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GLOBAL EPIDEMIOLOGY OF TROPICAL, REGIONAL AND PANDEMIC
INFECTIONS
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Keywords:	Indigenous diseases; Africa; Asia; Antarctica; Australia; Europe; America; Pandemic disease outbreak; Disease awareness and prevention program.
Abstract:	The world was twice threatened by pandemic infection outbreak, transmitted by fleeing migrants, in 1918 (Spanish flu) and 2019 (COVID-19) due to relapse in quarantine services and medical protocols at the borders. The situation could have been averted if migrants were aware of the dangers associated with concealing latent (asymptomatic) or early-phase infections from quarantine officers and medical personnel. Therefore, a review of some lethal infections across each continent was provided to increase disease awareness among migrants. STD/STI (e.g., HIV/AIDS) was the previous highest-ranking infection in Africa, killing about 2.2 million people (20.4%) in 2002; presently, respiratory infections rank 1st with about 775,000 deaths recorded in 2019. Heart related-diseases are the major cause of death in Asia (3.1 million deaths) and Latin America (4.3 million deaths), while cancer-related deaths are more frequent in Australia than anywhere in the globe with about 32,965 human casualties in 2020. So, African tourists are advised to take precautionary health measures against respiratory infections, amongst other diseases, as death from diseases is potentially high in Africa i.e., 93.1% (2002), 90.6% (2015), 90.0% (2016) and 90.0% (2019) than any other cause. The Antarctic visitors should be aware of potential pandemic infections like COVID-19 lurking in the icy terrain, while Asian, European, and American visitors should have basic training on how to detect or handle symptoms associated with heart-related diseases. Lastly, Australian tourists should be cautious of cancer infections, as communicable and non-communicable infections claim more lives than road accidents.
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Kind regards



Peter M. Etaware
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1 GLOBAL EPIDEMIOLOGY OF TROPICAL, REGIONAL AND

2 PANDEMIC INFECTIONS

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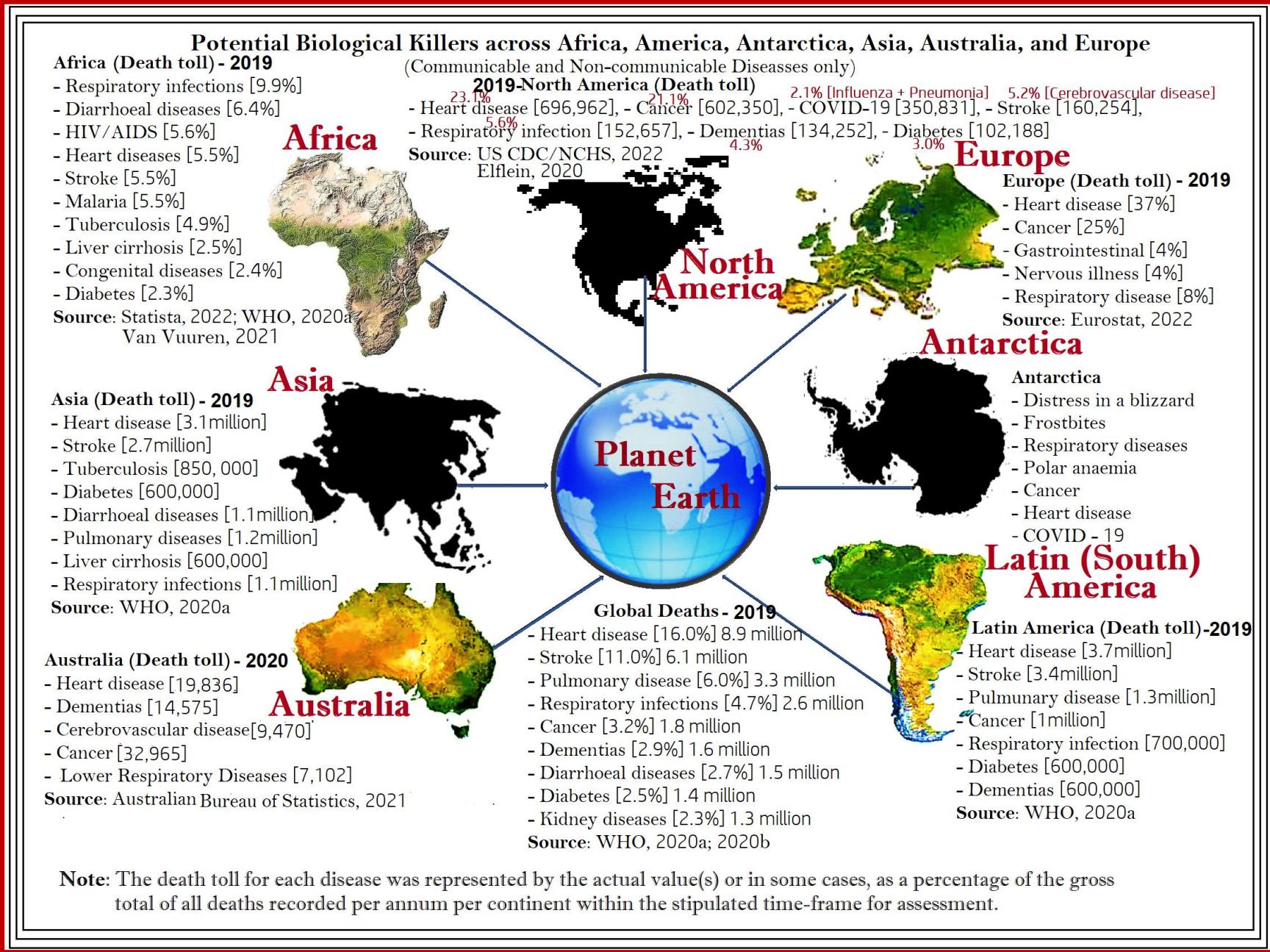
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21 Graphical Abstract



23 **Abstract**

24 The world was twice threatened by pandemic infection outbreak, transmitted by fleeing migrants,
25 in 1918 (Spanish flu) and 2019 (COVID-19) due to relapse in quarantine services and medical
26 protocols at the borders. The situation could have been averted if migrants were aware of the
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31 (20.4%) in 2002; presently, respiratory infections rank 1st with about 775,000 deaths recorded in
32 2019. Heart related-diseases are the major cause of death in Asia (3.1 million deaths) and Latin
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34 anywhere in the globe with about 32,965 human casualties in 2020. So, African tourists are
35 advised to take precautionary health measures against respiratory infections, amongst other
36 diseases, as death from diseases is potentially high in Africa i.e., 93.1% (2002), 90.6% (2015),
37 90.0% (2016) and 90.0% (2019) than any other cause. The Antarctic visitors should be aware of
38 potential pandemic infections like COVID-19 lurking in the icy terrain, while Asian, European,
39 and American visitors should have basic training on how to detect or handle symptoms
40 associated with heart-related diseases. Lastly, Australian tourists should be cautious of cancer
41 infections, as communicable and non-communicable infections claim more lives than road
42 accidents.

43 **Keywords:** Indigenous diseases; Africa; Asia; Antarctica; Australia; Europe; America;
44 Pandemic disease outbreak; Disease awareness and prevention program.

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47 **1.0 Introduction**

48 In 2019, humanity was threatened with total extinction as the world was taken unaware by a
49 deadly pandemic wave of severe acute respiratory disease termed “COVID-19”, which evolved
50 from Hubei, China [1, 2]. The disease swept through the world like a horrendous plague, rapidly
51 transforming/trans-mutating into lethal variants i.e., Alpha, Beta, Delta, and Omicron variants
52 [3], killing thousands of people within few weeks [4, 5]. The situation abruptly resulted in total
53 lockdown of the global economy, as humanity was on the verge of annihilation from the face of
54 the earth. Sadly, the situation could have been averted if timely disease studies and intervention
55 ensued in China. This was the 2nd time humanity survived extinction from disease outbreak. So,
56 in response to the current crisis, the World Health Organization (WHO) declared “disease” as the
57 major cause of death around the world, with heart infections topmost on the killer chart [6, 7].
58 The United Nations (UN) also seconded this view with a cry of dissatisfaction at the rate at
59 which life is lost to preventable diseases, providing a “red list” of one million (1,000,000) living
60 species on the verge of extinction [8]. Unfortunately, humans are the most recent addition to that
61 list.

62 Most killer infections across the world originated from a geographical landmark e.g.,
63 community, village or city, tribe or race, country or continent. For example, HIV/AIDS, Ebola,
64 and malaria were once indigenous to Africa [9, 10, 11], chickenpox, smallpox and measles also
65 indigenous diseases of Europe [12], while the most recent COVID-19, SARS and MERS
66 infections were truly indigenous to the middle east and Asia [13], Yellow fever was an
67 indigenous infection originated from the Caribbean and North America [14], while the wide
68 spreading influenza virus used to be indigenous to Asia, Europe and America alone [15] etc.
69 These indigenous diseases were indeed accountable for most deaths across the world [6]. Sadly,

70 the unprecedeted manner in which noxious pathogens mutate and killer diseases evolve from
71 each continent is a cause for global concern, as migrants play pivotal role(s) in the propagation
72 of these infections. Therefore, a compilation of the topmost lethal geo-spatial infections around
73 the world will help visitors to identify peculiar infections associated with specific locations
74 (disease hotspots) i.e., villages, towns, cities, countries or continents. This will enable visitors to
75 either avoid these disease hotspots (if they are immuno-compromised and prone to such diseases)
76 or enroll for vaccination against such diseases (where applicable and if traveling there was
77 necessary). This strategy will help truncate the potential transmission of several unknown or
78 futuristic pandemic infection outbreak(s) and also minimize deaths from diseases that could have
79 been prevented. Humans are not the only victims of this harsh reality, an epidemic can ensue in
80 plants [16, 17, 18, 19, 20, 21] or animals [22, 23], if foreign pathogens are introduced into the
81 environment from infected souvenirs collected during visits too.

82 **2.0 Methodology**

83 **2.1 Research focus**

84 The seven (7) continents of the world were the main focus of this research i.e., Africa,
85 Antarctica, Asia, Australia, Europe, North America, South (Latin) America.

86 **2.2 Geo-spatial diseases and their death statistics**

87 The statistics for indigenous diseases and their death toll across each continent was extracted
88 from the following references:

- 89 1. *Africa*: Emergent life-threatening infections within Africa (21st century) and the potential
90 areas earmarked for severe outbreak [24]. A summary of all causes of deaths in Africa
91 [25, 26, 27]. The percentage of annual deaths in Africa resulting from disease infections

92 [6, 25, 26, 27, 28, 29]. African death archive [30]. The 21st century biggest indigenously
93 referenced infections in Africa [6, 25, 26, 27, 28, 29].

94 2. *Antarctica*: Emergent life-threatening diseases and the possibility of experiencing an
95 outbreak of Avian flu [31], Poxvirus infections [32, 33], Influenza [33, 34], Anthrax,
96 Zika shifts and Zombie diseases [35], and COVID-19 pandemic in Antarctica.

97 Recommended vaccines for travelers and tourists intending to spend time in Antarctica
98 [36].

99 3. *Asia*: The prevalence of major life-threatening diseases in 19 selected countries in Asia
100 appraised by human death toll from each disease factor estimated per country (2008
101 Asia-Pacific statistics provided by Low *et al.* [37], and 2000 - 2019 statistics for top 10
102 causes of deaths in Asia [6].

103 4. *Australia*: Disease burden and major causes of deaths in Australia [38, 39, 40]. Important
104 causes of diseases, injuries, and deaths in Australia [41].

105 5. *Europe*: The numerical burden of human deaths associated with diseases and infections
106 across Europe, between 2000 and 2019 [6, 42, 43]. The percentage of all disease burden
107 across Europe, estimated in 2017 by Eurostat [43]. Some highlighted infections and their
108 estimated death toll analyses for 37 out of the 44 countries that constitute the European
109 continent, 2004 statistics provided by Busse *et al.* [42].

110 6. *North America*: Major causes of deaths in the US (North American continent) and the
111 percentage of human casualty associated with each death factor [44, 45]. Death analysis

112 from disease contraction, non-contagious infections and injuries in 2019, itemized based
113 on the basic sex/gender division i.e., male and female, provided by Heron [44].

114 7. *Latin (South) America*: 2000 to 2019 estimation of top 10 causes of deaths in Latin
115 America [6]. Deadly tropical diseases in Latin America and countries with highest
116 probable chances of disease outbreak [46].

117 8. *Worldwide*: A summary of all causes of deaths around the world, estimated between 2000
118 and 2019 [6]. Current list of the healthiest countries (Total = 192 countries) in the world,
119 ranked using the Bloomberg Global Health Index (BGHI) and the Global Health Security
120 Index (GHSI), with their estimated population value for 2022 [47].

121 **2.3 Data analysis**

122 The data used for this research was obtained from duly authorized online sources, referenced and
123 adequately cited in the current article. Data were analyzed and organized using Microsoft Excel,
124 2016. Deaths associated with diseases were calculated as percentages and/or presented as actual
125 values. Graphs and pictorial charts were developed using Microsoft Excel and Word, 2016.

126 **3.0 Results**

127 **3.1 Africa**

128 *Disease prevalence in Africa and the estimated death toll*

129 In 2000, the prevalence of respiratory infections was excessive in Africa, claiming about 560,000
130 lives across the continent [25, 48]. The prevalence and spread of respiratory infections was due
131 to the presence of favorable climate conditions suitable for pathogen(s) survival and trans-
132 mutational activities, and also the presence of vectors associated with zoonotic transmission of

133 the disease (Table 1). Two (2) years later, HIV/AIDS became Africa's leading indigenous
134 infection. The sexually transmitted disease "HIV/AIDS" moved to the top of the killer chart,
135 surpassing every known cause of death in Africa. The disease prevailed for 10 years as the
136 "ultimate killer" (2002-2012), killing about 2.2 million individuals in 2002 [25, 48], accounting
137 for 20.4% of the total deaths recorded that year (Fig 1). In 2010, about 1 million deaths was
138 recorded for HIV/AIDS [26], and close to 1.09 million individuals died from the disease in 2012
139 [28, 29], before scientists could find a panacea for the disease. Sadly, in 2015 several novel
140 variants of respiratory infections resurfaced, just after scientific intervention and global
141 technological advancement were initiated to curb HIV/AIDS. The new variants of respiratory
142 infections became the leading cause of death among the high-profile indigenous diseases in
143 Africa, killing about 798,000 persons in 2015, 917,000 individuals in 2016 [26, 27], and 415,000
144 deaths were recorded by WHO [6] among the 775,000 deaths that ensued in 2019 [27], as
145 elaborately noted in Table 1.

146 Apart from HIV/AIDS and respiratory infections, diarrhoeal disease is one of the fiercest killers
147 underrated in Africa. The disease was the 2nd most lethal infection in children below the age of
148 18 years within developing countries around the world and in Africa, killing about 1.6 million
149 children in 2002 alone [25, 48]. It also accounted for almost 7.4% of all deaths recorded in
150 Africa in 2016 (Fig 1). Heart related-disease became prevalent in Africa around 2000, causing
151 about 5.8% of the total deaths recorded in 2016 (Fig 1). Other common infections like stroke
152 (5.5% deaths in 2019), malaria (10.1% deaths in 2002), tuberculosis (5.1% deaths in 2015), and
153 liver cirrhosis (2.5% deaths in 2019) had their fair share as major death factors accountable for
154 the loss of human lives in Africa in the 21st century (Fig 1).

155

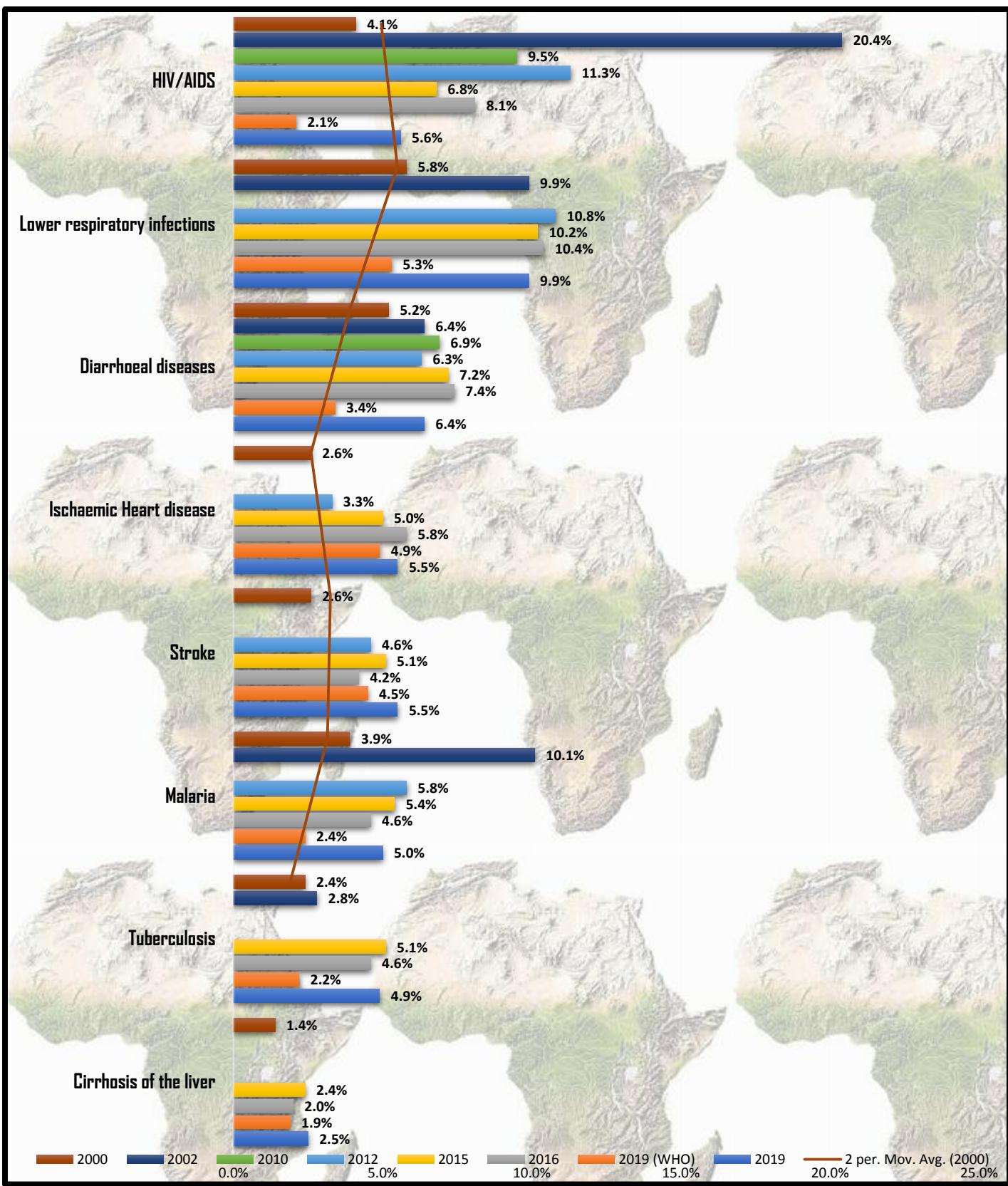
Table 1: Deaths associated with Indigenous diseases in Africa and other developing countries (DC) of the world

Cause of Human Death	Annual Deaths Associated with Indigenous Infections in Africa								Kids Stats
	2019	2019*	2016	2015	2012	2010	2002	2000	
Indigenous Infections									2002 (DC)
Respiratory infections	774,252	415,000	916,851	797,232	1,039,000	-	1,071,000	560,000	1,856,000
Diarrhoeal diseases	496,278	269,000	652,791	562,752	603,000	725,000	695,000	500,000	1,566,000
HIV/AIDS	434,543	161,000	718,800	531,488	1,088,000	1,000,000	2,203,000	395,000	370,000
Ischaemic Heart disease	429,179	385,000	511,916	390,800	312,000	-	-	250,000	-
Stroke	425,719	350,000	373,485	398,616	437,000	-	-	250,000	-
Malaria	388,229	190,000	408,125	422,064	554,000	-	1,087,000	375,000	1,098,000
Tuberculosis	378,193	170,000	405,496	398,616	230,000	-	303,000	230,000	-
Cirrhosis of the liver	195,320	150,000	174,420	187,584	-	-	-	140,000	-
Diabetes mellitus	177,079	-	-	164,136	175,000	-	-	-	-
Meningitis	140,400	-	-	-	246,000	-	-	-	-
Kidney diseases	130,582	-	-	125,056	-	-	-	-	-
Kwashiorkor/Marasmus	85,800	-	-	-	284,000	-	138,000	-	138,000
Sub-Total of Deaths	4,055,574	2,090,000	4,161,884	3,978,344	4,968,000	1,725,000	5,497,000	2,700,000	5,028,000
<i>Data was extracted from:</i>	[27]	[6]	[27]	[26, 27]	[28, 29]	[26]	[25, 48]	[25, 48]	[25, 48]
Mild Infections (Pooled)	2,844,426	4,810,000	3,838,116	3,102,656	-	-	4,534,000	-	-
Indigenous + Mild Infections	6,900,000	6,900,000	8,000,000	7,081,000	-	-	10,031,000	-	-
Injury/Random Cause	900,000	900,000	800,000	735,000	-	-	747,000	-	-
Total Deaths	7,800,000	7,800,000	8,800,000	7,816,000	9,600,000	10,560,000	10,778,000	9,700,000	10,778,000
<i>Data was extracted from:</i>	[27]	[27]	[26]	[27]	[28]	[30]	[25, 48]	[25, 48]	[25, 48]

156

All the data represented on the table were actual facts extracted from the duly cited authorities. * = Estimation made by World Health Organization. DC = Developing Countries of the World including Africa. - = Data was not available for that disease

157



158

159 Fig 1. Percentage of annual deaths in Africa caused by infections [6, 25, 26, 27, 28, 29, 49]

160 ***A summary of the burden of death in Africa***

161 Although, there was a steep decline in human death due to contraction of contagious infections in
162 Africa i.e., 72.2% (2002), 56.3% (2015), 56.0% (2016) and 52.9% (2019), the burden of death
163 from diseases still remains a major problem in Africa i.e., 93.1% (2002), 90.6% (2015), 90.0%
164 (2016) and 90.0% (2019) of the total deaths per annum (Table 2). In 2002, a total of 7.8 million
165 individuals lost their lives due to the contraction of contagious diseases, while about 2.3 million
166 persons died from non-communicable infections, with deaths from diseases alone accounting for
167 93.1% of all human deaths recorded in Africa within the year 2002, whereas road accidents and
168 other source of fatal injuries only accounted for about 6.9% of the recorded death toll (Table 2).

169 **Table 2.** Categorization of the major causes of deaths in Africa

Year	Communicable	Annual Death Trend			Injuries	Total deaths
		Non-Communicable				
2002	7,779,000	72.2%	2,252,000	20.9%	747,000	6.9%
2015	4,400,000	56.3%	2,681,000	34.3%	735,000	9.4%
2016	5,000,000	56.0%	3,000,000	34.0%	800,000	10.0%
2019	4,100,000	52.9%	2,800,000	37.1%	900,000	10.0%

170 **Source:** Van Vuuren [26, 27], Boutayeb [25]

171 ***Disease profiling in Africa***

172 It was reported by Fenollar and Mediannikov [24] that the Democratic Republic of Congo (DRC)
173 was a potential hotspot for measles in the 21st century. Nigeria, Guinea, Liberia, Cote d'Ivoire,
174 Senegal, Ghana, Sudan, Sierra Leone, Burkina Faso, Mali, Togo, Central African Republic,
175 Uganda, Cameroon, Chad, Ethiopia and Angola were reputable hotspots for possible yellow
176 fever disease outbreak. Meanwhile, monkeypox infection was restricted to the Central African
177 Republic and Nigeria alone. The outbreak of the deadly Ebola virus was projected to be

178 prevalent in countries like Gabon, Republic of the Congo, Uganda, Democratic Republic of
179 Congo, Guinea, Sierra Leone and Liberia. The rift valley fever was estimated to be restricted
180 majorly to countries like Egypt, Kenya, Somalia, Sudan, Tanzania, Madagascar, South Africa,
181 Mauritania and Niger, while the zika virus infection outbreak was exclusive to Cape Verde, and
182 the chikungunya virus infection was estimated to be prevalent in countries like Kenya, Guinea,
183 Tanzania, Sudan, Gabon, Cameroon, and the Democratic Republic of Congo (Table 3). The
184 biggest of them all was cholera infection which was expected to spread through the north, south,
185 east and western boundaries of Africa, even cutting across Madagascar (Table 3).

186 **Table 3.** Some disease hotspots in Africa since the beginning of the year 2000

S/N	Disease	African countries earmarked as disease hotspots
1	Measles	Democratic Republic of Congo
2	Yellow Fever	Nigeria, Guinea, Liberia, Cote d'Ivoire, Senegal, Ghana, Sudan, Sierra Leone, Burkina Faso, Mali, Togo, Central African Republic, Uganda, Cameroon, Chad, Ethiopia, Angola
3	Monkeypox	Central African Republic, Nigeria
4	Ebola	Gabon, Republic of the Congo, Uganda, Democratic Republic of Congo, Guinea, Sierra Leone, Liberia
5	Rift Valley Fever	Egypt, Kenya, Somalia, Sudan, Tanzania, Madagascar, South Africa, Mauritania, Niger
6	Zika virus	Cape Verde
7	Chikungunya virus	Kenya, Guinea, Tanzania, Sudan, Gabon, Cameroon, Democratic Republic of Congo
8	Cholera	Madagascar, Somalia, South Africa, Chad, Nigeria, Tanzania, Burundi, Cote d'Ivoire, Democratic Republic of Congo, Liberia, Malawi, Niger, Mozambique, Republic of Benin, Uganda, Zambia, Cameroon, Angola, Zimbabwe, Algeria,

9 Plague Madagascar, Democratic Republic of Congo, Uganda, Tanzania, Malawi,
Mozambique, Algeria

187 **Source:** Fenollar and Mediannikov [24]

188 **3.2 Antarctica**

189 ***Potential disease profile within Antarctica***

190 Several potentially deadly pathogens were recently earthed from the icy surface of the Antarctic,
191 suggesting that there is a possibility of massive infection outbreak. Avian influenza virus (AIV)
192 responsible for the deadly avian flu was earthed from the icy shores of the Siberian Lake [31],
193 strains of poxviruses was extracted from permafrost in Siberia [32, 33], while traces of the
194 influenza virus was encountered in dead remains of victims of the 1918 Spanish flu outbreak in
195 Alaska [33, 34]. Anthrax, zika shift and zombie disease pathogens were earthed in the permafrost
196 in Siberia [33, 35]. Lastly, original virus responsible for inciting COVID-19 infection was traced
197 to the Antarctica as its possible place of origin (Table 4). Therefore, the US Centre for Disease
198 Control and Prevention has advised travelers and tourists to be vaccinated against some
199 frequently recurrent diseases noted among migrants, like measles, mumps, rubella, chickenpox,
200 poliomyelitis, influenza and COVID-19 infections [36]. See a list of the recommended vaccines
201 in Table 5.

Table 4. Potential disease outbreak that could be life-threatening in Antarctica

S/N	Infections	Pathogen	Location	Host(s)	Source
1	Avian flu	Avian Influenza Virus (AIV)	Siberian Lake ice, Siberia	Birds, Humans	Zhang <i>et al.</i> , 2006
2	Poxvirus infections:	Poxviruses:			
	▪ Smallpox	Variola virus			
	▪ Monkeypox	Monkeypox virus			Biagini <i>et al.</i> , 2012
	▪ Molluscum contagiosum	Molluscum contagiosum virus	Siberian permafrost, Siberia	Humans, Animals	Edwards, 2015
	▪ Tanapox	Yatapoxvirus			
3	Influenza (1918 link)	Influenza virus	Brevig Mission, Alaska	Humans	Edwards, 2015
4	Influenza	H1N1 influenza viral chimeras	Brevig samples from Alaska	Humans	Qi <i>et al.</i> , 2009
5	Anthrax	Bacillus anthracis	Siberia	Humans Reindeer Cattle	Pappas, 2016
6	Zika shifts	Zika virus	Siberian permafrost, Siberia	Humans	Pappas, 2016
7	Zombie diseases	Pithovirus	Siberian permafrost, Siberia	Amoeba	Pappas, 2016
8	COVID-19	SARS-CoV-2	Antarctica (In general)	Humans	US CDC, 2022

203 **Table 5.** Routine vaccines recommended by the US CDC for travelers visiting Antarctica

Hybrid infections	Routine Vaccines (Recommended)
Measles	Measles-Mumps-Rubella (MMR) vaccine
Mumps	Measles-Mumps-Rubella (MMR) vaccine
Rubella	Measles-Mumps-Rubella (MMR) vaccine
Chickenpox	Varicella vaccine
Poliomyelitis	Polio vaccine
COVID-19	COVID-19 vaccines
Flu	Flu vaccines

204 **Source:** US CDC/US Department of Health and Human Services [36]205

3.3 Asia

206 *Major causes of human death in Asia*

207 In 2000, Ischaemic heart diseases and neonatal conditions jointly accounted for the death of
 208 about 4 million people in the lower-middle-income countries of Asia [6]. Diarrhoeal disease
 209 was the 3rd most lethal infection then (after neonatal conditions), killing about 1.9 million Asian
 210 citizens [6]. Respiratory infections, stroke, tuberculosis, chronic obstructive pulmonary disease,
 211 liver cirrhosis and diabetes mellitus were the 4th, 5th, 6th, 7th, 8th and 10th most recurrent death
 212 factor as at 2000, jointly accounting for about 5.6 million deaths in the Asian continent (Table
 213 6).

214 In 2019, heart related-disease became the ultimate killer in Asia, killing about 3.1 million
 215 individuals, almost doubling the effects of the 2nd most lethal death factor in Asia. Stroke alone
 216 was responsible for about 1.7 million deaths in 2019, while other infections accounted for
 217 almost 6.8 million deaths across Asia. Road travel injury only accounted for about 500,000
 218 deaths within Asia in 2019 (Table 6).

219

220 **Table 6.** The major causes of human deaths recorded in Asia between 2000 and 2019

Major causes of deaths in Asia			
S/N	Indigenous Diseases	Death in 2019	Death in 2000
1	Ischaemic Heart Diseases	3,100,000	2,000,000
2	Stroke	1,700,000	1,300,000
3	Neonatal conditions	1,200,000	2,000,000
4	Chronic obstructive pulmonary disease	1,200,000	850,000
5	Lower respiratory infections	1,100,000	1,500,000
6	Diarrhoeal diseases	1,100,000	1,900,000
7	Tuberculosis	800,000	1,150,000
8	Cirrhosis of the liver	700,000	500,000
9	Diabetes mellitus	700,000	300,000
10	Road injury	500,000	400,000

221 **Source:** WHO [6]222 **Disease burden in some selected countries in Asia**

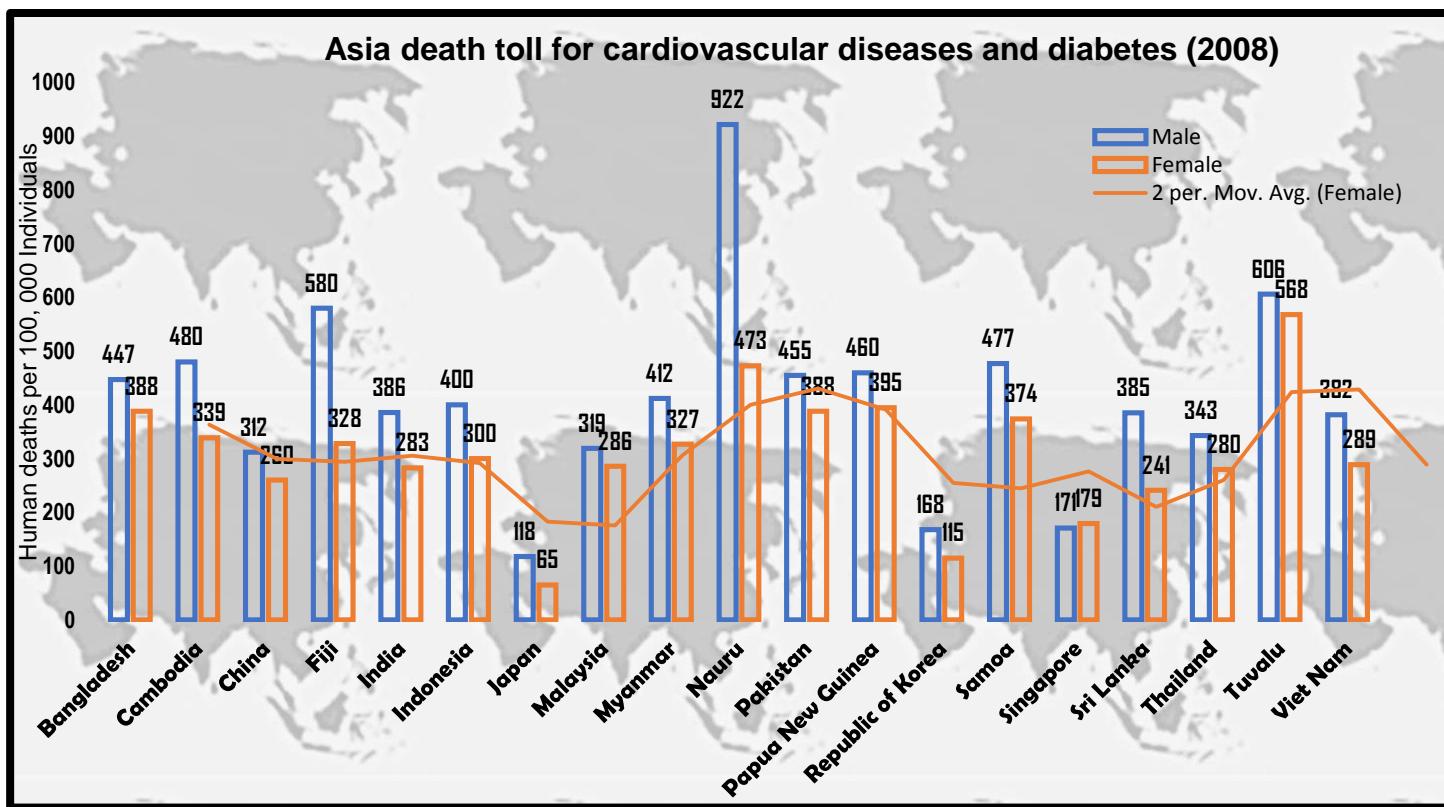
223 The country most affected by heart related-diseases and diabetes within the Asian continent in
 224 2008 was Nauru (1,395 deaths per 100,000 individuals), while Japan was the least affected with
 225 183 deaths per 100,000 citizens [37]. Sadly, Nauru was the country with the most recorded
 226 cases of death from cancer and other malignant neoplasms in 2008, with a documented death
 227 rate of 306 persons per 100,000 individuals (Table 7), while Samoa had the least report for
 228 deaths resulting from cancer (109 deaths per 100,000 persons). On the overall, men in Asia are
 229 more likely to suffer from heart-related diseases than women (Fig 2), with the population of
 230 men at risk located in Nauru (922 deaths per 100,000 men) as shown in Fig 2. On the other
 231 hand, both male and female have equal probability of dying from cancer infection (Fig 3). In
 232 summary, the population of men at risk of dying from cancer is well located in South Korea
 233 (191 deaths per 100,000 male), while females in Nauru are most likely to be at the apex of the
 234 cancer death chart (191 deaths per 100,000 female). The record obtained was for 2008 [37].

235 **Table 7.** Human casualty from heart disease, diabetes and cancer in Asia-Pacific in 2008

Human Casualties per 100,000 Individuals (Asia-Pacific, 2008)			
S/N	Country	Cardiovascular disease + Diabetes	Cancer
1	Bangladesh	835	212
2	Cambodia	819	235
3	China	572	287
4	Fiji	908	228
5	India	669	151
6	Indonesia	700	245
7	Japan	183	227
8	Malaysia	605	209
9	Myanmar	739	238
10	Nauru	1,395	306
11	Pakistan	843	189
12	Papua New Guinea	855	259
13	Republic of Korea	283	268
14	Samoa	851	109
15	Singapore	350	233
16	Sri Lanka	626	168
17	Thailand	623	211
18	Tuvalu	1,174	261
19	Viet Nam	671	231

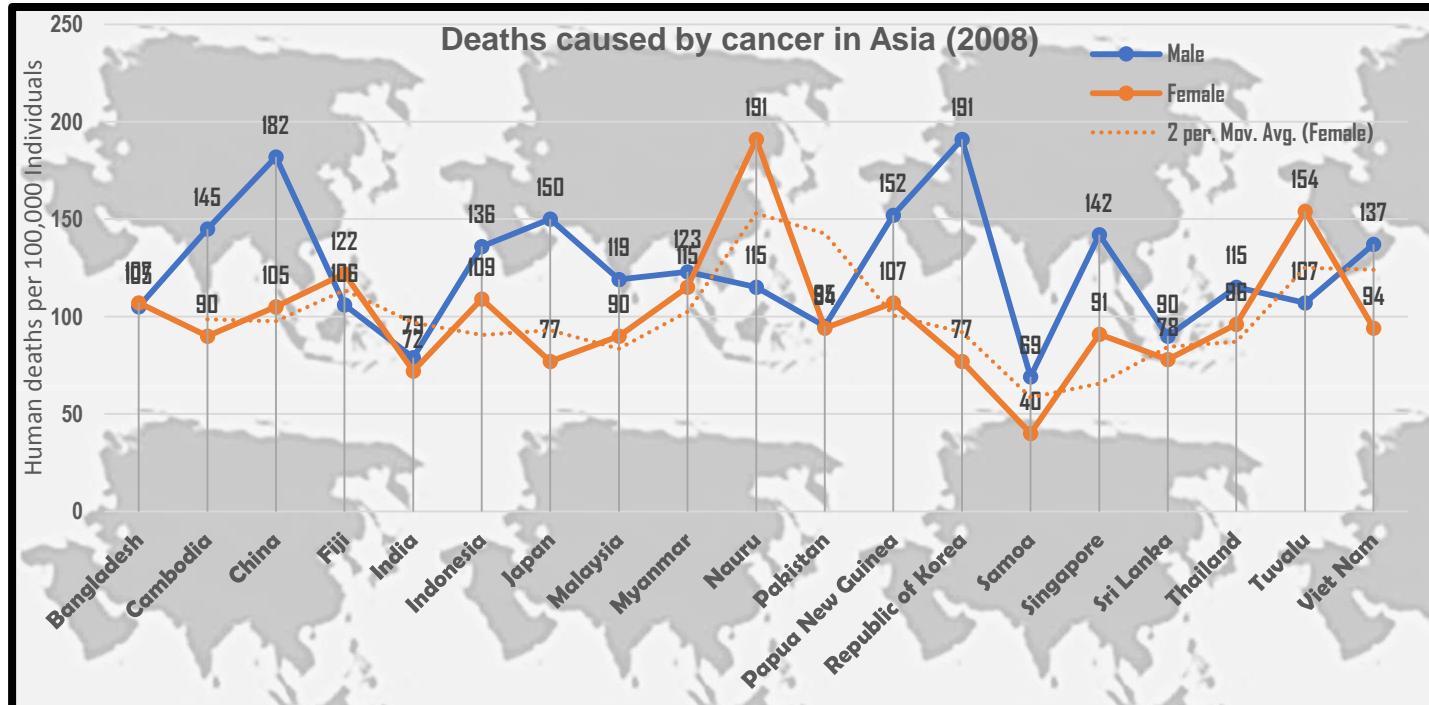
236

Source: Low *et al.* [37]



237

238 Fig 2. Human casualty in Asia caused by heart diseases and diabetes [37]



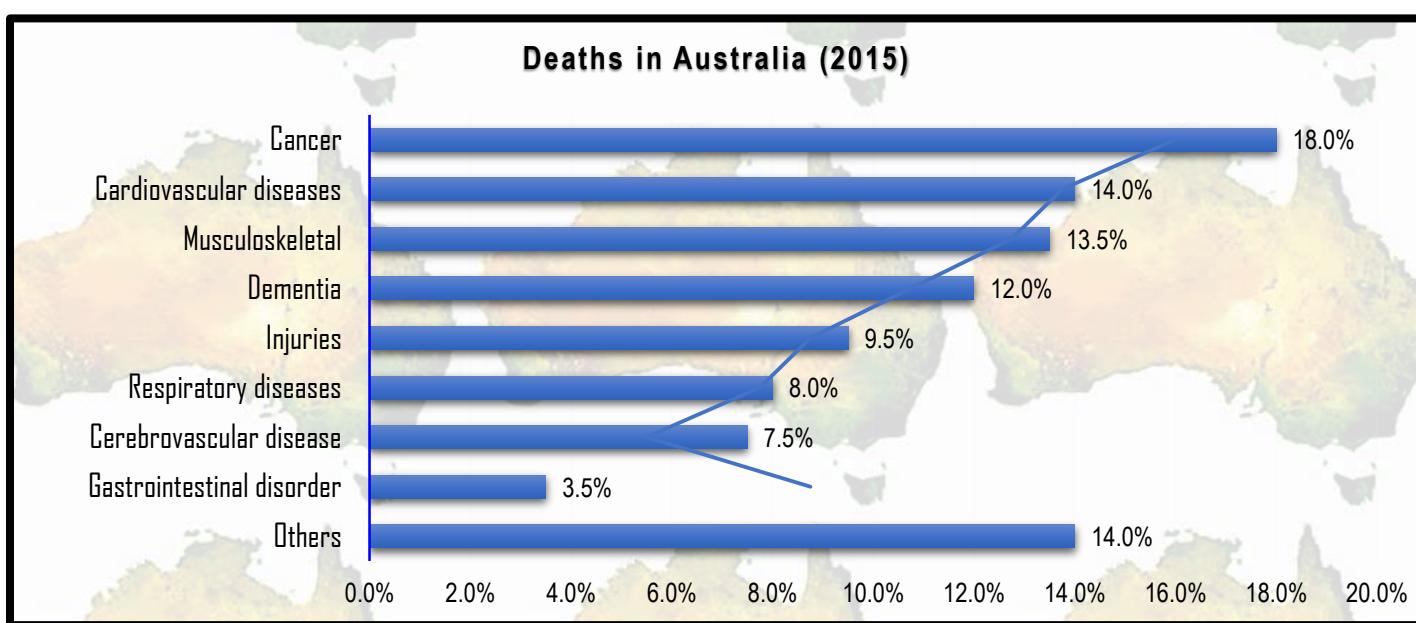
239

240 Fig 3. Death toll for some countries in Asia caused by cancer [37]

241 3.4 Australia

242 *The major causes of human deaths in Australia*

243 Cancer has been the major cause of death in Australia since 2011 (Table 8). It was responsible
244 for the death of 29,460 persons in 2011, 31,347 deaths were recorded in 2015 i.e., 18% of the
245 total deaths/year (Fig 4), 33,400 deaths were also recorded in 2019, and a decline in deaths
246 from cancer was observed in 2020, with a death toll of 32,965 (Table 8). The top five (5)
247 leading cause of death in Australia include heart related-diseases (25,012, 23,469 (14.0%),
248 21,892 and 19,836 deaths recorded in 2011, 2015, 2019 and 2020, respectively as shown in Fig
249 4 and Table 8), dementias (9,864, 12,635, 15,016, and 14,575 deaths recorded in 2011, 2015,
250 2019 and 2020, respectively), cerebrovascular (11,245, 10,867, 9,891 and 9,470 deaths
251 recorded in 2011, 2015, 2019 and 2020, respectively), and lower respiratory diseases (6,565,
252 8,017, 8,372 and 7,102 deaths recorded in 2011, 2015, 2019 and 2020, respectively), as shown
253 in Table 8. The trend of death from diseases in Australia seems to be on the decline between
254 2019 and 2020.



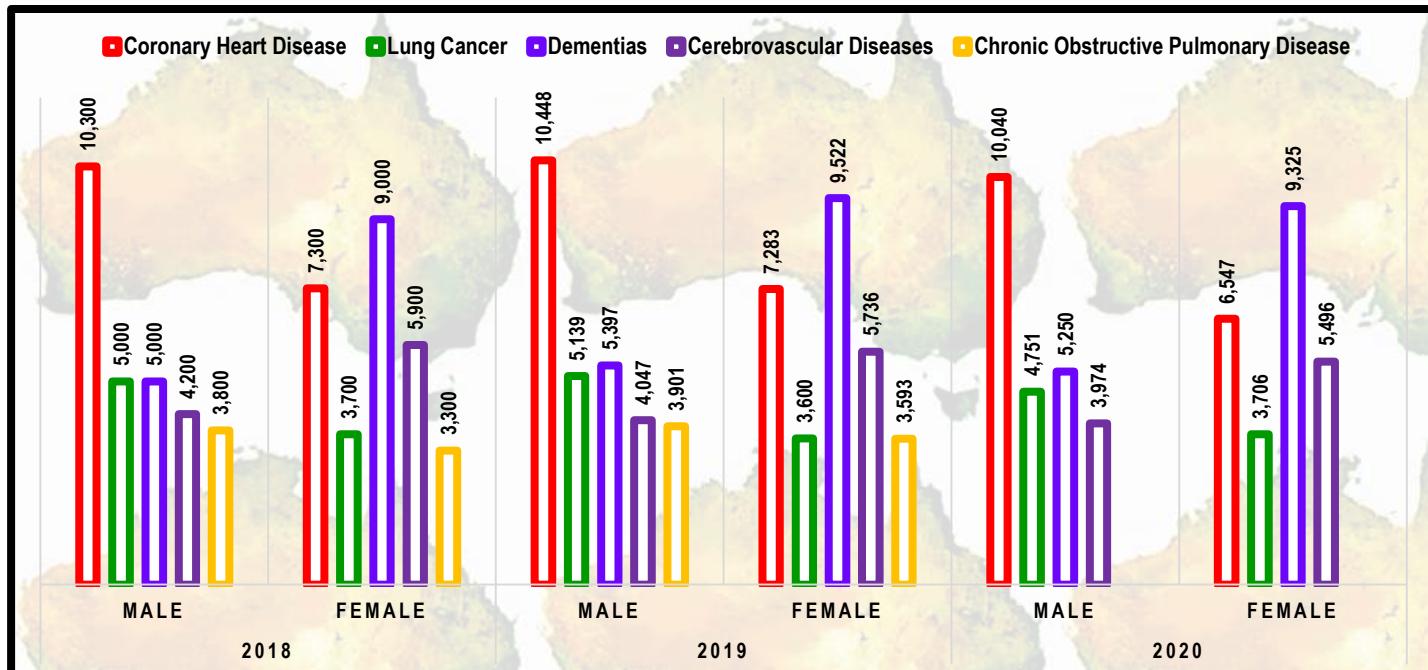
255
256 Fig 4. 2015 death toll in Australia [41]

257 **Table 8.** Top 22 leading causes of deaths in Australia

No.	Cause of death	Causes of human deaths in Australia			
		2011	2015	2019	2020
1.	Cancer (All causes)	29,460*	31,347*	33,400*	32,965*
2.	Heart diseases (All causes)	25,012	23,469	21,892	19,836
3.	Ischaemic heart diseases	21,526	19,911	18,244	16,587
4.	Dementias	9,864	12,635	15,016	14,575
5.	Cerebrovascular diseases	11,245	10,867	9,891	9,470
6.	Cancer of the respiratory tract	8,117	8,470	8,821	8,457
7.	Lower respiratory diseases	6,565	8,017	8,372	7,102
8.	Cancer of the anal cavity	5,206	5,549	5,410	5,483
9.	Diabetes	4,211	4,690	4,967	5,148
10.	Cancer of the lymphatic system	3,979	4,416	4,793	4,754
11.	Urinary diseases	3,384	3,446	3,903	4,019
12.	Prostate cancer	3,294	3,197	3,611	3,568
13.	Injuries	1,872	2,614	3,298	3,395
14.	Heart failure	3,486	3,558	3,648	3,249
15.	Cancer of the pancreas	2,416	2,764	3,207	3,244
16.	Breast cancer	2,938	2,967	3,261	3,144
17.	Suicide	2,393	3,093	3,318	3,139
18.	Cardiac arrhythmias	1,617	2,344	2,408	2,401
19.	Influenza & Pneumonia	2,487	3,069	4,124	2,287
20.	Cancer of the liver & hepatic cells	1,423	1,820	2,204	2,192
21.	Liver cirrhosis	1,592	1,868	2,111	2,186
22.	Skin cancer	2,087	2,164	2,093	2,123
Total deaths/Year		146,932	159,052	169,301	161,300

258 **Source:** Australian Bureau of Statistics [40]259 ***Human deaths in Australia analyzed based on sex***

260 It was observed that heart-related diseases was the major killer of men in Australia, killing
 261 10,300 men in 2018, 10,448 men in 2019, and 10,040 men in 2020 (Fig 5). On the contrary,
 262 dementias which include Alzheimer's disease was the major killer of the female folks in
 263 Australia, killing about 9,000 women in 2018, 9,522 women in 2019, and 9,325 women in 2020
 264 (Fig 5). Other infections like lung cancer, cerebrovascular and chronic obstructive pulmonary
 265 diseases were among the topmost killers of men and women in Australia.



266

267 Fig 5. Australian death analysis by sex [38, 39, 50]

268 **3.5 Europe**

269 *Indigenous diseases and infections responsible for human deaths in Europe*

270 Since the beginning of the new millennium, heart related-infections have been the major cause
 271 of human demise in Europe, with about 2.3 million deaths recorded in 2000 [6]. Five (5) years
 272 later, a geometric increase in value was observed with an astronomic elevation to 5.07 million
 273 deaths recorded for cardiovascular infections in 2005 [42]. The values recorded in 2005 were
 274 still the highest ever recorded figure for deaths associated with heart failure in Europe since
 275 year 2000. Meanwhile, 12 years later (i.e., 2017), 1.72 million [43], and about 2 million (2019)
 276 deaths have been recorded for heart related diseases [6] as shown in Table 9. Other diseases are
 277 just 2nd best when it comes to human deaths in Europe. In 2017, 25% of all deaths recorded in
 278 Europe was caused by cancer, 8.0% (respiratory infections), while diarrhoeal diseases,
 279 dementias and neurological disorders caused 12.0% deaths (Fig 6).

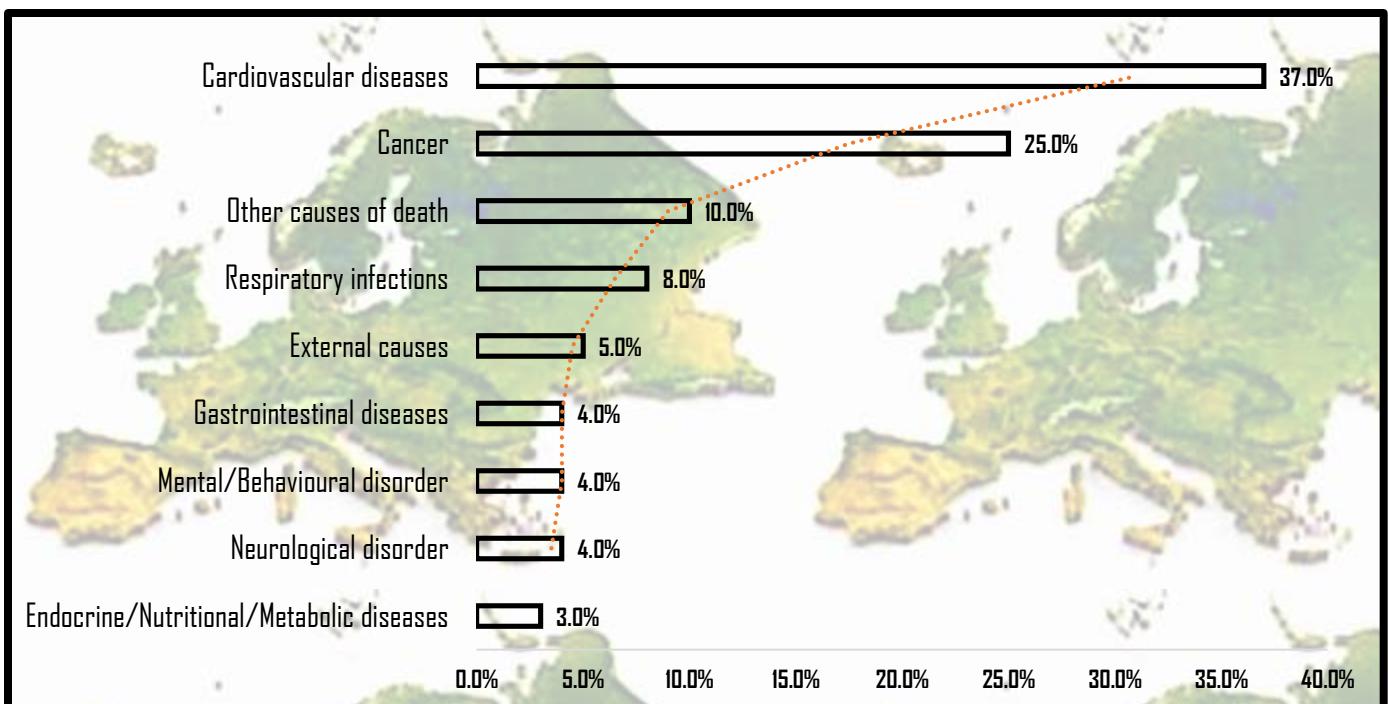
280 ***Analysis of some of the greatest indigenous diseases in Europe***

281 Deaths associated with stroke and partial paralysis was highest in Kyrgyzstan in 2004, with a
282 death rate of 250 human casualties per 100,000 individuals [42], whereas, Switzerland had the
283 least possible deaths from stroke and partial paralysis, with an all-time low rate of 25 deaths per
284 100,000 individuals [42] as shown in Table 10. The death toll from people suffering from
285 diabetes was highest in Armenia (79 deaths per 100,000 Armenian citizens) and lowest in
286 Belarus, Greece and Ukraine with a value of 4 deaths per 100,000 human population [42] as
287 documented in Table 10. For human deaths associated with the contraction of chronic
288 obstructive pulmonary diseases, Kyrgyzstan recorded the most deaths in 2004 (95 deaths per
289 100,000 individuals, while the least recorded death was in Greece (5 deaths per 100,000
290 persons) as reported by Busse *et al.* [42].

291 **Table 9.** Human deaths associated with infections and diseases within Europe

Indigenous diseases	Human deaths associated with Indigenous diseases across Europe			
	2019	2017	2005	2000
1. Cardiovascular diseases	2,000,000	1,720,500	5,070,000	2,300,000
2. Dementias/neurological disorder	814,000	186,000	260,000	300,000
3. Stroke	800,000	-	-	1,000,000
4. Cancer	1,000,000	1,162,500	1,860,000	900,000
5. COPD	580,000	-	-	500,000
6. Respiratory infections	500,000	372,000	420,000	450,000
7. Kidney disease	350,000	-	-	250,000
8. Diabetes mellitus	300,000	-	150,000	250,000
9. Gastrointestinal diseases	-	186,000	390,000	-
Source: [6] [43] [42] [6]				

292 COPD: Chronic obstructive pulmonary disease



293

294 **Fig 6.** All causes of human deaths in Europe in 2017 [43]295 **Table 10.** Deaths across some European countries associated with stroke, diabetes and COPD

Country	Age-Standardized death rate per 100,000 population (2004 records)		
	Stroke	Diabetes	Chronic obstructive pulmonary disease
Armenia	190	79	48
Austria	35	10	18
Belarus	150	4	19
Belgium	45	8	20
Bulgaria	145	14	9
Croatia	100	12	14
Czech Republic	75	8	9
Denmark	49	14	35
Estonia	100	13	9
Finland	45	6	9
France	35	10	6
Germany	40	13	14
Greece	75	4	5
Hungary	90	13	20
Ireland	40	8	23
Israel	30	32	10
Italy	45	12	10
Kazakhstan	215	11	49
Kyrgyzstan	250	12	95
Latvia	150	7	6

Country	Age-Standardized death rate per 100,000 population (2004 records)		
	Stroke	Diabetes	Chronic obstructive pulmonary disease
Lithuania	85	6	18
Luxembourg	50	7	16
Netherlands	40	14	20
Norway	40	7	19
Poland	70	10	14
Portugal	90	23	14
Republic of Moldova	180	8	39
Romania	180	7	18
Russian Federation	230	6	13
Slovakia	60	10	10
Slovenia	55	18	15
Spain	35	10	17
Sweden	40	9	13
Switzerland	25	10	12
Turkey	145	20	59
Ukraine	140	4	20
United Kingdom	49	5	22
Europe (37/44 Countries)	3,418	464	767

296 Source: Busse *et al.* [42]

3.6 North America

Top 10 causes of deaths in the United States and North American continent

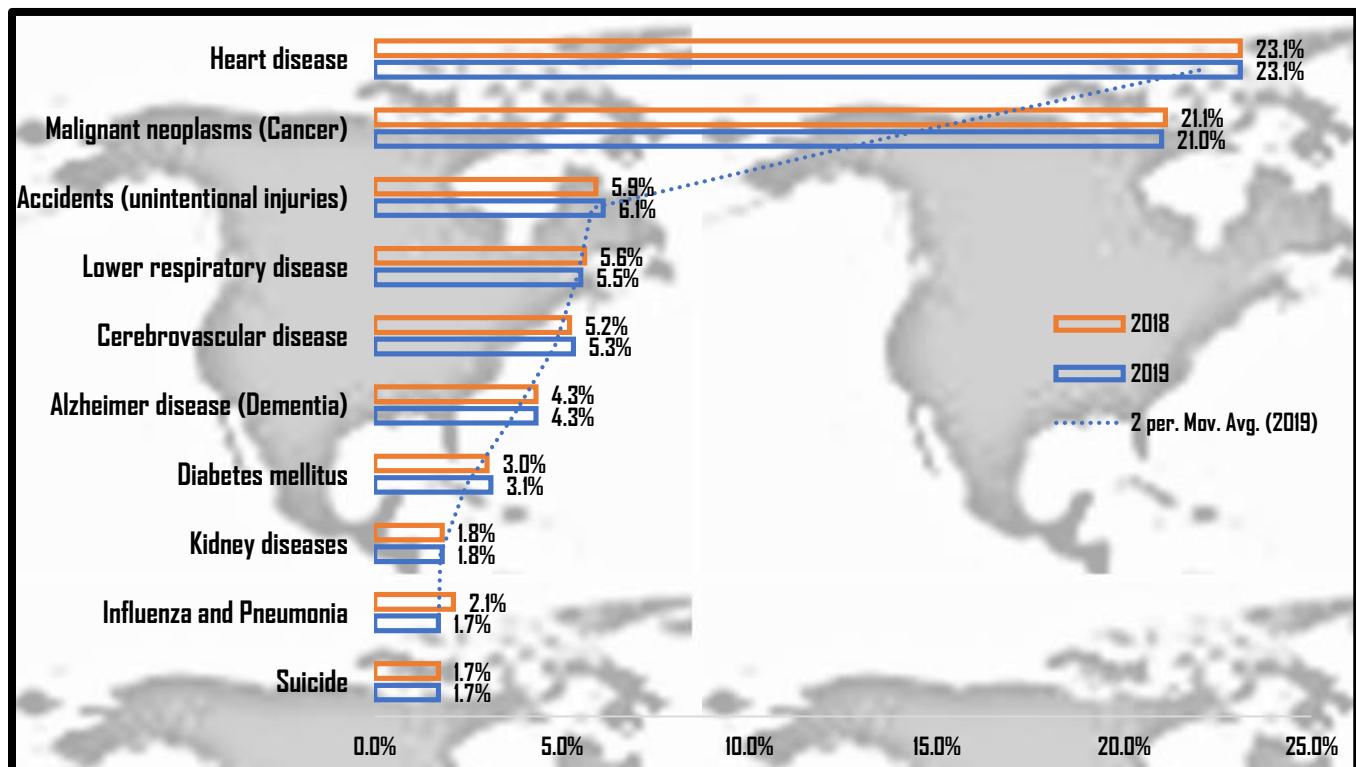
The major cause of human deaths in North America is heart related-diseases. It was responsible for the deaths of over 1.3 million citizens between 2018 and 2019 [44]. Heart related-infections still remain the major killer of human beings in North America (Table 11). Cancer, respiratory infections, cerebrovascular diseases, dementias, diabetes, kidney diseases, and influenza and/or pneumonia are 2nd, 4th, 5th, 6th, 7th, 8th and 9th on the killer list for North America (Table 11). As at 2019, heart related-infections caused about 23.1% of all deaths recorded in the US, cancer was responsible for 21.0% of the total deaths, while respiratory infections caused about 5.5% of all deaths recorded in 2019 (Fig 7). Cerebrovascular infections was responsible for 5.3% deaths, dementias caused 4.3% deaths, diabetes mellitus was responsible for a little over 3.0% deaths,

308 while kidney related-diseases and influenza/pneumonia were responsible for 1.8 and 1.7% of all
 309 deaths recorded in the US in 2019 (Fig 7), as reported by Heron [44] and Elflein [45].

310 **Table 11.** Human casualties resulting from ten (10) major causes of deaths in the United States

Indigenous disease	Causes of death in US	
	2019	2018
Heart disease	659,041	655,381
Malignant neoplasms (Cancer)	599,601	599,274
Accidents (unintentional injuries)	173,040	167,127
Lower respiratory disease	156,979	159,486
Cerebrovascular disease	150,005	147,810
Alzheimer disease (Dementia)	121,499	122,019
Diabetes mellitus	87,647	84,946
Kidney diseases	51,565	51,386
Influenza and Pneumonia	49,783	59,120
Suicide	47,511	48,344
All causes of deaths (Total)	2,854,838	2,839,205

311 **Source:** Heron [44]



312 **Fig 7.** The burden of deaths in the United States [44, 45]

314 ***Top 10 causes of deaths in the United States and North American continent***

315 Death analysis in the US for the year 2019 showed that male/men (24.3%) are more likely to
316 die of heart related infections than female/women (21.8%), whereas the female folks (6.0%) are
317 more vulnerable to death from the contraction of respiratory diseases than the male folks
318 (5.0%), as shown in Table 12. Furthermore, women are more liable to die from stroke (6.2%),
319 and dementias (6.0%) rather than men (4.4 and 2.6%, respectively) as reported by Heron
320 (2019). The male counterpart was reported to be prone to deaths associated with cancer
321 (21.4%), and diabetes (3.4%), while both sexes had equal chances of dying from kidney related
322 diseases (1.8%), as shown in Table 12.

323 **Table 12.** Death analysis from disease infection estimated based on sex in US

Indigenous disease	US death toll by sex in 2019 (%)	
	Male	Female
1. Heart related-diseases	24.3	21.8
2. Cancer	21.4	20.5
3. Accidents (unintentional injuries)	7.6	4.4
4. Lower respiratory disease	5.0	6.0
5. Stroke	4.4	6.2
6. Alzheimer disease (Dementia)	2.6	6.0
7. Diabetes mellitus	3.4	2.8
8. kidney diseases	1.8	1.8
9. Liver cirrhosis	1.9	-
10. Suicide	2.5	-
11. Influenza and Pneumonia	-	1.8
12. Hypertension	-	1.4
13. Others	25.1	27.2
Total	100	99.9

325 **3.7 Latin (South) America**

326 ***The most dreaded indigenous diseases and infections in Latin (South) America***

327 Stroke and partial paralysis were the most dreaded Indigenous infection in Latin America at the
328 advent of the new millennium, causing about 2.9 million deaths across the Latin (South)
329 American continent [6]. Heart related-diseases, chronic obstructive diseases pulmonary and
330 cancer (alongside stroke) were the top 4 Indigenous killer diseases in 2000, killing about 5.7
331 million individuals altogether (Table 13). In 2019, human deaths from heart related-infections
332 were elevated to almost 4.3 million casualties in South America, making it the current apex
333 killer in the continent. The disease burden from heart infection is one-third more than stroke
334 and partial paralysis (3.4 million deaths in 2019) and two-third more than the deaths caused by
335 cancer (1.5 million deaths) and chronic obstructive pulmonary diseases (1.4 million human
336 casualties), respectively (Table 13). The sum total of deaths caused by other death factors
337 (communicable, non-communicable diseases and injuries) was only about 2.44 million deaths
338 in 2019 alone, as reported by WHO [6].

339 **Table 13.** Major causes of death in South (Latin) America between 2000 and 2019

Indigenous diseases	2019	2000
1. Heart disease	4,250,000	2,800,000
2. Stroke	3,400,000	2,900,000
3. Chronic obstructive pulmonary disease	1,400,000	1,700,000
4. Cancer	1,500,000	1,190,000
5. Lower respiratory infection	750,000	750,000
6. Diabetes mellitus	700,000	300,000
7. Dementias	500,000	200,000
8. Road injury	490,000	500,000

341 **3.8 The World**

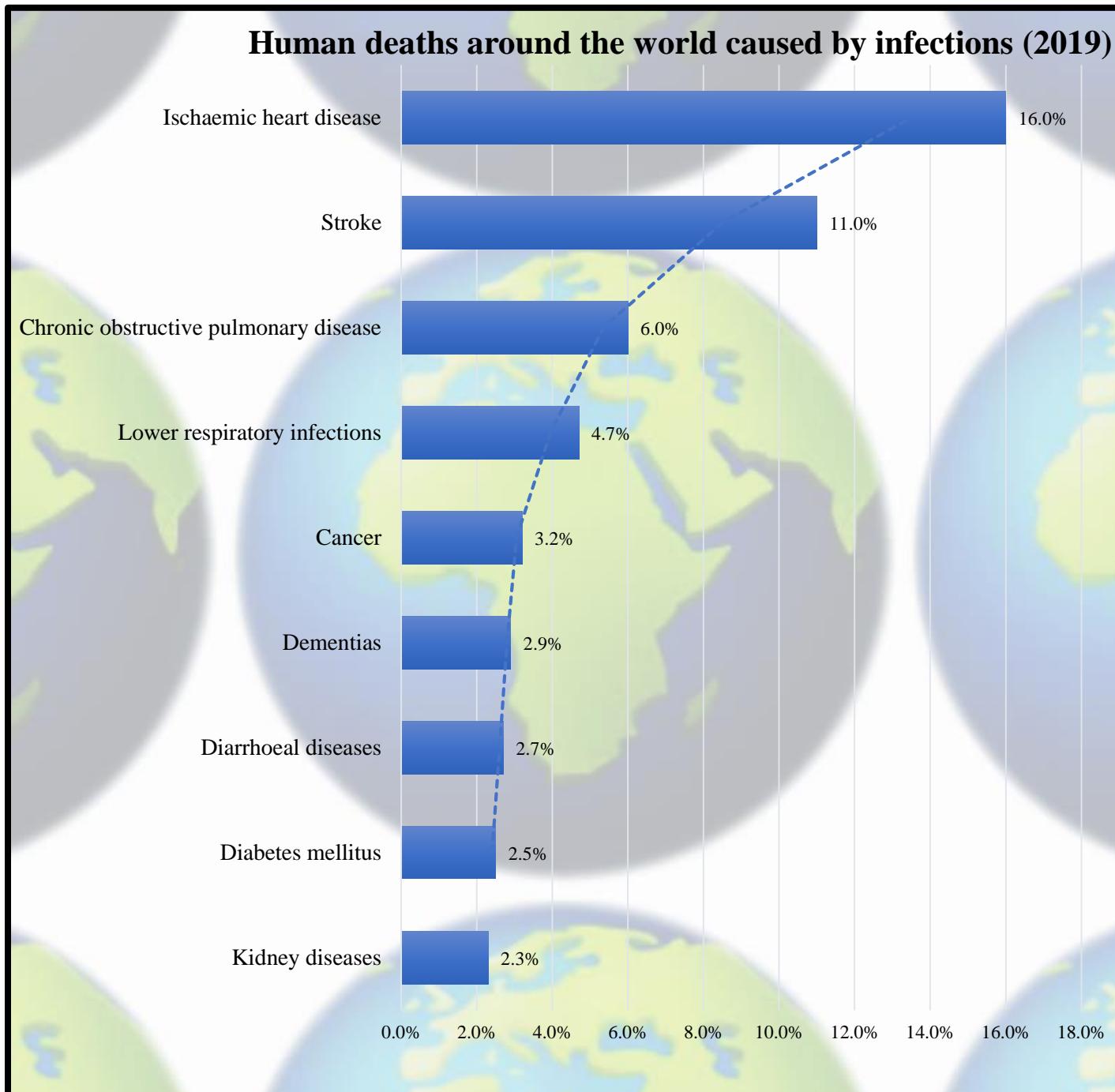
342 ***The world's leading cause of death as at 2019***

343 A summary of the world leading cause of death provided by WHO [6] showed that heart
344 related-infections still remain the greatest killer of human beings around the world, causing
345 about 16.0% of all deaths recorded across the globe (Fig 8). Stroke and partial paralysis,
346 chronic obstructive pulmonary diseases, respiratory infections, cancer, dementias, diarrhoeal
347 diseases, diabetes, and kidney diseases are among the top 10 causes of deaths in the world
348 causing 11.0, 6.0, 4.7, 3.2, 2.9, 2.7, 2.5, and 2.3% of all deaths recorded across the world,
349 respectively (Fig 8). The remaining 48.7% deaths were caused by other known and unknown
350 death factors around the world.

351 ***The current healthiest countries around the world (2022 ranking)***

352 Spain was ranked 1st in 2022, as the healthiest country in the world, according to the Bloomberg
353 Global Health Index (BGHI), with a BGHI score of 92.71 (Table 14). Other global ranking like
354 that of the Global Health Security Index (GHSI) stated otherwise. The GHSI showed that the
355 United States of America (GHSI = 75.9), Australia (GHSI = 71.1), Finland (GHSI = 70.9),
356 Canada (GHSI = 69.8), Slovenia (GHSI = 67.8), United Kingdom (GHSI = 67.2), Germany
357 (GHSI = 65.5), South Korea (GHSI = 65.4), Sweden (GHSI = 64.9), Netherland (GHSI = 64.7),
358 Denmark (GHSI = 64.4), New Zealand (GHSI = 62.5), France (GHSI = 61.9), Latvia (GHSI =
359 61.9), and Armenia (GHSI = 61.8) were indeed healthier than Spain (GHSI = 60.9) as at 2022,
360 as reported by the World Population Review (2022). The current disparity in ranking may be
361 due to the criteria employed by each ranking system in their bid to determine which countries
362 are less vulnerable to the outbreak or prevalence of communicable and other non-
363 communicable diseases. In any case, India was ranked the least healthy country (192nd position)

364 by the BGHI ranking system in 2022, whereas, the GHSI ranking system ranked Somalia as the
365 least healthy country among the 192 countries listed in 2022 (GHSI = 16.0), as shown in Table
366 14.



367

368 **Fig 8.** Human casualties across the world caused by diseases/infections [6]

369 **Table 14.** Global ranking of the healthiest countries in the world as at 2022

S/N	Country	Bloomberg Global Health Index	Global Health Security Index	2022 Population
1	Spain	92.75	60.9	46,719,142
2	Italy	91.59	51.9	60,262,770
3	Iceland	91.44	48.5	345,393
4	Japan	91.38	60.5	125,584,838
5	Switzerland	90.93	58.8	8,773,637
6	Sweden	90.24	64.9	10,218,971
7	Australia	89.75	71.1	26,068,792
8	Singapore	89.29	57.4	5,943,546
9	Norway	89.09	60.2	5,511,370
10	Israel	88.15	47.2	8,922,892
11	Luxembourg	87.39	48.4	642,371
12	France	86.94	61.9	65,584,518
13	Austria	86.30	56.9	9,066,710
14	Finland	85.89	70.9	5,554,960
15	Netherlands	85.86	64.7	17,211,447
16	Cameroon	85.70	28.6	27,911,548
17	South Korea	85.41	65.4	51,329,899
18	United Kingdom	84.28	67.2	68,497,907
19	Ireland	84.06	55.3	5,020,199
20	Cyprus	83.58	41.9	1,223,387
21	Portugal	83.10	54.7	10,140,570
22	Germany	83.06	65.5	83,883,596
23	Slovenia	82.72	67.8	2,078,034
24	Denmark	82.69	64.4	5,834,950
25	Greece	82.29	51.5	10,316,637
26	Malta	81.70	40.2	444,033
27	Belgium	80.46	59.3	11,668,278
28	Czech Republic	77.59	52.8	10,736,784
29	Cuba	74.66	30.5	11,305,652
30	Croatia	73.36	48.8	4,059,286
31	Estonia	73.32	55.5	1,321,910
32	Costa Rica	73.21	40.8	5,182,354
33	Chile	73.21	56.2	19,250,195
34	United States	73.02	75.9	334,805,269
35	Bahrain	72.31	36.6	1,783,983
36	Qatar	71.97	48.7	2,979,915
37	Maldives	70.95	32.0	540,985
38	Lebanon	70.53	33.4	6,684,849
39	Poland	70.25	55.7	37,739,785
40	Montenegro	69.69	44.1	627,950
41	Bosnia And Herzegovina	69.66	35.4	3,249,317
42	Albania	68.04	45.0	2,866,374

S/N	Country	Bloomberg Global Health Index	Global Health Security Index	2022 Population
43	Brunei	67.96	43.5	445,431
44	United Arab Emirates	67.14	39.6	10,081,785
45	Uruguay	65.66	40.3	3,496,016
46	Hungary	64.43	54.4	9,606,259
47	Oman	64.07	39.1	5,323,993
48	Panama	64.01	53.5	4,446,964
49	Turkey	62.81	50.0	85,561,976
50	China	62.52	47.5	1,448,471,400
51	Mexico	62.09	57.0	131,562,772
52	Argentina	61.19	54.4	46,010,234
53	Serbia	60.99	45.0	8,653,016
54	Niue	--	20.1	1,622
55	Nauru	--	18.0	10,903
56	Tuvalu	--	20.0	12,066
57	Cook Islands	--	23.9	17,571
58	Palau	--	25.5	18,233
59	San Marino	--	32.9	34,085
60	Liechtenstein	--	46.4	38,387
61	Monaco	--	33.3	39,783
62	Saint Kitts And Nevis	--	31.7	53,871
63	Marshall Islands	--	24.6	60,057
64	Dominica	--	26.4	72,344
65	Andorra	--	34.7	77,463
66	Seychelles	--	31.8	99,426
67	Antigua And Barbuda	--	30.0	99,509
68	Tonga	--	26.4	107,749
69	St Vincent+the Grenadines	--	33.5	111,551
70	Grenada	--	26.7	113,475
71	Micronesia	--	28.5	117,489
72	Kiribati	--	26.2	123,419
73	Saint Lucia	--	34.7	185,113
74	Samoa	--	28.8	202,239
75	Sao Tome And Principe	--	26.6	227,679
76	Barbados	--	34.9	288,023
77	Vanuatu	--	25.9	321,832
78	Bahamas	--	30.1	400,516
79	Belize	--	29.7	412,190
80	Suriname	--	35.0	596,831
81	Solomon Islands	--	23.3	721,159
82	Bhutan	--	39.8	787,941
83	Guyana	--	30.8	794,045
84	Comoros	--	24.9	907,419
85	Fiji	--	25.8	909,466
86	Djibouti	--	25.2	1,016,097

S/N	Country	Bloomberg Global Health Index	Global Health Security Index	2022 Population
87	Eswatini	--	29.3	1,184,817
88	Mauritius	--	39.7	1,274,727
89	Timor Leste	--	27.8	1,369,429
90	Trinidad And Tobago	--	36.8	1,406,585
91	Equatorial Guinea	--	17.4	1,496,662
92	Latvia	--	61.9	1,848,837
93	North Macedonia	--	42.2	2,081,304
94	Lesotho	--	30.9	2,175,699
95	Gabon	--	21.8	2,331,533
96	Botswana	--	33.6	2,441,162
97	Gambia	--	28.7	2,558,482
98	Namibia	--	30.3	2,633,874
99	Lithuania	--	59.5	2,661,708
100	Armenia	--	61.8	2,971,966
101	Jamaica	--	31.8	2,985,094
102	Mongolia	--	41.0	3,378,078
103	Eritrea	--	21.4	3,662,244
104	Georgia	--	52.6	3,968,738
105	Moldova	--	41.0	4,013,171
106	Kuwait	--	36.8	4,380,326
107	New Zealand	--	62.5	4,898,203
108	Mauritania	--	26.2	4,901,981
109	Central African Republic	--	18.6	5,016,678
110	Liberia	--	35.7	5,305,117
111	Slovakia	--	54.4	5,460,193
112	Republic of the Congo	--	26.3	5,797,805
113	Turkmenistan	--	31.9	6,201,943
114	El Salvador	--	40.8	6,550,389
115	Kyrgyzstan	--	42.4	6,728,271
116	Nicaragua	--	36.3	6,779,100
117	Bulgaria	--	59.9	6,844,597
118	Libya	--	25.3	7,040,745
119	Paraguay	--	40.3	7,305,843
120	Laos	--	34.8	7,481,023
121	Sierra Leone	--	32.7	8,306,436
122	Togo	--	27.8	8,680,837
123	Papua New Guinea	--	25.0	9,292,169
124	Belarus	--	43.9	9,432,800
125	Tajikistan	--	29.3	9,957,464
126	Honduras	--	26.2	10,221,247
127	Azerbaijan	--	34.7	10,300,205
128	Jordan	--	42.8	10,300,869
129	Dominican Republic	--	34.5	11,056,370
130	Haiti	--	30.4	11,680,283

S/N	Country	Bloomberg Global Health Index	Global Health Security Index	2022 Population
131	Bolivia	--	29.9	11,992,656
132	Tunisia	--	31.5	12,046,656
133	Burundi	--	22.1	12,624,840
134	Benin	--	25.4	12,784,726
135	Rwanda	--	33.1	13,600,464
136	Guinea	--	26.8	13,865,691
137	Zimbabwe	--	32.4	15,331,428
138	Somalia	--	16.0	16,841,795
139	Cambodia	--	31.1	17,168,639
140	Chad	--	23.9	17,413,580
141	Senegal	--	32.8	17,653,671
142	Ecuador	--	50.8	18,113,361
143	Guatemala	--	29.1	18,584,039
144	Romania	--	45.7	19,031,335
145	Kazakhstan	--	46.1	19,205,043
146	Syria	--	16.7	19,364,809
147	Zambia	--	26.5	19,470,234
148	Malawi	--	28.5	20,180,839
149	Mali	--	29.0	21,473,764
150	Sri Lanka	--	34.1	21,575,842
151	Burkina Faso	--	29.8	22,102,838
152	North Korea	--	16.1	25,990,679
153	Niger	--	28.7	26,083,660
154	Ivory Coast	--	31.2	27,742,298
155	Madagascar	--	30.4	29,178,077
156	Venezuela	--	20.9	29,266,991
157	Nepal	--	34.0	30,225,582
158	Yemen	--	16.1	31,154,867
159	Ghana	--	34.3	32,395,450
160	Mozambique	--	30.4	33,089,461
161	Malaysia	--	56.4	33,181,072
162	Peru	--	54.9	33,684,208
163	Uzbekistan	--	39.0	34,382,084
164	Angola	--	29.1	35,027,343
165	Saudi Arabia	--	44.9	35,844,909
166	Morocco	--	33.6	37,772,756
167	Canada	--	69.8	38,388,419
168	Afghanistan	--	28.8	40,754,388
169	Iraq	--	24.0	42,164,965
170	Ukraine	--	38.9	43,192,122
171	Algeria	--	26.2	45,350,148
172	Sudan	--	28.3	45,992,020
173	Uganda	--	36.5	48,432,863
174	Colombia	--	53.2	51,512,762

S/N	Country	Bloomberg Global Health Index	Global Health Security Index	2022 Population
175	Myanmar	--	38.3	55,227,143
176	Kenya	--	38.8	56,215,221
177	South Africa	--	45.8	60,756,135
178	Tanzania	--	31.3	63,298,550
179	Thailand	--	68.2	70,078,203
180	Iran	--	36.5	86,022,837
181	DR Congo	--	26.1	95,240,792
182	Vietnam	--	42.9	98,953,541
183	Egypt	--	28	106,156,692
184	Philippines	--	45.7	112,508,994
185	Ethiopia	--	37.8	120,812,698
186	Russia	--	49.1	145,805,947
187	Bangladesh	--	35.5	167,885,689
188	Brazil	--	51.2	215,353,593
189	Nigeria	--	38	216,746,934
190	Pakistan	--	30.4	229,488,994
191	Indonesia	--	50.4	279,134,505
192	India	--	42.8	1,406,631,776

370

Source: World Population Review [47]

371

4.0 Discussion

372

Travelers and tourists visiting countries in Africa for the first time should be cautious of

373

communicable infections, as they are advised to take appropriate medical measures to ensure

374

safety of their lives, and also avoid practices that could facilitate the contraction and spread of

375

such infections. This observation was in line with the critical warning issued by the Africa CDC

376

[51] on the issue of communicable infections in Africa. Also, tourists intending to visit

377

Antarctica should be aware that some frozen pathogens like avian flu, poxvirus and influenza

378

infections, anthrax, zika shifts, zombie diseases and COVID-19 are lurking in the icy terrain.

379

The US-CDC has advised tourists to seek medical advice before embarking on that “icy trip”.

380

This assertion was in line with the observations noted by Edwards [33] and Ohno *et al.* [52],

381

who signaled Antarctica as a cold storage for infectious pathogens that could thaw at any

382

moment.

383 Visitors intending to travel to Asia should be cautious of novel respiratory infections that could
384 be contracted from the surrounding environment. Also, they should be wary of the high risk of
385 dying from communicable (e.g., chikungunya, dengue fever, malaria, zika shift and COVID-19)
386 and non-communicable infections (e.g., heart related-diseases, stroke, partial paralysis, liver
387 cirrhosis and diabetes), according to the finding of WHO [6] and Mendoza [46]. Travelers
388 intending to visit the Australia should also be wary of the high risk associated with the
389 contraction and death from malignant neoplasms, cancer, heart related infections, loss of
390 memory (dementias), chronic obstructive pulmonary and cerebrovascular diseases. These death
391 factors were listed by the Australian health authorities [38, 39] as a warning to visitors, on the
392 need to engage in regular physical exercises and also go for routine medical checkups.

393 Europe, North America and Latin American visitors' should be cautious of infections like
394 cardiovascular diseases, stroke, cancer, respiratory infections, chronic obstructive pulmonary
395 diseases, loss of memory (dementia), kidney related-infections and diabetes. The current
396 opinion was in line with the health warnings issued by WHO [6]. It was noted that several
397 countries in the world had low level of disease outbreaks and other infections that could cause
398 death. Countries like the United States of America (USA), Australia, Finland, Canada,
399 Slovenia, United Kingdom, Germany, South Korea, Sweden, Netherland, Denmark, New
400 Zealand, France, Latvia, and Armenia were among the top countries recommended as very
401 healthy countries to visit, as at 2022.

402

403

404 **Conclusion**

405 Travelers and tourists are advised to consult with medical experts before embarking on any visit
406 outside their country or continent of residence. Furthermore, visitors checked-in (locally or
407 internationally) should ensure that they report any form of ailments or strange symptoms to the
408 local health authorities of their host nation for comprehensive medical checks to avoid
409 introduction of new infection(s) into their host nations. Finally, the security of human life
410 should be the priority of every human being, as self-medication and abuse of drugs should be
411 discouraged.

412 **Ethics statement**

413 Not applicable: live subjects (animals or humans) were not used in this research.

414 **Credit author statement**

415 **PME:** Conceptualized, Methodology, Software, Validity tests, Data curation, Writing-Original
416 draft preparation, Visualization, Investigation, Pictorial designs and graphics, Data analysis.
417 **VSE, MCO and UFE:** Supervision, Reviewing and editing,

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425 **Declaration of interests**

426 The authors declare that they have no known competing financial interests or personal
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428

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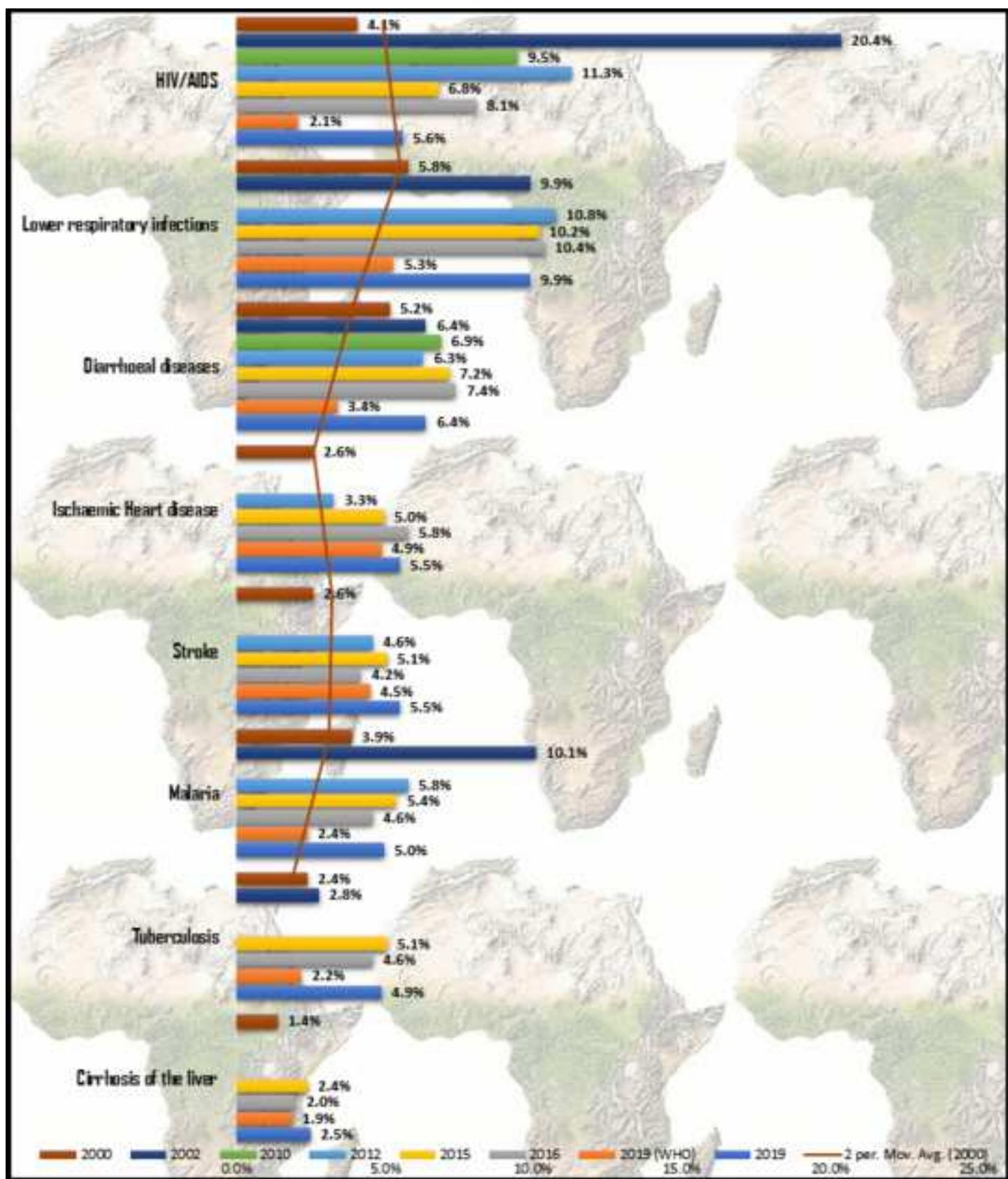
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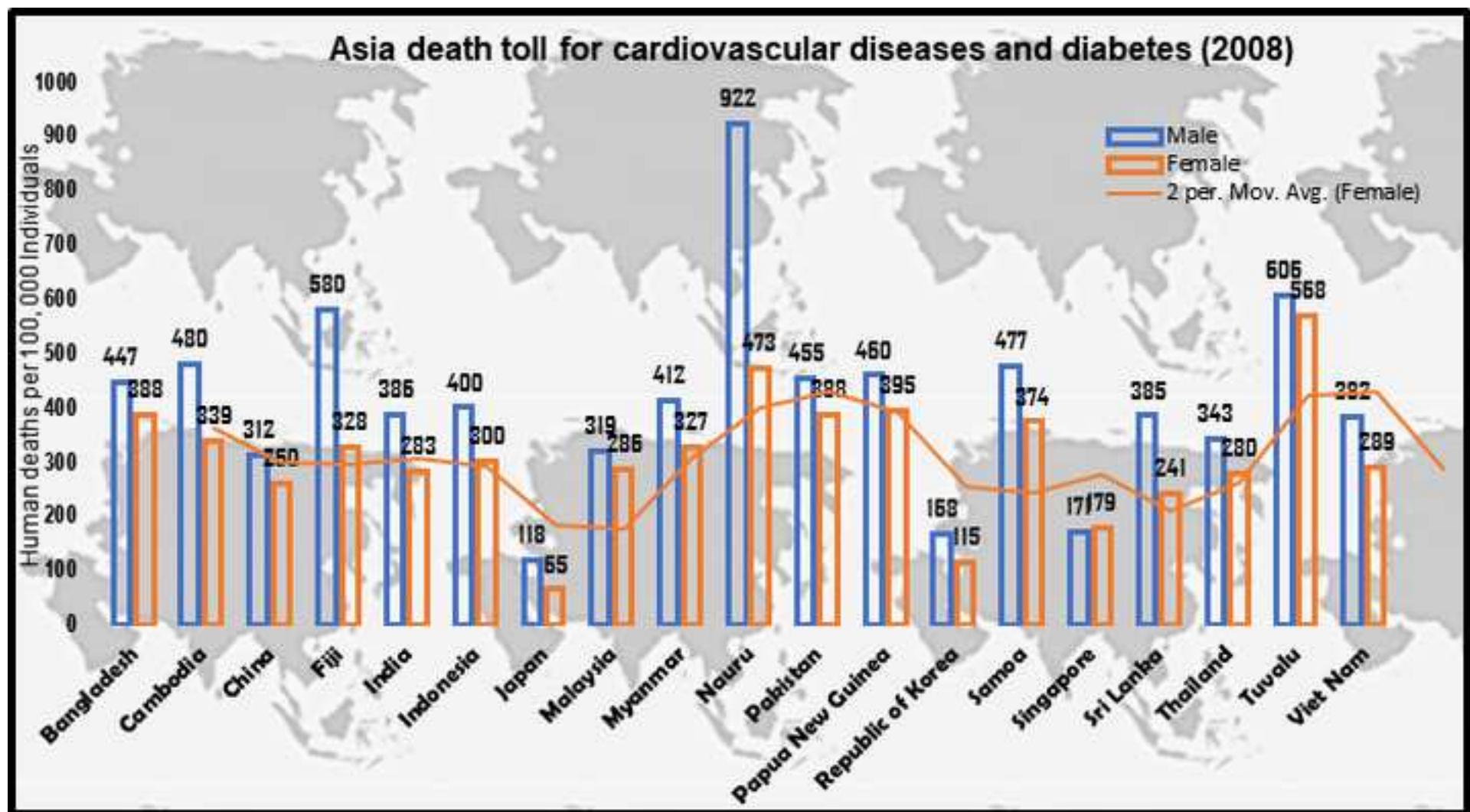
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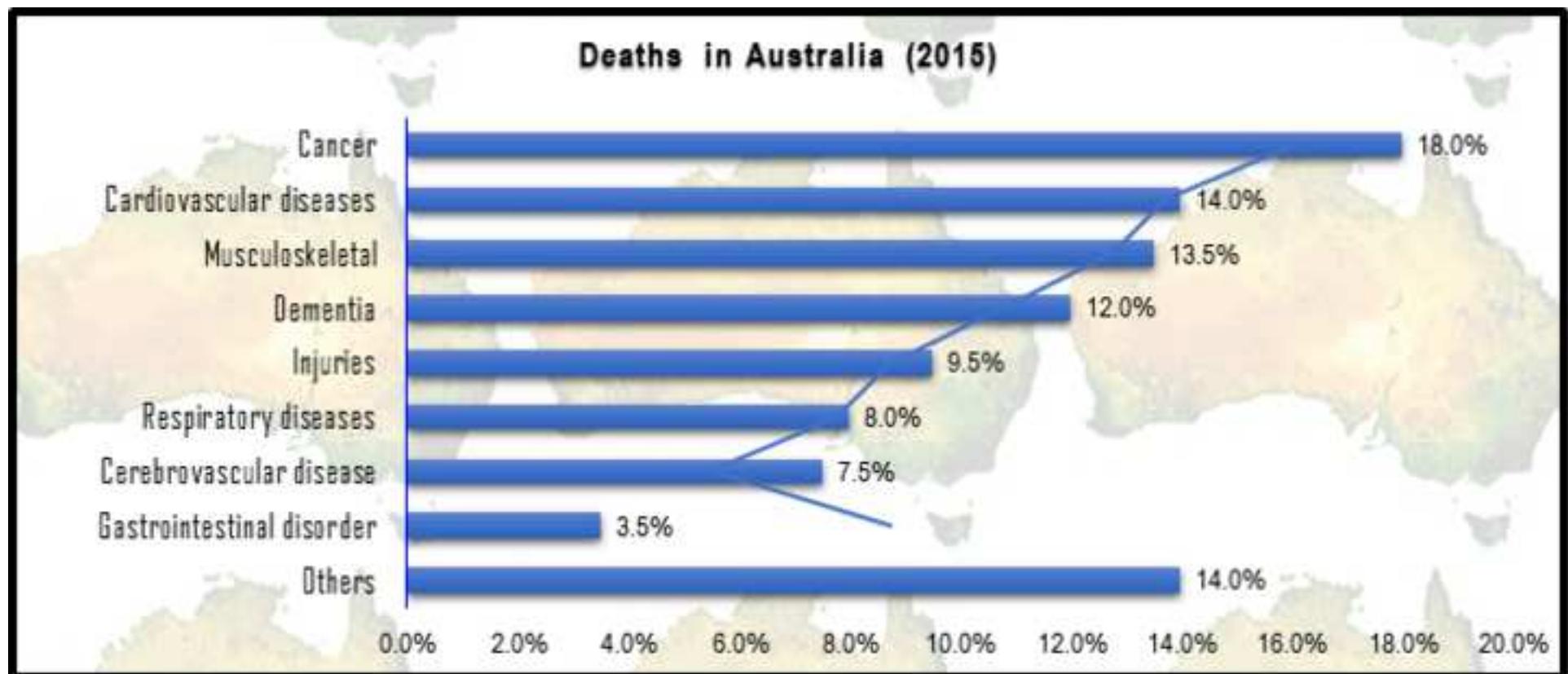
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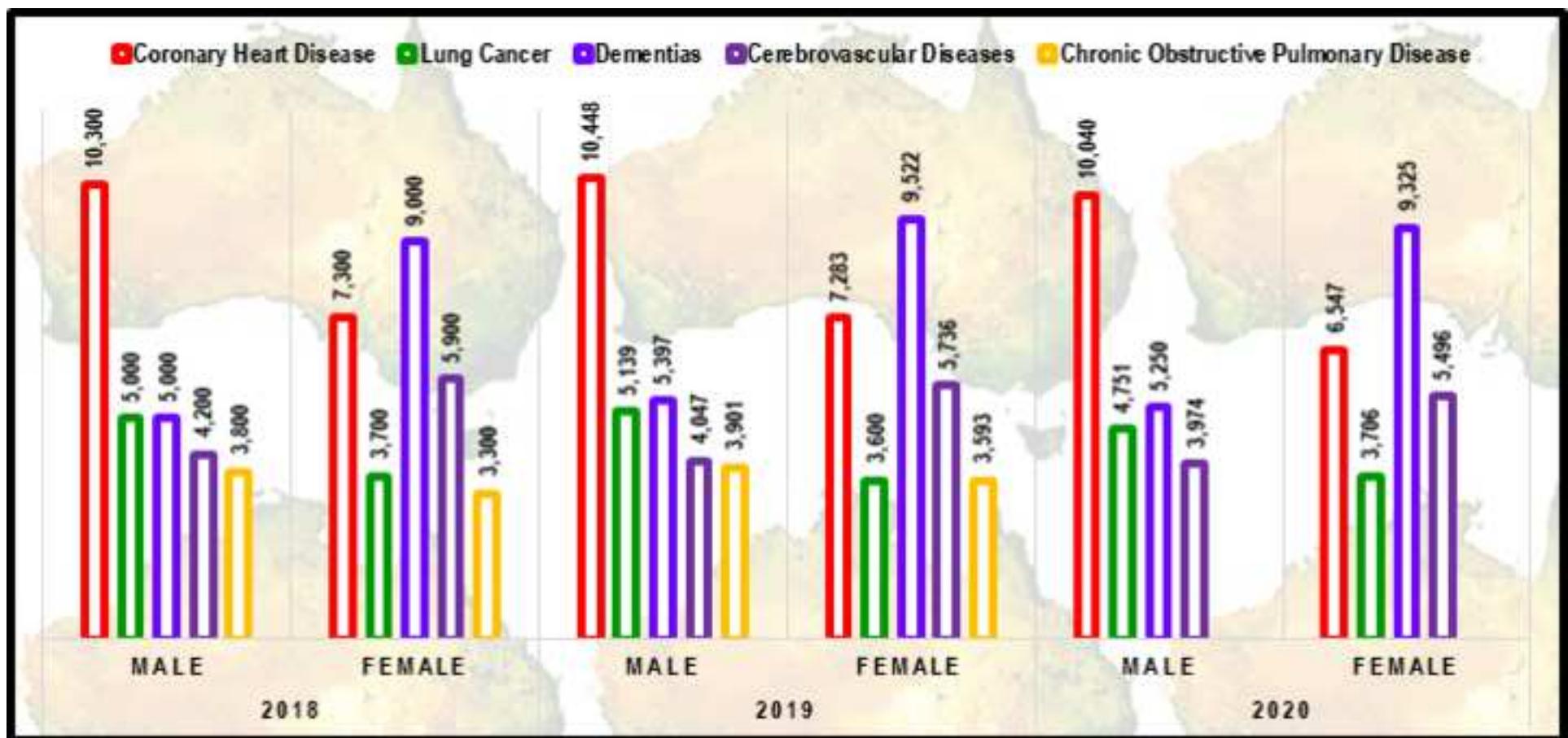
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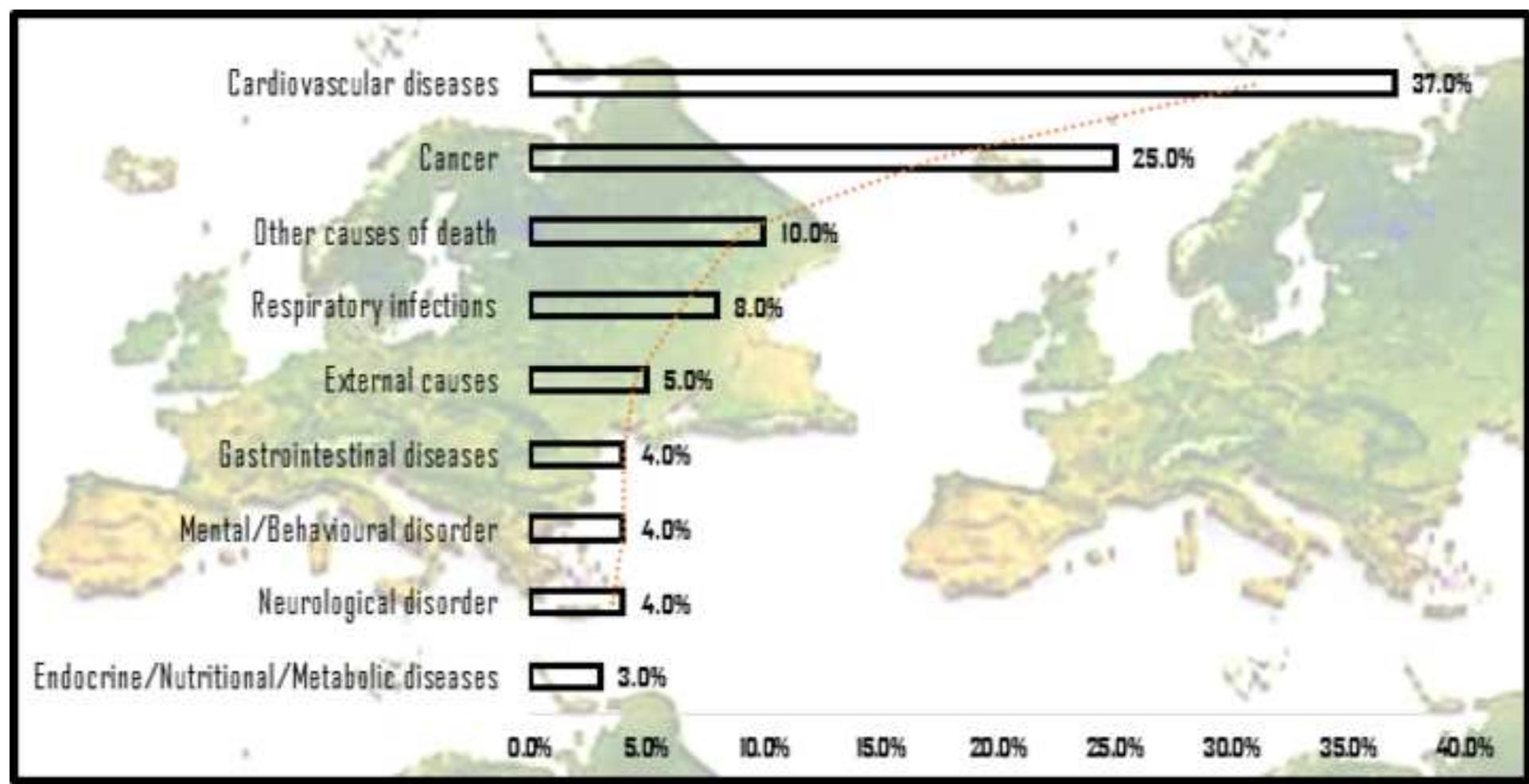


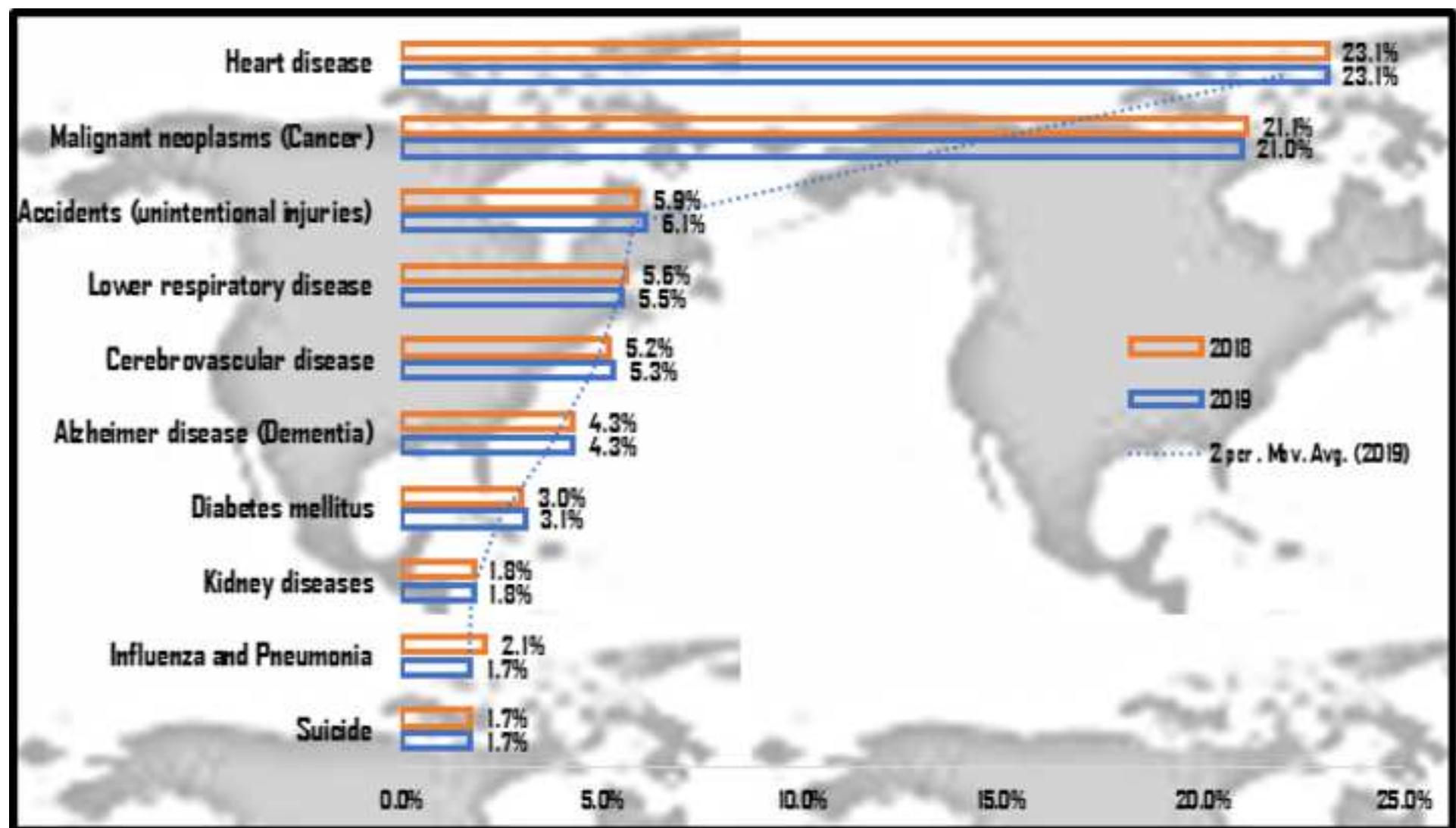


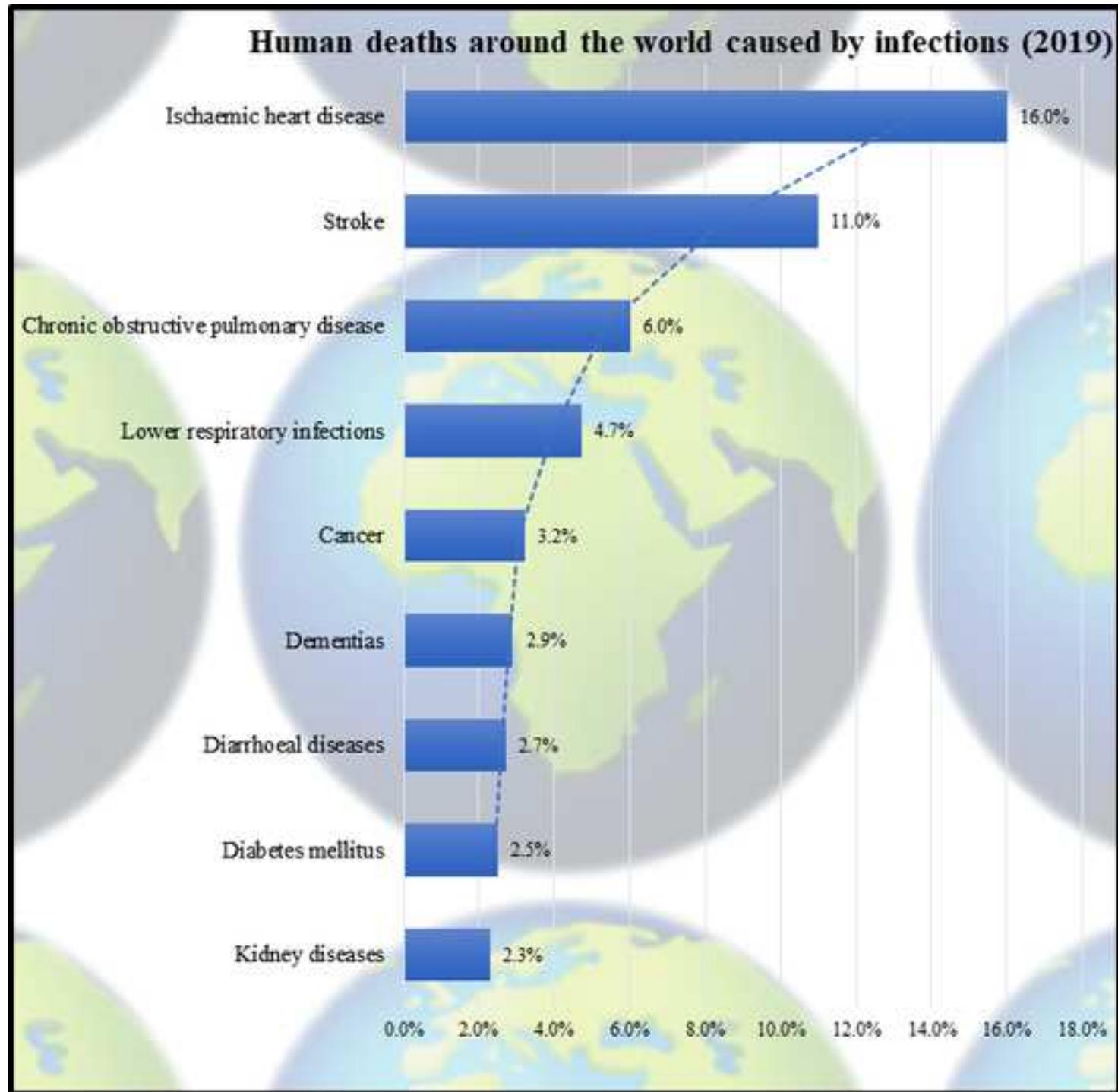












Potential Biological Killers across Africa, America, Antarctica, Asia, Australia, and Europe

Africa (Death toll) - 2019

- Respiratory infections [9.9%]
- Diarrhoeal diseases [6.4%]
- HIV/AIDS [5.6%]
- Heart diseases [5.5%]
- Stroke [5.5%]
- Malaria [5.5%]
- Tuberculosis [4.9%]
- Liver cirrhosis [2.5%]
- Congenital diseases [2.4%]
- Diabetes [2.3%]

Source: Statista, 2022; WHO, 2020a
Van Vuuren, 2021

Africa



(Communicable and Non-communicable Diseases only)

2019-North America (Death toll)

- Heart disease [696,962], - Cancer [602,350], - COVID-19 [350,831], - Stroke [160,254],
21.0% 21.18% 2.1% 5.2%
- Respiratory infection [152,657], - Dementias [134,252], - Diabetes [102,168]
5.6% 4.3% 1.0%

Source: US CDC/NCHS, 2022
Erflein, 2020

North America



Europe

Europe (Death toll) - 2019

- Heart disease [37%]
- Cancer [25%]
- Gastrointestinal [4%]
- Nervous illness [4%]
- Respiratory disease [8%]

Source: Eurostat, 2022

Antarctica



Antarctica

- Distress in a blizzard
- Frostbites
- Respiratory diseases
- Polar anaemia
- Cancer
- Heart disease
- COVID - 19

Latin (South) America



Latin (South) America

Latin America (Death toll)-2019

- Heart disease [3.7million]
- Stroke [3.4million]
- Pulmonary disease [1.3million]
- Cancer [1million]
- Respiratory infection [700,000]
- Diabetes [600,000]
- Dementias [600,000]

Source: WHO, 2020a

Asia (Death toll) - 2019

- Heart disease [3.1million]
- Stroke [2.7million]
- Tuberculosis [850,000]
- Diabetes [600,000]
- Diarrhoeal diseases [1.1million]
- Pulmonary diseases [1.2million]
- Liver cirrhosis [600,000]
- Respiratory infections [1.1million]

Source: WHO, 2020a

Asia



Australia (Death toll) - 2020

- Heart disease [19,836]
- Dementias [14,575]
- Cerebrovascular disease[9,470]
- Cancer [32,965]
- Lower Respiratory Diseases [7,102]

Source: Australian Bureau of Statistics, 2021

Australia



Planet Earth

Global Deaths - 2019

- Heart disease [16.0%] 8.9 million
- Stroke [11.0%] 6.1 million
- Pulmonary disease [6.0%] 3.3 million
- Respiratory infections [4.7%] 2.6 million
- Cancer [3.2%] 1.8 million
- Dementias [2.9%] 1.6 million
- Diarrhoeal diseases [2.7%] 1.5 million
- Diabetes [2.5%] 1.4 million
- Kidney diseases [2.3%] 1.3 million

Source: WHO, 2020a; 2020b

Note: The death toll for each disease was represented by the actual value(s) or in some cases, as a percentage of the gross total of all deaths recorded per annum per continent within the stipulated time-frame for assessment.

Response to Editor-in-Chief

Dear Editor-in-Chief,

I sincerely appreciate you, your editorial team and your board of reviewers for your patience and understanding. I have been under so much pressure to complete a research which I intend to share with the PLOS community. With respect to the questions raised by the editor, please find attached below, my response and perception towards the publication of my article under the auspices of the enviable PLOS ONE journal.

Thank you Sir.

Kind regards



Peter M. Etaware
B.Sc., M.Sc., Ph.D.
Plant Pathologist, Botanist & Epidemiologist

Explain why the article is suitable for publication in PLOS ONE?

Dr. Peter M. Etaware: The article titled “Global epidemiology of tropical, regional and pandemic infections” is suitable and well adapted for publication in PLOS ONE because it will serve as a universal compendium or catalogue for all manner of lethal infections such that novel (new) infections (not accounted for or catalogued among the existing human infections e.g., the case of COVID-19 in 2019) can be easily detected. Also, the article is a structural framework that is set to sensitize people on the different types of diseases or infections that are inherent in certain geographical locations, thereby, serving as a resource information or warning signal for tourist and travellers. Furthermore, this research will enable medical personnel or scientific researchers to crosscheck their facts about certain localized infections and how to manage it. The findings from this research will help shaping future vaccination, immunization and quarantine programs towards optimal safety of lives. Lastly, the idea proposed by this research was intended to aid the effective geo-tagging of specific areas with high occurrence of certain manner of infections such that people going in or coming out of that region will be screened or vaccinated, first and foremost, for or against that infection. In summary, the introduction of novel infections into areas where the infections does not exist initially, either by direct contact or by zoonotic transmission, will be reduced to a greater extent, since the content of this article will provide valuable insight into the origin, historical development and spread of some lethal human infections.

How does your article provide a worthwhile addition to the scientific literature?

Dr. Peter M. Etaware: Studying the global epidemiology of tropical, regional and pandemic infections will contribute significantly to the existing scientific literature by enhancing our understanding of disease patterns, transmission dynamics, and their impact on diverse populations of humans. It will help in the development of effective preventive strategies, improving health policies, and fostering international collaboration to combat infectious disease outbreak. Furthermore, this research has highlighted the interconnectedness of health across the borders and underscores the importance of preparedness and response to measures in the face of emerging threats from novel infections.

How does your paper relate to the previously published work?

Dr. Peter M. Etaware: The global epidemiology of tropical, regional and pandemic infections builds upon previously published work by expanding our knowledge through updated data, deeper analysis, and broader perspectives. It often incorporate findings from earlier studies, validating or challenging existing theories, filling gaps in understanding, and offering fresh insights into disease dynamics, spread and impact. Additionally, new research might refine or update our methods of data collection, figures generated, theories, or intervention strategies proposed in earlier literature, contributing to a more comprehensive understanding of infectious diseases.

Which type of scientists do you believe will be interested in your study?

Dr. Peter M. Etaware: A wide range of scientists across various disciplines would likely be interested in a publication about the global epidemiology of tropical, regional and pandemic infections. Epidemiologists specializing in infectious diseases would naturally find it very useful. Also, it will be a priceless information piece for immunologists, virologists, public health experts, microbiologists, clinicians, environmental scientists, and policy makers. Finally, researchers focused on global health, population dynamics, and disease transmission would also find valuable insights from the publication.

Thank you Sir.