

# EAN Fact Sheet

Country profile of North Macedonia

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The EAN is pleased to present this fact sheet to each and every national neurological society, offering key insights into the latest epidemiological, economic, and demographic trends. This data aims to support informed decision-making and enhance understanding of neurological conditions on both national and European level with information provided by three EAN projects: the [“Burden of Neurological Disease in Europe”](#) study, the EAN [“COst of Illness in Neurology in EUrope \(COIN-EU\)”](#) project, the EAN NNS 2021-2022 survey.



# Burden of Disease in Europe – Collaboration with IHME

Neurological disorders are the second most common cause of disability and premature death in the European Region and their prevalence and burden will likely increase with the progressive ageing of the European population. Greater attention to neurological diseases must be paid by health authorities for prevention and care. For this reason, the European Academy of Neurology is conducting research on gaining and analysing reliable data on the number of patients with neurological diseases.

These data are obtained from the currently most developed data base, the [Global Burden of Disease \(GBD\)](#) study of the Institute for Health Metrics and Evaluation (IHME), University of Washington, Seattle. The burden of neurological disorders in Europe was calculated for the year 2021 as prevalence, mortality, disability-adjusted life-years (DALYs), years of life lost (YLLs), and years lived with disability (YLDs) for the countries in the EU and the WHO European region for a total of 26 neurological disorders.

The study in Europe is run by the EAN and led by Prof. Dr. Günther Deuschl, Dr. Maurizio Leone and Maria Konti, M.Sc., in close collaboration with the leading scientists of the IHME Institute.

In the table below, you will find the national total counts for DALYs, YLDs, YLLs, prevalence, and deaths, the age-standardised rates by neurological disorder category for the years 1990 and 2021, and the percentage change for both of your country and the WHO Europe.

Diseases with counts less than one have been excluded and the number of decimal points has been adjusted individually for each disease.

	Counts	Age-standardized rate		Percentage change, 1990-2021	
	(thousands)	1990	2021	North Macedonia	WHO Europe
<b>All Neurological Disorders</b>					
DALYs	184,710	7,682	6,654	-13.4%	-29.0%
Deaths	7,472	320	315	-1.6%	-43.2%
Prevalence	1,065,390	42,213	43,129	2.2%	0.3%
YLDs	53,218	1,680	1,871	11.4%	2.9%
YLLs	131,489	6,002	4,782	-20.3%	-44.4%
<b>Alzheimer's disease and other dementias</b>					
DALYs	9,168	371	374	0.7%	-2.5%
Deaths	374	19.21	19.67	2.4%	-2.8%
Prevalence	17,227	641	637	-0.7%	-2.1%
YLDs	3,417	132	130	-1.3%	-2.6%
YLLs	5,751	240	244	1.9%	-2.5%
<b>Chromosomal abnormalities</b>					
DALYs	89	5.94	6.01	1.2%	-12.3%
Prevalence	984	66.70	67.27	0.9%	-12.8%
YLDs	89	5.94	6.01	1.1%	-12.4%
<b>Covid-19 (neurological)</b>					
DALYs	2,027	-	76	-	-
Prevalence	19,750	-	762	-	-
YLDs	2,027	-	76	-	-
<b>Cystic echinococcosis</b>					
DALYs	1	0.05	0.04	-24.9%	-18.3%
Prevalence	4	0.17	0.15	-12.0%	-9.0%
YLDs	1	0.05	0.04	-25.0%	-18.4%
<b>Diabetic neuropathy</b>					
DALYs	17,070	277	498	79.7%	98.1%
Prevalence	134,551	2,175	3,922	80.4%	97.9%
YLDs	17,070	277	498	79.7%	98.1%

	Counts	Age-standardized rate		Percentage change, 1990-2021	
	(thousands)	1990	2021	North Macedonia	WHO Europe
<b>Down syndrome</b>					
DALYs	56	3.77	3.77	0.0%	-19.6%
Prevalence	616	42	42	-0.8%	-20.7%
YLDs	56	3.77	3.77	-0.1%	-19.8%
<b>Encephalitis</b>					
DALYs	415	35	20	-41.8%	-30.1%
Deaths	9	0.49	0.36	-26.0%	-15.9%
Prevalence	364	17	14	-19.3%	-13.6%
YLDs	37	1.81	1.47	-18.7%	-12.0%
YLLs	378	33	19	-43.1%	-31.0%
<b>Epilepsy</b>					
DALYs	3,807	203	164	-19.1%	-12.6%
Deaths	42	1.65	1.57	-4.7%	3.9%
Prevalence	7,623	364	342	-6.0%	3.3%
YLDs	2,110	120	95	-21.2%	-11.3%
YLLs	1,697	83	70	-15.9%	-14.3%
<b>Guillain-Barre Syndrome</b>					
DALYs	10	0.42	0.42	0.2%	12.4%
Prevalence	35	1.42	1.42	0.1%	12.4%
YLDs	10	0.42	0.42	0.1%	12.4%
<b>Idiopathic intellectual disability</b>					
DALYs	358	23	18	-21.5%	-19.7%
Prevalence	7,843	520	393	-24.4%	-21.2%
YLDs	358	23	18	-21.5%	-19.7%
<b>Klinefelter syndrome</b>					
DALYs	1	0.02	0.02	7.5%	5.7%
Prevalence	49	2.61	2.83	8.5%	5.5%
YLDs	1	0.02	0.02	7.2%	5.5%

	Counts	Age-standardized rate		Percentage change, 1990-2021	
	(thousands)	1990	2021	North Macedonia	WHO Europe
<b>Meningitis</b>	2021	1990	2021	North Macedonia	WHO Europe
DALYs	281	170	14	-91.5%	-80.5%
Deaths	6	2.13	0.26	-88.0%	-75.4%
Prevalence	656	75	27	-63.8%	-66.7%
YLDs	55	6	2	-61.5%	-64.6%
YLLs	227	164	12	-92.6%	-81.3%
<b>Migraine</b>					
DALYs	12,682	517	512	-1.0%	0.04%
Prevalence	331,181	13,635	13,535	-0.7%	0.3%
YLDs	12,682	517	512	-1.0%	0.04%
<b>Motor neuron disease</b>					
DALYs	201	9.37	7.49	-20.1%	37.5%
Deaths	6	0.16	0.20	21.1%	54.1%
Prevalence	69	3.32	3.18	-4.4%	19.8%
YLDs	15	0.71	0.68	-4.5%	19.5%
YLLs	186	8.66	6.81	-21.4%	38.5%
<b>Multiple sclerosis</b>					
DALYs	826	28	27	-3.3%	-5.0%
Deaths	15	0.56	0.48	-14.7%	-12.5%
Prevalence	1,315	31	44	44.0%	26.4%
YLDs	335	8	11	39.7%	25.5%
YLLs	491	20	16	-20.9%	-22.2%
<b>Nervous system cancer</b>					
DALYs	7,321	275	266	-3.0%	-3.3%
Deaths	232	6.93	7.60	9.7%	10.8%
Prevalence	450	14	19	33.3%	35.9%
YLDs	74	2.30	2.72	18.2%	25.3%
YLLs	7,246	272	264	-3.2%	-3.7%

	Counts	Age-standardized rate		Percentage change, 1990-2021	
	(thousands)	1990	2021	North Macedonia	WHO Europe
<b>Neurocysticercosis</b>	2021	1990	2021	North Macedonia	WHO Europe
DALYs	458	24.77	14.38	-42.0%	-42.5%
Deaths	0	0.00	0.00	-69.7%	-69.2%
Prevalence	1,945	88.08	60.96	-30.8%	-32.8%
YLDs	457	24.73	14.37	-41.9%	-42.5%
YLLs	0	0.04	0.01	-74.2%	-70.7%
<b>Neurosyphilis</b>					
DALYs	1	0.03	0.03	23.4%	-43.6%
Prevalence	34	0.67	1.38	105.4%	-11.7%
YLDs	1	0.03	0.03	23.6%	-43.4%
<b>Other neurological disorders</b>					
DALYs	1,007	52	46	-11.6%	25.8%
Deaths	13	0.59	0.50	-14.6%	45.0%
YLDs	549	16	25	51.9%	62.9%
YLLs	455	35	21	-41.3%	14.2%
<b>Parkinson's disease</b>					
DALYs	3,030	96	105	9.3%	5.6%
Deaths	167	6	7	19.1%	4.0%
Prevalence	3,326	92	103	12.2%	21.9%
YLDs	469	13	15	11.6%	21.4%
YLLs	2,560	83	91	8.9%	2.0%
<b>Spinal cord injury</b>					
DALYs	1,788	76	67	-11.5%	-26.9%
Prevalence	6,486	238	240	1.0%	-21.9%
YLDs	1,788	76	67	-11.5%	-26.9%

	Counts (thousands)		Age-standardized rate (per 100 000 people)		Percentage change, 1990-2021	
	2021	1990	2021	North Macedonia	WHO Europe	
<b>Stroke</b>						
DALYs	119,596	5,343	4,267	-20.1%	-52.6%	
Deaths	6,606	282	277	-1.8%	-55.6%	
Prevalence	39,575	1,544	1,254	-18.8%	-19.2%	
YLDs	7,098	280	227	-19.1%	-18.9%	
YLLs	112,498	5,063	4,040	-20.2%	-55.3%	
<b>Tension-type headache</b>						
DALYs	1,893	72.80	72.65	-0.2%	-1.6%	
Prevalence	718,468	29,947	29,923	-0.04%	-0.8%	
YLDs	1,893	72.80	72.65	-0.2%	-1.6%	
<b>Traumatic Brain Injury</b>						
DALYs	2,625	98	93	-5.9%	-28.2%	
Prevalence	18,010	670	632	-5.7%	-28.0%	
YLDs	2,625	98	93	-5.9%	-28.2%	

Table 1: National total counts for DALYs, YLDs, YLLs, prevalence, and deaths, age-standardised rates by neurological disorder category for 1990 and 2021, and percentage change of 1990-2021. Diseases with counts less than one have been excluded and the number of decimal points has been adjusted individually for each disease.

## Neurological conditions

In figure 1 below, the top 20 neurological disorders are ranked based on the national age-standardised rate of DALYs per 100 000 population in 2021 for all age groups.

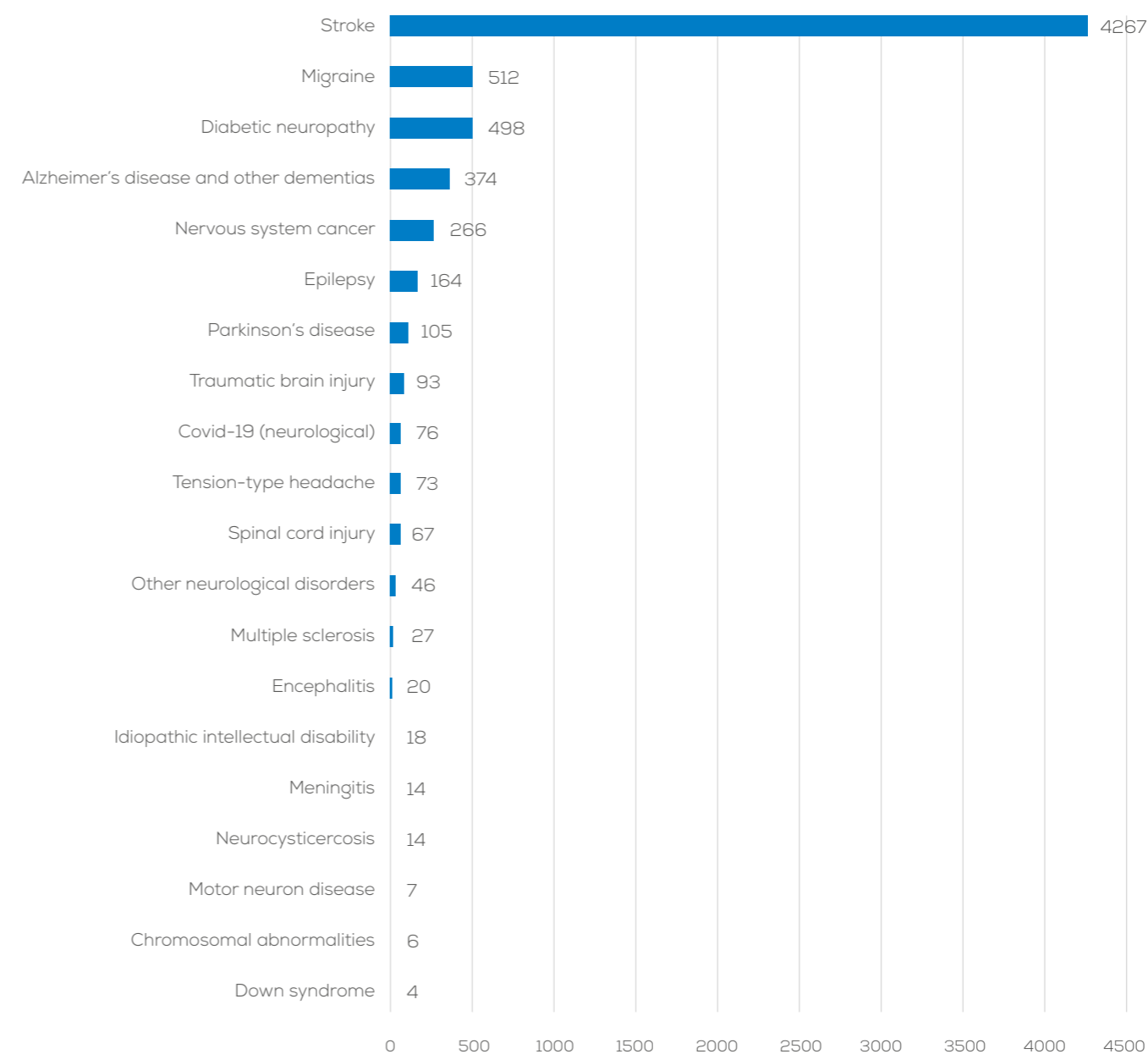


Figure 1: National age-standardised DALYs per 100 000 population by neurological disorder in 2021.

## DALYs per 100 000 population

In order to show how the diseases are evolving both in **North Macedonia** and the European Region, we present the temporal pattern of DALYs per 100 000 population over the last three decades in the figure below:

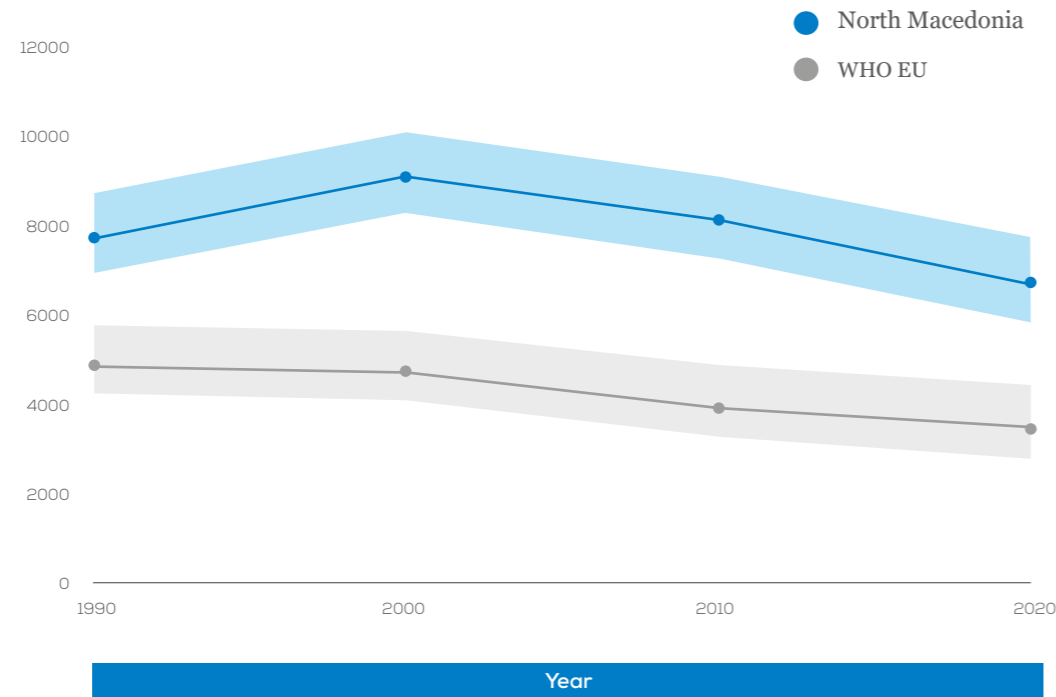


Figure 2: Age-Standardized DALYs per 100 000 population over the last 3 decades.

In figure 3 we show the distribution of DALYs rate per 100 000 population by age group divided in female and male:

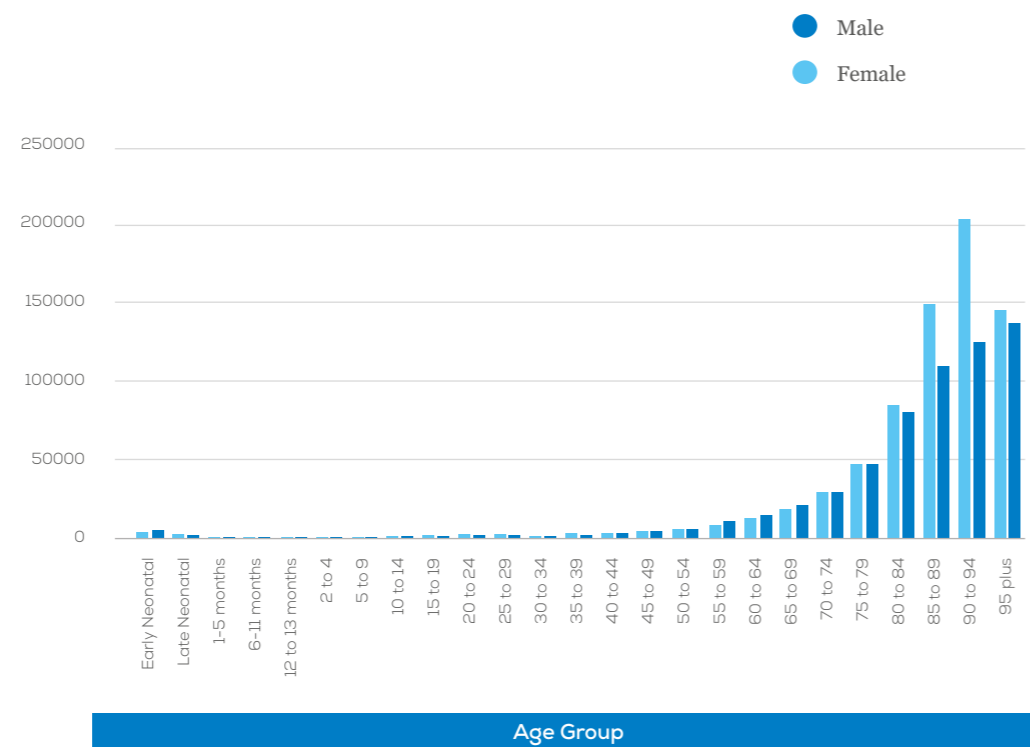


Figure 3: National DALYs per 100 000 population by age group and sex in 2021.

Extensive data and analyses are provided in the published paper and it will be communicated to the National Neurological societies.

# COIN-EU (Cost of Illness in Neurology in Europe)

The Cost of Illness in Neurology in Europe (COIN-EU) project, which was launched in 2021, is run by EAN and led by Prof. Richard Dodel, Prof. Uwe Siebert and Prof. Günther Deuschl. This project is overseen at the EAN by Prof. Paul Boon, Prof. Claudio Bassetti and Prof. Thomas Berger.

The aim of the study is to assess disease- and country-specific annual costs for 12 categories of neurological diseases in Europe with a focus on the prevalent adult patient population. Costs have been calculated in three main categories: a) direct health care costs (i.e., all goods and services related to the prevention, diagnosis and treatment of a disorder; e.g. physician visits, hospitalizations and pharmaceuticals), b) informal care costs (i.e. other goods and services related to the disorder; e.g. social services, special accommodation and informal care), and c) indirect costs (i.e., lost productivity due to work absence or early retirement).

As the literature review revealed many gaps in research for many diseases and many countries, the group has developed a method to provide estimations of the above cost categories for the cases where no data are available. Data are imputed for those countries which belong to the same GNI category with countries that do present data. In case none of the countries which belong to the same GNI category present data, then an imputation is not possible.

In the table below, costs for **North Macedonia** have been calculated for the diseases with available data, in three main categories where the numbers represent millions € PPP 2019.

million € PPP  
2019

Informal Care

Neurological Disorder	Total Costs	Direct Costs	Informal Care Costs	Indirect Costs
Stroke	114.1	52.6	24.1	37.4
Traumatic brain injury	40.8	40.8	-	-
Multiple sclerosis	24.9	21.0	2.0	1.9
Parkinson's disease	15.6	9.7	5.3	0.7
Idiopathic epilepsy	3.2	2.3	-	0.9
<b>Total Costs:</b>	<b>198.5</b>	<b>126.3</b>	<b>31.4</b>	<b>40.8</b>

Table 2: Total, direct, informal care and indirect costs per neurological disorder. Number of diseases depends on the availability of original studies and imputation of data.

# NNS Survey 2021

In December 2021, the EAN conducted a survey among the national neurological societies. By combining the data from the Burden of Disease in Europe study across all European Region countries, we can provide demographic data regarding the workforce of neurologists in Europe for the 37 countries who took part in the survey.

The figure below represents the number of neurologists, fully specialised and in training per 100 000 population.

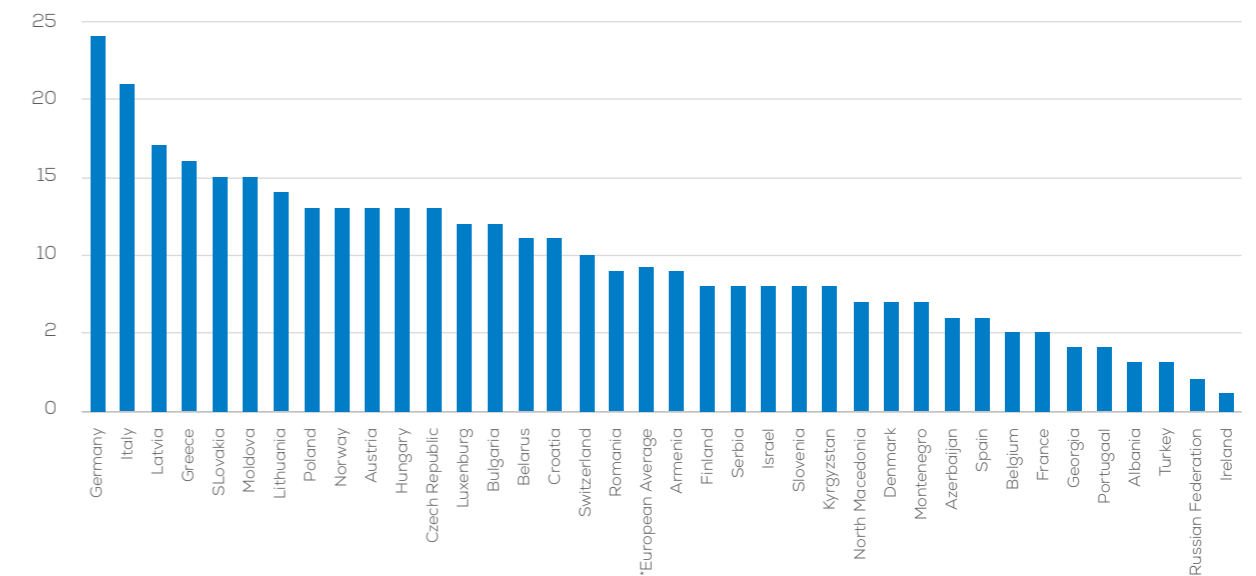


Figure 4: Number of neurologists (fully specialised and in training) per 100 000 population.

In the last figure the number of patients per neurologist is displayed:

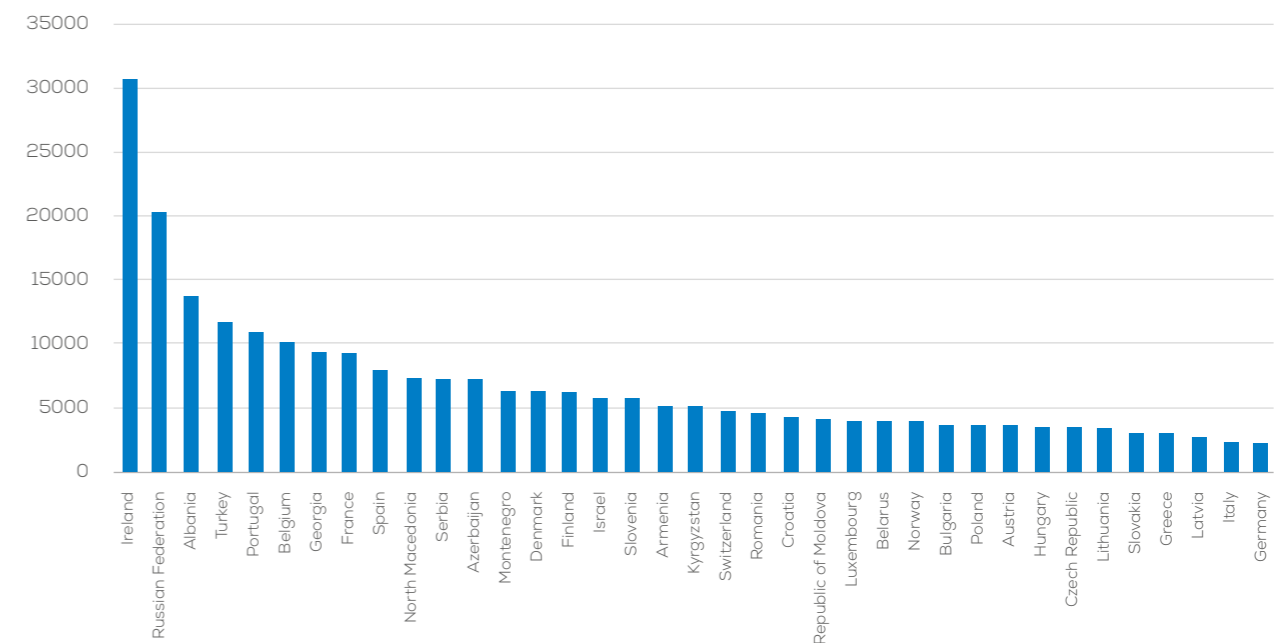
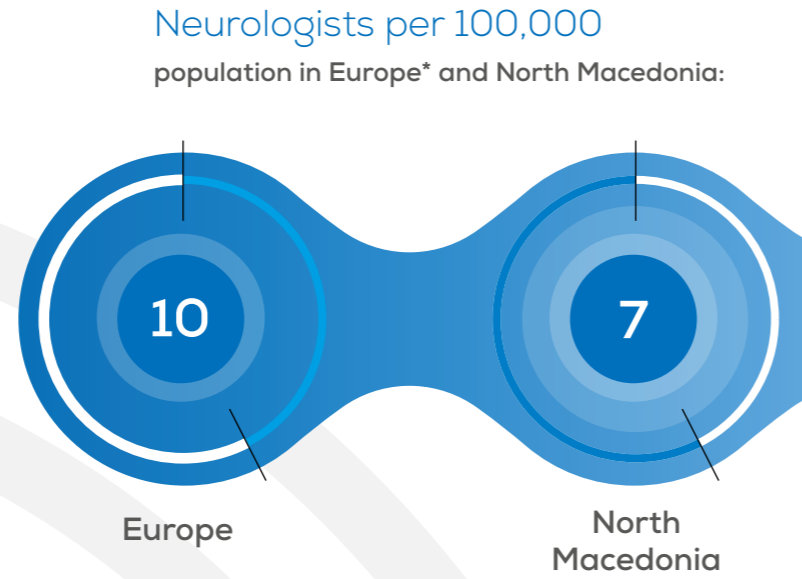
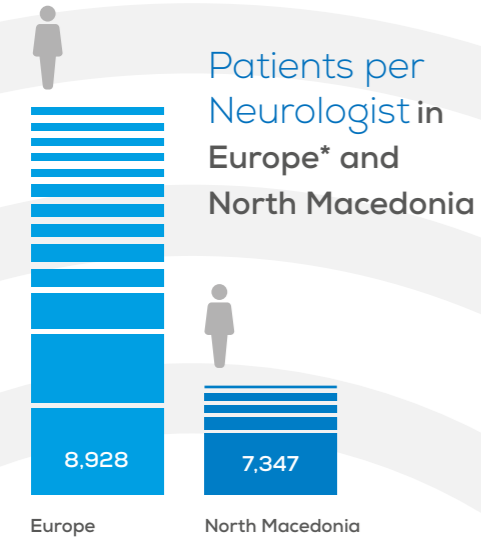


Figure 5: Number of patients per neurologist (fully specialised and in training).

# Neurological Diseases in Europe and North Macedonia:

Key Data and Trends from 2021



Percentage change of age-standardised DALYs, Deaths and prevalence from 1990 to 2021:

	WHO Europe	vs	North Macedonia
DALYs	-28.98%		-13.39%
Deaths	-43.19%		-1.57%
Prevalence	0.34%		2.17%

Most prevalent neurological diseases in North Macedonia in

# 2021

- 1 Tension-type headache
- 2 Migraine
- 3 Diabetic neuropathy
- 4 Stroke
- 5 Covid-19 (neurological)

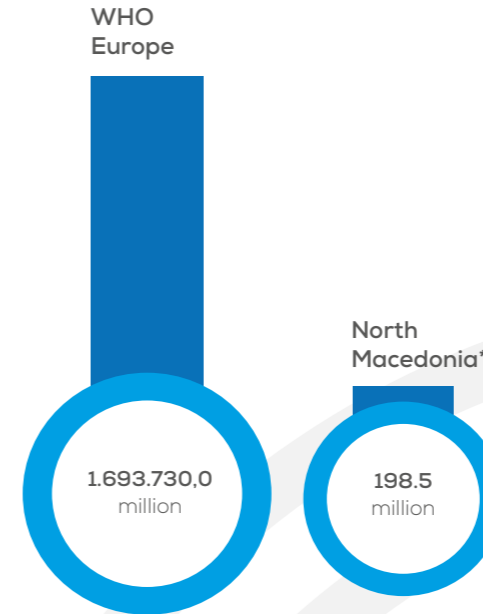
	Male	Female
WHO Europe	3,513	3,351
North Macedonia	6,372	6,797

Age-standardised DALYs rate per 100,000 population in 2021 by sex

North Macedonia 1,065,390

WHO Europe 449,278,770

Number of patients with a neurological disease in 2021 in the WHO Europe and in North Macedonia.



Annual total costs (in million € PPP 2019) for 12 major neurological diseases:

Leading neurological diseases in North Macedonia by total deaths in 2021:

1. Stroke
2. Alzheimer's disease and other dementias
3. Nervous system cancer
4. Parkinson's disease
5. Epilepsy

\*Based on data from 37 countries of the WHO European region  
 \*\*Cost estimates are derived from country-specific data available for specific diseases.

