

## Abstract

**Importance:** Nontraumatic subarachnoid hemorrhage (SAH) represents the third most common stroke type with unique etiologies, risk factors, diagnostics, and treatments. Nevertheless, epidemiological studies often cluster SAH with other stroke types leaving its distinct burden estimates obscure.

**Objective:** To estimate the worldwide burden of SAH.

**Design, setting, and participants:** Based on the repeated cross-sectional Global Burden of Disease (GBD) 2021 study, the global burden of SAH in 1990 to 2021 was estimated. Moreover, the SAH burden was compared with other diseases, and its associations with 14 individual risk factors were investigated with available data in the GBD 2021 study. The GBD study included the burden estimates of nontraumatic SAH among all ages in 204 countries and territories between 1990 and 2021.

**Exposures:** SAH and 14 modifiable risk factors.

**Main outcomes and measures:** Absolute numbers and age-standardized rates with 95% uncertainty intervals (UIs) of SAH incidence, prevalence, mortality, and disability-adjusted life-years (DALYs) as well as risk factor-specific population attributable fractions (PAFs).

**Results:** In 2021, the global age-standardized SAH incidence was 8.3 (95% UI, 7.3-9.5), prevalence was 92.2 (95% UI, 84.1-100.6), mortality was 4.2 (95% UI, 3.7-4.8), and DALY rate was 125.2 (95% UI, 110.5-142.6) per 100 000 people. The highest burden estimates were found in Latin America, the Caribbean, Oceania, and high-income Asia Pacific. Although the absolute number of SAH cases increased, especially in regions with a low sociodemographic index, all age-standardized burden rates decreased between 1990 and 2021: the incidence by 28.8% (95% UI, 25.7%-31.6%), prevalence by 16.1% (95% UI, 14.8%-17.7%), mortality by 56.1% (95% UI, 40.7%-64.3%), and DALY rate by 54.6% (95% UI, 42.8%-61.9%). Of 300 diseases, SAH ranked as the 36th most common cause of death and 59th most common cause of DALY in the world. Of all worldwide SAH-related DALYs, 71.6% (95% UI, 63.8%-78.6%) were associated with the 14 modeled risk factors of which high systolic blood pressure (population attributable fraction [PAF] = 51.6%; 95% UI, 38.0%-62.6%) and smoking (PAF = 14.4%; 95% UI, 12.4%-16.5%) had the highest attribution.

**Conclusions and relevance:** Although the global age-standardized burden rates of SAH more than halved over the last 3 decades, SAH remained one of the most common cardiovascular and

neurological causes of death and disabilities in the world, with increasing absolute case numbers. These findings suggest evidence for the potential health benefits of proactive public health planning and resource allocation toward the prevention of SAH.