

Epidemiological analysis of the incidence of early-onset kidney cancer stratified by country and continent

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Introduction

Renal cancer accounts for approximately 3% of malignant neoplasms in adults and is less common in individuals under 45 years old. However, early-onset cases may be associated with hereditary syndromes, such as Von Hippel-Lindau syndrome, hereditary papillary renal carcinoma, and Birt-Hogg-Dubé syndrome, which supports the National Comprehensive Cancer Network (NCCN, 2025) recommendation for genetic testing. This study aims to assess the incidence of early-onset kidney cancer worldwide, stratified by geographic region, Human Development Index (HDI), and income level.

Scientific Methodology

Data on the incidence of kidney cancer in individuals under 45 years old in 2022 were obtained from the Cancer Today platform (GLOBOCAN/IARC). The age-standardized rate (ASR) was used for comparisons between countries and continents. Analyses were stratified by continent, geographic region, HDI, and economic classification according to the World Bank.

Results

Globally, 45,986 cases of early-onset kidney cancer were identified, with an ASR of 0.80 per 100,000 inhabitants. The highest incidence was observed in North America (ASR = 2.6), followed by Europe (ASR = 1.6) and Oceania (ASR = 1.2), while the lowest rates were recorded in Asia (ASR = 0.52) and Africa (ASR = 0.70). Among countries, the highest ASR values were observed in the United States (ASR = 2.7), Belarus (ASR = 2.6), and France (ASR = 2.5). In Brazil, the ASR was 0.74, below both the global average and the South American average (0.83). When stratified by HDI, the highest ASR was observed in very high HDI countries (1.6), while medium and low HDI countries had rates of 0.41 and 0.64, respectively. In terms of economic classification, high-income countries had an ASR of 1.7, whereas lower-middle-income countries recorded the lowest rate (ASR = 0.46).

Top 3 countries with the highest incidence (ASR) of early-onset (0-44) kidney cancer (2022)

Population	Number of cases	ASR
1st) USA	6 478	2.70
2nd) Belarus	199	2.60
3rd) France	1 080	2.50
World	45 986	0.80
86th) Brazil	1 224	0.74

Incidence (ASR) of early-onset (0-44) kidney cancer by continent (2022)

Population	Number of cases	ASR
1st) Northern America	7 010	2.60
2nd) Europe	8 263	1.60
3rd) Oceania	388	1.20
4th) Latin America	4 056	0.84
World	45 986	0.80
5th) Africa	8 478	0.70
6th) Asia	17 791	0.52

Top 3 UN regions with the highest incidence (ASR) of early-onset (0-44) kidney cancer (2022)

Population	Number of cases	ASR
1st) Northern America	7 010	2.60
2nd) Australia-New Zealand	381	1.80
3rd) Eastern Europe	3 834	1.70
World	45 986	0.80

Incidence (ASR) of early-onset (0-44) kidney cancer by HDI (2022)

Population	Number of cases	ASR
1st) Very high HDI countries	18 886	1.60
World	45 986	0.80
2nd) High HDI countries	13 734	0.68
3rd) Low HDI countries	6 659	0.64
4th) Medium HDI countries	6 706	0.41

Incidence (ASR) of early-onset (0-44) kidney cancer by World Bank Classification (2022)

Population	Number of cases	ASR
1st) High income countries	14 518	1.70
2nd) Upper middle income countries	15 443	0.83
World	45 986	0.80
3rd) Low income countries	4 295	0.71
4th) Lower middle income countries	11 506	0.46

Conclusion

Early-onset kidney cancer shows marked geographic disparities, being more prevalent in North America and Europe, as well as in high-income and very high HDI countries. The higher incidence in these countries may reflect the impact of both genetic and environmental factors, as well as greater access to early diagnosis. Further research is required to explore genetic predispositions and environmental influences, particularly in high-incidence Caucasian populations.

References

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