

# Measuring Muscle Mass in the Longitudinal Study of Ageing and Health in Viet Nam

Yasuhiko Saito

Economic Research Institute for ASEAN and East Asia, Jakarta, Indonesia

Nihon University, Tokyo, Japan

Presented at THE NIA BIOMARKER NETWORK INTERNATIONAL MEETING

New Orleans, April 11, 2023

# Co-authors

- Angelique Chan: Center for Ageing Research and Education, Duke-NUS Medical School, Singapore
- Nguyen Cong Vu: Institute of Population, Health and Development, Ha Noi, Viet Nam
- Linh Dong: Institute of Population, Health and Development, Ha Noi, Viet Nam

# Research Question

- Does amount of segmental appendicular muscle mass vary by demographic variables among older adults in Viet Nam?
- How amount of segmental appendicular muscle mass correlate with hand grip strength among older adults in Viet Nam?
- Does amount of segmental appendicular muscle mass associated with falls history among older adults in Viet Nam?

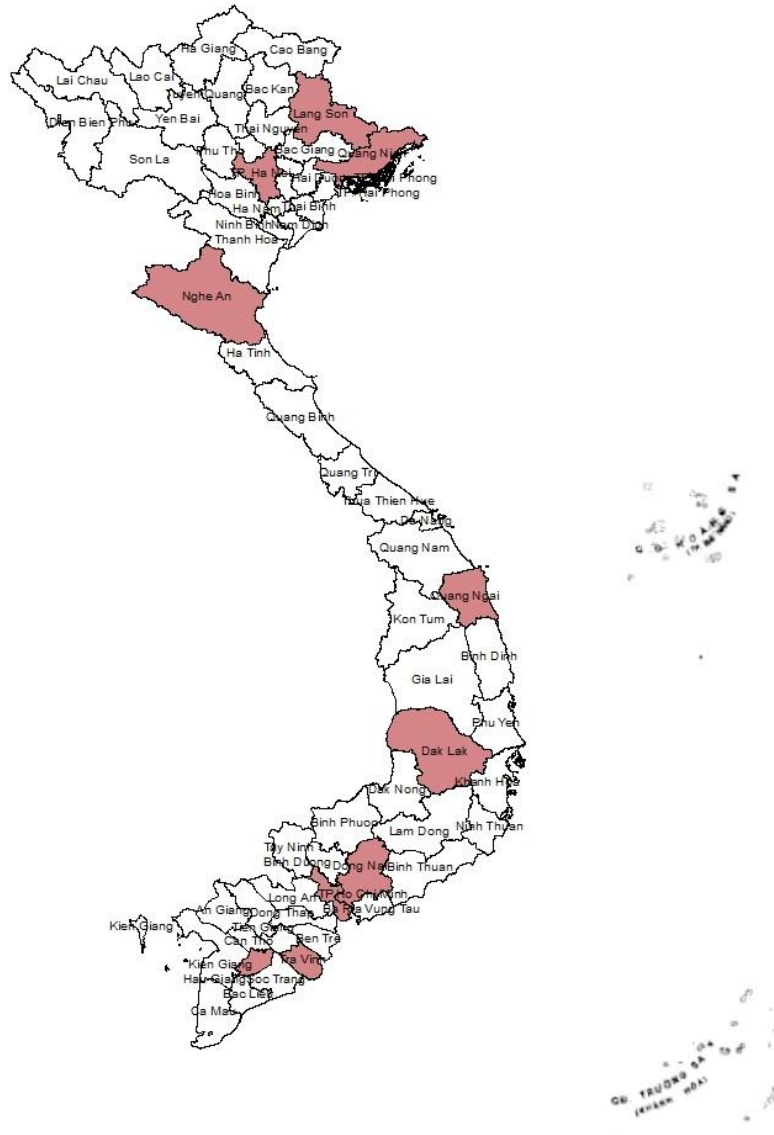
# Background

- Study showing relationship between skeletal muscle mass and falls
- Relationship between frailty and muscle strength
- Appendicular skeletal muscle mass index has been used to define sarcopenia

# Data: Longitudinal Study of Ageing and Health in Viet Nam (LSAHV)

- For baseline survey
  - Conducted in 2018-2019
  - Nationally representative sample of 60 and over (not household survey)
  - Sample size of 6,050 persons selected by Multi-stage stratified random sampling
  - oversampled those aged 70-79 by factor of 2 and aged 80+ by factor of 3
  - In-person interview survey using structured survey questionnaire (proxy allowed)--Tablets
  - Multi-actor survey including adult child and caregiver
- W2: planned in 2020 but could not because of COVID-19
  - fieldwork started in December 2022

# Sampled Provinces in Viet Nam



# Survey Questionnaire

- Household questionnaire
- Main questionnaire for older adults
- Anthropometric/performance measures questionnaire
- Child questionnaire
- Care giver/potential future care giver questionnaire

# Household Questionnaire

- Family Structure
- Living arrangements
- Information on Surviving Children's family
- Electricity
- Water
- Cooking fuel
- Toilet
- Asset
- Bank account
- GPS



# Main Questionnaire

- Demographic attributes
- Socioeconomic status
- Intergenerational exchange
- Social network
- Loneliness
- Health behaviors
- Chronic conditions
- WG disability questions
- Sleep
- Physical functioning (ADL, IADL, NAGI)
- Mental Health
- Vision & Hearing
- Fall
- Pain
- Dental Health
- Health Care Utilization
- Income/Pension
- Information Technology

# Anthropometric/Performance/Bio Measures

- Blood Pressure / Pulse
- Anthropometric Measures
  - Height
  - Weight
- Segmental Appendicular Muscle Mass
- Gait speed
- Functional Reach
- Hand Grip Strength
- Peak Flow

# Segmental Appendicular Muscle Mass



- Segmental Body Composition Monitor: Tanita BC601
  - Right arm
  - Left arm
  - Body
  - Right leg
  - Left let
- Bioelectrical Impedance Analysis (BIA)
- Mono frequency

# Measures created by using muscle mass

- Appendicular Skeletal Muscle Mass Index (ASMM)
  - $(\text{sum of 4 segmental appendicular muscle mass}) / (\text{height in meter})^2$
- Appendicular Skeletal Muscle Mass for Legs Index (ASMM-Leg)
  - $(\text{Sum of 2 segmental appendicular muscle mass for legs}) / \text{BMI}$

# Demographic factors considered

- Age (60-69, 70-79, 80+9)
- Sex
- Education (less than high school and high school+)
- Marital status (married or not)
- Living arrangements (live along or not)
- Work status (working or not)
- ADL difficulty (at least one ADL difficulty)

# Hand Grip Strength

- Smedley spring-type dynamometer (Hand Grip Meter, No. 6103-BL (75 kg); TANITA, Tokyo, Japan)
- Measured 3 times: used mean value
- Right, Left and Dominant hand grip strength
  - Right-handed: 11.4%
  - Left-handed: 83.7%
  - Ambidextrous: 4.9%

# Falls History

- Have you fallen in the past 12 months?
  - Yes (8.3%)/No
- How many times have you fallen in the past 12 months?
  - Number of times (mean: 2.2)
- In that fall/In any of those falls, did you injure yourself seriously enough to need medical treatment?
  - Yes (37%) /No

# Analyses

- Descriptive statistics
- Correlation



# Results: Means and T-test by sex

Measures	Men	Women	Significance
Right Arm	2.41 kg	1.68 kg	0.01
Left Arm	2.20 kg	1.54 kg	0.01
Right Leg	7.79 kg	5.79 kg	0.01
Left Leg	7.77 kg	5.73 kg	0.01
ASMM-Index	7.71	6.48	0.01
ASMM-Leg	0.72	0.53	0.01

# Results: Means and test by age group

Measures	60-69	70-79	80+	Significance
Right Arm	2.07 kg	1.86 kg	1.95 kg	Partial
Left Arm	1.89 kg	1.81 kg	1.59 kg	0.01
Right Leg	6.84 kg	6.51 kg	6.20 kg	0.01
Left Leg	6.78 kg	6.47 kg	6.19 kg	0.01
ASMM-Index	7.08	6.92	6.93 kg	Partial
ASMM-Leg	0.62	0.61	0.60	NS

# Results: Means and T-test by place of residence

Measures	Urban	Rural	Significance
Right Arm	2.09 kg	1.95 kg	0.01
Left Arm	1.88 kg	1.80 kg	0.01
Right Leg	6.93 kg	6.52 kg	0.01
Left Leg	6.84 kg	6.50 kg	0.01
ASMM-Index	7.16	6.94	0.01
ASMM-Leg	0.61	0.61	NS

# Results: Means and T-test by marital status

Measures	Married	Other	Significance
Right Arm	2.13 kg	1.76 kg	0.01
Left Arm	1.96 kg	1.59 kg	0.01
Right Leg	6.99 kg	6.08 kg	0.01
Left Leg	6.98 kg	5.96 kg	0.01
ASMM-Index	7.22	6.65	0.01
ASMM-Leg	0.64	0.56	0.01

# Results: Means and T-test by education

Measures	<Secondary	>Elementary	Significance
Right Arm	2.15 kg	1.89 kg	0.01
Left Arm	1.94 kg	1.74 kg	0.01
Right Leg	7.07 kg	6.38 kg	0.01
Left Leg	6.70 kg	6.35 kg	0.01
ASMM-Index	7.21	6.88	0.01
ASMM-Leg	064	0.60	0.01

## Results: Means and T-test by living arrangements

Measures	With someone	Alone	Significance
Right Arm	2.04 kg	1.99 kg	NS
Left Arm	1.86 kg	1.82 kg	NS
Right Leg	6.73 kg	6.72 kg	NS
Left Leg	6.67 kg	6.74 kg	NS
ASMM-Index	7.07	7.03	NS
ASMM-Leg	0.62	0.63	0.05

# Results: Means and T-test by working status

Measures	Working	Not working	Significance
Right Arm	1.99 kg	2.01 kg	NS
Left Arm	1.81 kg	1.87 kg	0.01
Right Leg	6.60 kg	6.78 kg	0.01
Left Leg	6.56 kg	6.73 kg	0.01
ASMM-Index	7.00	7.04	NS
ASMM-Leg	0.60	0.63	0.01

# Results: Means and T-test by ADL difficulty

Measures	No	Yes	Significance
Right Arm	2.02 kg	1.79 kg	0.01
Left Arm	1.85 kg	1.70 kg	0.01
Right Leg	6.71 kg	6.28 kg	0.01
Left Leg	6.65 kg	6.33 kg	0.01
ASMM-Index	7.03	6.93	NS
ASMM-Leg	0.61	0.60	NS



# Correlation between muscle mass indicators with hand grip strength and falls history

	Right arm	Left arm	Right leg	Left leg	ASMM-I	ASMM-L
R HGS	0.231**	0.307**	0.478**	0.480**	0.305**	0.408**
L HGS	0.221**	0.314**	0.468**	0.468**	0.300**	0.394**
Dominant	0.231**	0.311**	0.481**	0.479**	0.306**	0.411**
Fell	0.031*	0.039**	0.036**	0.045**	0.024	0.050**
N of falls	-0.048	0.008	-0.064	-0.068	-0.057	-0.011
Treated	0.006	0.083	0.099+	0.113*	0.061	0.127*

# Discussion

- Differences in ASMM are statistically significant by sex.
- ASMM declines by increasing age.
- Differences in ASMM are statistically significant by place of residence, marital status, level of education and status of functioning.
- But not significant by living arrangements and work status.
- ASMM is correlated with hand grip strength.
- ASMM is associated with experience of fall but not with the number of falls and injury caused by falls.

# Limitation

- mono frequency
- not controlled by room temperature and humidity

# Examples of places visited by interviewers

