand and Tarfieei and colleagues in Yazd found pharmaceuticals to be the leading cause of acute poisoning. Such discrepancies likely stemmed from differences in pharmaceutical access policies, cultural patterns of medication use, and the types of substances available. Environmental, industrial, and cultural variations across countries and even cities might further contribute to these differences.^{96, 97} In contrast, Alshahrani and colleagues reported that most poisoning cases in children in Saudi Arabia were due to unintentional oral ingestion of household chemicals,⁹⁸ aligning with the patterns observed across the reviewed studies.

Seasonal and Temporal Patterns

Temporal and seasonal patterns of poisoning were also notable. The highest incidence occurred during warm seasons, particularly summer.⁹⁹ Increased agricultural activity and reduced childcare supervision were reported as factors associated with higher poisoning rates during warm seasons.⁷⁶ The higher frequency of poisoning during nighttime hours might be related to reduced supervision, fatigue, or engagement in high-risk behaviors.³

A study by Lo and colleagues in South Korea reported contrasting results, with higher rates during colder seasons and daytime hours, attributed to seasonal depression and greater medication accessibility during working hours.¹⁰⁰ Conversely, studies by Vallersnes and colleagues and Shazia and colleagues were consistent with the patterns observed in the reviewed evidence, indicating increased poisoning among young individuals during summer and nighttime, particularly on weekends.^{3, 19} Weekend gatherings and leisure activities among youth might be associated with this observed trend. Overall, seasonal and temporal differences in poisoning across regions might be influenced

by climatic, cultural, economic, lifestyle, and recreational patterns.¹⁸

Future Perspectives and Challenges, and Limitations

The prevention and management of poisoning continue to face significant challenges. Easy access to toxic substances, weak reporting systems, lack of educational programs, and limited regulatory enforcement regarding the sale of hazardous materials pose major obstacles. A multilayered preventive approach, including widespread public education, development of occupational safety guidelines, stricter regulations on the distribution of toxic substances, enhanced monitoring of chemical use in industries, and promotion of household safety awareness through school-based programs, is essential for reducing the burden of poisoning. Future research should investigate individual, social, and environmental determinants, psychological interventions, high-risk behaviors, and the effectiveness of educational programs in diverse populations to foster sustainable reductions in poisoning incidence. The findings of this study underscored that poisoning is a multifactorial phenomenon resulting from complex interactions among personal, social, and environmental factors. Therefore, a comprehensive, multidisciplinary approach is essential for effective prevention and management.

This study was conducted as a narrative review. Given the substantial heterogeneity among the included studies in terms of study design, sample size, target populations, and the classification of poisoning types, quantitative comparisons or statistical meta-analysis were not considered feasible. Moreover, many available studies reported epidemiological data in a non-standardized or incomplete manner, and in several cases, essential details regarding data collection procedures or clinical outcomes were inadequately documented. These limitations restricted the precision and comparability of certain findings. In addition, no formal quality assessment or risk-of-bias evaluation was undertaken, consistent with the narrative synthesis approach adopted here. The methodological quality of the included studies varied considerably, which might have influenced the consistency and interpretation of the results.

Since only studies with accessible full texts were considered, evidence may have been inadvertently omitted, potentially introducing selection bias. The potential for publication bias should also be acknowledged, as studies reporting significant or severe outcomes

are disproportionately likely to be published. Furthermore, the predominance of hospital-based and large referral center data among the included studies might limit the generalizability of the findings and might lead to an underestimation of mild, unreported, or untreated poisoning cases occurring at the community level.

Accordingly, the findings of the present review should be interpreted with caution. Future investigations employing standardized methodologies and comprehensive surveillance systems are recommended to provide a more accurate and generalizable understanding of acute poisoning patterns.

Conclusion

The findings of this review indicated that acute poisoning remains a significant public health challenge, imposing a substantial burden on emergency services and intensive care units. The synthesis of existing literature suggested that the occurrence of poisoning is influenced by a complex interplay of individual, social, and environmental determinants. The concentration of cases among younger adults and the male working population serves as a warning signal for health and social policy planners. Given the prominent role of non-pharmaceutical agents, including pesticides, household chemicals, and illicit substances, in poisoning events, strengthening regulations concerning the production, distribution, and storage of toxic compounds is essential. The evidence also underscored the need for enhanced mental health screening and targeted psychological interventions, particularly among high-risk groups.

The development of standardized poisoning surveillance systems, continuous trend monitoring, and the establishment of integrated national registries would facilitate data-driven decision-making and optimal resource allocation. Ultimately, reducing mortality and morbidity associated with acute poisoning demands a multidisciplinary approach encompassing targeted public education, improved household and occupational safety measures, restricted access to hazardous substances, and strengthened healthcare capacity, especially in underserved regions. Continued prospective research with rigorous methodology and wider geographical coverage is recommended to refine trend analyses and identify priority areas for intervention.

Authors' Contribution

A.R.B: Study design, collecting data, writing,

reviewing, and finalizing the manuscript, R.S.R: Data collection and drafting; Sh.M.M: Data collection and drafting, M.R: Data gathering, drafting and reviewing; M.Gh: Data gathering, drafting and reviewing; S.Sh.J: Data gathering, drafting and reviewing; F.Kh: Study design, supervision, and reviewing the manuscript; All authors have reviewed and approved the final manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Declaration of AI

The authors declare that no AI tools were used in the preparation of this manuscript.

Conflict of Interest: None declared.

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