SHORT RESEARCH ARTICLE

Age, Sex, and Ethnic Differences in Intracerebral Haemorrhage in Karaganda Region, Kazakhstan, 2018-2020

Shynar Muratbekova[1*], Marina Grigolashvili[2], Mira Beisembayeva[3], Azamat Ibraev[4], Ruslan Belyayev[5], Alina Koshelyuk[6], Elena Shayakhmetova[7], Sharbanu Battakova[8]

[1-8]Department of Neurology, Psychiatry and Rehabilitation, Karaganda Medical University, Karaganda, Kazakhstan

DOI: 10.55489/njcm.170120265948

ABSTRACT

Background: Stroke morbidity and mortality rate varies depending on the level of economic and social development of the resident country, geographical region, as well as ethnicity and sex attribute. The aim of the study is to identify special aspects in morbidity and mortality rates among patients with intracerebral hemorrhages considering age, sex and ethnic differences in Kazakhstan.

Methodology: The study included 1,657 patients hospitalized in Kazakhstan between 2018 and 2020.

Results: In the study, we found that the average age at admission was significantly lower for male patients (59.96 years) compared to female patients (64.31 years). The overall mortality rate, including both in-hospital and within 30 days after discharge, was 35%. The distribution of mortality by age and sex showed statistically significant differences by ethnicity, with distinct patterns observed among patients of Kazakh and other ethnic groups.

Conclusions: Further detailed studies focused on identifying and preventing intracerebral hemorrhage risk factors are necessary to validate these results.

Keywords: Stroke, Intracerebral Haemorrhage, Risk Factors, Kazakhstan, Epidemiology

ARTICLE INFO

Financial Support: This work was supported by the Ministry of Science and Higher Education of the Republic of Kazakhstan [individual registration number AP23490807, Protocol version Contract No. 331/GF 24-26 01/10/2024].

Conflict of Interest: The authors have declared that no conflict of interest exists.

Received: 30-08-2025, **Accepted**: 10-12-2025, **Published**: 01-01-2026

***Correspondence:** Shynar Muratbekova (Email: MuratbekovaS@qmu.kz)

How to cite this article: Muratbekova S, Grigolashvili M, Beisembayeva M, Ibraev A, Belyayev R, Koshelyuk A, Shayakhmetova E, Battakova S. Age, Sex, and Ethnic Differences in Intracerebral Haemorrhage in Karaganda Region, Kazakhstan, 2018-2020. Natl J Community Med 2026;17(1):63-66. DOI: 10.55489/njcm.170120265948

www.njcmindia.com │ pISSN: 0976-3325 │ eISSN: 2229-6816 │ Published by Medsci Publications

INTRODUCTION

The global burden of acute cerebrovascular accidents is rising, largely driven by population ageing. While ischemic stroke accounts for the majority of cases, intracerebral haemorrhage is generally associated with poorer clinical outcomes, including higher mortality and disability, compared with other major stroke subtypes.[1] Global estimates from the Global Burden of Disease Study indicate that intracerebral haemorrhage accounted for approximately 3.41 million cases worldwide in 2019.[2] Available global and regional data suggest that stroke epidemiology, including intracerebral haemorrhage, varies by age, sex, and geographical region, with additional influences from ethnic and socioeconomic contexts.[1,2] However, detailed epidemiological data on ICH is still scarce in Central Asia, and specifically in Kazakhstan. This lack of regional understanding hampers the development of targeted healthcare strategies. The aim of the study was to identify special aspects in morbidity and mortality rates among ICH patients considering age, sex, and ethnic differences in Kazakhstan.

METHODOLOGY

In our study, we evaluated morbidity and mortality rates among ICH patients in Karaganda Region, who were admitted to hospital with diagnoses corresponding ICD Code I61.0-I61.9 from January 1, 2018 to December 31, 2020. Initial data for analysis were obtained from the Disease Register for Karaganda Region. The cases of transfer to other medical facilities, recurrent hospital admission cases for medical rehabilitation were excluded. There is no data on patients who received outpatient care without hospitalization. Each ICH case was validated by clinical information and brain imaging.

The average annual population of the Karaganda region in 2019 was 1.38 million people (approximately 7.4% of the total population of Kazakhstan)[3], with an ethnic composition predominantly Kazakh (49.4%) and a significant minority of European origin, primarily Russian (37.5%)[4].

Data were analyzed using descriptive statistical techniques, reporting absolute values (n), percentages (%), and 95% confidence intervals (using Wilson's method). Following verification of normality, non-parametric tests (Mann-Whitney and Kruskal-Wallis tests) and the chi-square test were applied with a significance level of $p < 0.05$. The morbidity rates were calculated per 100,000 individuals using standard formulas.

Ethical consideration: The authors assure that the study was conducted in accordance with the recommendations of the Declaration of Helsinki and approved by the Ethical Committee of the Karaganda Medical University (Minutes of the meeting No. 16 of 06/19/2020 with the assigned No. 57).

RESULTS

This analysis of 1,657 patients hospitalized with ICH reveals several key epidemiological patterns, while detailed demographic and mortality data are available in Tables 1 and 2.

Table 1: Sex, Age and Ethnic characteristics of Hospitalized Patients

Characteristics	Women		Men		Total (%) (N = 1657)
	Kazakhs (%) (N = 380)	Others (%) (N = 407)	Kazakhs (%) (N = 461)	Others (%) (N = 409)	
Age Group					
Mean ± SD	62.00±12.06	66.47±11.99	59.22±10.65	60.80±12.54	62.03±12.09
18-44	21 (5.53)	15 (3.69)	35 (7.59)	46 (11.25)	81 (9.31)
45-59	142 (37.37)	101 (24.82)	199 (43.17)	123 (30.07)	322 (37.01)
60-74	148 (38.95)	176 (43.24)	191 (41.43)	188 (45.97)	379 (43.56)
Over 75	69 (18.16)	115 (28.26)	36 (7.81)	52 (12.71)	88 (10.11)
ICD-10					
I61.0 ICH in hemisphere, subcortical	161 (42.37)	164 (40.29)	184 (39.91)	155 (37.9)	664 (40.07)
I61.1 ICH in hemisphere, cortical	90 (23.68)	51 (12.53)	109 (23.64)	62 (15.16)	312 (18.83)
I61.2 ICH in hemisphere, unspecified	3 (0.79)	7 (1.72)	13 (2.82)	9 (2.2)	32 (1.93)
I61.3 ICH in brain stem	11 (2.89)	15 (3.69)	19 (4.12)	20 (4.89)	65 (3.92)
I61.4 ICH in cerebellum	12 (3.16)	22 (5.41)	18 (3.9)	14 (3.42)	66 (3.98)
I61.5 ICH, intraventricular	21 (5.53)	28 (6.88)	18 (3.9)	28 (6.85)	95 (5.73)
I61.6 ICH, multiple localized	24 (6.32)	30 (7.37)	34 (7.38)	33 (8.07)	121 (7.3)
I61.8 Other ICH	52 (13.68)	86 (21.13)	61 (13.23)	86 (21.03)	285 (17.2)
I61.9 ICH, unspecified	6 (1.58)	4 (0.98)	5 (1.08)	2 (0.49)	17 (1.03)
Outcome					
Discharged	288 (75.79)	255 (62.65)	351 (76.14)	249 (60.88)	1143 (68.98)
Died in the hospital	92 (24.21)	152 (37.35)	110 (23.86)	160 (39.12)	514 (31.02)
Died 30 days	15 (3.95)	17 (4.18)	19 (4.12)	15 (3.67)	66 (3.98)

ICH: Intracerebral haemorrhage

Table 2: Sex, Age and Ethnic characteristics of Inpatient Mortality

Age (Year)	Women		Men		Total (%)
	Kazakhs (%)	Others (%)	Kazakhs (%)	Others (%)	
Mean ± SD	61.32 ± 11.15	67.77 ± 12.20	58.72 ± 10.35	59.54 ± 13.76	62.12 ± 10.13
18-44	2 (2.17)	6 (3.95)	9 (8.18)	25 (15.63)	42 (8.17)
45-59	43 (46.74)	30 (19.74)	49 (44.55)	52 (32.5)	174 (33.85)
60-74	32 (34.78)	66 (43.42)	44 (40)	62 (38.75)	204 (39.69)
Over 75	15 (16.3)	50 (32.89)	8 (7.27)	21 (13.13)	94 (18.29)
Total	92 (17.90)	152 (29.57)	110 (21.40)	160 31.13)	514 (100)

The sample demonstrated a slight male predominance (52.5%) and a significantly lower average age for male patients compared to female patients. While no significant differences in incidence or mortality were observed between ethnic groups, distinct patterns of age-at-onset emerged: Kazakh patients showed an equal peak in the 45-59- and 60-74-year age groups, while non-Kazakh patients were predominantly affected at older ages.

In-hospital mortality rates were 31% overall, with no significant difference between males and females. However, mortality patterns by age varied by ethnicity, reflecting the incidence peaks. Kazakh patients experienced the highest mortality rates in the 45-59- and 60-74-year age groups, whereas non-Kazakh patients had the highest mortality among older age groups.

Discussion

Our findings from the Karaganda region of Kazakhstan indicate a distinct epidemiological pattern for ICH. The data reveals a male predominance among patients with ICH, accounting for 52.5% of all cases. Additionally, there is a significant difference in the age of onset between men and women, with men experiencing ICH at a significantly younger average age. No overall ethnic disparities were observed in terms of incidence or mortality rates.

However, it is worth noting that the age distribution of ICH varies by ethnicity. Among ethnic Kazakhs, the highest incidence rates were observed in the 45-59- and 60-74-year age groups. In contrast, non-Kazakh patients were predominantly affected by ICH at older ages. Furthermore, the overall in-hospital mortality rate was high, at 31%.

A tendency toward earlier onset of stroke and a higher burden among men has been reported in several Asian population-based studies, suggesting possible regional similarities in demographic patterns. Population-based studies from Taiwan and Japan have reported sex- and age-related differences in overall stroke incidence, with a relatively higher burden observed among men in younger age groups.[5,6] Data from Yakutia (Russia) suggest differences in the structure of hemorrhagic stroke across racial groups, indicating that population-specific factors may influence disease patterns.[7] The observed age distribution may reflect cohort-related or lifestyle influences, as modifiable cardiovascular risk factors such as hypertension, smoking, and alcohol use are well-established contributors to hemorrhagic stroke in comparable populations. This underscores the necessity of targeted primary prevention focused on rigorous management of these modifiable risks from an early age.

Strength and Limitations

The main strength of this research is the provision of original, detailed epidemiological data from a large sample of patients in a hospital-based setting in an under-researched region of Central Asia. The data was collected using validated ICD diagnoses, which adds to the credibility of the findings.

However, it is important to acknowledge some limitations. The retrospective and single-center nature of the study limits the generalizability of the results to other regions in Kazakhstan or specific ethnic groups within the broader "non-Kazakh" population. Additionally, the lack of individual-level information on key modifiable risk factors such as blood pressure control, anticoagulant use, alcohol intake, and smoking status prevents a causal analysis of demographic patterns and interactions between age and ethnicity.

Conclusion

This study demonstrates that ICH in Central Kazakhstan disproportionately affects younger and middle-aged individuals, with ethnic Kazakhs exhibiting a unique bimodal age distribution. Despite the absence of overall ethnic disparities in mortality, the high fatality rate highlights ICH as a significant public health concern for all groups. These findings strongly support the development of tailored prevention programs that address the specific needs of different demographic groups, with a particular focus on aggressively managing cardiovascular risk factors in young and middle-aged adults, especially men. Future, prospective, multi-center studies that incorporate detailed risk-factor assessment are essential to confirm these trends and guide the development of effective, evidence-based interventions.

Individual Authors' Contributions: **SM** contributed to conceptualization, methodology, analysis, investigation, data curation, and original drafting. **MG** con-

tributed to conceptualization, methodology, validation, supervision, project administration, and review/editing. **MB**, **RB**, **AI**, **AK**, and **SE** contributed to investigation and original drafting, with **AK** and **SE** also involved in data curation. **SB** contributed to supervision and review/editing.

Availability of Data: Data of this study are not publicly available due to privacy reasons but are available from corresponding author upon reasonable request. Further inquiries can be directed to the corresponding author.

Declaration of No use of generative AI tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

REFERENCES

1. Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, et al. Heart Disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. Circulation. 2017 Mar 7;135(10):e146-e603. DOI: https://doi.org/10.1161/CIR.0000000000000491. PMID: 28122885; PMCID: PMC5408160.
2. GBD 2019 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Neurol. 2021;20(10):795-820. DOI: https://doi.org/10.1016/S1474-4422(21)00252-0 PMid:34487721 PMCID: PMC8443449.
3. Bureau of National Statistics, Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Average annual population [Internet]. Astana: BNS; (data table, incl. 2019 by region) [cited 2025 Dec 25]. Available from: https://stat.gov.kz/api/iblock/element/region/88689/file/en/?utm_source=chatgpt.com
4. GOV.KZ. Karaganda Region (regional information; population ethnic composition) [Internet]. Astana: Government of the Republic of Kazakhstan; [cited 2025 Dec 25]. Available from: https://www.gov.kz/memleket/entities/qazalem/activities/27975?lang=en&utm_source=chatgpt.com
5. Tsai CF, Wang YH, Teng NC, Yip PK, Chen LK. Incidence, subtypes, sex differences and trends of stroke in Taiwan. PLoS One. 2022;17(11):e0277296. DOI: https://doi.org/10.1371/journal.pone.0277296 PMid:36383604 PMCid:PMC9668115
6. Kondo Y, Yatsuya H, Ota A, et al. The Association Between Adult Height and Stroke Incidence in Japanese Men and Women: A Population-based Case-Control Study. J Epidemiol. 2023;33(1):23-30. DOI: https://doi.org/10.2188/jea.JE20200531 PMid:34176853 PMCid:PMC9727208
7. Chugunova SA, Nikolaeva TY, Semenov A. Contribution of cerebral vascular anomalies in hemorrhagic stroke struc-ture in different racial groups of Yakutia. Wiad Lek. 2015;68(4):604-607. PMID: 26887148.