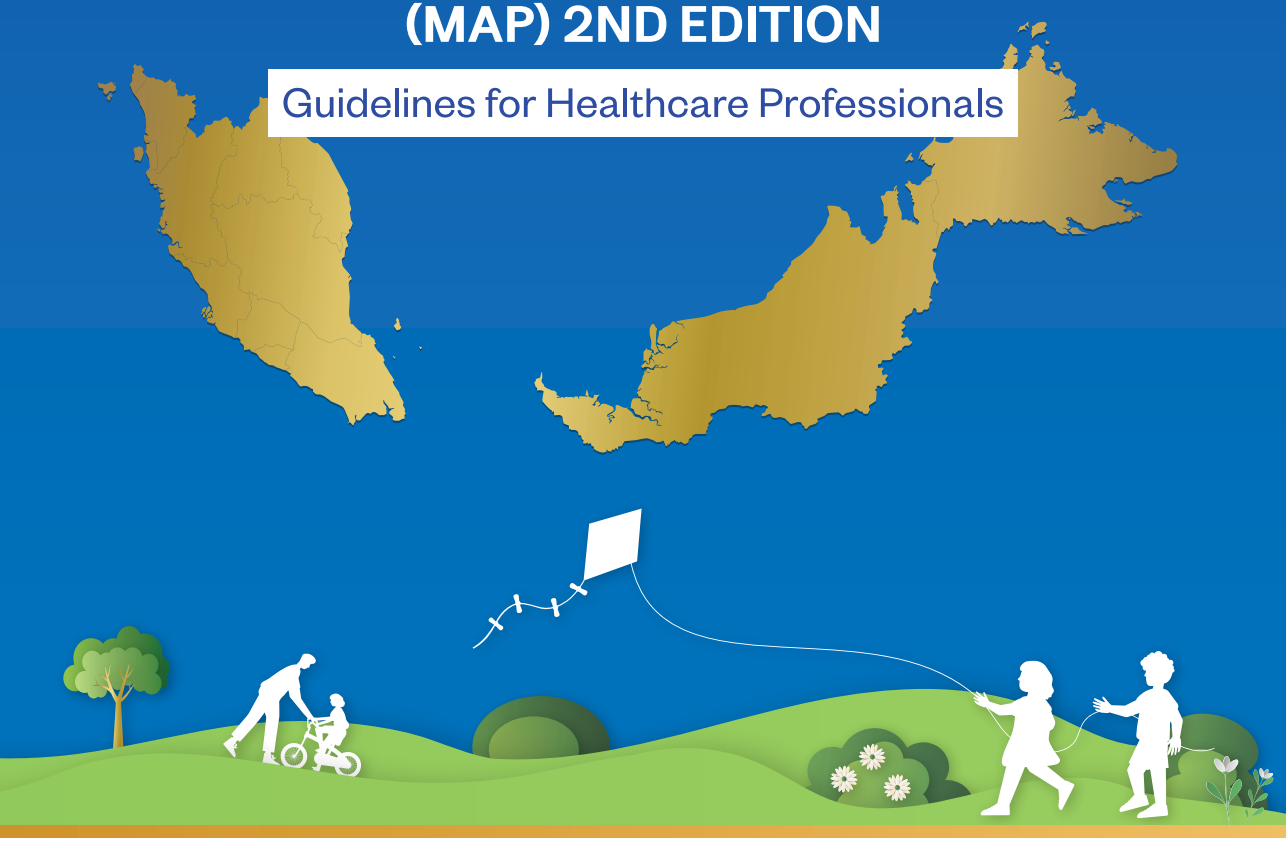
MALAYSIAN ALLERGY PREVENTION

(MAP) 2ND EDITION

Guidelines for Healthcare Professionals



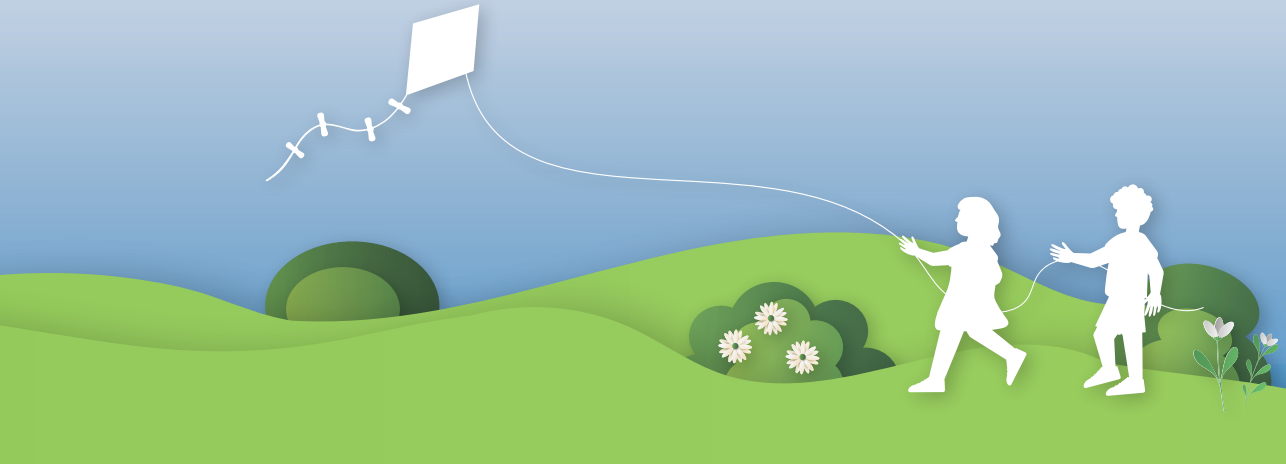
ENDORSED BY:

PERSATUAN ALERGI & IMUNOLOGI MALAYSIA
MSAI

Obstetrical and Gynaecological Society of Malaysia

Malaysian Paediatric Association
PERSATUAN PEDIATRIK MALAYSIA

TABLE OF CONTENTS



SECTION 1:
INTRODUCTION

1.1 OVERVIEW

1. Allergic diseases are an important and growing public health problem. Prevalence has increased over the past years.[1]
2. Due to these concerns, the Malaysian Society of Allergy and Immunology (MSAI), the Obstetrical and Gynaecological Society of Malaysia (OGSM) and the Malaysian Paediatric Association (MPA) embarked upon an initiative to formulate and update the existing guidelines for the prevention of allergy.
3. Based on a comprehensive review and objective evaluation of published scientific literature, the guidelines were developed for healthcare professionals.
4. These guidelines are in evolution.

1.2 APPLICATION

These guidelines are applicable for the primary prevention of allergic disease among infants at risk of allergy, and **NOT** for infants with known allergy, except for Section 7, which explores secondary allergy prevention modalities.

1.3 METHODOLOGY

The recommendations of the Malaysian Allergy Prevention Guidelines published in 2014, were revised and consented based on current literature. A comprehensive search of PubMed, Cochrane Library, and guideline repositories for studies on primary prevention strategies for allergic disease published between 2015 and 2025 was conducted, and supplemented with relevant references provided by the Panel. The literature found was screened in two filtering processes, first by title and by abstract, followed by which remaining papers were screened in the full text for relevance. Identified studies were graded according to level of evidence (Table 1).[2]

Table 1: Level of evidence

Level of evidence	Type of study
1a	Systematic review of (homogenous) randomised controlled trials
1b	Individual randomised controlled trials (with narrow confidence intervals)
2a	Systematic review of (homogenous) cohort studies of "exposed" and "unexposed" subjects
2b	Individual cohort study/low-quality randomised control studies
3a	Systematic review of (homogenous) case-control studies
3b	Individual case-control studies
4	Case series, low quality cohort or case-control studies
5	Expert opinions based on non-systematic reviews of results or mechanistic studies

The Delphi consensus method was employed to develop and refine the recommendations through a structured, iterative process combining panel discussions and anonymous voting. In the first two rounds, roundtable discussions were held with the Panel to review, debate, and refine the draft recommendations. Following these discussions, the guidelines were revised based on feedback and circulated back to the Panel for additional written comments. Prior to the third round, an anonymous survey was distributed to the Panel to formally vote on each recommendation. Given the small size of the Panel (N = 7), a consensus threshold of 70% agreement was determined *a priori* as the criterion for achieving consensus. Recommendations that did not reach consensus in this survey were collated and discussed in a final roundtable meeting. During this meeting, the Panel deliberated to address outstanding disagreements and achieve consensus.

This combined approach of iterative discussion, revision, and anonymous voting ensured that the final recommendations were rigorously evaluated, integrating clinical expertise with current evidence, and reflecting broad expert agreement.

1.4 EPIDEMIOLOGY

The prevalence of allergic diseases in Malaysia is presented in Figure 1.[3-7]

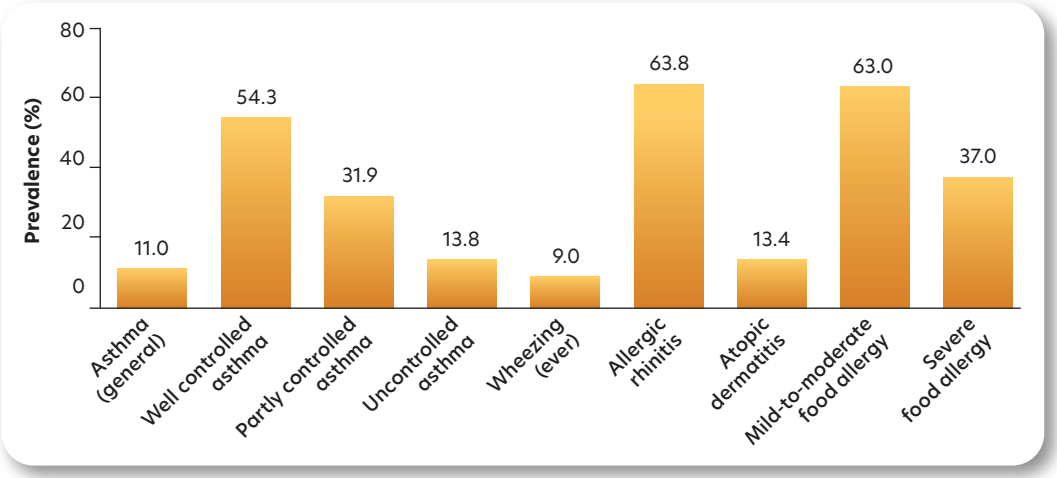


Figure 1: Prevalence of allergic diseases in Malaysia

Data for asthma were adapted from Hussein N, et al. Health Sci Rep. 2023; wheezing (ever) from Dinglasan JL, et al. Saudi Med J. 2022; allergic rhinitis from Yadav A, et al. J Allergy Clin Immunol. 2013; atopic dermatitis from Goh YY, et al. Dermatitis. 2018; food allergy from Ibrahim IS, et al. Children (Basel). 2021.

1.5 RISK GRADING OF ALLERGIC DISEASE

1. Family history is the most important risk factor (Table 2).[8]

Table 2: Percentage of risk of allergy in offspring based on family history of allergy

Allergic disease present in		Risk of allergic disease in child (%)	Risk grade
Parent	Sibling		
0	0	10-20	Low
1	0	20-40	Medium
0	1	20-40	Medium
1	1	50-80	High
2	0	50-80	High

Presence of allergic disease in parent/sibling is coded as follows: 0 = no parent/sibling has history of allergy; 1 = one parent/sibling has history of allergy; 2 = two or more parents/siblings have history of allergy.

1.6 AT-RISK CHILD

1. A family history of allergy identifies a child at risk for allergic disease (Appendix 1).[8-14]

1.7 THE ALLERGIC MARCH

1. 60% of allergies appear during the first year of life.[15]
2. The "Allergic March" (or the Atopic March) shows that one allergy can progress to another allergy over time.[15-17]
3. Prevention strategies aim to stop the first manifestations of allergy or its progression.[15]
4. Common presentations of allergy include asthma, allergic rhinitis, atopic dermatitis, and food allergy.[15-17]
5. Recent publications observed the concomitant presentation of gastrointestinal symptoms and atopic dermatitis as early presenting symptoms in non-IgE-mediated allergies which later progress into development of asthma and allergic rhinitis, similar to the IgE-mediated Allergic March (Figure 2).[18]

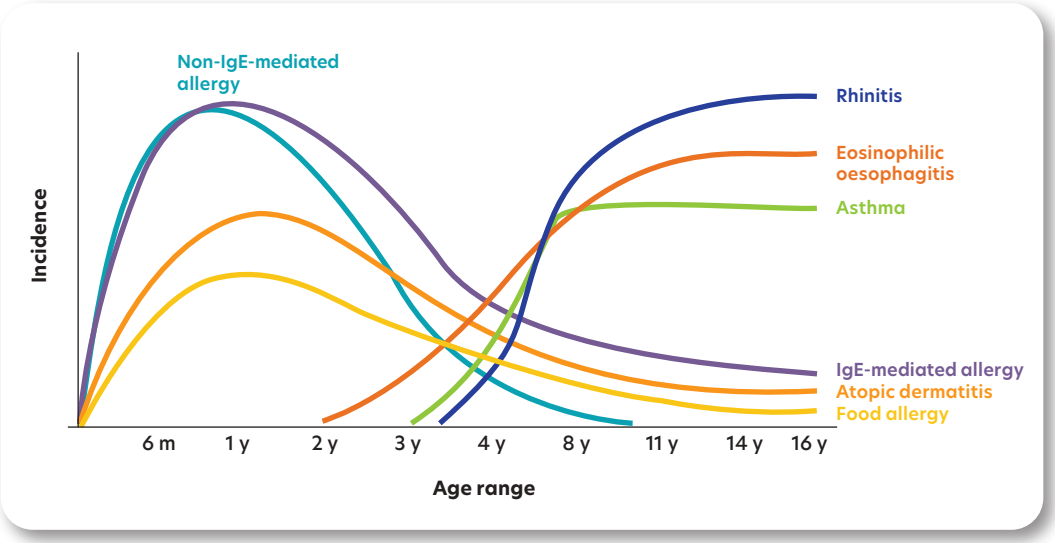


Figure 2: Integrated IgE- and non-IgE-mediated Allergic March

Adapted from Meyer R, et al. Pediatr Allergy Immunol. 2019 and Tsuge M, et al. Children. 2021.

1.8 STEPS FOR ALLERGY PREVENTION

Steps for allergy prevention are outlined in Figure 3.[19]

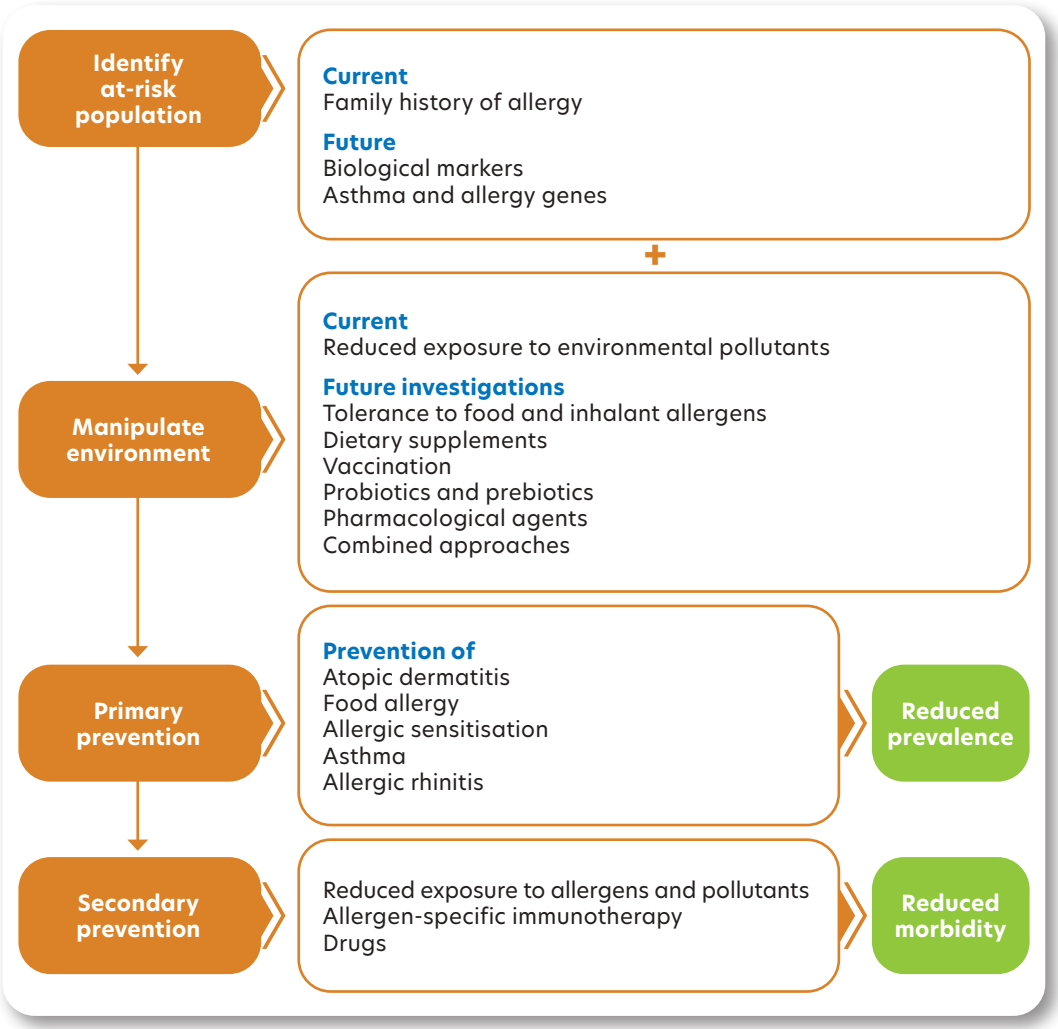


Figure 3: Flowchart of the steps involved in allergy prevention

Adapted from Arshad SH. J Allergy Clin Immunol. 2005.

Primary prevention refers to inhibition of clinical disease development before it occurs.[13]

Secondary prevention refers to prevention of symptoms, exacerbation, or lung function deterioration in those who have allergy.[13]

1.9 ALLERGENICITY OF FOODS

1. Different food groups have differing allergenicity, defined as *"the potential of a material to cause sensitisation and allergic reactions, frequently associated with IgE antibody"*.[20]
2. A food allergen scale can provide an indication of allergenicity of food groups.[21]
3. Appendix 2 illustrates some major food groups and their allergenicity.[21]

1.10 MAP GUIDELINES AND USERS

1. These guidelines are not fixed protocol.
2. Clinical judgement on the management of individual patients remains paramount.
3. Healthcare professionals, patients, and their families need to develop individual treatment plans that are appropriate to the circumstances of the patients.

1.11 THE PANEL

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1.12 ENDORSEMENT

This guideline has been reviewed and endorsed by MSAI, OGSM, and MPA, affirming the guideline's relevance and credibility.

1.13 DISCLAIMER

The content and recommendations made in these Guidelines are based on current scientific evidence and/or best clinical practice. The Panel recognises the limited number of published or available local data and the impact it may have on the recommendations. Healthcare professionals are to exercise their discretion when utilising the information contained in these Guidelines in their clinical practice.

1.14 COPYRIGHT OWNERSHIP

1.15 ACCESSIBILITY

The Malaysian Allergy Prevention Guidelines (2nd edition) are available from these websites:

- **Malaysian Society of Allergy & Immunology (MSAI)**
  www.allergymsai.org
- **Obstetrical & Gynaecological Society of Malaysia (OGSM)**
  www.ogsm.org.my
- **Malaysian Paediatric Association (MPA)**
  www.mpaeds.my

1.16 ACKNOWLEDGMENT

The development of this guideline was supported by Nestlé Nutrition Institute.

This guideline is published in 2025 and is an update to the Malaysian Allergy Prevention Guideline published in 2014.

SECTION 2:
MATERNAL DIET AND BEHAVIOUR

RECOMMENDATION 1 – **ALLERGENIC FOODS**

1. During pregnancy or lactation, maternal avoidance of essential foods such as milk and egg is not recommended.[22,23]
2. Data is inconclusive to recommend peanut avoidance during pregnancy.[24,25]
3. There is no evidence that during pregnancy, maternal avoidance of known dietary allergens reduces the risk of offspring developing allergic disease.[23,26]

RECOMMENDATION

Maternal avoidance of allergenic foods during pregnancy or lactation is not recommended.

Note:

i. *Mothers with a known dietary allergy should continue to avoid those specific allergens during pregnancy or lactation.*

ii. *During pregnancy, a mother who chooses to avoid certain foods is advised to receive dietary counselling with a nutritionist to obtain adequate nutrition for herself and her foetus.*

RECOMMENDATION 2 – **INHALANT ALLERGENS**

1. Data remains inconclusive to suggest that maternal avoidance of inhalant allergens during pregnancy or lactation reduces allergic disease.[27,28]

For more information on cigarette smoking and indoor pollutants, refer to Section 6, Recommendation 3.

RECOMMENDATION

Maternal avoidance of inhalant allergens during pregnancy or lactation is not recommended.

RECOMMENDATION 3 – **PROBIOTICS**

1. Probiotics may prevent the development of eczema when administered during pregnancy and continued while breastfeeding, as well as to infants after birth.[29-32]
2. Benefits of probiotics for eczema prevention may be strain-specific as some strains showed no benefits.[33]
3. The probiotic *Lactobacillus rhamnosus* GG has the most evidence on eczema prevention.[34,35]
4. A strain-specific sub-meta-analysis found that a mixture of different species of probiotics may reduce the incidence of atopic dermatitis.[31]

RECOMMENDATION

1. *Probiotic use may be suggested in pregnant or lactating women who have a high risk of allergy in their children, because considering all critical outcomes, there is a net benefit resulting primarily for prevention of eczema.*
2. *Probiotics supplementation is recommended to begin during the prenatal period and continue during the postnatal period, both to breastfeeding mothers and to infants, regardless of their risk status.*

RECOMMENDATION 4 – **PREBIOTICS**

1. There is little evidence that prebiotic supplementation during pregnancy reduces the risk of allergy.[36,37]
2. Benefits of prebiotics may depend on the specific ratio of galacto- and fructooligosaccharides (GOS/FOS).[38]

RECOMMENDATION

There is a paucity of studies on the use of prebiotics in prevention of allergy to recommend its use. More research is needed.

RECOMMENDATION 5 – **FISH OILS**

1. Maternal supplementation with fish oil providing 2,400 mg/day of n-3 long-chain polyunsaturated fatty acids (LCPUFA) (55% eicosapentaenoic acid and 37% docosahexaenoic acid) from early pregnancy reduced the overall risk of non-atopic asthma in offspring by 73% at age 6 years but showed no overall effect on atopic asthma risk.[39]
2. Maternal supplementation with at least 1,200 mg/day of n-3 LCPUFA significantly decreased the risk of asthma and/or wheeze in offspring, while lower doses did not show this association.[40,41]
3. Supplementation doses ranging from 900 mg to 2,400 mg/day did not alter the progression of IgE-mediated allergic diseases or sensitisation in childhood.[42-44]

RECOMMENDATION

Limited studies have shown the lack of benefits for fish oil supplementation in allergy prevention. Thus, no recommendation can be made.

RECOMMENDATION 6 – **ANTIOXIDANTS AND VITAMINS**

1. There is weak evidence supporting vitamins A, D and E, and zinc for prevention of allergy.[45]
2. Due to the teratogenic effects secondary to vitamin A intake, vitamin A supplementation should not exceed 3,000 mcg/day.[46]
3. Maternal adherence to an antioxidant-rich and vitamin-rich diet (e.g., yoghurt, fruit, vegetables), along with increased infant diet diversity at 12 months, may reduce the risk of allergic disease in early childhood.[47-49]

RECOMMENDATION

1. *No recommendation can be made as more studies are needed to examine the role of vitamin supplementation in prevention of allergy.*
2. *Vitamin D has been investigated for allergy prevention. At this point in time, there is insufficient data to recommend vitamin D during pregnancy and lactation for the purpose of allergy prevention. This recommendation does not apply to those mothers who have other indications for prophylactic or therapeutic use of vitamin D.*

RECOMMENDATION 7 – **PSYCHOSOCIAL FACTORS**

1. Prenatal maternal stress may increase the risk of atopic dermatitis, asthma, wheeze and allergic rhinitis in their offspring.[50-52]
2. Prenatal and postnatal maternal stress is associated with increasing odds of wheezing in their children during the first 6 years of life.[53,54]
3. Prenatal maternal depression may increase the risk of allergic rhinoconjunctivitis during the first 5 years of life.[55]

RECOMMENDATION

Maternal psychological well-being may influence allergic disease risk. Therefore, it is recommended for pregnant mothers to undergo mental health screening using the appropriate tools during antenatal check-ups.

RECOMMENDATION 8 – **BODY WEIGHT DURING PREGNANCY**

1. Maternal obesity during pregnancy may increase the risk of childhood wheezing and asthma.[56-58]
2. Maternal underweight may increase the risk of childhood atopic dermatitis.[59]
3. Moderate, very high, and extreme gestational weight gain may increase the risk of childhood atopic dermatitis and asthma.[59]

RECOMMENDATION

Weight management preconception and during pregnancy is encouraged for the prevention of allergic disease in children.

RECOMMENDATION 9 – **CAESAREAN SECTION**

Some studies suggest a slight increase in allergy risk for children born via Caesarean section,[60-67] but this should not influence mode of delivery. When clinically indicated, Caesarean section should not be deterred on the basis of allergy prevention.

RECOMMENDATION

When clinically indicated, Caesarean section should not be deterred on the basis of allergy prevention.

SECTION 3:
BREASTFEEDING

The Panel acknowledges that breastfeeding is the recommended feeding method with benefits that extend beyond allergy prevention.

RECOMMENDATION 1 – **BREASTFEEDING**

1. Breastfeeding is not specifically recommended for preventing allergy but may provide a small reduction in risk of allergic disease for those who had breastfed for at least 4 months.[68,69]
2. It possibly reduces the incidence of atopic dermatitis in children younger than 2 years.[70-73]
3. Breastfeeding more than 3 to 4 months may reduce the risk of wheezing in the first 2 years of life.[73-75]
4. Longer duration of breastfeeding may reduce the risk of developing asthma for children aged 5 to 18 years.[73-75]
5. It reduces the incidence of cow's milk protein allergy in the first 2 years of life, but does not necessarily reduce food allergy in general.[76]
6. There are no clear effects of breastfeeding on allergic rhinitis.[77,78]
7. Data are conflicting whether exclusive breastfeeding longer than 3 months has an effect on the incidence of atopic dermatitis in children.[79-81]
8. Some studies showed increased risk of allergic disease with exclusive breastfeeding beyond 6 months.[80-82]

RECOMMENDATION

Exclusive breastfeeding is recommended up to 6 months of age, with a minimum duration of 4 months.

RECOMMENDATION 2 – **ALLERGENIC FOODS**

1. There is no convincing evidence that maternal avoidance of dietary allergens during breastfeeding reduces the risk of allergy in the child.[8]

RECOMMENDATION

During breastfeeding, maternal avoidance of allergenic foods is not recommended unless the mother has a known food allergy.

Note: *Mothers with a known food allergy should continue to avoid those specific allergens during lactation.*

SECTION 4:
INFANT FORMULA

The Panel acknowledges that breastfeeding is the recommended feeding method with benefits beyond allergy prevention.

RECOMMENDATION 1 – **REGULAR COW'S MILK-BASED FORMULA**

1. In infants with no prior exposure to regular cow's milk-based formula, current evidence is inconclusive regarding its benefit over breastmilk in reducing the risk of allergic disease.[83]
2. In infants previously exposed to regular cow's milk-based formula now transitioning to breastfeeding, continuous exposure to regular cow's milk-based formula is required to maintain tolerance and reduce the risk of cow's milk protein allergy.[84-86]

RECOMMENDATION

***In infants with no prior exposure to regular cow's milk-based formula**, the use of regular cow's milk-based formula over breastmilk to reduce the risk of allergic disease is not recommended.*

***In infants previously exposed to regular cow's milk-based formula now transitioning to breastfeeding**, continuous exposure is recommended to maintain tolerance and reduce the risk of cow's milk protein allergy.*

***Note:** The decision to continue exposure to regular cow's milk-based formula (with intact protein without hydrolysis) while breastfeeding should be determined by the infant's allergy risk status and preference of the parent.*

RECOMMENDATION 2 – **HYDROLYSED FORMULA**

1. Partially hydrolysed whey formula reduces the risk of atopic dermatitis while extensively hydrolysed casein formula reduces the risk of cow's milk protein allergy compared to regular cow's milk protein.[87-94]
2. Protein source, method, and degree of hydrolysis depend on the manufacturer, contributing to differences in allergy prevention effects among the hydrolysed formula.[95]
3. When considering a hydrolysed formula, it is advised to choose one with reduced allergenicity where preventive effect has been proven or confirmed in a clinical trial.[95]

RECOMMENDATION

For infants who cannot be exclusively breastfed, a hydrolysed formula given during the first 4 to 6 months of life appears to offer advantages to reduce the risk of allergic disease.

RECOMMENDATION 3 – **SOY FORMULA**

1. There is no substantial evidence to support soy formula for the reduction of risk of allergies and food intolerance.[82,83]

RECOMMENDATION

Soy formula is not recommended for the reduction of risk of allergy.

RECOMMENDATION 4 – **AMINO ACID FORMULA**

1. Studies are lacking for amino acid formula in the reduction of risk of allergies.[8,82]
2. Amino acid formula may reduce the risk of sensitisation and cow's milk allergy in early childhood.[96]

RECOMMENDATION

Amino acid formula is not recommended for the reduction of risk of allergy.

RECOMMENDATION 5 – **GOAT'S MILK FORMULA**

1. There is no substantial evidence to support goat's milk formula for the reduction of risk of allergies.[8,82]

RECOMMENDATION

Goat's milk formula is not recommended for the reduction of risk of allergy.

RECOMMENDATION 6 – **PROBIOTICS**

1. Probiotics may prevent the development of eczema when administered during pregnancy and continued while breastfeeding and to infants at risk after birth.[31,97]
2. A strain-specific sub-meta-analysis found that a mixture of different species of probiotics may reduce the incidence of atopic dermatitis.[31]

RECOMMENDATION

Probiotics supplementation is recommended to begin during the prenatal period and continue during the postnatal period, both to breastfeeding mothers and to infants, regardless of their risk status.

RECOMMENDATION 7 – **PREBIOTICS**

1. One meta-analysis of 4 studies with 1,218 infants found a reduction in eczema in those administered formula supplemented with a mixture of GOS/FOS and acidic oligosaccharides.[98]
2. Human milk oligosaccharide 2′-fucosyllactose (2′-FL) supports the development of a healthy gut microbiome by promoting the growth of beneficial bifidobacteria,[99] which play a critical role in immune system maturation and modulation.[100,101]
3. Evidence indicates that 2′-FL contributes to strengthening the intestinal barriers and reducing inflammation,[102] which may help to lower the risk of allergic manifestations in at-risk infants.[100,101]

RECOMMENDATION

In infants who are not exclusively breastfed, emerging evidence suggests that prebiotic supplementation with human milk oligosaccharides may be considered for allergy prevention.

SECTION 5:
COMPLEMENTARY FOODS

The Panel strongly encourages breastfeeding during the first 2 years of life. Breastfeeding practices should also be continued alongside exposure to complementary foods.

RECOMMENDATION 1 – **WHEN TO INTRODUCE**

1. Introduction of complementary foods between age 4 to 6 months modestly reduces the risk of allergy in at-risk infants.[8,82,103-105]
2. First, introduce single-ingredient foods one at a time between age 4 to 6 months.[82]
3. Emerging data suggest that introduction of solid foods delayed beyond 6 months, especially allergenic foods, may increase the risk of food allergy or eczema.[106-109]
4. Timely introduction of allergenic foods (such as cow's milk, peanuts & eggs) may prevent food allergy in infants and children.[107-110]
5. Avoidance of certain foods (such as peanuts and tree nuts) could contribute to an increased risk of sensitisation to those foods.[82,106]
6. Peanuts and tree nuts in the form of butters or other formulations can be introduced,[111,112] while whole nuts should be avoided due to potential aspiration risk.[111,112]
7. Cow's milk protein, presented as infant formula, yoghurt, or cheese, can be introduced before age 1 year.[111,112]
8. However, use of whole cow's milk for infant nutrition should be avoided until after age 1 year, due to increased renal solute load and low iron content.[113,114]
9. Introduction of acidic fruits (berries, tomatoes, citrus fruits) and vegetables, that may cause perioral rash or irritation, does not need to be delayed since they do not usually result in systemic reactions.[82]
10. Greater diversity of food in the first year of life lowers the risk of allergic disease.[49,115,116,178]
11. There is no evidence that dietary restrictions after age 4 to 6 months reduces the risk of allergy.[115-117]
12. Consumption of a healthy diet rich in fruits, vegetables, low saturated fat and non-processed food, has beneficial effects against asthma and food allergy.[118]

RECOMMENDATION 1 – **WHEN TO INTRODUCE** (cont'd)

RECOMMENDATION

Complementary foods can be introduced between age 4 to 6 months to reduce the risk of allergy in at-risk infants, when an infant has sufficient neck control and shows very keen interest in parents eating.

RECOMMENDATION 2 – **HOW TO INTRODUCE**

Counsel parents on how to introduce allergenic foods in the manner below.

1. Introduce allergenic foods after other complementary foods have been introduced and tolerated.[82]
2. Introduce an initial taste of allergenic food at home, rather than at a daycare centre or a restaurant (for some foods such as peanuts, most reactions occur in response to the initial ingestion).[82]
3. Introduce a small initial quantity (e.g., 1/4 teaspoon) of allergenic foods. If no adverse reaction occurs, gradually increase the quantity (e.g., 1/2 teaspoon) during subsequent exposures.[82]
4. Introduce one new allergenic food every 3 to 5 days.[82]
5. By the age of 12 months, all the major allergenic foods should have been introduced to the diet.[82]
6. Allergenic foods (such as peanut, cooked egg, cow's milk, sesame, white fish, and wheat) should be introduced to all infants between age 4 to 6 months, irrespective of allergy risk.[107,110,119]
7. Once allergenic foods are introduced and tolerated, they should be consumed regularly 2 to 3 times per week.[109]

RECOMMENDATION 3 – **WHEN TO REFER**

Consult with an allergist or clinical immunologist for a personalised plan for introduction of complementary food for any situation below.

1. Infant has moderate to severe atopic dermatitis despite optimal management.[120]
2. Infant had an immediate allergic reaction to a food.[120]
3. Infant has a known food allergy.[120]
4. Infant has a sibling with a peanut allergy.[120]
5. Infant has positive food-specific serum IgE test to a food not yet introduced.[121]
6. Infant has a convincing history of an allergic reaction, and with no detectable food-specific serum IgE.[120]
7. Family members who are hesitant to introduce commonly allergic foods at home or in a primary care clinic despite education about the benefits of home introduction.[122]
8. Family members of infants who already have a food allergy (suspected or confirmed), who are hesitant to introduce other allergenic foods for the purpose of primary prevention (Figure 4).[122]

Note: *Routine serum food-specific IgE screening on children without a history of an allergic reaction or other symptoms/signs of food-related allergic disease is* ***not*** *recommended.*

RECOMMENDATION 3 – **WHEN TO REFER** (cont'd)

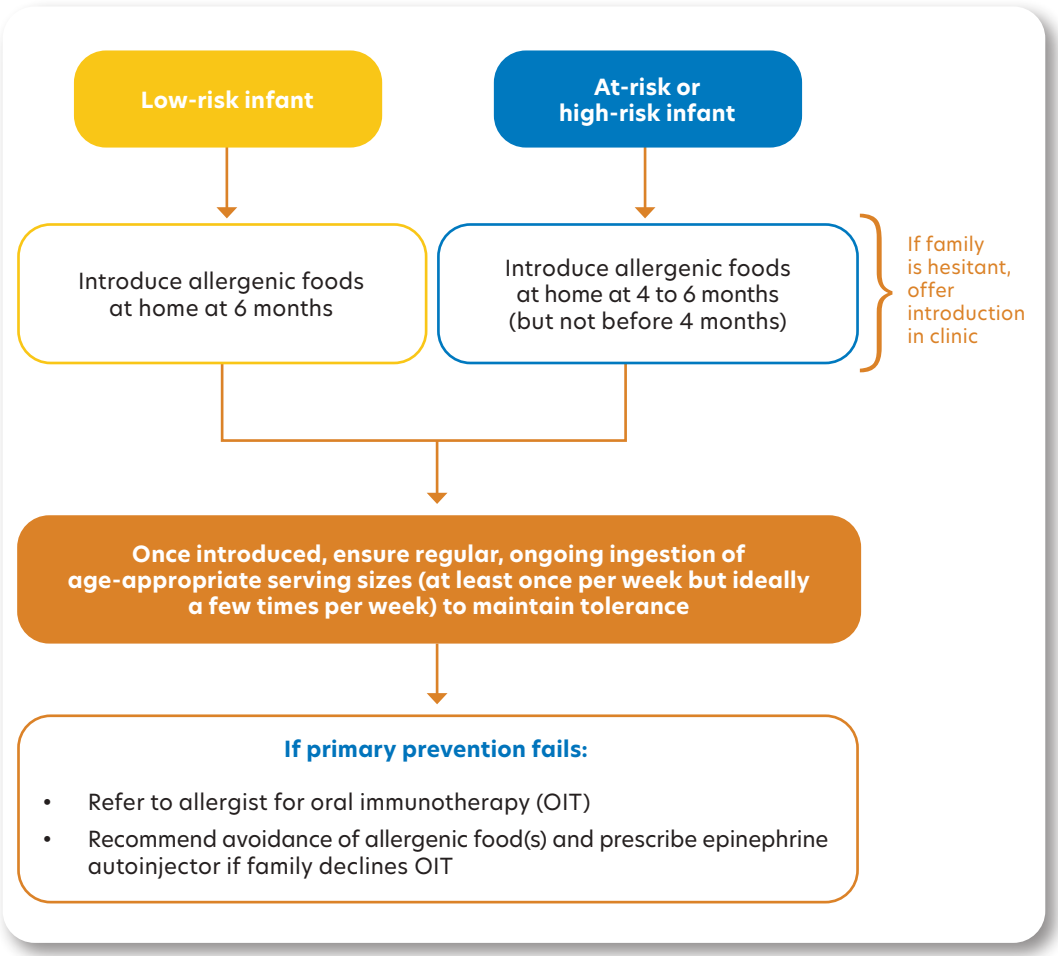


Figure 4: Simplified algorithm for the primary prevention of food allergy

Adapted from Chan ES, et al. AACI. 2024.

RECOMMENDATION 1 – **HOUSE DUST MITES (HDM)**

1. A large intervention trial using HDM reduction strategies from the perinatal period onwards failed to reduce the risk of asthma or allergy despite 61% reduction in HDM allergen levels.[123]
2. Reducing HDM levels during pregnancy does not reduce the risk of allergic disease.[124-126]
3. Reducing HDM levels in postnatal period does not reduce the risk of allergic disease.[124,126,127]
4. No evidence was found to support the use of impermeable mattress covers in the primary prevention of allergic disease.[128]

RECOMMENDATION

HDM avoidance has not been shown to prevent allergy but may have beneficial effect in persons with established allergic disease and sensitisation.

RECOMMENDATION 2 – **PETS**

1. Pet exposure in early infancy does not increase the risk of allergy.[129]
2. In some studies, pet exposure in the first year of age was associated with lower prevalence of asthma and airway reactivity in later childhood.[130,131]
3. A systematic review concluded that exposure to pets increases the risk of asthma and wheezing in children above 6 years, but not below that age.[132]

RECOMMENDATION

1. *Pet exposure at early age does not seem to increase risk for allergy and may even be protective.*
2. *Removal of pets may be beneficial in patients with established allergic disease and sensitisation to pet allergens.*

RECOMMENDATION 3 – **CIGARETTE SMOKE, POLLUTANTS**

Evidence indicates that maternal smoking during pregnancy has both short- and long-term consequences that can adversely affect offspring.

1. Tobacco exposure *in utero* significantly increases the risk of low birth weight and preterm birth,[133,134] which may increase the risk of asthma in offspring.[135]
2. Maternal smoking during pregnancy can lead to impaired infant lung development,[136] persisting in adolescence and increasing the risk of asthma and wheeze.[135]
3. Some studies suggest that maternal smoking during pregnancy is linked to higher odds of increased birth weight, potentially increasing the risk of childhood food allergy and allergic dermatitis.[137,138]
4. Parental smoking is associated with wheezing and asthma in early childhood.[135,139]
5. Exposure to indoor pollutants can increase the risk of allergy.[140-142]

For more information on aeroallergens, refer to Section 2, Recommendation 2.

RECOMMENDATION

1. *Avoidance of cigarette smoke during pregnancy is recommended.*
2. *Children should not be exposed to cigarette smoke.*

RECOMMENDATION 4 – **ANTIBIOTIC USE**

Clinicians should use antibiotics judiciously during pregnancy and early life to minimise the small risk of long-term allergic disease.[143-147] In cases where antibiotic use is indicated, they should be given to prevent disease progression, as untreated infections may cause greater harm.

RECOMMENDATION

In cases where antibiotic use is indicated, they should be given to prevent disease progression, as untreated infections may cause greater harm.

RECOMMENDATION 5 – **PLANETARY HEALTH**

Climate change and allergic disease

1. Climate change contributes to rising temperatures, increased carbon dioxide (CO_2) levels, and air pollution, all of which exacerbate the prevalence of asthma and allergic disease.[148,149]
2. Rising atmospheric CO_2 levels enhance plant growth and increase pollen production, leading to higher allergen exposure.[148]

Biodiversity and allergy prevention

1. A biodiverse environment, particularly during early life, protects against the development of atopic disease.[150]
2. Exposure to green spaces and diverse microbial environments is linked to lower allergy rates.[150]

Air pollution and allergies

1. Increased air pollution from fossil fuel combustion, industrial emissions, and biomass emissions worsens allergic disease.[151,152]
2. Fine particulate matter (PM), nitrogen dioxide (NO_2) and ozone (O_3) have been identified as key pollutants that exacerbate asthma and allergic rhinitis.[151,152]

RECOMMENDATION 5 – **PLANETARY HEALTH** (cont'd)

Dietary and lifestyle interventions

1. The Planetary Health Diet, rich in plant-based foods and low in processed foods, supports immune health and reduces inflammation, lowering allergy risks.[149]
2. Early-life exposure to a variety of dietary proteins enhances immune tolerance and may reduce allergy development.[149]

RECOMMENDATION

1. *Early childhood exposure to biodiverse environments and green spaces is recommended to protect against the development of asthma and allergies.*
2. *Adherence to the Planetary Health Diet, rich in plant-based foods, with a variety of dietary proteins, and low in processed foods, is recommended to support immune health and reduce allergy risks.*

RECOMMENDATION 1 – **ALLERGEN IMMUNOTHERAPY (AIT)**

AIT is recommended for patients with allergic rhinitis or allergic asthma confirmed by IgE-mediated sensitisation. It is particularly beneficial in cases where symptoms are not adequately controlled by pharmacotherapy or avoidance measures.[153-155] There are two approaches to allergen immunotherapy: subcutaneous immunotherapy (SCIT) and sublingual immunotherapy (SLIT).[156]

1. Allergen immunotherapy can reduce the development of asthma and new allergen sensitisations, thus preventing the progression to polysensitisation.[135]
2. HDM SLIT may be considered for adults or adolescents with HDM-driven allergic asthma with persisting symptoms despite regular therapy,[156,157] but should be considered only if forced expiratory volume in one second (FEV_1) is > 70% predicted.[156]
3. There is insufficient evidence to make a recommendation about HDM SLIT in children with asthma.[156]
4. Studies on SCIT in the treatment of adult and paediatric asthma revealed that the addition of SCIT led a to reduction of inhaled corticosteroid (ICS) requirement and may improve asthma-specific quality of life and lung function, while reducing reliever use and the need for systemic corticosteroids.[156]
5. SCIT should not be initiated until good asthma control (symptom control and exacerbations) has been established.[156]
6. A minimum of 3 years of therapy is recommended to achieve long-term efficacy.[158,159]
7. Clinical benefits of allergen immunotherapy persist even after discontinuation of therapy, with reduced symptoms and medication needs.[153,155]

RECOMMENDATION

AIT is recommended for patients with allergic rhinitis or allergic asthma confirmed by IgE-mediated sensitisation.

RECOMMENDATION 2 – **BIOLOGICS**

Biologic therapies have emerged as a promising approach in the management and prevention of allergic diseases, particularly in individuals with established allergic conditions who are at risk of disease progression or exacerbation. These targeted therapies modulate specific immune pathways involved in allergic inflammation, thus reducing symptoms and preventing further sensitisation. Treatment duration should be individualised, with a minimum 6-month trial recommended before assessing efficacy.[160,161]

Omalizumab (anti-IgE therapy)

1. Omalizumab reduces the risk of severe reactions during accidental allergen exposure through IgE blockade.[161,162]
2. Studies have shown that omalizumab achieved comparable improvements across several outcome measures such as exacerbation rates, lung function improvement, and quality of life, regardless of number and type of allergen sensitisations in patients with moderate-to-severe asthma.[163,164]

Dupilumab (IL-4 and IL-13 inhibitor)

1. Several studies reported a reduction in allergic rhinitis-associated nasal and ocular symptoms in patients treated with dupilumab for atopic dermatitis and asthma.[165-168]

Biologics for chronic rhinosinusitis with nasal polyps (CRSwNP)

1. Biologics such as dupilumab, omalizumab, and mepolizumab are indicated for severe CRSwNP in patients with comorbid asthma or allergic rhinitis.[169,170]

RECOMMENDATION 2 – **BIOLOGICS** (cont'd)

Adjunctive use of biologics with OIT

1. Omalizumab has shown to accelerate desensitisation during OIT.[171]
2. Omalizumab administration during OIT minimises the risk of OIT-related allergic side effects.[172]
3. The use of omalizumab allows OIT-mediated tolerance to be achieved, enabling safer up-dosing protocols in patients with pronounced IgE-mediated immunoreactivity.[172]

Emerging anti-alarmin therapies

1. Early-phase trials show thymic stromal lymphopoietin (TSLP) inhibitors have shown reduced exacerbations in patients with severe asthma.[173]

RECOMMENDATION

1. *Omalizumab is recommended for individuals with moderate-to-severe persistent allergic asthma, who are inadequately controlled with regular therapy, to reduce the risk of severe reactions during accidental allergen exposure.*
2. *Dupilumab may be recommended for patients with atopic dermatitis or asthma with allergic rhinitis-associated nasal and ocular symptoms.*
3. *Combination of biologics with OIT is recommended to accelerate desensitisation, reduce OIT-related adverse events, enabling safer up-dosing protocols in high-risk patients.*

RECOMMENDATION 3 – **BRUTON'S TYROSINE KINASE (BTK) INHIBITORS**

Pharmacologic inhibitors of BTK, used to treat B cell malignancies, have shown to fully prevent IgE-mediated activations of human mast cells and basophils in an allergen-independent manner.[174] Recent studies suggest that BTK inhibitors could prevent IgE-mediated anaphylaxis with its rapid onset of action and transient efficacy.[174,175]

1. In an open-label clinical trial, administration of BTK inhibitor, acalabrutinib, reduced or prevented clinical reactivity to peanuts in peanut-allergic adults.[175]
2. BTK inhibitors may be considered as an adjunct therapy for reducing or preventing adverse reactions during food OIT, which can induce desensitisation or a temporary state of hyporesponsiveness to foods in patients with allergic diseases.[174]
3. A short course of BTK inhibitors may reduce the frequency and/or severity of adverse reactions (such as anaphylaxis) to OIT doses during build-up, allowing patients to achieve maintenance dose.[174]

RECOMMENDATION

At this time, no recommendation can be made on BTK inhibitors as an adjunct therapy for reducing the frequency and/or severity of anaphylaxis during OIT.

SECTION 8:
CONCLUSIONS

These guidelines provide evidence-based recommendations for preventing allergic diseases in at-risk infants while promoting overall maternal and infant well-being. The Panel advises against dietary restrictions of allergenic foods during pregnancy or lactation unless the mother has a known food allergy.[22-26] Probiotics supplementation, particularly during both prenatal and postnatal periods, demonstrates potential benefits and represents a promising area of intervention in eczema prevention.[29-32] In contrast, evidence remains insufficient to recommend maternal supplementation of fish oils and vitamins for allergy prevention.[36,37,41-44] The Panel also underscores the foundational role of maternal psychosocial well-being and appropriate gestational weight, although their direct impact on allergy prevention will need to be further investigated.[50-59] Caesarean section should remain a clinical decision and should not be avoided solely for allergy prevention.

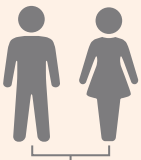
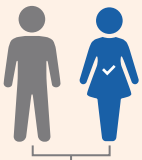
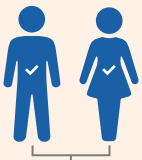
The Panel strongly encourages exclusive breastfeeding for at least 4 months and preferably up to 6 months,[68,69] with continued breastfeeding alongside complementary feeding for the first 2 years of life.[176] In the event that regular cow's milk-based formula has been introduced, continued exposure alongside breastfeeding is recommended to maintain immune tolerance and reduce the risk of cow's milk protein allergy.[84-86] However, the decision to continue formula remains with the parental preference and infant's allergy risk status. When exclusive breastfeeding is not feasible, hydrolysed formula may be given to reduce the risk of allergic disease at age 4 to 6 months.[87-94] Additionally, it is advised to consider a hydrolysed formula with reduced allergenicity where preventive effect has been proven or confirmed in a clinical trial.[95] In regards to prebiotic supplementation, human milk oligosaccharides may be considered for allergy prevention in infants who are not exclusively breastfed.[98-101] The use of soy, amino acid, or goat's milk formulas is not supported due to insufficient evidence supporting their role in allergy prevention.[8,82,83]

Complementary foods should be introduced between age 4 to 6 months,[8,82,103-105] particularly for at-risk infants demonstrating developmental readiness such as sufficient neck control and an interest in parents eating. Cigarette smoke is widely avoided due to its harmful effects on respiratory and overall child health.[133-138] Although avoidance of house dust mites and pets do not prevent the onset of allergy, continuous avoidance may benefit patients with existing allergic conditions.[123-132] Evidence suggests that there may be a small risk of long-term allergic disease with antibiotic use,[143-147] however the Panel agrees that antibiotics should be prescribed when clinically indicated, as untreated infections may cause greater harm than the potential risk of allergy. Exposure to biodiverse environments and adherence to a plant-based diet with a variety of dietary proteins and low in processed foods are also encouraged as this may contribute to reduced allergic sensitisation and broader health benefits.[149,150]

In addition to primary prevention, the guidelines explore emerging strategies in secondary allergy prevention, including allergen immunotherapy, biologic agents, and BTK inhibitors, which has shown promise for treating established allergic diseases.[153-161,163-175,177] These targeted therapies represent substantial advances in allergy management and indicate the growing role for precision medicine in allergy care.

In summary, effective allergy prevention in at-risk infants require a comprehensive approach encompassing maternal well-being, breastfeeding, timely dietary exposures, and supportive environmental factors, while addressing the secondary prevention methods in established allergy cases. These guidelines are designed to inform clinical decision making, facilitate practical implementation, and remain adaptable as emerging research continues to refine best practices in allergy prevention.

APPENDIX 1: FAMILY HISTORY OF ALLERGIES AND RISK GRADING[9-14]

Risk grade for allergy	LOW	MEDIUM	HIGH
Family history of allergy	None 	One 1st degree family member 	Two or more 1st degree family members 
Risk for allergy in offspring	 10-20%	 20-40%	 50-80%

Adapted from Exl BM, Fritsché R. Nutrition. 2001; Aberg N, et al. Allergy. 1996; Bergmann RL, et al. Clin Exp Allergy. 1997; Hays T, Wood RA. Arch Pediatr Adolesc Med. 2005; Tariq SM, et al. J Allergy Clin Immunol. 1998; Wahn U, et al. Clin Exp Allergy. 1998.

APPENDIX 2: FOOD ALLERGEN SCALE[21]

Grains & flours	Vegetables	Fruits	Nuts, seeds & dried legumes	Meats & alternates	Milk & milk products
Wheat Triticale Semolina Bulgur Spelt Kamut	Tomato Spinach Celery (raw)	Strawberry Raspberry Orange Fig Mango Watermelon	Peanut Soy Hazelnut (Filbert) Sesame seed	Egg white Egg yolk	Ice cream Cow's milk: Homogenised Raw milk 1% 2% Skim
Rye	Carrot (raw) Green pea Lima bean Broad bean (Fava bean) Cabbage (heart)	Apple (raw) Apricot (raw) Peach (raw) Date Cantaloupe	Walnut Pecan Brazil nut Almond	Shellfish: • Crab • Lobster • Prawn/shrimp • Clam • Oyster • Scallop	Cheese: Fermented: Cheddar Camembert Blace Swiss Edam Mozzarella Goat cheese
Corn		Pineapple Raisin Apple (cooked)	Cocoa bean Chocolate Coconut		
Oats Barley	Cauliflower Brussels sprouts Green bean	Kiwi Cherry Plum/prune Apricot (cooked)	Cashew Pistachio Macadamia	Fin fish • Cod • Sole • Other white fish • Tuna • Salmon	Cottage cheese Cream cheese
White rice Brown rice Wild rice	Avocado Cabbage (outer leaves)	Loganberry Boysenberry	Dried peas Lentils Dried beans • Navy • Pinto • Garbanzo carob Sunflower seed Flaxseed		Cream Sour cream
Millet T'ef	Onion Green onion Garlic	Plantain Banana Grape		Processed meats • Pepperoni • Salami • Bologna • Wieners Ham Bacon	Canned milk (evaporated)
Buckwheat (kasha)	Celery (cooked) Green/red peppers	Grapefruit Lemon Lime			Goat milk Sheep milk
Amaranth	Potato Cucumber Lettuce	Currants (Red/Black)	Pumpkin seed	Pork	Processed cheese
Tapioca Cassava	Asparagus Broccoli Beets	Peach (cooked/ canned)	Bean sprouts	Chicken Beef Veal Turkey	Soft cheese (Philadelphia)
Sago Arrowroot	Squashes (all types)	Cranberry Blackberry Blueberry	Poppy seed	Wild meats • Deer • Elk • Moose • Bear • Buffalo	Yogurt Buttermilk
Quinoa	Carrot (cooked) Parsnip	Pear			Butter
	Turnip Sweet potato Yam	Rhubarb		Rabbit Lamb	Clarified butter

Foods are listed from the highest to the lowest allergenicity. People vary in their reactivity to foods and show a different pattern of reactivity depending on their individual characteristics. The scale is based on the typical North American diet. Persons following ethnic diets tend to show a different order of allergenicity.

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