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Study design and baseline characteristics of Shenzhen ageing-related disorder cohort in China

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ABSTRACT

Purpose The Shenzhen ageing-related disorder cohort was designed to detect the associations of lifestyle, environmental and genetic factors with major ageing-related disorders, especially neurological and mental disorders.

Participants The cohort was a community-dwelling prospective study of 9411 elderly adults aged 60 to 92 years from 51 community health service centres in Luohu district of Shenzhen, China. The baseline data were collected between 2017 and 2018, including demographics and socioeconomics, lifestyles, medical history, family history of major non-communicable chronic disease, environmental exposures, clinical analysis of blood and urine, clinical imaging measurements, anthropometric measures and neurological function and mental health assessments. Blood and urinary samples were collected at baseline. All participants will be followed for physiological and psychological disorders and updated lifestyle and environmental exposures every 5 years.

Findings to date The mean age of the participants was 67.73 years at baseline, and 42.74% were males. The prevalences of individuals with unhealthy conditions were as follows: overweight/obesity (54.38%), hypertension (58.24%), diabetes mellitus (22.30%), dyslipidaemia (75.69%), chronic bronchitis (1.45%), myocardial infarction (0.55%), coronary heart disease (5.69%), stroke (1.10%), cancer (2.18%), arthritis (5.04%), Alzheimer's disease (0.18%), Parkinson's disease (0.23%), brain injury (5.75%), cognitive impairment (5.39%) and depression status (3.28%). The mean scores for the Lawton-Brody Activities of Daily Living Scale and the Social Support Rate Scale were 14.15 and 39.54, respectively.

Future plans 2000 new entrants from Luohu district will be recruited every year until 2028. The data collection is expected to be ended at the end of 2030. The data will be used to assess the causality of ageing-related disorders, especially neurological and mental disorders through integrating environmental, genetic and lifestyle factors. The data sets generated and/or analysed during the current study are not publicly available at this stage, but are available from the corresponding author on reasonable request.

Strengths and limitations of this study

- The Shenzhen ageing-related disorder cohort is a community-dwelling cohort with the comprehensive collections of epidemiological data, clinical examinations, environmental exposures, body components and biological samples in elderly Chinese population, which would be used to analyse the causality of various ageing-related disorders, especially neurological and mental disorders through integrating environmental, genetic and lifestyle factors.
- Several ways will be applied to identify the morbidities and mortalities of ageing-related diseases during the follow-up through questionnaire investigation, physical examinations and searching the National Electronic Disease Surveillance System as well as the National Mortality Surveillance System, which guarantee the integrity and validity of the health outcomes of interest in our cohort.
- Only adults aged 60 years or older were included into the current study, which might hinder the detection of influencing factors for early-onset mental and neurological diseases.
- The medical histories of the participants in the current cohort were mainly self-reported, which might cause biassed estimation between disease histories and ageing-related disorders.
- Only a subsample (34.98%) of the participants at baseline took part in the measurement of body components.

INTRODUCTION

Globally, life expectancy at birth increased by 7.4 years from 1990 to 2017.[1] It is forecasted that the life expectancy will keep increasing until 2040.[2] Consequently, population ageing has become one of the major challenges facing most countries worldwide. The proportion of people with ageing-related disorders, especially non-communicable chronic diseases has been growing.[3] For instance, the lifetime risk of stroke increased by 8.9% from 1990 to 2016,[4] the cancer incidence

Figure 1 Location of Shenzhen in China.

increased by 28% from 2006 and 2016[5] and the number of dementia is forecasted to increase from 47.5 million in 2010 to 131.5 million by 2050.[6 7] In 2017, ageing-related diseases accounted for 51.3% of the global burden of diseases among adults.[8]

As a county with rapid economic and social development, China has stepped into an ageing society. The growing incidences of ageing-related disorders have threatened public health and economy.[9] Besides cardiovascular diseases, cancer and diabetes,[10–13] neurological and mental disorders have attracted growing attention due to their dramatically increased contributions to disease burdens, the relative lack of resources for intervention of various mental diseases and the need for more research to find the best ways to provide mental health services.[14 15] Data from the Chinese Longitudinal Healthy Longevity Study revealed an annual increase of 0.7% to 2.2% of cognitive impairment rate and an annual decrease of 0.4% to 3.8% of objective physical performance capacity among the oldest old Chinese between 1998 and 2008.[16] The prevalence of Parkinson's disease increased by 116% in China from 1990 to 2016,[17] and that

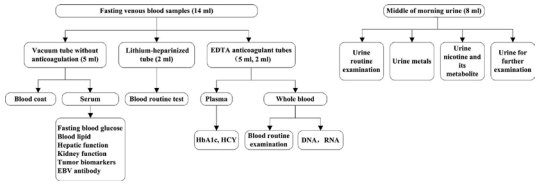

Figure 2 The flow diagram of collection and separation of blood and urine specimen. EBV,Epstein-Barr virus; HbA1c, glycated haemoglobin; HCY,homocysteine.

of Alzheimer's disease was estimated to have quadrupled between 2011 and 2015, from 6 to 28 million.[18] However, to date, there are no known effective treatments for most ageing-related disorders, especially for neurological diseases, it is therefore urgent to identify the risk factors, particularly modifiable ones for facilitating early intervention and prevention of the onset of ageing-related disorders.

Shenzhen, a major city in Guangdong province, China, situates immediately north of Hong Kong. As the first special economic zone and the birthplace of economic miracle of China, Shenzhen grew from a small fishing village in 1980 to the 22nd most competitive financial centre in the world in 2017. Along with the highest-speed urbanisation, Shenzhen has attracted large internal migration across the country, and experienced dramatic socioeconomic changes and accelerated ageing process during the past decades. Given the population diversity, rapid urbanisation, high-speed ageing process as well as adequate medical and health resources in Shenzhen city, a dynamic, prospective cohort study, the Shenzhen ageing-related disorder cohort, was designed to provide evidence for addressing opportunities regarding ageing-related disorders as an ageing-oriented research model for areas with the most rapid urbanisation and the socioeconomic structure changes in developing countries.

The purposes of the Shenzhen ageing-related disorder cohort were to:

1. Determine the prevalence of ageing-related disorders, including neurological disorders, mental diseases, chronic respiratory diseases, cardiovascular diseases, diabetes mellitus, neoplasms, injuries and other non-communicable diseases in Shenzhen;
2. Detect the incidences of major mental and neurological disorders, including mild cognitive impairment, dementia, Alzheimer's disease and Parkinson's disease;
3. Estimate the disease burden of ageing-related disorders, especially that from neurological and mental disorders in Shenzhen;
4. Describe the temporal dynamics of ageing-related disorders in Shenzhen;
5. Assess the effects of environmental factors, lifestyle and genetic factors on the initiation and progression of ageing-related disorders, especially for neurological and mental disorders;
6. Develop risk prediction tools for multiple ageing-related disorders;
7. Generate health intervention and management strategies for ageing-related disorders, especially for neurological and mental disorders.

COHORT DESCRIPTION

The participants of the cohort

The Shenzhen ageing-related disorder cohort was established between 2017 and 2018 based on participants from 51 community health service centres in Luohu district of Shenzhen city, Guangdong province, China (figure 1).

Table 1 Summary of studied items at baseline in the Shenzhen ageing-related disorder cohort

Categories	Measurements
Demographics and socioeconomics	Birthday, gender, residential address, race, birth place, education level, marital status, occupation, housing condition and family yearly income
Lifestyles	Consumption frequencies of major food groups and drinks, active and passive smoking status, alcohol intake, physical activity, sleep habits and cooking habits
Medical histories	Histories of hypertension, dyslipidaemia, coronary heart disease, stroke, diabetes mellitus, cancers, chronic bronchitis, asthma, pulmonary tuberculosis, chronic hepatitis, nephritis, arthritis, osteoporosis, migraine, epilepsy, depression, Alzheimer's disease and Parkinson's disease Use of health services and taking medicines in the past 2 weeks
Family histories of diseases	Family histories of hypertension, dyslipidaemia, coronary heart disease, stroke, diabetes mellitus, cancers, chronic bronchitis, asthma, pulmonary tuberculosis, chronic hepatitis, nephritis, arthritis, osteoporosis, migraine, epilepsy, depression, Alzheimer's disease and Parkinson's disease
Reproductive history (for women)	Histories of pregnancy and delivery, menopause status and history of taking contraceptive pills
Clinical analysis of blood and urine	Blood routine examination, fasting plasma glucose, total cholesterol, triglycerides, low density lipoprotein cholesterol, high density lipoprotein cholesterol, alanine aminotransferase, glycated haemoglobin and homocysteine, creatinine, uric acid, urea nitrogen, tumour biomarkers, Epstein-Barr virus antibody, glycated haemoglobin A1c, homocysteine
	Urine glucose, urine bilirubin, urine acetone bodies, urine specific gravity, pH, urinary protein, urobilinogen, urine nitrite, urine white blood cell, urine occult blood Urine metals (lithium, beryllium, aluminium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, arsenic, selenium, rubidium, strontium, molybdenum, cadmium, indium, tin, antimony, barium, thallium, lead) Urine nicotine and its metabolite (nicotine, cotinine, trans-3'-hydroxy cotinine, nicotine-N-β-glucuronide, cotinine N-β-D-glucuronide, trans-3'-hydroxy cotinine O- β -D-glucuronide, (R,S)-nornicotine, (R,S)-norcotinine, (1'S,2'S)-nicotine-1'-oxide, (S)-cotinine N-Oxide, rac 4-Hydroxy-4-(3-pyridyl)butanoic Acid Dicyclohexylamine Salt)
Parameters of clinical measurements and imaging	Height, weight, blood pressure,ECG, chest X-ray, colour doppler ultrasound of liver, gallbladder, spleen, pancreas, kidney, bladder, ureter and prostate (men only), bone mineral density
	Basal metabolic rate, body mass index, circumference of neck, chest, waist, hip, biceps and thigh, total body fat, percentage of body fat, visceral fat level, fat free mass, lean muscle mass, skeletal muscle, total body water, intracellular water, extracellular water, body protein, body minerals, body cell count, bio-electrical impedance
Assessments of neurological function and activities of daily living	Mini-Cog, Mini-mental State Examination, Centre for Epidemiological Studies Depression Scale, Activities of Daily Living Scale, Social Support Rating Scale, Pittsburgh Sleep Quality Index

The community health service centre is the basic health administration unit located in each community, which is responsible for disease prevention, healthcare, promoting recovery in each stage of health-illness process, health education, family planning and medical treatment of all the population in the area under its jurisdiction. First, among the 11 districts of Shenzhen city, Luohu district was selected considering its similarity with Shenzhen city in terms of socioeconomic structure (online supplementary table 1). Second, all 51 community health service centres in Luohu district were included, which managed 24 402 household registered permanent elderly residents older than 60 years. Individuals with severe physical disabilities or mental disorders which could affect daily activities or language communication were excluded through checking the medical insurance for urban residents and the National Electronic Disease Surveillance System considering that they could not response well to the questionnaire investigation, clinical examination and further follow-ups. Then, all household registered permanent elderly residents aged at least 60 years old and without severe physical or mental disorders (n=16 843) of the selected community health service centres were invited to participate in the study. Approximately 56% (n=9411) agreed and provided signed informed consent, but 44% of the local residents refused the invitation due to unwillingness to spent time on the epidemiological investigation or less attraction for them or they had finished the physical examination in early 2017. Although the age distribution of our cohort was comparable with that of Shenzhen city, the current cohort had higher proportion of females when compared with the elderly permanent residents in Luohu district or Shenzhen city (online supplementary table 2). All participants were asked to bring their unique national identity cards for questionnaire investigation and physical examination in local health centres or hospitals. Considering the annual increase of 4000 adults aged 60 years or older in the above-mentioned community health service centres between 2016 and 2018, the cohort will be expanded by recruiting 2000 new entrants from the same community health services from Luohu district every year until 2028. The data collection is expected to be ended at the end of 2030.

Epidemiological investigation

The epidemiological data were collected through face-to-face interviews by health professionals. A semi-structured questionnaire was designed to collect demographic

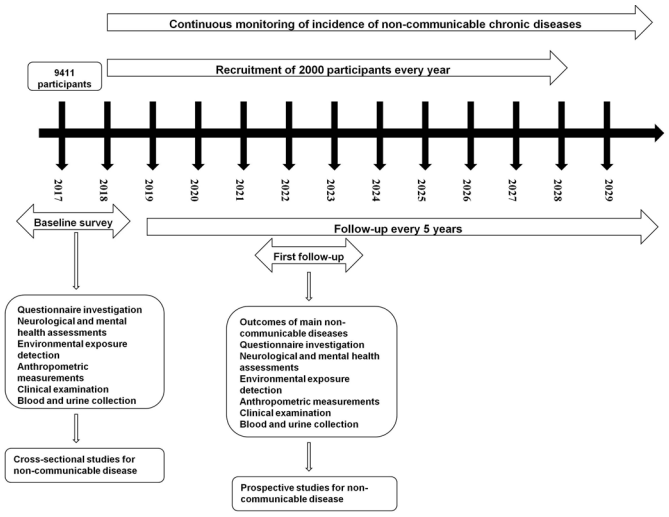

Figure 3 The flow diagram of the cohort design.

information (name, identity card, gender, birthday, education level, marital status, native place, occupation, housing condition, annual family income, and so on), commuting tools, lifestyle (such as food intake, active and passive smoking status, alcohol consumption, physical activity, cooking and sleep habits), histories of chronic diseases (including hypertension, dyslipidaemia, coronary heart disease, stroke, diabetes mellitus, cancer, neurological and mental disorders), medication history, family histories of aforementioned chronic diseases and reproductive history (women only). After the investigation, trained investigators checked the integrity and logical errors of each questionnaire. The missing information was entered and logical errors were corrected by further telephone investigation. Data from each questionnaire were entered into computer by two integrators independently using EpiData software (V.3.1). All information was double-checked for the validity. Data items of the questionnaire query are summarised as table 1.

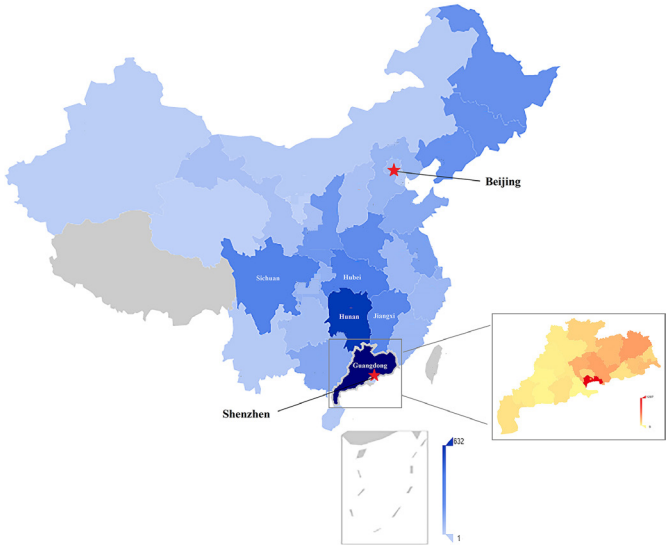

Figure 4 The birthplace distribution of the studied individuals.

Assessments of neurological function and activities of daily living

Standardised scales were applied to estimate cognitive function, depression status, functional disability, social support and sleep quality. The Mini-Cog, a 5-point scale combining three-item recall and Clock Drawing Test[19] was used as preliminary screening instrument for mild cognitive impairment. For those who got 4 or less scores of Mini-Cog, further Chinese version of the Mini-Mental State Examination (MMSE) was applied to classify them into two groups (≥24 points and <24 points).[20] The validity and reliability of the Chinese MMSE have been verified previously.[16] The Centre for Epidemiological Studies Depression Scale (CES-D) was applied to estimate the depression status of each participant. To favour international comparisons, we used the cut-off of 16 or more out of a total of 60 points to define the prevalence of depression.[21 22] The Lawton-Brody Activities of Daily Living Scale (ADLS) combining basic (ability to toilet, feed, dress, groom, bathe and walk) and instrumental (ability to shop, prepare food, perform housekeeping, wash laundry, arrange transport, administer medication, use a telephone and manage finances) scales was used to assess functional disability of each participant. The participants with higher ADLS scores (ranging from 14 to 64) exhibit worse independence.[23] The Pittsburgh Sleep Quality Index (PSQI), a 24-item questionnaire comprising seven component scores, was applied to assess the sleep quality of all participants.[24] The participants with higher PSQI scores (ranging from 0 to 21) had worse sleep quality. The 10 items of the Social Support Rate Scale (SSRS) reflect the three dimensions of the social support, namely subjective support (emotional support, four items), objective support (tangible support, three items) and availability support (three items). Higher SSRS scores represent a better social support. The validity and reliability of SSRS have been verified previously.[25]

Clinical analysis of blood and urine

After at least 8 hours of overnight fasting, venous blood samples from each participant were separately collected into the EDTA anticoagulant tubes (one 2 mL and one 5 mL), promoting coagulation tube (5 mL) and the lithium-heparinised tube (2 mL), and then the blood specimens were centrifuged at 3000 rpm for 5 min at room temperature to separate plasma and serum. The serum samples were used for biochemical analyses, including fasting blood glucose, blood lipid, hepatic function, kidney function (creatinine, uric acid and urea nitrogen), tumour biomarkers and Epstein-Barr virus (EBV) antibody. The lithium-heparinised whole blood was used for blood routine test, including the total number of white blood cell (WBC) counts, red blood cell (RBC) counts, haemoglobin contents and blood platelet counts. The detailed biochemical indexes of blood are listed in online supplementary table 3. The EDTA-anticoagulated whole blood (0.3 mL) and plasma specimens (1 mL) were used

Table 2 Baseline characteristics of participants in the Shenzhen ageing-related disorder cohort

Variables	Total (n=9411)	Male (n=4022)	Female (n=5389)	t/x^{2}*	P value
Age (years, mean±SD)	67.73±5.41	68.38±5.59	67.24±5.23	10.12	<0.0001
Age groups (years, n, %)				89.80	<0.0001
60–64	3142 (33.39)	1167 (29.02)	1975 (36.65)		
65–69	3274 (34.79)	1399 (34.78)	1875 (34.79)		
70–74	1818 (19.32)	848 (21.08)	970 (18.00)		
≥75	1177 (12.51)	608 (15.12)	569 (10.56)		
Race (n, %)				6.88	0.03
Han Chinese	8577 (91.14)	3684 (91.60)	4893 (90.80)		
Other ethnic groups	57 (0.61)	15 (0.37)	42 (0.78)		
Missing	777 (8.26)	323 (8.03)	454 (8.42)		
Migration time to Shenzhen (n, %)				65.89	<0.0001
<1950	1450 (15.41)	554 (13.77)	896 (16.63)		
1950-	404 (4.29)	174 (4.33)	230 (4.27)		
1970-	3735 (39.69)	1722 (42.81)	2013 (37.35)		
1990-	2661 (28.28)	1022 (25.41)	1639 (30.41)		
2010-	729 (7.75)	365 (9.08)	364 (6.75)		
Missing	432 (4.59)	185 (4.60)	247 (4.58)		
Education level (n, %)				571.31	<0.0001
Primary school or illiteracy	1637 (17.39)	390 (9.70)	1247 (23.14)		
Middle school	2564 (27.24)	934 (23.22)	1630 (30.25)		
High school	3143 (33.40)	1450 (36.05)	1693 (31.42)		
University or college or higher	1977 (21.01)	1210 (30.08)	767 (14.23)		
Missing	90 (0.96)	38 (0.94)	52 (0.96)		
Marital status (n, %)				419.31	<0.0001
Single	37 (0.39)	13 (0.32)	24 (0.45)		
Married	8045 (85.49)	3762 (93.54)	4283 (79.48)		
Widowed	1023 (10.87)	147 (3.65)	876 (16.26)		
Divorced	119 (1.26)	26 (0.65)	93 (1.73)		
Cohabited	2 (0.02)	0	2 (0.04)		
Remarried	9 (0.10)	7 (0.17)	2 (0.04)		
Missing	176 (1.87)	67 (1.67)	109 (2.02)		
Family yearly income (yuan, n, %)				32.87	<0.0001
<40 000	306 (3.25)	87 (2.16)	219 (4.06)		
40 000 -	857 (9.11)	339 (8.43)	518 (9.61)		
80 000 -	1401 (14.89)	626 (15.56)	775 (14.38)		
120 000 -	1951 (20.73)	852 (21.18)	1099 (20.39)		
≥160 000	4114 (43.71)	1787 (44.43)	2327 (43.18)		
Missing	782 (8.31)	331 (8.23)	451 (8.37)		
Exposure to occupational hazards†				127.85	<0.0001
Yes	1563 (16.61)	834 (20.74)	729 (13.53)		
No	5361 (56.97)	2309 (57.41)	3052 (56.63)		
Missing	2487 (26.43)	879 (21.85)	1608 (29.84)		
Exposure to kitchen fumes (n, %)				1104.43	<0.0001
Yes	6284 (66.77)	1943 (48.31)	4341 (80.55)		
No	2975 (31.61)	2017 (50.15)	958 (17.78)		
Missing	152 (1.62)	62 (1.54)	90 (1.67)		
Menolipsis (n=5233, %)		–	5230 (99.94)		
Parturition (n=5233, times)		–	2.02±1.04		

*Student's t-test and Pearson x^{2} test were used for the comparisons between continuous variables and categorical variables, respectively.
†Occupational hazards included high temperature, noise, radiation, metal, dust, organic solvent and farm chemical.

for DNA and RNA extractions, and analysis of glycated haemoglobin and homocysteine, respectively.

Additionally, an early morning, on the spot, urine sample (8 mL) was collected from each participant for urine routine examination, urinary concentrations of 24 metals as well as nicotine and its 10 metabolites. The detailed biochemical indices of urine are listed in online supplementary table 3. The resting blood and urine specimens were stored at −80°C and −20°C refrigerators, respectively. The flow diagram of collections and separations for blood and urine samples is shown as figure 2.

Parameters of clinical measurements and imaging

Each participant took part in the physical examination conducted by trained physicians in the district hospital. The inspection-palpation-percussion-auscultation approach was used to find visual abnormalities in the eyes, ears, nasal cavity, oral cavity, thyroid, thorax, lung, heart, liver, spleen, skin and limbs. The measurements of baseline anthropometric indices for each participant were performed on the day of physical examination. Standing height, weight and waist were measured with the subjects in light clothing and without shoes by ultrasonic weighing apparatus (HNH-219, OMRON Healthcare Co, Ltd, Japan). Resting blood pressure and pulse rate were tested in duplicate using an electronic sphygmomanometers (HBP-1300, OMRON Healthcare Co, Ltd, Japan) with the participant in sitting position and the right arm supported at heart-level. Statistical analysis was based on the average of the two measures. Twelve-lead resting ECG, routine chest X-ray, abdominal B-type ultrasound inspection of the liver, gall bladder, spleen or pancreas, urinary tract B-type ultrasound inspections of uterus, bladder and kidney, prostate B-type ultrasound inspection (only for males) and bone mineral density scan were then conducted. Out of 9411 participants, 3292 took part in the body composition measurements. The visceral fat and fluid imbalances in each segment of the body and the phase angle for cellular indicator of cell integrity were measured by bioelectrical impedance analysis using an InBody 570 body composition analyser (Biospace, Seoul, Korea). The body segments were analysed, including elementary body composition (body weight, body mass index, protein mass and minerals mass), total body water (TBW) analysis (intracellular water, extracellular water (ECW) and ECW/TBW), segmental muscle and fat analysis (total skeletal muscle mass and total body fat percentage), segmental lean mass analysis (neck, waist, hip and limb circumferences, waist-to-hip ratio, visceral fat area and visceral fat level) and basal metabolic rate.

The instruments used for the physical examination and the body composition measurements are listed as online supplementary table 4.

The follow-up procedure

Follow-up will be conducted every 5 years to update exposures and outcomes by the staffs in the community health service centres, who have established good relationship with the elderly during daily disease prevention, treatment and recovery to reduce the potential impact of losses to follow-up on the validity of the study result. An annual health education on ageing-related disorders will be provided by Shenzhen Center for Disease Control and Prevention, and the daily medical consultation will be provided by the community health service centres for the participants to assure the retention of the participants. The questionnaire survey, physical examination, the body composition measures and neurological function and mental health assessments will be re-conducted during the follow-up. Blood and urine specimens will be collected according to the design procedures at baseline. The incidence of non-communicable chronic diseases, including neurological and mental disorders, hypertension, dyslipidaemia, stroke, coronary heart disease, diabetes mellitus, cancer and other ageing-related diseases will be annually verified through searching the IDs of participants of the cohort, which were collected during the baseline questionnaire interviews in the medical insurance for urban residents, the National Electronic Disease Surveillance System and the National Mortality Surveillance System. The disease reports will be extracted manually. For those presenting low MMSE score (less than 24 points) at baseline or significant decline of cognition in MMSE but without diagnosis of mental or neurological disorders from the medical insurance for urban residents or the National Electronic Disease Surveillance System, the clinical diagnosis of mental disorders will be further performed by an expert panel from Shenzhen Luohu Hospital Group.

All death cases will be verified by Chinese Cause of Death Registration System in Shenzhen Center for Disease Control and Prevention. The diagnosis of the aforementioned conditions and the causes of death will be classified according to the 10th version of the International Statistical Classification of Diseases (ICD-10). The flow diagram of the cohort design is presented as figure 3. The anticipated rate of attrition is no more than 15% until the end of 2030.

Patient and public involvement

Participants were not involved in the development of study design or conduct. However, each participant received a health report of their examinations and tests.

FINDINGS TO DATE

A total of 9411 people were recruited into the Shenzhen ageing-related disorder cohort. The participants were from 33 provinces, municipalities directly under the Central Government and autonomous regions of China (except for Tibet Autonomous Region). Among them, 48.65% of the cohort participants were from the outside areas of Guangdong province (Shenzhen city, a city of Guangdong) (figure 4). The age of participants ranged from 60 to 92 years at baseline. Among all participants, 42.74% were males. The distributions of race,

Table 3 Baseline lifestyle and diet habits of participants in the Shenzhen ageing-related disorder cohort

Variables	Total (n=9411)	Male (n=4041)	Female (n=5370)	t/x^{2}*	P value
Smoking status (n, %)				2994.95	<0.0001
Never smoker	7449 (79.15)	2129 (52.93)	5320 (98.72)		
Former smoker	974 (10.35)	961 (23.89)	13 (0.24)		
Current smoker	926 (9.84)	904 (22.48)	22 (0.41)		
Missing	62 (0.66)	28 (0.70)	34 (0.63)		
Passive smoker (n, %)				419.58	<0.0001
Yes	1054 (11.20)	144 (3.58)	910 (16.89)		
No	8282 (88.00)	3830 (95.23)	4452 (82.61)		
Missing	75 (0.80)	48 (1.19)	27 (0.50)		
Drinking status (n, %)				1383.99	<0.0001
Never drinker	7998 (84.99)	2794 (69.47)	5204 (96.57)		
Former drinker	247 (2.62)	227 (5.64)	20 (0.37)		
Current drinker	1104 (11.73)	976 (24.27)	128 (2.38)		
Missing	62 (0.66)	25 (0.62)	37 (0.69)		
Afternoon nap (n, %)				30.79	<0.0001
Yes	7020 (74.59)	3116 (77.47)	3904 (72.44)		
No	2301 (24.45)	871 (21.66)	1430 (26.54)		
Missing	90 (0.96)	35 (0.87)	55 (1.02)		
Sleep duration at night (**n=9185**, hours/day, mean±SD)	7.45±1.11	7.49±1.13	7.43±1.10	2.34	0.02
Pittsburgh Sleep Quality Index (**n=7772**, mean±SD)	4.20±2.61	3.84±2.41	4.46±2.72	−10.50	<0.0001
Physical activity (n, %)				80.11	<0.0001
Yes	7588 (80.63)	3411 (84.81)	4177 (77.51)		
No	1749 (18.58)	581 (14.45)	1168 (21.67)		
Missing	74 (0.79)	30 (0.75)	44 (0.82)		
Rice (**n=9259,** times/day, mean±SD)	1.98±0.65	2.00±0.65	1.96±0.65	3.04	0.002
Wheat (**n=9224,** times/day, mean±SD)	0.79±0.57	0.78±0.57	0.80±0.57	−2.24	0.03
Coarse grain (**n=9241,** times/week, mean±SD)	5.08±3.28	4.88±3.35	5.22±3.22	−4.80	<0.0001
Vegetables (**n=9267**, times/day, mean±SD)	1.62±0.71	1.60±0.72	1.63±0.71	−1.81	0.07
Fruit (**n=9256,** times/day, mean±SD)	0.95±0.50	0.92±0.51	0.97±0.50	−4.68	<0.0001
Meat (**n=9258,** times/day, mean±SD)	1.00±0.60	1.03±0.61	0.98±0.60	4.17	<0.0001
Fish (**n=9240,** times/week, mean±SD)	3.12±3.33	3.22±3.41	3.04±3.27	2.53	0.01
Shrimp/shell (**n=9204,** times/week, mean±SD)	1.20±3.04	1.29±3.14	1.12±2.95	2.59	0.009
Egg (**n=9263,** times/week, mean±SD)	5.51±2.64	5.52±2.65	5.50±2.63	0.39	0.70
Milk (**n=9256,** times/week, mean±SD)	3.52±3.23	3.34±3.19	3.66±3.25	−4.68	<0.0001
Bean (**n=9225,** times/week, mean±SD)	2.31±2.52	2.36±2.60	2.27±2.46	1.69	0.09
Pickle (**n=9267,** times/week, mean±SD)	1.10±2.20	1.08±2.14	1.11±2.25	−0.63	0.53
Processed meat (**n=9266**, times/week, mean±SD)	0.25±1.01	0.24±0.94	0.26±1.06	−0.93	0.35
Green tea (n, %)				612.93	<0.0001
Yes	3348 (35.58)	1999 (49.70)	1349 (25.03)		
No	5760 (61.20)	1912 (47.54)	3848 (71.40)		
Missing	303 (3.22)	111 (2.76)	192 (3.56)		
Black tea (n, %)				253.99	<0.0001
Yes	1741 (18.50)	1040 (25.88)	700 (12.99)		
No	7331 (77.90)	2847 (70.79)	4484 (83.21)		
Missing	339 (3.60)	134 (3.33)	205 (3.80)		
Coffee (n, %)				3.21	0.20
Yes	144 (1.53)	72 (1.79)	72 (1.34)		
No	8872 (94.27)	3784 (94.08)	5088 (94.41)		
Missing	395 (4.20)	166 (4.13)	229 (4.25)		
Juice (n, %)				0.40	0.82

Continued

Table 3 Continued

Variables	Total (n=9411)	Male (n=4041)	Female (n=5370)	t/x^2*	P value
Yes	47 (0.50)	18 (0.45)	29 (0.54)		
No	8970 (95.31)	3837 (95.40)	5133 (95.25)		

*Student's t-test and Pearson x^2 test were used for the comparisons between continuous variables and for the categorical variables, respectively.

education levels, marital status and exposures to occupational hazards and kitchen fumes are shown in table 2. The baseline lifestyle and diet habits of participants are presented in table 3. The significant differences in the demographics and lifestyle between males and females were observed. Males were more likely to have higher education level, possess the habits of smoking, drinking, taking afternoon nap and drinking tea, be physically active, and have worse sleep quality (all p<0.05) (tables 2 and 3).

The baseline levels of participants in the Shenzhen ageing-related disorder cohort were detected, including blood routine, lipid levels, blood glucose, homocysteine, hepatic function, kidney function, tumour biomarkers, EBV antibody and urine routine. The detailed items are provided as online supplementary table 3. With the exception of the parameters (including aspartate aminotransferase, EB virus status, carcino-embryonic antigen, alpha-fetoprotein and urine bilirubin), other indices presented significant difference between both sexes (all p<0.05, tables 4 and 5).

Table 6 presents the baseline levels of clinical measurement parameters of participants in the Shenzhen ageing-related disorder cohort, including blood pressure, pulse rate, examinations of ECG, chest X-ray, colour doppler ultrasound of liver/gallbladder/spleen/pancreas, colour doppler ultrasound of urinary system, colour doppler ultrasound of prostate and bone mineral density. Owing to the relatively long waiting time, less interest and attention for their body components, only 34.98% (3292 of 9411) of the participants completed the measurements of body component (table 6), which comprised of waist hip ratio, basal metabolic rate, total body water, intracellular water, extracellular water, body fat mass, percentage of body fat, fat free mass, skeletal muscle, soft lean mass (SLM), body protein, body minerals and InBody score. All clinical parameters presented significant difference between men and women (all p<0.05). With the exception of age, sex, the prevalence of overweight/obesity, hypertension and arthritis, ADL score and SSRS score as well as the other characteristics were comparable between individuals with and without body component data at baseline (online supplementary table 5).

Table 7 shows the prevalences of main non-communicable chronic diseases, including overweight/obesity, hypertension, diabetes mellitus, dyslipidaemia, chronic bronchitis, chronicobstructive pulmonary disease, asthma, tuberculosis, angina, myocardial infarction, coronary heart disease, stroke, cancer, arthritis, chronic hepatitis, migraine, nephritis, Alzheimer's disease, Parkinson's disease and brain injury. The assessments of mental health based on MMSE and CES-D, activities based on ADLS, and social support based on SSRS were also provided in table 7. Except for asthma, tuberculosis, angina, coronary heart disease, chronic hepatitis, nephritis, Alzheimer's disease, brain injury, MMSE score, depression status and ADL as well as other health-related outcomes presented significant difference between males and females (all p<0.05).

Strengths and limitations

This is the community-dwelling ageing-related disorder cohort with main focus on neurological and mental disorders. We comprehensively collected epidemiological data, clinical examination, environmental exposures, body components and biological samples in Chinese population, which will facilitate the identification of the causality of various ageing-related disorders, especially neurological and mental disorders through integrating environmental, genetic and lifestyle factors. As an epitome of the areas with the rapid economic development and growth of immigrant population, Shenzhen reflects the ageing process of population in cites with rapid economic development in China. The setting up of our cohort is able to provide more epidemiological evidence for the prevention and control of ageing-related diseases in China, especially in those areas with upcoming booming economy. With the except of routine follow-up by questionnaires, the incidence of ageing-related diseases, especially neurological and mental disorders will be annually verified from the National Electronic Disease Surveillance System and National Mortality Surveillance System in Shenzhen Center for Disease Control and Prevention, which guarantees the integrity and validity of outcomes of interest in our cohort. Comprehensive measurement of internal exposures is another strength of our cohort. A total of 24 metals as well as nicotine and its metabolites in urine samples have been detected for all participants at baseline. Chronic risk assessment of exposure to environmental pollutants will be extended to pesticides in 2020. Compared with the previous cohorts, including China Kadoorie Biobank,[26] the China Health and Retirement Longitudinal Study[27] and Chinese Longitudinal Healthy Longevity Survey,[28] the Shenzhen ageing-related disorder cohort might help to provide more epidemiological evidence for the causality of neurological and mental disorders through wide exploration of the environmental

Table 4 Baseline levels of blood biochemical traits of participants in the Shenzhen ageing-related disorder cohort

Variables	Total	Male	Female	t/x^{2}*	P value
Blood routine					
WBC (**n=9377**,×10^{9}/l, mean±SD)	6.62±1.64	6.89±1.71	6.43±1.56	13.48	<0.0001
RBC (**n=9377**,×10^{12}/l, mean±SD)	4.60±0.50	4.80±0.51	4.45±0.44	35.59	<0.0001
Haemoglobin (**n=9377**, g/dl, mean±SD)	13.74±1.27	14.52±1.20	13.15±0.97	59.52	<0.0001
Platelet count (**n=9377**,×10^{9}/l, mean±SD)	230.16±58.14	219.75±54.62	237.9±59.47	−15.34	<0.0001
Lipid levels					
TCHO (**n=9376**, mmol/l, mean±SD)	5.50±1.09	5.20±1.05	5.72±1.07	−23.50	<0.0001
TCHO ≥5.18 mmol/L (n, %)	5732 (61.13)	2019 (50.67)	3703 (68.93)	321.83	<0.0001
TG (**n=9376**, mmol/l, mean±SD)	1.64±1.08	1.56±1.08	1.70±1.07	−6.24	<0.0001
TG ≥1.7 mmol/L (n, %)	3232 (34.47)	1226 (30.62)	2006 (37.34)	45.90	<0.0001
HDL-C (**n=9376**, mmol/l, mean±SD)	1.54±0.37	1.44±0.34	1.63±0.37	−25.85	<0.0001
HDL-C <1.0 mmol/L (n, %)	349 (3.72)	256 (6.39)	93 (1.73)	139.16	<0.0001
LDL-C (**n=9376**, mmol/l, mean±SD)	3.13±0.85	3.00±0.83	3.22±0.86	−12.65	<0.0001
LDL-C ≥3.37 mmol/L (n, %)	3633 (38.63)	1296 (32.37)	2326 (43.30)	115.62	<0.0001
Fasting blood glucose (**n=9366**, mmol/l, mean±SD)	6.17±1.78	6.22±1.84	6.13±1.73	2.59	0.01
Fasting blood glucose value ≥7.0 mmol/L (%)	1561 (16.67)	716 (17.90)	845 (15.75)	7.59	0.006
HbA1c (**n=6487**, %, mean±SD)	6.27±1.06	6.31±1.14	6.24±0.99	2.32	0.02
HCY (**n=6488**, µmol/l, mean±SD)	15.14±6.75	17.42±7.52	13.47±5.56	23.25	<0.0001
Hepatic function					
Total protein (**n=9378**, g/l, mean±SD)	73.93±4.08	73.52±4.00	74.23±4.12	−8.42	<0.0001
Abnormal total protein (n, %)	33 (0.35)	9 (0.22)	24 (0.26)	3.23	0.07
Total bilirubin (**n=9378**, µmol/l, mean±SD)	15.55±5.06	16.34±5.60	14.97±4.53	12.71	<0.0001
Abnormal total bilirubin (n, %)	3036 (32.37)	1562 (38.99)	1474 (27.44)	139.90	<0.0001
Albumin (**n=9378**, g/l, mean±SD)	44.55±2.06	44.68±2.09	44.46±2.03	5.05	<0.0001
Abnormal albumin (n, %)	77 (0.82)	41 (1.02)	36 (0.67)	3.50	0.06
ALT (**n=9378**,U/l, mean±SD)	21.93±19.53	22.70±14.29	21.35±22.65	3.52	0.0004
Abnormal ALT (n, %)	619 (6.60)	283 (7.06)	336 (6.25)	2.44	0.12
AST (**n=9378**, U/l, mean±SD)	22.07±12.27	21.88±9.22	22.21±14.12	−1.38	0.17
Abnormal AST (n, %)	310 (3.31)	108 (2.70)	202 (3.76)	8.14	0.004
Kidney function					
Blood urea nitrogen (**n=9369**, mmol/l, mean±SD)	5.78±1.60	6.00±1.74	5.61±1.46	11.769	<0.0001
Creatinine (**n=9369**, µmol/l, mean±SD)	80.03±24.11	93.36±26.30	70.10±16.37	49.30	<0.0001
Uric acid (**n=9369**, µmol/l, mean±SD)	373.79±90.64	408.49±88.68	347.93±83.14	33.58	<0.0001
EB virus (n, %)				0.60	0.74
Negative	9354 (99.39)	3997 (99.38)	5357 (99.41)		
Positive	19 (0.20)	7 (0.17)	12 (0.22)		
Missing	38 (0.40)	18 (0.45)	20 (0.37)		
CEA (n, %)					0.68†
Negative	9367 (99.53)	4001 (99.48)	5366 (99.57)		
Positive	7 (0.07)	4 (0.10)	3 (0.06)		
Missing	37 (0.39)	17 (0.42)	20 (0.37)		
AFP (n, %)				0.94	0.62
Negative	9364 (99.50)	3999 (99.43)	5365 (99.55)		
Positive	9 (0.09)	5 (0.12)	4 (0.07)		
Missing	38 (0.40)	18 (0.45)	20 (0.37)		

*Student's t-test and Pearson x^{2} test were used for the comparisons between continuous variables and the categorical variables, respectively.
†Fisher's exact test was used.
AFP, alpha-fetoprotein; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CEA, carcino-embryonic antigen; EB virus, Epstein-Barr virus; HbA1c, glycated haemoglobin; HCY, homocysteine; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; RBC, red blood cell count; TCHO, total cholesterol; TG, triglycerides; WBC, white blood cell count.

Table 5 Baseline levels of urine indices of participants in the Shenzhen ageing-related disorder cohort

Variables	Total	Male	Female	t/x^{2}*	P value
Urine glucose (n, %)				76.90	<0.0001
Negative	8862 (94.17)	3696 (91.89)	5166 (95.86)		
Positive/suspected positive	469 (4.98)	292 (7.26)	177 (3.28)		
Missing	80 (0.85)	34 (0.85)	46 (0.85)		
Urine bilirubin (n, %)				2.08	0.35
Negative	9198 (97.74)	3923 (97.54)	5275 (97.88)		
Positive/suspected positive	133 (1.41)	65 (1.62)	68 (1.26)		
Missing	80 (0.85)	34 (0.85)	46 (0.85)		
Urine acetone bodies (n, %)				5.55	0.06
Negative	9244 (98.23)	3940 (97.96)	5304 (98.42)		
Positive/suspected positive	87 (0.92)	48 (1.19)	39 (0.72)		
Missing	80 (0.85)	34 (0.85)	46 (0.85)		
Urine specific gravity (**n=9331**, mean±SD)	1.02±0.01	1.02±0.01	1.02±0.01	3.28	0.001
Urinary protein (n, %)				18.46	<0.0001
Negative	7997 (84.98)	3346 (83.19)	4651 (86.31)		
Positive/suspected positive	1334 (14.17)	643 (15.91)	691 (12.87)		
Missing	80 (0.85)	34 (0.85)	46 (0.85)		
Urobilinogen (n, %)				33.40	<0.0001
Negative	9186 (97.61)	3891 (96.74)	5295 (98.26)		
Positive/suspected positive	143 (1.52)	95 (2.36)	48 (0.89)		
Missing	82 (0.87)	36 (0.90)	46 (0.85)		
Urine nitrite (n, %)				116.02	<0.0001
Negative	9080 (96.48)	3964 (98.56)	5116 (94.93)		
Positive/suspected positive	251 (2.67)	24 (0.60)	225 (4.21)		
Missing	80 (0.85)	34 (0.85)	46 (0.85)		
Urine white blood cell (n, %)				874.22	<0.0001
Negative	7406 (78.70)	3737 (92.91)	3669 (68.08)		
Positive/suspected positive	1925 (20.45)	251 (6.24)	1674 (31.06)		
Missing	80 (0.85)	34 (0.85)	46 (0.85)		
Urine occult blood (n, %)				263.04	<0.0001
Negative	6803 (72.29)	3252 (80.86)	3551 (65.89)		
Positive/suspected positive	2528 (26.86)	736 (18.30)	1792 (33.25)		
Missing	80 (0.85)	34 (0.85)	46 (0.85)		

*Student's t-test and Pearson x^{2} test were used for the comparisons between continuous variables and the categorical variables, respectively.

exposures, such as lifestyle, metals, metabolite of tobacco and pesticide.

However, there are some limitations of our cohort. First, although Luohu district is similar with Shenzhen city in socioeconomic structures among all 11 districts, there is inevitably some deviations, especially in age composition. However, the age structure in our cohort is comparable with that of the elderly in Shenzhen city. But our cohort has higher proportion of females, which may cause deviations of the demographic features for the whole study population. To reduce the potential bias, we presented all results by sex. Second, all participants are adults aged 60 years or older, then we could not have information on their early-life exposures. However, the high incidence of ageing-related disorders in older adults in the context of rapid epidemiological transition will provide us with sufficient power for further analysis. Third, the medical histories of the participants in our cohort were self-reported. But the link between our cohort and disease surveillance system in Shenzhen Center for Disease Control and Prevention will guarantee the accuracy and reliability of the information. Fourth, only 3292 participants took part in the body components analysis at baseline. However, the selection bias tends to be small since most baseline characteristics are comparable between individuals with and without body component data (online supplementary table 5). Fifth, recruitment of 9411 participants at baseline makes our sample size relatively smaller compared with other cohorts in the world. However, according to the study design, an annual 2000 new participants will

Table 6 Baseline levels of clinical measurement parameters of participants in the Shenzhen ageing-related disorder cohort

Variables	Total	Male	Female	t/x^2*	P value
Blood pressure (mm Hg, mean±SD)					
Systolic blood pressure (**n=9330**)	138.47±19.42	137.19±18.74	139.43±19.96	−5.37	<0.0001
Diastolic blood pressure (**n=9330**)	77.35±10.72	79.23±10.69	75.93±10.52	14.82	<0.0001
Pulse rate (**n=6681**, times/min)	75.32±11.39	74.61±11.58	75.85±11.21	−4.43	<0.0001
Electrocardiogram (n, %)				7.40	0.02
Normal	4995 (53.08)	2073 (51.54)	2922 (54.22)		
Abnormal	4347 (46.19)	1915 (47.61)	2432 (45.13)		
Missing	69 (0.73)	34 (0.85)	35 (0.65)		
Chest X-ray				5.46	0.07
Normal	1911 (20.31)	813 (20.21)	1098 (20.37)		
Abnormal	7291 (77.47)	3136 (77.97)	4155 (77.10)		
Missing	209 (2.22)	73 (1.82)	136 (2.52)		
Colour doppler ultrasound of liver/gallbladder/spleen/pancreas (n, %)				17.02	0.007
Normal	3678 (39.08)	1559 (38.76)	2119 (39.32)		
Abnormal	5655 (60.09)	2416 (60.07)	3239 (60.10)		
Uncertainty/missing†	78 (0.83)	47 (1.17)	31 (0.58)		
Colour doppler ultrasound of urinary system (n, %)				267.05	<0.0001
Normal	6026 (64.03)	2305 (57.31)	3721 (69.05)		
Abnormal	2775 (29.49)	1533 (38.12)	1242 (23.05)		
Uncertainty/missing†	610 (6.48)	184 (4.57)	426 (7.90)		
Colour doppler ultrasound of prostate (**n=4022**, %)					
Normal		1139 (28.32)	–		
Abnormal		2770 (68.87)	–		
Uncertainty/missing†		113 (2.81)	–		
Bone mineral density (n, %)				583.26	<0.0001
Normal	1395 (14.82)	1003 (24.94)	392 (7.27)		
Osteopenia/osteoporosis	7846 (83.37)	2931 (72.87)	4915 (91.20)		
Missing	170 (1.81)	88 (2.19)	82 (1.52)		
Waist hip ratio (**n=3292**, mean±SD)	0.88±0.05	0.89±0.06	0.88±0.05	7.14	<0.0001
Basal metabolic rate (**n=3292**, kcal, mean±SD)	1281.47±158.83	1433.37±114.83	1178.89±85.16	68.94	<0.0001
Total body water (**n=3292**, k, mean±SD)	31.10±5.45	36.32±3.91	27.58±2.91	69.47	<0.0001
Intracellular water (**n=3292**, L, mean±SD)	19.07±3.39	22.32±2.43	16.87±1.81	69.68	<0.0001
Extracellular water (**n=3292**, L, mean±SD)	12.04±2.07	14.00±1.51	10.71±1.12	67.67	<0.0001
Body fat mass (**n=3292**,kg, mean±SD)	19.98±5.72	18.77±5.46	20.80±5.74	−10.25	<0.0001
Percentage of body fat (**n=3292**, %, mean±SD)	31.94±6.79	27.19±5.41	35.15±5.65	−40.37	<0.0001
Fat free mass (**n=3292**,Kg, mean±SD)	42.20±7.35	49.23±5.32	37.45±3.94	68.92	<0.0001
Skeletal muscle (**n=3292**,Kg, mean±SD)	22.87±4.23	27.12±3.18	20.00±2.36	69.67	<0.0001
SLM (**n=3292**,Kg, mean±SD)	39.85±7.00	46.56±5.03	35.31±3.74	69.54	<0.0001
Body protein (**n=3292**,kg, mean±SD)	8.24±1.47	9.64±1.05	7.29±0.78	69.62	<0.0001
Body minerals (**n=3292**,kg, mean±SD)	2.85±0.46	3.25±0.38	2.58±0.27	55.68	<0.0001
InBody score (**n=3292**, mean±SD)	69.05±4.92	68.15±5.16	69.67±4.65	−8.50	<0.0001

*Student's t-test and Pearson x^2 test were used for the comparisons between continuous variables and the categorical variables, respectively.
†Uncertainty was caused by unsatisfied examination conditions.

be recruited to enlarge the cohort until 2028, which will ensure the statistical power for most association studies in the future.

Collaboration

The data sets generated and/or analysed during the current study are not publicly available at this stage, but

Table 7 The prevalence of the common non-communicable disorders in the Shenzhen ageing-related disorder cohort

Variables	Total	Male	Female	t/x^2*	P value
Overweight/obesity† (**n=9307**, %)	5061 (54.38)	2219 (55.84)	2842 (53.29)	5.96	0.01
Hypertension‡ (**n=9374**, %)	5476 (58.24)	2256 (56.32)	3220 (59.99)	12.72	0.0004
Diabetes mellitus§ (**n=9340**, %)	2083 (22.30)	954 (23.91)	1129 (21.10)	10.39	0.001
Dyslipidaemia¶ (**n=9377**, %)	7097 (75.69)	2711 (67.74)	4386 (81.60)	239.42	<0.0001
Chronic bronchitis** (**n=9354**, %)	136 (1.45)	71 (1.78)	65 (1.21)	5.09	0.02
COPD** (**n=9357**, %)	18 (0.19)	12 (0.30)	6 (0.11)	4.23	0.04
Asthma** (**n=9356**, %)	41 (0.44)	19 (0.48)	22 (0.41)	0.22	0.64
Tuberculosis** (**n=9315**, %)	38 (0.40)	16 (0.40)	22 (0.41)	0.007	0.93
Angina** (**n=9311**, %)	36 (0.39)	13 (0.33)	23 (0.43)	0.65	0.42
Myocardial infarction** (**n=9312**, %)	51 (0.55)	35 (0.88)	16 (0.30)	14.07	0.0002
Coronary heart disease** (**n=9315**, %)	530 (5.69)	239 (6.01)	291 (5.45)	1.33	0.25
Stroke** (**n=9309**, %)	102 (1.10)	57 (1.43)	45 (0.84)	7.30	0.007
Cancer** (**n=9303**, %)	203 (2.18)	53 (1.33)	150 (2.82)	23.45	<0.0001
Chronic hepatitis** (**n=9311**, %)	47 (0.50)	24 (0.60)	23 (0.43)	1.35	0.24
Arthritis** (**n=9308**, %)	469 (5.04)	118 (2.97)	351 (6.58)	62.28	<0.0001
Migraine** (**n=9311**, %)	58 (0.62)	16 (0.40)	42 (0.79)	5.47	0.02
Nephritis** (**n=9312**, %)	36 (0.39)	17 (0.43)	19 (0.36)	0.30	0.58
Alzheimer's disease** (**n=9309**, %)	17 (0.18)	9 (0.23)	8 (0.15)	0.73	0.39
Parkinson's disease** (**n=9309**, %)	21 (0.23)	13 (0.33)	8 (0.15)	3.17	0.08
Brain injury** (**n=9267**, %)	533 (5.75)	227 (5.74)	306 (5.76)	0.001	0.97
MMSE score <24 (**n=8678**, %)	468 (5.39)	205 (5.42)	263 (5.37)	0.01	0.92
Depression status†† (**n=9243**, %)	303 (3.28)	111 (2.81)	192 (3.63)	3.67	0.06
ADL (**n=9240**, scores, mean±SD)	14.15±1.58	14.16±1.73	14.14±1.44	0.78	0.43
SSRS (n=**8117**, score, mean±SD)	39.54±7.89	39.17±7.90	39.83±7.88	–3.75	0.0002

*Student's t-test and Pearson x^2 test were used for the comparisons between continuous variables and the categorical variables, respectively.
†Overweight/obesity was defined as BMI at least 24 kg/m^2.
‡Hypertension was defined as diastolic blood pressure ≥90 mm Hg and/or systolic blood pressure ≥140 mm Hg, or self-reported hypertension diagnosed by a physician or taking antihypertension drugs.
§Diabetes was defined as fasting blood glucose value ≥7.0 mmol/L or antidiabetic therapy, or self-reported diabetes diagnosed by a physician or taking hypoglycaemic agent or insulin.
¶Dyslipidaemia was defined as TCHO ≥5.18 mmol/L, or TG ≥1.7 mmol/L, or HDL-C <1.0 mmol/L, or LDL-C ≥3.37 mmol/L, or self-reported hyperlipidaemia diagnosis by a physician or taking lipid-lowering drugs.
**The disease was defined as self-reported disease.
††Depression was defined as having at least 16 scores in the Centre for Epidemiological Studies Depression Scale.
ADL, activities of daily living; BMI, body mass index; COPD, chronic obstructive pulmonary disease; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; MMSE, Mini-Mental State Examination; SSRS, Social Support Rate Scale; TCHO, total cholesterol; TG, triglyceride.

are available from the corresponding author on reasonable request from employees of a recognised academic institution, health service organisation or charitable research organisation with experience in medical research with the clear statement of their research interest, analysis proposal, data protection measures and corporation mechanisms. However, specific ideas and proposals for potential collaborations would be welcomed and invited to contact the corresponding authors via email to LJ (JJLIUSZCDC@163.com) and YJ (jyuan@tjh.tjmu.edu.cn).

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