

# The Specific Characteristics of Childhood Obesity and the Effective Strategies to Combat Childhood Obesity in Hong Kong: A Short Review

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**Abstract**— Childhood obesity is a serious public health problem all around the world. The problem also currently exists in Hong Kong. Unhealthy lifestyle behavior may be one of key factors contributing to childhood obesity.

The review revealed the specific characteristics of childhood obesity and the effective strategies in prevention of childhood obesity in Hong Kong context. Hong Kong is a metropolitan city which is interwoven eastern and western culture. The historical reasons and the complex political issues lead to overcrowded of people living in a small place. The environmental factors and the lifestyle pattern are the crucial causes contributing to childhood obesity. Parents have significant influence in shaping lifestyle behavior of children. While Chinese culture, informal childcare and more energy-dense food consumptions are the specific factors affecting children in lifestyle behavior as shown in the previous studies. The finding of the present review paper is expected to realize root causes of the prevalence of childhood obesity. On the other hand, many studies regarding to the treatment of childhood obesity were also reviewed. It was found that fewer studies were conducted to provide the combined intervention to combat childhood obesity. Generally, parental education was not the focus of childhood obesity intervention programs and parent-oriented approach was not commonly adopted in these programs. While limited childhood obesity intervention programs have been conducted in Hong Kong, it is recommended to conduct an appropriate program for children specifically in Hong Kong context. The design of preventive strategies should take into consideration of these specific characteristics in Hong Kong to reverse the increased prevalence of childhood obesity.

**Keywords-component:** *childhood obesity, lifestyle behaviour, Hong Kong, Parental education*

## Introduction

Childhood obesity is a serious health problem adversely affecting the health of children [1]. It is likely for children to stay obese into adulthood and they sustain a high risk to develop chronic illnesses such as diabetes and cardiovascular diseases at a younger age. To avoid the serious health outcomes, preventive strategies of childhood obesity needs earlier planning and implementation.

## What is Childhood Obesity?

Childhood obesity is defined as the body accumulating excessive fat abnormally and present as a risk of health of children [5]. The weight of obese children is also heavier than the normal weight for their height and age. Because of the continuous physical development of the body of children, the measurement of childhood obesity and adulthood obesity is difference. Skinfold thickness, Body Mass Index (BMI) and growth reference for 5-19 years are the tools to classify childhood obesity. If children's skinfold thickness are more than 25% or 30% respectively [2] or BMI is more than 95th percentiles [3,4] or growth reference for 5-19 years is more than two standard deviation [3, 5], they are classified as obesity.

## Epidemiology of Childhood Obesity

According to World Obesity Federation, childhood obesity is common in westernized countries. In United States, the prevalent rate of childhood overweight and obesity is quite high. Childhood Overweight and obesity increased from 7% in

1980 to 18% in 2012[54]. In United Kingdom, 19.1%, 9.1% of children were obese in aged 10-11 and in aged 4-5 respectively in 2014/15 [58]. Africa, Asia, Europe, the Americas and the Middle East are also found to have the rising prevalence of childhood obesity. Hong Kong is one of the cities with high prevalent rate of childhood obesity in Asia [6]. According to the report from Department of Health, Education Bureau and Leisure and Cultural Service Department, primary school students with obesity has increased from 16.4% to 21.3% in 1997/98 to 2007/08 and the decreased gradually to 20% [7,61]. However, the prevalent rate of childhood obesity is still on the high side.

### **Comorbidity of Childhood Obesity**

Obesity not only affects individuals, but also influences health care system in one's country. It threatens children in current and future health. Obese children are less physically active and spend much more time in sedentary activities. As a result, their physical fitness is negatively affected. Physical fitness significantly associated with physical activity level. It includes cardiorespiratory fitness, muscular endurance, muscular strength, flexibility, coordination and speed [8]. Moreover, children's physical fitness may be affected by maturation status. Sexual maturation in obese girls was found to be earlier when compared with non-obese girl [9]. Obese children are likely to become obese adolescent or adult. They also suffer from various health consequences in physiological and psychological aspects. Many complications may not appear until years later. When children become obese, the metabolic disorder may become in progress and increase physical stress for the body. The onset of some metabolic complications such as insulin resistance and glucose intolerance, hypertension, dyslipidemia, non-alcoholic fatty liver disease, menstrual abnormalities and sleep apnea are earlier. It significantly influences mortality and mobility in their later life [10, 17].

Obese children also confront difficulties in social interaction. Laziness and lack of individual self-control are the prevalent perceptions of obese people, including obese children. The negative attitude of public has made obese children under the stress of stigmatization. Under the negative experience, they subjected to bullying and harassment [11]. From a study determining any associations between BMI and body esteem of overweight and obese children, it found that BMI inversely associated with body esteem [12]. Also, they also experience social difficulties with peers and teachers. A study assessed the peer relation of obese children in classroom environment shown that obese children significantly less nominated as best friends, less leadership behavior and more aggressive-disruptive behavior were perceived. Teachers also described obese children as more prosocial, compared with peers. Peers observed obese children as less attractive and less authentically skilled. They were ill more often and get fatigue easily [13]. Obese children promoted an increased risk of having depression, anxiety, and suicide [11, 12, 13].

Academic performance of obese children was poor performed, compared with non-obese children. A study reviewed numerous papers and found that obese children had poor academic performance in the United States [14]. Another similar study investigated the effectiveness of the school-based program on BMI percentile and academic performance in the United States. Children in the intervention group had more BMI percentile reduction and better academic performance, compared with children in the control group [15].

Obesity becomes the economic burden on the health care system in many countries. The direct cost in treating obesity included preventive strategies, investigation, treatment, and relevant problems. Another indirect cost such as economic losses and its related conditions cannot be calculated [18]. In the United States, the direct medical costs of childhood obesity are 14.1 billion and \$237.6 million for outpatient and inpatient care respectively [19]. The indirect cost is not estimated. Little evidence was published to estimate the medical costs of childhood obesity in Hong Kong.

### **Literature review of childhood obesity**

After reviewed many literatures as above, the imbalance of energy intake and consumption is the key factor contributing childhood obesity. Many researchers focused on this aspect to provide various interventions for prevention of childhood obesity. Moreover, some of them also provide the other effective strategies to benefit the health of children.

### **Childhood Obesity Worldwide**

Childhood Obesity is an epidemic worldwide. The current situation and view of childhood obesity is also revealed in their countries. Different factors affecting childhood obesity, intervention and the challenge in management were also addressed [53]. Many situations affect children become obesity. In the United States, parents are busy in working; many single parent families were formed. They spent much time to earn their living so that children' health is ignored [59]. The public perception viewed obesity as a disease shift to consider as a matter of personal responsibility. Although it generalized describing overweight and obesity, childhood obesity becomes a health concern in Sweden [56]. To help children remaining healthy, the collaboration among parents, teachers and health professional is necessary [59]. However, the focus of this paper is in exploring childhood obesity in Hong Kong and a brief summary will only be highlighted in this short review

While many countries confront the same health problem, no effective strategies were noted. A report recommended the further research direction on childhood obesity. It suggested the researchers fully understand the impact of diet, physical activity and obesity of children including new idea testing, develop new model and find out the critical period on obesity development [70].

## Childhood Obesity in Hong Kong

Hong Kong has complex background with historical and political issues. It is a metropolitan city which is interwoven eastern and western culture. Due to historical agreement, Hong Kong is a colony belonging to the United Kingdom from 1842 1997. It becomes a special administrative region of China with self-governing (HKSAR). More than 90% people are Chinese and they are growing in the environment with mixed culture. A high proportion of migrants from mainland China settle in Hong Kong after widen the policy of immigration. The aim of their immigration is to enjoy western lifestyle, higher quality of life and upward economic mobility. Due to the higher living standard and metrics of health, most of people have long life span and lower infant mortality rate. Hong Kong is a small place with accommodating huge amount of people. As a result, families are living in the tiny apartment and afford higher living cost. To afford the heavy cost of living, half of women work outside in Hong Kong. Children are under care by grandparents, domestic helpers, and nurseries [28]. Due to the great difference in socioeconomic status and lifestyle practice between citizens and immigrants, many families problems such as child abuse and divorce, are increasing in the group of newly immigrant families [42]. These families also confront the acculturation stress and affect their living and behavior. The problems of lower breast-feeding rates, lower activity level and problems in oral health, diet, behavior and obesity related to the parenting skill. Lower socioeconomic background, single parent families and newly immigrant families were found to have more problems in parenting so that affecting children development [41]. The government provides more services and more positive parenting programs in concerning the health of children. However, these services are free for permanent citizens only and not eligible for immigrant families [41].

## Risk Factors of Childhood Obesity in Hong Kong

Apart from genetic factor, child weight status directly associated with lifestyle behavior such as dietary intake, physical activity and sedentary behavior [16]. A healthy lifestyle promotes health and increase energy expenditure of children. These lifestyle behaviors interfere energy balance of children and contributing to childhood obesity.

## Physical activity

Physical activity can significantly increase energy expense of children. It is suggested to engage in physical activity for at least 60 minutes daily, but few individuals can fulfill this recommendation [17]. It is an activity to increase energy expenditure. Many factors such as environmental factors and design, parents' lifestyle and perception of physical activity affect the level and the pattern of physical activity of children.

Hong Kong is a small place to accommodate millions of people. People need to live with tiny apartment with high living cost. It is no doubt to predict the lack of facilities and limited space for physical activity engagement. A study assessed the association between socioeconomic status of adolescents and physical activity level. Adolescents with lower

socioeconomic status found to have lower level of physical activity participation. Their neighborhood area is lack of sport facilities and recreational facilities and the presence of steep streets. On the other hand, adolescents with higher socioeconomic status more physical active in school –based environmental support [24].

The arrangement of activity and the perception in physical activity of parents affects the level of physical activity engagement of children. Hong Kong parents are physically inactive. Parents understand physical activity to bring children' well-being, they seldom encouraged children engaging in physical activity [23]. Hong Kong parents are likely to overprotect children and control their development and achievement directly. Many parents need to engage in full-time employment so that they arrange children spent much time on nonconductive physical activity in the adult-controlled social settings. A study investigated how Chinese parents' thinking on encouragement or discouragement of children' physical activity in Hong Kong. It showed that parents encourage children engaging in physical activity with high participatory engagement of them. In contrast, parents did not allow children to engage in physical activity because of lack of time and safety concern. Parents arrange more indoor activities for children instead of outdoor activities [26].

The subject of Physical Education arrangement also affects the physical activity level of children. Hong Kong schools need to meet 5-8% of the total curriculum time allocation for physical education only [30]. The subject of physical education is undervalued so that it restricts physical development and impairs the health of children [27]. Although two physical education lessons are provided per week, the physical activity level of children is questionable. A study assessed the physical activity level of children in Hong Kong primary schools. During the lesson, children are likely to walk or stand on the playground whereas relatively less time engaging in moderate to vigorous physical activity. Moreover, the participating time of physical activity is not enough to achieve the health-related purposes in physical education lessons [60].

## Sedentary behavior

It is the behavior to reduce energy expenditure and contribute to obesity of children. TV viewing, playing digital games and computer games are counted to be sedentary behavior [21]. In Hong Kong, TV viewing is the common recreation activity for children. While TV viewing cannot increase the energy output of children, it has synergetic effect when children eat more energy-dense foods at the same time [23]. Parents appreciate the health benefit of physical activity but they usually have habitual lifestyle behavior such as shopping, Yamcha, watching a movie, and they seldom engaged in physical activity. Children were also encouraged having such habitual behavior as mentioned rather than physical activity engagement [27].

## Dietary intake

Dietary behavior determines the amount of food intake and eating pattern that affects energy intake of children. Parents play a significant role in building a healthy eating environment and shaping eating behavior of children.

### Large food Portion

The eating amount determines the energy intake of children and is . More energy intake, the higher risk of contributing to childhood obesity is well-known. An ethnographic study was conducted to confirm risk factors and reveal how these factors interacted and contributed to obesity. The main finding demonstrated that parents or grandparents feed children food with oversize was one of the risk factors producing obesity of children in Hong Kong [28].

### Eating Out

Eating out is a habit increasing energy intake of children. Eating prepacked foods, ready-to-eat meals and eating foods in restaurants are also included the habit of eating out [40]. Food with eating out contains higher energy, fat intake, and lower micronutrient intake. Children tend to become obese when they have this dietary practice [58,59]. Parents are the persons to alter unhealthy eating habit of children. Fewer families make meals and have practice of eating out when parents are working [44]. In Hong Kong, children had the practice of eating out of home more than three meals per week. They commonly consume foods in western and eastern restaurant. Another study assessed how the current policies and practices affecting children's weight in Hong Kong. Primary carers such as mothers and grandparents were interviewed. Grandparents who are main carers of obese children, preferred to buy prepackaged supermarket food that branded in English or American products for children. It reflected grandparents did not realize the prepacked foods increasing energy intake of children and impairing the health of children [28]. Full-day school arrangement commonly facilitated in primary schools in Hong Kong and students must have lunch in schools. The majority of children consume school lunch so that eating out becomes a usual eating habit of children. Therefore, primary school students are more likely contributing to obesity in Hong Kong [31].

### Breakfast Skipping

Breakfast skipping is an unhealthy eating habit producing more energy intake of children. When children skipped breakfast, they consume more snacks. They usually consume higher fat and energy-dense snacks [44]. However, it is the common habit of Hong Kong children and adolescents. A study investigated the association between breakfast skipping and BMI of Chinese children in Hong Kong. A standardized questionnaire was used to assess their breakfast habit and lifestyle for two years. A negative association between breakfast skipping and BMI found. Interestingly, children with breakfast skipping also associated with another unhealthy

lifestyle behaviors such as low level of physical activity. It also found that parents and children also have a wrong concept that breakfast skipping is a strategy for weight control [32]. It is necessary to reinforce the health education among parents and children.

### Snacking

Snacking is defined as the habit to eat little and often [31]. It contributes to obesity because of positive energy balance. Frequent snacking was associated with obesity. Sweet, fatty snacks such as cakes/cookies, candies/chocolate and desserts were common choices for snacking and contributed to positive energy intake. Seventy-nine percent of children reported to have habitual snacking in school breaks [31]. They were usually consumed potatoes chips as their snacks and another energy-dense food [23]. To promote health benefit and prevent childhood obesity, parents should encourage children to develop healthy eating habit and provide adequate food choice for children [23].

## Specific Characteristics of Childhood Obesity in Hong Kong

Hong Kong is a city which mixed with eastern and western culture. Apart from unhealthy lifestyle behavior as mentioned above, parenting style and informal childcare are specific factors influencing energy consumption of children in Hong Kong.

### Over emphasis placed on academic achievement

Under Confucianism, quality parenting reflected on the academic achievement of children. Parents concern academic performance rather than other developments. It is the most important indicator of the success of children [27]. Too much physical activity is discouraged because of affecting academic concentration [51]. Children have great encouragement to engage in physical activity when their parents participated in physical activity together. However, parents focus on work and caring of children resulting in no time engaging in physical activity with them [27]. On the other hand, parents control child's development and achievement with high-level engagement. Although parents provide instrumental, motivation and conditional support on physical activity of children, they discouraged children's physical activity due to lack of time, safety issues and focus on academic achievement. The parental practice absolutely affects physical activity engagement of children [26].

### Informal Childcare

Informal childcare defined as caring children by grandparents, other families, friends or others [52]. It is another situation contributing childhood obesity. They are less likely to regulate food intake and activity pattern. However, mother is less likely to give snack children at irregular times, compared with caring for fathers or grandparents [21]. Many parents work with the long schedule in Hong Kong. Grandparents and

domestic helpers become main carers of children. They experienced poverty, and were less likely both children eating. Under Chinese culture, fat represent a symbol of wealthy and healthy so that grandparents encouraged children to eat more [52]. Moreover, grandparents also focus on the academic achievement of children and do not allow them engaging in physical activity [28].

### Strategies of Childhood Obesity in Hong Kong

Increasing leisure places and relevant facilities encourage physical activity engagement in Hong Kong. Many literatures described and explored the risk factors, consequences and review the current situation of childhood obesity in Hong Kong [22, 23,24,25,26,28,31,33,36,43,48,49,63]. These literatures focus on how parenting practice and informal care affecting various lifestyle behavior of children. As the limited places such as lack of sport facilities and tiny living area is the cause inhibit physical activity of children [29]. It is no doubt to increase more leisure places, sport facilities or recreation centers motivating physically active of children in Hong Kong.

Sleeping pattern is also associated with childhood obesity. Many cross-sectional studies were conducted to find out the association of some habits with childhood obesity. A study investigated the association between sleeping compensation during weekend and holiday and childhood obesity. It revealed that sleep compensation during weekend and holiday cannot compensate the sleeping deficit in weekdays. Children had high risk contributing to obesity if they had such habit [38]. Children probably have breakfast slipping and have two meals at the same time in weekend so that they eat more, compared with weekdays. It should arouse parents' alertness to avoid such bad habit.

The perception of body weight is significantly related to exhibit weight control behavior. A cross-sectional study examined the relationship between body weight perception, gender, estimated BMI and weight control behavior. Adolescents, even male and female exhibited more weight control behavior such as exercise and restrict calorie intake when they perceived themselves becoming overweight [37]. The explicit body weight perception should be elaborated more to understand the perspective of adolescents so as to control the problem of obesity.

Medical-related strategies in treating obese-related diseases and current strategies were introduced in Hong Kong. These studies investigated the relationship between childhood obesity and various diseases or the development of reference frameworks in primary care setting in preventing childhood obesity [20, 34, 35]. The former literatures is related to the risk and consequence towards childhood obesity and the latter literature described about current clinical service and the reference framework for preventive care for children. These literatures provided the further comorbidity and a current view related to childhood obesity.

#### Effective and Ineffective Strategies

Many various strategies such as low glycemic diet and motivational interview had been examined the effectiveness to

combat childhood obesity. A study investigated the effectiveness of low glycemic diet in control of BMI and the other obesity index for youth in Hong Kong. It addressed the significantly reduction in waist circumference, BMI and body weight but no difference was found in in body fat percentage and visceral fat percentage [62]. Another study assessed the effectiveness of motivational interviewing and phone follow up to promote weight loss in obese children respectively. It revealed the significantly improvement in their weight-related behavior and obesity-related anthropometric measures in both experimental groups. Although the motivational interviewing and phone follow up involved many messages regarding to behavioral change, dietary intake and physical activity, it did not examine the maintaining effect after the treatment period [45].

Habitual engagement in physical activity and healthy dietary behavior is a primary intervention to enhance the health of individuals. Fewer studies were found to enhance the health in promoting healthy lifestyle behavior. A study assessed the effectiveness of rope skipping to encourage physically active of children. Although the physical activity level of children did not have the significantly improvement, the better health quality of life was perceived [46,55]. It reflected the single intervention is less effective, compared with the combined interventions.

The various campaigns are organized to promote healthy eating and physical activity for school children by Department of Health and the Education Bureau [20]. Although parents also support and appreciate these campaigns and the effectiveness of weight loss, it cannot maintain the long-term effect because no reinforcement of parents' knowledge in childhood obesity was provided. The healthy lifestyle behavior cannot be formed under parents' assistance till adulthood.

After reviewed previous studies and their strategies, the healthy lifestyle behavior must be promoted to shape children's behavior. At the same time, it is better to invite parents' participation to assist children figuring positive behavior. Furthermore, the single intervention is not recommended to provide either promotion on physical activity or healthy dietary intake. It is recommended to provide several interventions such as parental education in health knowledge and parenting skill and collaboration with teachers or health care professionals at the same time in order to enhance behavioral change of children. The combined interventions are more powerful to enhance the effectiveness on prevention of childhood obesity [64].

### Research Gaps

After reviewed previous studies, some research gaps were found. Referred to the previous studies worldwide, the collaboration among parents, teachers and health professionals is essential to the comprehensive interventions of childhood obesity [69]. Moreover, a report recommended the further research direction on childhood obesity is to fully understand the impact of diet, physical activity and obesity of children including new idea testing, develop new model and find out the critical period on obesity development [70]. As fewer



interventional studies of childhood obesity were not found to promote healthy lifestyle behavior in Hong Kong, the collaboration among parents, teachers and health professional is needed to promote healthy lifestyle behavior. On the other hand, parents are the primary carers of children who are shaping lifestyle behavior of children. Their knowledge affects the activity arrangement and lifestyle behavior of children so that parental education is vital in delivering correct health message and facilitating children adoption of healthy lifestyle behavior [32]. The further research studies may focus on the provision of the combined interventions and the enhancement of parental education to combat childhood obesity in Hong Kong.

## Conclusion

Childhood obesity affects the health of children in Hong Kong. Unhealthy lifestyle behavior is the risk factor contributing to childhood obesity. To enhance the health of children, collaboration with different disciplines is necessary to provide effective strategies in controlling childhood obesity in various behavior of children. Apart from collaboration, parents play a significant role to shape or facilitate this behavior, parental education and parent-oriented approach on combating childhood obesity is important.

As Hong Kong is a metropolitan city with a unique mixture of east and west cultures, parents arrange more sedentary activity and increase energy intake of children under the influence of Chinese culture. The prevalence of informal childcare, overemphasis on academic performance resulting in reduced level of physical activity, breakfast skipping and snacking of children become specific characteristics contributing to childhood obesity in Hong Kong. Parents should be alerted of the prevalence and be reminded to minimize such arrangement or behavior of children. However, parental education and parent-oriented approach was rarely found in reviewing previous programs and studies. As childhood obesity in Hong Kong prevails, it is necessary to tailor made an effective program with parental education or parent-oriented approach to promote healthy lifestyle behavior for children. It could be more effective in enhancing health and quality of life of children.

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