ISAAC – Global epidemiology of allergic diseases

Innes Asher

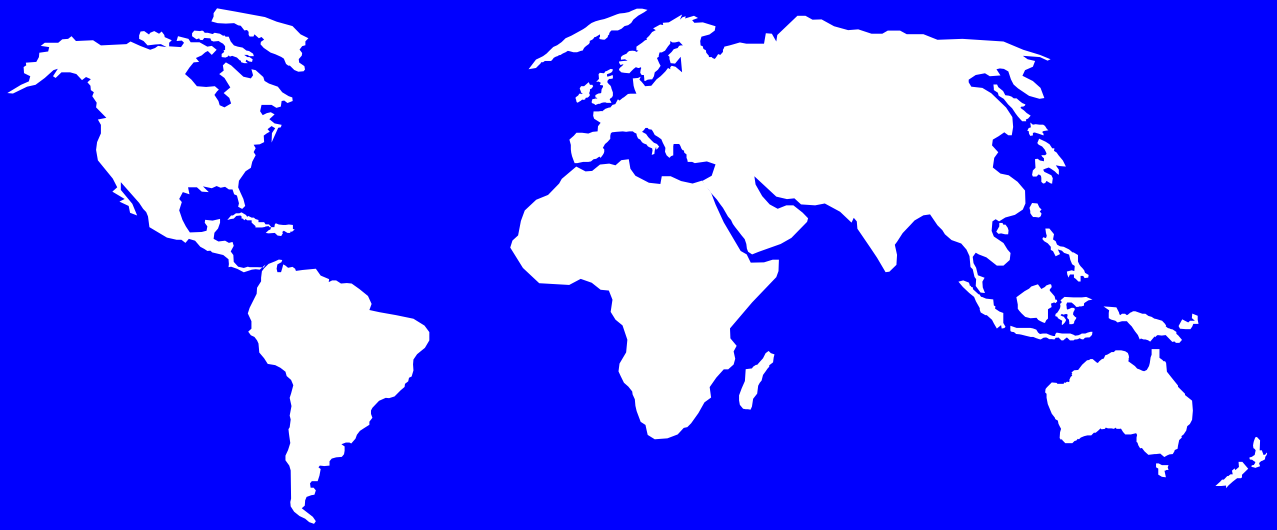
on behalf of the ISAAC Study Group

28 November 2009

http://isaac.auckland.ac.nz

The challenge

A fresh look was needed with a world population view



Asthma

Rhinoconjunctivitis

Eczema

The ISAAC Programme

- ISAAC Phase One 1991 – 1998
- Phase One Ecological Analyses 1998 – 2002
- ISAAC Phase Two 2000 – 2004
- ISAAC Phase Three 2001 – 2005

Global variations in asthma prevalence

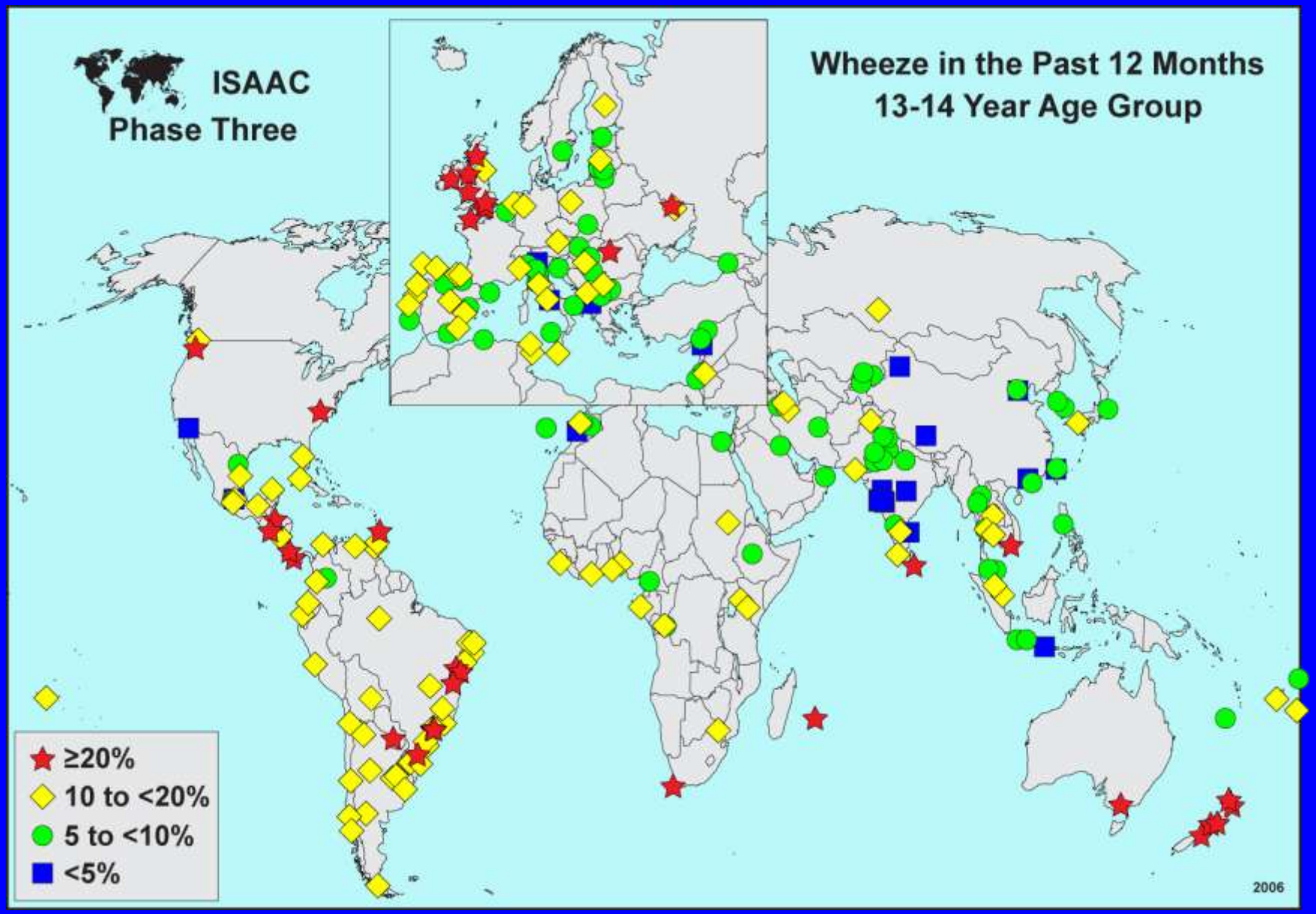
ISAAC Phase One and Three Methods

- Multicentre cross-sectional study of school children
- 13-14 year olds and 6-7 year olds
- Schools randomly sampled
- 3000 per age group per centre
- Simple core written questionnaires

Asher MI *et al* & the ISAAC Steering Committee. *Eur Respir J* 1995; 8(3): 483-491.
Ellwood *et al &* the ISAAC Phase Three Study Group *Int J Tub Lung Dis* 2005;9:10-16.

ISAAC Phase Three (One)
Global variation - world maps

	Countries	Centres	Participants	Response Rate (%)
13-14 year	97 (55)	233 (156)	798,685	88
6-7 year	61 (38)	144 (91)	388,811	85



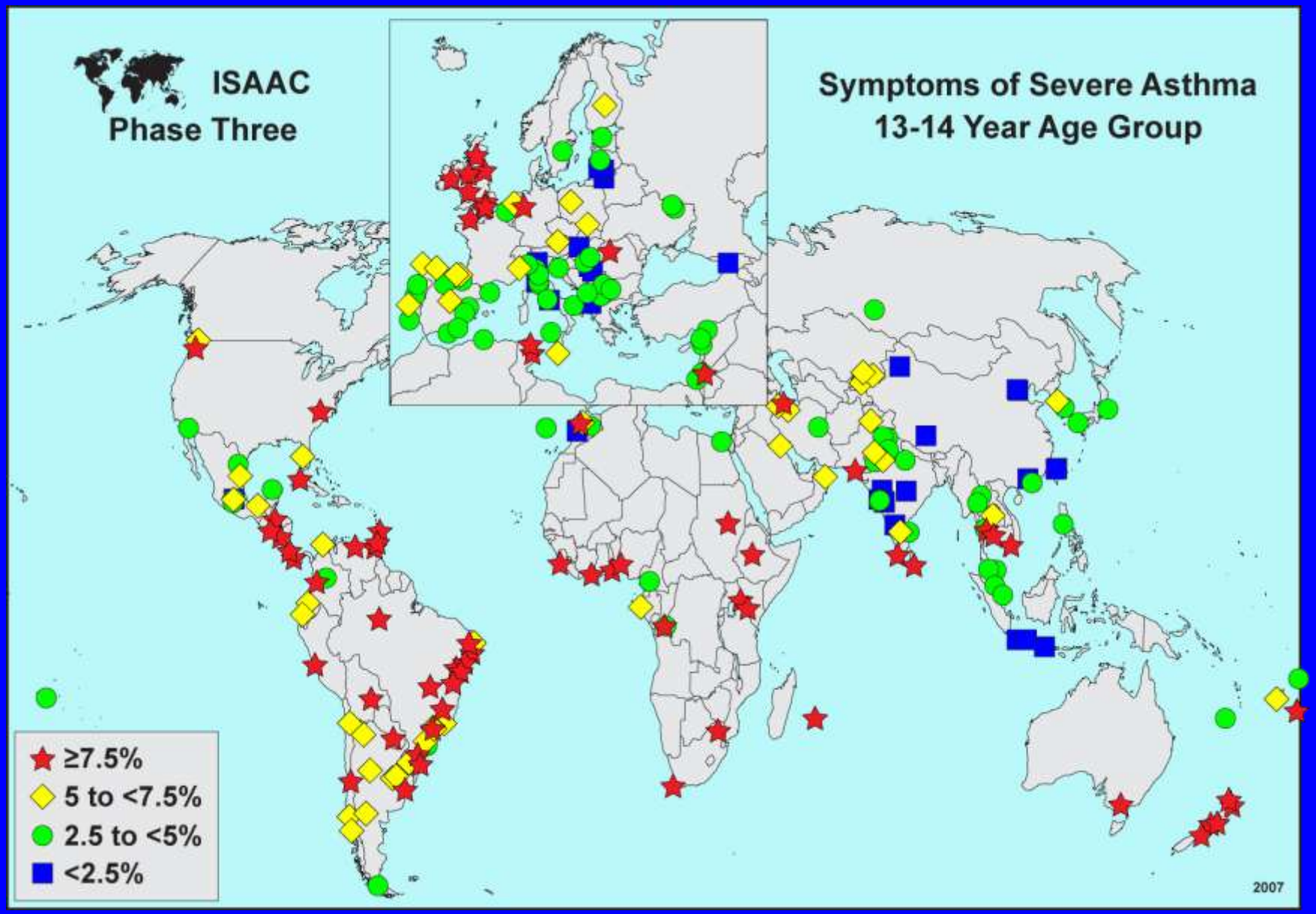
Lai CKW, *et al*. Thorax 2009;64:476-483.

Definition of Symptoms of Severe Asthma

Wheezing in the past 12 months and at least one of:

- **>4 attacks of wheeze**
- **>1 night per week sleep disturbance from wheeze**
- **wheeze affecting speech**

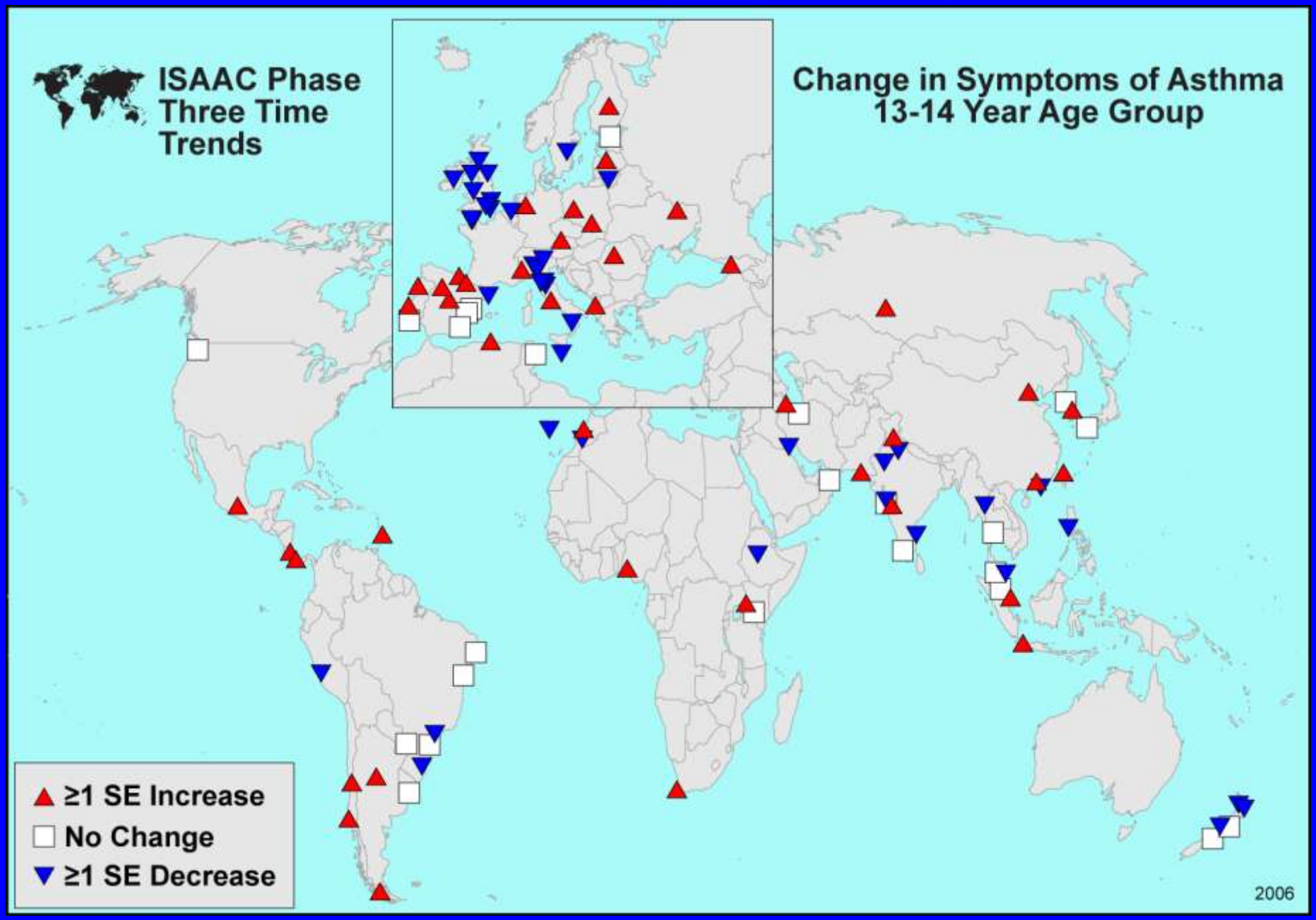
Lai CKW, *et al*. Thorax 2009;64:476-483.



Lai CKW, *et al*. Thorax 2009;64:476-483.

ISAAC Phase Three
time trends of asthma prevalence
7 year period (average)

	Countries	Centres	Participants	Response Rate (%)
13-14 year	55	104	298,080	91
6-7 year	36	64	185,891	84



Asher MI *et al* & the ISAAC Phase Three Study Group. *Lancet* 2006; 368(9537): 733-743.

How have environmental factors been studied in ISAAC?

1. ISAAC Phase One ecological analyses with centre or country data

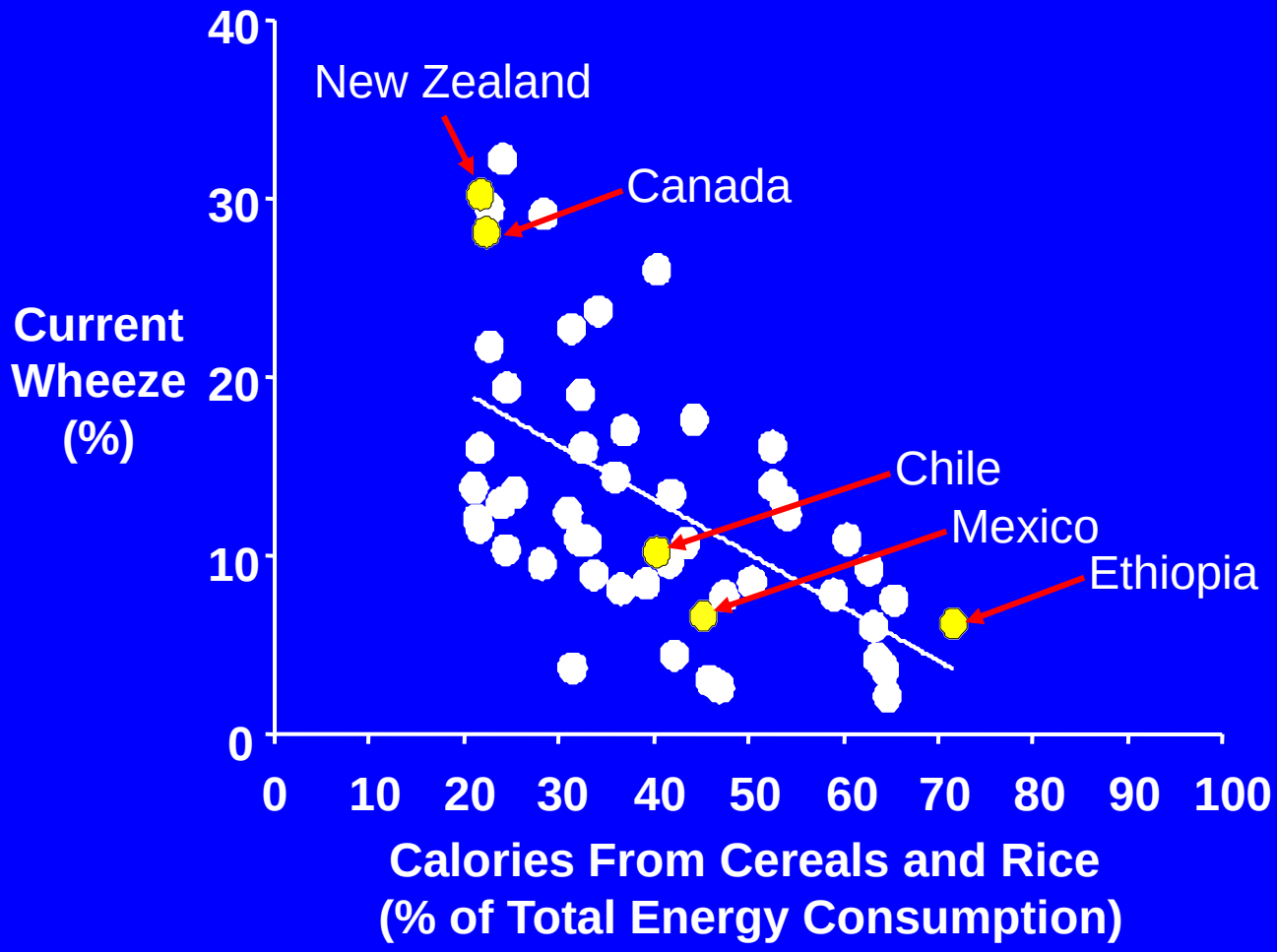
2. ISAAC Phase Three environmental questionnaires with data reported by individuals

ISAAC Phase One ecological analyses: What associations were found between symptom prevalence and environmental factors?

- Economic factors – *positive assoc. with GNP*
- Diet – *inverse assoc. with of plant food*
- Immunisation – *inverse assoc. with DTP & M*
- Infection – *inverse assoc. with TB*
- Antibiotics – *no assoc.*
- Climate – *little assoc.*
- Indoor environment – *mixed effects of ETS*
- Outdoor allergens – *inverse assoc. with pollens*
- Outdoor air pollution – *little or no assoc.*
- Paracetamol – *positive assoc with sales*

Diet and asthma symptoms

ISAAC Phase One ecological analysis



Ellwood P *et al* & the ISAAC Phase One Study Group. *Eur Respir J* 2001; 17(3): 436-443.

ISAAC Phase Three: Wheeze in past year and three environmental factors

	Odds Ratio (95%CI) Multivariate analysis
Antibiotic use in the 1st year of life	1.70 (1.60-1.80)
Paracetamol use in the 1st year of life	1.46 (1.36-1.56)
Truck traffic in street of residence	1.35 (1.23-1.49)

Foliaki S, *et al*. J Allergy Clin Immunol 2009;124:982-9.
Beasley R, *et al*. Lancet 2008;372:1039-48.
Brunekreef B, et al. Environ Health Perspect. 2009;117:1791-98.

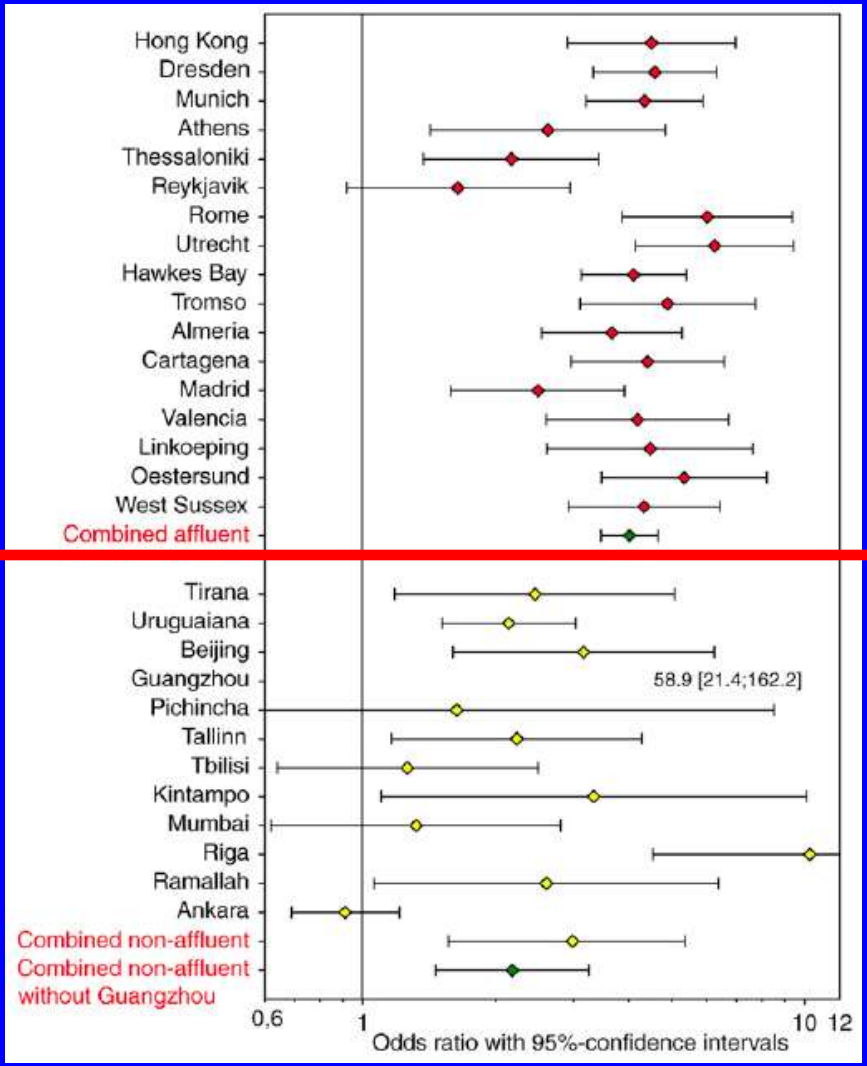
Country income and atopy

Symptoms of Asthma, Lower Income vs. High Income Countries 13-14 yr olds

	Odds Ratio (95%CI)
Wheeze in past 12 months	0.55 (0.42-0.72)
Symptoms of severe wheeze among wheezers In past 12 months	1.46 (1.21-1.75)

Lai CKW, *et al*. Thorax 2009;64:476-483.

ISAAC Phase Two Association of Wheeze in past 12 months & Skin Prick Test Reactivity



Weinmayr G, *et al*. Am J Respir Crit Care Med 2007;176:565-574.

ISAAC Phase Two . Association Between Breastfeeding Practice and Wheeze in past year

	Odds Ratio (95%CI)
Non-atopic wheezers in lower income countries	0.69 (0.53-0.90)
Atopic wheezers in lower income countries	0.86 (0.55-1.35)

Nagel G, *et al*. Eur Respir J 2009;33:993-1002.

Summary

- Large global variations in asthma prevalence , and environmental factors are important
- Asthma is increasing in prevalence in many populous countries, but is not in some high prevalence countries
- Inverse associations with plant based diet etc
- Positive associations with GNP, paracetamol, antibiotics, truck traffic
- In low and middle income countries the asthma reported is
  - more severe
  - less influenced by allergic sensitisation, and in non-atopic more protected by breastfeeding

ISAAC has exploded these myths

1. A study of asthma and allergies in more than a few countries is not feasible
2. Asthma is a disease of English-language countries where it continues to increase
3. Asthma is rare in low and middle income countries
4. Asthma is rare in less hygienic environments
5. New genetics will explain asthma
6. Asthma is mainly due to atopy

ISAAC has exploded these myths

1. A study of asthma and allergies in more than a few countries is not feasible X
2. Asthma is a disease of English-language countries where it continues to increase
3. Asthma is rare in low and middle income countries
4. Asthma is rare in less hygienic environments
5. New genetics will explain asthma
6. Asthma is mainly due to atopy

ISAAC has exploded these myths

1. A study of asthma and allergies in more than a few countries is not feasible X
2. Asthma is a disease of English-language countries where it continues to increase X
3. Asthma is rare in low and middle income countries
4. Asthma is rare in less hygienic environments
5. New genetics will explain asthma
6. Asthma is mainly due to atopy

ISAAC has exploded these myths

1. A study of asthma and allergies in more than a few countries is not feasible X
2. Asthma is a disease of English-language countries where it continues to increase X
3. Asthma is rare in low and middle income countries X
4. Asthma is rare in less hygienic environments
5. New genetics will explain asthma
6. Asthma is mainly due to atopy

ISAAC has exploded these myths

1. A study of asthma and allergies in more than a few countries is not feasible X
2. Asthma is a disease of English-language countries where it continues to increase X
3. Asthma is rare in low and middle income countries X
4. Asthma is rare in less hygienic environments X
5. New genetics will explain asthma
6. Asthma is mainly due to atopy

ISAAC has exploded these myths

1. A study of asthma and allergies in more than a few countries is not feasible X
2. Asthma is a disease of English-language countries where it continues to increase X
3. Asthma is rare in low and middle income countries X
4. Asthma is rare in less hygienic environments X
5. New genetics will explain asthma X
6. Asthma is mainly due to atopy

ISAAC has exploded these myths

1. A study of asthma and allergies in more than a few countries is not feasible X
2. Asthma is a disease of English-language countries where it continues to increase X
3. Asthma is rare in low and middle income countries X
4. Asthma is rare in less hygienic environments X
5. New genetics will explain asthma X
6. Asthma is mainly due to atopy X

Thanks to

- Children
- Parents
- School staff
- Funders
- ISAAC collaborators