Social Factors Involved in the Lack of Public Awareness and Acknowledgement on Food Allergies in China

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

Food allergy (FA) prevalence is on the rise globally and has remained a major public health issue (Tanno et al., 2022, p. 1). The most severe reaction, anaphylaxis, can lead to respiratory problems and a dangerous drop in blood pressure that can result in life-threatening medical emergencies (Hammett, 2017, p. 23). Without any effective cure to FA, the main preventative strategy for developing FA reactions is to intentionally avoid specific food allergens (U.S. Food and Drug Administration, 2024). If the FA growth is left unaddressed as a perpetuating public health issue, the consequences could entail the occurrence of more FA-induced anaphylaxis, potential mental health problems, and reduced quality of life (Mayo Clinic, 2024 & Bingemann et al., 2024, p. 2).

In China, the prevalence of FA ranges from 4.0% to 8.2%, comparable to that in the U.S., where FA affects up to 8% of children and 10% of adults (Feng et al., 2023). During the first sixteen years of my life growing up in China, the idea of food allergies (FA) as a public health issue was largely unfamiliar to me. However, after spending just a few years studying abroad in the U.S., I quickly became aware, through my everyday interactions and social surroundings, of the need to be attentive to my friends' FA conditions and those of others around me. This experience led me to actively recognize and approach FA as an under-recognized public health concern, despite the fact that I was not personally affected by FA.

Having spent the majority of my life in China, I began to reflect on the potential consequences of overlooking food allergies (FA) as a public health issue, especially the risks involved in failing to recognize and support those around me who may be affected to different degrees. This raised an important question for me: why had I not received education or resources that emphasized the collective responsibility to acknowledge and address FA as a public health

problem in order to prevent serious allergic reactions, particularly since there is no effective cure for all to FA? Furthermore, what if the food allergen information on a prepackaged food or an item served in a restaurant is labeled incompletely or inaccessibly out of negligence from the food providers and suppliers, then what would be the resulting public health risks to the more vulnerable people with FA?

In China, there has been a self-perpetuating and under-recognized lack of public awareness campaigns on the public health necessity for early FA diagnosis, prevention, and management, while there are social initiatives in the U.S. like the Food Allergy Awareness Week. Some main challenges in FA management in China stem from its varying distribution of prevalence according to the vast environmental and geological differences across the country, a shortage of trained allergists, and low accessibility to standardized allergy diagnostic tests (Leung et al., 2024, p. 1). This STS research paper aims to investigate in detail some social factors contributing to the gap between the high but disparate prevalence of FA in China and the limited public awareness of it as a public health issue. By drawing comparisons with the U.S., the study seeks to identify social and context-specific barriers, promoting early-stage, standardized diagnosis and education on FA management.

Background

Regarding the current public perception on FA, there is a general belief that it is uncommon in China when compared to Western countries, despite its prevalence being comparable between China and the U.S. (Feng et al., 2023; Liu et al., 2024, p. 166). Some studies have shed light on how socioeconomic status might play a role in the local FA prevalence, which can then, due to the medical demand, lead to more public access to the knowledge and awareness of FA. The underlying mechanism connecting higher socioeconomic

status and a raised FA prevalence as a whole can be attributed to a variety of reasons, including better access to FA diagnostic tools that enable for more reporting of FA cases, more health awareness in general, and a reduced immune tolerance to food allergens due to the clean-living conditions (Wang et al., 2018, p. 1909). When focused on China, a combination of factors related to economic development can attribute to the rise of FA prevalence across the nation overtime, from the shift in traditional Chinese diet to include more meat consumption, to urbanization of a growing urban population from 50% in 2010 to 64% in 2020, to the improved hygiene practices across the country, and to the doubled household income since 2010 (Liu et al, 2024, p. 166).

Evidence: Disparities of FA Prevalence & Lack of FA Public Awareness in China

It is clear that geographic and environmental influences play a significant role in defining the epidemiology and landscape of FA in China (Leung et al., 2024, pp. 1-2). When focusing on children affected by FA in China, Leung et al. (2024, p. 1) reinforced that egg and milk are the most common allergies amongst children under three years of age; for those older, the regional differences characterize food allergens, with shellfish allergies being more common in southern and eastern coastal regions, whereas wheat and fruit are the more major sources of FA in northern regions. Peanut and tree nut allergies, on the other hand, remain relatively low compared to Western countries, but cases have been reported and emerging in some cosmopolitans in China.

In China, the shortage of standardized FA diagnostic tests may contribute to social barriers that hinder timely prevention through early and accurate diagnosis. For example, there is a lack of standardized skin prick test (SPT) reagents and unaddressed inconsistency in SPT results that are susceptible to compromising public trusts in seeking out these allergy tests for early-stage diagnosis, crucial to forming preventative strategies and treatment plans. In addition

to SPT, oral food challenges (OFC) are also important for confirming FA diagnoses, specifically for assessing tolerance thresholds and informing potential cross-reactive allergens, and both the accessibility and standardization of OFC await expansion and enhancement in China (Leung et al., 2024, pp. 1-3).

Furthermore, there is a gap in anaphylaxis management, particularly due to insufficient supply and public training programs of Epinephrine Autoinjectors (EAIs), which are prescribed to individuals undergoing anaphylaxis. Although a special "urgent import" request was approved for Jext EAIs to reach the Guangdong Greater Bay Area from Hong Kong and Macau in early 2023, there remains a greatly uneven accessibility profile of insufficient EAIs across China, where only a handful of regions have reliable access to the life-saving devices. A probe into the causes of the imbalanced availability alludes factors including but not limited to regulatory challenges, inadequate market drives, and limited healthcare supporting widespread distribution and education for self-administration. More importantly, there persists a lack of public awareness about anaphylaxis from severe FA reactions and its treatment, which renders a sizable population in the nation vulnerable without access to effective emergency treatment tools in the event of any anaphylactic food allergic responses. (Leung et al., 2024, p. 10).

When studying the knowledge and perceptions of FA amongst parents of children with food allergies, Liu et al. (2024, p. 12) found that only a small percentage of them recognized that their lives have been affected considerably by their children's FA. Parents can have critical influences on helping their children navigate through psychological repercussions, as Liu et al. (2024, p. 11) also discovered that FA posed an adverse impact on children's social life, where 14.8% of them in the study disclosed being treated differently by friends due to FA. For those parents noticeably involved and informed of their children's FA, they consider limiting their

children's social activities to prevent accidental exposure to food allergens outside of the house, which could further, unintentionally, intensify the children's feeling of being socially isolated from their peers because of FA (Liu et al, 2024, p. 11). One third of the parents in Liu et al.'s studies expressed frustration and dissatisfaction with the FA information quality through some online social media platforms, mainly due to incomplete content and a lack of authority. To alleviate these concerns, more medical professionals and healthcare providers should be engaged to offer clarifications and accurate information through current social media platforms to promote evidence-based practice parameters for FA (Liu et al., 2024, pp. 11-12).

Moreover, Liu et al. (2024, p. 166) also highlighted how the complexity of Chinese cuisine can make it more challenging to identify specific allergens during an allergic reaction. This intricate use of ingredients reinforces my STS approach, which explores whether food labeling and allergen warnings on restaurant menus in China are effectively designed to raise public awareness of food allergies, ultimately supporting community health and well-being beyond individual concerns.

Theoretical Framework: The Health Impact Pyramid

The theoretical framework used in this study is the Health Impact Pyramid, which illustrates the effects of various public health interventions. The pyramid consists of five tiers, from bottom to top: socioeconomic factors, health context, long-lasting protective interventions, clinical interventions, and counseling and education (Frieden, 2010). These levels are arranged according to their overall impact on public health, with the greatest influence occurring at the lower levels. My methodology will focus on the bottom two tiers of the pyramid: socioeconomic factors and context for health. I aim to compare how these two tiers are reflected differently in FA in the U.S. and China, leading to potential variations in public knowledge, followed by

offering some insights into improving public knowledge of FA in China. Although some populations may be less affected by FA, addressing it as a global public health issue requires shared awareness. The "context for health" tier considers the comprehensiveness and accessibility of food service establishments in disclosing FA information. This is important because the general food prevalence is comparable in the U.S. and in China, where the rates of challenge-diagnosed FA in China reported to become similar to that in Western countries. (Loh et al., 2018, p. 1).

Analysis: Socioeconomic Factors

Compared to China, the United States has conducted more targeted research on how socioeconomic determinants influence the distribution of FA, especially among children. The more abundant, focused research available provides stronger academic guidance and evidence that allows for more thorough, effective approaches and resources to address food allergy-related public health issues through socioeconomic perspectives. Children are not only the more vulnerable, susceptible population to developing FA than adults, but are also most directly affected by the way socioeconomic status shapes public knowledge and awareness of FA (Elghoudi, 2022, p. 254). Born into socioeconomic conditions they cannot control, children inherit the structural advantages or disadvantages of their families. Their parents not only shape the household's socioeconomic position through their resources and social mobility, but also serve as the primary decision-makers and first responders in managing food allergy reactions. As a result, children reflect the compounded effects of limited public education and unequal access to resources—making them a critical focal point for STS research on the intersection of health, inequality, and knowledge dissemination. Bilaver et al. (2016, pp. 1-5) stated that children living in the lowest income stratum had a 2.5-time more incurrence on emergency department visits

(ED) and hospitalization costs caused by FA than those from higher income areas; the former also incurred significantly less in terms of out-of-pocket expenses for any preventive measures for FA. As a result, the study revealed the higher risk for accidental ingestions as well as cases of FA-induced anaphylaxis given the limited access to specialty care, allergen-free food options, and proper emergency management medications, such as the epinephrine autoinjectors. The study also alluded to the intersectionality of race and ethnicity, concluding that African American children had the least amount spent on direct medical care and out-of-pocket expenses on FA-related incidents. Moreover, Bilaver et al. pinpointed how the lower costs in these low-income families are directly proportional to the level of awareness, education, access to care, and potentially the perceived and predicted severity of child's FA. This research study

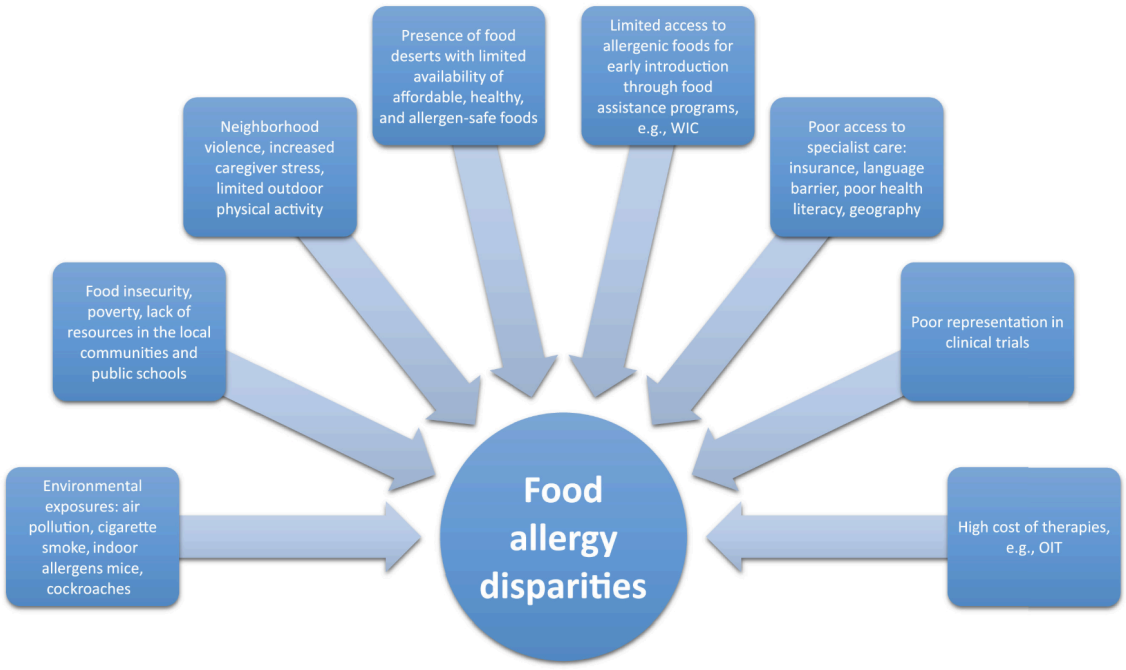

Fig 1. Leeds et al. (2022, p. 392) attributed FA disparities to diverse factors, many of which stem from unequal socioeconomic determinants.

specifically appealed to the pediatricians that they need to increase their awareness of the underlying socioeconomic factors with respect to income levels that impact children's access to especially care and epinephrine for FA management.

In addition to the roles parents and pediatricians can play in overcoming socioeconomic barriers to proper FA intervention and management, Stephen et al. (2022, pp. 405–406) reinstated that children in low-income and underserved communities could greatly benefit from increased public education and resources for managing FA reactions. The perspective article emphasized the importance of critical school-based interventions, as some of the initiatives involved aiming to improve access to epinephrine, enhance timely recognition of anaphylaxis, and equip school staff with the training necessary for effective FA response. As a whole, numerous academic studies and research conducted in the U.S. have underscored the significant impact of socioeconomic status on disparities in FA, particularly amongst children. These disparities are especially evident in poor access to specialty care, restricted availability of allergen-safe foods, and a lack of resources in public communities and schools. Leeds et al. (2022, p. 392) have also emphasized these factors in their overview of the various contributors to FA disparities (Fig. 1).

In contrast, China has fewer studies assessing how socioeconomic factors lead to a shortage in public knowledge on how to intervene and manage FA in a timely and effective manner. One study focused on parental burdens from caring for their children with FA in low-income families. Specifically, those parents with lower financial affordability or social support tend to experience higher burden levels in the event of their children's developing FA (Li et al, 2022, p. 9). Most research highlights the need for systematic investigations into the varying prevalence of food allergies across different socioeconomic groups nationwide (Tang et al., 2019, p. 107).

Nevertheless, when broadening the scope beyond food-induced allergies, more research has explored the relationship between socioeconomic determinants and the prevalence of childhood allergy diseases in general. Interestingly, Li et al. (2011, p. 3) found that in China, higher individual socioeconomic status—measured by parental education and per capita household income—was associated with a greater prevalence of allergic diseases such as asthma, rhinitis, and eczema. This trend was especially the case in Shanghai, Guangzhou, Wuhan, and Chengdu, which are the four biggest and most economically-developed cities in the study. In contrast, according to the study, other researches conducted in developed countries have shown an inverse relationship, with higher socioeconomic status actually linked to a lower prevalence of FA. These distinct outcomes suggest that the relationship between socioeconomic status and allergic disease prevalence may be shaped by a country's overall level of economic development. The impact of socioeconomic factors on FA appears to be more complex and context-dependent, suggesting that different hypotheses support and explain the contrasting patterns observed between China and more economically-stable, developed nations (Li et al., 2011, p. 8).

Given the limited research in China specifically addressing how socioeconomic factors are associated with the prevalence of FA, along with a general lack of public awareness regarding the recognition and management of adverse FA reactions, the results from Li et al. underscore the critical need for improved public education and awareness on FA. This is especially important in areas with higher socioeconomic status, which are typically assumed to be equipped with better access to resources and social support. The findings further suggest that even in these more economically advantaged regions, represented by the four biggest and economically-thriving cities, there is still a pressing need to promote the general population’s

perception and approach to developing and learning effective strategies for FA risk reduction and timely management of adverse allergic reactions.

Analysis: Controllable Context for Health

Moving to the second tier of the Health Impact Pyramid, "Changing the Context to Make Individual's Default Decision Healthy", which is typically illustrated by policies such as smoke-free laws and tobacco tax (Frieden, 2010). In the context of FA, my research methodology applies this concept through the lens of allergen labeling guidelines for prepackaged foods and menu items in restaurants, aiming to create an environment where safer choices become the underlying default for individuals either managing FA for themselves or looking out for others from a public health standpoint.

In the United States, the Hazard Analysis and Risk-Based Preventive Controls (HARPC) is intended to reinforce preventive control to regulate potential food supply risks and instruct proactive, corrective measures that eliminate contamination (Stankovich et al., 2023, p. 7). Stankovich et al. (2023, p. 7) identified that the restaurant industry could improve on allergen management compared to the prepacked food industry, as they proposed that state and local regulations should channel HARPC to gradually and steadily nurture customer confidence as well as establish standardization in allergen safety. China has implemented its first set of FA labeling laws in 2012 for domestically produced foods, while the National Standard includes two parts to the labeling requirements: General Rule for the Labeling of Prepackaged Foods, and General Rule for Nutrition Labeling of Prepackaged Foods (Stankovich et al., 2023, p. 3).

Compared to the United States, the Standard in China has the same list of key allergens and is solely implemented for prepackaged foods. As a result, the Standard does not exert its effectiveness or influence on foods for immediate consumption, which is required in the

European Union (EU), nor does it apply to food manufacturers that supply food to caterers. This discrepancy could shed light on the potential for the regulation and enforcement powers in China to adapt certain international labeling guidelines and standardizations to expand beyond prepackaged foods to the restaurant industry. Moreover, the GB 7718-2011 National Food Safety Standard-General Standard for the Labeling of Prepackaged Foods in China has a list of eight categories of allergenic substances, which refer to the Codex Alimentarius Standard, and is composed of recommended foods to guide and highly encourage food industries and enterprises to take on voluntary actions as well as initiatives in labeling to inform consumers of the allergens. According to Feng et al. (2022, p. 6), however, three of the top eight allergenic foods identified in the study (mango, beef, and lamb) are not included in the recommended list of food allergens in the Chinese GB 7718-2011 National Food Safety Standard, despite them being considered the major food allergens capable of causing severe adverse FA reactions. These results open up future initiatives in China that take into account the country's sheer vast geographic diversity, complex demographics, and influential environmental factors – all of which affect local prevalence of FA and the patterns of the food allergen profiles. Given that the occurrence and development of FA are closely tied to the changing economic and social conditions, this approach highlights the importance of regularly updating local standards and guidelines surrounding FA in response to region-specific trends and the time-dependent local situations regarding FA.

Conclusion

In conclusion, it is evident that socioeconomic status serves as the fundamental contributing factor that perpetuates a lack of public knowledge in China on the local FA prevalence, proper management to reduce risks of and respond to adverse FA reactions, and the

shared responsibility in being aware of FA to address it as a public health issue. The purpose of comparing public perception and awareness of FA management between the United States and China is to highlight the pressing need for more targeted research in China, both regionally and nationally. Such research is essential for developing a more comprehensive understanding of FA prevalence, public knowledge of FA, and emerging patterns in food allergens across different populations, in an ultimate effort to promote the most up-to-date, relevant, effective, and accessible public education of FA risk reduction and management to address it as a public health problem.

Since FA is more common in children than in adults, the children population is typically a more passive and accurate reflection of the impact of socioeconomic status on the public knowledge on FA management. Children are often the first and most directly affected by their parents' awareness and care, school-based interventions, and guidance from pediatricians, as all of these are shaped by broader socioeconomic conditions. Therefore, more targeted research can also be focused on the pediatric population to form a better understanding on the necessary steps in society that could help overcome local disparities in socioeconomic status that prevent and limit the best prevention, treatment, and medical management necessary for a child susceptible to developing FA and dependent on an adult's care for as well as proper response to FA.

For the second to last tier of the Health Impact Pyramid that focuses on implementing policy changes and regulations in place that will encourage the general population to choose the safer options as default, which, in the case of FA, indicates accurate and comprehensive labeling of major food allergens in prepackaged foods and menu items in restaurants. In addition to critical national-level guidelines, it is also important to take into account the fact that the FA prevalence and the patterns of the food allergen profile can be heavily influenced by regional

environmental and cultural factors. Currently in China, given that regional disparities exist in studies on FA prevalence, research on risk assessment of certain allergenic foods has been restricted to specific regions. Due to the incomplete epidemiologic studies of FA prevalence in China, a list of priority allergenic foods that accurately reflects the current FA situation of the Chinese population is not available (Chen & Wu, 2022, p. 772).

Therefore, as a solution, labeling policies should be further strategized to be region-specific according to the local situation on FA on top of national guidelines to allow for more effective, instructive, and relevant policies. Stricter regulations will help enterprises and food industries to develop their lists of allergenic foods to include in prepackaged foods and menu items, which will serve as a safer food choice for people to consider if they are in need of managing their own FA conditions or looking out for others, a mindset crucial to addressing FA as one of the major public health issues.

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