Preplanned Studies

Perceptions of Primary Caregivers on Children's Weight Status Versus Actual Weight Status in Children Aged 6–15 Years — China, 2021

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Summary

What is already known about this topic?

Childhood obesity has been linked to adverse health outcomes during both childhood and adulthood. An accurate understanding of children's weight status by primary caregivers is essential for effective weight management strategies.

What is added by this report?

The data utilized in this study were obtained from the 2021 Nutrition Improvement Program for Rural Compulsory Education Students in China. It was found that over one-third of primary caregivers underestimated their children's weight status, and more than half of the primary caregivers of overweight or obese children underreported the weight status of those children. A low level of agreement was observed between primary caregivers' perceptions of their children's weight status and the actual weight status.

What are the implications for public health practice?

There is a relatively higher underestimation of children's weight in China, which necessitates more effective strategies to enhance the primary caregivers' perception of their children's weight status, especially in primary caregivers of males, younger children and children in urban areas.

The prevalence of childhood overweight and obesity has been increasing rapidly worldwide (*1*). In the 2020 Report on Chinese Residents' Chronic Diseases and Nutrition, the rates of overweight and obesity among Chinese children aged 6–17 years were reported to be 11.1% and 7.9%, respectively. Childhood obesity is associated with both physical and mental health problems during childhood, as well as a range of non-communicable diseases in adulthood, such as cardiovascular diseases, hypertension, and Type II diabetes (*2*–*3*). Parents who have accurate perceptions of their children's weight status and are concerned about their health are more likely to take action to modify the weight-related behaviors of overweight or obese children (*4*). Primary caregivers' misperceptions may influence the weight management of their children. Therefore, enhancing primary caregivers' perception of a child's weight status is essential in the prevention and control of obesity. To the best of our knowledge, few studies have explored primary caregivers' perceptions of children's weight status among a nationwide sample of Chinese children and their primary caregivers.

The aim of this study was to examine the consistency between primary caregivers' perceptions of Chinese children's weight status and their actual weight status. Data were collected from the Nutrition Improvement Program for Rural Compulsory Education Students (NIPRCES) in China in 2021. Demographic information, anthropometric measurements of children, and primary caregivers' perceptions of children's weight status were obtained from 160 key monitoring counties between September and December 2021. The monitoring counties included 70 national pilot counties and 60 local pilot counties where NIPRCES was implemented, as well as 30 counties without NIPRCES. In each county, eight schools were selected, with approximately 40 students per class selected in each grade. The fasting weight and height of children aged 6–15 years were measured by trained investigators via standardized protocols. Weight was measured to the nearest 0.1 kg using an electronic scale and height to the nearest 0.1 cm using a height meter. Body mass index (BMI) was calculated using weight and height (BMI=kg/m^2). Children with stunting (assessed by height standards) were excluded. The remaining children were classified into three groups: wasting, normal weight, and overweight/obesity, according to their BMI [based on the Chinese Screening Standards for Malnutrition of

School-Age Children and Adolescents (WS/T 456-2014) and Screening for Overweight and Obesity Among School-Age Children and Adolescents (WS/T 586-2018)]. Information about the relationships of primary caregivers to children and primary caregivers' perceptions of children's weight status was collected by trained investigators using a specifically designed questionnaire. Primary caregivers' perceptions were assessed with the question, "Do you consider your child's body image to be (too thin, thin, normal weight, fat, too fat)?" The responses were categorized as "thin" (too thin and thin), "normal weight", and "fat" (fat and too fat). A total of 171,872 primary caregivers and child pairs were included in the study. The perception and weight status were considered consistent when the primary caregiver's response matched the child's actual weight status (e.g., thin *vs.* wasting; normal-weight *vs.* normal-weight; fat *vs.* overweight/obesity). The agreement between primary caregivers' perceptions and children's weight status was measured using Kappa coefficient. The Kappa values reflected the following: less than 0.00=poor agreement, 0.00–0.20=slight agreement, 0.21–0.40=fair agreement, 0.41–0.60=moderate agreement, 0.61–0.80=substantial agreement, 0.81–1.00=almost perfect agreement. Statistical analyses were performed using SAS (version 9.4; SAS Institute Inc., Cary, USA).

The general characteristics of the children, their actual weight status, and the primary caregivers' perceptions of the children's weight status are presented in Table 1. Based on BMI data, 22.7% of the children were classified as "overweight/obesity", 70.4% as "normal weight", and 6.9% as "wasting". The prevalence of overweight/obesity was found to be higher among males, urban children, children aged 6–8 years or 9–11 years, and those residing in eastern or central China (Table 2). However, according to primary caregivers' responses, only 12.9% perceived their children as "fat", while 59.0% considered them "normal weight", and 28.1% identified them as "thin".

Most of the primary caregivers were the children's parents (88.4%), followed by grandparents (7.8%), and other relationships (3.8%). In this study, it was observed that a mere 59.9% of primary caregivers accurately gauged their child's weight status. However, 35.2% of the caregivers underestimated, and 4.9% overestimated their child's weight status (Supplementary Table S1, available in http://weekly.chinacdc.cn). The agreement between primary caregivers' perceptions and the actual weight status of their children was found to be fair (kappa=0.253). Among normal-weight children, 32.0% of primary caregivers underestimated their child's weight status. Furthermore, more than half (55.6%) of the primary caregivers with overweight or obese children were found to underestimate their child's weight status, classifying them as "normal weight" (51.2%) or "thin" (4.4%) (Table 3).

TABLE 1. General characteristics of children aged 6–15 years and their primary caregivers — China, 2021.

Item	*N* (%)
Age (years)	
6–8	47,288 (27.5)
9–11	59,666 (34.7)
12–15	64,918 (37.8)
Gender	
Male	86,909 (50.6)
Female	84,963 (49.4)
Region	
Eastern	28,983 (16.9)
Central	58,581 (34.1)
Western	84,308 (49.0)
Area	
Urban	50,838 (29.6)
Rural	121,034 (70.4)
Children's weight status	
Wasting	11,808 (6.9)
Normal weight	120,962 (70.4)
Overweight/obesity	39,102 (22.7)
Primary caregivers' perceptions	
Thin	48,333 (28.1)
Normal weight	101,418 (59.0)
Fat	22,121 (12.9)
Total	171,872 (100.0)

Consistency between primary caregivers' perceptions and children's weight status across various age groups, regions, and areas is illustrated in Supplementary Table S1 (available in http://weekly.chinacdc.cn). Primary caregivers of males and younger children had more underestimation about children's weight status compared to caregivers of females and older children. For example, the underestimation rate among primary caregivers of 6–8-year-old males reached 47.1%. Underestimation rates were higher among primary caregivers of children residing in eastern and central regions in China (37.9%, 38.2%) compared to those in western China (32.1%). Furthermore,

TABLE 2. Weight status categories of children aged 6–15 years — China, 2021.

Item	Wasting [*n* (%)]	Normal weight [*n* (%)]	Overweight/obesity [*n* (%)]	*P*
Age (years)				
6–8	3,423 (7.2)	32,333 (68.4)	11,532 (24.4)	<0.001
9–11	4,114 (6.9)	41,195 (69.0)	14,357 (24.1)	
12–15	4,271 (6.6)	47,434 (73.1)	13,213 (20.3)	
Gender				
Male	7,170 (8.3)	57,113 (65.7)	22,626 (26.0)	<0.001
Female	4,638 (5.5)	63,849 (75.1)	16,476 (19.4)	
Region				
Eastern	2,006 (6.9)	19,221 (66.3)	7,756 (26.8)	<0.001
Central	3,484 (5.9)	39,692 (67.8)	15,405 (26.3)	
Western	6,318 (7.5)	62,049 (73.6)	15,941 (18.9)	
Area				
Urban	3,156 (6.2)	34,253 (67.4)	13,429 (26.4)	<0.001
Rural	8,652 (7.2)	86,709 (71.6)	25,673 (21.2)	
Total	11,808 (6.9)	120,962 (70.4)	39,102 (22.7)	

TABLE 3. Consistency analysis of primary caregivers' perceptions on children's weight status and actual weight status in children aged 6–15 years — China, 2021.

Primary caregivers' perceptions	Children's weight status				
	Wasting [*n* (%)]	Normal weight [*n* (%)]	Overweight/obesity [*n* (%)]	Total	Kappa (*P*)
Thin	7,950 (67.3)	38,660 (32.0)	1,723 (4.4)	48,333 (28.1)	0.253 (<0.001)
Normal weight	3,722 (31.5)	77,682 (64.2)	20,014 (51.2)	101,418 (59.0)	
Fat	136 (1.2)	4,620 (3.8)	17,365 (44.4)	22,121 (12.9)	
Total	11,808 (100.0)	120,962 (100.0)	39,102 (100.0)	171,872 (100.0)	

underestimation rate was higher in urban areas than in rural areas (37.8% *vs.* 34.0%).

DISCUSSION

In the present study, a low level of agreement was observed between primary caregivers' perceptions on children's weight status and children's actual weight status. More than half of the caregivers underestimated the weight status of their overweight or obese children, which was markedly higher than the rate observed among caregivers of normal-weight children in our study. These findings align with previous researches conducted in both developing and developed countries (*5*–*7*). For instance, a Saudi Arabian study conducted in the children aged 6–10 years showed that misclassification of children's weight status was higher among parents of overweight or obese children compared to parents of normal-weight children (*5*). In a study that focused on Polish children aged 10–16 and their parents, parental underestimation of children's weight status increased in tandem with the children's weight, with 57.1% of parents having obese children underestimating their children's weight status (*6*).

Parents tended to underestimate children's weight status (*8*). More than a third of primary caregivers underestimated the weight status of children in our study. The underestimation of a child's weight status is associated with various factors such as the child's age, gender, and residence (*9*–*10*). In our study, it was observed that the primary caregivers of males and children in urban areas had more underestimation about children's weight compared to those of females and children in rural areas. Higher weight of males might be more acceptable than that of females for parents (*11*). In a study conducted by Rodrigues et al. (*10*) in Portugal, parents of males living in urban areas were more likely to underestimate their children's weight status. However, a study in China reported that

parents were more likely to overestimate the weight status of children living in urban areas (*12*). Future studies investigating the factors of residence associated with parental perception of children's weight are necessary.

Primary caregivers' accurate perception of their children's weight status can enhance efforts to prevent overweight and obesity, as demonstrated in a study conducted in China. Mothers who perceived their children as overweight were more likely to encourage them to engage in physical activity and modify their diets (*13*). In recent years, the prevalence of obesity has been increasing in both urban and rural areas of China. Both national and international policies encourage parental involvement in the prevention of childhood obesity (*14*). Parents and caregivers should establish a healthy family environment and participate in the weight management of obese children, which will contribute to the prevention of childhood obesity.

This study has some limitations worth noting. As a cross-sectional study, the direction of the relationship between primary caregivers' perceptions and children's weight status remains undetermined. Future research should investigate the factors contributing to primary caregivers' misperceptions regarding their children's weight status.

The accurate perception of a child's weight status by the primary caregiver is crucial for effective weight management. This study found only a fair agreement between primary caregivers' perceptions and the actual weight status of children in China in 2021. Implementing effective strategies to enhance primary caregivers' understanding of their children's weight status is necessary.

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SUPPLEMENTARY MATERIALS

SUPPLEMENTARY TABLE S1. Consistency between perceptions of primary caregivers on children's weight status and actual weight status in children aged 6–15 Years — China, 2021.

Item	Underestimation [*n* (%)]	Consistency [*n* (%)]	Overestimation [*n* (%)]	*P*
Age (years)				
6–8				
Male	11,277 (47.1)	11,952 (49.9)	725 (3.0)	<0.001
Female	9,883 (42.3)	12,621 (54.1)	830 (3.6)	
9–11				
Male	11,549 (38.3)	17,340 (57.5)	1,269 (4.2)	<0.001
Female	9,227 (31.3)	18,885 (64.0)	1,396 (4.7)	
12–15				
Male	10,669 (32.5)	20,161 (61.5)	1,967 (6.0)	<0.001
Female	7,792 (24.3)	22,038 (68.6)	2,291 (7.1)	
Region				
Eastern	10,980 (37.9)	16,991 (58.6)	1,012 (3.5)	<0.001
Central	22,383 (38.2)	33,613 (57.4)	2,585 (4.4)	
Western	27,034 (32.1)	52,393 (62.1)	4,881 (5.8)	
Area				
Urban	19,225 (37.8)	29,443 (57.9)	2,170 (4.3)	<0.001
Rural	41,172 (34.0)	73,554 (60.8)	6,308 (5.2)	
Total	60,397 (35.2)	102,997 (59.9)	8,478 (4.9)	