



## THE PARKINSON PANDEMIC: EMERGING EVIDENCE

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### ABSTRACT

Parkinson disease is the neurological condition with the fastest global growth rate and is currently the main cause of disability. Over 6 million people now have Parkinson disease, up from 2 million in 1990. This number is expected to more than double to nearly 12 million by 2040, primarily due to ageing. The load could increase to nearly 17 million as a result of additional factors like longer life expectancy, a decline in smoking rates, and increased industrialization. Parkinson's disease has always been a rare condition. However, a pandemic of Parkinson's disease brought on by demography and the byproducts of industrialization will need for increased advocacy, targeted preparation, and creative strategies.

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## INTRODUCTION

Six patients with a severe illness that had "not yet found a position in the categorization of nosologists" [1] were the subjects of a case series written in 1817 by 62-year-old British physician Dr. James Parkinson. According to Dr. Parkinson, "Parkinson's disease," as Dr. Jean-Martin Charcot would first refer to it, did not "seem to have engaged the general notice of the profession" [1]. Dr. Parkinson was probably reporting something unusual, something that a senior physician would find notable, even though old Indian and Chinese scriptures mention symptoms of Parkinson illness.

Parkinson's disease was a rare ailment during the majority of history. About 22 out of 15 million persons in England and Wales died from the disease in 1855, 40 years after Dr. James Parkinson originally characterized it [2]. Of the 65 million people in the UK, 5,000 to 10,000 experienced the same fate in 2014 [3]. A once-rare illness became widespread in less than two centuries.

According to the Global Burden of Disease research, neurological disorders are currently the main cause of disease around the world, and Parkinson disease is one of these conditions with the fastest expanding age-standardized rates of prevalence, disability, and fatalities [4]. Parkinson disease affected 6.2 million people worldwide in 2015, an increase of 118% from 1990 [4]. Studies on the prevalence of Parkinson's disease throughout time have produced contradictory results

[5-8]. But according to the most recent Global Burden of Disease survey, Parkinson disease age-standardized rates rose globally between 1990 and 2016.

Age-standardized prevalence rates increased globally by over 22% [9]. The prevalence of Parkinson disease may be increasing, according to convergent data from assessments of global surveys [9], medical records from major institutions [10], national census offices [11], and death certificates [12]. Prospective cohort studies and thorough registries are required to properly understand these changes [9]. We concentrate on what is often referred to as Parkinson disease in this work, but the overall burden brought on by other parkinsonian illnesses, including vascular parkinsonism or neurodegenerative atypical parkinsonism, is much greater.

### The Epidemic of Parkinson's Disease

The Parkinson pandemic, however non-infectious, has several pandemic-like traits [13]. Large geographic areas are affected by pandemics, and Parkinson disease is spreading throughout the world's major regions [9]. Pandemics also have a tendency to spread, and although Parkinson disease is becoming more prevalent globally, its burden also seems to be changing as a result of changes in ageing and urbanization. In fact, one study came to the conclusion that the load would move from the West to the East, particularly China, as a result of demographic trends [14]. No one is immune to the Parkinson pandemic, which is spreading exponentially like earlier pandemics.

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In a general context, Allen's description of the non-communicable disease pandemic [15] can be applied to the Parkinson pandemic. Many chronic diseases, like diabetes, which are now the main causes of death and disability worldwide, according to the author, "are essentially communicable diseases, and although the disease's vectors are unconventional, the pandemic term is appropriate" [15]. Numerous noncommunicable diseases are on the rise as a result of social, political, and economic developments, and ultra-processed food and drink, alcohol, cigarette products, and broader social and environmental changes that discourage physical activity are just a few of the "vectors of illness" [15].

### Causes of the Pandemic

Aging populations, longer life expectancies, a drop in smoking rates, and the byproducts of industrialization are all contributing factors to the Parkinson pandemic. Parkinson disease is more common as people get older, peaking about age 65 [16]. The number and proportion of people over 65 is fast rising, which indicates that the world's population is ageing (Fig. 1). An enormous increase in the number of people with Parkinson disease is the combined effect of these two variables. Parkinson disease is expected to affect more than 12 million persons worldwide by 2040 [17]. It's important to note that Parkinson disease affects people of all ages; many people under 50 have the illness.

Other variables, in addition to ageing, will probably cause the worldwide burden of Parkinson disease to exceed current projections. The prevalence of an illness and the survival rate of those who have it determine how many people have it. The prevalence of the disease will rise as people live longer, both with and without Parkinson's disease. Global life expectancy has grown by six years during the past 20 years, independent of Parkinson's disease [18]. In France, 65-year-olds with Parkinson disease would live an average of an additional 3 years between 2010 and 2030, according to a recent study by Wannevich and colleagues, who also found that secular trends in life expectancy will extend this population's survival. Over a 20-year period, this increase in longevity will cause the age standardized prevalence rate to rise by 12 percent [19]. Additionally, as people live longer, there will probably be more people with advanced Parkinson's disease, which is harder to treat and typically results in considerably less access to care.

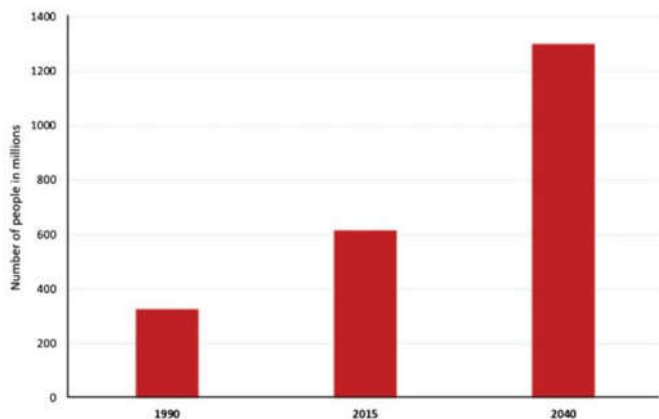


Figure 1 World population 65 and older, 1990–2040 [33, 34].

Despite being good for world health, some nations may see an increase in Parkinson disease as smoking rates decline. According to numerous studies, smokers have a roughly 40% lower risk of developing Parkinson's disease [20]. Lower

smoking rates may result in increased incidence of Parkinson disease if the relationship is causal, which remains to be determined. In fact, a 2018 study by Rossi and colleagues predicted that the U.S.'s dropping smoking rates may result in a 10% rise in the number of people with Parkinson's disease over forecasts that simply account for the effects of ageing [11]. Another study found an increase in the prevalence of Parkinson disease between 1976 and 2005, especially in males over 70, which may be partly attributable to the decline in smoking in those age groups previous decades [5].

Finally, the rise in Parkinson disease cases may be attributed to industrialization's byproducts. Parkinson disease has been associated with a number of industrial byproducts, including certain pesticides, solvents, and heavy metals [21]. The rates of Parkinson disease have increased most dramatically in the nations that have seen the fastest industrialization. For instance, the adjusted prevalence rates of Parkinson disease more than doubled in China from 1990 to 2016 compared to any other nation [9]. Additionally, pesticide usage worldwide is at or close to its highest levels [22]. Various insecticides that have been related to Parkinson's disease are still being used. For instance, the United States continues to use paraquat in ever-increasing amounts despite the fact that 32 countries have outlawed its usage [23]. Paraquat is closely associated with Parkinson disease. Some nations that have outlawed the pesticide, like England (where the disease's first comprehensive description was published), nonetheless export it to other nations, like Brazil, Columbia, South Africa, Taiwan, and the United States [24].

Continued usage is also observed for other neurotoxic substances connected to Parkinson's disease, such as trichloroethylene. The majority of Superfund sites in the US are contaminated, including one under Google's Mountain View, CA, headquarters, where major players like Fairchild Semiconductor and Intel employed the chemical in the semiconductor industry [25]. Even though there have been numerous reports on "the toxicity of trichloroethylene" dating back to at least 1932, including a letter published in the Journal of the American Medical Association [26], it is projected that global use of the solvent will rise by 2 percent annually and by 4 percent annually in China. The enormous number of people with Parkinson disease may be caused by a combination of several variables, including ageing populations, longer life expectancies, declining smoking rates, and the byproducts of industrialization.

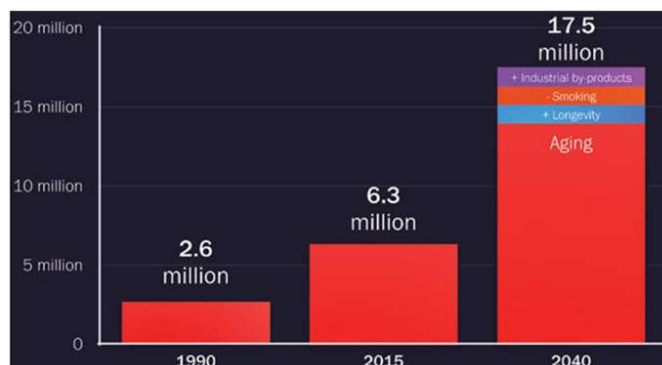


Figure 2 Projected global burden of Parkinson disease accounting for changes in aging, longevity, smoking rates, and industrialization, 1990–2040.

The burden of Parkinson disease could surpass 17 million by 2040 (Fig. 2), assuming a 12 percent increase due to longer life expectancy, a 10 percent increase due to less smoking, and that

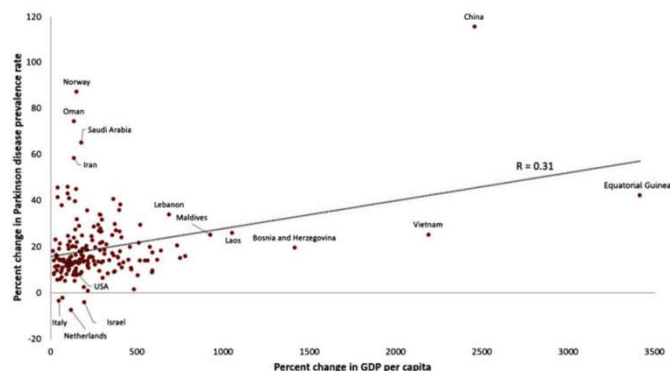
about half (10 percent) of the observed increase in age-adjusted prevalence rates persists due to environmental factors [9, 11, 19].

These predictions are certainly theoretical, but they show how the Parkinson pandemic may spread. Additionally, estimates of the prevalence (of Parkinson disease) rise as procedures advance, as Strickland and Bertoni observed in 2004 [27], "suggesting that under-counting is the fundamental problem in counting Parkinson's patients."

### Why Worry ?

Parkinson disease is increasing and may be a creation of our times. As opposed to most diseases whose burden decreases with improving socioeconomic level, the burden of Parkinson disease does the opposite. Disability due to Parkinson disease increases with the Socio-demographic Index, a compound measure of income per-capita, education, and fertility, and is the only neurological disorder to do so [9]. As GDP per capita rises, so too does the rate of Parkinson disease (Fig. 3). While the association is modest, the direction of the relationship is concerning and again highlights the role that human activities, especially industrialization, may be playing in the increasing burden of Parkinson disease. The lifetime risk of Parkinson disease, including for the readers of this paper, is now 1 in 15 [19, 28].

The prevalence and spread of Parkinson's disease are on the rise. Both the patients and those around them suffer greatly as a result of Parkinson disease. The stress of providing care has negative health effects of its own [29]. The financial expenditures of Parkinson's disease are likewise high, on the rise, and, at least in the United States, predominately going toward institutional care, which few people choose [30, 31]. Fortunately, there are indications about the pandemic's origins all around us. A willingness to take action is what is lacking.



**Figure 3** Correlation between increasing gross domestic product (GDP) per capita and increasing Parkinson disease prevalence rate, 1990–2016 [4, 35].

### The Way Forward

Throughout the last century, polio, breast cancer, and HIV pandemics have all been successfully managed by society. Unrestrained activism was essential to the success of these initiatives. From a March of Dimes to the White House to raise awareness for polio to First Lady Betty Ford's brave declaration of her breast cancer to a quilt covering the National Mall to raise awareness for AIDS, those impacted by the disease made their voices heard and their diseases recognized. This action aided in the eradication of polio and HIV, as well as the care of all those affected and the development of cutting-edge medications.

A "PACT" can be created by persons who have the condition and others who are at risk in order to prevent, promote, care for, and treat it. Wherever possible, we should reduce and, in some situations, stop using substances that are known to raise the risk of Parkinson's disease in order to avoid the disease. We have the tools to stop millions from ever suffering from Parkinson disease's crippling symptoms. However, we also need to raise more money to extend new care models that aim to provide high-quality care to everyone and to better understand the environmental, genetic, and molecular origins of the disease [32]. Finally, Parkinson disease needs new highly effective therapies; the most effective therapy (levodopa) is now fifty years old. The Parkinson pandemic is preventable, not inevitable.

### Conflicts of Interest

The Author Declares No Conflict of Interests

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