**ALZHEIMER’S DISEASE, GEOGRAPHICAL LOCATION and HOSPITALS IN AUSTRALIA**

**IBM PROFESSIONAL CERTIFICATE IN DATA SCIENCE**

**CAPSTONE PROJECT (WEEK 4)**

**(A health-related project)**

Emmanuel Michael Mukinda Bukajumbe

**Description of the problem and background**

Alzheimer’s disease (AD) is a neurodegenerative disease affecting the brain. It mainly occurs among the elderly that is, over 65 years of age (late onset AD) although it also occurs earlier (early onset AD).(1, 2) It is the second leading cause of morbidity and mortality in the Australia,(3)but has no cure. There are many factors associated with AD with ageing as the one most linked to the disease. Others factors include sex (more females are affected than males), cigarette smoking, alcoholism, chronic diseases such as diabetes mellitus, Huntington’s disease and others, low education and low socioeconomic status, traumatic brain injury, anaemia, positive Apolipoprotein E-ε4 gene status, environmental pollutants.(1, 2, 4-7) In terms of the associated factors, there is a paucity of evidence concerning AD area (state) geographical differences in Australia. However, there is research evidence to suggest that geographical regions may differ in the progression of AD and its measurement.(8) A meta-analysis suggests that rural living (especially early-life rural living) as opposed to urban living, is associated with a high risk for AD.(9)

This project therefore primarily seeks to determine the link between AD and Australian states (Australian Capital Territory (ACT), New South Wales (NSW), Northern Territory (NT), Queensland (QLD), South Australia (SA), Tasmania (TAS), Victoria (VIC), and Western Australia (WA)) and their respective geographical locations. It secondarily briefly considers differences in terms of hospitals as well. The findings of the project may help the government of Australia and other governments to plan cities and/or housing in line with the geographical location of the different states and/or cities. It may also contribute to the planning of hospital infrastructure in Australia.

**Description of the data and how they will be used to solve the problem**

The data contain Australian states by latitude, longitude, and the prevalence of AD by state. The data also contain Australian cities by latitude and longitude and, the number of hospitals in the various states. The data on AD were obtained from Dementia Australia’s electronic article on dementia in Australia and the prevalence estimates from 2019 to 2058(10) whereas the data on cities was obtained from LatLong.net, a website detailing the geographical coordinates of the cities(11).

Using various machine learning algorithms in Python (Python Software Foundation, version 3.7), the data will be used to check the association between the number of hospitals (classified by hospital type) and the prevalence of dementia. They will be used to show whether there is an association between latitude and longitude of a particular state with the prevalence of dementia. The data will also be used to show the location of the major cities in the different states. Using the Foursquare API, the data will be used to show the hospitals found in the different key cities of states, with a comparison of the prevalence of AD in the cities and states.

**References**

1. Flemming KD, Jones Jr, L.K., editor. Chapter 30. Mild Cognitive Impairment and Alzheimer's Disease by Khan, Q.U.A., Taner, D. in; Mayo Clinic Neurology Board Review. Clinical Neurology for Initial Certification and MOC, page 275-284

New York, USA: Oxford University Press; 2015.

2. Halter JB, Ouslander, J.G., Studenski, S., High, K.P., Asthana, S., Supiano, M.A., Ritchie, C., editor. Chapter 66. Dementia Including Alzheimer Disease by Carlsson C,M., Gleason C.E., Puglielli L., Asthana S in; Hazzard's Geriatric Medicine and Gerontology: pages 991-1013. 7th ed. USA: McGraw Hill Education; 2017.

3. Australia D. Dementia statistics Australia2019 [Available from: <https://www.dementia.org.au/statistics>.

4. Daroff R, Ankovich, J., Mazziota, J.C., Pomeroy, S.L., editor. Chapter 95 Alzheimer's Disease and other Dementias by Peterson R., Graff-Radford J in; Bradley's Neurology in Clinical Practice; pages 1380-1399. 7th ed: Elsevier; 2016.

5. de la Torre JC. Alzheimer's disease is a vasocognopathy: a new term to describe its nature. Neurol Res. 2004;26(5):517-24.

6. Hong CH, Falvey C, Harris TB, Simonsick EM, Satterfield S, Ferrucci L, et al. Anemia and risk of dementia in older adults: findings from the Health ABC study. Neurology. 2013;81(6):528-33.

7. Kivipelto M, Mangialasche F, Solomon A, Group FS. Pointing the FINGER at multimodal dementia prevention - Authors' reply. Lancet. 2015;386(10004):1627.

8. Henley DB, Dowsett SA, Chen Y-F, Liu-Seifert H, Grill JD, Doody RS, et al. Alzheimer’s disease progression by geographical region in a clinical trial setting. Alzheimer's Research & Therapy. 2015;7(1):43.

9. Russ TC, Batty GD, Hearnshaw GF, Fenton C, Starr JM. Geographical variation in dementia: systematic review with meta-analysis. International journal of epidemiology. 2012;41(4):1012-32.

10. Australia D. Dementia in Australia; Prevalence Estimates 2019 - 20582019 28/08/2019:[<https://www.dementia.org.au/files/documents/2019-58-Dementia-prevalence-S-T.pdf> pp.].

11. LatLong.net. Cities in Australia: LatLong.net; 2019 [Available from: <https://www.latlong.net/category/cities-14-15.html>.