

# Global, regional, and national burden of Parkinson's disease, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016

GBD 2016 Parkinson's Disease Collaborators

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Background: Neurological disorders are now the leading source of disability globally, and ageing is increasing the burden of neurodegenerative disorders, including Parkinson's disease. We aimed to determine the global burden of Parkinson's disease between 1990 and 2016 to identify trends and to enable appropriate public health, medical, and scientific responses. Methods: Through a systematic analysis of epidemiological studies, we estimated global, regional, and country-specific prevalence and years of life lived with disability for Parkinson's disease from 1990 to 2016. We estimated the proportion of mild, moderate, and severe Parkinson's disease on the basis of studies that used the Hoehn and Yahr scale and assigned disability weights to each level. We jointly modelled prevalence and excess mortality risk in a natural history model to derive estimates of deaths due to Parkinson's disease. Death counts were multiplied by values from the Global Burden of Disease study's

standard life expectancy to compute years of life lost. Disability-adjusted life-years (DALYs) were computed as the sum of years lived with disability and years of life lost. We also analysed results based on the Socio-demographic Index, a compound measure of income per capita, education, and fertility. Findings: In 2016, 6.1 million (95% uncertainty interval [UI] 5.0-7.3) individuals had Parkinson's disease globally, compared with 2.5 million (2.0-3.0) in 1990. This increase was not solely due to increasing numbers of older people, because age-standardised prevalence rates increased by 21.7% (95% UI 18.1-25.3) over the same period (compared with an increase of 74.3%, 95% UI 69.2-79.6, for crude prevalence rates). Parkinson's disease caused 3.2 million (95% UI 2.6-4.0) DALYs and 211 296 deaths (95% UI 167 771-265 160) in 2016. The male-to-female ratios of age-standardised prevalence rates were similar in 2016 (1.40, 95% UI 1.36-1.43) and 1990 (1.37, 1.34-1.40). From 1990 to 2016, age-standardised prevalence, DALY rates, and death rates increased for all global burden of disease regions except for southern Latin America, eastern Europe, and Oceania. In addition, age-standardised DALY rates generally increased across the Socio-demographic Index. Interpretation: Over the past generation, the global burden of Parkinson's disease has more than doubled as a result of increasing numbers of older people, with potential contributions from longer disease duration and environmental factors. Demographic and potentially other factors are poised to increase the future burden of Parkinson's disease substantially. Funding: Bill & Melinda Gates Foundation. © 2018 The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY 4.0 license