

Global Disease Burden From Acute Glomerulonephritis 1990–2019



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Acute glomerulonephritis (GN) is an acute episode of glomerular injury accompanied by inflammation, usually characterizing by edema, hematuria, hypertension, and acute kidney injury.¹ In the classification of the clinical renal presentation, acute GN (International Classification of Diseases code: N00-N01.9) (Table S1) generally includes nephritic syndrome and rapidly progressive GN.¹ The clinical outcome of patients with acute GN depends on the disease severity and the underlying cause. Acute post-infectious glomerulonephritis is the most common form of acute GN, particularly in children. Viral, bacterial, and protozoal organisms can cause infections, with subsequent acute post-infectious glomerulonephritis.² With the aging population growing, acute GN is increasingly common in older patients due to the increased rates of endocarditis, which is associated with the ongoing utility of intravenous drugs and cardiac devices.³ Thus, not only younger children but also older adults are affected by this disease. In addition to acute post-infectious glomerulonephritis, the other forms of acute GN include immunoglobulin A nephropathy and rapidly progressive GN.¹ Immunoglobulin A nephropathy is characterized by a mesangial proliferative GN. Rapidly progressive GN has the potential to destroy renal function within days. These forms of acute GN usually cannot be expected to resolve spontaneously.¹ Acute GN can result in acute renal failure requiring dialysis and intensive care and results in economic costs to families and the health system. Therefore, we do not turn a blind eye to the disease burden of acute GN. Previous predominantly single-center studies have described the clinical characteristics, complications, and clinical outcome of adults and children with acute GN.^{4,5} However, a large-scale systematic analysis of the global disease burden of acute GN is lacking. The Global Burden of Disease (GBD) Study 2019 provides up-to-date data

regarding the epidemiology of acute GN for 195 countries and territories from 1990 to 2019.⁶ Using this data source, we analyzed rates in 2019, and temporal trends between 1990 and 2019, for the point prevalence, incidence, disability-adjusted life-years (DALYs), and mortality (Table S2) associated with acute GN at a global, regional, and national level.

Globally, there were 48,375 point prevalent cases, 722,244 incident cases, 10,522 deaths, and 307,480 DALYs attributed to acute GN in 2019. The age-standardized rates in 2019 for prevalence per 100,000 population were 0.63 (95% uncertainty interval [UI], 0.52 to 0.76), for incidence was 9.45 (95% UI, 7.72 to 11.55), the mortality rate was 0.13 (95% UI, 0.10 to 0.16), and the DALY rate was 3.90 (95% UI, 2.57 to 4.61) (Table 1). The highest age-standardized rates were in North Korea (1.75; 95% UI, 1.27 to 2.32) for prevalence, in Vietnam (25.44; 95% UI, 19.32 to 32.90) for incidence, in China (0.40; 95% UI, 0.27 to 0.46) for mortality, and in Timor-Leste (21.70; 95% UI, 8.04 to 32.32) for DALYs (rate per 100,000 population in 2019) (Table 1, Figure 1). These rates decreased significantly from 1990 to 2019 per year. Generally, East Asia had the highest decreased trend of age-standardized prevalence and age-standardized incidence rate during 1990 to 2019, respectively. Eastern Europe had the highest decreased trend of age-standardized mortality and age-standardized DALYs over the same period. By contrast, the highest increased trend in age-standardized incidence and age-standardized prevalence rate was in South Asia. At the same time, North Africa and Middle East, High-income North America, and Central Latin America had the highest increased trends of age-standardized mortality and age-standardized DALYs from 1990 to 2019 (Table 1, Figure S1). The national age-standardized rates and trends of prevalence, incidence,

Table 1. Numbers, age-standardized rates of prevalence, incidence, mortality, and disability-adjusted life years from acute glomerulonephritis in 2019, and trends from 1990 to 2019 in the global and regional levels

Variables	Prevalence		
	Count (IQR)	Age-standardized prevalence (95% UI)	Annual percent change in rate (CI) ^a
Prevalence			
Global level	48,375 (39,386, 58,295)	0.63 (0.52 to 0.76)	-1.92 (-2.14, -1.69)
Male	25,791 (21,044, 31,044)	0.67 (0.55 to 0.8)	-2.02 (-2.26, -1.78)
Female	22,583 (18,339, 27,267)	0.60 (0.48 to 0.72)	-1.81 (-2.02, -1.6)
Regional level			
Low SDI	6196 (4870, 7745)	0.55 (0.45 to 0.67)	0.54 (0.43, 0.66)
Low-middle SDI	13,997 (11,377, 16,925)	0.78 (0.64 to 0.93)	-0.1 (-0.18, -0.02)
Middle SDI	15,894 (12,903, 19,163)	0.69 (0.56 to 0.83)	-2.75 (-3.12, -2.37)
High-middle SDI	8427 (6,902, 10,229)	0.62 (0.5 to 0.75)	-3.28 (-3.66, -2.9)
High SDI	3832 (3,121, 4,605)	0.41 (0.32 to 0.5)	-0.74 (-0.8, -0.68)
Andean Latin America	202 (154, 259)	0.32 (0.24 to 0.41)	0.24 (0.11, 0.37)
Australasia	93 (69, 120)	0.35 (0.25 to 0.47)	-0.02 (-0.07, 0.04)
Caribbean	279 (207, 363)	0.6 (0.44 to 0.78)	0.18 (0.15, 0.2)
Central Asia	1377 (1078, 1753)	1.45 (1.14 to 1.84)	-0.46 (-0.64, -0.28)
Central Europe	936 (753, 1150)	0.94 (0.74 to 1.18)	-0.18 (-0.28, -0.08)
Central Latin America	1166(904,1468)	0.48 (0.37 to 0.6)	-0.24 (-0.4, -0.07)
Central sub-Saharan Africa	590 (425, 776)	0.49 (0.37 to 0.63)	-0.04 (-0.1, 0.02)
East Asia	6805 (5516, 8513)	0.53 (0.42 to 0.66)	-5.34 (-6.1, -4.58)
Eastern Europe	2876 (2412, 3448)	1.3 (1.09 to 1.55)	-1.62 (-1.86, -1.38)
Eastern sub-Saharan Africa	2144 (1641, 2738)	0.54 (0.43 to 0.67)	-0.11 (-0.16, -0.05)
High-income Asia Pacific	1939 (1558, 2345)	1.41 (1.08 to 1.80)	0.27 (0.21, 0.33)
High-income North America	526 (457, 600)	0.12 (0.10 to 0.14)	-0.32 (-0.49, -0.14)
North Africa and Middle East	2683 (2092, 3415)	0.46 (0.36 to 0.58)	0.96 (0.91, 1.01)
Oceania	128 (91, 174)	0.91 (0.67 to 1.19)	0.21 (0.17, 0.25)
South Asia	14,564 (11,840, 17,670)	0.78 (0.64 to 0.94)	1.75 (1.44, 2.07)
Southeast Asia	6790 (5344, 8557)	1.05 (0.83 to 1.34)	-0.85 (-0.95, -0.74)
Southern Latin America	131 (97, 174)	0.19 (0.14 to 0.26)	0.01 (-0.13, 0.16)
Southern sub-Saharan Africa	398 (321, 489)	0.5 (0.41 to 0.61)	0.09 (0.04, 0.14)
Tropical Latin America	2889 (2385, 3516)	1.43 (1.17 to 1.78)	-1.14 (-1.32, -0.97)
Western Europe	682 (535, 853)	0.17 (0.13 to 0.22)	0.01 (-0.07, 0.1)
Western sub-Saharan Africa	1176 (886, 1497)	0.26 (0.2 to 0.32)	0.26 (0.19, 0.32)
Incidence			
Global level	722,244 (595,182, 877,834)	9.45 (7.72 to 11.55)	-1.84 (-2.05, -1.62)
Male	384,881 (317,618, 466,573)	10 (8.23 to 12.16)	-1.94 (-2.17,-1.71)
Female	337,363 (277,087, 410,579)	8.91 (7.23 to 10.9)	-1.72 (-1.93, -1.52)
Regional level			
Low SDI	90,785 (71,609, 113,621)	8.13 (6.57 to 9.93)	0.53 (0.39, 0.68)
Low-middle SDI	209,162 (171,704, 254,192)	11.71 (9.67 to 14.18)	-0.04 (-0.12, 0.05)
Middle SDI	229,525 (188,587, 279,710)	9.96 (8.15 to 12.2)	-2.49 (-2.81, -2.17)
High-middle SDI	124,479 (102,778, 150,652)	9.13 (7.41 to 11.24)	-3.23 (-3.61, -2.86)
High SDI	56,795 (47,068, 68,265)	6.00 (4.78 to 7.51)	-0.75 (-0.81, -0.68)
Andean Latin America	3034 (2312, 3921)	4.79 (3.65 to 6.18)	0.25 (0.12, 0.38)
Australasia	1368 (1037, 1770)	5.15 (3.79 to 6.85)	-0.03 (-0.09, 0.03)
Caribbean	4196 (3119, 5510)	9.01 (6.67 to 11.88)	0.16 (0.14, 0.19)
Central Asia	20,600 (16,148, 26,447)	21.67 (16.95 to 27.73)	-0.39 (-0.55, -0.23)
Central Europe	13,940 (11,329, 17,197)	13.98 (11.1 to 17.69)	-0.18 (-0.27, -0.08)
Central Latin America	17,472 (13,693, 22,068)	7.17 (5.63 to 9.05)	-0.27 (-0.43, -0.11)
Central sub-Saharan Africa	8854 (6432, 11,696)	7.46 (5.69 to 9.59)	0 (-0.06, 0.05)
East Asia	97,614 (79,539, 119,180)	7.65 (6.16 to 9.4)	-5.34 (-6.1, -4.57)
Eastern Europe	43,027 (36,442, 51,278)	19.53 (16.55 to 23.27)	-1.5 (-1.73, -1.27)
Eastern sub-Saharan Africa	32,783 (25,239, 41,795)	8.31 (6.66 to 10.38)	-0.12 (-0.17, -0.06)
High-income Asia Pacific	28,660 (23,389, 34,876)	20.76 (16.04 to 26.93)	0.26 (0.2, 0.32)
High-income North America	7723 (6781, 8749)	1.76 (1.56 to 2)	-0.36 (-0.53, -0.2)
North Africa and Middle East	39,991 (31,202, 51,879)	6.88 (5.4 to 8.72)	0.92 (0.87, 0.96)
Oceania	1938 (1400, 2654)	13.73 (10.09 to 18.28)	0.2 (0.16, 0.24)
South Asia	220,143 (180,802, 265,753)	11.86 (9.88 to 14.25)	1.72 (1.4, 2.04)
Southeast Asia	101,025 (79,100, 129,176)	15.73 (12.31 to 20.21)	-0.82 (-0.92, -0.72)

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Table 1. (Continued)

Variables	Prevalence		
	Count (IQR)	Age-standardized prevalence (95% UI)	Annual percent change in rate (CI) ^a
Southern Latin America	1969 (1479, 2559)	2.87 (2.15 to 3.79)	0 (-0.15, 0.15)
Southern sub-Saharan Africa	6005 (4851, 7402)	7.56 (6.2 to 9.27)	0.1 (0.05, 0.15)
Tropical Latin America	43,849 (36,483, 52,981)	21.8 (17.88 to 26.71)	-1.11 (-1.28, -0.93)
Western Europe	10,091 (8034, 12,503)	2.55 (1.99 to 3.28)	0 (-0.09, 0.08)
Western sub-Saharan Africa	17,961 (13,753, 22,763)	3.93 (3.11 to 4.9)	0.23 (0.17, 0.29)
Mortality			
Global level	10,522 (7199, 12,200)	0.13 (0.09 to 0.15)	-2.89 (-3.15, -2.63)
Male	5670 (2969, 6847)	0.16 (0.08 to 0.19)	-2.67 (-2.96, -2.38)
Female	4853 (3784, 5980)	0.11 (0.09 to 0.14)	-3.17 (-3.4, -2.94)
Regional level			
Low SDI	548 (153, 1053)	0.08 (0.02 to 0.18)	-2.1 (-2.19, -2.02)
Low-middle SDI	1971 (1010, 2297)	0.15 (0.08 to 0.18)	-2.86 (-3.01, -2.7)
Middle SDI	5502 (3660, 6453)	0.24 (0.17 to 0.29)	-2.86 (-3.18, -2.55)
High-middle SDI	1945 (1539, 2256)	0.1 (0.08 to 0.12)	-4.07 (-4.37, -3.77)
High SDI	554 (476, 606)	0.03 (0.02 to 0.03)	-0.02 (-1.15, 1.1)
Andean Latin America	8 (6, 11)	0.02 (0.01 to 0.02)	-5.41 (-6.06, -4.75)
Australasia	7 (6, 9)	0.01 (0.01 to 0.02)	-0.65 (-3.21, 1.91)
Caribbean	17 (10, 27)	0.04 (0.02 to 0.06)	-1.42 (-1.99, -0.85)
Central Asia	110 (93, 134)	0.12 (0.1 to 0.15)	-3.79 (-4.55, -3.03)
Central Europe	41 (35, 47)	0.02 (0.02 to 0.02)	-5.18 (-6.2, -4.16)
Central Latin America	281 (242, 320)	0.12 (0.11 to 0.14)	3.2 (0.57, 5.84)
Central sub-Saharan Africa	110 (30, 221)	0.18 (0.04, 0.41)	-1.33 (-1.62, -1.05)
East Asia	7175 (4789, 8407)	0.39 (0.27 to 0.45)	-3.24 (-3.5, -2.97)
Eastern Europe	156 (132, 182)	0.05 (0.05 to 0.06)	-7.86 (-8.72, -7)
Eastern sub-Saharan Africa	317 (76, 761)	0.15 (0.03 to 0.41)	-2.74 (-2.83, -2.65)
High-income Asia Pacific	151 (119, 172)	0.03 (0.02 to 0.03)	-1.52 (-1.75, -1.29)
High-income North America	269(236,297)	0.04 (0.04 to 0.04)	2.99 (0.25, 5.73)
North Africa and Middle East	424 (58, 528)	0.1 (0.02 to 0.12)	3.17 (2.66, 3.69)
Oceania	4 (1, 8)	0.04 (0.01 to 0.08)	0.04 (-0.18, 0.25)
South Asia	171 (124, 226)	0.01 (0.01 to 0.02)	-3.9 (-4.06, -3.74)
Southeast Asia	1060 (311, 1464)	0.19 (0.06 to 0.26)	-3.17 (-3.28, -3.05)
Southern Latin America	3 (2, 3)	0.003 (0.0029 to 0.004)	-3.56 (-4.75, -2.38)
Southern sub-Saharan Africa	35 (30, 41)	0.06 (0.05 to 0.06)	-0.69 (-0.98, -0.39)
Tropical Latin America	58 (53, 63)	0.03 (0.02 to 0.03)	-6.15 (-6.71, -5.59)
Western Europe	92 (80, 101)	0.0087 (0.008 to 0.009)	-1.18 (-3, 0.65)
Western sub-Saharan Africa	34 (12, 63)	0.01 (0 to 0.02)	-1.94 (-2.13, -1.75)
DALYs			
Global level	307,480 (204,185, 362,573)	3.90 (2.57 to 4.61)	-3.89 (-4.08, -3.7)
Male	168,933 (84,118, 207,613)	4.39 (2.18 to 5.36)	-3.59 (-3.81, -3.36)
Female	138,547 (94,777, 178,442)	3.46 (2.29 to 4.5)	-4.24 (-4.38, -4.09)
Regional level			
Low SDI	27,352 (8248, 47,095)	2.67 (0.77 to 5.1)	-2.7 (-2.77, -2.63)
Low-middle SDI	62,601 (31,604, 74,473)	4.05 (2.05 to 4.79)	-3.96 (-4.09, -3.83)
Middle SDI	158,186 (102,853, 185,699)	6.61 (4.28 to 7.72)	-3.77 (-4.05, -3.49)
High-middle SDI	50,545 (41,348, 58,939)	2.86 (2.32 to 3.33)	-5.02 (-5.29, -4.75)
High SDI	8668 (7820, 9364)	0.52 (0.48 to 0.56)	-0.78 (-1.77, 0.21)
Andean Latin America	241 (162, 333)	0.4 (0.28 to 0.56)	-7.11 (-7.79, -6.44)
Australasia	123 (101, 148)	0.28 (0.23 to 0.33)	-1.06 (-3.2, 1.09)
Caribbean	782 (423, 1369)	1.73 (0.92 to 3.08)	-1.58 (-2.04, -1.11)
Central Asia	4728 (3952, 5765)	4.99 (4.20 to 6.04)	-3.82 (-4.57, -3.07)
Central Europe	1012 (871, 1163)	0.65 (0.56 to 0.75)	-5.72 (-6.68, -4.76)
Central Latin America	6802 (5875, 7754)	2.84 (2.45 to 3.23)	2.1 (-0.38, 4.58)
Central sub-Saharan Africa	5067 (1465, 10,186)	4.98 (1.38 to 10.05)	-2.17 (-2.48, -1.86)
East Asia	183,639 (125,297, 217,608)	10.17 (7.02 to 11.93)	-4.18 (-4.41, -3.95)
Eastern Europe	5495 (4680, 6414)	2.14 (1.83 to 2.5)	-7.96 (-8.81, -7.11)
Eastern sub-Saharan Africa	15,382 (4016, 31,248)	4.49 (1.09 to 10.97)	-3.55 (-3.65, -3.45)
High-income Asia Pacific	2029 (1723, 2241)	0.51 (0.45 to 0.56)	-1.48 (-1.71, -1.26)
High-income North America	4107 (3772, 4440)	0.71 (0.66 to 0.76)	2.65 (0.02, 5.27)

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Table 1. (Continued)

Variables	Count (IQR)	Prevalence	
		Age-standardized prevalence (95% UI)	Annual percent change in rate (CI) ^a
North Africa and Middle East	16,079 (2321, 20,747)	2.97 (0.44 to 3.79)	2.74 (2.25, 3.24)
Oceania	190 (44, 428)	1.51 (0.36 to 3.22)	0.17 (-0.08, 0.43)
South Asia	6692 (4863, 8314)	0.41 (0.3 to 0.51)	-3.94 (-4.04, -3.84)
Southeast Asia	47,484 (11,297, 64,070)	7.66 (1.88 to 10.42)	-3.7 (-3.85, -3.56)
Southern Latin America	73 (62, 87)	0.10 (0.09 to 0.13)	-3.65 (-4.52, -2.78)
Southern sub-Saharan Africa	1510 (1279, 1824)	2.01 (1.72 to 2.41)	-1.63 (-1.95, -1.31)
Tropical Latin America	2410 (2181, 2656)	1.19 (1.06 to 1.33)	-6.9 (-7.35, -6.44)
Western Europe	1311 (1182, 1418)	0.17 (0.15 to 0.18)	-1.67 (-3.2, -0.15)
Western sub-Saharan Africa	2323 (695, 4595)	0.41 (0.15 to 0.76)	-2.06 (-2.27, -1.84)

CI, confidence interval; DALY, disability-adjusted life-years; IQR, interquartile range; SDI, sociodemographic index; UI, uncertainty interval.

^aPercent change in rate refer to average annual percent changes between 1990 and 2019.

mortality, and DALYs across the 195 countries and territories were seen in [Table S3](#). Here, we found the highest disease burden in Asian countries, particularly in Brunei, Uzbekistan, Vietnam, and North Korea with the highest prevalence and incidence, and in China, Laos, Afghanistan, North Korea, and Cambodia with the highest mortality and DALYs.

Notably, acute GN most often results from a soft tissue infection such as beta-hemolytic streptococci pharyngitis in children, namely acute post-streptococcal GN.⁷ Consistent with the previous studies, we found that the highest rate of prevalence and incidence occurred in children. As shown in [Figure S2](#), the initial increased peak in the age-standardized prevalence and

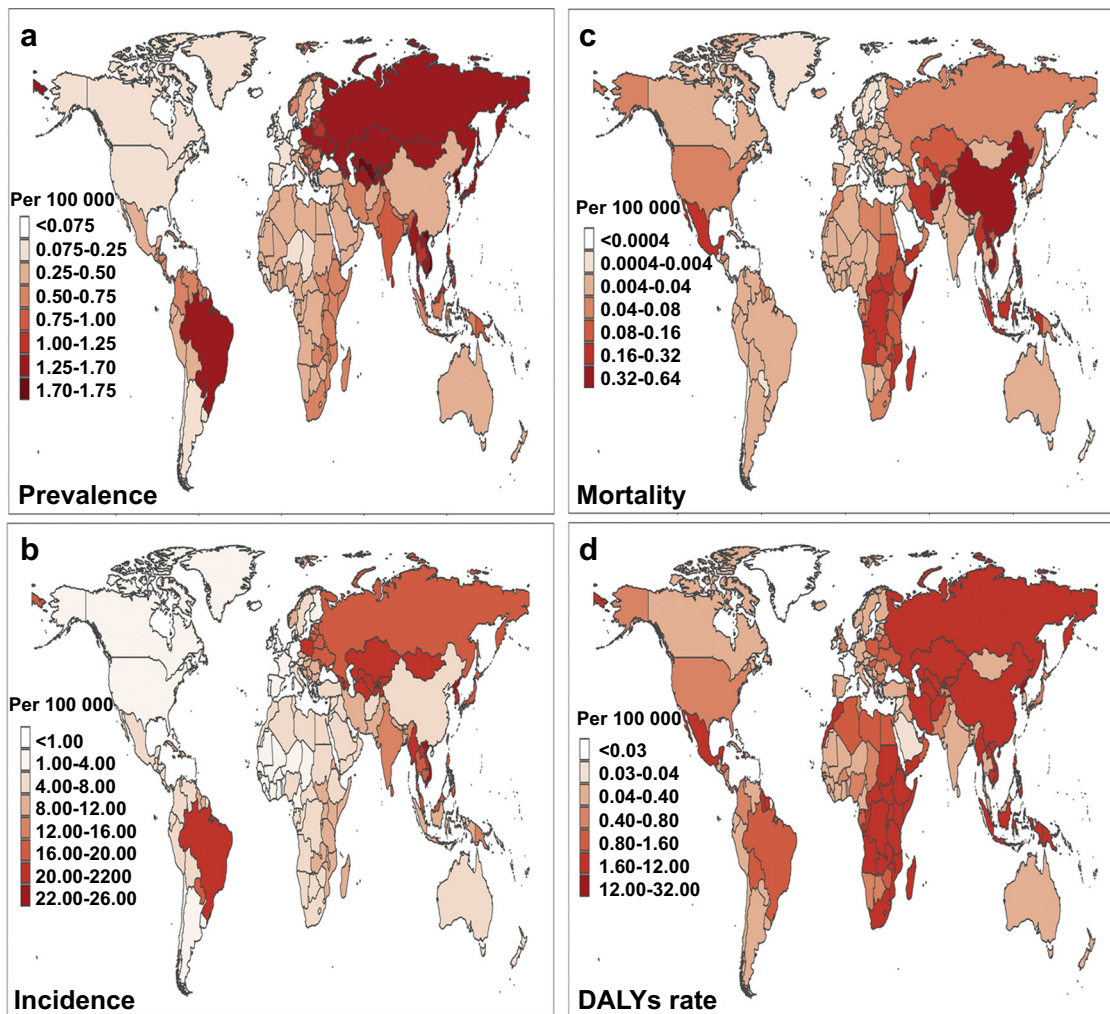


Figure 1. Age-standardized point prevalence (A), incidence (B), mortality (C), and disability-adjusted life years (D) for acute glomerulonephritis per 100,000 population by countries in 2019. DALY, disability-adjusted life-years.

incidence was, respectively, in the 10 to 14 age group, followed by a decline in younger adults, and accompanied by a small wave with some fluctuations in the older population. Acute GN can also occur in adults. Most previous studies about acute GN were limited to children with acute post-streptococcal GN. Therefore, studies involving adults are needed. Different forms of acute GN occur in elderly people, especially those who are immunocompromised with health conditions such as diabetes. For example, protozoal and viral infections in the skin occur more frequently than streptococcal pharyngeal infections as a cause of acute GN in elderly patients.⁸ Also, immunoglobulin A nephropathy and membranoproliferative GN can result in acute GN⁸; membranous GN is the underlying cause of acute GN in the elderly due to a variety of malignancies including carcinoma of the lung, stomach, breast, and colon. Rapidly progressive GN can result in acute kidney injury requiring dialysis, and become a major contributor to morbidity and disability within the growing aging population. In this study, we found that the age-standardized rates of mortality and DALYs increased with age, and peaked in the 80- to 85-year-old age groups in 2019 (Figure S2). These rates were slightly higher in males than in females, although no statistically significant differences were observed. Distributions of these rates were similar to those of case numbers of prevalence, incidence, mortality, and DALYs in 2019 (Figure S3). Thus, policymakers should take the elderly population into account when deciding on approaches to reducing the disease burden of acute GN in the future.

In this study, no association was found between age-standardized incidence, age-standardized prevalence rates or sociodemographic index (SDI) in 2019 regionally and nationally (Figure S4 and S5). However, a negative association between SDI and age-standardized mortality as well as DALYs was observed. Similar results were also seen in expected age-standardized rates based on their own SDI values in 21 regions (Figure S6–S9). Notably, East Asia and Southeast Asia had a higher observed burden than expected to mortality and disability from 1990 to 2019 (Figure S8 and S9). Likewise, countries and territories such as China, Myanmar, Timor-Leste, Cambodia, Laos, and North Korea had much higher observed age-standardized mortality and DALYs than expected in 2019 (Figure S10 and S11). These results indicated that the burden of acute GN may be generally higher at lower socioeconomic levels of development possible due to the higher frequency of acute post-infectious glomerulonephritis. The underlying reason may be explained by the hygiene hypothesis, namely, early and frequent exposure to bacterial antigens is more common in developing

countries than in industrialized nations, which had fewer infections due to better public hygiene.⁹ Thus, increasing population awareness about these relations is warranted to reduce the future burden of acute GN, particularly in the Asia region.

In conclusion, the prevalence, incidence, mortality, and disability related to acute GN have decreased globally. But a high disease burden remains in children and elderly people, particularly in some Asian regions. Increasing awareness about acute GN in these populations is warranted to reduce the future burden of acute GN.

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The GBD study 2019, conducted by Institute of Health Metrics and Evaluation (IHME), provides the available datasets. IHME uses de-identified and aggregated data, so informed consent is not applicable to the GBD study. This manuscript is a review article and does not involve a research protocol requiring approval by the relevant institutional review board or ethics committee.

SUPPLEMENTARY MATERIAL

[Supplementary File \(PDF\)](#)

Table S1. International Classification of Diseases code (N00-N01.9) as reference to diagnosis acute GN in this study.

Table S2. Definitions of measure metrics in GDB 2019.

Table S3. Numbers, age-standardized rates of prevalence, incidence, mortality and disability-adjusted life years from acute glomerulonephritis in 2019, and trends from 1990 to 2019 in GBD study in the national levels.

Figure S1. Annual percentage changes of prevalence, incidence, mortality, and disability-adjusted life years for 21 regions in 2019. APCpre, APCinc, APCmort, and APCdaly represent annual percent changes of prevalence, incidence, mortality, and disability-adjusted life years, respectively.

Figure S2. Age-standardized point prevalence (A), incidence (B), mortality (C) and disability-adjusted life years (D) for acute glomerulonephritis per 100,000 population by sex and age in 2019. Red and green lines represent females and males, respectively.

Figure S3. Global number of prevalent cases (A), incident cases (B), mortality cases (C), and DALYs cases (D) by sex and age in 2019.

Figure S4. Correlation relationship among sociodemographic index (SDI) and age-standardized rates of prevalence (ASPR), incidence (ASIR), mortality (ASMR), and disability-adjusted life years (DALYs) in 21 regions in 2019.

Figure S5. Correlation relationship among sociodemographic index (SDI) and age-standardized rates of prevalence (Pre), incidence (Inc), mortality (Mort), and disability-adjusted life years (DALYs) in 195 countries in 2019.

Figure S6. The estimated relation between SDI and expected age-standardized prevalence from 1900 to 2019 in 21 regions.

Figure S7. The estimated relation between SDI and expected age-standardized incidence (ASIR) from 1900 to 2019 in 21 regions.

Figure S8. The estimated relation between SDI and expected age-standardized mortality (ASMR) from 1900 to 2019 in 21 regions.

Figure S9. The estimated relation between SDI and expected age-standardized disability-adjusted life years (DALYs) from 1900 to 2019 in 21 regions.

Figure S10. Age-standardized DALYs rate for acute glomerulonephritis per 100,000 population for 195 countries by sociodemographic index in 2019.

Figure S11. Age-standardized mortality rate for acute glomerulonephritis per 100,000 population for 195 countries

by sociodemographic index in 2019. Gray ribbon represents expected disease rates based on sociodemographic index in all countries. Points are plotted for the observed age-standardized mortality rate in each country.

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