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RESEARCH ARTICLE

Evidence of Rising Neurological Mortality and Examining Multiple-Interactive Environmental Causes in the 21stCentury

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Abstract

Aims: To examine whether increased neurological deaths during 21st Century are predominately due to elderly demographics, or major influences of interactive-multiple environmental contributory factors? We examine WHO Early-Adult-Deaths (55-74yearolds), which is below Western life-expectancy, and total Age-Standardised-Death-Rates (ASDR) controlled by age, sex, and population, to challenge the demographic assumption.

Method.

Based upon WHO latest global neurological mortality categories, Nervous-Disease-Deaths and Alzheimer's & Other Dementias, which provides the Combined Neurological Death, rates per million (pm), for the twenty-one West-Developed-Nations (WDN) over the period.

Early-Adult-Death rates based upon numbers of deaths, divided by 55-74 population and WHO total ASDR during the 21st Century. Increases between Over 75's population and Over 75's neurological mortality is compared using Odds Ratios. Numbers of deaths are indicative of family and services pressures.

Results: Every country's 55-74yearolds Nervous-Disease-Deaths rates were higher than Alzheimer's & Dementia Deaths, ten countries Nervous-Disease-Deaths rose higher than Alzheimer's & Dementias during Century.

Highest Combined Deaths and increases were Finland 1006 per million (pm) up 44%, USA 710pm, rose 39% and UK 653pm a rise of 32%, countries average of 25%, though Belgium, Canada and France rates fell.

Highest ASDR were Finland 973pm, up 104%, USA 592pm, rose 76%, UK 553pm, increase 170%. Lowest were Japan 112pm, yet up 90%, Greece 184pm, rose 64% and Austria 214pm increased 102%, average nation's 62%.

Belgium at 387pm up 34%, Canada 401pm, increased 13% and France ASDR 336pm up 11%.

Population compared with total neurological amongst Early-Adult-Deaths and Over 75's, ratios of change, were respectively 1:1.34 and 1:2.21, yielding an Odds ratios of 1:1.65

French total neurological numbers were 40,594 rose to 71,543, up 76%, UK 24,601 to 103,550 increased 321% and the USA 174,708 to 436,438 rising 150%.

Discussion: We reject the hypothesis that neurological increases were mainly dues to demographics. Our results support by new studies across the continents, with their findings of significant causal multiple-interactive-environmental pollutants, including, endocrine disruptive chemicals, air pollution, organophosphates, plastics, petrochemicals, impact of low ubiquitous prolonged electro-magnetism, etc, associated with neuro-degenerative disease, especially Early-Onset-Dementia, below Western life-expectancy.

Conclusions: Governments should seek urgent research to explain this new epidemic.

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Introduction: The first comparative international study of changing patterns of neurological deaths between 1979 to 1997, found that twelve of the twenty-one Western Developed Nations (W.D.N) had substantial increase over the period [1]. However, some authorities have argued that increases were either mainly due to improved diagnostic, especially related to Motor Neurone Disease [2,3], are to demographics because of there are more elderly people (Over 75's) in the population. This was based on the Gompertzian hypothesis, that as people live longer, they are more likely to developed age-related illnesses, in particular neurological conditions [3-5].

Yet, later studies on rises in neurological conditions would appear to challenge the Gompertzian [6,7]. However, in Britain, in a recent Office of National Statistics (ONS, 2022) report on Alzheimer's they stated, "*Dementia and Alzheimer's disease are more likely to occur at older age and surviving other illnesses will result in more deaths related to ageing*", though they gave no evidence to support this assumption [3].

Whilst it has been predicted that Alzheimer's Disease will double in Europe by 2050 and possible even higher across in wider world [8]. Their assumption appears to be linked to increasing of accumulating amyloid plaques, associated with the long-standing association of genetic factors in neurological morbidity [8-10].

To test both these assumptions this study builds upon the latest available data and challenge the Gompertzian hypothesis [3,4], as the main cause of rises in neurological disease. Moreover, whilst there are known genetic factors related to neurological conditions, changes related to genetic factors take a considerable time to emerge, especially as the study only examines changes during the 21st century, that is between 2000 to 2015.

The study examines whether that there are real substantial rises in neurological disease, which apart from mainly elderly, the Over 75's in the population, but may also be influenced by a range of multiple-interactive environmental causes during the 21stCentury.

To challenge the Gompertzian hypothesis, we intend to examine Early Adult Deaths (E.A.D), people in the age-band 55-74 years, which is below the average life-expectancy in WDN, averaging at 82 years [11]. In addition, we analyse WHO Age-Standardised-Death-Rates (ASDR) which are controlled for population by age and sexes over time for total neurological mortality rates over the period [11]. We stress that the simplistic assumption that because of increased proportion of elderly people in Western countries, is mainly due to demographics, which ignores the WHO own Age-Standardised-Death-States (ASDR), which controls for age and therefore substantial increases in the rates of ASDR are a real increase in neurological deaths over the period.

There is one simple working null hypothesis. That there will be no substantial increases in neurological mortality rates during the 21st century in the twenty-one Western Developed Nations (WDN).

Methodology:

To match the initial international neurological comparative analysis consists of Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the UK, and the USA.

There are three global categories for neurological deaths provided by the WHO [11]. These are Nervous Disease Deaths (NDD), coded G00-G99, that include the major and minor diagnostic categories such as motor neurone disease (known as amyotrophic lateral sclerosis in the USA), Parkinson's Disease, multiple sclerosis, the lesser such as multiple system atrophy, progressive bulbar pathology, etc , etc. Then Alzheimer's & the Dementias Deaths (AlzhD), coded F01, F03, G30-31, this included Alzheimer's Disease, Picks Disease, and other dementias etc, etc.

A third category group is `Mental and Behavioural Disorders' (coded F10-19), which includes "neurological conditions not reported elsewhere" [11]. However, there is no separate reporting data within this sub-group, only the global category. Hence, as we could not measure specifically for the neurological related deaths, this category was excluded from the analysis. This means there will be a degree of under-reporting of the extent of neurological rises, which is a more cautious calculation, when coming to the results.

We draw upon the categories of Nervous-Disease-Deaths (NDD) and Alzheimer's Disease& Dementias (AlzhD) rates as the 'Combined Neurological' Death (C.N.D) rates, from summing the two neurological categories NDD and AlzhD as rates per million (pm) [11].

From the latest WHO data, from 2000 to 2015, we examine any changes during the 21st Century from people aged 55-74years, which justifies the designation Early Adult Deaths (E.A.D.) because this well below the WDN average of life-expectancy (81.9years). E.A.D rates are calculated by the numbers of deaths in the two separate category divided by the population of people aged 55-74,

for both sexes to calculate a E.A.D. total neurological rates per million (pm).

Total Combined-Neurological -Deaths (CND) are drawn from the WHO Age-Standardised-Death-Rates (ASDR) per million [11], based upon controlled age and standardised world population, which enables us to calculate any real change, within a controlled population over the period.

In addition, to challenge the assumed demographic main cause of any changes, we also measure changing rates of Over 75's people for population and CND for both sexes. It is recognised that there have been major increases in CND amongst the Over 75's, so to test this is mainly due to major increases in Over 75's population, we calculate ratios of change for population and CND, from which to calculate an Odds Ratios. We take as any Odds Ratio of >1:1.10 as a substantial rise [12].

Results:

Early Adult Deaths: Table [1] for E.A.D. (55-74) shows the changing rates of NDD and AlzhD, which together are the Combined Neurological Death (CND) rates.

Over the period ten nation's NDD rose faster than AlzhD, whilst every country's NDD were higher than their AlzhD rates.

The highest CND were Finland 1006pm, increased 44%, the USA 710pm was a 39% rise and the UK 653pm was up 32%. The lowest country's being Japan at 206pm, yet was a rise of 36%, as was in Greece 378pm, up 13% and Austria 415pm, a rise of 77% over the period. During the period Early-Adult-Death rates increased, an average of 25%, Germany at 52% had the highest increase, whilst there were falls in Belgium -5%, Canada -10% and France -23%.

Table [1] Nervous Disease Deaths (NDD) & Alzheimer & Other Dementia Deaths (AlzhD) are Combined Neurological Death (CND) 55–74-year-olds rates per million 2000-02 v 2013-15 Ratio change. Rankled by Highest CNM rates.

Country & Ratio change	**NDD 55-74 2000-02 v2013-15**	**AlzhD 55-74 2000-02 v 2013-15**	**CND 55-74 2000-02 2013-15**
1.Finland Ratio change	394 - 642 **63%**	305 – 364 19%	699 – 1006 44%
2.USA Ratio change	364 – 455 25%	147 - 255 73%	511- 710 39%
3.UK Ratio change	256 - 399 **56%**	164 - 254 55%	420 – 653 32%
4.Sweden Ratio change	267 - 387 45%	157 - 239 52%	424 - 626 48%
5=.Netherland Ratio change	350 - 379 8%	116 - 223 92%	466 - 602 29%
5=.Denmark Ratio change	339 - 398 17%	115 - 204 77%	454 - 602 33%
7.Norway Ratio change	365- 390 7%	125 - 176 39%	490- 566 16%
8.Belgium Ratio change	377 - 383 2%	206 - 172 -17% #	583 - 555 -5% #
9.Switzerland Ratio change	297 - 356 20%	141 - 180 28%	438 - 536 22%
10.Ireland 2014 Ratio change	291 - 345 **19%**	174 - 176 1%	465 - 521 12%
11.Spain Ratio change	299 - 329 **10%**	195 - 179 -8% #	494- 508 3%
12.Australia %change	272 - 335 23%	105 - 171 63%	377- 506 34%
13.Canada 2013 Ratio change	376 - 318 -15 #	159- 165 4%	535 - 483 -10% #
14.Germany Ratio change	254 - 342 35%	60 - 136 127%	314 - 478 52%
15.New Zealand 2013 %change	279 - 314 13%	129 - 161 25%	408 - 475 16%
16.Italy Ratio change	266 - 327 **23%**	186 - 133 -28% #	452 - 460 2%
17.Portugal 2014 Ratio change	230 - 290 **26%**	144 - 142 -1 % #	374 - 432 16%

18.France Ratio change	397- 321 **-19 % #**	173 - 119 -31% #	570- 440 -23% #
19.Austria Ratio change	160 – 286 **79%**	74 - 129 74%	234 - 415 77%
20.Greece Ratio change	213 - 279 **31%**	121 - 99 -18% #	334 - 378 13%
21.Japan %change	123 - 180 **46%**	28 - 26 -7 % #	151 - 206 36%
Average % Change	**24%**	**28%**	**25%**

BOLD NDD higher rate than AlzhD. # Rates fell over the period.

Age-Standardised-Death-Rates (ASDR). Table [2] showed that for ASDR total NDD there was an average rise of 46% and an increase of 110% rise of AlzhD. Except for seven countries, AlzhD were higher rates than NDD in fourteen WDN.

Total neurological deaths was highest in Finland, 973pm, up 104%, USA 592pm, an increase 76% and the UK 553pm, was a rise of 170%.

The lowest WDN was again Japan 112pm but up 90%, Greece 184pm, a 64% rise and Austria 214pm an increase of 102%.

The outlier countries Belgium, Canada and France ASDR rose 34%, 13% and 11% respectively, all showing a real rise of total neurological mortality, with an overall average of the twenty-one countries rise of 63%.

Table [2] Nervous Disease Deaths (NDD) & Alzheimer & Other Dementia Deaths (AlzhD) Total Age-Standardised-Death-Rates (ASDR) are Combined Neurological Deaths (CND)per million 2000-02 v 2013-15 Ranked by Highest Rates

Country & Ratio change	**NDD ASDR 2000-02 v 2013-15**	**AlzhD ASDR 2000-02 v 2013-15**	**CND ASDR 2000-02 v 2013-15**
1.Finland Ratio change	165 – 492 198%	311 - 481 55%	476 - 973 104%
2.USA Ratio change	187 - 281 50%	149 – 311 109%	336 - 592 76%
3.UK Ratio change	109 - 205 88%	96 - 348 262%	205 - 553 170%
4.Netherland Ratio change	110- 190 73%	164 - 297 81%	274 - 487 78%
5.Sweden Ratio change	101 - 175 73%	156 - 261 67%	257 - 436 70%
6.Ireland Ratio change	130 - 186 43%	78 - 225 188%	208 - 411 98%
7.Switzerland Ratio change	151 - 171 13%	142- 239 68%	293 - 410 40%
8.Spain Ratio change	132 - 188 42%	166- 215 30%	298 - 403 35%
9.Denmark Ratio change	122 - 173 42%	100 - 227 127%	222 - 400 80%
10.Norway Ratio change	123 - 172 40%	85 - 224 163%	208 - 396 90%
11.Belgium Ratio change	144 - 190 32%	144- 197 37%	288 - 387 34%
12.Australia %change	136 - 172 26%	106 - 213 101%	242 - 385 59%
13.Canada 2013 Ratio change	188 - 168 -11% #	167 - 233 40%	355 - 401 13%
14.New Zealand 2013 %change	138- 152 10%	124 - 196 58%	262 - 348 33%
15.France Ratio change	169 - 182 8%	135- 154 14%	304 - 336 11%
16.Germany Ratio change	104 - 135 30%	33 - 147 345%	137 - 282 106%
17.Italy Ratio change	111- 148 33%	103 - 133 29%	214 - 281 31%

18.Portugal Ratio change	89 - 135 52%	52 - 121 133%	141 - 256 82%
19.Austria Ratio change	78 - 134 72%	27- 80 196%	106 - 214 102%
20.Greece *Ratio change	74 - 132 78%	38 - 52 37%	112 - 184 64%
21.Japan % change	44 - 71 61%	15 - 41 173%	59 - 112 90%
Average % Change	**46%**	**110%**	**62%**

Over 75's: Table [3] contrast the changes of the Over 75' for population and CND and is ranked by widest Odds Ratios. The Over 75's population increase average ratios was 1:1.34 but the Elderly CND ratio was 1:2.21, yielding an Odds Ratios of 1:1.65.

The UK had the widest Odds Ratio 1:3.26, with Austria, Denmark, Ireland, and Norway greater than 1:2.00. Eight countries, led by Sweden 1:1.98 had greater than 1:1.30 Odds Ratios, the others reached above >1:1.10 except France at 1:1.09, Italy and Spain at 1:1.07, Greece at 1:1.05 and Canada 1.0.98.

Table [3] Over-75's Population & Combined Neurological Deaths rates per million 2000-2015. Ratio of change Population to CND then Odds Ratios. Ranked by highest Widest Population: CND Odds Ratio

Country & Widest Odds Ratio Rank	**Population Millions**	**Ratio of Change**	**Rates CND**	**Ratio of Change**	**Population: CND Odds Ratio**
1.UK 2000 2015	4.406 5.190	1.18	4005 15438	3.85	1:3.26
2.Norway 2000 2015	0.350 0.358	1.02	4200 11735	2.79	1:2.74
3. Austria 2000 2016	0.568 0.752	1.32	1674 5570	3.33	1:2.52
4.Ireland 2000 2014	0.184 0.240	1.30	3592 10812	3.01	1:2.32
5.Denmark 2000 2015	0.378 0.420	1.11	4838 11122	2.30	1:2.07
6.Sweden 2000 2016	0.788 0.830	1.05	6626 13801	2.08	1:1.98
7.Finland 2000 2015	0.336 0.467	1.28	12506 31246	2.50	1:1.95
8.USA 2000 2015	16.601 19.621	1.18	8346 18056	2.16	1:1.83
9=. Germany 2000 2015	5.854 8.459	1.44	2511 6422	2.56	1:1.78
9=. Portugal 2000 2014	0.690 1.003	1.45	2152 5551	2.58	1:1.78
11.Netherlands 2000 2016	0.965 1.282	1.33	7078 14868	2.10	1:1.58
12. Japan 2000 2015	8.980 15.896	1.77	880 2682	2.57	1:1.45
13.Australia 2000 2014	1.069 1.496	1.40	5722 11064	1.93	1:1.38
14.Belgium 2000 2015	0.747 0.998	1.34	6593 10771	1.63	1:1.22
15.Switzerland 2000 2015	0.515 0.675	1.31	8074 12693	1.57	1:1.20
16.New Zealand 2000 2013	0.203 0.265	1.31	6379 9844	1.54	1:1.18
17.France 2000 2014	4.307 5.853	1.36	7530 11177	1.48	1:1.09
18. Italy 2000 2015	4.473 6.595	1.47	4641 7319	1.58	1:1.07

19.Spain 2000 2015	2.902 4.298	1.48	7524 11920	1.58	1:1.07
20. Greece 2000 2015	0.669 1.158	1.73	1239 2261	1.81	1:1.05
21. Canada 2000 2013	1.716 2.356	1.37	9185 12235	1.34	**1:0.98 #**
Average ratios		**1.34**		**2.21**	**1.65**

Numbers as Pressures on Families & Services (Population : CND):

Table [4] based upon changes actual numbers of population and CND of the 55-74 age-band and total CND and the countries are ranked by widest Odds Ratios (COR).

The average of E.A.D. for Odds ratio of population versus CND was 1:1.32, the average for total CND was 1: 2.39.

The widest E.A.D. Odds Ratios were Netherlands 1:1.71, Ireland and Japan 1:1.60, only Belgium, Cand, France, and Spain had less than 1:1.10

The widest Odds Ratios was for Total population and CND was Norway 1: 4.09, Japan at 1: 4.03, and UK 1: 3.86.

Twelve WDN had ratios of >1:2.00, others were Sweden 1:1.95, Belgium 1:1.85, New Zealand 1:1.66, France 1:1.61 and Canada 1:1.60.

To exemplify these numbers impacting upon families and services, we examine France, the most outlier country of the twenty-one, the UK and the USA.

French 55-74 neurological deaths fell slightly from 6,236 to 5,997, a fall of 4%. However, total France deaths rose from 40,594 to 71,543, up 76%.

In the UK. It's E.A.D. went from 4,650 to 9,019 a rise of 94%, whilst its total deaths went from 24,601 to 103,550, a rise of 321%.

In America, it's E.A.D rose from 21,818 to 48,047 a rise of 120% over the period and USA total deaths rose from 174,08 to 436,438, an increase of 150% in just sixteen years.

Table [4] Numbers- Both Sexes 55-74 & Total Combined Neurological Deaths (CND) 2000-15. % Population (in millions). Percentage Change for Population & CND. Ranked by Biggest Total Pop: CND Odds Ratio

Country CND Numbers v Population	**2000 v 2015 55-74years**	**Ratio Change**	**Odds Ratio**	**2000-2015 Total CND**	**Ratio Change**	**Odds Ratio**
1. Norway Population	371 - 616 0.757 - 1.088	1.66 1.44	1.15	1096 - 5203 4.470 - 5.189	4.75 1.16	4.09
2.Japan Population	4438 - 8099 29.392 - 33.471	1.82 1.14	1.60	14023 - 56027 125.612 - 125.319	3.99 0.99	4.03
3.UK Population	4650 - 9019 11.065 - 13.792	1.94 1.25	1.55	24601 - 103550 59.704 - 65.110	4.21 1.09	3.86
4.Germany Population	5790 - 9332 18.424 - 19.491	1.61 1.06	1.52	22543 - 73310 82.188 - 81.687	3.25 0.99	3.28
5.Austria Population	369 - 702 1..571 - 1.901	1.90 1.21	1.57	1519 - 5107 8.011 - 8.629	3.36 1.08	3.11
6.Finland Population	692 - 1385 0.991 - 1.377	2.00 1.39	1.45	5063 - 17155 5.176 - 5.482	3.23 1.06	3.10
7. Ireland 2014 Population	262 - 445 0.565 - 0.616	1.74 1.09	1.60	1080 - 3384 3.789 - 3.979	3.13 1.05	2.98
8. Portugal Population	779 - 1037 2.084 - 2.409	1.33 1.16	1.15	2842 - 7775 10.290 - 10.401	2.74 1.01	2.71
9.Netherlands Population	1026 - 2389 2.799 - 3.813	2,33 1.36	1.71	8279 - 21931 15.925 - 16.939	2.65 1.06	2.50
10. Denmark Population	465 - 798 1.023 - 1.325	1.72 1. 30	1.32	2460 - 5925 5.337 - 5.678	2.41 1.06	2.27
11.Australia Population	1155 - 2407 3.072 - 4.749	2.08 1.55	1.34	7846 - 21594 19.153 - 23.781	2.75 1.24	2.22
12.USA Population	21818 - 48047 42.666 - 67.380	2.20 1.58	1.39	174708 - 436438 281.421 - 319.929	2.50 1.14	2.19
13. Italy deaths Population	5693 - 6542 12.598 - 14.231	1.68 1.13	1.49	27554 - 61678 56.924 - 60.731	2.24 1.07	2.09
14.Greece Population	788 - 927 2.357 - 2.452	1.18 1.04	1.13	2092 - 4741 10.917 - 10.871	2.27 1.09	2.08

15. Spain Population	3892 - 5007 7.888 - 9.876	1.29 1.25	1.03	26679 - 62871 40.174 - 46.410	2.35 1.16	2.03
16. Sweden Population	743 - 1355 1.754 - 2.209	1.82 1.26	1.46	6159 - 13110 8.872 - 9.696	2..13 1.09	1.95
17. Belgium Population	1179 - 1363 2.020 – 2.462	1.16 1.22	**0.95 #**	6400 - 13054 10.251 - 11.266	2.04 1.10	1.85
18.Switzerland Population	601 - 972 1.373 - 1.814	1.62 1.32	1.23	4904 - 10225 7.209 - 8.320	2.09 1.15	1.82
19.N. Zealand 2013 Population	240 - 414 0.588 - 0.872	1.73 1.48	1.17	1689 - 3199 3.887 - 4.442	1.89 1.14	1.66
20.France Population	6236 - 5997 10.628 - 13.956	0.96 1.31	**0.73 #**	40594 - 71543 58.898 - 64.129	1.76 1.09	1.61
21. Canada 2013 Population	2649 - 3652 0.496 - 0.761	1.38 1.53	**0.90 #**	19293 - 35091 30.791 - 35.255	1.82 1.14	1.60
Average Odds Ratio			**1.32**			**2.39**

#55-74 CND Fall in BOLD

Limits

The study's main limit is that we cannot account for any of the neurological changes within the twenty-one countries, a few reduced, others more than doubled in the Century. In particular, we cannot explain the E.A.D. falls in Belgium, Canada, and France, though it might because their patients lived longer to then die in the Over 75's rates, because all three countries had increases amongst total ASDR. However, since 2005 Canada have an active policy to increase immigration, and by 2021, there were new 401,000 citizens annually [13], which may have distorted the Canadian results?

Another inexplicable, is Japan, that who still have the lowest neurologist rates, yet have some of the increases than rises of the other WDN. Whilst the E.A.D. Nervous Disease Deaths rates were higher than Alzheimer's, and though of both ASDR categories rose substantially, but speeded more amongst the Alzheimer's in fourteen of the WDN.

However, the greatest and change amongst these WDN was the USA, as in the first comparative study America was 15th highest but now are second highest of the twenty-one WDN [1, 7]. Our data cannot explain these marked changes, other than to suggest that, in the most modern technologically country in the world, there may be greater impact of multiple-interactive environmental factors, related to waste products surrounding increases in economic activity?

Discussion:

We can reject the null hypotheses, as there are unequivocal increases in neurological deaths of people aged 55-74 in sixteen WDN. Whilst all countries had substantial rises in neurological Age-Standardised-Death-Rates which are controlled for population, age, and sex [11]. Thus, there is no doubt that within the total WDN population, there are real major increases in neurological deaths during the 21st Century. Which appears far in excess in the Gompertzian hypothesis that saw demographics are the key feature.

Indeed, in the ONS Report on Anglo-Welsh ASDR Dementias (G01, G03) and Alzheimer's (G30) between 2000 and 2020. We undertook a perusal of the ONS data, to find that Dementia's ASDR rose from 233pm to 781pm, a rise of 235%, Alzheimer's ASDR went from 79pm to 368pm, an increase of 348% [3]. Such increases must question the earlier ONS assumptions on demographics, of such rises in just twenty-one years, moreover their study did not include all the other conditions in the Nervous Disease Death category.

Furthermore, our results have already passed the predicting doubling of Alzheimer's by 2050 [8]. These authors emphasised genetic factors, after all most disease have a degree of genetic predisposition. However, when we see the extent of the acceleration of neurological conditions, it appears to be far faster than just genetic predispositions. For example, Scandinavian rates, who have a known genetic link, their rates increased disproportionately and starting earlier [9,10]. Furthermore, a Finnish study found that early onset dementias, although associated with genetics, had risen faster amongst their younger patients [10]. Moreover, even in France, the outliers compared to the other WDN, France's total ASDR rose 11% in the Century, whilst their total numbers of neurological deaths rose 76% over the period.

Linked Findings of Neuro-degenerative Conditions and Environment:

1] All twenty-one country's ASDR neurological rose substantially, after the elderly have been controlled for population, age, and sex.

2] Whilst the extent of unprecedented neurological means major demands on families. For example, in the UK neurological number's roses from 24,601 at the start of the Century to 103,550, and America, went from 174,708 to 436,430. It is suggested that such an acceleration is beyond just genetics, diagnosis and demography, which impact upon services, that may not yet be acknowledged but perhaps experienced by front-line services.

3] Crucially, it is rises amongst Early-Adult-Deaths in sixteen countries, averaging 25%. This indicating that neurological disorders are starting earlier, challenging the Gompertzian position. Indeed, two of the authors experience goes back to the 1960's, and if there had been such a young onset, it would be news in the whole hospital, not least the rarer conditions such progressive supranuclear palsy and multiple system atrophy, [14], which are included in overall Nervous Disease Deaths category amongst 55-74yearolds [11]. Indeed, there are new British charities, "Young Dementia UK' and the 'Young Persons Parkinson's Society', which has been created to meet the needs of a clientele of people under fifty, so perhaps, the problem is beginning to be recognised?

4] Our results of Early-Adult-Deaths 55-74years have received considerable indirect support, from studies on Early-Onset-Dementias (E.O.D) mortality which are reported across the continents, which totally challenges the Gompertzian hypothesis. There are studies showing rising of E.O.D deaths in America [15-20], Europe [21-24] and China [25-29]. Moreover, there are results from traditionally countries with low neurological morbidity, in South America, and Asia [30--34]. Indeed, Japan, with the lowest Western neurological prevalence, their Early Onset Dementia rates increased more than their older-onset Alzheimer's deaths [35,36].

We fear that causal environmental factors on health are being ignored, which have a relatively recent have had a poor history, such as DDT, tabaco and asbestosis [37] and it appears that there may be a similar situation developing with neurological disorders and our rapidly changing environment.

Possible Multiple-Interactive- Environmental Factors: This leads us to explore the multi-interactive environmental factors, that appear to contribute to neurological morbidity.

Consider the simple concept, that economic activities produce waste products, therefore recognise the extent of socio-economic changes over the last fifty affluent years, alongside climate changes, all might also be impacting upon human health?

A relatively new concern is about air pollution which has been related to neurological conditions, seen in a major meta-analysis that highlighted Alzheimer's Disease being associated with air pollution in Western countries [37-39]. Whilst recently acknowledged, is about the impact of endocrine disruptive chemicals, that have been added to the human environment, that is also associated with neurodegenerative conditions [40-43]. The environmental interactive factors now include the world-wide blanket of plastics, organophosphates, endocrine disrupter chemicals, solvents, petrochemicals, heavy metals in water, food additives, air, and water pollutants and the low ubiquitous but prolonged electro-magnetism exposure, are factors have been associated with neurological conditions [44-47].

Indeed, vested interest surrounding organophosphates have been denied as dangerous for years but now are recognised that they can be problematic to human health [39,44]. Moreover, a good example of interactive factors as damage is related to neurotoxicity, of accumulation within the environment, possibly triggered by low frequency but prolonged exposure of electro-magnetism in the Western world [44.] However, it must be acknowledged that some studies have argued that there is no convincing association between low frequency EMF and neurological condition [48,49]. Moreover, there is positive evidence that EMF direct application to fractured wounds and burns can be therapeutic [51-54].

We do not wish to particularly over-state the link with the new digital ubiquitous world, but in the USA the Environmental Health Trust [54], successfully sued the Federal Communications Commission [55] in the Supreme Court, because the FCC had inadequately warned the public about low level [54] yet prolonged exposure of electromagnetism are recognised as linked to neuro-degenerative conditions [44,47, 53]. Indeed, the European Union Health Commission argued that manufacturers have not given a high enough priority about the possible health impacts of background EMF, because there is "*increasing evidence that this is beginning to emerge*" [44] Indeed, a recent authoritative study showed that the rising geomagnetic fields, with increasing human triggered EMF can impact upon the nervous system. They stated that there is "*compelling evidence of new electric mechanisms in human brains may interfere with the evolution of neuro-degenerative disease*" [56].

A major strength in medicine is the focus upon convergent evidence to provide a more comprehensive diagnosis. However, medicine needs to be able to think more laterally at causes of

illnesses and to `think outside the box'. Hence, whilst we stress that the digital world is not the major cause but they might be a trigger factor upon a range of a *multiplicity of environmental interactive* factors, leading to a new human multiple-interactive environmental pathology?

It has been asked if the modern world leads to brain disease and of course the most `modern world' is the USA, yet in 1979 they were fifteenth of the twenty-one nations neurological deaths but by 2015, they are now second highest of neurological deaths rates [1,7]. Does this reflect the changing modern world environment. In the late 1960's Rachel Carson's, in her `The Silent Spring' taught us that we all live in the `natural' world, but in this rapidly changing there is an inevitable impact upon us all, for better or worse [57].

Invariably, in undertaking research with differing WDN populations, we need to compare relative rates. However, this sounds too detached from these changes impacting upon families and services. At the macro level, the numbers of CND in the UK were 103,550 and in America 436,438, which was higher than just there one year's covid-19 deaths! Yet these numbers have appeared to be ignored by the media or authorities, almost a `hidden epidemic'. Whilst our statistical analysis is vital, we need not just numbers but look at a case situations and ask what does this in practice mean for the patient and family impact of neurological disease.

There is a case of a 49year-old professional man, a strong family man and very fit being a keen squash player. Sadly, he was diagnosed with earlier onset of Alzheimer's and had to resign, as he was uncapable of maintaining his professional standards. There was a speeding up of failing cognition and memory, with severe family stresses for his wife and adolescent children. After four years, he began to show very disinhibited sexual speech and behaviour, to further distress for all, with a major a change in his personality. The severity was such that aged 55 he required custodial care, though for the last 3years his wife continues to visit him.

Such a psycho-social-economic distress is catastrophic for any family. In one sense, his story can now speak for the silent of new thousands of families for who might be sharing something of his family reality.

Conclusion:

We are confident that there are multiple but interactive environmental causes are related to the unequivocal increases in neurological morbidity and mortality. These results will not be welcome, yet if we not "dare to speak truth to power " [58], who will? We fear that until Governments under-take the necessary research to fully explain what is happening in during a virtual `hidden epidemic', then it is likely that there will be even more cases, with even more distress for our patient, their family and services, all will be overwhelmed.

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