

Report on Childhood Obesity in China (4) Prevalence and Trends of Overweight and Obesity in Chinese Urban School-age Children and Adolescents, 1985-2000¹

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Objective To describe the nationwide prevalence of childhood overweight/obesity, and their group variations and trends over the past 20 years in the Chinese urban population. **Methods** Data sets of boys and girls at the age of 7-18 years collected from the series of Chinese national surveillance on students' constitution and health (CNSSCH) between 1985 and 2000 were divided into five socioeconomic and demographic groups, while BMI classification reference proposed by Working Group on Obesity in China (WGOCC) was used as screening reference to calculate the prevalence and trends of overweight/obesity in these groups. **Results** In 2000, the prevalence of obesity and overweight in boys aged 7-18 years was 11.3% and 6.5% in Beijing, 13.2% and 4.9% in Shanghai, 9.9% and 4.5% in coastal big cities, and 5.8% and 2.0% in coastal medium/small-sized cities, respectively, while the prevalence of obesity and overweight in girls of the same age group was 8.2% and 3.7% in Beijing, 7.3% and 2.6% in Shanghai, 5.9% and 2.8% in coastal big cities, and 4.8% and 1.7% in coastal medium/small-sized cities, respectively. The prevalence of obesity was low in most of the inland cities at an early stage of epidemic overweight. The epidemic manifested a gradient distribution in groups, which was closely related to socioeconomic status (SES) of the study population. However, a dramatic and steady increasing trend was witnessed among all sex-age subgroups in the five urban groups, and such a trend was stronger in boys than in girls, and much stronger in children than in adolescents. **Conclusion** Although China is at an early stage of epidemic obesity by and large, the prevalence of obesity in her urban population, particularly in coastal big cities has reached the average level of developed countries. The increasing trend has been rapid since early 1990s, and the increments in obesity and overweight are exceptionally high. The prospect of epidemic obesity in China is in no way optimistic. Therefore, preventive program should be focused on the improvement of the balance between caloric intake and energy expenditure, and interventions aimed at changing children's life styles.

Key words: Obesity; Overweight; Prevalence; Epidemic changes; Chinese urban areas; School-age children and adolescents

INTRODUCTION

The rising prevalence of childhood obesity is becoming a major public health concern in developed countries^[1-3]. Childhood obesity causes not only immediate psychological consequences, but also involves cardiovascular risk factors such as hypertension, hyperlipemia and abnormal glucose tolerance^[4]. Obesity in childhood also predisposes to obesity in adulthood with all its known adverse health outcomes^[5-6].

As a developing country, China has limited historical data on the prevalence of childhood overweight/obesity and inadequate analyses of the temporal changes in BMI and prevalence of

overweight/obesity in children and adolescents^[7]. Since the end of the 1990s, several surveys have documented an increasing prevalence of overweight/obesity among the Chinese metropolitan youth. However, most of these surveys used obsolete methods. For example, some types of relative index of obesity, such as 120% or greater than a 'standard' weight-for-height have evident shortcomings since they often preclude comparisons across populations^[8]. Other surveys used cut-offs of international definitions of overweight/obesity, such as the NCHS and IOTF sex-age-specific BMI (body mass index, kg/m²) references. However, these international references are irrelevant to reflecting the specific growth patterns of Chinese adolescents. Many of overweight or obese

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adolescents cannot be identified *via* screening based on the above references owing to its lower sensitivity^[9].

In 2003, a new criterion, the “BMI Classification Reference for Screening Overweight and Obesity in Chinese School-age Children and Adolescents” was proposed by WGOC under the support of the International Life Sciences Institute (ILSI) Focal Point in China^[10]. However, more information is needed to elucidate if this new reference can be effectively used to screen cases of obesity and overweight from various groups, of Chinese populations in different years.

The purposes of this study were (a) to present the nationwide prevalence of childhood overweight/obesity in Chinese urban children and adolescents, (b) to analyze the variation among different groups of population described by demographic and socioeconomic factors, and (c) to demonstrate the changing trends of epidemic of overweight/obesity over the past 20 years, especially between 1985 and 2000.

METHODS

Study Population and Data Sources

Chinese national surveillance on students' constitution and health (CNSSCH) is a series of cross-sectional nationwide representative surveys conducted about every five years by the CNSSCH Association under the auspices of the Ministry of Education, the Ministry of Health, and the State Sports Administration. It is composed of four data sets, i.e. data of surveys in 1985, 1991, 1995, and 2000^[11-14]. The 1985 data are extremely important because they dated back to a time when the prevalence of childhood obesity was very low whereas the underweight was rather common even among the urban populations. The survey covers thirty provinces of and autonomous regions of China, with Tibet Autonomous Region and Taiwan Province excluded owing to unavailability of related data.

Since 2002, another surveillance system, the Chinese national surveillance on students' physical fitness (CNSSPF) established by the Ministry of Education has been in operation, and surveys have been conducted every two years^[15]. Following the same design and methodology as CNSSCH, this system covers only 16 representative provinces. Its purpose is to monitor changes in nutrition and physical fitness among the Chinese students in the “transitional” period with rapid socioeconomic development. Thus, the CNSSPF survey in 2004 was used as 2004 data set in the present study, and its findings on the prevalence of overweight/obesity have been used to estimate the epidemic trends of obesity in several special groups since 2000.

These surveys were designed as a stratified multistage sample based on the selected primary and secondary schools^[11]. All subjects were Han students at the age of 7-18 years. According to their residence, subjects in each province were divided into urban and rural groups, consisting of equal numbers of students from three socioeconomic classes, i.e. 1st (‘upper’), 2nd (‘middle’), and 3rd (‘lower’) defined by five social, demographic, and income indices^[10]. Only urban groups resided in the locality for at least one year were selected for this study. For each of the sex-age-subgroups, there were 286-302 subjects for the 1985 data, 178-185 for the 1991, 1995, 2000, and 2004 data in each of the provinces^[11-15].

To identifying the different intervention approaches to the target groups, the sub-populations were divided into five groups. (a) Group I including sub-populations in Beijing and Shanghai, the two most developed metropolises where children's physical growth level generally ranks the highest in China. (b) Groups II and III including sub-populations in other Chinese big cities. Except for Tianjin, a municipality directly under the central government, they are all provincial capitals with a total population of more than 1 000 000, representing the best socioeconomic status in their own provinces. Group II, or “coastal big city” group, was composed of 8 big cities located in the developed coastal areas in Eastern China, including Tianjin, Shijiazhuang, Shenyang, Jinan, Nanjing, Hangzhou, Hefei and Nanchang. Group III, or “inland big city” group, was composed of 16 big cities mostly located in the inland central area of western China, such as Hohhot, Taiyuan, Changchun, Harbin, Zhenzhou, Wuhan, Changsha, Chengdu, Guiyang, Kunming, Xi'an, Lanzhou, Xining, Yinchuan, and Urumqi, as well as Chongqing, a municipality directly under the central government. Another four big cities, such as Fuzhou, Guangzhou, Nanning, and Haikou, were included because of their relatively low childhood growth levels, though they are located in coastal areas. (c) Groups IV and V were composed of medium and small-sized cities all over the 28 provinces, which have a total population of 200 000-1 000 000 or 50 000-200 000^[10]. Epidemic estimates for groups IV and V were not available for the 1991 survey, which only contained comparable data from big cities. The sample sizes for calculating the prevalence of overweight/obesity among various groups in different surveys are shown in Table 1. The number of the subjects for the 2004 survey was not described here, because only a small part of it was used in this analysis.

Description of Variables and Data Analysis

All subjects had a thorough medical examination

TABLE 1

The Sample Size of Various Groups in Different Survey

Groups	1985 yr		1991 yr		1995 yr		2000 yr	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Beijing and Shanghai	7236	7175	4368	4332	4320	4273	4380	4344
Coastal Big Cities	9733	9708	5785	5891	5760	5772	5736	5821
Inland Big Cities	24287	20203	14591	14508	14508	14567	14586	14617
Coastal Medium and Small Sized Cities	9767	9719	—	—	5760	5808	5820	5796
Inland Medium and Small Sized Cities	24168	24108	—	—	14892	14830	14736	14508
Total	75191	70913	24744	24731	45240	45250	45258	45086

before measurement, and overt disease or physical/mental deformities were excluded. Since 1985, stature (cm) and weight (kg) have been measured following the same standardized procedures^[16] by using the same apparatus recommended by Cameron^[17]. All technicians were specially trained for anthropometric skills, and the coefficients of variations among provinces ranged from 1.5% to 2.4% in 1985, 1.7% to 2.2% in 1991, 1.5% to 2.1% in 1995, 1.7% to 2.2% in 2000, and 1.7% to 2.4% in 2004, respectively.

All cases of overweight and obesity were defined identically in different surveys by using the same reference, "BMI Classification Reference for Screening Overweight and Obesity in Chinese School-age Children and Adolescents" proposed by WGOC^[10]. All the five surveys were independently designed with no intended overlap. Therefore, in testing differences in the surveys, a covariance of zero was assumed. In each sex-age subgroup, the differences in the prevalence of overweight/obesity between the two surveys were tested univariately by using t statistic at least 0.05 significance level. The prevalence calculated at 1-year age intervals was

averaged across the groups at the ages of 7-12 years and 13-18 years for cross-sectional estimates of children and adolescents, corresponding to primary and secondary school students, respectively. Calculations were conducted by using SPSS/PC 11.0 package in the Institute of Child and Adolescent Health, Peking University Health Science Center.

RESULTS

Prevalence of Overweight and Obesity in 2000

The prevalence of overweight/obesity in Beijing was estimated as the highest among the study municipalities (Table 2). In 2000, the prevalence of obesity in boys and girls aged 7-18 years reached 10% and 5.2%, respectively. Among them, the prevalence of obesity in boys aged 7-12 years reached 12.7%. The prevalence of obesity in Shanghai was relatively low, especially in the adolescents aged 13-18 years.

Significant differences in the prevalence of overweight and obesity were found between groups

TABLE 2

Prevalence and Trends of Overweight and Obesity in Chinese Urban Children and Adolescents Aged 7-18 Years in Beijing and Shanghai, 1985-2000

Population	1985 yr		1991 yr		1995 yr		2000 yr	
	Overweight (%)	Obesity (%)						
7-12 Years Boys								
Beijing	4.4	1.4	7.9	6.5	10.0	7.5	16.3	12.7
Shanghai	3.9	1.6	5.3	1.0	14.8	5.7	18.8	10.1
13-18 Years Boys								
Beijing	3.8	1.0	10.8	3.9	12.6	5.5	17.7	7.3
Shanghai	2.0	0.7	2.7	1.0	11.6	4.1	13.2	4.0
Average of 7-18 Years Boys								
Beijing	4.1	1.2	9.3	5.3	11.3	6.5	17.0	10.0
Shanghai	2.9	1.1	4.0	1.0	13.2	4.9	16.0	7.2
7-12 Years Girls								
Beijing	2.9	1.4	4.4	3.0	6.7	5.3	10.0	7.3
Shanghai	1.7	0.5	2.2	1.0	7.9	3.9	9.3	6.0
13-18 Years Girls								
Beijing	4.3	0.8	7.5	2.0	9.6	2.0	11.5	3.1
Shanghai	2.4	0.4	2.0	1.5	6.8	1.2	7.6	2.0
Average of 7-18 Years Girls								
Beijing	3.6	1.1	6.0	1.8	8.2	3.7	10.7	5.2
Shanghai	2.0	0.4	2.1	1.2	7.3	2.6	8.5	4.1

II and III (Table 3). The prevalence of obesity in boys and girls aged 7-18 years in group II was 9.1% and 4.8%, respectively, and 3.1% in boys and 2.0% in girls of the same age in group III. The prevalence of overweight and obesity in group II was significantly lower than that in the Beijing subgroup. However, the prevalence of obesity in both boys and girls in this group, especially in adolescent girls

aged 13-18 years, was significantly higher than that in the Shanghai subgroup.

Table 4 shows the prevalence of childhood overweight/obesity in groups IV and V. The prevalence of overweight was much higher in boys and girls of group IV (9.1% and 4.8%) than in those of group V (3.1% and 2.0%). The prevalence of obesity was even 1.6 and 2 times higher in adolescent boys and girls of

TABLE 3

The Prevalence and Trends of Overweight and Obesity in Chinese Urban Children and Adolescents Aged 7-18 Years in Costal and Inland Big Cities, 1985-2000

Population	1985 yr		1991 yr		1995 yr		2000 yr	
	Overweight (%)	Obesity(%)						
7-12 Years Boys								
Costal Big Cities	1.5	0.4	5.9	2.8	9.3	5.6	14.7	10.6
Inland Big Cities	0.6	0.2	3.8	1.2	5.9	2.1	9.7	4.2
13-18 Years Boys								
Costal Big Cities	1.4	0.1	5.6	1.0	10.5	3.5	14.4	7.7
Inland Big Cities	0.6	0.0	3.1	0.3	5.1	1.2	8.9	2.1
Average of 7-18 Years Boys								
Costal Big Cities			5.8	1.8	9.9	4.5	14.5	9.1
Inland Big Cities			3.5	0.7	5.6	1.6	9.3	3.1
7-12 Years Girls								
Costal Big Cities	1.0	0.3	3.3	1.9	4.7	3.6	8.4	6.3
Inland Big Cities	0.5	0.2	4.3	0.9	3.1	1.1	4.3	2.6
13-18 Years Girls								
Costal Big Cities	2.2	0.2	2.1	0.8	7.0	2.1	9.3	3.4
Inland Big Cities	1.6	0.1	2.5	0.3	4.5	0.8	6.1	1.2
Average of 7-18 Years Girls								
Costal Big Cities	1.6	0.2	2.8	1.4	5.9	2.8	8.8	4.8
Inland Big Cities	1.1	0.1	3.4	0.6	3.8	0.9	5.2	2.0

TABLE 4

The Prevalence and Trends of Overweight and Obesity in Chinese Urban Children and Adolescents Aged 7-18 Years in Coastal and Inland Medium and Small Sized Cities, 1985-2000

Population	1985 yr		1991 yr		1995 yr		2000 yr	
	Overweight (%)	Obesity(%)						
7-12 Years Boys								
Costal Cities	1.5	0.4	~	~	7.6	3.0	12.4	8.5
Inland Cities	0.5	0.1	~	~	3.5	0.5	8.2	3.6
13-18 Years Boys								
Costal Cities	1.4	0.1	~	~	4.1	1.1	12.3	4.9
Inland Cities	0.6	0.1	~	~	4.4	0.1	6.9	1.9
Average of 7-18 Years Boys								
Costal Cities	1.4	0.3			5.8	2.0	12.4	6.7
Inland Cities	0.5	0.1			3.9	0.3	7.5	2.8
7-12 Years Girls								
Costal Cities	1.0	0.3	~	~	4.1	2.3	6.9	4.8
Inland Cities	2.3	0.2	~	~	2.0	0.9	4.2	2.0
13-18 Years Girls								
Costal Cities	0.4	0.2	~	~	5.6	1.2	6.9	2.7
Inland Cities	1.7	0.1	~	~	3.5	0.4	5.6	0.9
Average of 7-18 Years Girls								
Costal Cities	0.7	0.2			4.8	1.7	6.9	3.8
Inland Cities	1.9	0.1			2.8	0.6	4.9	1.4

the former than in those of the latter. The prevalence of obesity and overweight was generally lower in group IV than in group II, but much higher than in group III. On the other hand, the prevalence of overweight and obesity in group V (especially for the adolescent girls) was significant lower than that in group III.

Trends of Prevalence in 1985 to 2000

From 1985 to 2000, dramatic increase in the epidemic overweight/obesity was found among all the five groups based on their prevalence. For group I, the early stage of epidemic overweight already existed in 1985, and the prevalence of obesity/overweight increased rapidly and steadily from 1985 to 1991 and from 1995 to 2000. During this period, the increase rates of obesity were much higher than those of overweight (6.6 vs 3.2 times and 5.3 vs 4.3 times for the boys aged 7-12 years and 13-18 years; 5.7 vs 3.2 times and 3.3 vs 1.8 times for the girls of corresponding age groups, respectively).

For groups II and III, an early epidemic overweight was found in 1991 (Table 3). Dramatic increases in the prevalence of obesity/overweight had been identified in group II since then, with the similar trends as in group I in the same period. Taking the girls aged 7-12 years as an example, the prevalence of obesity and overweight in 2000 was 3.2 and 3.4 times higher than that in 1991. In the same period, the prevalence of overweight and obesity (especially that of obesity) in group III was increased at a rapid rate despite a very low epidemic rate.

An epidemic overweight/obesity had already been shaped in groups IV and V since early 1990s

(Table 4). For the boys aged 13-18 years in group IV, the prevalence of obesity and overweight was 3.5 and 2 times higher in 2000 than in 1995. Group V was just at the beginning of epidemic overweight in 1995. However, rather high increase rates, especially for obesity were found among all the sex-age subgroups from 1995 to 2000.

Continuous Increasing Trend of Overweight/Obesity

Figures 1 and 2 take Beijing subgroup as an example to show the consistent and rapid increasing shift of overweight/obesity in Chinese metropolises in recent years. In 2004, the prevalence of overweight/obesity in the boys and girls aged 7-18 years already reached 30.6% and 18.5%, respectively. The 10-12 years old boys and the 13-15 years old girls constituted the highest risk subgroups of overweight/obesity. Besides, greater gender differences were witnessed during these years.

Figures 3-6 take Nanjing (costal big city), Lanzhou (inland big city), Yingkou (coastal medium sized city) and Qujing (inland small sized city) as separate examples to illustrate different trends of overweight/obesity among different socioeconomic populations. Taking the 7-12 years old boys as an example, the prevalence of overweight/obesity in these cities reached 32.9%, 22.0%, 16.3%, and 13.3% in 2004, respectively, all showing a rapid increase in terms of their original epidemic rate, but the increments were much higher in the big cities (6.7 times in Nanjing and 7.8 times in Lanzhou) with higher epidemic rates than in the small-sized cities (4.6 times in Yingkou and 5.7 times in Qujing) with low epidemic rates in 1985.

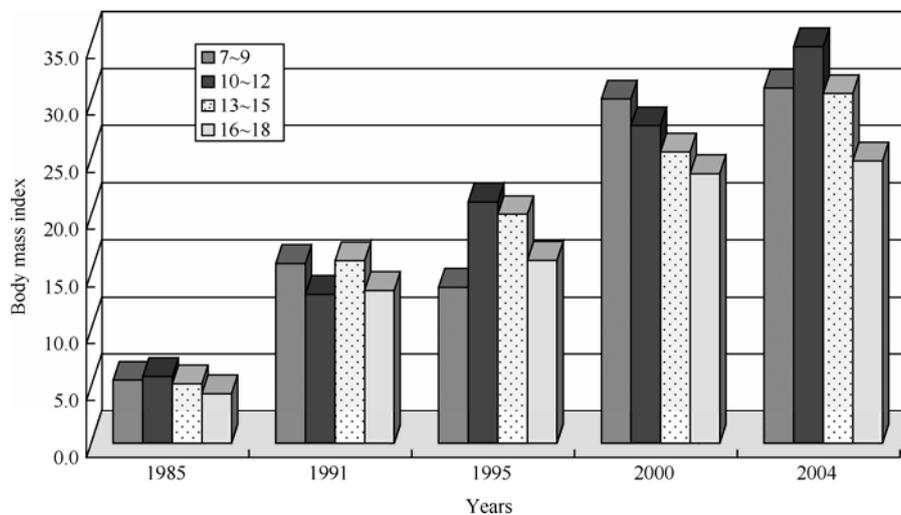


FIG. 1. The increasing trend on the prevalence of overweight/obesity combined among Beijing boys, 1985-2004.

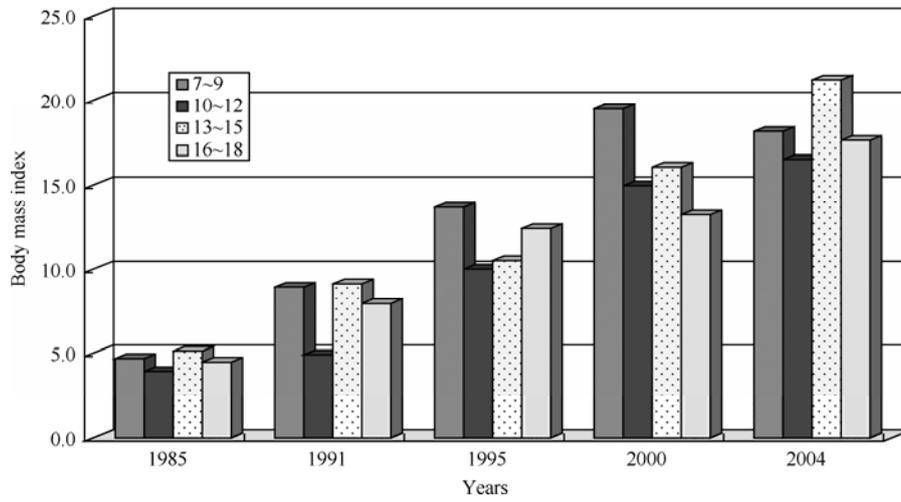


FIG. 2. The increasing trend on the prevalence of overweight/obesity combined among Beijing girls, 1985-2004.

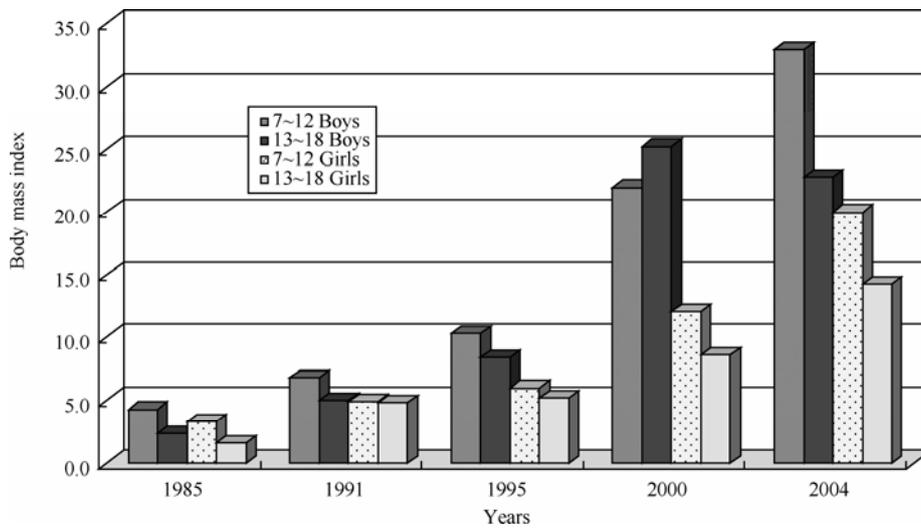


FIG. 3. Trends on the prevalence of overweight/obesity combined in Nanjing City, Jiangsu Province, 1985-2004.

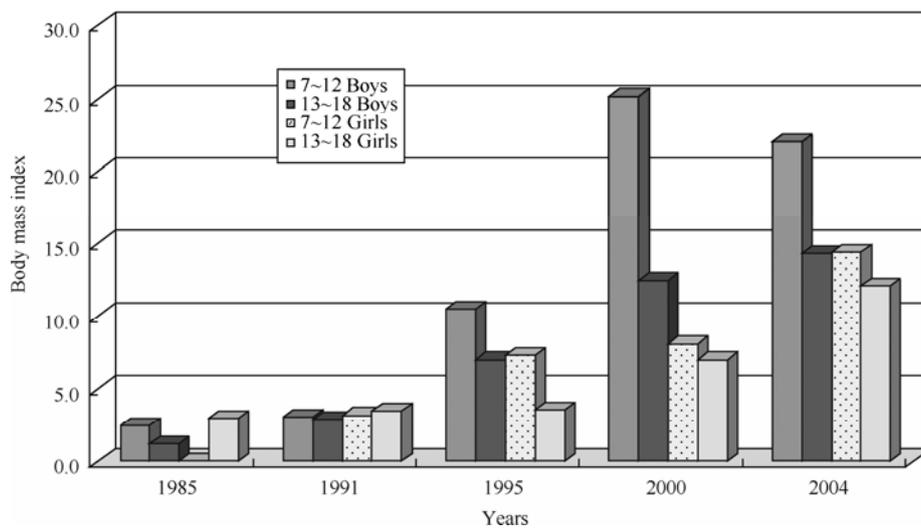


FIG. 4. Trends on the prevalence of overweight/obesity combined in Lanzhou City, Gansu Province, 1985-2004.

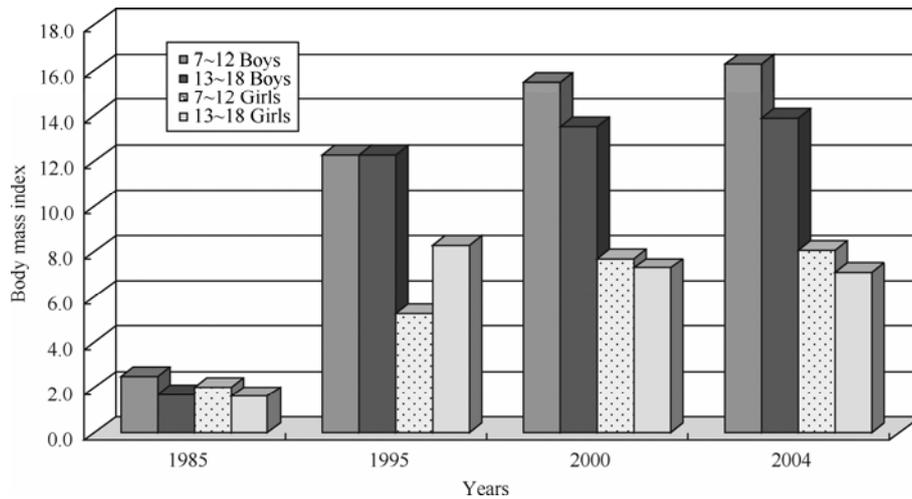


FIG. 5. Trends on the prevalence of overweight/obesity combined in Yingkou City, Liaoning Province, 1985-2004.

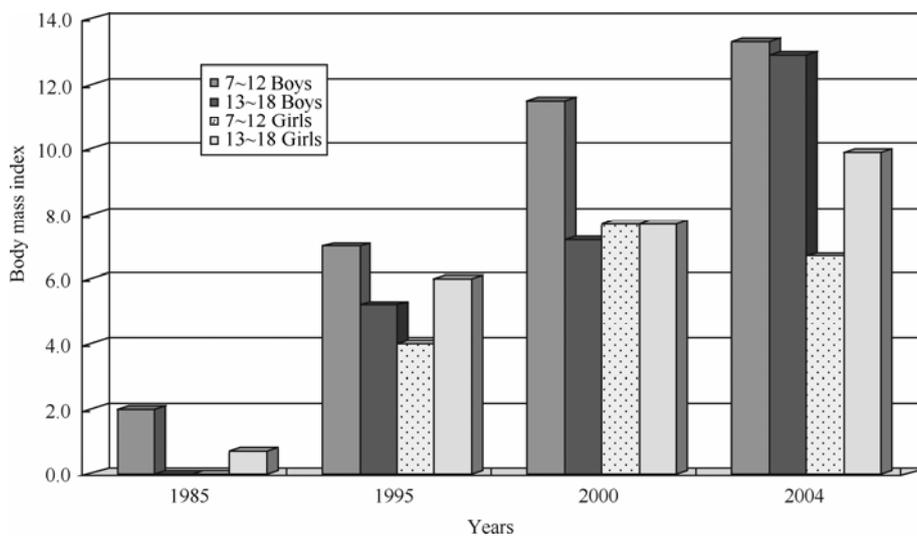


FIG. 6. Trends on the prevalence of overweight/obesity combined in Qujing City, Yunnan Province, 1985-2004.

DISCUSSION

The “percentage (%) of obesity” is an index commonly used for estimating obesity epidemic and trends in developed countries. However, since China is at an early epidemic stage of obesity and emphasis is placed on raising public awareness of its early prevention, both “% of overweight” and “% of overweight/obesity combined” were frequently cited in this study. The criterion for defining obesity/overweight is the new WGOC reference proposed by Chinese scientists which is characterized by the following two aspects. First, it uses similar definitions of obesity and overweight for 7-12 years old children as the international reference (NCHS BMI curves). Second, it uses a relatively low and less skipped BMI-for-age curve for 13-18 years old

adolescents, that comparatively matches with the growth pattern of body composition in Asian populations^[18-20]. Rather than 25 and 30, 24 and 28 of BMI were respectively used as cut-offs of overweight and obesity for the 18-years old boys and girls as previously described^[21]. Our screening process documented the validity and sensitivity of this new reference in describing the prevalence of overweight/obesity, showing the variation among target groups and the trends over time^[10]. It is concluded that this new reference can be used nationwide in an effective way.

An epidemic of childhood overweight/obesity is spreading in Chinese urban areas. However, the prevalence manifests a gradient distribution both in sex-age subgroups and in different socioeconomic groups. (a) 7-12 years old children represent the

relatively high risk subgroup of obesity in comparison with adolescents; (b) the prevalence of obesity is much higher in boys than in girls; (c) in 2000, only the prevalence of obesity in 7-18 years old boys in Beijing and 7-12 years old boys in Shanghai and other coastal big cities (group II) dropped to a low level of epidemic obesity as in developed countries (10%-15% in boys and girls)^[22]; (d) the prevalence of obesity declined to a low level of epidemic obesity (7%-10% both for boys and girls) as in societies during economic transition^[23] only among the youth in group I (except for the adolescent girls), the boys in group II and the 7-12 years old boys in group IV (except for the adolescent girls), the boys in group II and the 7-12 years old boys in group IV; (e) the prevalence of obesity was only 1.2% in adolescent girls of group III, and 1.9% and 0.9% in adolescent boys and girls of group V, respectively, accounting for more than 60% of the Chinese population. It clearly suggests that the epidemic of childhood obesity in China urban areas is generally at an early stage at present.

However, the overall increasing trend of overweight/obesity occurred among all the sex-age subgroups in the urban areas within a span of 15 years should be taken into serious consideration. This trend can be divided into four stages: (a) in 1985, an epidemic of overweight occurred in the advanced metropolises, such as Beijing and Shanghai; (b) from 1985 to 1991, swift changes took place among groups I, II, and IV, and the 7-12 years old boys in group I became the highest risk subgroup. The prevalence of obesity in Beijing subgroups in 1991 was 1-3 times higher than that in 1985. In groups II and IV, the increasing trend of overweight was strong, whereas that of obesity was weak; (c) from 1991 to 1995, the increasing shift of overweight/obesity was consistently rapid in group I, while the increasing rates in groups II and IV were even higher. In groups IV and V, significant increasing trends also occurred based on a low previous epidemic; (d) from 1995 to 2000, the prevalence of obesity among 7-12 years old boys reached the average level of developed countries, though the overall prevalence of obesity, especially in the adolescent girls, remained much lower than that in these countries. Moreover, the current continuous rapid increasing trends as shown by the 2004 survey indicated that the prospect of epidemic obesity in China was in no way optimistic, at least in the near future.

Prevalence of obesity across sub-populations is closely associated with their socio-economic status (SES) and related environmental factors, though the genetic predisposition plays a role, too^[24-25]. Two factors play an important role in influencing the

prevalence of childhood overweight/obesity in China. The first factor ("eastern-western gap") exists between coastal cities in prosperous eastern areas and inland cities situated in less developed areas in western China. This disparity is closely related with SES, which is reflected not only by regional gross domestic product, total annual income per capita, average food consumption per capita, but also by social welfare index and others. Since there are gaps the childhood in the residential conditions (urban or rural areas) of the childhood populations in developed countries, SES status, cultural backgrounds and consequently targeted approach to health promotion will be specifically adopted against different cultural backgrounds of children and their parents. The impact of SES on childhood obesity is more likely attributed to parent's backgrounds, such as knowledge of nutrition and obesity^[26]. In other words, with a well-established food production and distribution system, children and youth in different SES settings in developed countries can virtually access to food choice. However, there is a strong relationship between SES and childhood obesity in China. Children living in coastal areas on average have a better access to meat, poultry and other energy-dense food than their counterparts living in inland areas. Children with higher SES are more likely to become obese than their counterparts with lower SES. This factor not only exerts a strong impact on children's physical growth in long run, but also directly influences the food consumption at present, since children in "western" regions on average have lower BMI than their "eastern" counterparts. That is why the prevalence of childhood obesity/overweight is higher in group IV (coastal middle and small cities) than in group III (inland big cities). In the same period, more evident changes in childhood lifestyle take place in coastal areas than in the inland big cities^[19]. The 2004 survey suggests that lifestyle changes serve as one of the most powerful triggers for the rising prevalence of obesity among Chinese urban population in recent years^[8,15].

The second factor ("southern-northern gap") is independent of SES. This disparity strongly influences children's physical growth, since the "southern" youth have on average lower height, weight and BMI than their "northern" counterparts. For this reason, several coastal big cities have been categorized into the "inland big cities", though they are actually situated in coastal prosperous areas in south China. Shanghai is an alternative example. Although the SES levels are higher in Shanghai than in Beijing, a much lower prevalence of obesity was found among its sex-age subgroups, especially

among the adolescent girls. The prevalence of obesity and overweight in boys and girls of Shanghai is only 74.6% and 55%, and 66% and 65%, respectively, same as in Beijing. Geographic and climate conditions as well as dietary habits play a role. However, further study is needed to clarify how this gap impacts upon the imbalance between dietary intake and energy expenditure.

The information derived from the present study is important, because other than broad population-based approaches, a targeted approach is applied to address the specific factors related to the increasing prevalence of obesity in each group, to allocate health promotion resources in the context of specific conditions of different regions and thus to adopt most appropriate interventions. Specific strategy and approaches are needed for each of the city subgroups, according to the preventive objective and the local SES status and living environments^[27-28]. Obesity prevention should focus on improving the balance between caloric intake and energy expenditure, by rational assorting of foods, avoiding high-fat consumption, increasing physical activity (at least for 60 minutes daily), reducing activities such as television watching and computer games, as well as wide dissemination of scientific knowledge and life skills among children and their parents^[29]. Multiple and integrated interventions should be designed, since no single intervention by itself is likely to produce dramatic reduction in the prevalence of obesity/overweight. Especially for young children, the interventions adopted should be carefully designed and sustainable^[30].

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