

BRAIN AGE IN A NIGERIAN COHORT

Tolulope Olusuyi¹, Jasmine Cakmak², Oumayma Soula³, Confidence Raymond^{1,2,4}, Reza Rajabli², Ayomide Oladele¹, Charity Umoren¹, Ifeoluwa Oladeji¹, Gamaliel Adebayo¹, Anu Gbadamosi¹, Oluyemisi Toyobo¹, Farouk Dako^{1,5}, Abbas Rabi Muhammad⁶, Suwaid Mohammed Abba⁶, Rachel Akinola⁷, Olubukola Omidiji⁸, Mayomi Onuwaje⁹, Harrison Aduluwa², Benjamin Anyanwu¹⁰, Chinedum Anosike¹¹, Jasmit Shah¹², James Cole¹³, Chinedu Udeh-Momoh¹², Louis Collins^{2,4}, Abiodun Fatade^{1,14}, Maruf Adewole^{1,5}, Udunna Anazodo^{1,2,4}

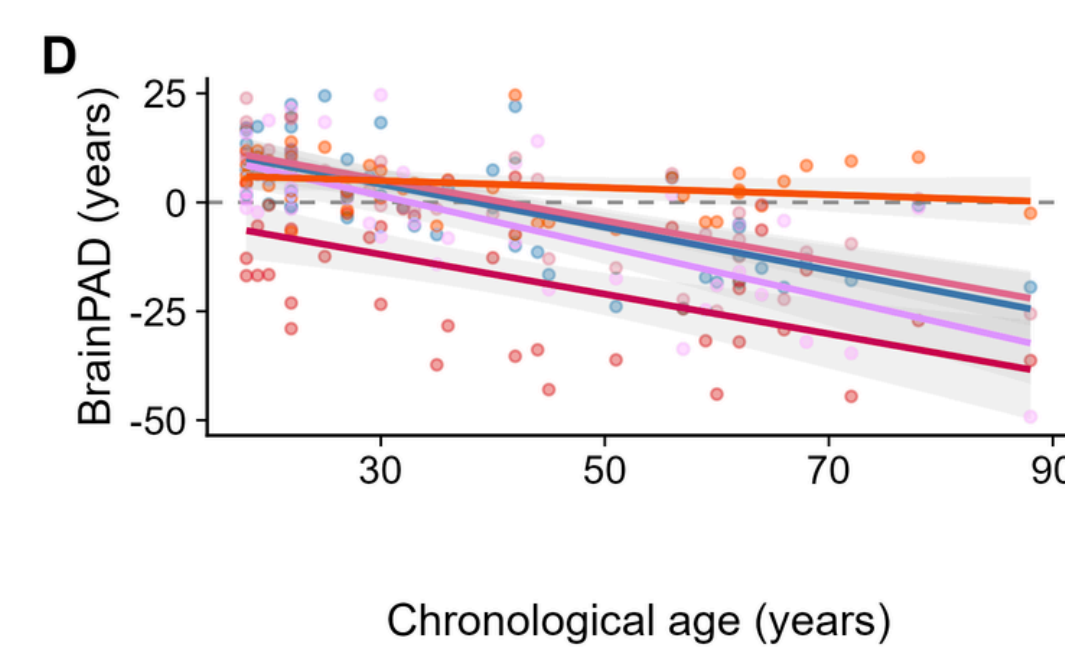
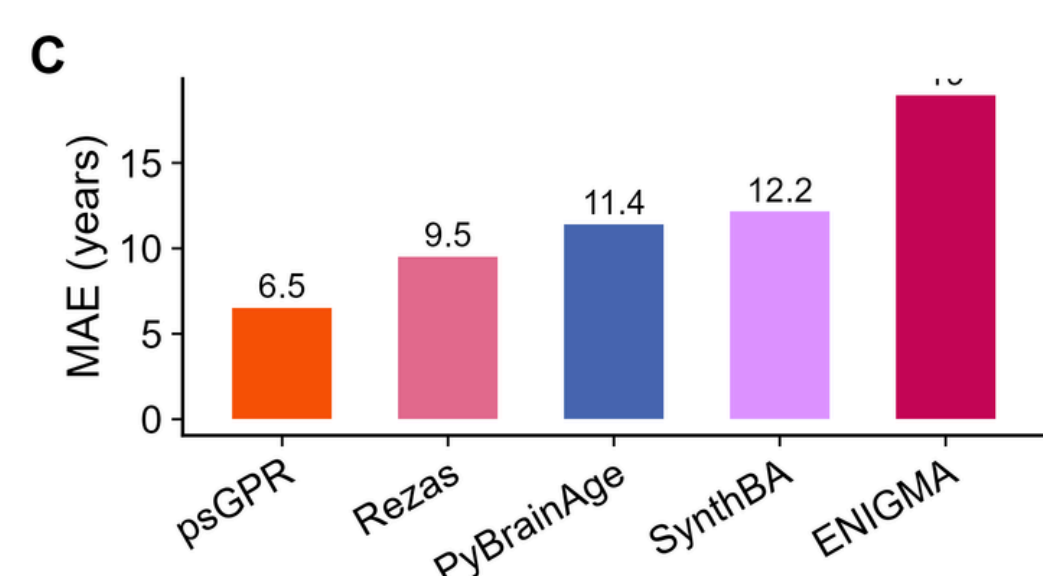
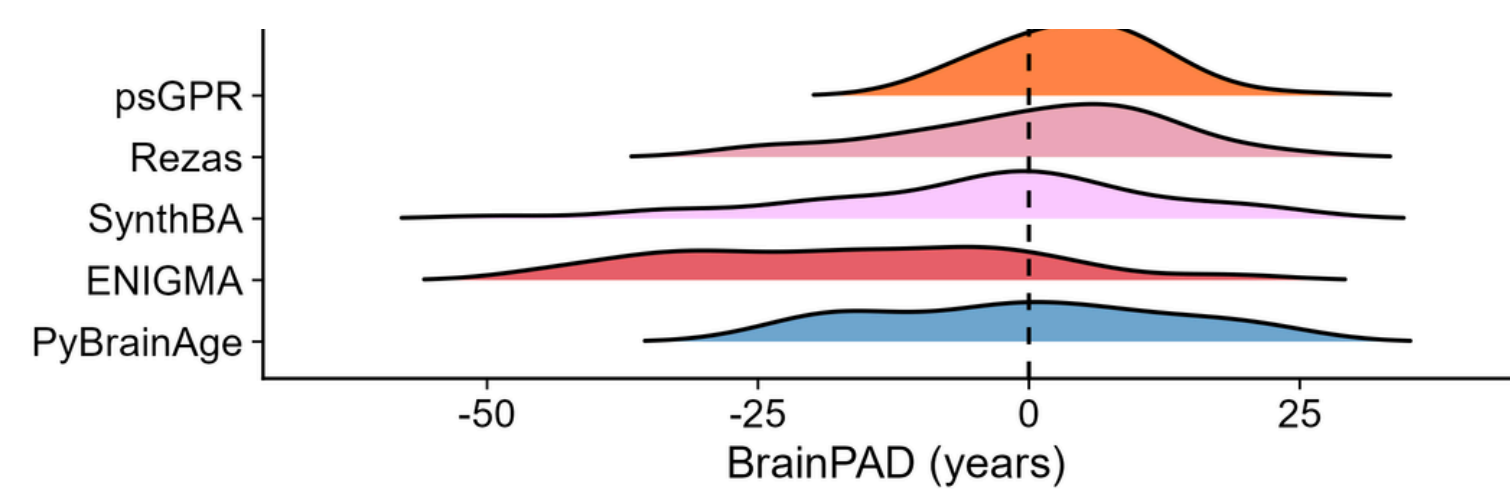
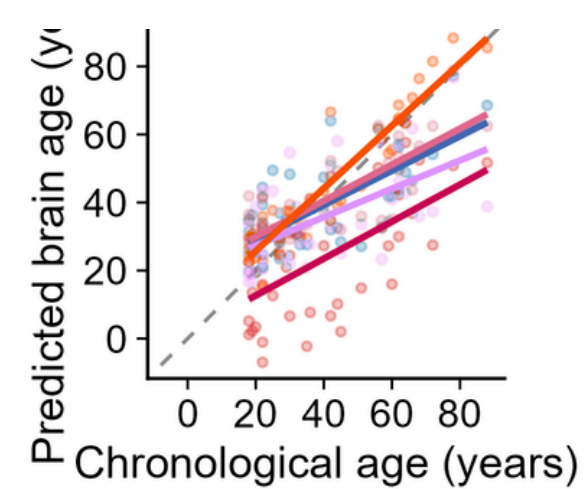
¹Medical Artificial Intelligence Laboratory, Lagos, Nigeria, ²Montreal Neurological Institute, McGill University, Montreal, Canada, ³Faculty of Medicine, University of Sfax, Sfax, Tunisia, ⁴Department of Biomedical Engineering, McGill University, Montreal, Canada, ⁵Department of Radiology, University of Pennsylvania, USA, ⁶Bayero University, Kano, Nigeria, ⁷Lagos State University Teaching Hospital (LASUTH), Lagos, Nigeria, ⁸Lagos University Teaching Hospital (LUTH), Lagos, Nigeria, ⁹Lily Hospital, Benin, Nigeria, ¹⁰Regions Healthcare Hospitals and Specialist Clinics, Owerri, Nigeria, ¹¹Accuread Radiology Nigeria, Lagos, Nigeria, ¹²Brain and Mind Institute, Aga Khan University, Nairobi, Kenya, ¹³Department of Computer Science, University College London, UK, ¹⁴Crestview Radiology Ltd., Lagos, Nigeria

INTRODUCTION

- Brain age is an emerging imaging biomarker for early detection of neurodegenerative disorders, based on the estimation of the brain's biological age.
- Deviations of brain structure and function from expected chronological age, which is known as Brain age gap (BAG), is considered a sign of pathological ageing.
- Existing predictive models are predominantly trained on Global North (GN) neuroimaging data, limiting their sensitivity when applied to underrepresented populations due to geographic, imaging scanner, and biological heterogeneity.
- We investigated this bias by adapting the standard Gaussian Process Regression (GPR) prediction method to a population-specific (PS) brain age model.

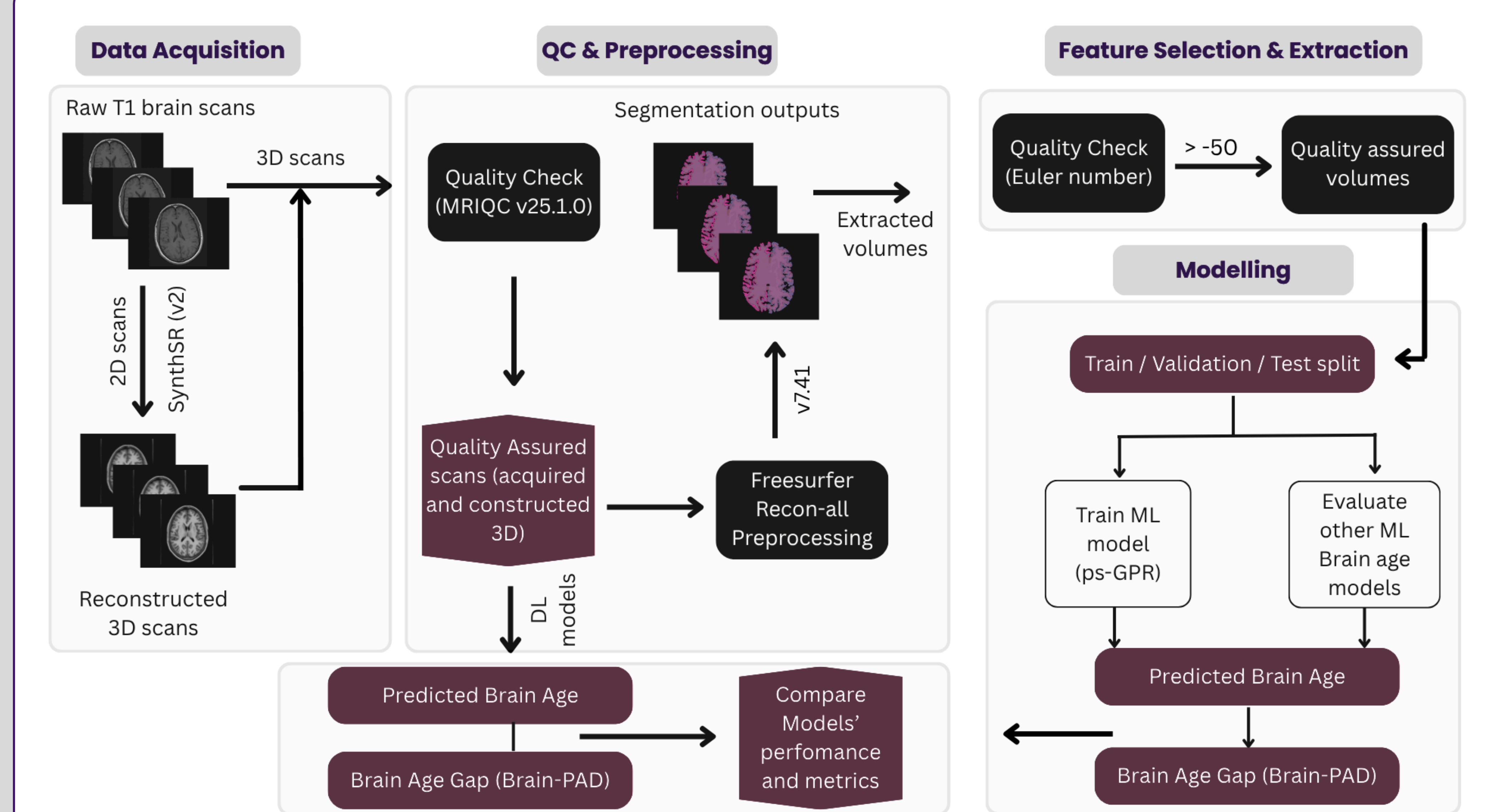
RESULTS

Model	MAE (int_test)	MAE (ext_test)
PyBrainAge	11.42	13.87
ENIGMA	18.98	33.25
SynthBA	12.16	12.76
SFCN-reg	9.53	10.52
psGPR	6.52	8.78



— psGPR — PyBrainAge — ENIGMA — SynthBA — Rezas — psGPR — psGPR — Rezas — PyBrainAge — SynthBA — ENIGMA

METHODOLOGY



CONCLUSION

- This work demonstrates that equitable and accurate brain age assessment in underrepresented populations is achievable but requires a deliberate use of population-specific data for model training and the application of bias correction to ensure a clinically valid biomarker.
- It highlights that the future of global brain health does not depend on universally applied 'one-size-fits-all' models, but on an ecosystem of validated, population-aware tools.
- With the expansion of imaging data beyond Nigeria through the Africa Neuroimaging Archive (AfNiA), we will further develop the PS model to identify individuals with accelerated brain ageing for early intervention in at-risk adults.

REFERENCES

- Adewole, M., Rudie, J. D., Gbadamosi, A., Zhang, D., Raymond, C., Ajigbotoshso, J., ... & Anazodo, U. C. (2025). The BraTS-Africa dataset: Expanding the brain tumor segmentation data to capture African populations. *Radiology: Artificial Intelligence*, 7(4), e240528. <https://doi.org/10.1148/ryai.240528>
- Anazodo, U. C., Adewole, M., & Dako, F. (2022). AI for population and global health in radiology. *Radiology: Artificial Intelligence*, 4(6), e220107. <https://doi.org/10.1148/ryai.220107>
- Umoren, C., Adewole, M., Oladele, A., Oyeniran, O., & Anazodo, U. C. (2025). Mapping neuroimaging capacity in Africa. *Alzheimer's & Dementia*, 21, e108454. <https://doi.org/10.1002/alz.108454>



ALZHEIMER'S ASSOCIATION
AAIC >26

