

N I C O L A

The logo for NICOLA features the letters N, I, C, O, L, and A in a bold, dark brown, sans-serif font. The letter 'I' is replaced by a green circular graphic composed of numerous thin, radiating lines, resembling a sunburst or a fan.

Understanding Today for a Healthier Tomorrow

Study Update

Prof Bernadette McGuinness, April 2025

NICOLA..the Northern Ireland Cohort for the Longitudinal Study of Ageing

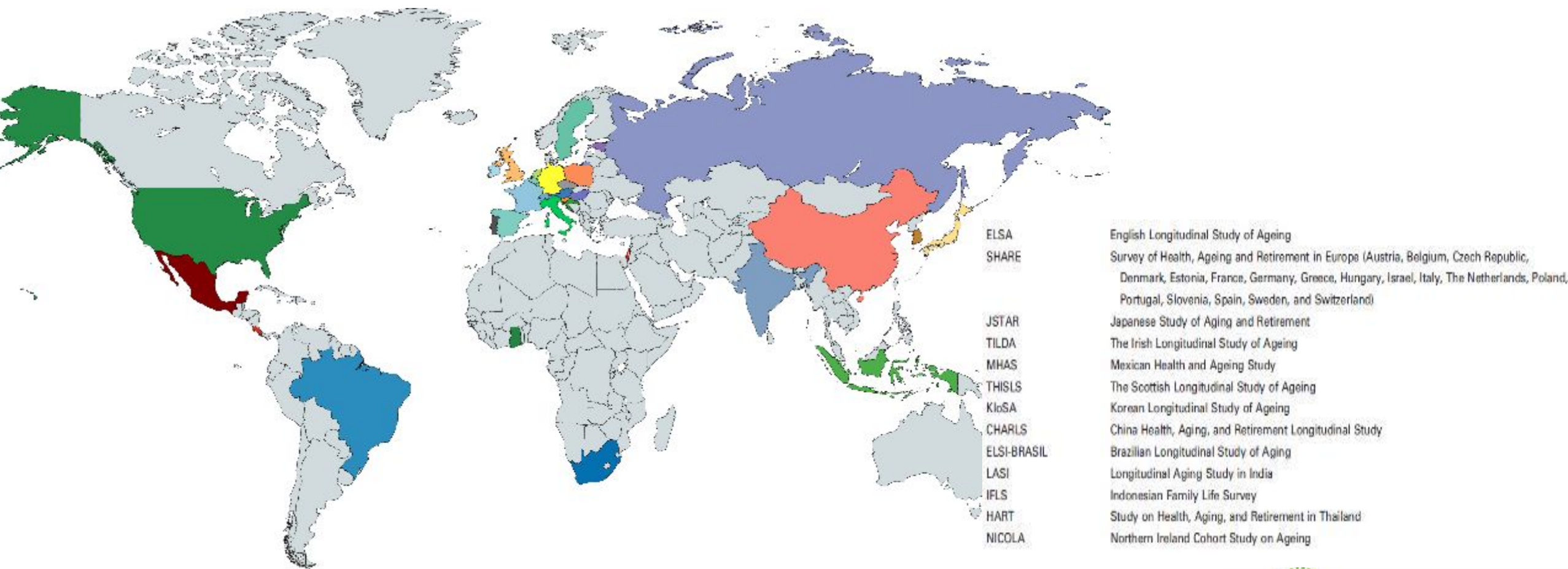


- ❖ N.Ireland's only large-scale longitudinal study of aging
- ❖ Stratified random sample of ~8500 men / women aged 50+
- ❖ Longitudinal: repeated interviews approx. every 2-3 yrs, health assessment every 4-5 yrs
- ❖ Explores why and how social, economic, environmental and biological factors are changing the lives of older people
- ❖ Representative of both rural (42%) and urban (58%) regions of NI.
- ❖ Population has limited ethnic and genetic diversity; highest rates of deprivation in UK
- ❖ Unique focus: Legacy of "The Troubles", nutrition, eye health

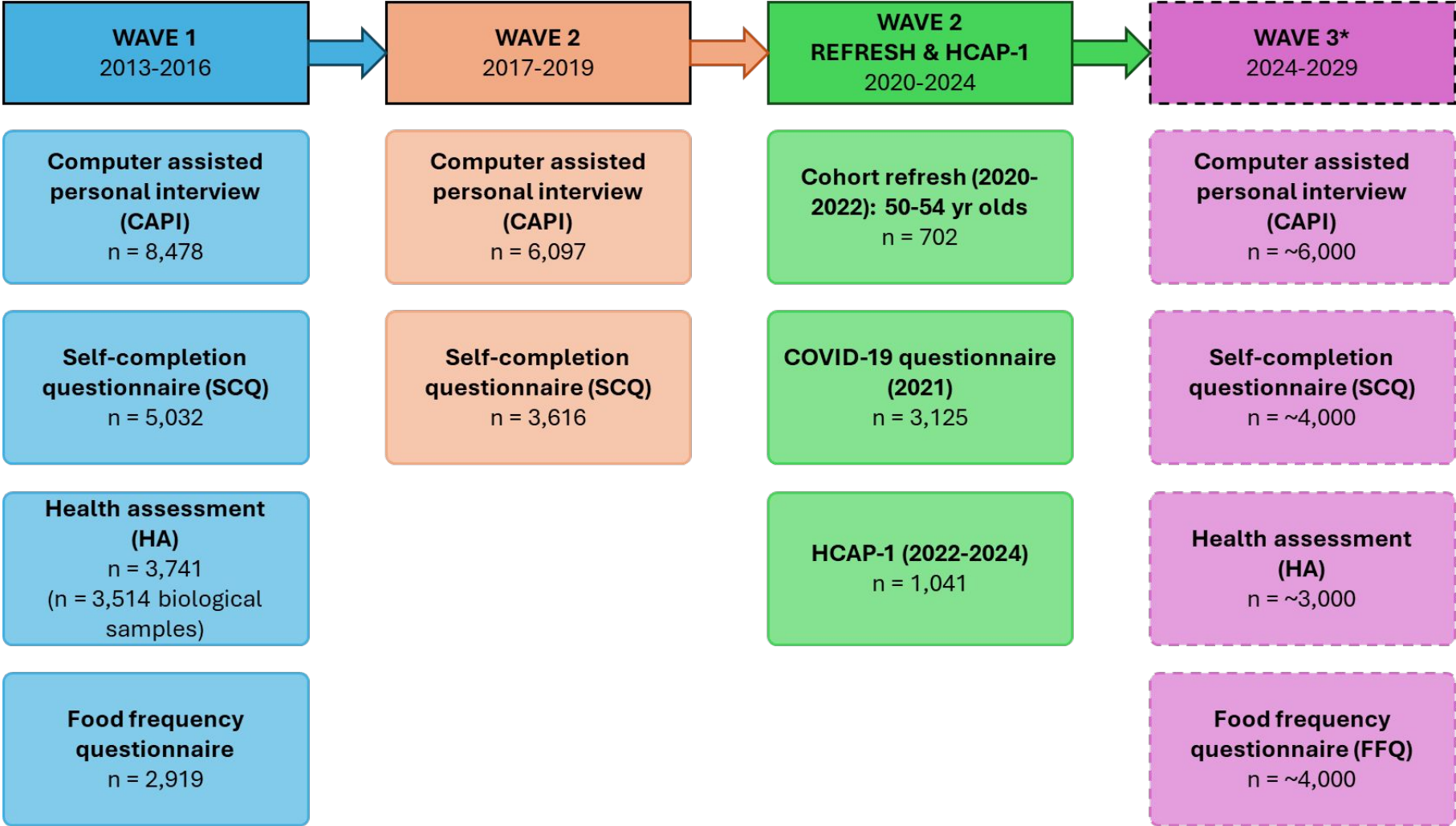
**NORTHERN IRELAND COHORT FOR
THE LONGITUDINAL STUDY OF
AGEING**

UNDERSTANDING TODAY FOR A

Network of HRS sister studies



Update on Data Collection



* Approximate/estimated completion numbers

Wave 3: Study sample / Recruitment

- Wave 3 commenced December 2024
- Participants who took part in Wave 1 and/or Wave 2 and consented to follow-up are invited (n=~6000)
- 795 CAPI interviews & 67 health assessments completed to date
- Rate of recruitment: currently 100 CAPI's / week and 8 health assessments / week
- Participants who have moved into nursing or residential care homes are included
- Participants aged >65 yrs will be invited to HCAP-2 substudy (at end of Wave 3)
- Proxy interviews will be sought for those unable to participate for physical or cognitive reasons.
- End-of-life interviews will be sought for participants that consented to follow-up but have since passed away.

Wave 3: Data collection

COMPUTER ASSISTED PERSONAL INTERVIEW (CAPI)

Repeated measures: Demographics, physical and cognitive health, life events, trauma and stress, personality measures, employment, healthcare utilisation, activities of daily living (ADL and IADL), health related behaviors, medications, pensions, social connectedness, social participation and social capital, psychological wellbeing.

New measures: Digital inclusion, fuel poverty, food insecurity, climate change attitudes and behaviors, social vulnerability, Advance care planning status

SELF-COMPLETION QUESTIONNAIRE (SCQ) & FOOD FREQUENCY QUESTIONNAIRE (FFQ)

Repeated measures: Relationships, loneliness, worry, alcohol, stressful and traumatic life events including the legacy of “The Troubles”; 130-item FFQ (based on EPIC-Norfolk FFQ)

HEALTH ASSESSMENT (HA)

Repeated measures: Neuropsychological function, cognitive health (memory, verbal fluency, executive function, literacy and numeracy)

(objective) eye health (retinal imaging, visual function, refractive status, axial length, intra-ocular pressure), gait and balance, anthropometric measures

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Repeated samples: Blood, urine

New measures: Biomarkers of neurodegeneration (A β 42/40, p-tau 217, neurofilament light chain (NfL) glial fibrillary acidic protein (GFAP) (HCAP-2 participants); faecal sample (for microbiome analysis); widefield retinal OCT, OCT-Angiography, anterior segment OCT; Digital technology (Actigraph GT3X accelerometers, Axivity monitors) to assess physical activity and sleep; GPS devices (Qstarz BT-Q1000XT) for location monitoring; Hearing test (TabletScreening audiometer) (<https://www.hearxgroup.com/hearscreen>)



Wave 3: Sub-Study

Harmonizing Cognitive Assessment Protocol (NICOLA-HCAP2)



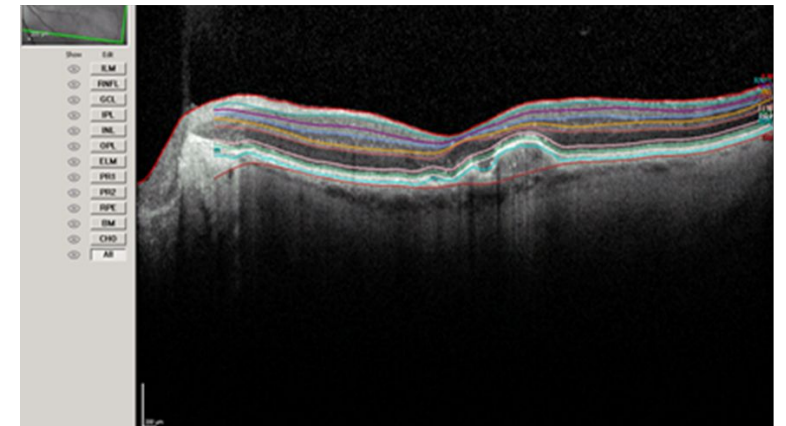
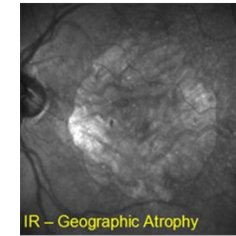
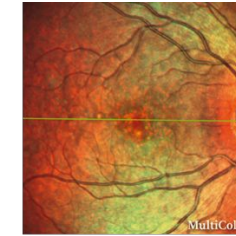
- Aims to investigate dementia risk using a harmonised cognitive assessment protocol
- 1000 NICOLA participants aged 65 yrs and over
- Cognitive and neuropsychological assessments to discriminate between normal cognitive performance, cognitive impairment and dementia
- This work will:
 - generate an extensive global dementia bioresource
 - produce internationally comparable data



N I C O L A

Innovation in Wave 3

RESEARCH AREA	New measures
Cognition	<ul style="list-style-type: none"> • Blood based markers of neurodegeneration i.e. amyloid and phosphorylated tau proteins, NFL and GFAP • Clinical validation of HCAP tool
Eye health	<ul style="list-style-type: none"> • Novel imaging modalities incl. widefield retinal OCT, OCT-angiography and anterior segment OCT • Epigenetic clock analyses to define exposure associated methylation changes that influence aging, age-related ocular disease and retinal markers of brain health
Kidney disease	<ul style="list-style-type: none"> • Investigation of genetic, epigenetic and proteomic basis of kidney disease and contributing to largest genome-wide association study (GWAS) conducted to date • Identification of genetic changes, DNA methylation profiles, telomere variation and mitochondrial dysfunction as risk factors for renal outcomes
Molecular biomarkers	<ul style="list-style-type: none"> • Long read sequencing to identify mosaic loss of chromosome X and Y that occurs more frequently as people age
Microbiome	<ul style="list-style-type: none"> • Analysis of stool samples to explore the influence of medicines on the microbiome, the influence of gut microbiome on metabolism and effectiveness of medication and microbial taxa enrichment/depletion to inform personalised medicine • Analysis of saliva, oral examination in a subset
Nutrition	<ul style="list-style-type: none"> • Nutrient biomarkers and nutrient intake data for >50 nutrients based on FFQ • Impact of food insecurity and diet quality on aging
Environment	<ul style="list-style-type: none"> • Linkage of >280 environment related variables to Wave 1 and 2 data • Deriving harmonized environmental variables for international comparative analyses • Development of a publicly accessible environmental data geoportal



Example of retinal images

Core areas of research for Wave 3

RESEARCH TOPIC	RESEARCH AIMS
Immunoage molecular and cellular biomarkers	<ul style="list-style-type: none">• Molecular and cellular inflammatory cell characterisation using flow cytometry and immunophenotyping• DNA methylation epigenome-wide association studies associated with immunophenotypic characteristics• Implementation of ML approaches to detect complex patterns across datasets
Impact of food insecurity and diet quality on healthy aging	<ul style="list-style-type: none">• Determine associations between food insecurity, diet and health outcomes• Examine heterogeneity in food security, diet quality & age-related disease• Multi-omic evaluation of biological pathways between nutrition and age-related disease
Eye health	<ul style="list-style-type: none">• Associations between lifestyle, multimorbidity, epigenetics and age-related eye disease• Evaluate prognostic value of longitudinal data on retinal biomarkers• Investigate chronotype influence on age-related eye disease• Examine associations between peripheral retinal features and AMD and cognitive decline
Climate/environment related mechanistic pathways on mental and physical health	<ul style="list-style-type: none">• Effect of climate exposure on health outcomes• Influence on climate related attitudes and behaviours• Explore biological responses to climate exposure using multi-omic approaches
Microbiome	<ul style="list-style-type: none">• Associations between microbiome and multimorbidity, obesity, health inequality and immunological status• Development of disease risk stratification tool• Evaluation of medication and microbiome as an indicator of drug response• Determination of microbial taxa enrichment/depletion to inform personalised medicine

Acknowledgements / Funders

NICOLA Team

Prof Bernadette McGuinness – Principal Investigator
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Prof Amy Jayne McKnight – Biorepository
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Dr Beckie Ingram – Immunology / Cellular
Prof AJ McKnight – Multiomics, CKD

Website: <https://www.qub.ac.uk/sites/NICOLA/Informationforresearchers/>

