Body mass index, leisure-time physical activity and physical fitness in Chinese adults: a series of national surveys from 2000 to 2014

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Abstract

Background:

Obesity, physical inactivity and reduced physical fitness may contribute to the rising burden of chronic diseases in China. We investigated these factors in China over a 14-year period using data from the randomized national surveys in 2000, 2005, 2010 and 2014.

Methods:

We conducted four national surveys among 151,656, 163,386, 154,931and 146,703 Chinese adults aged 20-59 in 2000, 2005, 2010 and 2014, respectively. Body mass index (BMI, kg/m^2) was used to evaluate underweight (BMI<18·5), overweight (BMI 23·0-27·5) and obesity (BMI≥27·5). Central obesity was defined as waist circumference >90 cm in men and >85 cm in women. Leisure-time physical activity (LTPA) was evaluated by whether or not the participants had completed the recommended minimum 150-min moderate or 75-min vigorous exercise per week. Indices for assessing physical fitness included forced vital capacity, resting heart rate, handgrip strength, sit and reach, and standing on one leg.

Findings:

The prevalence of obesity increased from 8·6% in 2000, 10·3% in 2005, and 12·2% in 2010 to 12·9% in 2014 (0·32% per year). Comparable estimates were 37·4%, 39·2%, 40·7% and 41·2% for overweight and 13·9%, 18·3%, 22·1% and 24·9% for central obesity. The corresponding upward trends per year were 0·27% and 0·78%, respectively. The prevalence of overweight, obesity and central obesity increased with age and was higher in men than women.. A simultaneous decrease was observed in the prevalence of underweight (5·4% in 2000 versus 4·6% in 2014, a downward trend of 0·06% per year). More participants met the minimum LTPA recommendation (17·2% in 2000 versus 22·8% in 2014), with the prevalence change per year being 0·33%, 0·50%, 0·37%, 0·06% for underweight, normal-weight, overweight, and obesity, respectively. Physical fitness deterioration was observed for all measures examined except resting heart rate.

Interpretation:

Despite increased participation in LTPA, we observed an upward trend in overweight/obesity and a decline in physical fitness in Chinese adults. Continued nationwide interventions are needed for promoting physical activity and other healthy lifestyles in China.

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Introduction

In recent decades, China has witnessed a rapid rise in the burden of non-communicable diseases (NCDs). Despite differences in sampling methods and

diagnostic criteria, the estimated prevalence grew from 9.7% to 11.6% for type 2 diabetes, and from 15.5% to 50.1% for pre-diabetes between 2008 and 2010.[1] These diseases accounted for an estimated 80% of deaths and 70% of total disease burden in China.[2] While aging of the population is an important contributing factor, such health consequences are also likely attributed to the drastic changes in lifestyles following China's economic boom that result in obesity and physical inactivity.[3] These two factors, despite their strong correlation, have been independently linked to increased risk of major NCDs and higher all-cause mortality.[4, 5] Conversely, health problems due to undernutrition and underweight may coexist with obesity epidemic in China, particularly in rural and poor urban areas.[6] Furthermore, physical fitness is another powerful measure for cardiorespiratory and musculoskeletal health. Maintaining or improving fitness has been associated with higher quality of life and lower all-cause mortality independent of change in body mass index (BMI).[7] Understanding these health parameters at the population level is important for disease prevention and policymaking. However, the long-term trends in obesity, physical activity and physical fitness in China have not been clearly characterized.

The China Physical Fitness Surveillance Center conducted a series of nationwide surveys since 2000 to monitor physical health in the Chinese population. This study used four waves of the national survey data (2000, 2005, 2010 and 2014) to provide accurate estimates for the secular trends in obesity, physical activity and physical fitness among Chinese population aged 20-59.

Methods

Study population

Each survey selected a nationally representative sample of the civilian, non-institutionalized Chinese population using a complex, stratified, multistage probability cluster sampling design (Appendix 1). The first stage covered all 31 provinces, autonomous regions, and municipalities in mainland China. Subsequently, three cities were randomly selected from each province according to their economic condition assessed by GDP (second stage), three districts (for urban area) and three counties (for rural area) from each city (third stage), three streets/towns from each district/county (fourth stage), and two neighborhood committees/villages from each street/town (fifth stage). The final stage used systematic sampling to select equal number of eligible participants from each neighborhood committee/village, who had been living in their current residence for ≥3 years. Assuming a response rate of 100/130 with expected enrollment of 4,800 for each province, a total of 151,656, 163,386, 154,931 and 146,703 men and women between age 20-59 were surveyed in 2000, 2005, 2010 and 2014, respectively (Table S1). The overall response rates were 78%, 84%, 80%, and 76% for 2000, 2005, 2010 and 2014 survey, respectively. The study protocol was approved by the ethical review committee of the China Institute of Sport Science and other participating institutes. Written informed consent was obtained from each participant.

Data collection

Data were collected by a combination of interviewer-administered questionnaires and standardized physical and physiological measurements. The participants were weighed to the nearest 0.1 kg on a calibrated digital scale in light clothing without shoes (Jianmin II, Beijing). Height was measured to the nearest 0.1 cm using a calibrated stadiometer (Jianmin II, Beijing). BMI was calculated as the weight in kilograms divided by the square of the height in meters (kg/m^2). Waist circumference measurement was taken horizontally to the nearest 0.1 cm at the midway between the inferior margin of the last rib and the iliac crest, standing with feet 25-30 cm apart. Leisure-time physical activity (LTPA) was assessed by asking participants to report the number of days in a usual week during the past year they participated in 1) vigorous-intensity exercise that requires great physical effort and causes large increases in sweating, breathing rate and heart rate, or 2) moderate-intensity exercise that requires moderate physical effort and causes small increases in sweating, breathing rate and heart rate. If the response was non-zero, the participant was further asked about the average duration of exercise per day (Appendix 2). For 2010 survey, LTPA information was only queried among participants aged 20-39.
Forced vital capacity (FVC, mL)[8] and resting heart rate (RHR, beats/min)[9, 10] were measured to evaluate cardiorespiratory fitness. Handgrip strength (kg),[11] sit and reach (cm),[12] and standing on one leg with eyes closed (sec)[13] were measured to reflect muscular strength, flexibility, and balance, respectively. A stringent quality assurance and quality control program was implemented to ensure data validity and reliability. All investigators and research staffs underwent one-week training sessions on use of the standardized protocols and instruments for data collection (Appendix 3).

Statistical analyses

All analyses were weighted to appropriately account for the complex sampling design, nonresponse and post-stratification using survey procedures available in SAS 9.3 (SAS Institute, Cary, NC). Post-stratification with a total of 48 strata was defined by economic status (3 strata: east, middle and west according to the region's gross domestic product per capita), sex (2 strata: male and female), and age (8 strata: 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, and 55-59) based on 2000 (for 2000 survey), 2005 (for 2005 survey), and 2010 (used for both 2010 and 2014 surveys) China census data, thus the weighted estimates were representative of the civilian, non-institutionalized Chinese population. We used PROC SURVEYFREQ to calculate prevalence and 95% confidence interval (CI) for underweight (BMI<18.5), overweight (BMI 23.0-27.5) and obesity (BMI≥27.5) and central obesity (defined as waist circumference >90 cm in men and >85 cm in women). The prevalence was evaluated in the overall population and by survey period, sex,age, location (rural, urban) and geographic region (East, Middle, West, as an indicator for economic development; Appendix 4). We also examined the prevalence using alternative cutoffs specific to Western countries, with overweight defined as BMI 25.0-29.9, obesity as BMI≥30.0 and central obesity as waist circumference >102 cm in men and >88 cm in women. The Cochran-Armitage test was used to test for trend across survey periods and age groups, and Cochran-Mantel-Haenszel chi-square test was used to compare

sex differences. PROC SURVEYREG and PROC RSREG were used to estimate average prevalence changes across survey years and age.
Similarly, we calculated the weighted percentage of participants meeting the LTPA recommendations. We used the guidelines by the American College of Sports Medicine[14] and CDC [15] to define the recommended minimum levels of LTPA, which is 150-min moderate-intensity exercise, or 75-min vigorous-intensity exercise per week to achieve a total energy expenditure of ≥500-1000 MET-min/week. In addition to survey period, sex, age, location and geographic region, we additionally stratified by categories of BMI and waist circumference to explore whether participation in LTPA differed by obesity status. We also evaluated the potential nonlinear association between LTPA participation and age by adding a quadratic age term into the regression model. PROC SURVEYMEANS was used to obtain average measurement for FVC, RHR, handgrip strength, sit and reach and standing on one leg. We evaluated trends in these physical fitness indices by age (restricted to normal-weight participants) and by BMI for each sex group, and tested for trends using PROC SURVEYREG. All P-values were 2-sided.

Role of the funding source
The sponsors of the study had no role in the study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results
In 2000-2014, there was a graded increase in the prevalence of overweight in the Chinese population (Table 1), which was 37·4% in 2000, 39·2% in 2005, 40·7% in 2010 and 41·2% in 2014, with an average increase of 0·27% per year (P<0·0001). The corresponding prevalence change per survey year was 0·43% for men and 0·11% for women (P<0·0001 for both). Of note, the prevalence of overweight between 2000-2014 showed a slight decrease for women aged 40-59. In both men and women, the prevalence of overweight increased with age. The prevalence change per survey year was 0·18% for urban area and 0·47% for rural area, and 0·07%, 0·35% and 0·48% for economically developed, intermediately developed, and underdeveloped regions, respectively. The results based on overweight definition for Chinese (24≤BMI<28 kg/m^2) and western populations (25.0-29·9 kg/m^2) suggested the same trends (Table S2 and S3).
The prevalence of obesity increased from 8·6% in 2000, 10·3% in 2005, 12·2% in 2010 to 12·9% in 2014, an average increase of 0·32% per year (P<0·0001) (Table 2). The corresponding prevalence change per year was 0·49% for men and 0·13% for women (P<0·0001 for both). Particularly, older women, aged 45-59, showed a downward trend in 2014. The prevalence change per survey year was 0·23% for urban area and 0·49% for rural area, and 0·24%, 0·35% and 0·38% for economically developed, intermediately developed, and underdeveloped regions, respectively (P<0·0001 for all). Using alternative obesity definition for Chinese (BMI≥28 kg/m^2;

Table S4) and western populations (BMI≥30 kg/m^2; Table S5), the trends were essentially the same. When further dividing obesity into grade 1-3, the obese individuals were predominantly in grade 1; the prevalence of grade 2 obesity was 0·1% in 2000 and 0·3% in 2014, while the prevalence of grade 3 obesity was nearly 0 (Table S6).

A slight but significant decrease was observed for underweight, which was 5·4% in 2000, 5·0% in 2005, 4·7 % in 2010 and 4·6 % in 2014, with an average decrease of 0·06% per year (P<0·0001) (Table 3). In men, the prevalence continued to decline (4·3%, 3·9%, 3·4% and 3·2%), while in women, the prevalence tended to stabilize after 2005 (6·5%, 6·1%, 6·0% and 6·1%). The corresponding downward trend per year was -0·08%for men (P<0·0001), -0·03% for women (P=0·0012), -0·04% for urban area (P<0·0001), -0·09% for rural area (P<0·0001), -0·01% for more developed region (P=0·406), -0·06% for intermediately developed region (P<0·0001), and -0·12% for underdeveloped regions (P<0·0001). Underweight was more common in younger individuals, particularly for the age group 20-24.

In parallel with overweight/obesity, a significant increase was also noted for central obesity (Table 4). The overall prevalence of central obesity was 13·9% in 2000, 18·3% in 2005, 22·1% in 2010 and 24·9% in 2014, an increase of 0·78% per year (P<0·0001). Upward trends were observed in both men (15·4%, 21·7%, 26·8% and 29·9%) and women (12·3%, 15·0%, 17·3% and 19·8%). These findings correspond to an average increase per survey year of 1·03% for men and 0·53% for women (P<0·0001 for both). Similarly, the annual increase was 0·67% for urban area and 1·02% for rural area, and 0·66%, 0·83% and 0·89% for developed, intermediately developed, and underdeveloped regions, respectively (P<0·0001 for all). There was a positive relationship between central obesity and age, particularly for women. The trends by survey periods, sex and age were similar when central obesity was defined as waist circumference >102 cm in men and >88 cm in women (Table S7), or specifically as >80 cm for women (Table S8).

The percentage of participants meeting the recommendation of LTPA was 17·2% in 2000, 18·1% in 2005, and 22·8% in 2014, an average increase of 0·42% per year (P<0·0001) (Table 5). The percentage achieving recommended LTPA was consistently higher in men (18·4%, 19·3% and 23·5%) compared to women (15·9%, 16·9% and 22·1%; P<0·0001), although the average increase per year was higher in women (0·46%) than in men (0·38%). Achievement of LTPA recommendation had a U-shaped relationship with age in both sexes, with middle-aged individuals having the lowest rate compared to younger or older ones (P for nonlinearity<0.0001). Although LTPA participation was more common in urban versus rural area, the increasing trend was more remarkable in rural than urban area (0·49% versus 0·38% per survey year). Similarly, the increase per survey year was 0·29%, 0·45% and 0·56% for developed, intermediately developed, and underdeveloped regions, respectively (P<0·0001 for all). According to BMI categories, the increase in LTPA participation per year was 0·33%, 0·50%, 0·37%, and 0·06% for underweight, normal-weight, overweight, and obesity, respectively. Participation rate remained the highest in the overweight group. Similar secular trends were seen for central obesity, and the increase per year was

0·15% and 0·46% for individuals with and without central obesity, respectively(P<·0001 for both). The results usingcutoffs for western populations showed the same trend (Table S9).
The indices of physical fitness, including RHR, FVC, handgrip strength, sit-and-reach, and standing on one leg, declined with age (all P for trend<0·0001; Figure 1). Within each age group among normal-weight individuals, there was a persistent decline in these indices (except RHR) over time between 2000-2014 (all P for trend<0·0001; Figure 1). FVC and handgrip strength were positively correlated with BMI (P<0·0001 for both, Figure 2). By contrast, overweight/obese participants performed worse on sit-and-reach and standing on one leg than normal-weight/underweight participants (P<0·0001 for both; Figure 2). Men had significantly greater FVC and handgrip strength compared to women (P<0·0001 for both), while women had significantly longer stretch in sit-and-reach than men (P<0·0001).

Discussion

Our data from four waves of large-scale surveys over a 15-year period, which included a >600,000 nationally representative sample, provide a comprehensive overview of the secular trend in BMI, central obesity, physical activity and physical fitness in China. In 2000-2014, the prevalence of overweight, obesity and central obesity continued to increase, which was observed in both men and women and in almost all age groups between 20-59. In addition, individuals in the rural and economically underdeveloped areas showed a greater upward trend compared to those in the urban and developed areas. A small decrease in underweight appeared to be occurring simultaneously. Despite moderate improvement of participation in the recommended minimum LTPA, fitness indicators for lung capacity and muscular strength, flexibility and balance showed continued declines for all age groups.
These findings have important public health implications. In 2014, 41·2% of the Chinese population were overweight and 12·9% were obese, an increase of 3·8% and 4·3%, respectively, compared to 2000. These numbers indicate a substantial public health and economic burden, given the large population in China as well as the established associations of overweight/obesity with various health outcomes.[16] Such rapid growth was also present in younger and middle-aged Chinese, suggesting that obesity may have prolonged influences on population well-being for the next few decades. At the other end of the BMI distribution, 4·6% were underweight in 2014, similar to the prevalence of obesity. Despite continued declines in underweight coupled with China's nutrition transition,[17] there is need to further reduce underweight and its health impact by eliminating malnutrition, restricting smoking and increasing awareness of undiagnosed chronic diseases, particularly among socioeconomically disadvantaged populations.[18] Furthermore, the prevalence estimate of central obesity, a measure of excess intra-abdominal fat that predisposes individuals to metabolic abnormality,[19] was almost doubled compared to 2000, reaching 24·9% in 2014. Although obesity and central obesity in China were much less prevalent compared to Western countries such as the US (e.g., 34·9% for obesity, defined as BMI≥30 kg/m^2,[20] and 54·2% for central obesity, defined as waist circumference >102 cm in men

and >88 cm in women,[21] in 2011-2012), some patterns were similar. For example, the prevalence of obesity increased with age among adults between 20-59,[20] and the prevalence of central obesity was higher in women than in men.[21] However, Chinese men had higher prevalence of obesity than women, while it was the opposite in the US.[20] Possible explanations for such differences might be multi-factorial, such as racial differences in fat distribution, and sociocultural influences on attitudes towards obesity, etc., although we cannot exclude the possibility that this may just reflect a transient state during transition to obesity in China, which requires further follow-up studies.

With increased participation in LTPA, we would expect a slowdown in the increase of overweight/obesity, which, however, was not strongly supported by our observation. This might be explained by the fact that the increased LTPA participation was most evident among normal-weight participants who had small influences on the overall overweight/obesity pattern. Also, our assessment did not include physical activity in occupational, household, and transport domains, the more common types in developing countries.[22] Accelerated urbanization in China may have led to reductions in these major domains, thus decreased total physical activity that contributed to obesity may have not been captured by LTPA alone. Ongoing national surveys using the global physical activity questionnaire[23] will provide additional data to clarify this question. Besides physical activity, other emerging risk factors associated with economic development, including Western diet, sleep deprivation and environmental pollution, may also play important roles in the obesity epidemic.[24]

Given the substantial health benefits of physical activity for the prevention of NCDs,[25] the Chinese government has implemented a number of population-level measures to promote participation in LTPA since 2000. The improved participation rate observed in our study suggests that these initiatives have already taken some effect. Also, our data suggest that the rising trends in overweight/obesity tended to slow down over time. Of note, in certain strata of the population (e.g., women), the prevalence of overweight/obesity appeared to have reached a plateau after 2010. However, participation in LTPA was still lower compared to US (51·6%)[26] and Finland (33% in men and 27% in women)[27], and there is a long way from the planned target that 0·5 billion Chinese will meet the recommendation by 2025.

FVC is an important indicator for lung function and chronic respiratory diseases,[8] the third leading cause of death in China.[2] Handgrip strength, sit-and reach and standing on one leg are reliable tests for measuring musculoskeletal fitness, which have been implicated in bone/cardiometabolic health, quality of life and longevity.[28] Despite increase in LTPA participation rate, we reported a downwards progression of these physical fitness indices over time for each age group. This suggests that the general population should be encouraged to focus on not only the quantity but also the quality of exercise, such as different types of exercise that enhance muscular strength, flexibility and balance.[29] Interestingly, although we did not observe a clear time trend, RHR was consistently higher in obese participants; higher or increased RHR has been associated with elevated cardiovascular morbidity and mortality.[9, 10] Also, age-related decline in FVC and muscular strength exhibited an earlier onset and more rapid

change among overweight/obese individuals, further underscoring the importance of reducing obesity for improving population health.

There are several limitations in our study. First, the continued public promotion of physical activity in China may lead to an increased tendency to over-report physical activity levels over time. However, we believe that such 'social desirability' bias is minimal, as the reported LTPA participation among older participants remained stable between 2000-2014. Second, our assessment of physical activity focused on LTPA and did not include physical activity in other settings. This may result in misclassification of the total physical activity level, and further studies are required to elucidate its potential impact on our results. Third, although we did not have physical activity data in 2010 for participants aged 40-59, the overall trend based on the other three waves of surveys, as well as the age-specific trends among 20-39 participants based on all four surveys, strongly supports our conclusion that participation in LTPA increased between 2000-2014 in Chinese adults . Finally, the approximation of economic development using geographic regions was unlikely to fully reflect the individual socioeconomic status, particularly considering the large floating population in China (253 million in 2015). However, the data stratified by geographic region (East, Middle, West) or urban/rural location were consistent with our hypothesis that economic growth and associated factors may contribute to the obesity epidemic in China.

Conclusion

Based on four national surveys between 2000 and 2014, we observed a modest increase in LTPA participation in the Chinese population, a rising prevalence of overweight/obesity and central obesity, and a decline in physical fitness to a certain extent. Continued efforts to develop and maintain national programs for the promotion of physical activity and other healthy lifestyles are required to reduce obesity and enhance physical fitness in the Chinese population.

Contributors

Tian Y did the overall trial management. Tian Y and Jian C conceived and designed the study. Wang M, Cai R, Zhang YF, Wang H, Wu D, and Wang F contributed to the design of the database and electronic case report forms, and collated and cleaned the data. Liu X, He ZT, An P, Wang M, Tang Q, Yang Y, Zhao J, LV S, Zhou W, Yu B, Lan J, Yang X, and Zhang L contributed to data acquisition. Tian Y, Jiang C, He ZH, and Gu Z contributed to the study analysis plan and data analysis. Tian Y, Tian H, and He ZH drafted the report. Song Y, Huang T, and McNaughton L commented and edited on the draft.

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Declaration of interests

We declare no competing interests.

Research in Context

Evidence before this study

Obesity, physical inactivity and reduced physical fitness may contribute to the rising health and economic burden in China given their strong associations with chronic diseases and mortality. While it is generally accepted that obesity epidemic has emerged in many developing countries, including China, no large-scale studies at the national level have been conducted to provide systematic, accurate estimates for the long-term trends in the prevalence of overweight/obesity. Evidence is also lacking regarding physical activity and physical fitness in the Chinese population. Understanding these health parameters at the population level is important for disease prevention and policymaking.

Added value of this study

We conducted four national surveys between 2000-2014 among >0.5 million Chinese adults to investigate the trends in obesity, leisure-time physical activity and physical fitness. We observed significant increases in the prevalence of overweight/obesity and central obesity and decline in physical fitness, including forced vital capacity, handgrip strength, sit and reach, and standing on one leg, although participation in leisure-time physical activity modestly improved, particularly among normal-weight participants. These trends were consistently observed in participants of different age and sex, except for women aged 40-59, among whom the prevalence of overweight/obesity tended to level off or decrease. Higher participation rate was also reported in the women in their LTPA across four surveys.

Implications of all the available evidence

Our results suggest that the prevalence of overweight/obesity and central obesity continued to increase among Chinese adults between 2000-2014. Despite improved participation in leisure-time physical activity, physical fitness worsened over the same time period. Although the upward trends in overweight and obesity appeared to slow down or stabilize in certain strata of the population, effective national programs for promoting physical activity and other healthy lifestyles, particularly those targeting overweight/obese individuals, are needed to reduce obesity and improve physical fitness in the Chinese population.

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Table 1: Prevalence of overweight among Chinese adults aged 20-59 in 2000-2014 according to survey period, age, urban/rural, economic status and sex

	Prevalence of overweight[1] (95% CI), %				Prevalence change per year	
	2000	2005	2010	2014	(95% CI), %	P for trend
All						
Overall	37·4 (37·1-37·7)	39·2 (39·0-39·5)	40·7 (40·4-41·0)	41·2 (40·9-41·4)	0·27 (0·25-0·30)	<·0001
20-24	19·6 (19·0-20·2)	19·9 (19·3-20·5)	22·3 (21·7-22·9)	23·4 (22·8-24·0)	0·30 (0·24-0·35)	<·0001
25-29	27·2 (26·5-27·8)	27·9 (27·3-28·6)	31·1 (30·4-31·7)	31·5 (30·8-32·2)	0·34 (0·28-0·40)	<·0001
30-34	34·3 (33·6-35·0)	34·3 (33·7-35·0)	38·0 (37·3-38·7)	38·6 (37·9-39·3)	0·35 (0·28-0·41)	<·0001
35-39	41·0 (40·3-41·7)	39·8 (39·1-40·5)	42·5 (41·7-43·2)	43·6 (42·9-44·3)	0·23 (0·16-0·29)	<·0001
40-44	46·0 (45·3-46·7)	44·9 (44·2-45·6)	47·0 (46·2-47·7)	46·9 (46·2-47·7)	0·12 (0·05-0·19)	0·0009
45-49	48·3 (47·5-49·0)	47·6 (46·8-48·3)	50·0 (49·3-50·8)	50·2 (49·4-50·9)	0·17 (0·11-0·24)	<·0001
50-54	49·3 (48·6-50·0)	47·8 (47·0-48·5)	50·7 (50·0-51·4)	50·9 (50·2-51·7)	0·19 (0·12-0·26)	<·0001
55-59	48·5 (47·7-49·2)	48·6 (47·9-49·3)	50·8 (50·1-51·6)	50·8 (50·1-51·6)	0·21 (0·14-0·28)	<·0001
Age trend per year	0·93 (0·91-0·96)	0·83 (0·81-0·85)	0·86 (0·84-0·88)	0·83 (0·81-0·85)		
P for trend	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	38·9 (38·6-39·2)	40·1 (39·7-40·4)	40·9 (40·6-41·2)	41·4 (41·1-41·7)	0·18 (0·15-0·21)	<·0001
rural	34·3 (33·9-34·8)	37·6 (37·2-38·0)	40·2 (39·8-40·7)	40·7 (40·3-41·2)	0·47 (0·43-0·51)	<·0001
Economic status[2]						
East	39·8 (39·4-40·2)	40·1 (39·7-40·5)	40·9 (40·5-41·3)	40·6 (40·2-41·0)	0·07 (0·03-0·11)	0·0006
Middle	36·5 (36·0-37·0)	40·0 (39·6-40·5)	40·7 (40·2-41·1)	41·9 (41·4-42·3)	0·35 (0·31-0·40)	<·0001
West	35·1 (34·7-35·5)	36·9 (36·5-37·3)	40·4 (40·0-40·8)	41·4 (40·9-41·8)	0·48 (0·44-0·52)	<·0001
Men						
Overall	41·0 (40·6-41·4)	43·4 (43·1-43·8)	45·7 (45·6-46·0)	47·0 (46·6-47·3)	0·43 (0·40-0·46)	<·0001
20-24	23·9 (23·1-24·8)	25·3 (24·4-26·2)	28·9 (27·9-29·8)	30·8 (29·9-31·8)	0·52 (0·43-0·60)	<·0001
25-29	33·5 (32·5-34·4)	36·3 (35·3-37·2)	39·1 (38·1-40·1)	40·3 (39·3-41·4)	0·50 (0·42-0·59)	<·0001

30-34	40·6 (39·6-41·6)	42·6 (41·7-43·6)	45·4 (44·4-46·4)	46·0 (44·9-47·0)	0·41 (0·31-0·50)	<·0001
35-39	44·9 (43·9-45·9)	45·9 (44·9-46·9)	48·8 (47·8-49·8)	49·9 (48·9-50·9)	0·39 (0·29-0·48)	<·0001
40-44	47·0 (45·9-48·0)	47·4 (46·5-48·4)	50·1 (49·1-51·1)	52·0 (50·9-53·0)	0·39 (0·29-0·49)	<·0001
45-49	48·9 (47·9-50·0)	48·8 (47·8-49·8)	52·1 (51·0-53·1)	53·9 (52·9-55·0)	0·39 (0·29-0·48)	<·0001
50-54	49·9 (48·9-51·0)	48·2 (47·2-49·2)	53·0 (52·0-54·0)	53·5 (52·5-54·6)	0·36 (0·26-0·46)	<·0001
55-59	48·6 (47·6-49·6)	48·8 (47·8-49·8)	53·1 (52·1-54·2)	53·8 (52·8-54·9)	0·45 (0·35-0·56)	<·0001
Age trend per year	0·74 (0·71-0·77)	0·59 (0·55-0·62)	0·68 (0·65-0·71)	0·66 (0·63-0·69)		
P for trend	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	43·8 (43·3-44·2)	45·8 (45·4-46·2)	47·1 (46·6-47·5)	48·2 (47·7-48·6)	0·31 (0·27-0·35)	<·0001
rural	35·2 (34·5-35·8)	38·6 (38·0-39·2)	42·8 (42·2-43·4)	44·6 (43·9-45·2)	0·69 (0·63-0·75)	<·0001
Economic status[2]						
East	44·4 (43·8-45)	44·7 (44·1-45·3)	46·1 (45·5-46·7)	46·0 (45·4-46·6)	0·13 (0·08-0·19)	<·0001
Middle	39·5 (38·8-40·2)	44·3 (43·6-45·0)	45·3 (44·6-46·1)	48·1 (47·5-48·8)	0·58 (0·51-0·64)	<·0001
West	38 (37·4-38·5)	40·4 (39·8-41·0)	45·4 (44·8-45·9)	47·2 (46·5-47·8)	0·70 (0·64-0·75)	<·0001
Women						
Overall	33·6 (33·4-34·0)	35·1 (34·8-35·5)	35·6 (35·2-35·9)	35·2 (34·9-35·6)	0·11 (0·08-0·15)	<·0001
20-24	15·2 (14·4-15·9)	14·7 (14·0-15·4)	15·6 (14·9-16·4)	15·9 (15·2-16·7)	0·07 (0·00-0·14)	0·0469
25-29	20·6 (19·7-21·4)	20·1 (19·3-20·9)	22·9 (22·0-23·8)	22·5 (21·6-23·4)	0·18 (0·11-0·26)	<·0001
30-34	27·6 (26·7-28·5)	26·3 (25·4-27·1)	30·4 (29·4-31·3)	31·0 (30·0-31·9)	0·29 (0·20-0·37)	<·0001
35-39	36·8 (35·8-37·8)	33·8 (32·9-34·8)	35·8 (34·8-36·8)	37·0 (36·0-37·9)	0·05 (-0·04-0·15)	0·2460
40-44	45·0 (43·9-46·0)	42·3 (41·4-43·3)	43·7 (42·6-44·7)	41·6 (40·6-42·7)	-0·16 (-0·26--0·06)	0·0013
45-49	47·6 (46·6-48·6)	46·3 (45·3-47·3)	47·9 (46·9-48·9)	46·2 (45·2-47·3)	-0·05 (-0·15-0·05)	0·3048
50-54	48·6 (47·6-49·7)	47·3 (46·3-48·3)	48·3 (47·2-49·3)	48·2 (47·1-49·2)	0·00 (-0·10-0·11)	0·9328
55-59	48·3 (47·3-49·4)	48·4 (47·4-49·4)	48·5 (47·4-49·5)	47·7 (46·7-48·8)	-0·04 (-0·14-0·06)	0·4605
Age trend per year	1·13 (1·10-1·16)	1·07 (1·04-1·10)	1·04 (1·01-1·07)	1·00 (0·97-1·03)		

P for trend	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	33·7 (33·3-34·1)	34·4 (33·9-34·8)	34·6 (34·1-35·0)	34·5 (34·1-34·9)	0·06 (0·02-0·10)	0·0054
rural	33·4 (32·8-34·1)	36·6 (36·0-37·2)	37·6 (37·0-38·3)	36·7 (36·1-37·4)	0·23 (0·17-0·29)	<·0001
Economic status[2]						
East	35·0 (34·4-35·6)	35·6 (35·1-36·2)	35·5 (35·0-36·1)	35·0 (34·4-35·6)	0·0 (-0·06-0·05)	0·8959
Middle	33·3 (32·7-34·0)	35·9 (35·2-36·6)	35·9 (35·3-36·6)	35·5 (34·9-36·1)	0·14 (0·08-0·20)	<·0001
West	31·9 (31·4-32·5)	33·4 (32·8-33·9)	35·3 (34·7-35·8)	35·3 (34·7-35·9)	0·26 (0·20-0·31)	<·0001

[1] Overweight defined as BMI 23-27·5 kg/m^2

[2] Geographic regions (East, Middle, and West) were used as an indicator for economic development, which correspond to developed, intermediately developed, and underdeveloped economic status, respectively.

Table 2: Prevalence of obesity among Chinese adults aged 20-59 in 2000-2014 according to survey period, age, urban/rural, economic status and sex

	Prevalence of obesity[1] (95% CI), %				Prevalence change per year	
	2000	2005	2010	2014	(95% CI), %	P value
All						
Overall	8·6 (8·5-8·8)	10·3 (10·2-10·5)	12·2 (12·0-12·3)	12·9 (12·7-13·1)	0·32(0·30-0·33)	<·0001
20-24	2·9 (2·6-3·1)	3·7 (3·4-4·0)	5·6 (5·2-5·9)	6·5 (6·2-6·9)	0·28(0·25-0·30)	<·0001
25-29	5·0 (4·7-5·3)	6·3 (5·9-6·6)	9·0 (8·6-9·5)	9·9 (9·5-10·4)	0·37(0·34-0·41)	<·0001
30-34	6·9 (6·6-7·3)	7·8 (7·5-8·2)	11·2 (10·8-11·7)	12·6 (12·1-13·1)	0·42(0·39-0·46)	<·0001
35-39	8·9 (8·4-9·3)	9·6 (9·2-10·1)	12·3 (11·8-12·8)	13·7 (13·2-14·2)	0·37(0·33-0·41)	<·0001
40-44	11·1 (10·6-11·6)	12·0 (11·5-12·4)	14·0 (13·5-14·5)	14·9 (14·4-15·5)	0·30(0·25-0·34)	<·0001
45-49	12·9 (12·4-13·4)	12·8 (12·3-13·2)	15·7 (15·2-16·2)	15·9 (15·4-16·5)	0·26(0·21-0·30)	<·0001
50-54	14·5 (14·0-15·0)	15·0 (14·5-15·5)	16·0 (15·5-16·5)	16·8 (16·3-17·4)	0·17(0·12-0·22)	<·0001
55-59	13·5 (13·0-14·0)	14·6 (14·1-15·1)	16·2 (15·7-16·7)	15·2 (14·6-15·7)	0·13(0·08-0·18)	<·0001
Age trend per year	0·36(0·35-0·37)	0·33(0·32-0·35)	0·31(0·3-0·33)	0·27(0·26-0·29)		
P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	9·0(8·8-9·2)	10·4(10·2-10·6)	11·6(11·4-11·8)	12·2(11·9-12·4)	0·23(0·21-0·25)	<·0001
rural	7·9(7·6-8·1)	10·2(9·9-10·5)	13·3(13·0-13·6)	14·5(14·2-14·8)	0·49(0·47-0·52)	<·0001
Economic status[2]						
East	9·8(9·5-10)	11·2(10·9-11·4)	12·8(12·5-13·1)	13·0(12·7-13·3)	0·24(0·21-0·27)	<·0001
Middle	8·1(7·9-8·4)	9·7(9·4-10·0)	12·5(12·1-12·8)	12·6(12·3-12·9)	0·35(0·32-0·38)	<·0001
West	7·6(7·4-7·8)	9·7(9·4-9·9)	10·8(10·5-11·0)	13·2(12·9-13·5)	0·38(0·36-0·41)	<·0001
Men						
overall	9·7 (9·4-9·9)	12·3 (12·0-12·5)	15·0 (14·8-15·3)	16·4 (16·1-16·7)	0·49(0·47-0·51)	<·0001
20-24	4·1 (3·7-4·5)	5·7 (5·2-6·1)	8·3 (7·8-8·9)	9·6 (9·0-10·2)	0·41(0·36-0·46)	<·0001
25-29	6·9 (6·4-7·4)	9·5 (8·9-10·1)	13·6 (12·8-14·3)	15·1 (14·3-15·8)	0·61(0·55-0·66)	<·0001

30-34	9·4 (8·8-10·0)	11·6 (11·0-12·2)	16·1 (15·4-16·9)	18·0 (17·2-18·8)	0·64(0·58-0·70)	<·0001
35-39	10·5 (9·9-11·2)	13·2 (12·5-13·9)	16·4 (15·7-17·2)	18·8 (18·0-19·6)	0·6(0·53-0·66)	<·0001
40-44	12·2 (11·5-12·9)	14·7 (14·0-15·4)	17·9 (17·1-18·7)	18·4 (17·6-19·2)	0·46(0·39-0·53)	<·0001
45-49	12·5 (11·8-13·2)	13·8 (13·1-14·5)	17·7 (16·9-18·5)	18·7 (17·9-19·5)	0·48(0·41-0·55)	<·0001
50-54	13·2 (12·5-13·9)	14·1 (13·4-14·8)	15·8 (15·0-16·5)	18·5 (17·6-19·3)	0·38(0·3-0·45)	<·0001
55-59	11·7 (11·1-12·4)	13·4 (12·7-14·1)	15·2 (14·5-16·0)	15·3 (14·5-16·1)	0·26(0·19-0·33)	<·0001
Age trend per year	0·25(0·23-0·27)	0·2(0·18-0·22)	0·19(0·17-0·21)	0·17(0·15-0·20)		
P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	10·6(10·3-10·9)	13·2(12·9-13·5)	15·4(15·1-15·7)	16·3(16·0-16·6)	0·41(0·39-0·44)	<·0001
rural	7·7(7·4-8·1)	10·4(10-10·8)	14·2(13·8-14·7)	16·7(16·2-17·2)	0·66(0·62-0·69)	<·0001
Economic status[2]						
East	11·3(10·9-11·7)	13·1(12·7-13·5)	15·7(15·3-16·1)	16·8(16·3-17·2)	0·41(0·36-0·45)	<·0001
Middle	9·0(8·6-9·4)	12·2(11·8-12·7)	15·9(15·4-16·4)	15·7(15·3-16·2)	0·51(0·47-0·56)	<·0001
West	8·0(7·7-8·4)	11·0(10·7-11·4)	12·9(12·5-13·2)	16·7(16·2-17·2)	0·59(0·55-0·62)	<·0001
Women						
Overall	7·5 (7·4-7·7)	8·4 (8·2-8·6)	9·2 (9·0-9·4)	9·3 (9·1-9·5)	0·13(0·11-0·15)	<·0001
20-24	1·6 (1·3-1·8)	1·8 (1·5-2·1)	2·8 (2·5-3·2)	3·5 (3·1-3·8)	0·14(0·11-0·17)	<·0001
25-29	2·9 (2·6-3·3)	3·2 (2·9-3·6)	4·4 (4·0-4·9)	4·7 (4·2-5·1)	0·14(0·1-0·17)	<·0001
30-34	4·3 (3·9-4·8)	4·2 (3·8-4·6)	6·2 (5·7-6·7)	6·9 (6·4-7·5)	0·2(0·16-0·24)	<·0001
35-39	7·1 (6·5-7·6)	6·1 (5·7-6·6)	8·0 (7·4-8·5)	8·5 (7·9-9·0)	0·13(0·08-0·18)	<·0001
40-44	9·9 (9·3-10·5)	9·2 (8·6-9·8)	10·0 (9·4-10·7)	11·3 (10·6-12·0)	0·12(0·06-0·18)	<·0001
45-49	13·3 (12·6-14·0)	11·8 (11·1-12·4)	13·6 (12·9-14·3)	11·3 (10·6-12·0)	0·02(-0·04-0·09)	0·5128
50-54	15·9 (15·2-16·7)	15·9 (15·2-16·6)	16·3 (15·5-17·0)	13·0 (12·3-13·7)	-0·04(-0·12-0·03)	0·2615
55-59	15·5 (14·7-16·3)	15·8 (15·1-16·6)	17·2 (16·4-18·0)	15·0 (14·3-15·8)	-0·01(-0·08-0·07)	0·8349
Age trend per year	0·47(0·45-0·49)	0·46(0·44-0·47)	0·44(0·42-0·46)	0·37(0·35-0·39)		

P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	7·3(7·1-7·5)	7·6(7·4-7·8)	7·7(7·4-7·9)	7·9(7·7-8·1)	0·04(0·02-0·06)	0·0004
rural	8·1(7·7-8·4)	10(9·6-10·4)	12·4(12·0-12·8)	12·2(11·8-12·7)	0·32(0·28-0·36)	<·0001
Economic status[2]						
East	8·1(7·8-8·5)	9·3(9·0-9·7)	9·8(9·5-10·2)	9·0(8·7-9·4)	0·07(0·03-0·1)	0·0001
Middle	7·2(6·8-7·6)	7·3(6·9-7·7)	9·0(8·6-9·4)	9·5(9·1-9·8)	0·18(0·15-0·22)	<·0001
West	7·1(6·8-7·4)	8·3(8·0-8·6)	8·6(8·3-8·9)	9·6(9·2-10·0)	0·17(0·14-0·2)	<·0001

[1] obesity defined as BMI≥27·5kg/m^2

[2] Geographic regions (East, Middle, and West) were used as an indicator for economic development, which correspond to developed, intermediately developed, and underdeveloped economic status, respectively.

Table 3: Prevalence of underweight among Chinese adults aged 20-59, by age, sex and survey period, in 2000-2014

	Prevalence of underweight[1] (95% CI), %				Prevalence change per year	
	2000	2005	2010	2014	(95% CI), %	P value
All						
Overall	5·4 (5·3-5·5)	5·0 (4·9-5·1)	4·7 (4·6-4·8)	4·6 (4·5-4·7)	-0·06(-0·07--0·04)	<·0001
20-24	12·9 (12·4-13·3)	13·9 (13·4-14·4)	13·2 (12·7-13·7)	12·0 (11·5-12·5)	-0·07(-0·12--0·03)	0·0016
25-29	8·3 (7·9-8·7)	8·5 (8·1-8·9)	7·8 (7·4-8·2)	7·7 (7·3-8·1)	-0·05(-0·09--0·01)	0·0097
30-34	5·4 (5·1-5·7)	5·8 (5·5-6·1)	4·5 (4·2-4·8)	4·4 (4·1-4·7)	-0·08(-0·11--0·05)	<·0001
35-39	3·5 (3·2-3·7)	3·8 (3·6-4·1)	3·0 (2·7-3·2)	2·7 (2·5-2·9)	-0·06(-0·09--0·04)	<·0001
40-44	2·4 (2·2-2·7)	2·5 (2·2-2·7)	2·0 (1·8-2·2)	2·1 (1·9-2·4)	-0·03(-0·05--0·01)	0·0043
45-49	2·1 (1·9-2·3)	2·5 (2·2-2·7)	1·6 (1·4-1·7)	2 ·0(1·8-2·2)	-0·02(-0·04-0·00)	0·0244
50-54	2·1 (1·9-2·3)	2·5 (2·3-2·7)	1·7 (1·5-1·9)	1·7 (1·5-1·9)	-0·05(-0·07--0·03)	<·0001
55-59	2·9 (2·7-3·2)	2·6 (2·4-2·9)	1·8 (1·6-2·0)	2·1 (1·9-2·3)	-0·07(-0·09--0·05)	<·0001
Age trend per year	-0·30(-0·31--0·29)	-0·29(-0·3--0·28)	-0·32(-0·33--0·31)	-0·28(-0·29--0·27)		
P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	5·2(5·1-5·4)	4·9(4·8-5·0)	4·7(4·6-4·8)	4·7(4·6-4·9)	-0·04(-0·05--0·03)	<·0001
rural	5·7(5·5-6·0)	5·3(5·1-5·4)	4·8(4·6-5·0)	4·4(4·2-4·6)	-0·09(-0·10--0·07)	<·0001
Economic status[2]						
East	5·0(4·8-5·2)	4·9(4·7-5·1)	4·8(4·6-5·0)	5·0(4·8-5·2)	-0·01(-0·02-0·01)	0·406
Middle	5·3(5·1-5·6)	4·7(4·5-4·9)	4·7(4·5-4·9)	4·4(4·3-4·6)	-0·06(-0·08--0·04)	<·0001
West	5·9(5·7-6·1)	5·5(5·3-5·7)	4·7(4·5-4·8)	4·2(4·1-4·4)	-0·12(-0·14--0·11)	<·0001
Men						
Overall	4·3 (4·1-4·4)	3·9 (3·8-4·1)	3·4 (3·3-3·6)	3·2 (3·1-3·3)	-0·08(-0·09--0·07)	<·0001
20-24	10·3 (9·7-1·9)	10·5 (9·9-11·1)	9·3 (8·7-9·9)	8·1 (7·5-8·7)	-0·16(-0·22--0·11)	<·0001
25-29	5·7 (5·2-6·2)	5·4 (4·9-5·8)	4·8 (4·4-5·2)	4·6 (4·2-5·0)	-0·08(-0·12--0·04)	0·0003

30-34	4·0 (3·6-4·4)	3·9 (3·5-4·3)	2·9 (2·6-3·2)	2·4 (2·1-2·7)	-0·12(-0·16--0·09)	<·0001
35-39	2·9 (2·6-3·2)	2·9 (2·5-3·2)	2·3 (2·0-2·6)	1·9 (1·6-2·2)	-0·07(-0·10--0·04)	<·0001
40-44	2·3 (2·0-2·6)	2·3 (2·0-2·6)	1·8 (1·5-2·1)	1·8 (1·5-2·0)	-0·05(-0·08--0·02)	0·0009
45-49	2·2 (1·9-2·5)	2·6 (2·2-2·9)	1·4 (1·2-1·6)	1·9 (1·6-2·2)	-0·04(-0·07--0·01)	0·0031
50-54	1·9 (1·7-2·2)	2·7 (2·4-3·0)	1·7 (1·4-2·0)	1·7 (1·4-2·0)	-0·04(-0·07--0·02)	0·0012
55-59	3·3 (3·0-3·7)	2·6 (2·3-3·0)	1·8 (1·6-2·1)	1·9 (1·6-2·2)	-0·10(-0·14--0·07)	<·0001
Age trend per year	-0·20(-0·22--0·19)	-0·18(-0·19--0·16)	-0·20(-0·21--0·18)	-0·16(-0·18--0·15)		
P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	3·9(3·7-4·1)	3·6(3·4-3·7)	3·2(3·0-3·3)	3·1(2·9-3·2)	-0·06(-0·08--0·05)	<·0001
rural	5·1(4·8-5·4)	4·6(4·4-4·9)	4·0(3·7-4·2)	3·4(3·2-3·7)	-0·12(-0·14--0·1)	<·0001
Economic status[2]						
East	3·8(3·5-4·0)	3·6(3·4-3·8)	3·4(3·1-3·6)	3·6(3·3-3·8)	-0·02(-0·04-0)	0·09
Middle	4·3(4·0-4·6)	3·6(3·4-3·9)	3·3(3·1-3·6)	3·1(2·9-3·4)	-0·08(-0·1--0·06)	<·0001
West	5·0(4·8-5·3)	4·7(4·5-5·0)	3·7(3·5-3·9)	2·6(2·4-2·8)	-0·17(-0·2--0·15)	<·0001
Women						
overall	6·5 (5·4-6·7)	6·1 (5·9-6·3)	6·0 (5·9-6·2)	6·1 (5·9-6·3)	-0·03(-0·05--0·01)	0·0012
20-24	15·6 (14·8-16·3)	17·1 (16·4-17·9)	17·1 (16·3-17·9)	15·8 (15·1-16·6)	0·02(-0·06-0·09)	0·649
25-29	11·1 (10·4-11·7)	11·5 (10·8-12·1)	10·8 (10·2-11·5)	10·9 (10·3-11·5)	-0·02(-0·08-0·04)	0·4855
30-34	6·8 (6·3-7·3)	7·6 (7·1-8·1)	6·1 (5·6-6·6)	6·6 (6·1-7·1)	-0·05(-0·09-0·00)	0·0675
35-39	4·0 (3·6-4·4)	4·8 (4·4-5·2)	3·6 (3·3-4·0)	3·6 (3·2-4·0)	-0·05(-0·09--0·02)	0·0052
40-44	2·6 (2·3-2·9)	2·6 (2·3-2·9)	2·1 (1·8-2·4)	2·6 (2·2-2·9)	-0·01(-0·05-0·02)	0·4082
45-49	2·0 (1·7-2·2)	2·4 (2·1-2·7)	1·7 (1·4-2·0)	2·2 (1·8-2·5)	0·00(-0·03-0·03)	0·8689
50-54	2·3 (2·0-2·6)	2·3 (2·0-2·6)	1·7 (1·4-1·9)	1·8 (1·5-2·1)	-0·05(-0·08--0·02)	0·0009
55-59	2·5 (2·2-2·9)	2·6 (2·3-3·0)	1·7 (1·4-2·0)	2·3 (2·0-2·6)	-0·04(-0·07-0·00)	0·0242
Age trend per year	-0·40(-0·42--0·39)	-0·40(-0·42--0·38)	-0·44(-0·46--0·42)	-0·40(-0·42--0·39)		

P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	6·6(6·4-6·8)	6·2(6·0-6·4)	6·3(6·0-6·5)	6·4(6·2-6·6)	-0·01(-0·03-0·01)	0·2973
rural	6·4(6·1-6·8)	5·9(5·6-6·1)	5·6(5·3-5·9)	5·5(5·2-5·8)	-0·07(-0·1--0·04)	<·0001
Economic status[2]						
East	6·4(6·1-6·7)	6·2(5·9-6·5)	6·2(5·9-6·6)	6·5(6·1-6·8)	0·01(-0·02-0·03)	0·6899
Middle	6·5(6·1-6·8)	5·8(5·5-6·1)	6·0(5·7-6·4)	5·8(5·5-6·1)	-0·04(-0·07--0·01)	0·01
West	6·9(6·5-7·2)	6·3(6·0-6·5)	5·7(5·4-6·0)	5·9(5·6-6·2)	-0·07(-0·1--0·05)	<·0001

[1] Underweight defined as BMI <18·5 kg/m^2

[2] Geographic regions (East, Middle, and West) were used as an indicator for economic development, which correspond to developed, intermediately developed, and underdeveloped economic status, respectively.

Table 4: Prevalence of central obesity among Chinese adults aged 20-59 in 2000-2014 according to survey period, age and sex

	Prevalence of central obesity[1] (95% CI), %				Prevalence change per year	
	2000	2005	2010	2014	(95% CI), %	P value
All						
Overall	13·9(13·7-14·1)	18·3(18·1-18·5)	22·1(21·9-22·3)	24·9(24·7-25·1)	0·78(0·76-0·80)	<·0001
20-24	3·8(3·5-4·0)	5·1(4·8-5·4)	8·7(8·3-9·1)	9·7(9·3-10·2)	0·46(0·42-0·49)	<·0001
25-29	6·5(6·2-6·9)	9·5(9·1-9·9)	14·2(13·7-14·7)	16·2(15·6-16·7)	0·71(0·67-0·75)	<·0001
30-34	10·2(9·8-10·7)	12·3(11·8-12·7)	18·6(18-19·2)	21·3(20·7-21·9)	0·83(0·78-0·87)	<·0001
35-39	13·7(13·2-14·2)	16·2(15·7-16·8)	20·7(20·1-21·3)	24·5(23·9-25·2)	0·79(0·74-0·84)	<·0001
40-44	17·8(17·3-18·4)	20·8(20·3-21·4)	25·1(24·5-25·7)	28·2(27·5-28·9)	0·76(0·70-0·82)	<·0001
45-49	22·0(21·4-22·6)	23·8(23·2-24·4)	29·6(28·9-30·3)	32·8(32·1-33·5)	0·81(0·75-0·87)	<·0001
50-54	25·7(25-26·3)	28·1(27·5-28·8)	32·3(31·6-33·0)	37·5(36·8-38·2)	0·86(0·79-0·92)	<·0001
55-59	26(25·3-26·7)	30·4(29·7-31·0)	35·0(34·3-35·7)	36·9(36·1-37·6)	0·79(0·72-0·85)	<·0001
Age trend per year	0·71(0·70-0·73)	0·75(0·73-0·77)	0·76(0·74-0·78)	0·82(0·80-0·84)		
P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	14·3(14·1-14·6)	18·3(18·1-18·6)	21·1(20·8-21·3)	23·9(23·6-24·2)	0·67(0·64-0·69)	<·0001
rural	13·0(12·7-13·3)	18·3(18·0-18·7)	24·2(23·8-24·6)	27·0(26·6-27·4)	1·02(0·99-1·06)	<·0001
Economic status[2]						
East	15·8(15·5-16·1)	19·6(19·3-19·9)	22·7(22·4-23·1)	25·1(24·7-25·5)	0·66(0·63-0·69)	<·0001
Middle	13·4(13·1-13·8)	18(17·6-18·4)	22·8(22·4-23·3)	24·8(24·4-25·2)	0·83(0·80-0·87)	<·0001
West	11·8(11·5-12)	16·7(16·4-17)	20·1(19·8-20·5)	24·7(24·3-25·1)	0·89(0·86-0·92)	<·0001
Men						
Overall	15·4(15·2-15·7)	21·7(21·4-22·0)	26·8(26·5-27·1)	29·9(29·5-30·2)	1·03(1·00-1·06)	<·0001
20-24	5·2(4·7-5·7)	7·5(7·0-8·0)	11·6(10·9-12·3)	13·5(12·8-14·2)	0·61(0·56-0·67)	<·0001

25-29	8·5(7·9-9·0)	14·4(13·7-15·1)	20·0(19·1-20·8)	22·6(21·7-23·5)	1·03(0·97-1·10)	<·0001
30-34	13·9(13·2-14·6)	18·5(17·8-19·3)	26·1(25·2-27·0)	29·0(28·0-29·9)	1·12(1·05-1·20)	<·0001
35-39	17·4(16·6-18·2)	23·0(22·2-23·9)	28·2(27·3-29·1)	32·0(31·0-32·9)	1·04(0·96-1·12)	<·0001
40-44	20·9(20·0-21·7)	26·6(25·7-27·4)	32·0(31·0-32·9)	34·8(33·8-35·8)	1·0 (0·91-1·09)	<·0001
45-49	21·9(21·0-22·8)	26·4(25·5-27·3)	34·5(33·5-35·5)	37·5(36·4-38·5)	1·17(1·08-1·26)	<·0001
50-54	23·2(22·3-24·0)	27·0(26·1-27·9)	33·4(32·4-34·3)	39·6(38·6-40·7)	1·20(1·11-1·29)	<·0001
55-59	21·1(20·2-21·9)	26·4(25·5-27·3)	33·1(32·1-34·1)	35·3(34·3-36·4)	1·05(0·96-1·15)	<·0001
Age trend per year	0·56(0·53-0·58)	0·54(0·51-0·56)	0·64(0·61-0·67)	0·68(0·65-0·71)		
P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	17·0(16·6-17·3)	23·4(23·0-23·8)	27·3(26·9-27·7)	30·3(29·8-30·7)	0·93(0·9-0·97)	<·0001
rural	12·2(11·8-12·6)	18·3(17·8-18·8)	25·8(25·3-26·4)	29·1(28·5-29·7)	1·24(1·19-1·29)	<·0001
Economic status[2]						
East	18·0(17·5-18·4)	22·5(22·0-23·0)	27·6(27·1-28·1)	30·2(29·6-30·7)	0·89(0·84-0·94)	<·0001
Middle	14·6(14·0-15·1)	22·3(21·7-22·9)	28·0(27·4-28·6)	29·0(28·4-29·6)	1·05(1·00-1·11)	<·0001
West	12·9(12·5-13·3)	19·7(19·2-20·1)	24·0(23·6-24·5)	30·4(29·9-31·0)	1·21(1·17-1·25)	<·0001
Women						
Overall	12·3(12-12·5)	15·0(14·8-15·3)	17·3(17·0-17·5)	19·8(19·5-20·1)	0·53(0·50-0·55)	<·0001
20-24	2·3(2·0-2·6)	2·8(2·4-3·1)	5·7(5·2-6·2)	6·0(5·5-6·5)	0·30(0·26-0·34)	<·0001
25-29	4·5(4·1-4·9)	4·9(4·4-5·3)	8·3(7·7-8·9)	9·7(9·0-10·3)	0·39(0·35-0·44)	<·0001
30-34	6·3(5·8-6·8)	6·2(5·8-6·7)	10·8(10·1-11·4)	13·3(12·6-14·0)	0·52(0·46-0·57)	<·0001
35-39	9·7(9·1-10·3)	9·6(9·0-10·2)	12·8(12·1-13·5)	16·8(16·0-17·5)	0·52(0·46-0·58)	<·0001
40-44	14·5(13·8-15·3)	15·2(14·5-15·9)	18·0 (17·2-18·8)	21·3(20·5-22·2)	0·51(0·44-0·59)	<·0001
45-49	22·1(21·2-22·9)	21·3(20·4-22·1)	24·5(23·6-25·4)	27·9(26·9-28·9)	0·44(0·36-0·53)	<·0001
50-54	28·4(27·4-29·3)	29·3(28·4-30·2)	31·2(30·3-32·2)	35·3(34·3-36·3)	0·49(0·40-0·58)	<·0001
55-59	31·3(30·3-32·3)	34·4(33·5-35·4)	36·9(35·9-37·9)	38·5(37·4-39·5)	0·50(0·40-0·60)	<·0001

Age trend per year	0·56(0·53-0·58)	0·54(0·51-0·56)	0·64(0·61-0·67)	0·68(0·65-0·71)		
P value	<·0001	<·0001	<·0001	<·0001		
Urban/rural						
urban	11·5(11·3-11·8)	13·3(13·0-13·6)	14·6(14·3-14·9)	17·4(17·0-17·7)	0·40(0·37-0·43)	<·0001
rural	13·7(13·3-14·2)	18·4(17·9-18·9)	22·5(22·0-23·1)	24·8(24·2-25·3)	0·79(0·74-0·84)	<·0001
Economic status[2]						
East	13·5(13·1-13·9)	16·8(16·4-17·2)	17·7(17·3-18·1)	19·9(19·4-20·4)	0·42(0·38-0·47)	<·0001
Middle	12·2(11·8-12·7)	13·8(13·3-14·3)	17·6(17·1-18·2)	20·6(20·0-21·1)	0·62(0·57-0·66)	<·0001
West	10·6(10·2-10·9)	13·8(13·4-14·2)	16·0 (15·6-16·5)	18·6(18·1-19·1)	0·56(0·52-0·60)	<·0001

[1] Central obesity defined as waist circumference >90 cm in men and >85 cm in women

[2] Geographic regions (East, Middle, and West) were used as an indicator for economic development, which correspond to developed, intermediately developed, and underdeveloped economic status, respectively.

Table 5: Percentage of participants meeting the minimum recommendations for leisure-time physical activity among Chinese adults aged 20-59 in 2000-2014 according to survey period, age, sex, BMI, and central obesity

	Percentage of participants meeting the recommendations for leisure-time physical activity				Prevalence change per year	
	2000	2005	2010[1]	2014	(95% CI), %	P value
All						
Overall	17·2 (17·0-17·4)	18·1 (17·9-18·3)		22·8 (22·6-23·0)	0·42(0·40-0·44)	<·0001
20-24	18·7 (18·1-19·3)	17·9 (17·4-18·5)	21·0 (20·4-21·6)	23·9 (23·2-24·5)	0·41(0·35-0·47)	<·0001
25-29	14·8 (14·3-15·3)	12·2 (11·7-12·7)	16·4 (15·8-16·9)	19·1 (18·5-19·7)	0·34(0·28-0·39)	<·0001
30-34	12·8 (12·3-13·3)	11·5 (11·0-11·9)	14·5 (14·0-15·0)	17·0 (16·5-17·6)	0·32(0·27-0·37)	<·0001
35-39	13·4 (12·9-13·9)	12·7 (12·3-13·2)	15·2 (14·7-15·7)	19·6 (19·0-20·2)	0·49(0·43-0·54)	<·0001
40-44	15·0 (14·5-15·6)	15·4 (14·9-15·9)	--	21·2 (20·6-21·8)	0·49(0·43-0·55)	<·0001
45-49	18·5 (17·9-19·1)	19·8 (19·3-20·4)	--	24·7 (24·0-25·3)	0·46(0·40-0·52)	<·0001
50-54	23·9 (23·3-24·6)	26·2 (25·6-26·9)	--	27·7 (27·0-28·4)	0·25(0·18-0·31)	<·0001
55-59	33·1 (32·4-33·7)	32·9 (32·3-33·6)	--	32·3 (31·6-33·0)	-0·05(-0·13-0·02)	0·1414
Change trend per age	-2·7(-2·83--2·57)	-2·64(-2·76--2·51)		-1·93(-2·07--1·79)		
P value[2]	<·0001	<·0001		<·0001		
Urban/rural						
urban	20·1(19·8-20·3)	21·9(21·6-22·1)	--	25·4(25·2-25·7)	0·38(0·36-0·41)	<·0001
rural	11·1(10·8-11·4)	10·6(10·3-10·8)	--	17·3(17·0-17·7)	0·49(0·46-0·52)	<·0001
Economic status[3]						
East	18·9(18·6-19·3)	19·2(18·9-19·5)	--	22·7(22·4-23·1)	0·29(0·26-0·33)	<·0001
Middle	15·2(14·8-15·5)	17·5(17·2-17·9)	--	21·5(21·1-21·9)	0·45(0·42-0·49)	<·0001
West	17·1(16·8-17·4)	17·0(16·7-17·3)	--	24·4(24·0-24·7)	0·56(0·53-0·59)	<·0001
Men						
Overall	18·4 (18·1-18·7)	19·3 (19·0-19·6)	--	23·5 (23·1-23·8)	0·38(0·35-0·41)	<·0001

20-24	23·2 (22·3-24·1)	24·9 (24·0-25·7)	27·9 (27·0-28·8)	29·2 (28·3-30·2)	0·44(0·35-0·53)	<·0001
25-29	18·4 (17·6-19·2)	16·7 (15·9-17·4)	22·2 (21·3-23·0)	22·9 (22·0-23·8)	0·35(0·27-0·44)	<·0001
30-34	15·1 (14·3-15·8)	14·6 (13·9-15·2)	17·9 (17·2-18·7)	19·4 (18·6-20·2)	0·32(0·25-0·40)	<·0001
35-39	15·4 (14·6-16·1)	14·8 (14·1-15·5)	19·0 (18·2-19·8)	20·4 (19·6-21·2)	0·40(0·32-0·48)	<·0001
40-44	15·7 (15·0-16·5)	16·4 (15·6-17·1)	--	21·3 (20·5-22·2)	0·44(0·35-0·52)	<·0001
45-49	17·7 (16·9-18·4)	19·4 (18·6-20·2)	--	23·1 (22·2-24·0)	0·39(0·31-0·48)	<·0001
50-54	20·6 (19·8-21·4)	22·9 (22·1-23·8)	--	24·4 (23·5-25·3)	0·25(0·16-0·34)	<·0001
55-59	28·1 (27·1-29·0)	28·4 (27·5-29·3)	--	27·3 (26·4-28·3)	-0·07(-0·16-0·03)	0·1731
Change trend per age	-2·6(-2·80--2·41)	-2·89(-3·07--2·7)		-2·18(-2·38--1·98)		
P value[2]	<·0001	<·0001		0·0225		
Urban/rural						
urban	21·1(20·8-21·5)	22·6(22·3-23·0)		26·3(25·9-26·7)	0·38(0·34-0·41)	<·0001
rural	12·6(12·2-13·1)	12·6(12·1-13·0)		17·6(17·1-18·1)	0·39(0·35-0·43)	<·0001
Economic status[3]						
East	20·5(20·0-21·0)	21·1(20·6-21·5)		22·9(22·4-23·4)	0·18(0·13-0·22)	<·0001
Middle	16·9(16·3-17·4)	18·5(18·0-19·0)		22·6(22·0-23·1)	0·41(0·36-0·46)	<·0001
West	17·2(16·7-17·6)	17·4(17·0-17·8)		25·5(24·9-26·0)	0·63(0·59-0·68)	<·0001
Women						
Overall	15·9 (15·7-16·2)	16·9 (16·7-17·2)	--	22·1 (21·8-22·4)	0·46(0·43-0·49)	<·0001
20-24	14·1 (13·4-14·8)	11·3 (10·7-12·0)	14·0 (13·3-14·7)	18·4 (17·6-19·2)	0·38(0·31-0·46)	<·0001
25-29	11·1 (10·5-11·8)	8·0 (7·4-8·5)	10·5 (9·8-11·1)	15·2 (14·5-15·9)	0·33(0·26-0·40)	<·0001
30-34	10·5 (9·9-11·1)	8·5 (7·9-9·0)	10·8 (10·2-11·5)	14·6 (13·9-15·3)	0·32(0·25-0·39)	<·0001
35-39	11·4 (10·7-12·0)	10·7 (10·1-11·3)	11·2 (10·6-11·9)	18·8 (18·0-19·6)	0·58(0·51-0·66)	<·0001
40-44	14·3 (13·6-15·0)	14·5 (13·8-15·1)	--	21·0 (20·2-21·9)	0·54(0·46-0·62)	<·0001
45-49	19·4 (18·6-20·2)	20·3 (19·5-21·1)	--	26·3 (25·4-27·3)	0·52(0·43-0·61)	<·0001
50-54	27·6 (26·6-28·5)	29·6 (28·7-30·5)	--	31·1 (30·1-32·1)	0·23(0·14-0·33)	<·0001

55-59	38·4 (37·4-39·4)	37·6 (36·6-38·6)	--	37·4 (36·4-38·5)	-0·05(-0·16-0·05)	0· 3141
Change trend per age	-2·83(-3·01--2·65)	-2·42(-2·59--2·25)		-1·68(-1·87--1·48)		
P value[2]	<·0001	<·0001		<·0001		
Urban/rural						
urban	19·0(18·6-19·3)	21·1(20·8-21·5)		24·5(24·1-24·9)	0·39(0·36-0·43)	<·0001
rural	9·5(9·2-9·9)	8·6(8·3-9·0)		17·0(16·6-17·5)	0·60(0·56-0·64)	<·0001
Economic status[3]						
East	17·3(16·8-17·7)	17·3(16·9-17·7)		22·6(22·1-23·1)	0·41(0·37-0·46)	<·0001
Middle	13·3(12·9-13·8)	16·6(16·1-17·1)		20·5(20·0-21·0)	0·50(0·45-0·55)	<·0001
West	17·0(16·6-17·4)	16·7(16·3-17·1)		23·2(22·6-23·7)	0·48(0·44-0·53)	<·0001
BMI categories						
BMI<18·5						
Overall	12·9 (12·1-13·7)	10·3 (9·7-11·0)	--	16·8 (15·9-17·7)	0·33(0·24-0·42)	<·0001
20-24	17·2 (15·6-18·7)	12·1 (10·9-13·4)	17·3 (15·8-18·8)	19 (17·4-20·7)	0·23(0·07-0·39)	0·0053
25-29	10·2 (8·7-11·7)	7·3 (6·1-8·6)	12·8 (11·0-14·6)	13·3 (11·6-15·1)	0·25(0·08-0·41)	0·0032
30-34	10·2 (8·3-12·1)	7·2 (5·7-8·6)	12·0 (9·8-14·2)	11·9 (9·7-14·1)	0·13(-0·07-0·34)	0·2058
35-39	9·5 (7·2-11·8)	7·5 (5·7-9·4)	10·5 (8·0-13·0)	17·1 (13·9-20·4)	0·60(0·31-0·89)	<·0001
40-44	12·1 (9·1-15·0)	11·7 (8·8-14·6)	--	16·4 (12·5-20·1)	0·35(0·00-0·70)	0·058
45-49	10·2 (7·1-13·3)	11·5 (8·6-14·4)	--	17·1 (13·1-21·1)	0·51(0·15-0·88)	0·0059
50-54	11·6 (8·5-14·7)	12·8 (9·8-15·7)	--	20·1 (15·6-24·6)	0·64(0·24-1·05)	0·0017
55-59	22·4 (18·9-26·0)	18·4 (15·0-21·8)	--	22·1 (17·8-26·4)	0·06(-0·34-0·47)	0·7533
Change trend per age	-2·39(-2·91--1·87)	-1·77(-2·19--1·36)		-1·86(-2·49--1·24)		
P value[2]	<·0001	<·0001		<·0001		
18·5≤BMI<23						
Overall	15·3(15·0-15·6)	15·7(15·4-15·9)		21·9(21·6-22·3)	0·50(0·47-0·53)	<·0001
20-24	18·9(18·2-19·6)	18·4(17·7-19·1)	20·3(19·6-21·1)	23·9(23·1-24·8)	0·40(0·33-0·47)	<·0001

25-29	14·3(13·7-15·0)	11·4(10·8-12·0)	15·1(14·3-15·8)	18·3(17·6-19·1)	0·31(0·25-0·38)	<·0001
30-34	12·6(11·9-13·2)	10·2(9·7-10·8)	13·1(12·4-13·8)	15·8(15·0-16·5)	0·24(0·17-0·3)	<·0001
35-39	12·5(11·8-13·2)	11·5(10·8-12·1)	13·8(13·1-14·6)	18·7(17·8-19·6)	0·49(0·41-0·56)	<·0001
40-44	13·3(12·5-14·1)	13·9(13·1-14·6)		20·6(19·6-21·6)	0·57(0·49-0·66)	<·0001
45-49	14·5(13·7-15·4)	17·9(17·0-18·8)		24·6(23·5-25·8)	0·72(0·63-0·82)	<·0001
50-54	19·5(18·5-20·4)	22·8(21·8-23·8)		27·9(26·7-29·1)	0·6(0·48-0·71)	<·0001
55-59	26·5(25·4-27·7)	28·3(27·2-29·4)		32·7(31·4-33·9)	0·45(0·33-0·57)	<·0001
Change trend per age	-2·46(-2·64--2·27)	-2·73(-2·9--2·55)		-2·36(-2·57--2·14)		
P value[2]	<·0001	<·0001		<·0001		
23≤BMI<27·5						
Overall	19·2(18·8-19·5)	20·8(20·5-21·1)		24·3(24·0-24·7)	0·37(0·34-0·40)	<·0001
20-24	18·9(17·6-20·1)	19·9(18·6-21·2)	24·6(23·3-26·0)	25·7(24·4-27·0)	0·51(0·39-0·63)	<·0001
25-29	17·0 (16·0-18·1)	14·6(13·7-15·6)	18·5(17·5-19·5)	21·2(20·1-22·2)	0·34(0·24-0·43)	<·0001
30-34	13·1(12·3-14·0)	13·5(12·7-14·3)	15·7(14·8-16·5)	18·5(17·5-19·4)	0·39(0·31-0·48)	<·0001
35-39	14·5(13·6-15·3)	14·2(13·4-14·9)	16·4(15·5-17·2)	20·1(19·2-21·0)	0·44(0·36-0·52)	<·0001
40-44	16·2(15·4-17·0)	16·4(15·6-17·1)		22·4(21·4-23·3)	0·49(0·41-0·57)	<·0001
45-49	21(20·1-21·9)	21·5(20·6-22·3)		25·6(24·7-26·5)	0·35(0·26-0·43)	<·0001
50-54	25·7(24·8-26·6)	28·5(27·6-29·4)		28·3(27·3-29·2)	0·14(0·05-0·24)	0·0031
55-59	36·1(35·1-37·1)	35·9(34·9-36·9)		33·5(32·5-34·5)	-0·21(-0·31--0·11)	<·0001
Change trend per age	-2·84(-3·09--2·6)	-2·89(-3·13--2·65)		-1·96(-2·2--1·72)		
P value[2]	<·0001	<·0001		<·0001		
BMI≥27·5						
Overall	21·8(21·1-22·5)	22·2(21·5-22·8)		22·7(22·1-23·3)	0·06(0·00-0·13)	0·0438
20-24	21·1(17·6-24·7)	21·8(18·7-24·8)	21·8(19·2-24·4)	25·3(22·8-27·8)	0·32(0·03-0·61)	0·0290
25-29	16·6(14·2-19·0)	15·0(13·0-17·0)	19·4(17·5-21·4)	20·8(18·8-22·7)	0·36(0·16-0·55)	0·0003
30-34	15·4(13·4-17·4)	13·7(12·0-15·4)	16·9(15·3-18·6)	19·1(17·5-20·7)	0·32(0·15-0·48)	0·0002

35-39	15·0(13·3-16·8)	14·8(13·2-16·4)	17·2(15·6-18·7)	21·1(19·5-22·7)	0·49(0·33-0·65)	<·0001
40-44	17·1(15·4-18·8)	17·8(16·3-19·4)		19·6(18·1-21·1)	0·19(0·03-0·34)	0·0196
45-49	21·7(20·0-23·4)	20·8(19·2-22·4)		22·9(21·3-24·5)	0·11(-0·04-0·26)	0·1599
50-54	30·3(28·5-32·1)	29·2(27·5-30·8)		26·2(24·6-27·8)	-0·30(-0·47--0·13)	0·0005
55-59	41·1(39·1-43·1)	36·3(34·6-38·1)		29·1(27·3-30·9)	-0·84(-1·03--0·66)	<·0001
Change trend per age	-3·62(-4·17--3·06)	-2·84(-3·35--2·32)		-1·71(-2·14--1·27)		
P value[2]	<·0001	<·0001		<·0001		
With central obesity[4]						
Overall	21·0(20·4-21·5)	21·9(21·4-22·4)		23·1(22·7-23·6)	0·15(0·10-0·19)	<·0001
20-24	19·4(16·4-22·4)	18·6(16·1-21·1)	19·7(17·7-21·7)	24·1(22·1-26·1)	0·41(0·17-0·65)	0·0008
25-29	16·0(13·9-18·1)	13·3(11·8-14·9)	16·6(15·2-18·1)	19·2(17·8-20·7)	0·32(0·16-0·47)	<·0001
30-34	14·6(12·9-16·2)	13·5(12·1-14·8)	15·5(14·2-16·7)	18·3(17·1-19·6)	0·32(0·19-0·44)	<·0001
35-39	15·0(13·5-16·4)	14·5(13·3-15·8)	16·3(15·1-17·5)	20·1(18·9-21·3)	0·43(0·31-0·55)	<·0001
40-44	16·8(15·4-18·1)	16·4(15·3-17·6)		20·0(18·9-21·1)	0·28(0·17-0·40)	<·0001
45-49	20·0(18·7-21·2)	20·7(19·6-21·9)		23·1(22·0-24·2)	0·23(0·12-0·34)	<·0001
50-54	27·2(25·9-28·5)	27·7(26·5-28·9)		26·4(25·3-27·5)	-0·08(-0·20-0·04)	0·1898
55-59	37·3(35·9-38·7)	35·8(34·6-37·1)		31·5(30·4-32·7)	-0·43(-0·56--0·31)	<·0001
Change trend per age	-3·07(-3·51--2·63)	-2·64(-3·04--2·24)		-1·75(-2·07--1·43)		
P value[2]	<·0001	<·0001		<·0001		
Without central obesity[4]						
Overall	16·6(16·4-16·8)	17·2(17·0-17·4)		22·7(22·4-22·9)	0·46(0·43-0·48)	<·0001
20-24	18·7(18·1-19·3)	17·9(17·3-18·5)	21·1(20·5-21·7)	23·8(23·2-24·5)	0·41(0·35-0·46)	<·0001
25-29	14·7(14·2-15·3)	12·1(11·6-12·5)	16·3(15·7-16·9)	19·1(18·4-19·7)	0·34(0·28-0·39)	<·0001
30-34	12·6(12·1-13·1)	11·1(10·7-11·6)	14·2(13·7-14·8)	16·7(16·1-17·3)	0·30(0·25-0·35)	<·0001
35-39	13·2(12·6-13·7)	12·4(11·9-12·9)	14·9(14·4-15·5)	19·4(18·8-20·1)	0·49(0·43-0·54)	<·0001
40-44	14·7(14·1-15·2)	15·1(14·6-15·7)		21·7(20·9-22·4)	0·55(0·48-0·61)	<·0001

45-49	18·1(17·5-18·7)	19·5(18·9-20·2)	25·5(24·7-26·3)	0·54(0·48-0·61)	<·0001
50-54	22·8(22·1-23·5)	25·7(24·9-26·4)	28·4(27·6-29·3)	0·39(0·31-0·47)	<·0001
55-59	31·5(30·7-32·4)	31·6(30·8-32·4)	32·8(31·9-33·7)	0·10(0·02-0·18)	0·0193
Change trend per age	-2·62(-2·76--2·48)	-2·62(-2·76--2·49)	-2·03(-2·19--1·87)		
P value[2]	<·0001	<·0001	<·0001		

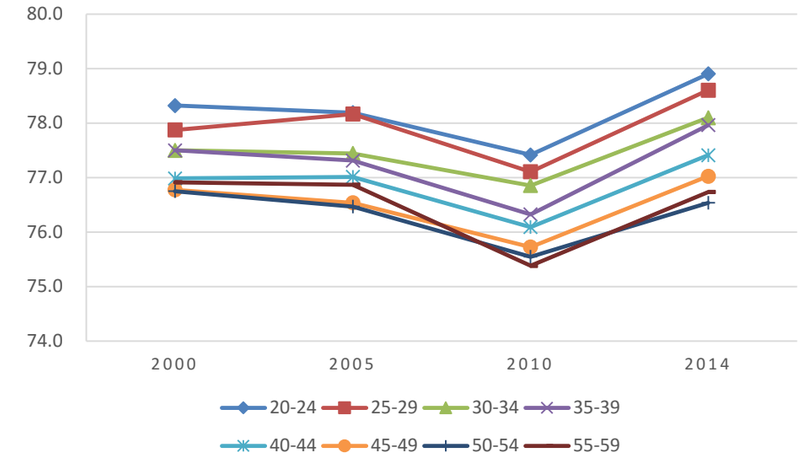
[1] Physical activity data were missing in 40-59 in 2010 survey

[2] P value for the nonlinear trend across age groups

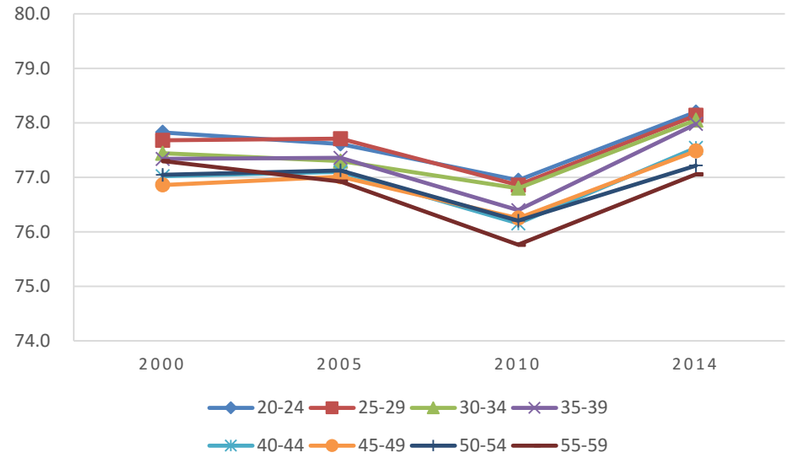
[3] Geographic regions (East, Middle, and West) were used as an indicator for economic development, which correspond to developed, intermediately developed, and underdeveloped economic status, respectively.

[4] Central obesity defined as waist circumference >90 cm in men and >85 cm in women

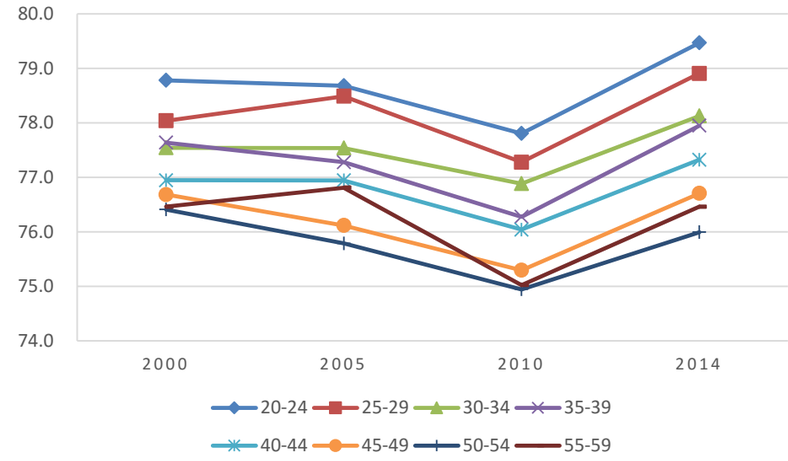
Rest heart rate(beats/min)



A1： for all subjects

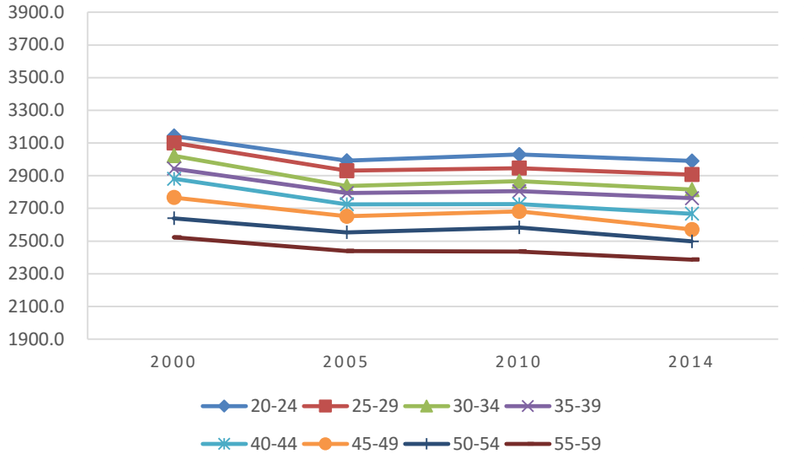


A2： for men

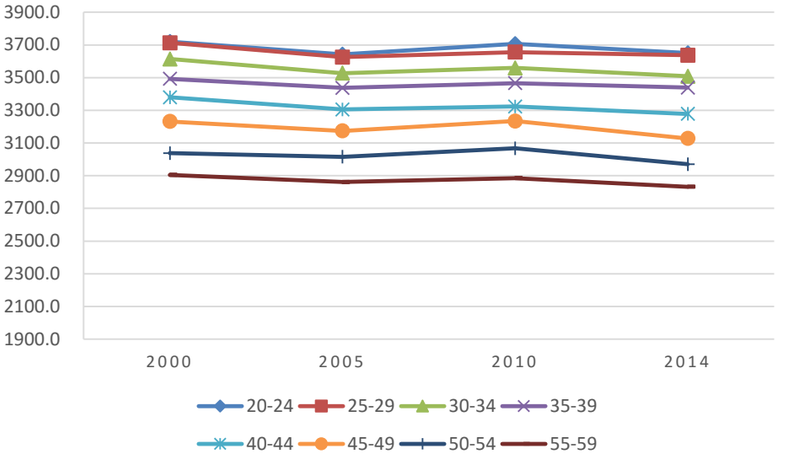


A3： for women

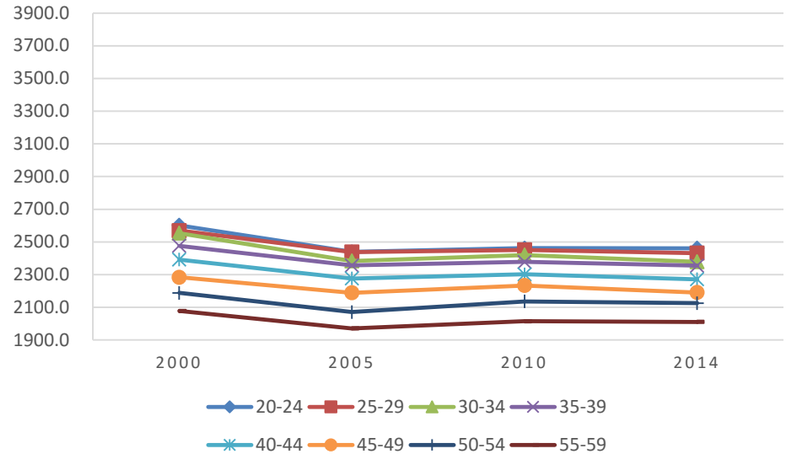
Forced vital capacity(ml)



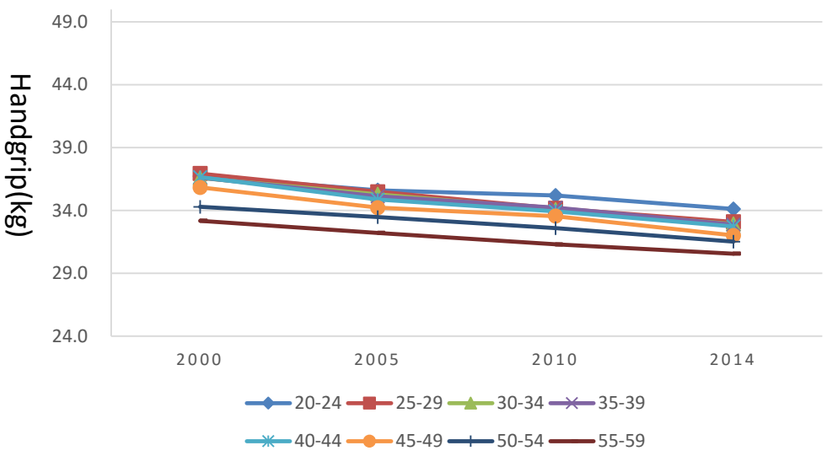
B1： for all subjects



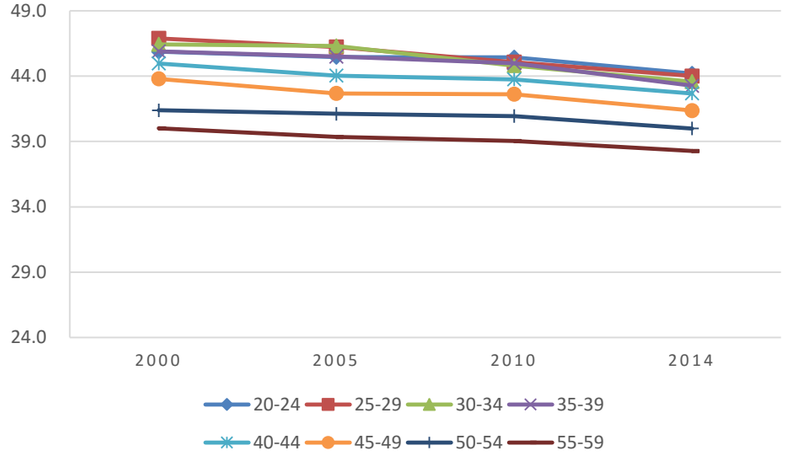
B2： for men



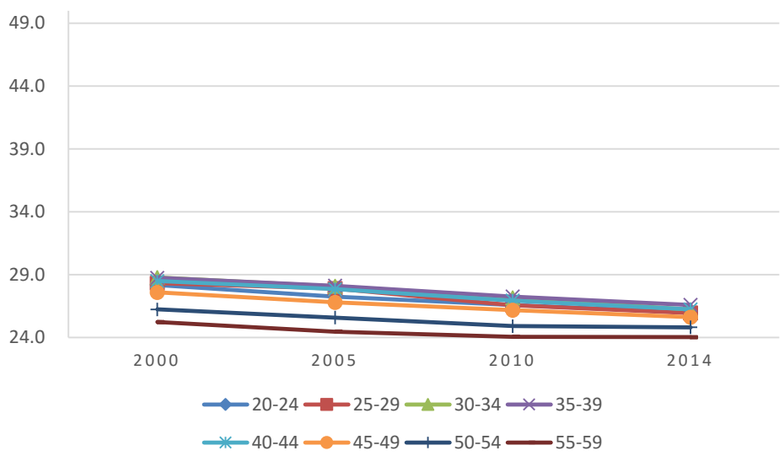
B3： for women



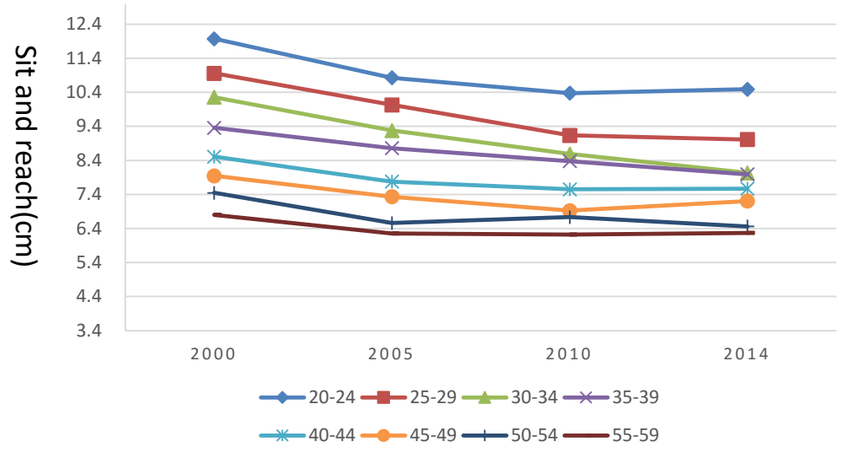
C1： for all subjects



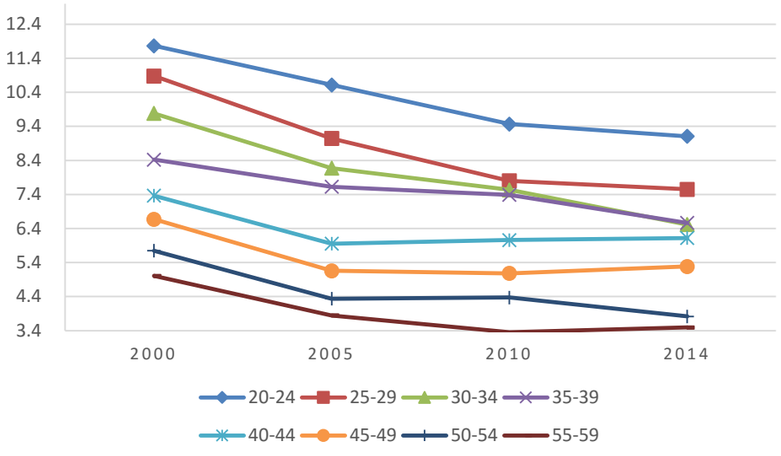
C2： for men



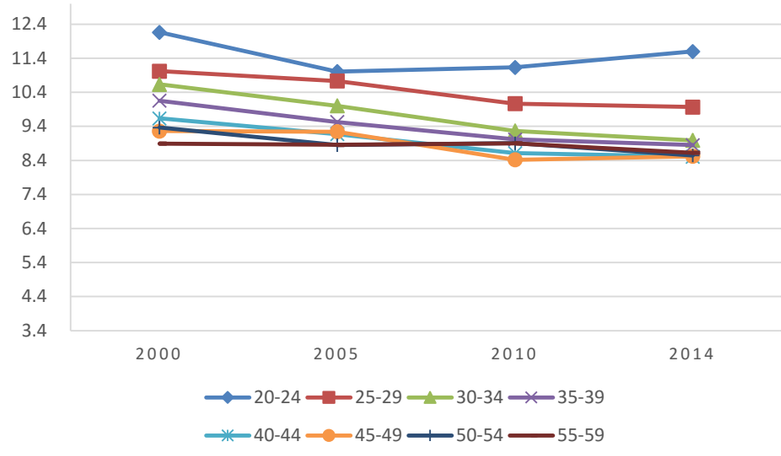
C3： for women



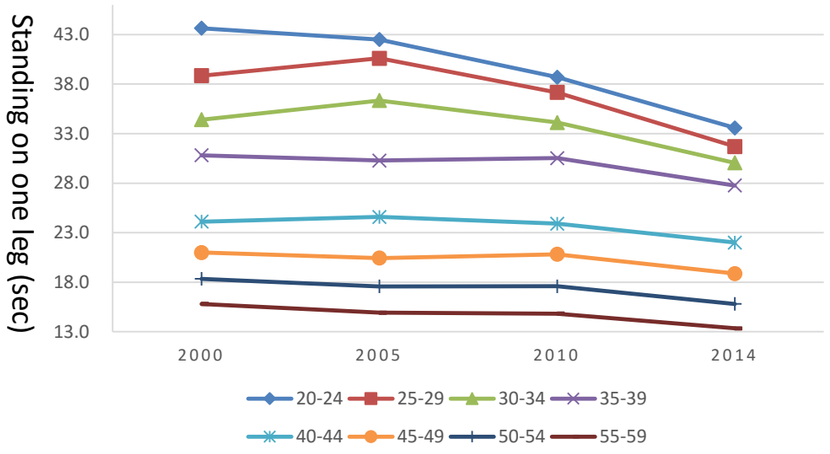
D1： for all subjects



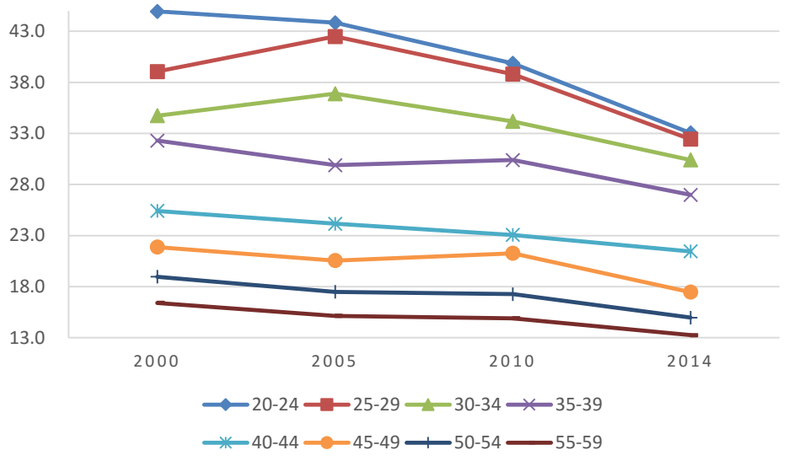
D2： for men



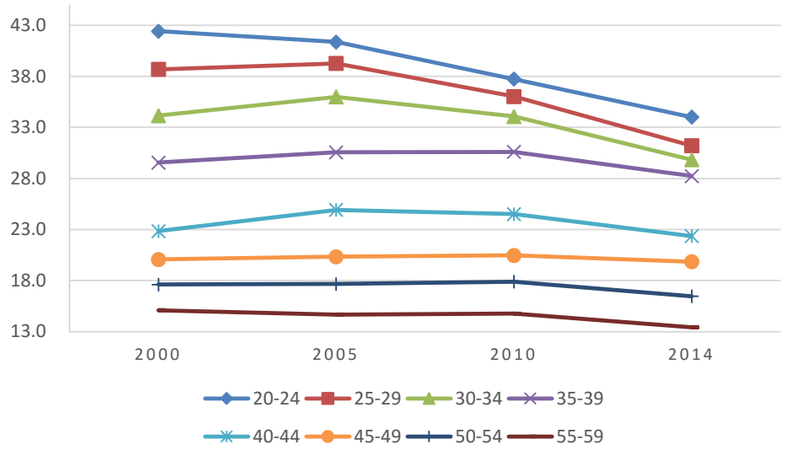
D3： for women



E1： for all subjects



E2： for men



E3： for women

Figure legend:

Figure 1: Trends in resting heart rate, forced vital capacity, handgrip strength, sit and reach, standing on one leg in Chinese adult population among normal-weight participants ($18.5 \leq BMI < 23 kg/m^2$) by age groups

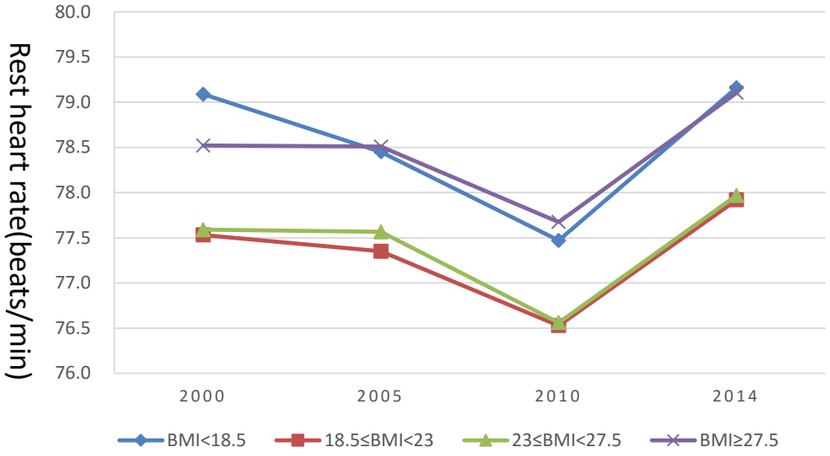
A1-A3: resting heart rate, for all subjects, for men, and for women, respectively.

B1-B3: forced vital capacity, for all subjects, for men, and for women, respectively.

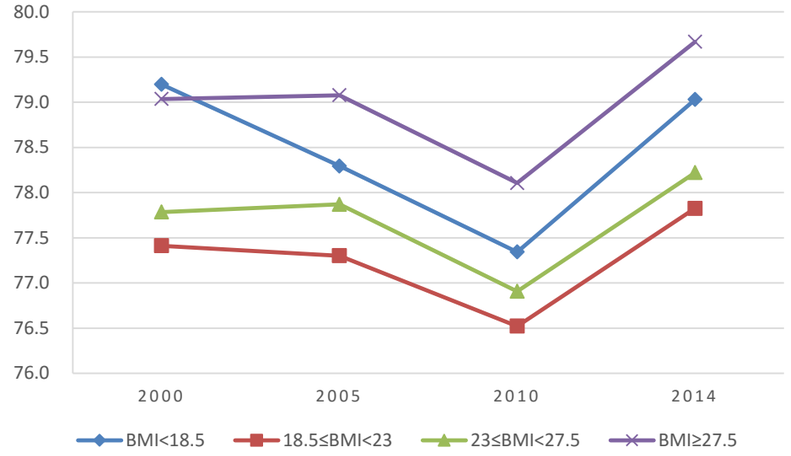
C1-C3: handgrip strength, for all subjects, for men, and for women, respectively.

D1-D3: sit and reach, for all subjects, for men, and for women, respectively.

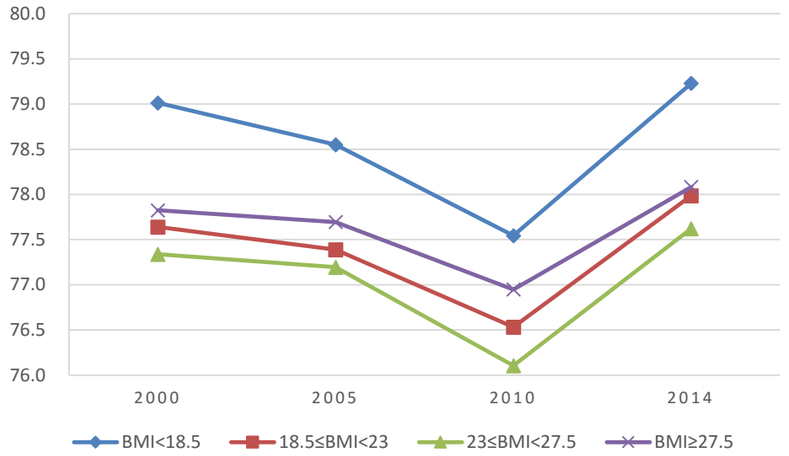
E1-E3: standing on one leg with eyes closed, for all subjects, for men, and for women, respectively.



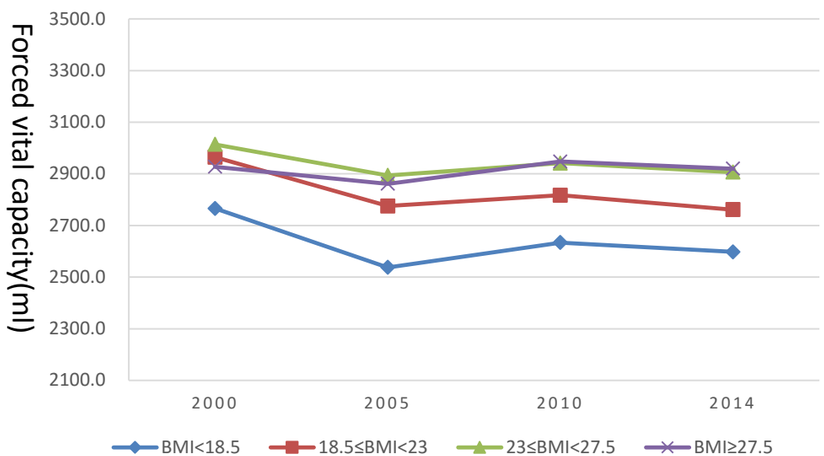
A1： for all subjects



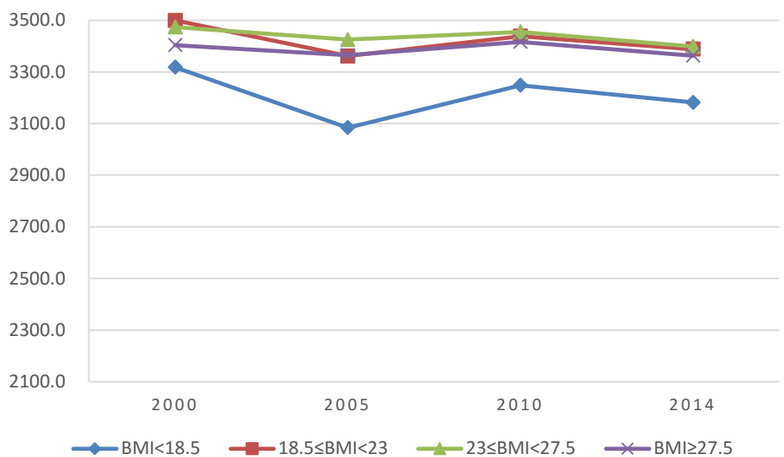
A2： for men



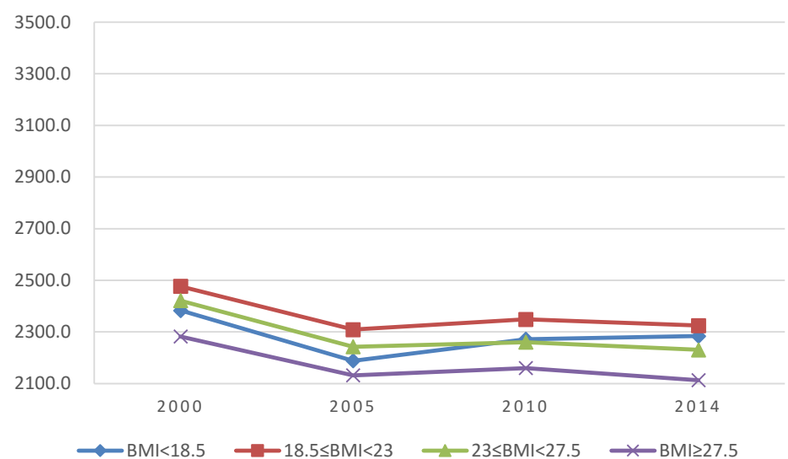
A3： for women



B1： for all subjects

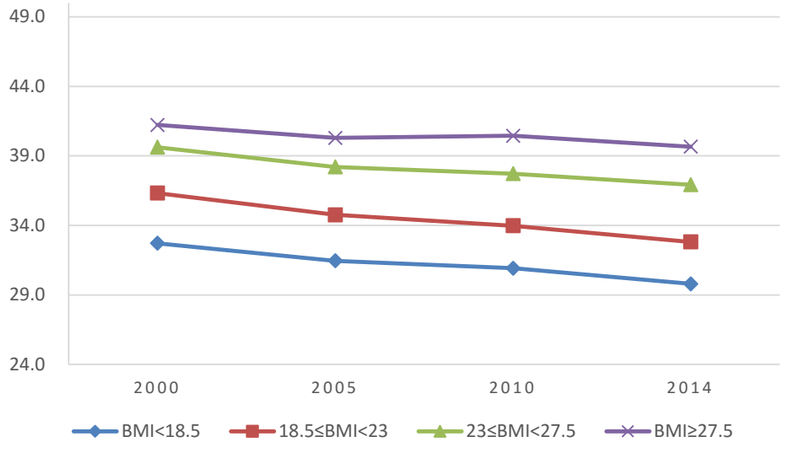


B1： for men

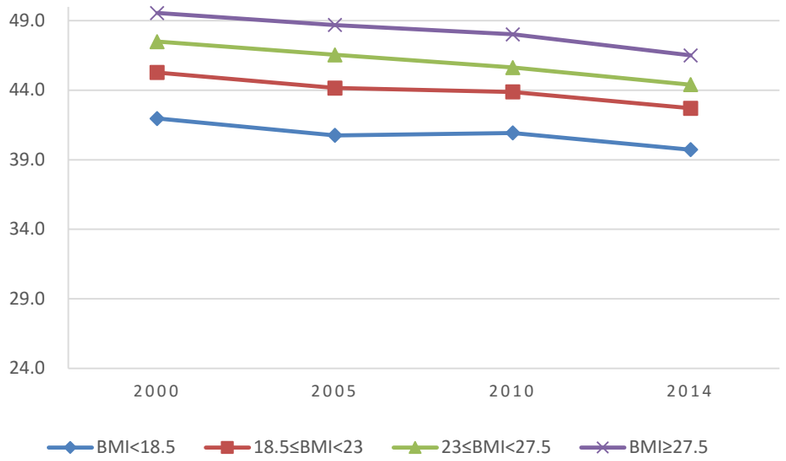


B3： for women

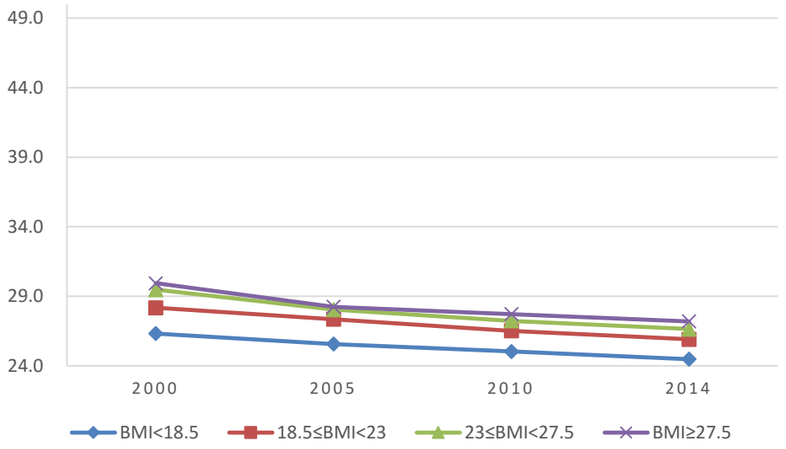
Handgrip(kg)



C1： for all subjects

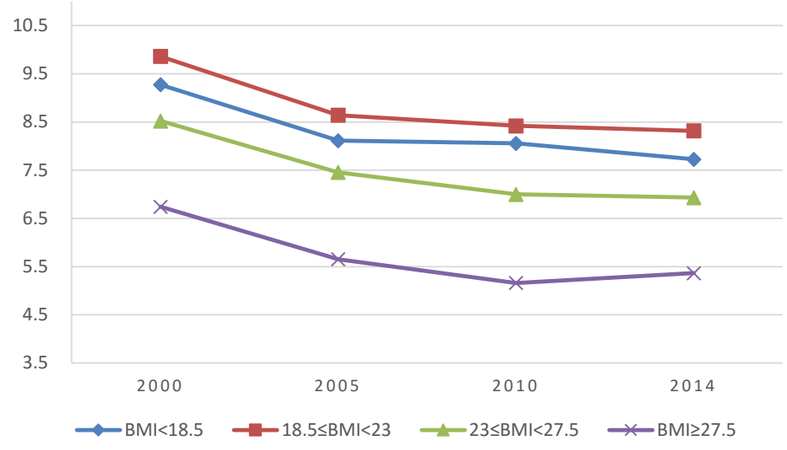


C2： for men

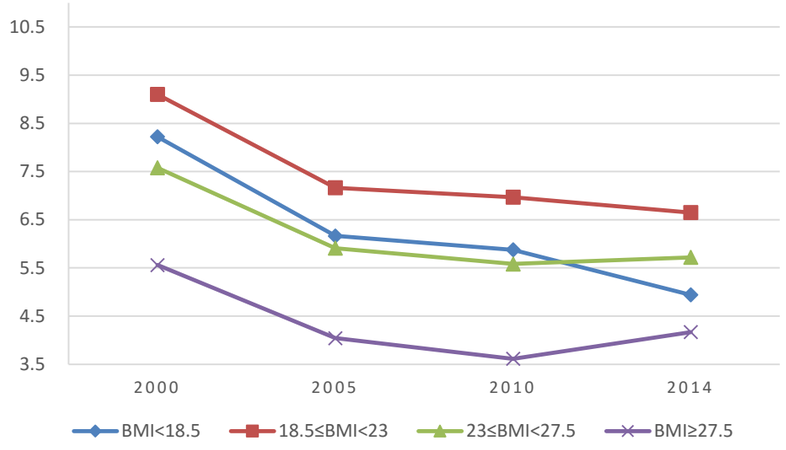


C3： for women

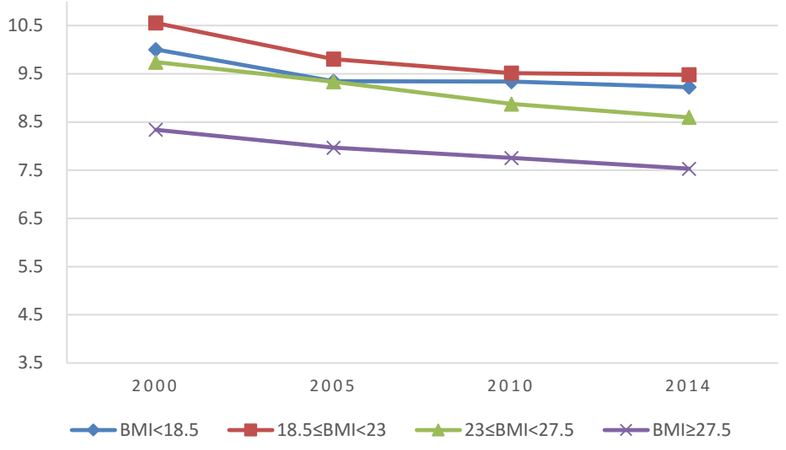
Sit and reach(cm)



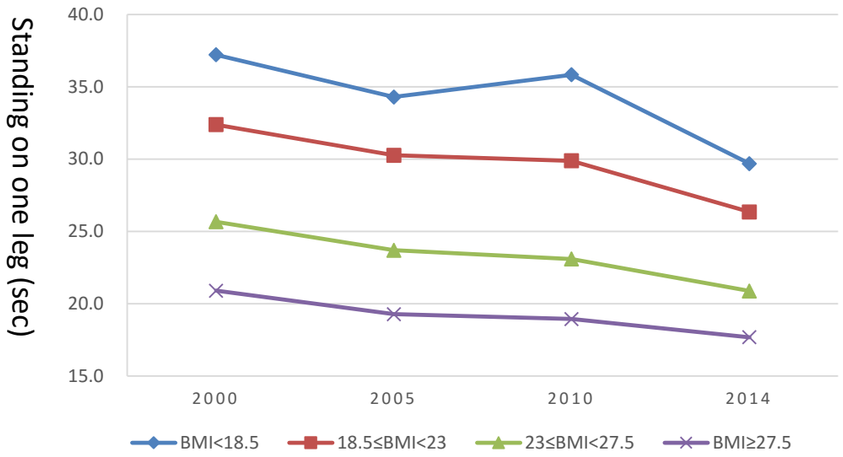
D1： for all subjects



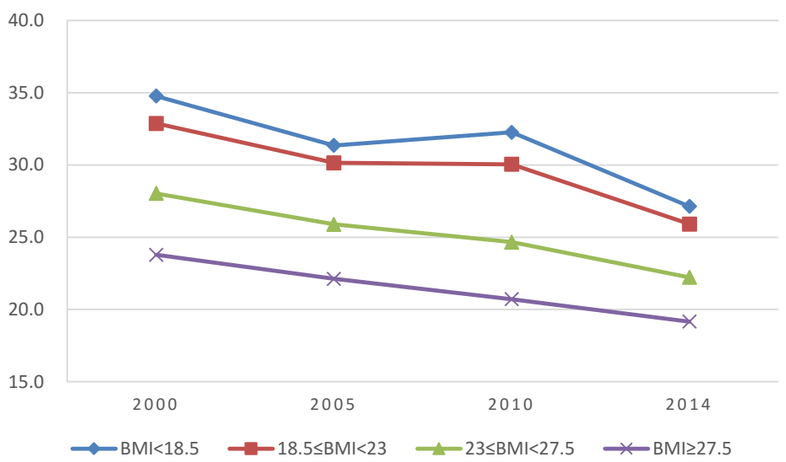
D2： for men



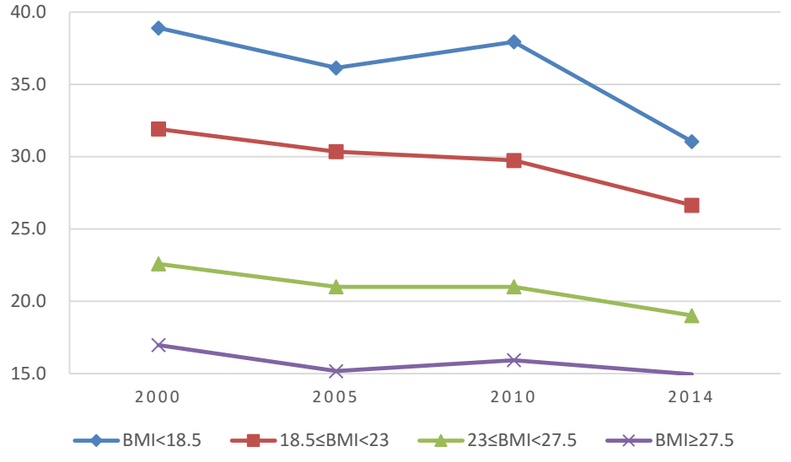
D3： for women



E1： for all subjects



E2： for men



E3： for women

Figure legend:
Figure 2: Trends in resting heart rate, forced vital capacity, handgrip strength, sit and reach and standing on one leg in Chinese adult population from 2000 to 2014 by different BMI.
A1-A3: resting heart rate, for all subjects, for men, and for women, respectively.
B1-B3: forced vital capacity, for all subjects, for men, and for women, respectively.
C1-C3: handgrip strength, for all subjects, for men, and for women, respectively.
D1-D3: sit and reach, for all subjects, for men, and for women, respectively.
E1-E3: standing on one leg with eyes closed, for all subjects, for men, and for women, respectively.