Geriatrics & Gerontology International
Medline Indexed

Geriatr Gerontol Int 2015

ORIGINAL ARTICLE: EPIDEMIOLOGY, CLINICAL PRACTICE AND HEALTH

Design of the Mobility and Independent Living in Elders Study: An older adult cohort in rural India

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Aim: The Mobility and Independent Living in Elders Study (MILES) was established in 2012 to estimate the prevalence, incidence, and risk factors for disability and age-related disease in rural older Indians. Here we describe the main goals of MILES, the essential elements of its design and examinations, and the initial findings from the baseline visit.

Methods: A random sample of 562 men and women aged ≥60 years was enrolled from the Medchal region in Telangana State. Baseline examination consisted of two separate clinical visits, and included measurements of blood pressure, anthropometry, physical function, peripheral artery disease, cognitive function, bone and muscle quality, knee osteoarthritis, carotid intima-media thickness, and blood biomarkers. A comprehensive interview was carried out for demographics, disability and disease history. Annual follow-up visits are ongoing to collect information on incident disability and disease.

Results: The median age of participants was 66 years (range 60–92 years); median body mass index 21.7 kg/m^2, median gait speed 0.67 m/s and 55% self-reported their health status as fair or poor.

Conclusions: These findings suggest a more frail population in the MILES cohort compared with older adults in USA cohorts. MILES will provide estimates of burden of disease, and disability and risk factors in older adults. Findings will be used to identify potential interventions to prevent disability in this rural Indian population. **Geriatr Gerontol Int 2015; ••: ••–••.**

Keywords: aged, chronic disease, cohort studies, India, prevalence.

Introduction

Most developed countries already have relatively high proportions (15–22%) of individuals aged ≥65 years, but the most rapid increases in the older population are in the developing world. Birth rates are rapidly declining in many countries, including developing countries, such as India, further accelerating the shift towards an aging society.[1] In 1950, approximately 5% of the world's population was aged ≥65 years, whereas 13% was aged <5 years. By 2020, individuals who are aged ≥65 years will outnumber children who are aged <5 years.[2,3] This projected increase will be equivalent to a 10-fold increase in the ≥60 population and a 27-fold increase in the ≥80 population globally.

India is the second most populous country in the world, with 1.21 billion people in its 2011 census.[4] In 2011, the ≥60 years population accounted for 8% of the Indian population (93 million people). By the year 2050, the ≥60 years population will climb and account for 19% (323 million people) of the population.[2] In India, the increase in the ≥60 years population is due to combined effects of fertility decline and increased life expectancy.[3] These trends will likely lead to increases in the burden of physical and cognitive disability, and non-communicable diseases, notably osteoarthritis, cardiovascular disease (CVD) and diabetes. Developing countries, such India, are not fully equipped to address most of these issues associated with these dramatic

Accepted for publication 17 September 2015.

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doi: 10.1111/ggi.12668

changes in demographics. Additionally, population aging in developing countries is taking place at much lower levels of socioeconomic development compared with developed countries, leading to further complications.

To date, few research studies have been carried out in the rural older population in India, even though as many as two-thirds of elderly persons in India live in rural areas.[5–7] Barring a few recent projects, most studies in older Indians are either cross-sectional or have not used objective examination to estimate chronic disease prevalence and risk factor identification.[8–11] One of the biggest challenges in measuring health status in most developing countries and particularly India is the unreliability of participant self-report.[11] Self-reported data have several limitations, even in more developed countries, which has led to the introduction of biomarkers in the measurement protocols of most of the European and North American studies and surveys. Health awareness in India is very poor, especially in the rural older population that is mostly illiterate and has inadequate healthcare access. This population is characterized by widespread undiagnosed disease, including easily diagnosable diseases, such as hypertension and diabetes.[12] Furthermore, objectively measured data could show preclinical or subclinical disease (e.g. prehypertension, prediabetes, decline in performance measures, mild cognitive impairment, etc.) that can be used to educate the participants about preventive measures and treatments. Additionally, as most studies are cross-sectional, it is not possible to infer causality. There is a great need for more detailed data on the prevalence of these diseases, their risk factors and consequences, particularly with respect to disability and death in developing countries, such as India.

To define the prevalence, incidence, and risk factors for disability and age-related disease in a rural part of India, we recruited a random sample of older adults from a region in the south-central part of the country to establish a longitudinal cohort study – Mobility and Independent Living in Elders Study (MILES). The main study objectives were to: (i) determine the prevalence of age-related chronic disease in older adults; (ii) determine the prevalence of socioeconomic, psychosocial, behavioral, dietary, and environmental risk factors for age-related chronic disease and disability using examinations and non-invasive testing; and (iii) determine which conditions are most strongly associated with mobility disability, both cross-sectionally and longitudinally. Measures were chosen based on a comprehensive model of major common chronic disease and disability, assessed with subjective and objective measures. In the present article, we describe the concept and design features of the study.

Methods

Study design

We designed a 5-year prospective longitudinal cohort study of a representative sample of approximately 550 men and women (275 each) aged ≥60 years from the Medchal mandal region near Hyderabad in Telangana State in south-central India.

Setting and sampling frame

Science Health Allied Research & Education INDIA/MediCiti Institute of Medical Science

Science Health Allied Research & Education (SHARE) INDIA is a research foundation established in Telangana State, India. It is affiliated with a 640-bed teaching hospital – MediCiti Institute of Medical Sciences. One significant research undertaking by SHARE INDIA has been the Rural Effective Affordable Health Care (REACH) project, established in the year 1995. REACH provides health education, immunizations, antenatal care and offers primary to tertiary care for a population of approximately 49 792 in 7405 households in 40 villages in the Ranga Reddy district on the northern outskirts of Hyderabad, Telangana State.[13] The REACH Project has enumerated all households in the region and mapped each dwelling by GPS. Household information was collected, including self-reported age of the residents in the area. This annually updated census was used for the MILES sampling frame.

Sample size and power

A sample size of 500 was chosen to accurately estimate the prevalence of common chronic health conditions and disability within ±2.6% to ±4.3% if the true prevalence is in the range of 10–40%. Additionally, we estimated that we would have >80% power to determine risk factors for incidence of mobility disability, defined as the inability to complete a usual paced 400-m walk, if 400 participants of 500 were free of disability at the baseline examination, thus at risk for an incident event. Power for longitudinal follow up will be adequate, because the rates of mobility limitation are expected to be high. The sample size was increased by 10% to account for missing data, and the final sample size was 550.

Sampling methodology

There are 40 villages in the Medchal mandal (similar to a county) with a total population of 49 749. Of these, 3567 persons were aged ≥60 years, as of 2 July, 2011 (source REACH database). Seven villages where the age eligible population was less than 30 were excluded. Two villages that were used for an Indian Council of Medical Research-funded research project on older adults were also excluded. Thus, the final sampling frame consisted of 31 villages. A total of 10 villages were selected by probability proportion to population size method at the first stage. A random sample of households with at least one person aged ≥60 years in each village was selected. The number of respondents to be recruited from each of the 10 villages was calculated as proportional to the number of adults aged ≥60 years in the village.

A random number generator was used to assign a random number to each household in the village with at least one person aged ≥60 years. The household list was sorted in order of random number. The recruitment team consecutively went to each household in the ordered list to recruit until they recruited the expected number of male and female respondents from that village. If both husband and wife and any other adult member living in the same household were age eligible, all were recruited for the study. Initial age eligibility was based on reported age in the 2011 REACH census. Recruitment continued in each village from a random ordered list until the goal for men and women was reached.

Recruitment process

A two-member team went to the village in a SHARE vehicle, accompanied by two community health volunteers. Recruitment was carried out 3 days per week (Monday, Thursday and Saturday). The goal was to recruit four individuals for each MILES clinic day, 5 days a week (from Monday to Friday). A maximum number of three visits were made to each household if the selected household members were not available. Local language (Telugu) translated and institutional review board approved consent form, recruitment script, and eligibility form were used. Individuals who were eligible and agreed to participate were scheduled for the MILES clinic visit.

Eligibility

Men and women were eligible to participate in MILES if they were aged ≥60 years according to the REACH census and lived in a randomly selected household. Eligibility also included the ability to give informed consent (functional vision, hearing and cognitive function), no plan to move from the area over the next 5 years and no end-stage diseases, such as terminal cancer. Table 1 shows the mean age of the ≥60 years population in the county, sampled villages, refusals, not-eligible and enrolled participants. Figure 1 shows the recruitment flowchart for the first baseline visit. Of 826 screened eligible population, 562 (68%) were enrolled in the study. The main reasons for refusal to participate were lack of interest in the study, family or work obligations and resistance from family members.

Informed consent

The protocol and consent forms were approved by the MIMS ethics committee and the University of Pittsburgh institutional review board. The consent form was translated into Telugu and back translated into English to ensure comparability. All Indian staff employed to work on MILES were fluent in English and Telugu. All participants provided informed consent. This international collaboration between SHARE INDIA and the University of Pittsburgh researchers was approved by the Indian Council of Medical Research.

Data collection

Baseline assessment for MILES was organized into two clinic visits. The duration of each visit was approximately 5 h. The first visit consisted of a fasting blood draw, measurements of blood pressure, anthropometry, short physical performance battery, 400-m walk, grip strength, ankle arm index, electrocardiogram, and an interview including questions on demographic information, socioeconomic status, health behaviors, and self-reported disease and disability. The second visit

Table 1 Mean age of age ≥60 years population in the county, sampled villages, refusals, not-eligible and participants enrolled in the study

Level of sampling	Population size	Mean age, years (total population ≥60 years)	Mean age, years (≥60 years men)	Mean age, years (≥60 years women)
40 villages (total county)	3567	68.6	68.6	68.6
10 villages (selected)	1598	68.4	68.4	68.5
Underwent eligibility	885	68.2	68.2	68.2
Eligible respondents	826	67.8	68.0	67.6
Not-eligible respondents	59	73.7	70.6	75.5
Enrolled respondents	562	67.6	67.9	67.3
Refused respondents	264	68.3	68.3	68.3

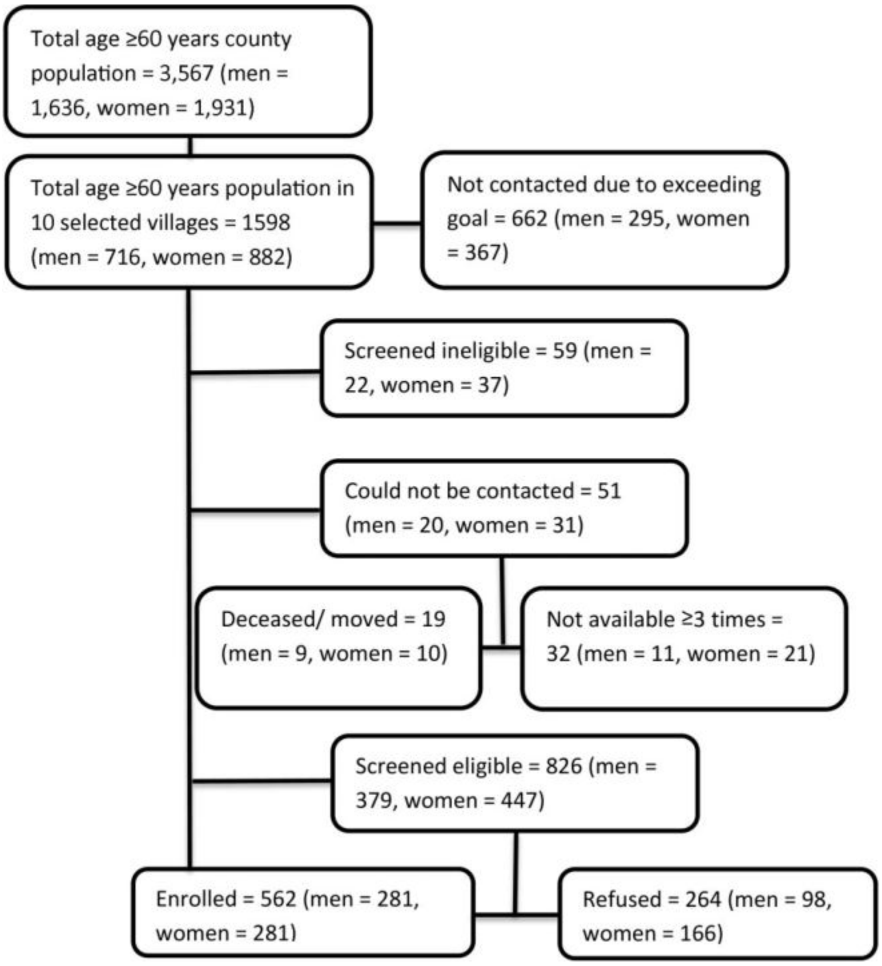

Figure 1 Flow chart of recruitment for Mobility and Independent Living in Elders Study (MILES). The flow chart shows the total ≥60 years population in the county (*n* = 3,567) and selected villages (*n* = 1598) at the time of recruitment. It further shows the number of individuals that were not contacted (*n* = 662), could not be contacted (*n* = 51) or were ineligible (*n* = 59). Then the figure shows the eligible individuals (*n* = 826) and those who were finally enrolled (*n* = 562) or refused to take part in the study (*n* = 264).

consisted of a cognitive function examination, peripheral quantitative computerized tomography of bone and muscle in the upper and lower extremities, knee x-ray, monofilament test for peripheral nerve function, dietary questionnaire, event history questionnaire and a carotid ultrasonography. All forms and protocols were modeled after major global and U.S. aging studies.[14–16]

Training and quality control

The staff recruited for interviews and clinical examination were required to have a graduate level education, good interpersonal skills, and literacy in Telugu and English. Preference was given to people who had similar experience with data collection in the past. A medical social worker was also appointed who had experience in handling research data collection and cohort study recruitment.

Training and certification was required for all MILES staff before the start of the study. MILES staff was trained for three weeks by an expert research assistant who traveled from the Center for Aging and Population Health, University of Pittsburgh. Training included review of examination protocols, practice with data form completion and instruction in standardized interviewing strategies. Certification required demonstration of correct procedures by each staff person, observed and documented by the trainer using a step-by-step checklist. Retraining and recertification was conducted periodically and at least every 6 months. Training and certification for carotid ultrasonography were provided by technicians from the Ultrasound Research Lab (URL) at the University of Pittsburgh.

Data quality was assessed through periodic inter- and intra-technician review for carotid ultrasonography, peripheral quantitative computerized tomography and knee x-ray. Annual recertification of all MILES staff was required to ensure that they have not deviated from MILES protocol and manual of procedures. Quality was also ensured by random checks of data at regular intervals. All equipment was checked and calibrated frequently to ensure proper functioning.

The data collection and questionnaire plan are summarized in Tables 2 and 3.

Table 2 Components of Mobility and Independent Living in Elders Study baseline evaluation

Measurement category	Data points, procedures and instruments
First clinic visit	
Interviewer administered questionnaires	
General characteristics	• Age, religion, caste
Socioeconomic and lifestyle	• Marital status • Education • Occupation • Work activity • Living arrangement • Household possessions • Income and expenditure • Healthcare access
Medical history (self-report of a health professional's diagnosis of health conditions)	• Osteoarthritis/rheumatoid arthritis • Stroke • Hypertension • Coronary artery bypass graft surgery/angioplasty • Myocardial infarction • Angina • Rheumatic heart disease • Diabetes • Chronic pulmonary disease, asthma • Depression (Geriatric Depression Scale)[17] • Vision problems, cataract • Hearing problems • Number of teeth in the mouth • Falls, fractures and other injuries • Cancer • Cervical cancer and breast cancer screening questions (women) • Urinary incontinence (women) • Prostate health (men) • Infectious conditions
Disability	• Overall health • Problems with work or activity due to physical health • Pain that interfered with normal activities • Problems with memory • Problems with work or activity due to emotions • Sleep and fatigue • Difficulty with activities of daily living
Tobacco and alcohol use	• Smoking history, type, frequency, quantity and duration • Exposure to tobacco smoke • Chewing tobacco use • Alcohol use history, type, frequency and quantity • Other substance abuse
Weight and weight history	• Weight and weight history
Cooking, water and food security	• Type of cooking fuel • Exposure to smoke from cooking fuel • Source of water used for cooking and drinking • Water storage • Food security
Physical activity	• Walking/bicycling for daily work/activities • Exercise frequency and duration • Time spent sitting or reclining
Pain/stiffness	• Knee pain, back pain or any other joint pain • Joint stiffness or swelling
Medication inventory	• Type, name and duration of physician prescription, non-physician prescription, and over-the-counter medications taken in the last 14 days • Information on alternative medication use, including ayurvedic and homeopathic preparations
Physical examination	
Fasting blood sample	• Lipid Profile • Fasting blood sugar • Complete blood count, including hemoglobin and hematocrit
Anthropometry	• Height • Weight • Waist and hip circumference

Table 2 *Continued*

Measurement category	Data points, procedures and instruments
Blood pressure and heart rate	• Resting blood pressure and heart rate • Hypertension defined as self-reported and use of anti-hypertensive medication or by the measured blood pressure categorized according to the JNC 7 criteria[18]
Physical performance	
Short Physical Performance Battery[19]	• Balance tests • 4-m usual-paced walk • Chair stands
400-m walk[16]	
Grip strength[20]	• Hand grip strength was measured to assess upper body skeletal muscle function using Jamar handheld dynamometer (Lafayette Instrument, Lafayette, IN, USA)
Cardiovascular examination	
Electrocardiogram	• Standard 12-lead resting ECG obtained using GE MAC 600 (GE Healthcare) machine and were read by a physician and classified into major and minor ECG abnormalities[21]
Ankle-brachial index	• ABI is the ratio of ankle to brachial systolic blood pressure[22]
Second clinic visit	
Carotid artery ultrasonography	• Carotid artery ultrasonography used to measure common carotid intima-media thickness and plaque number and size in the common carotid arteries[23]
Cognitive function examination[24]	• Translated version of the Hindi Mental State Examination, which is a modified version of the Mini Mental State Examination • Word List Learning, Recall, and Delayed Recognition Tests • Object Naming Test • Verbal Fluency Test
Peripheral quantitative computed tomography	• To measures bone strength, quality and skeletal muscle area and fat infiltration. The images will be read by a single center using specialized software. Standard protocols were followed[25]
Bilateral fixed flexion knee radiograph	• Radiographs of both right and left knees were acquired • Articular cartilage thickness measured indirectly by radiographic joint-space width was used to assess osteoarthritis of the knee • To reduce variability due to image acquisition, the SynaFlexer (CCBR-Synarc, Newark, CA, USA) positioning frame and phantom were used • The images were read by a clinical radiologist using a Kellgren–Lawrence scale protocol[26]
Monofilament test	• Monofilaments were used to evaluate the presence or absence of normal light touch sensation, an indicator of the state of peripheral nerve function[27]
Dietary questionnaire	• A mix of closed and open- ended questions were used to capture questions on meal pattern, frequency of consumption, food intake changes over the last one year, as well as trying to identify symptoms associated with food intake
Health events questionnaire	• Questions on health events since the last study visit

ABI, ankle-brachial index; ECG, electrocardiogram.

Results

The mean age of the 60 + population in Medchal mandal was 68.6 years and in the sampled villages was 68.4 years. The mean age did not differ much between the Medchal mandal and sampled villages and the mean age of eligible respondents (67.8), enrolled participants (67.6), and those who refused to participate (68.3) (Table 1). However, the mean age of individuals who were not-eligible was higher (73.7). The proportion of adults aged 60 + in Medchal mandal is 7.2% and those in selected villages is 7.7%. This proportion is lower than the proportion of older adults in rural Ranga Reddy district (9.2%) and rural India (8.8%).[28]

In this cohort of rural older Indians, there were important differences in the health profiles between men and women (Table 4). At a similar median age, women had worse function and more chronic health conditions compared to men. More than 90% of the men were married, but the majority (>60%) of the women were widowed. Almost half of the men had some level of schooling, whereas only 8.5% of the women had any formal education. The median BMI was low in both men and women, although women were slightly heavier with a median BMI of 22.5 kg/m^2 compared to a BMI of 21.2 kg/m^2 in men. Women also had a higher prevalence of diabetes, and depressive symptoms in comparison to men. However, prevalence of hypertension was similar in men and women, with approximately half of the population being hypertensive. Women reported more difficulty in walking short and long distances and performed poorly on measures of physical function compared to men. Measures of mobility were poor in both sexes, with the median gait

Table 3 Components of Mobility and Independent Living in Elders Study annual follow-up contact

Measurement
Questionnaires
General health and function
Physical activity/sleep
Health events
Anthropometry
Height
Weight
Blood pressure
Heart rate
Short Physical Performance Battery
400-m walk
Grip strength
Vision examination
Hearing function examination
Medication inventory
Blood draw
Fasting Blood Glucose
Hemoglobin

of 0.74 m/s in men, and 0.61 m/s in women. Similarly, 27.9% of men and 43.8% could not complete the 400 meter walk. Additionally, grip strength was only 19.5 kg in men and 12.0 kg in women.

Discussion

MILES is novel and important in several ways, most notably in its extensive characterization of health, disease, and physical and cognitive function in a population based random sample of older adults from rural India. The data from the study will enable us to analyze many important health issues facing this neglected population. The study incorporates a mix of self-reported and objective measures, which will allow us to assess clinical and subclinical disease and function, as well as the correlation between these measures in this population. The longitudinal data will provide us with incidence and risk factors for morbidity, disability and mortality in rural older Indians.

State of the art techniques and internationally validated methods were used in MILES to quantify the burden of disease and disability. To our knowledge, the 400-meter walk has not been used in studies in India, and the use of carotid intima-media thickness (IMT) to identify subclinical vascular disease as a risk factor for incident disease and disability has been very limited. The same is true for peripheral quantitative computerized tomography. The addition of the ankle-brachial index and carotid IMT to make a composite subclinical CVD measure to define the role of vascular disease in the onset of disability the older Indian population is novel. Standardized measures used in epidemiological studies worldwide were used in MILES, to enable comparison of these findings from India with other populations in future. To our knowledge, there are no cross-national comparative studies using all these measures in an older Indian population.

The baseline data from MILES suggest a frail rural population of older individuals, and major differences in demographic and health indicators between men and women. Women were less likely to be currently married, educated and currently working, and had poor overall health and physical function. There are several reasons for these differences in men and women. Marital status in older adults can indicate economic and social well-being. Studies have shown that married older adults have better socioeconomic status than those who are single.[29] In India, there is a striking disparity in widowhood, with more widowed women compared with men. The main reasons for this are: higher life expectancy in women, likelihood of women to marry men older than themselves and higher tendency of men to remarry compared with women.[29,30] Other theories to explain these difference include greater perception of functional impairment in women compared with men,[31] and higher rates of comorbidity or chronic health conditions in women, including depression and osteoarthritis.[32] These indicators are similar to results from other studies carried out in older Indian populations.[29] A recent cross-sectional survey, the Building Knowledge Base on Population Aging in India, conducted by United Nations Population Fund, and other partners in rural and urban areas in seven states in India (Himachal Pradesh, Punjab, West Bengal, Odisha, Maharashtra, Kerala and Tamil Nadu), showed similar results for several demographic and health indicators in older Indians.[33] In this survey, estimates from the rural population for marital status, self-reported health and several chronic diseases, including diabetes, were similar to the estimates from MILES.[34,35] Objective measures of disease and physical function could not be compared, as these were not collected in the Building Knowledge Base on Population Aging in India study. In comparison with studies of older adults in the USA, the gait speed in this cohort was much lower for both men and women. Compared with a gait speed of 0.74 m/s in men in MILES, the mean gait speed in older men (mean age 73.6 years) in the Osteoporotic Fractures in Men Study was 1.19 m/s.[14,36] Similarly, gait speed in MILES women was just 0.61 m/s, compared with a mean gait speed of 0.95 m/s in older women (mean age 71.8 years) in the Study of Osteoporotic Fractures.[36] In another cohort of older adults in the USA, the Health, Aging and Body Composition study, the grip strength in older men (mean age 73.7 years) was 40.8 kg, compared with

Table 4 Characteristics of Mobility and Independent Living in Elders Study participants at baseline

Characteristics	Men (*n* = 281)	Women (*n* = 281)
Median age, years (range)	66 (60–90)	65 (60–92)
Marital status		
Currently married, *n* (%)	253 (90.4)	109 (38.8)
Widowed, *n* (%)	26 (9.3)	169 (60.1)
Divorced/separated/abandoned, *n* (%)	1 (0.3)	3 (1.1)
Schooling (any level), *n* (%)	132 (47.1)	24 (8.5)
Currently working, *n* (%)	123 (43.9)	64 (22.8)
Health status (self-reported)		
Good, *n* (%)	134 (47.9)	118 (42.0)
Fair, *n* (%)	144 (51.4)	120 (42.7)
Poor, *n* (%)	2 (0.7)	43 (15.3)
Median BMI, kg/m^2 (IQR)	21.2 (18.3–24.0)	22.5 (19.5–26.2)
Fallers (in the past 12 months), *n* (%)	24 (8.6)	47 (16.7)
Diabetes (self-reported), *n* (%)	34 (12.14)	43 (15.30)
Diabetes (self-reported and/or FBS >125), *n* (%)	45 (16.07)	65 (23.30)
Hypertension (blood pressure ≥140/90 and/or self-reported AND antihypertensive use), *n* (%)	137 (48.8)	143 (50.9)
Cardiovascular disease history (self-reported), *n* (%)	28 (10.0)	16 (5.7)
Peripheral artery disease, *n* (%)	17 (6.1)	20 (7.1)
Depression categories (15-item GDS)		
No depression (≤5 depressive answers), *n* (%)	247 (89.2)	170 (60.7)
Mild depression (6–10 depressive answers), *n* (%)	21 (7.6)	66 (23.6)
Severe depression (>10 depressive answers), *n* (%)	9 (3.3)	44 (15.7)
Difficulty in walking short distances (self-reported), *n* (%)	88 (31.4)	167 (59.4)
Difficulty in walking long distances (self-reported), *n* (%)	203 (72.5)	222 (79.0)
Median gait speed, m/s (IQR)	0.74 (0.59–0.85)	0.61 (0.49–0.72)
Median grip strength, kg (IQR)	19.5 (16.0–23.5)	12.0 (9.5–16.5)
Median Short Physical Performance Battery score (IQR)	9 (7–11)	8 (5–9)
400-me walk (non-completers), *n* (%)	78 (27.9)	123 (43.8)

BMI, body mass index; FBS, fasting blood sugar; GDS, Geriatric Depression Scale; IQR, interquartile range.

19.5 kg in MILES, and 25.1 kg in women (mean age 73.4 years), compared with 12.0 kg in MILES.[20] These comparisons show a much frailer population of older Indians in this cohort, even at a younger mean age.

There were several limitations to MILES. The recruitment reflected the study goal of recruiting committed individuals who agreed to be followed up over a period of 5 years. Therefore, the generalizability of the study might be limited in favor of internal validity. The proportion of older adults in Medchal mandal, and in the chosen villages was lower than the district and the national rural proportions of older adults, which could indicate a difference in characteristics of the study participants. Nevertheless, the age distribution of the enrolled population was similar to those who were eligible but refused within the selected villages. However, as the mean age of those who refused to participate was higher than the enrolled participants, in addition to the inclusion criteria of maintained basic functioning to be able to participate, the findings from the study might be limited in generalizability to a less disabled population. Pulmonary function testing using spirometry was initially planned to be included in the study, but was not carried out as a result of technical challenges. A dietary assessment questionnaire was considered, but a validated tool in this population was unavailable.

Despite the substantial progress in improving our understanding of aging, and age-related disease and disability in the developed world, there is very little known about the disease processes, risk factors, and impact of aging and disease on disability and mortality in older Indian population. Yet, the bulk of future disease and disability burden will be in developing countries, such as India. The scant literature about Indian health comes primarily from urban settings, yet 70% of the Indian population is rural.[37] In Asian populations, there are important biological differences in age-related chronic disease compared with Western populations with differences in risk factors and potentially differences related to genetic factors.[12] For example, compared with some developed countries, rates of cardiovascular disease and diabetes in Indians are high,[7,38,39] even at a lower prevalence of obesity.[38] Thus, it is important that each region of the world carries out studies to identify the factors that are unique to that region.

There are five large cross-national efforts that provide data to address some of the health concerns in older adults. The Survey of Health and Retirement in Europe is modeled on the English Longitudinal Study of Ageing[40] and the US Health and Retirement study.[41] The Health and Retirement survey is designed to include all 27 members of the EU in 2008. These projects include surveys of health and disability, but focus on socioeconomic factors related to retirement. The International Network for the Demographic Evaluation of Populations and their Health project includes 37 sites in 19 countries in Africa, Asia (including India) and Latin America, and is designed to provide adult mortality data that is otherwise lacking.[10] The WHO recently launched the Study of Global Ageing and Adult Health in six countries, including China, Ghana, India, Mexico, Russia and South Africa. It is modeled on the Health and Retirement survey, and will also link to the International Network for the Demographic Evaluation of Populations and their Health project.[9] These studies will provide demographic data, but differ from the MILES project in that they are not designed for in depth study of disease prevalence, causes of disability or exploring mechanisms, nor do they include state-of-the-art subclinical and clinical assessments.

Another study, the Longitudinal Aging Study in India, an investigation of the economic, physical and social well-being of India's growing elderly population, was started recently, and is a joint effort of the Harvard School of Public Health, the International Institute for Population Sciences and the RAND Corporation.[42] A pilot study was carried out in 2010 and enrolled 1683 participants, aged >45 years from four states in India. The long-term goal is to enrol a nationally representative sample of 30 000 individuals into a longitudinal survey on aging, health and retirement. The data collection consists of a household survey, household finances, assets, debts and living conditions, with information on demographics, family and social networks, health, health care utilization, work and employment pensions, and retirement. The clinical examination in the Longitudinal Aging Study in India is limited to measurements of blood pressure, blood spot storage, anthropometrics, gait speed, grip strength, balance, lung function and vision.[11] There is no assessment of subclinical disease; that is, CVD, knee osteoarthritis, or state of the art measures of bone or muscle.

MILES is well positioned to characterize the major contributors to disease and disability with long follow up. The study will present opportunities for further understanding of disease processes and developing interventions, not only in India, but also in other developing and developed countries. The future plan for MILES is to continue annual visits to capture incident disease and disability in this cohort of rural older Indians.

Acknowledgments

The Mobility and Independent Living in Elders Study (MILES) was carried out with institutional support from the University of Pittsburgh Graduate School of Public Health, SHARE INDIA and Fogarty International Center (FIC) D43 TW009078. We also acknowledge the important contributions of colleagues from the University of Pittsburgh and SHARE INDIA to the study.

Disclosure statement

The authors declare no conflict of interest.

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