

Perspectives and gaps in the management of food allergy and anaphylaxis in the Asia-Pacific Region



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Hong Kong and Beijing, China; Tokyo, Aichi, and Tsu, Japan; Bangkok, Thailand; Singapore, Singapore; Ho Chi Minh City, Vietnam; Jakarta and Yogyakarta, Indonesia; Tainan, Taiwan; Kuala Lumpur, Malaysia; Suwon, Korea; Manila, Philippines; Perth and Melbourne, Australia; Ulaanbaatar, Mongolia; Dhaka, Bangladesh; and Nugegoda, Sri Lanka

Background: Food allergy (FA), which is a condition that has no effective cure and can result in severe life-threatening allergic reactions, remains a global public health concern; however, little is known about how FAs are currently managed in the Asia-Pacific region.

Objective: The main objective of this survey was to evaluate the epidemiology of FA, as well as the availability of resources and

practices for management of FA and anaphylaxis by health care providers across Asia.

Methods: From June 2022 to September 2022, a questionnaire-based survey comprising 66 questions was electronically sent to member societies of the Asia Pacific Association of Allergy Asthma and Clinical Immunology by using Survey Monkey.

Results: A total of 20 responses were received from 15 member countries and territories. Compared with the pediatric data, there was a lack of prevalence data for FA in adults. Except for Australia and Japan, most regions had between 0.1 and 0.5 allergists per 100,000 population and some had fewer than 0.1 allergists per 100,000 population. The perceived rate of FA in regions with a short supply of allergists was high. Although specific IgE tests and oral food challenges were available in all regions, the median wait time for oral food challenges at government facilities was 37 days (interquartile range = 10.5-60 days). Seven regions still relied on prescriptions of ampules and syringes of injectable adrenaline, and adrenaline autoinjectors were not accessible in 4 regions. Oral immunotherapy as FA treatment was available in half of the surveyed countries and territories.

Conclusions: Our study offers a cross-sectional evaluation of the management practices for FA in each Asia Pacific Association of Allergy Asthma and Clinical Immunology member country or territory. Urgent actions are required to enhance allergy services, improve the accessibility and affordability of adrenaline autoinjectors, and conduct robust epidemiologic studies. (*J Allergy Clin Immunol Global* 2024;3:100202.)

Key words: Food allergy, anaphylaxis, allergy service, allergist, adrenaline autoinjector

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Received for publication May 25, 2023; revised October 3, 2023; accepted for publication October 8, 2023.

Available online December 23, 2023.

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2772-8293

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<https://doi.org/10.1016/j.jacig.2023.100202>

Food allergy (FA) is a condition that has no effective cure and can result in potentially fatal allergic responses. Up to 1 in 10 adults¹ and 1 in 12 children² have FA, with more than one-third of individuals with allergy having visited the emergency department for an FA reaction at least once in their lifetime. Avoidance of the food allergen and emergency treatment with adrenaline in the event of accidental consumption remain the mainstay of FA management. Complete allergen avoidance is difficult, however, and inadvertent unintentional allergen exposure is known to occur

Abbreviations used

APAAACI: Asia Pacific Association of Allergy Asthma and Clinical Immunology
 FA: Food allergy
 IQR: Interquartile Range
 OIT: Oral immunotherapy

in half of the children who develop FA within the next 2 years.³ Although active introduction below a patient's reaction threshold is gaining favor among practitioners,⁴ such practice is often impractical in regions in which allergy service provision and resources are limited. Furthermore, fatal anaphylaxis has continued to occur as a result of the delay in recognizing and administering life-saving adrenaline therapy.^{5,6}

When it comes to examining the burden of FAs across different countries, much of the attention has been placed on identifying variations in the prevalence rates between different regions. Although this is certainly an important aspect to consider, it is equally crucial that other factors relating to a region's health delivery systems and socioeconomic status, which can contribute to the disease burden, be taken into account. This includes study of the availability of allergy services and the time it takes for a child with a possible FA to be examined by a specialist and undergo allergy testing, which are crucial aspects of an effective health care delivery model. It is critical that besides including allergy physicians, who play a leading role in food allergy management, the health care delivery service be based on a multidisciplinary model involving primary care doctors and emergency physicians (as they are often the initial contact point at which patients experience acute allergic reactions) and also include support from specialist allergy nurses, dietitians, and clinical psychologist, who represent the link between clinical setting and the community. Administration of adrenaline, which is the only effective treatment option for anaphylaxis, is still not available in the form of autoinjectors in some parts of the world. The availability of oral immunotherapy (OIT) in Asia, as a promising treatment modality to increase the threshold of reactivity of a patient with allergy to a given allergen, has not been well reported.

To provide insight into current perspectives and gaps in FA management, it is important to study health service provision in Asia, which consists of a rich tapestry of economies encompassing a broad spectrum of development levels, from the most advanced and established nations to those still in the process of development. In a previous survey that provided a global overview of FA prevalence, substantial disparities in health service provision were identified, even among developed countries.⁷ However, the scarcity of published literature on FA management practices and health service provision in Asia may impede a effectiveness of a systematic review. Therefore, the Asia Pacific Association of Allergy Asthma and Clinical Immunology (APAAACI) conducted a structured survey of representative experts from its member societies with the objectives of evaluating the epidemiology, resources, and practices relating to FA management in the Asia-Pacific region.

METHODS

This cross-sectional survey was initiated by the APAAACI to capture the current disease burden, availability of resources, and management practices of FA by health care providers in the region.

The APAAACI is Asia's regional allergy organization, and its members are Asian societies, each of which has a good representation of the local allergy specialists. Three junior APAAACI members interested in FA research collaborated with the chair of the APAAACI Food Allergy and Anaphylaxis Committee to design the study and survey instrument. A questionnaire comprising 66 questions was sent electronically to 16 member countries of APAAACI from June 10, 2022, to September 7, 2022. Using Survey Monkey, the APAAACI Secretariat sent the electronic questionnaire to the presidents of member societies, who nominated members of their society to participate in the survey. Each nominated respondent was either a national or regional representative who was actively engaged in allergy clinical practice at his or her institutional, member society, or professional society level. Throughout the survey period, we sent regular e-mail reminders to member societies until we had received all responses from the societies that accepted the invitation. The questions covered the following areas: the respondents' demographic profile; the regional prevalence of FA; the availability of allergy services; and the management of FA, including prescription of adrenaline and food OIT. Additional inquiries were made regarding the management of FA and anaphylaxis in the respondents' own practices both before and during the coronavirus disease 2019 (COVID-19) pandemic. Some questions called for single best responses, whereas others allowed multiple responses. Therefore, the total responses for multiple-response questions may not add up to 100%. Estimation of the number of allergists per 100,000 population was based on Worldometer's population statistics.⁸ Results were compiled and reported using a denominator representing the number of respondents or member societies that answered each question. The denominator for each question differed, as some respondents or societies did not answer specific questions. A similar methodology was used for the previous surveys conducted by APAAACI.^{9,10}

RESULTS

Demographic profile of respondents

Of the 16 member societies that were contacted, only the society in India did not provide a response. The respondents were from Australia, Bangladesh, China, the Hong Kong Special Administrative Region of the People's Republic of China, Indonesia, Japan, Korea, Malaysia, Mongolia, the Philippines, Singapore, Sri Lanka, Taiwan, Thailand, and Vietnam. In some countries, allergists treated both pediatric and adult patients, whereas in others, allergists treated children and adults separately. To ensure a more comprehensive representation of patients across different age groups, some member societies nominated more than 1 individual to participate in the survey. On average, 1.3 respondents per member society participated in the survey (see [Table E1](#) in the Online Repository at www.jaci-global.org). Of the 21 responses received, 1 was excluded as a duplicate. Among the 20 respondents providing valid responses, 3 (15%) looked after adult patients only, 7 (35%) cared for pediatric patients only, and 10 (50%) cared for both adult and pediatric patients. The respondents' median years of experience in the allergy and immunology specialty was 20 years (interquartile range [IQR] = 9.8-23) years.

Epidemiology of FA in the Asia-Pacific region

A total of 14 member societies submitted answers dealing with the prevalence of FA in their respective regions. Regarding the

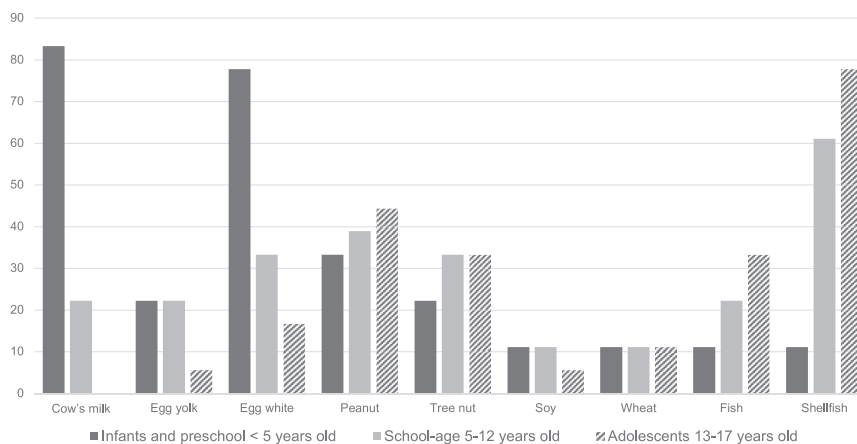


FIG 1. Top food allergens in the Asia-Pacific region, by age group. Cow's milk and egg are common food allergens in children younger than 5 years; shellfish, peanuts, tree nut, and fish are more prevalent food allergens among school-aged children aged 5 to 12 years and adolescents aged 13 to 17 years.

responses providing prevalence data among the pediatric population, 9 (64%) were based on published research, 3 (21%) were based on institutional and/or hospital databases, and 1 (7%) was based on school-based data (see Table E2 in the Online Repository at www.jaci-global.org). Three respondents (21%) indicated that no prevalence data on immediate FA were available. In all, 9 regions indicated that prevalence data based on published literature were available, with 5 of the 9 regions (56%) having data based on oral food challenge results. The burdens of FA in descending order of prevalence were as follows: 10% in Australian infants, 7.7% in Chinese infants and toddlers, 5% in Australian school-aged children (aged 10-14 years), 4% in Korean school-aged children (aged 6-16 years), 0.5% in Singaporean infants, and 0.45% in Thai preschoolers. Prevalence data based on institutional and/or hospital databases with IgE sensitization results available suggested that FA prevalence was higher in Indonesia (10%-15%), followed by Japan (5%-10%), the Philippines (5%), and Vietnam (1%-5%). Data based on self-reporting showed that FA prevalence was 7.4% in Taiwan and 5% in Hong Kong. The most common food allergens affecting children younger than 5 years included cow's milk (83%) and egg white (78%); common food allergens in children aged 5 to 12 years included shellfish (61%), peanuts (39%), and tree nut and egg white (33%). The food allergens predominantly reported in children aged 13 to 17 years were shellfish (78%), peanuts (44%), and tree nut and fish (33%) (Fig 1). Food allergens, including egg yolk and soy, were more prevalent in younger children than in adolescents; however, the prevalence of wheat allergy was similar across different pediatric age groups. Fruits were reported as a common food allergen in school-aged children in Japan and China, whereas buckwheat was an important allergen in Korea and beef was an important allergen in Bangladesh, Mongolia, and Sri Lanka.

Concerning the prevalence data among the adult population, in 4 cases (29%) the information provided was based on published research and in 3 cases (21%) it was based on institutional or hospital databases (see Table E2). In no cases were the prevalence data based on oral food challenge results. Prevalence data were not available for 7 regions (50%). Prevalence from either data source varied considerably between regions and within regions. FA prevalence in adults was reported to range from 1% to 10%

in Vietnam and from 6% to 10% in Indonesia. Prevalence, mostly self-reported, was around 5% in Japan and Taiwan, 2% to 4% in Australia, and 1% in Singapore. Seafood, including fish and shellfish, was consistently the most common food allergen in adults (accounting for 69% of cases of FA); other common food allergens included wheat, fruits, peanuts, tree nuts, Hilsha fish (herring), and brinjal (eggplant).

FA service provision in the Asia-Pacific region

Patients with FA were predominantly cared for by allergists/immunologists (81%) and general pediatricians (75%) in their regions (Fig 2 and see Table E3 in the Online Repository at www.jaci-global.org). General practitioners (50%) also played a major role in looking after patients with FA in some regions, whereas internists and respiratory physicians (31%) and gastroenterologists (13%) were less commonly involved. The availability of allergists/immunologists in the Asia-Pacific region was generally low and varied substantially by region (Table I). Pediatric allergists were relatively more abundant in Japan (1.5 per 100,000 population), but in most Asia-Pacific regions, including Hong Kong, the Philippines, Singapore, and Thailand, availability of allergists was between 0.1 and 0.5 per 100,000 population. In Bangladesh, Indonesia, Malaysia, Mongolia, and Vietnam, there were no more than 0.1 pediatric allergists per 100,000 population. With regard to adult allergists, the availability of allergists was relatively higher in Australia (1 per 100,000 population), followed by Singapore (0.4 per 100,000 population). In most other regions, however, adult allergists were severely lacking, with availability less than 0.1 per 100,000 population in Hong Kong, Indonesia, Japan, Malaysia, Mongolia, the Philippines, and Vietnam.

In most regions, allergists (81.3%), and to a lesser extent pediatricians (18.8%), provided follow-up care, including annual reviews for patients with FA. Support from allergy nurses was "always" or "frequently" available in half of the respondents' clinical practices and available only "sometimes" or "rarely" in the other half. Only 12.5% of respondents reported having access to allied health services, such as dietetic counseling, whereas most respondents (31.3%) reported having access to dietitians only rarely.

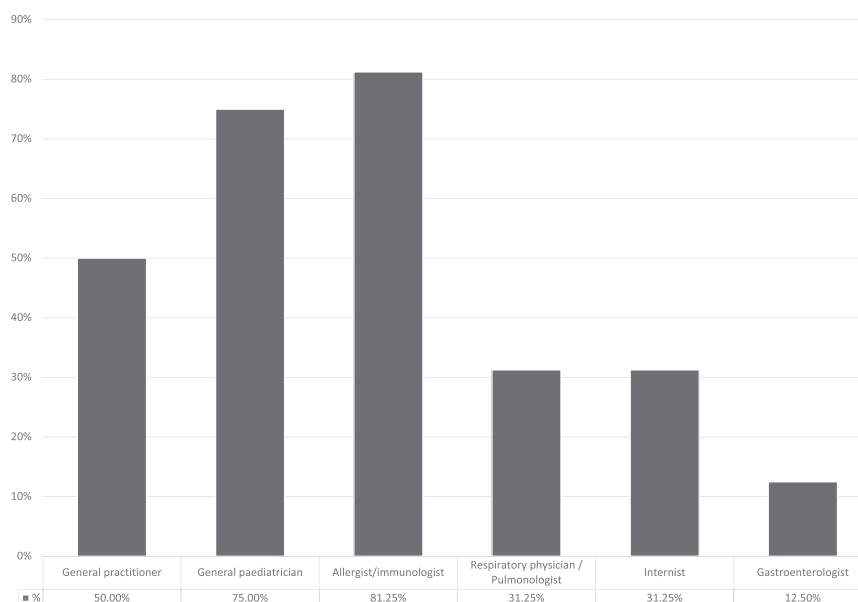


FIG 2. Health professionals who typically manage FA in the Asia-Pacific region (total responses). The majority of patients with allergy (81%) were managed by allergists/immunologists, although general pediatricians (75%), general practitioners (50%), respiratory physicians (31%), internists (31%), and gastroenterologists (13%) also played important roles in managing patients with FA in this region.

TABLE I. Availability of adult and pediatric allergists in each country

Country/region	No. of adult allergists per 100,000 population per region	No. of pediatric allergists per 100,000 population per region
Australia	1	<1
Bangladesh	Very few	Very few
China	Information not available	Information not available
Hong Kong SAR	0.04	0.4
Indonesia	0.02	0.07
Japan	<0.1	1.5
Korea	Information not available	Information not available
Malaysia	0.02	0.06
Mongolia	0.1	0.11
Philippines	0.05	0.26
Singapore	0.4	0.4
Sri Lanka	Information not available	Information not available
Thailand	Information not available	0.2
Taiwan	Information not available	Information not available
Vietnam	0.005	0.017

SAR, Special Administrative Region.

The government was mainly responsible for covering the cost of allergy consultations in Australia, the Hong Kong Special Administrative Region, Thailand, and Taiwan, whereas in Japan, the fee for allergy consultations was paid entirely by insurance. In Indonesia, Mongolia, Singapore, and Vietnam, allergy consultations were subsidized almost equally by the government and insurance. The cost of private allergy consultations varied considerably in the Asia-Pacific region, with the highest fees reported in Singapore (\$100-\$500 per consultation), Hong Kong (\$200-\$350 per consultation), and Australia (\$150-\$300 per consultation). However, the cost of allergy consultation was considerably lower (at \$10 to \$80 per consultation) in Mongolia, the Philippines, Indonesia, and Taiwan (see Fig E1 in the Online Repository at www.jaci-global.org). Skin prick tests, specific IgE tests, and oral food challenges were available in all regions. A total of 9 member societies (60%) provided information about

the waiting time for their allergy services. The wait time for a patient to obtain a subsidized skin prick or specific IgE test at a government facility ranged from 1 week to 1 month (median 10.5 days [IQR = 2.5-32.6 days]) from the time of referral for allergy evaluation, and mostly within a week (median 3.5 days [IQR = 0-5 days]) following the initial consultation (Table II). However, the wait time for a patient to undergo an oral food challenge at a government facility varied significantly between countries and territories, and the median wait time was 37 days (IQR = 10.5-60 days).

Practices in FA and anaphylaxis management

The availability of adrenaline autoinjectors, which are essential for the immediate management of anaphylaxis, is limited in the Asia-Pacific region. Adrenaline autoinjectors were not accessible

TABLE II. Typical waiting time for a child or adult to receive specific IgE level and/or skin prick tests and oral food challenges at a government facility

Country/Region	Waiting time to receive sigE and/or skin prick tests from allergy referral, d	Waiting time to receive sigE and/or skin prick tests from initial consultation, d	Waiting time to receive an oral food challenge, d
Australia	180	< 1 (done on the day of consultation)	90-180
Bangladesh	10	Not available	Not available
Hong Kong SAR	225	90	30-300
Indonesia	7-14	3 to 5	3
Japan	0	0 (no waiting time)	30-60
Philippines	7-14	0 to 15	7-14
Singapore	7-60	0 to 7	30-60
Thailand	30	14	180
Vietnam	1	0 (no waiting time)	3-5

SAR, Special Administrative Region; sigE, specific IgE.

in 4 of the 13 regions (31%) that supplied information regarding the clinical practice of prescribing the drug; specifically, autoinjectors were unavailable in Bangladesh, Indonesia, Mongolia, and Vietnam (Table III). Ampules and injectable adrenaline syringes remained commonly prescribed in 7 (54%) regions. In regions with distribution of adrenaline autoinjectors, Epipen was the most common brand (available in 8 member countries or territories [62%]), followed by Anapen and Jext (available in 7.7%). More than half of the member societies (62%) indicated that no specific guideline on the prescription of adrenaline was followed in their respective regions. The rates of nurse and pharmacist involvement in educating patients on the use of adrenaline devices were 73% and 53%, respectively. Standardized national and/or regional anaphylaxis or allergy action plans were available in 63% of respondents' respective regions; action plans were lacking or nonstandardized in Bangladesh, Indonesia, Malaysia, Mongolia, and the Philippines. In Australia, a separate action plan for individuals with FA who were not prescribed an adrenaline autoinjector was available, but no such plan was available in the other regions. Only half of eligible patients (52%) received an anaphylaxis action plan, and only 46% of those patients followed the plan's directions, suggesting only fair compliance.

When asked how likely they were to admit anaphylactic patients to the hospital before versus after the COVID-19 epidemic, respondents generally stated that their practices had not changed much and that such occurrences had taken place only "sometimes" (see Fig E2, A in the Online Repository at www.jaci-global.org). The likelihood that respondents would observe patients experiencing anaphylaxis at home after having their adrenaline doses was also assessed, and once more, most respondents indicated that their practices had not changed significantly and that such instances happened rarely (see Fig E2, B).

OIT was clinically available in half of the regions, including Hong Kong, Japan, Malaysia, Singapore, Thailand, and Taiwan (see Table E4 in the Online Repository at www.jaci-global.org). In all of these regions in which clinical OIT was provided, the OIT items were unregistered and given as nonprescription treatment. The region with the highest availability of OIT was Japan, where more than 100 allergy centers provided OIT for the treatment of FAs. In other regions, OIT was offered at 2 to 8 centers within the country or territory. The most common food OIT prescribed was egg, peanut, milk, wheat, tree nut, and soy.

In those regions that offered OIT, no national or regional guidelines regarding OIT as a treatment were available. The only region in which such guidelines were available was Australia,¹¹ in which only OIT approved by the Therapeutic Goods Administration or OIT administered as part of a clinical research trial can be offered to patients with FA.

DISCUSSION

This survey distributed to APAAACI member countries sought information on the level of allergy care across the Asia-Pacific region. Such information is required for engagement with stakeholders and policymakers at the national and international levels to strengthen the discipline of allergology. Our study highlighted a number of unmet needs in the Asia-Pacific region in terms of FA research and management, including the paucity of reliable data on FA epidemiology, the lack of allergists in the area, the lengthy wait times for diagnostic oral food challenges, and lastly the dearth of adrenaline autoinjectors in the Asia-Pacific countries/territories.

The true prevalence of FA in Asia, especially among adults, remains elusive. In our study, 27% and 53% of the regions evaluated lacked prevalence data on IgE-mediated FA in children and adults, respectively. Only 5 regions provided challenge-confirmed data on the prevalence of FAs, and none of them included data from adults. The prevalence of FAs from self-reporting data, however, represented the "perceived" rate of FA in a region, which is a good surrogate marker of the quality of life and financial burden that FA imposes. In most regions, the prevalence of "perceived" FA was around 5%, which was similar to the situation in Europe, where it was reported that 1 in 20 children had ever had an allergy to 1 or more foods.¹² However, in some regions, such as in Indonesia and Vietnam, the rate could be as high as 10%. In these regions in which the self-reported prevalence of FA was high, the availability of allergists was low (<0.1 per 100,000 population), suggesting that the high rate of "perceived" FA might have been contributed to by the low level of allergy service provision. It is imperative that patients who were perceived to have an FA receive appropriate evaluation by a specialist, as FA has a significant impact on the psychological well-being and quality of life of individuals with allergy and their families.¹³

Compared with the United States¹⁴ and Europe,¹⁵ which had 1 allergist per 100,000 population and 1.8 allergists per 100,000

TABLE III. Type of adrenaline device in each country/ region

Country/region*	Type of adrenaline device		If AALnjs are available, what are the brands?	Are there any guidelines on the prescription of AALnjs in your country/region?
	Adrenaline vial and syringe	AALnj		
Australia		✓	EpiPen, Anapen	Yes
Bangladesh	✓			No
Hong Kong SAR		✓	EpiPen, Jext	Yes
Indonesia	✓			No
Japan		✓	EpiPen	Yes
Malaysia		✓		No
Mongolia	✓			No
Philippines	✓	✓	EpiPen	Yes
Singapore		✓	EpiPen	No
Sri Lanka	✓	✓	EpiPen	No
Thailand	✓	✓	EpiPen	Yes
Taiwan		✓	EpiPen	No
Vietnam	✓			No

AALnj, Adrenaline autoinjector; SAR, special autonomous region.

*Information from China and Korea was not available.

population, respectively, the availability of allergy physicians in Asia (<0.5 per 100,000 population) was generally low (except in Australia and Japan). In Australia, where a government-funded National Allergy Strategy to support the improvement in allergy care has been in place since 2015,¹⁶ allergists/clinical immunologists were available at a rate of around 1 per 100,000 adult population.^{17,18} As for Japan, where the country's Basic Law on Measures Against Allergic Diseases has been in effect since June 2014,¹⁹ the availability of pediatric allergists was relatively higher (1.5 per 100,000 population), but the number of adult allergists remained low (<0.1 per 100,000 population). Several regions were involved in a previous global survey that evaluated allergy services provision.^{20,21} Since that previous survey (which was conducted in 2005), there has been at least a 2-fold rise in the number of allergists in Malaysia (from 0.004 to 0.02-0.06 per 100,000 population), Mongolia (from 0.04 to 0.1 per 100,000 population), and Bangladesh (from none to a few). The advances have been slow versus in Germany, where the yearly allergy specialist registration rate has been up to 140 per year.¹⁵ Most other European countries have also reported that allergy is a steadily growing specialty. A recent article reviewed that Germany had a high ratio of 6.5 allergists per 100,000 population, but not all allergy specialists managed FAs.²² Some might be in different fields such as dermatology or respiratory therapy, highlighting the challenges in comparing allergy service provision across regions. To ensure that there are enough allergy specialists to meet the rising demand for allergy care, it is critical to continue advancing the allergy discipline across the Asia-Pacific region. This is especially relevant in areas such as China, where the prevalence of allergic diseases is rising.

In Bangladesh, Malaysia, and Vietnam, patients with FA were primarily evaluated not by allergists/immunologists but rather by general practitioners, pediatricians, or respiratory physicians. In other regions, although allergy and immunology consultation services were available, general pediatricians (75%) and general practitioners (50%) also played a key role in the care of patients with FA. According to a survey, more than 40% of the respondents representing different countries claimed that allergy/immunology was not recognized as a separate specialty in their country. According to that survey, the Asia-Pacific area had the lowest recognition of allergy/immunology as a specialty, with 30% of

respondents in the Asia-Pacific region stating that allergy/immunology was considered a specialty in their country or territory, compared to 60-70% in Europe and America.²³ The diagnosis and management of allergic diseases often require a multidisciplinary approach, including collaboration with other health care providers such as primary care physicians, gastroenterologists, and dermatologists. Allergists frequently play a central role in encouraging cross-disciplinary care such that the quality of care for patients with complex allergic disease can be improved. In addition, in most regions, the proportion of pediatric allergists was generally higher than the proportion adult allergists, likely partly owing to the fact that FAs present mostly in the first few years of life and allergies to allergens such as eggs and cow's milk tend to be outgrown with time.²⁴ However, because other allergic conditions such as asthma and allergic rhinitis tend to develop later in life and severe eczema and FAs such as peanut and tree nut allergy persist throughout life,²⁵ capacity for training adult allergists should be enhanced. It will also be challenging to implement OIT as a standard FA treatment in areas lacking adequate allergy service provision. Promoting the allergy specialty is therefore essential for improving patient outcomes, encouraging interdisciplinary collaboration, and raising awareness of allergy management.

Our study also revealed that adrenaline autoinjectors were not available in 4 of the 13 regions that responded to the survey, and in half of the regions, adrenaline was still provided in ampules together with 1-mL syringes and needles or 1-mL tuberculin syringes prefilled with the appropriate adrenaline dose. One issue with these methods is that caregivers or patients are likely to be slower in drawing up an accurate dose of adrenaline from the ampule than are health care professionals in an emergency. In addition, in contrast to adrenaline autoinjectors, which usually have a shelf-life of a minimum of 12 months²⁶ and can last for as long as 30 months, prefilled syringes containing adrenaline have a short half-life and need to be exchanged every 3 months.^{27,28} In contrast to the findings from our study, a global review of IgE-mediated FA management showed that all surveyed countries but Brazil had access to adrenaline autoinjectors, with most offering 2 brands and some up to 4.²² In most of the regions examined, the reasons mentioned as contributing to the unavailability of adrenaline autoinjectors include high costs,

lack of regionally produced autoinjectors, and lack of guidelines on the prescription of adrenaline at a national or regional level. On the basis of the most recent guidelines, it is recommended that adrenaline autoinjectors be used as the primary treatment for anaphylaxis.²⁹⁻³¹ Therefore, public health measures to ensure the widespread availability of adrenaline autoinjectors should be a priority to avoid unnecessary morbidity and mortality.

These findings should be interpreted in light of several limitations. On average, 1.3 respondents per region or country participated in the survey. Sampling bias, a limitation inherent in survey study, should be taken into consideration, although respondents were encouraged to consult with relevant experts of their respective societies before completing the questionnaires. Also, the responses might reflect the opinion of the respondent and not the nationally representative data. Although surveys are a low-quality methodologic design for epidemiologic data, they are a feasible strategy, especially when reliable data from the Asia-Pacific region are lacking. Some of Asia's most populous areas, notably China, lacked information about supply of allergy care. Our figures on FA prevalence and allergist availability have not been validated; thus, the data collected are better viewed as qualitative rather than quantitative. The accuracy of anaphylaxis referrals to the allergy clinic and hospital admissions can be improved by gathering information from both emergency medicine providers and allergy/immunology specialists. In addition, data on the wait time to receive allergy care and the cost of allergy consultation are also subject to respondents' primary affiliation and the health care delivery system of each country.

In conclusion, our study provides a cross-sectional assessment of the pattern of FAs, the resources that are available, and the ways in which each member country or territory of APAAACI in the Asia-Pacific area managed FAs and anaphylaxis at the time of the survey. There is an urgent call for robust epidemiologic studies in Asia to produce accurate and reliable incidence and prevalence of FA across time, to breach the gap between the demand and supply of allergy services, and to enhance the availability and accessibility of adrenaline autoinjectors and allergen-specific immunotherapy.

DISCLOSURE STATEMENT

Disclosure of potential conflict of interest: The authors declare that they have no relevant conflicts of interest.

We thank all of the APAAACI member countries for participating in this survey. Availability of data and materials: We confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

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