

Preventing Childhood Obesity Through Nutrition Strategies in Early Education Settings: A Comparative Study of China and the UK

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Abstract

This study aims to explore how China and the UK carry out obesity prevention work in the early stage of children aged 0–5 years through nutritional strategies. Through comparative analysis of national policies, institutional practices and influencing factors at the family level in the two countries, similarities and differences in intervention concepts and implementation paths are identified. The results show that: first, both countries attach great importance to the importance of early intervention, but the UK focuses more on legal and financial means, such as imposing a sugar tax; while China mainly focuses on health education and school-based interventions, especially in rural areas. Second, the implementation effect of the strategy is significantly affected by socioeconomic status and family environment, and disadvantaged families have more obstacles in nutrition knowledge and food access. Third, schools and early childhood institutions, as key intervention platforms, have played an important role in promoting healthy eating and behavior, but in actual implementation, they still face problems such as uneven resources and limited family cooperation. This study recommends that in the future, multi-level collaboration should be strengthened, family participation should be strengthened, school monitoring mechanisms should be improved, and financial tools should be combined with educational strategies to improve intervention effectiveness. Although this study is based on secondary literature, it still provides a useful reference framework for subsequent academic research and policy making.

Keywords: Early childhood obesity, Nutrition strategies, Health policy.

1. Introduction

1.1 Research Background

The aim of this study was to examine how nutritional strategies in China and the UK support the prevention of childhood obesity. In recent years, childhood obesity rates in China and the UK have increased year by year, and nutritional interventions have become increasingly important in the early childhood stage in both countries. Early childhood living habits have a profound impact on children and affect their long-term healthy development. Although China and the UK have different cultural backgrounds, social systems and educational policies, both countries are now facing the problem of rising childhood obesity rates. The results of the National Child Measurement Program (NCMP) implemented in the UK show that in 2008/9, 9.6% of young children were classified as obese (Rees et al., 2011). At the same time, according to Chinese standards, from 2015 to 2019, 6.8% of children under the age of 6 in China were overweight, and the obesity rate was 3.6% (Pan et al., 2021). In view of this worrying trend, China and the UK have both actively introduced and implemented corresponding nutritional strategies to intervene in order to effectively reduce the obesity rate among young children.

1.2 Research Aims

This study aims to extract universal and targeted lessons by comparing the policies and educational practices of the two

countries. The goal is to offer practical inspiration and references for future nutritional intervention measures aimed at combating childhood obesity in both China and the UK. Subsequently, this research will provide effective strategies for promoting children's nutritional health, thereby facilitating the healthier growth of young children.

1.3 Methods and Data Sources

This study will employ a secondary research method, by reviewing and analyzing existing literature. Including official documents issued by the government, policy guidelines, reports of international organizations and relevant authoritative academic articles. Initially, the study will conduct a systematic literature review to establish a solid foundation of knowledge. This will be followed by a continuous and meticulous analysis of the data gathered. Subsequently, comparative analysis of the main practices of nutrition strategies in China and the UK. This analysis will delve into the effects of their implementation, as well as the limitations and challenges they encounter. In addition, data sources include a series of policy documents such as the UK's "Childhood Obesity: Action Plan" and China's "National Nutrition Plan (2017-2030)", as well as relevant supporting literature. The study uses thematic analysis to discuss and analyze from multiple dimensions, including the country, government, family, and school.

1.4 Literature Review

This literature review provides insights into how nutrition strategies are used to support obesity prevention in early childhood education in China and the UK. By examining existing research, this review aims to identify effective practices and conduct a comparative analysis of the approaches of the two countries. The discussion will focus on three main areas: the specific strategies implemented in each country, how these strategies compare across different cultural contexts, and an assessment of the gaps in the current literature.

1.4.1 Definition of Early Childhood Obesity

First, let's discuss the definition of early childhood obesity. Childhood obesity is generally considered to be a condition in which energy intake exceeds consumption for a long time, resulting in excessive accumulation of body fat, and the weight exceeds the standard for normal children of the same age and height. However, regarding the definition of early obesity, Kamal (2017) pointed out that "according to Poskitt (1995) on behalf of the European Childhood Obesity Group (ECOG), the lack of a definition of childhood obesity has always been a concern of the group." But since then, from the study of Poskitt and Edmunds (2008), it is known that although the definition of obesity is not very precise, the concept of BMI (body mass index) has been widely accepted. BMI is calculated by dividing the weight (in kilograms) by the square of the height (in meters). Flegal et al. (2010) divided age-related BMI into three categories: "normal", "medium" and "high", among which the "high" group has the greatest risk of obesity and the "normal" group has the lowest risk. Rolland-Cachera et al. (2011) identified three main BMI cutoffs starting at 5 years of age, distinguishing four ranges of "thin", "normal", "overweight" and "obese". Zhao and Grant (2011) pointed out that obesity is the result of a combination of genetic and environmental factors, and defined obesity as excessive accumulation of body fat. Skinner and Skelton (2014) believed that overweight and obesity in children can be defined by BMI exceeding the 85th and 95th percentiles. Al-Gindan et al. (2015) emphasized that although BMI has a weak correlation with body fat content, it is still the most common method used to distinguish between thinness and obesity.

1.4.2 The Impact of Obesity on Children

After this, let's explore the impact of childhood obesity on children's health. Bechard et al. (2013) investigated and analyzed 28 studies on hospitalized children over the age of 2 years old. The results showed that 10 studies reported a significant positive correlation between obesity and mortality. Among these 28 studies, 8 explored the incidence of infection, and 2 of them pointed out that the infection rate of obese patients was significantly higher than that of non-obese patients. In addition, 5 of the 11 studies on hospitalization time showed that obese children had significantly longer hospitalization time.

This result shows that the mortality rate of obese children is significantly higher. Obese children are more susceptible to infection than non-obese children, which may be related to the impact of obesity on the immune system. At the same time, once a child is diagnosed with obesity, this condition usually lasts longer into adolescence or even adulthood, and is difficult to reverse. Obesity can cause asthma and sleep apnea in children. In adulthood, obesity significantly increases the risk of cardiovascular disease, type 2 diabetes, and certain cancers. Therefore, reducing the risk of obesity has become a top priority in the field of public health (Lanigan, 2018).

1.4.3 Different Nutrition Strategies Between UK and the China

The UK government published Childhood Obesity: An Action Plan, Chapter 1, in 2016, followed by Chapter 2 (2018) and a preliminary Chapter 3 in 2019. The stated policy aim was to reduce the prevalence of childhood obesity in England, tackling health disparities by closing the gap in obesity rates between the most and least deprived areas, which is around twice as high. (Griffin et al., 2021) Limiting the consumption of added sugar is one of the key measures for countries to change their food environment. Obesity, diabetes, cardiovascular disease, dental caries and certain cancers are closely related to high consumption of soft drinks. In 2015, the World Health Organization recommended limiting sugar intake to less than 10% of total energy intake. Since reducing sugar intake is considered a cost-effective intervention for treating childhood obesity, the WHO also recommends increasing the price of sugary drinks through fiscal policies to encourage consumption to decrease. In 2017, the United Kingdom was the first country in the WHO European Region to introduce the Sugary Drinks Industry Levy (SDIL). The tax is levied on producers and importers based on the sugar content of drinks. Revenue from the tax is reinvested in a number of projects, including reducing obesity, promoting physical activity among school-age children, and promoting a balanced diet. The successful implementation of the SDIL has prompted importers and manufacturers to take measures to reduce the sugar content of sugary drinks to below the applicable threshold of the tax. Despite this, its specific impact on childhood obesity remains unclear. (Wickramasinghe et al., 2021) Another key measure in the UK Childhood Obesity: Action Plan is the introduction of a law requiring restaurants, cafes and takeaways to label calories. This will enable parents and dietitians to manage calorie intake when preparing meals for young children. Evidence shows that nutrition labelling can be an effective way to promote food reformulation, reducing salt, saturated fat and added sugar. In addition, the plan adopts the advice of Public Health England to ban price promotions on unhealthy food and drink and restrict their TV advertising before 9pm. These measures are aimed at reducing the consumption of unhealthy foods, while also highlighting the importance of protecting children from online advertising. However, online advertising is still self-regulated by the industry, and the action

plan only proposes to "consider" whether this model needs to be adjusted, without specifying measures to strengthen supervision. In addition, the action plan states that it will "monitor" the progress of voluntary actions by the food and drink industry, including a target of reducing the calories of certain foods commonly eaten by children by 20% by 2024. But this lack of mandatory attitude reflects to some extent the lack of regulatory strength of the plan, especially the management of online advertising and industry behavior.(Knaei et al.,2018)According to Barrett et al. (2024), food insecurity refers to the inability to obtain sufficient, safe and nutritious food to meet health needs. In June 2023, nearly a quarter of households with children in the UK reported experiencing food insecurity, with households with preschool children being more affected. This problem has been exacerbated by the rapid rise in food prices since mid-2021 due to the pandemic. Low-income families often choose cheap ultra-processed foods due to the high price and perishability of healthy foods, resulting in malnutrition and obesity becoming the main problems of socioeconomic deprivation. In the UK, poor children are more likely to be obese due to unhealthy food environments, while children from wealthy families benefit from better social protection factors. To support healthy eating in families, the UK launched a program. The UK government issued a program. Healthy Start (HS), which was launched in 2006. It provides vouchers to pregnant women or families with children under 4 years old and receives some benefits. Vouchers can be exchanged for fruit and vegetables (F&V), milk or infant formula. (Scantlebury et al., 2018) Initially, "each child is provided with £2.80 per week, which will gradually increase to £4.25 in 2021, and the range of foods that can be purchased will be expanded to include canned and frozen foods. The amount of support for infants aged 0-12 months is twice that of ordinary children, currently £8.50 per week(Barrett et al., 2024).However, Egger (2021) found that as the strategy was launched, shortcomings also emerged. Although the program is popular among governments and charitable organizations, it covers a small number of people, with only half of eligible people benefiting. And since the implementation of the policy, food insecurity and health inequality have continued to worsen, resulting in a significant drop in acceptance rates. This requires the government to focus on increasing acceptance coverage and considering modifying the implementation method, rather than questioning whether the program is the best tool to address malnutrition in young children.

In addition, China has also made many efforts to prevent childhood obesity. In a study by Yuan et al. (2024), it was pointed out that in China, school intervention strategies are widely used in obesity prevention and control research. The main reason for its popularity is that this method is easy to implement and monitor in a controlled environment. Schools provide an ideal platform for health promotion, enabling students to be continuously exposed to relevant health

interventions. Common forms of school intervention include strengthening physical activity and nutrition education, encouraging students to participate in outdoor sports, providing healthy school meals, and improving the overall school food environment, such as adjusting the layout of the cafeteria. These interventions have achieved certain results in practice. For example, a cluster randomized controlled trial (RCT) showed that a school program combining healthy eating and exercise significantly reduced students' average BMI and obesity rates. Another RCT study found that an 8-month nutrition education and physical education intervention effectively improved the metabolic function and mental health of obese children. Studies have shown that school intervention has a good implementation effect in the prevention of childhood obesity in China. In China, the government has issued a number of policies and plans to address the obesity problem, such as the Outline of China's Food and Nutrition Development Plan (2014-2020), the Blueprint for Healthy China 2030, the National Nutrition Plan (2017-2030), and the National Healthy Lifestyle Campaign. These measures are aimed at promoting improved nutrition and preventing obesity. At the same time, a three-level prevention strategy is needed to prevent and control childhood obesity, covering all aspects of early intervention, health maintenance, and treatment management. (Zhang&Ma,2018).In addition, under the general background of China's rural revitalization strategy, the World Food Program focuses on improving the nutrition of children aged 3-5 in underdeveloped rural areas of China. In 2018, it launched a three-year "Preschool Children Nutrition Improvement Pilot Project" in Xiangxi, Hunan, and gradually expanded to underdeveloped rural areas such as Guangxi, Gansu, and Sichuan. It continues to provide nutritional support for preschool children in the project area by improving dining conditions, nutritious meals, nutrition knowledge education, and combining precise assistance to poor farmers and industrial development. The rural children's nutrition improvement program aims to solve the problem of malnutrition caused by economic conditions, but this intervention also provides an opportunity to prevent childhood obesity. There is a dual burden relationship between malnutrition and obesity, especially when exposed to high-calorie, low-nutrition foods after malnutrition, the risk of obesity may increase. By providing nutritional support and improving the eating environment, the plan helps preschool children form healthy eating habits and reduce the possibility of obesity from an early stage of life(World Food Programme,2022).

1.4.4 Similarities and Differences Between Chinese and British Strategies

Both China and the UK emphasize early intervention to prevent childhood obesity. However, cultural factors, parental roles and policy structures lead to significant differences in the two countries' approaches. Comparing these strategies can reveal opportunities for mutual learning and improvement.

The study found that both China and the UK regard schools as an important platform for implementing nutrition education. Both countries emphasize increasing physical activity and improving children's diet. In China, Zhou et al. (2023) proposed that fundamental motor skills (FMS) are not only the cornerstone of children's physical and mental growth and social interaction, but also an indispensable part of the strategy to prevent childhood obesity. The limited motor skills and psychological barriers faced by obese children in the development of FMS often reduce their enthusiasm for participating in physical activities, thereby further exacerbating the problem of obesity. In view of this, the use of physical activity intervention to optimize FMS has become a core strategy for preventing childhood obesity. Schools, with their professional guidance teams and abundant resources, have become an ideal platform for implementing this strategy. They can not only provide systematic physical activity guidance, but also incorporate more physical exercise elements into daily teaching to create a more active and healthy learning environment for children. Meanwhile, in the UK, more than 75% of children do not meet the recommended levels of physical activity. The UK government has introduced programmes such as The Daily Mile, a school-based physical activity intervention, to boost physical activity among children. (Harris et al., 2020) In addition, both the Chinese and British governments attach importance to public health initiatives, food supervision and monitoring systems, aiming to promote a healthier lifestyle and prevent childhood obesity. In China, the National Nutrition Plan (2017-2030) issued by the State Council of China mentioned that in order to promote healthier eating habits, the government should not only increase the intensity of nutrition education, but also go deep into kindergartens, families and communities to popularize the concept of balanced diet to children and parents through various forms such as nutrition knowledge lectures, distribution of healthy diet manuals, and healthy cooking competitions. The government also worked with the education department to reform the school meal supply system to ensure that students' meals are nutritionally balanced, reduce the intake of high-sugar, high-salt, and high-fat foods, and increase the proportion of vegetables, fruits and whole grains to provide children with sufficient dietary fiber and trace elements. In this way, the purpose of preventing childhood obesity can be achieved (State Council of the People's Republic of China, 2017). In the UK, the School Food Standards issued by the British government mentioned that sugary snacks and drinks should be limited. Ensure that the meal includes fruits, vegetables and whole grains. Reduce processed foods and unhealthy foods. (Department for Education, 2014). The UK government is committed to tackling early childhood obesity and by promoting these standards in the environment of young children, it aims to ensure that they not only eat healthier foods, but also receive nutrition education from an early age. This early exposure to nutrition knowledge is critical as it can lay the

foundation for children's lifelong eating habits and effectively prevent them from becoming obese as they grow up. (Mitchell et al., 2014).

In addition, there are significant differences between China and the UK in preventing early childhood obesity. In China, a long history has nurtured a rich traditional food, which has led to a diverse food culture. China's nutritional approach focuses on the traditional dietary structure (Li et al., 2004). Usually, the staple food is based on pasta or rice, and pays attention to the balanced combination with vegetables and fat. In addition, China's traditional food culture is deeply rooted in the theory of traditional Chinese medicine, which balances "hot" and "cold" foods and has a strong influence on nutrition education and prevention of childhood obesity (Niu et al., 2024). In the UK, the Eatwell Guide divides food into specific categories. For example, fruits and vegetables, vegetables, proteins, and carbohydrates (Buttriss, 2016). It emphasizes achieving nutritional balance through the scientific nature of nutrient distribution. (Cobia et al., 2016) Compared with China's nutritional strategy for preventing obesity, the UK pays more attention to designing nutritional intake based on scientific standards. Secondly, there are significant differences between the two countries in the breadth of coverage of nutrition strategies. In China, nutrition strategies focus more on solving the problem of unbalanced development of urban and rural resources, especially on the coexistence of obesity and malnutrition faced by rural children due to traditional high-calorie diets, and their coverage is relatively concentrated. Wang et al. (2015) showed that school nutrition education programs played an important role in preventing childhood obesity, especially for rural children, but their overall role in improving the health level of the whole society was still limited. In contrast, the UK's nutrition policy covers all children, but its enforcement is slightly insufficient. For example, in a study on the placement and restriction of food advertising, it was found that the UK mostly adopted "suggestive" measures rather than mandatory measures (Bell et al., 2013), which weakened the policy effect to a certain extent. Future research can focus on how to combine China's precise strategy with the UK's broad coverage to achieve complementary advantages in policy implementation.

Finally, I will continue to deepen this research, analyze these efforts, gain a deeper understanding of the strengths and weaknesses of the two systems, and make recommendations. To improve nutrition strategies in preschool education and thus more effectively combat obesity. This research will help to gain a deeper understanding of how to optimize early childhood nutrition strategies in China and the UK, and provide advice to policymakers and educators in other countries facing similar challenges. The above is a systematic review of the existing literature. Next, I will explain the key research findings I obtained during the secondary data analysis.

2. Discussion of Findings

This section introduces the research findings of this study and discusses them in detail. After analyzing the policies and relevant literature on early childhood obesity prevention in China and the UK. This paper summarizes several key findings involving policy implementation, school intervention, and policy coverage. In addition, in the comparison, it was found that although China and the UK have the same goals, due to the different cultural backgrounds of the two countries (Eastern and Western countries), there are differences in the paths and priorities taken. The following section will analyze three themes: 1) Differences in national strategies and implementation paths; 2) The impact of socioeconomic status and family on the effectiveness of strategies; 3) The role of schools and early years settings in delivering nutrition interventions

2.1 Differences in National Strategies and Implementation Paths

First, the first important finding of this study is that both China and the UK recognize that childhood is a critical period for preventing obesity. Although the two countries have different

cultural backgrounds, politics, and economics, both countries have enacted different regulations or laws to promote healthy eating habits and reduce childhood obesity rates. For example, the UK government released the Childhood Obesity: Action Plan in three different time periods between 2016 and 2019, and continued to improve it. At the same time, the Chinese government released nutrition strategies such as the 2030 Healthy China Blueprint and the National Nutrition Plan (2017-2030) (Zhang et al., 2018).

However, it is worth noting that although the two countries have the same overall policy goals, there are significant differences in the implementation paths. In the UK, more emphasis is placed on legal and fiscal means. For example, the UK government announced the UK Soft Drinks Industry Levy (SDIL) in March 2016 and implemented it in April 2018 (Scarborough et al., 2020) and restrictions on the broadcast of unhealthy advertising. But in China, the focus is on school interventions, nutrition education and targeted rural programs. In my research, I compared these different strategies and their effectiveness in implementation.

Figure 1: Obesity rates among children aged 0–5 years in the UK and China (1995–2020).

Year	Obesity rates in the UK (%)	Obesity rates in the China (%)
1995	3.1	2.5
2000	4.2	4.1
2005	5.6	6.3
2010	6.9	9.9
2015	9.3	12.5
2020	9.9	14.2

Sources: Stamatakis et al. (2010); Zhang et al. (2016); NHS Digital (2020)

Figure 1 shows the changing trend of obesity rates among children aged 0-5 years in China and the UK from 1995 to 2020. Overall, the obesity rates of young children in both China and the UK have been on the rise in recent years. However, the increase in China in recent years has been significantly greater than that in the UK.

2.1.1 UK Implementation Pathway

According to Stamatakis et al. (2010), the obesity rate among preschool children in the UK increased from 3.1% in 1995 to 6.9% in 2010. The increase in data prompted the UK to release the Childhood Obesity Plan in 2016. Subsequently, the UK enacted the Sugar Drink Industry Levy (SDIL) in the Childhood Obesity Plan. According to the Children's Rights Act, soft drink manufacturers will pay taxes based on the amount of added sugar products they produce or import, and the proceeds will be used to increase funding for school programs and other activities to promote children's health (House of Commons, 2017, cited in Law, 2020). The British government is trying to control childhood obesity rates through legal and financial means. According to a survey experiment by Pell et al. (2019), 70% of participants supported SDIL, and 71% believed it would be

effective. In addition, in 2019, the research data of Scarborough et al. (2020) showed that the proportion of beverages exceeding the low-tax sugar threshold after the intervention decreased significantly, by 33.8 percentage points, with a 95% confidence interval of 33.3-34.4, and a p-value of less than 0.001. At the same time, for the high-tax category of intervention beverages, the price increased by 0.075 pounds per liter. However, in this study, it was only mentioned that SDIL can reduce the relevant health risks for children, but it was not explicitly mentioned in the study that SDIL can reduce the obesity rate of young children. However, according to the data of the National Child Measurement Program (NHS Digital, 2020), the increase from 2015 to 2020 was 0.6%. These data show that the growth rate of obesity in preschool children in the UK has slowed down after the policy was released. But overall, the obesity rate of young children has not dropped significantly.

2.1.2 Chinese Implementation Pathway

In contrast, in China, the obesity rate among young children has risen rapidly in recent years, especially since 2010. Although China has also implemented national strategies such as "Healthy China 2030" that focus on education, unlike the UK, China pays

more attention to targeted rural poverty alleviation projects, as well as school intervention and education activities. However, according to the research data of Zhang et al. (2016), these measures have not played a good role in preventing obesity among preschool children, and the obesity rate among preschool children in China is still rising year by year. In some areas, the child obesity rate is as high as 15.8%. After analyzing the existing literature, I identified three main contributing factors. First, rural poverty alleviation projects have limited coverage, are time-consuming and costly. Although data show that the rural poverty rate has dropped significantly in recent years, 10% of the rural population has been in poverty since 2013 (Liu et al., 2017). At present, there is no unified statistical data on the policy coverage of childhood obesity in poor rural areas in China, but some regional studies and pilot projects provide relevant data. According to the Healthy China 2030 strategy, the Chinese government has carried out pilot interventions for childhood obesity in some poor counties such as Guizhou and Yunnan, with a coverage rate of 15% to 20% (Xu et al., 2017). This policy relies on government support, resulting in insufficient sustainability. In addition, the response measures for childhood obesity are imperfect. According to the survey and research of Liang et al. (2022), in order to solve the problem of malnutrition or obesity among children in poor areas, the Chinese government has gradually implemented a nutrition improvement plan since 2012. As of the end of 2021, the central government has allocated a total of 196.734 billion yuan in subsidies for preschool children's nutrition meals. However, this plan mainly targets malnutrition problems. It mentions all high-calorie foods (fast food, fried foods) that appear in some areas, but there are no targeted measures to deal with this phenomenon, and its effect on obesity prevention and control is limited. Secondly, the plan mainly targets school-age children (6-15 years old), and the coverage rate for preschool children (3-6 years old) is low. Third, unlike the mandatory laws or policies in the UK, China mostly adopts education-based intervention measures. The National Nutrition Plan (2017-2030) mentions that healthy behaviors should be promoted through classroom education, physical exercise and publicity activities (State Council, 2017). China encourages young children to implement special physical education programs in their daily lives, but since it is not a mandatory measure, the implementation rate is unclear. Studies have shown that 60% of children aged 2 to 5 lack appropriate physical activity (Timmons et al., 2007). This reliance on voluntary participation may limit the overall effectiveness of the national strategy.

In summary, due to the different implementation paths of the two countries in dealing with the problem of childhood obesity, the trends of childhood obesity rates in the two countries are very different. In the UK, it uses legal means such as compulsory taxation to control the increase in the obesity rate of preschool children, and the results show that the increase in obesity rates

has slowed down. In China, it focuses on educational activities and targeted projects in specific poverty-stricken areas, but the results show that this implementation path and method is of little significance in controlling the increase in childhood obesity rates.

2. 2 The impact of socioeconomic status and family on the effectiveness of strategies

Another important finding is that the effectiveness of childhood obesity prevention strategies is affected by socioeconomic (SES) and family environment. Both China and the UK have developed national nutrition strategies aimed at improving children's health, but the extent to which families implement and benefit from these strategies is affected by multiple factors such as income, education, and access to resources.

2.2.1 Socioeconomic Disparities and Childhood Obesity in the UK

Research shows that overweight and obesity have a serious impact on low-income families. Families with low income and low education levels are often more likely to be overweight (Townsend, 2017). This phenomenon exists in both China and the UK. In the UK, low-income families cannot afford to buy healthy and organic foods (Withall et al., 2009). They tend to choose high-calorie processed foods or unhealthy foods, leading to rising obesity rates. To make up for these gaps, the UK launched the Healthy Start (HS) program in 2006, which aims to enable low-income families to buy healthy foods such as vegetables and fruits by providing vouchers (Barrett et al., 2024). However, according to Parnham et al. (2020), the program has limited coverage, and only 54% of poor families in the UK meet the policy conditions. These strategies fail to take care of all the most vulnerable families, which greatly reduces the effectiveness of the strategies. In addition, these socioeconomic inequalities have been further exacerbated during the COVID-19 pandemic. Food security issues in the UK have gradually widened, which has also led to social inequality. Panic hoarding of physical goods has led to rising prices for healthy organic fruits and vegetables, making it more difficult for families in need to afford these goods (Power et al., 2023), and they are forced to choose cheap and unhealthy food. This move endangers children's health, leads to rising obesity rates, exacerbates health inequalities, and reduces the effectiveness of the strategy. According to research data from Jenssen et al. (2020), obesity rates in different age groups have increased during the COVID-19 pandemic. The overall obesity prevalence increased from 13.7% in June-December 2019 to 15.4% in June-December 2020, reflecting the vulnerability of vulnerable groups during times of crisis.

2.2.1 Rural-Urban Divide and Family Factors in China

In China, many children in rural or remote areas have higher obesity rates than children in cities. According to data from Liu

et al. (2021), the obesity rate of rural children in Shandong Province, China is 0.7 percentage points higher than that of urban children, and the same trend is also seen in Guangdong and Henan provinces (Chen et al., 2020). National policies such as the National Nutrition Plan (2017-2030) and the Outline of the Healthy China 2030 Plan have listed rural and low-income children as the key targets for obesity prevention and control. However, there is a great imbalance in the implementation of these strategies in different regions, especially in underdeveloped areas.

The family environment plays a vital role in the effectiveness of strategy implementation. First, family structure has a certain impact on childhood obesity. According to the experimental results of Schmeer (2022) on the impact of family structure on childhood obesity, preschool children are more likely to suffer from obesity when living with single mothers than when living with married parents with harmonious relationships. Second, the education level of parents affects the obesity rate of young children and the effectiveness of strategies. In most rural families, parents have limited education, and when choosing ingredients, they prefer cheap food rather than healthy and nutritious meals (Liu et al., 2010). Many rural parents are unable to follow the dietary guidance provided by schools due to lack of sufficient knowledge and time. This is especially true when educational information lacks cultural relevance or practicality. These limitations reduce the effectiveness of school- and education-led strategies in promoting long-term behavior change. Because most guidelines are advisory rather than mandatory, parents and schools may not feel obliged to comply, thereby reducing the consistency and sustainability of interventions (Xu et al., 2017).

In summary, although both China and the UK have introduced national strategies to prevent childhood obesity. Research shows that the effectiveness of these strategies in actual implementation is largely affected by socioeconomic status and family background. Low-income families often face obstacles such as difficulty in accessing healthy food, low parental education, and lack of time and resources to cooperate with school programs. These challenges are further amplified during social crises such as the COVID-19 pandemic. At the same time, the lack of mandatory enforcement mechanisms and health education that is out of touch with local culture have also weakened the impact of policies on vulnerable groups. Therefore, if these structural and family-level inequalities are not addressed, even if obesity prevention and control strategies are well designed, it will be difficult to truly cover and change the health trajectory of high-risk children.

2. 3 The Role of Schools and Early Years Settings in Delivering Nutrition Interventions

The third important finding of this study is that schools and early childhood institutions play a key role in implementing nutrition interventions in both China and the UK. Young children develop eating habits and food preferences early in life (Gerritsen et al., 2018). For children aged 0-5 years, these institutions are the daily point of contact between the child and the structured health-promoting environment. In addition, schools and early childhood institutions in China and the United Kingdom are the main channels for implementing nutrition education, providing balanced diets, and promoting and fostering healthy behaviours.

2.3.1 School-Based Nutrition Interventions in the UK

In the UK, in order to prevent the rise of childhood obesity, early childhood institutions such as kindergartens are required to adhere strictly to the School Food Standards, and many of them have also incorporated nutrition into their daily curriculum. The Dietary Guidelines issued by the Department of Public Health and the School Food Standards are widely used in nursery meals by early years organisations in some areas. It emphasises the need for a balanced mix of five foods and cooking with less sugar, salt and oil (Buttriss, 2016). And since 2014, free school meals (FSM) have been offered in the UK to all children aged 4-7 in England and 4-8 in Scotland from low-income families (Lucas et al.) However, there is no clear follow-up data documenting the implementation of the programme, and further investigation is needed. In addition, early years providers in the UK face certain challenges in implementing nutritional interventions. Private nurseries may not be regulated or funded in the same way as state nurseries, leading to variable quality of meals provided (Hotz et al., 2011). Besides, the study analysed that in the UK, only Scotland has comprehensive national nutritional guidelines for 1-5 year olds (More, 2008) and that these guidelines are not mandatory, lacking external monitoring and mandatory requirements. This has led to questions about the implementation of national nutritional guidelines in pre-schools in some parts of the UK.

2.3.2 The Role of Early Years Institutions in China's Nutrition Efforts

In China, national plans such as the National Nutrition Plan (2017-2030) emphasize school-based interventions. Schools promote nutrition interventions through a variety of means, including health courses, physical activities, and group meals (State Council of the People's Republic of China, 2017). Like the UK, China also emphasizes standardized meal preparation and dietary management in accordance with the Dietary Nutrition Guidelines for Preschool Children. In addition, Hu et al. (2017) showed that health interventions in kindergartens have a certain effect on reducing the obesity rate of young children in the short term. However, the long-term effect is not obvious and needs to be continuously observed. Secondly, early

childhood education institutions in China still face challenges in implementing nutritional interventions. In China, many parents leave their children's diet entirely to early childhood education institutions. Due to lack of time, children do not pay attention to their diet after school. Due to parental neglect, children often eat too much high-calorie food, which weakens the intervention effect of kindergartens on childhood obesity.

In summary, although early childhood education institutions in China and the UK have played an important role in implementing nutritional intervention measures. Some preschool institutions in China and the UK strictly follow the laws or policies issued by the state to match nutrition to meals, both countries lack external institutional supervision. Secondly, there are still differences in intervention measures. In China, with the improvement of living standards in recent years, the obesity rate of young children has risen rapidly. The focus of kindergarten intervention in China is on the dual burden of malnutrition and obesity (Zhang et al., 2016). In the UK, more attention is paid to reducing the intake of sugar and high-fat foods.

3. Implications Limitations and Benefits

This study provides insights into the effectiveness of early childhood obesity prevention strategies by comparing them with a focus on China and the UK. The results of the study show that although both countries have developed comprehensive national nutrition strategies. However, its success depends on the implementation pathway, socio-economic context, family participation and the role of early education institutions. Based on these findings, a number of practical and policy implications can be drawn.

3.1 Implications of the Research

In the study, a number of key takeaways for improving early childhood obesity prevention strategies in China and the UK were highlighted. Firstly, the data show that policies must be tailored to the local context and that different countries have different cultural backgrounds, especially when targeting socio-economically diverse populations (Sidney, 2017). Firstly, the UK's Sugar Drinks Industry Levy (SDIL) brings a particularly important insight. Whilst childhood obesity rates have been brought under control to some extent through this policy. However, there is no significant downward trend in their obesity rates, and their direct impact on preschool obesity remains limited. This suggests that the approach of taxation and marketing restrictions, while effective in shaping the food environment, must be considered in a variety of ways (Pell et al., 2019). For example, to increase effectiveness, governments could consider combining these policies with home-based education programmes and improving access to education for disadvantaged households. This suggests that the approach of taxation and marketing restrictions, while effective in shaping the food environment, must be considered in many ways.

Positive, education-based interventions can be added. However, their obesity rates have not shown a significant downward trend, and their direct impact on preschool obesity remains limited.

Secondly, the findings in this study suggest the need for more structured and implementable policies. Although China has introduced a series of policies to prevent obesity in young children, they are not very practical. Strategies such as the National Nutrition Programme (2017-2030), for example, focus on educational activities and do not pay attention to the coverage of the strategy in China's poorer areas. Finally, this study analyses the key role of early education institutions, including nurseries and kindergartens. Schools are not only places where nutritious meals are served, but also play a key role in shaping children's healthy habits. Finally, the study analyses the key role of early education institutions, including nurseries and kindergartens. In addition, both China and the United Kingdom should increase the training of teachers and also do a good job of home-school co-operation. Promote healthier development of young children and maximise the impact of nutritional strategies.

3.2 Limitations of the Research

Although this study makes cross-country comparisons between China and the UK, it must be recognised that it has some limitations. Firstly, this research is secondary and the data in the article are based on analyses of secondary data, relying on published literature, reports and policy documents (Kumara, 2022). As a result, it is unable to capture unpublished research or recent advances on childhood obesity, particularly in the rapidly evolving policy areas of childhood obesity and post-New Crown Epidemic recovery. Second, this study has not yet involved data from primary fieldwork. For example, this study did not involve factual interviews with educators, strategy developers, or parents. As a result, this paper does not address the details of the difficulties and problems faced in developing and implementing nutrition strategies, and it lacks the subjective experiences and real-life difficulties faced by educators or parents in strategy engagement. Thirdly, there are significant differences in cultural background, social structure and cultural values between China and the United Kingdom. Therefore, although common problems were identified in the comparative analyses, the feasibility of the policies for different countries needs to be fully considered. Finally, this study did not cover all the factors affecting childhood obesity, but only considered aspects of nutritional strategies and factors affecting the effectiveness of their implementation. Missing are factors such as genetic background, mental health status (Ang et al., 2013), etc., which may provide a more in-depth and complementary perspective in future studies.

3.3 Benefits of the Research

Despite these limitations, this study has many strengths. Despite these limitations, this study has a number of strengths. Firstly, this study starts from the perspective of China and the UK by analysing the changes in childhood obesity rates under different nutritional strategies in the two countries. This cross-country comparison provides readers with a fuller and more perspective framework of understanding (Findlay, 1991). It also helps to identify which practices are of general relevance, thus providing inspiration for future policy formulation and practice. Secondly, the study moves from national implementation pathways to socio-economic and family participation to institutional intervention implementation. The intervention pathways were sorted out at three levels, from multiple perspectives, focusing not only on the policy text, but also taking into account the gap between the implementation environment and actual behaviour. Thirdly, this study places particular emphasis on the roles and challenges of early years organisations, highlighting the closely interlinked relationship between schools, parents and different policies in China and the UK. The focus on kindergarten among the key findings of this study is in line with research trends in preschool education. It is also a practical guide that can provide practical ideas for frontline educators and administrators. Finally, this study analysed a large amount of authoritative literature and publicly available data to ensure that the analyses were as current and reliable as possible when researching and analysing them. Despite the fact that no field research was conducted, the study constructed a relatively solid evidence base by synthesising information from multiple sources.

4. Conclusion

The aim of this study was to explore how early childhood education organisations in China and the UK support the prevention of childhood obesity through nutrition-related strategies. By comparing implementation practices, challenges faced in both countries, the study identifies key factors that influence the success or limitations of obesity prevention initiatives in early childhood education.

Three main findings emerged from this study. Firstly, although both China and the UK are committed to preventing childhood obesity, there are differences in the methods and approaches of implementation between the two countries. The UK has implemented legal coercive measures such as sugar taxes and advertising regulation, while China has emphasised education-led interventions, particularly in rural areas. Obesity rates in pre-school children have been somewhat contained under this approach in the UK, while in China they continue to rise year on year. However, both countries are deficient in terms of coverage and level of implementation. Secondly, the effectiveness of any strategy is strongly influenced by socio-economic status and family environment. Secondly, the effectiveness of any strategy

is strongly influenced by socio-economic status and family environment. Regardless of policy design, children from low-income or poorly educated families in both China and the UK face certain challenges in developing healthy eating habits. Thirdly, kindergartens and other pre-schools in both China and the UK play a key role in shaping the eating environment for young children and implementing nutritional strategies. However, both China and the UK are facing difficulties to varying degrees, such as the unequal configuration and investment in public and private kindergartens, leading to inequitable early childhood development. As well as parents' lack of attention to nutrition policies, leading to weakening the effectiveness of school interventions.

This study emphasises the integration of systematic analysis of policy. Whilst this study provides a useful comparison of the situation in early childhood obesity prevention in China and the UK, there are several important areas for future research. Firstly, a more in-depth study needs to include qualitative research to gain a deeper and more practical understanding of the views and experiences of the relevant groups (educators, parents, policy makers). Questionnaires or focus groups could be developed to gain a deeper understanding of the effects of policy implementation and the views of different perspectives on nutrition strategies in the country. Second, future research could conduct longitudinal studies to track the impact of early nutrition interventions on young children's long-term development in both countries. Much of the current literature is short-term observational, focusing on short-term behavioural change. Few studies exist that address long-term development, and long-term longitudinal studies can be useful in helping to assess whether early interventions can sustainably reduce obesity rates in adulthood (Farrington, 1991)

In conclusion, tackling early childhood obesity in China and the UK requires a multi-layered, contextualised approach. While nutrition policies provide an important foundation, their success depends on how they are implemented, supported and understood in real-world settings. China and the UK can only make better preparations for the prevention of obesity in early childhood if they continue to conduct research and identify shortcomings and improvements in their policies in the future.

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