LASI, LONGITUDINAL AGING STUDY IN INDIA

An ongoing cohort study of 72,000 older adults in India
  - Co-funded by the US National Institute on Aging, the Government of India (Ministry of Health & Social Welfare), and UNFPA

Sample
  - 45+ older adults & spouses at all ages
  - Representative of the nation as well as 30 states and 6 union territories
  - Over-sample of 60+ (1/3 of the sample is 60+)
  - Over-sample of 4 metropolitan cities

PI: David Bloom, P. Arokiasamy, Jinkook Lee

Biological data personnel: Perry Hu, Sarang Pedgaonkar
LASI

Household Interview
- Household Roster
- Housing & Environment
- Consumption, Asset, Income
- Health Insurance

Individual Interview
- Demographics
- Work, Retirement & Pension
- Health & Cognition
- Health Care Utilization
- Family & Social Network
- Experimental Modules: Expectations, Vignettes, Time Use & Wellbeing, Social Connectedness

Biomarkers
- Anthropometrics
- Blood pressure & pulse
- Timed walk, balance test, grip strength
- Vision test, spirometry
- Dried blood specimen

Community Interview
- Infrastructure and public facilities
- Health care facilities
- History of environmental shocks
- Prices of rationed goods
BIOMARKERS

What’s funded:
DBS assay on Hb, HbA1c, CRP & EBV antibody levels for a sub-sample
Pilot study on Vitamin D assay from DBS
Pilot study on whole genome sequencing from DBS

Proposed biomarkers:
Cystatin C, CMV antibody, IL-6, Vitamin D, blood lead levels all from DBS
LASI-DAD, DIAGNOSTIC ASSESSMENT OF DEMENTIA

2019 International Biomarker Network Meeting
Jinkook Lee, USC
An in-depth study of late-life cognition and dementia using hospitals as phenotyping centers

A sub-sample of 3,200 respondents aged 60 and older from a nationally representative study, the Longitudinal Aging Study in India (LASI)

Administers an enriched Harmonized Cognitive Aging Project (HCAP) protocol

PI: Jinkook Lee
Co-PI: A.B. Dey

Biological data personnel: Perry Hu, Pranali Khobragade, Joyita Banerjee
Two-stage stratified random sampling with oversampling of those at high risk of cognitive impairment

1. Stratify the entire LASI sample based on risk of cognitive impairment and state of residence

   - Cognitive impairment risk is determined based on the performance of memory and non-memory domain cognitive tests, overall test performance, refusal or inability to participate in the cognitive tests, and proxy interview in the main LASI

2. Randomly draw a sample with about equal numbers of those at high risk and not high risk of cognitive impairment

   - The sample size for each state is set in consideration of the main LASI sample size

Released in batches, after 2-month interval from the main LASI; an average interval between LASI and DAD is about 4 months

Response rate = 86.9%

Target sample size 3,200 (As of Mar 17, 3,003 completed interviews)
Collaborating Institutions across 14 states

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>Jammu &amp; Kashmir</td>
</tr>
<tr>
<td>All India Institute of Medical Sciences, Delhi</td>
<td>Sher-i- Kashmir institute of Medical sciences, Srinagar</td>
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<tr>
<td>Rajasthan</td>
<td>West Bengal</td>
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<tr>
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<td>Kolkata Medical College</td>
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<td>Uttar Pradesh</td>
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<td>Guwahati Medical College</td>
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<td>Odisha</td>
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<td>NIMHANS, Bangalore</td>
<td>AIIMS, Bhubaneswar</td>
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<td>Kerala</td>
<td>Telangana</td>
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<td>Trivandrum Medical College, Trivandrum</td>
<td>Nizam's Institute of Medical Sciences, Hyderabad</td>
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<td>Maharashtra</td>
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<td>Madras Medical College, Chennai</td>
<td>Grant Medical college, Mumbai</td>
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<td>Haryana</td>
<td>Madhya Pradesh</td>
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<tr>
<td>All India Institute of Medical Sciences, Delhi</td>
<td>Gwalior Medical College, Gwalior</td>
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</tbody>
</table>
## Sample Characteristics

**As of Mar 7, 2019**

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Overall</th>
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<tbody>
<tr>
<td>60-64</td>
<td>333</td>
<td>474</td>
<td>807</td>
</tr>
<tr>
<td>65-69</td>
<td>388</td>
<td>450</td>
<td>838</td>
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<tr>
<td>70-74</td>
<td>281</td>
<td>255</td>
<td>536</td>
</tr>
<tr>
<td>75-79</td>
<td>175</td>
<td>191</td>
<td>366</td>
</tr>
<tr>
<td>80+</td>
<td>178</td>
<td>189</td>
<td>367</td>
</tr>
<tr>
<td>Total</td>
<td>1355</td>
<td>1559</td>
<td>2914</td>
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</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>Urban</th>
<th>Rural</th>
<th>Overall</th>
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<tbody>
<tr>
<td>Never attended school</td>
<td>668</td>
<td>704</td>
<td>1372</td>
</tr>
<tr>
<td>Less than primary to primary school</td>
<td>432</td>
<td>338</td>
<td>770</td>
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<tr>
<td>Middle school to higher secondary school</td>
<td>359</td>
<td>263</td>
<td>622</td>
</tr>
<tr>
<td>Diploma and certificate and above</td>
<td>84</td>
<td>66</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>1543</td>
<td>1371</td>
<td>2914</td>
</tr>
</tbody>
</table>
17 ml VBS collected by phlebotomists at home and hospitals

Venous blood-based tests
- Complete blood cell counts, HbA1c, serum based assays, glucose, lipid panel, lipoprotein(a), proBNP, hsCRP, metabolic panel, including renal and liver functions, cystatin C, TSH, T3, T4, vitamin B12, folic acid, homocysteine, 25-hydroxyl-vitamin D

Whole blood repository (serum, plasma, buffy coat, dried blood spot)

Physical function (Timed up and go, 6-minute walk, hearing test), Mini Nutritional Assessment

Diet, spice use (medical use), polypharmacy (only phase 2)
**BIOMARKER (CONTINUED)**

**Genomics**
- Whole Genome Sequencing validation study in partnership with Broad Institute and MedGenome
- Global Screening Array (Illumina Infinium GSA-24 v2.0 Beadchip, 640,000 genetic markers) for \(N=1,010\) (Phase 1 sample plus QC sample) in partnership with Kardia (UM), Moorjani (UC Berkley) and MedGenome
- Whole Genome Sequencing R01, in partnership with Kardia (MPI, UM), Moorjani (UC Berkley), Ganna (Broad), and Schellenberg (U Penn), pending

**Pollution**
- PM2.5 estimates from satellite data, ground monitor data from the GoI, 10x10m
- Currently, bringing geo-covariates including road patterns, typology, etc.

**MRI**
- ADNI-3 protocol, including structural MRI and resting state fMRI
- 64 cases completed to date