2016 Airway Symposium

Korean epidemiology of asthma

2016. 11. 17.

분당서울대병원 알레르기내과

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Contents

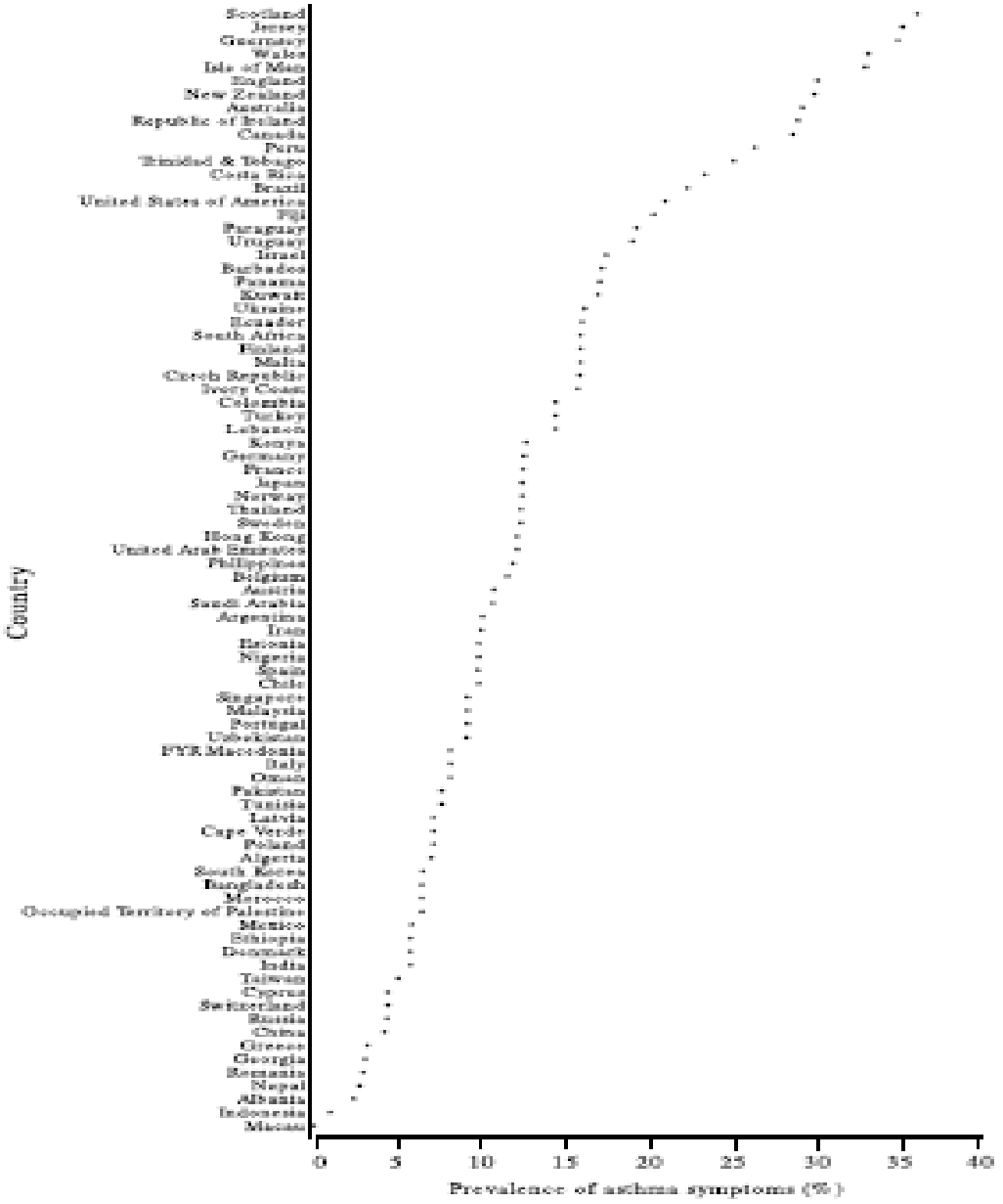
- Prevalence
- Socioeconomic burden
- Risk factors, triggers, & co-morbidities
- Control status & issues in patient care

Methodology of asthma prevalence study

- **Questionnaire survey** (written, video-guided)
  - physician diagnosis
  - current symptoms (wheezing)
  - medication use
- **Community-based field survey**
  - questionnaire for current symptoms
  - examination for AHR (methacholine BPT etc.)
- **Big data analysis** : healthcare use, claim, etc.

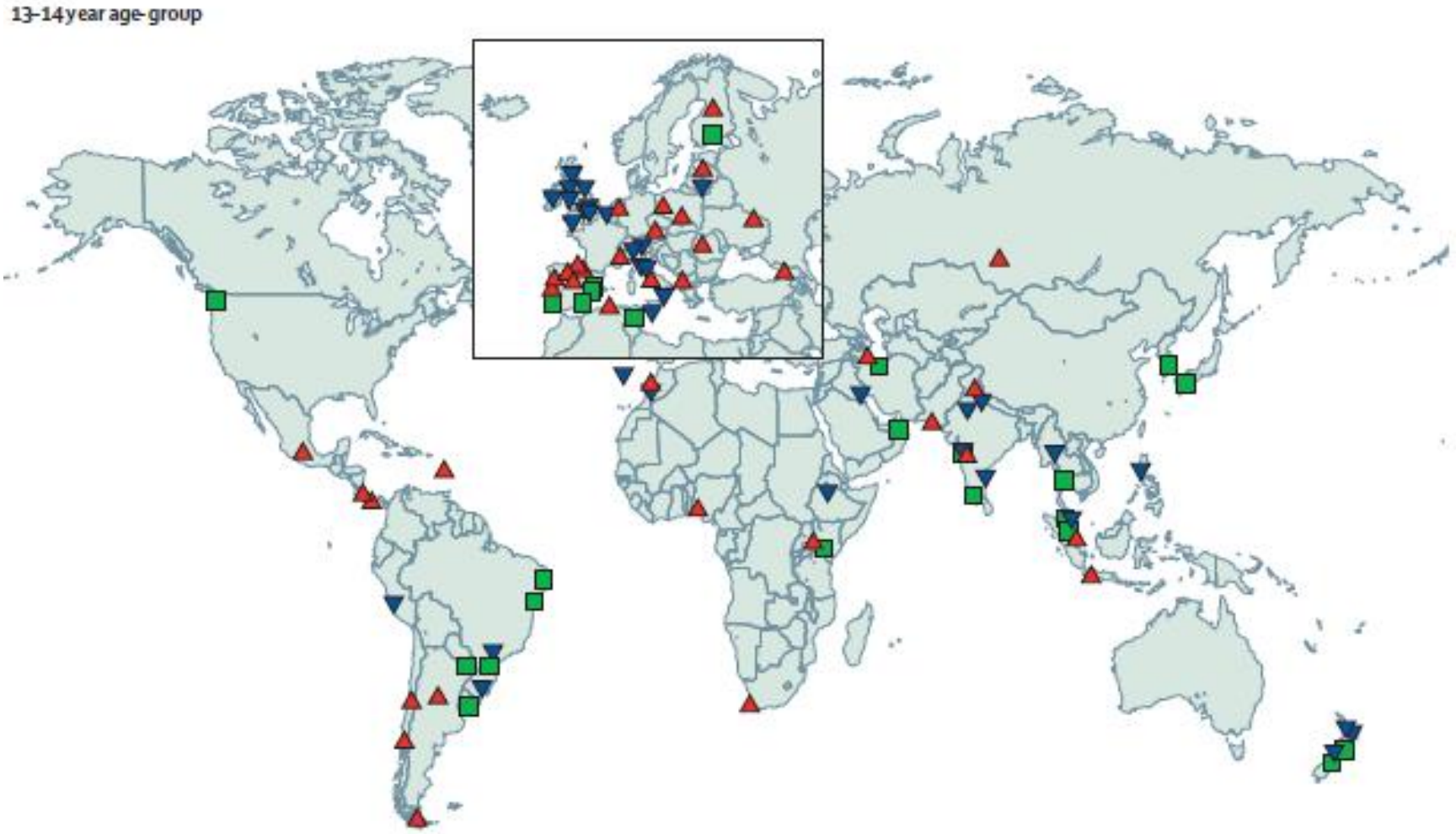
Childhood asthma

- The International Study of Asthma and Allergies in Childhood (ISAAC) Phase I~III



Masoli M et al. Allergy, 2004

Trends of global childhood asthma : ISAAC I~III



Asher M et al. Lancet, 2006

Prevalence of childhood asthma in Korea: ISAAC (1)

- Nationwide study conducted in 1995 and 2000
- Korean version of ISAAC written and video-guided questionnaires

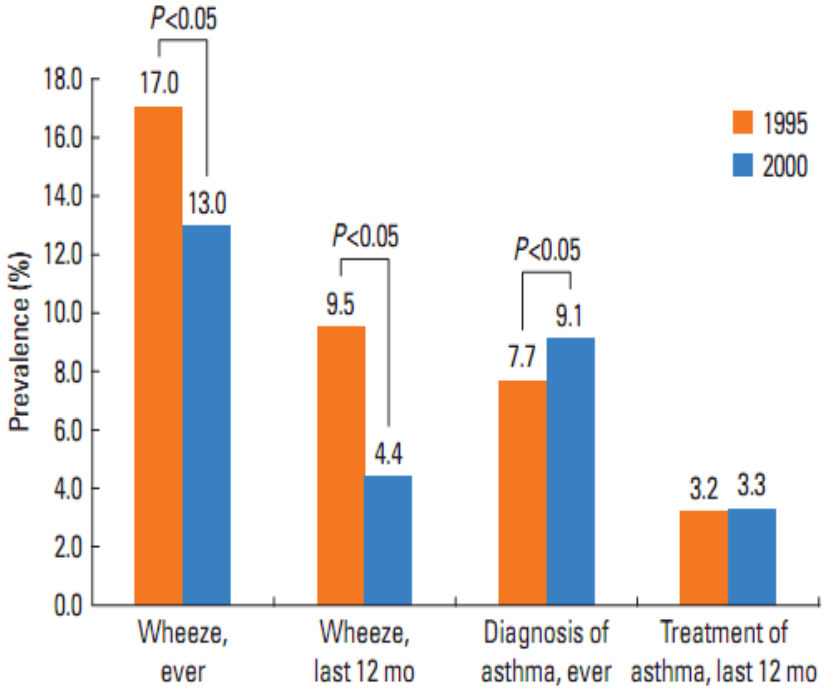


Fig. 1. Prevalence of asthma by the written questionnaire survey in elementary school children (6-12 years).

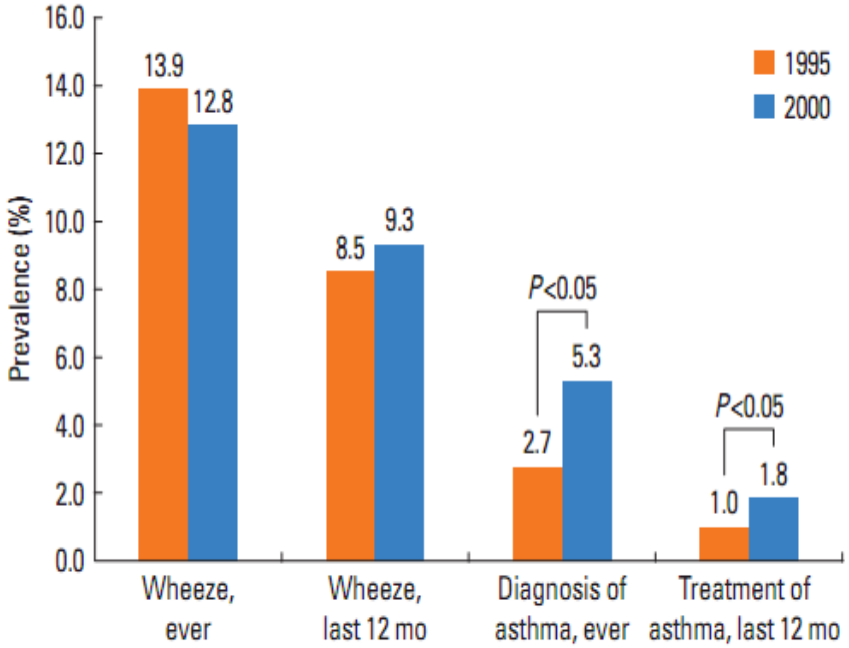


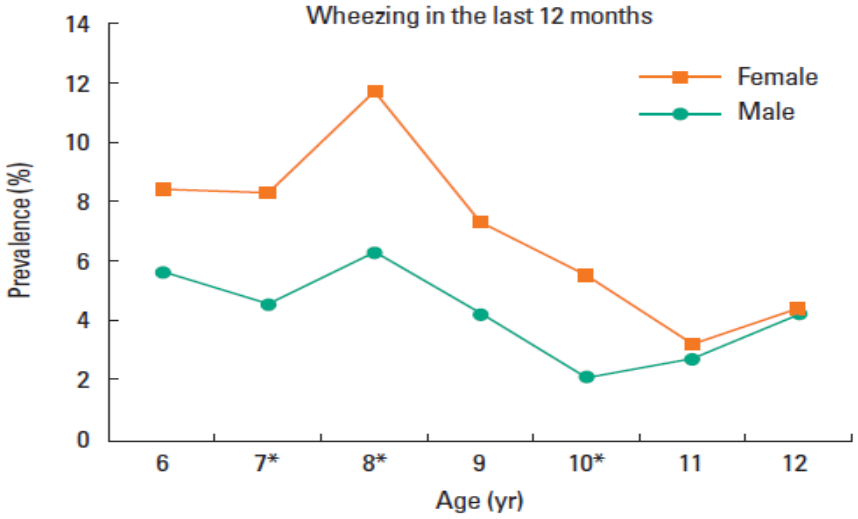
Fig. 2. Prevalence of asthma by the written questionnaire survey in junior high school children (12-15 years).

Lee SI, Allergy Asthma Immunol Res, 2010

Prevalence of childhood asthma in Korea: ISAAC (2)

Table 5. Comparison of prevalence of asthma in elementary school children in Seoul between the surveys conducted in 1995, 2000, 2005, and 2008[4-6]

	1995 (95% CI)[4,5]	2000 (95% CI)[4,5]	2005 (95% CI)[6]	2008 (95% CI)
No. of subjects	4,729	4,617	8,378	4,554
Response rate (%)	94.8	96.4	94.4	93.9
Wheeze, ever	19.3 (18.4-20.2)	14.4 (13.6-15.3)	13.0 (12.2-13.8)	11.7 (10.7-12.7)
Wheeze, last 12 months	10.5 (9.8-11.2)	5.2 (4.6-5.7)	5.5 (5.0-6.0)	5.6 (4.9-6.3)
Asthma diagnosis, ever	8.7 (8.1-9.3)	9.4 (8.8-10.1)	7.6 (7.0-8.2)	7.9 (7.1-8.7)
Asthma treatment, last 12 months	3.5 (3.1-3.9)	3.3 (2.9-3.7)	3.0 (2.7-3.4)	2.7 (2.2-3.2)



Kwon JW et al. Allergy Asthma Immunol Res, 2011

Methodological issues in adult asthma prevalence study

- Definition of true clinical asthma
  - lack of single objective diagnostic test
  - different classification of conditions
  - different interpretation of symptoms
- Validated questionnaires
- False positive symptoms
- Physicians diagnosis, medication use
  - large variations between regions, countries

Prevalence of adult asthma in Korea

- 2,467 adults in urban and rural areas
- Modified ISAAC questionnaire with MBPT and skin tests

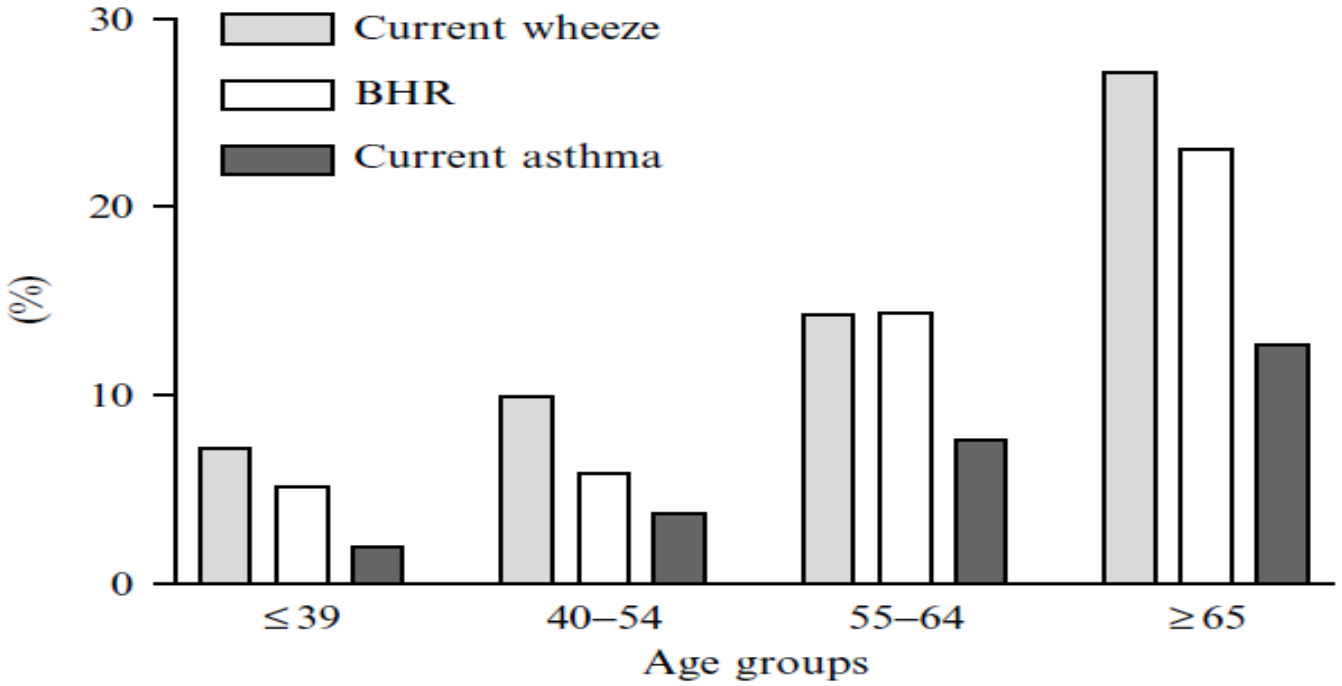
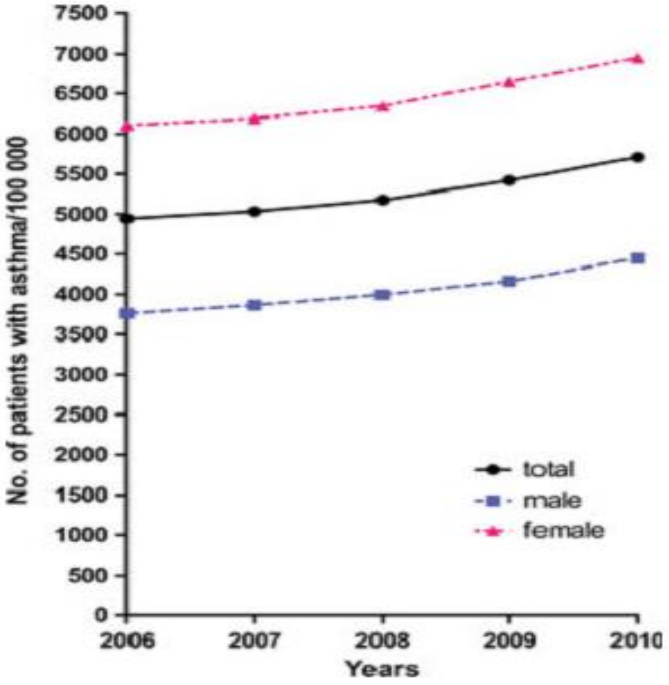


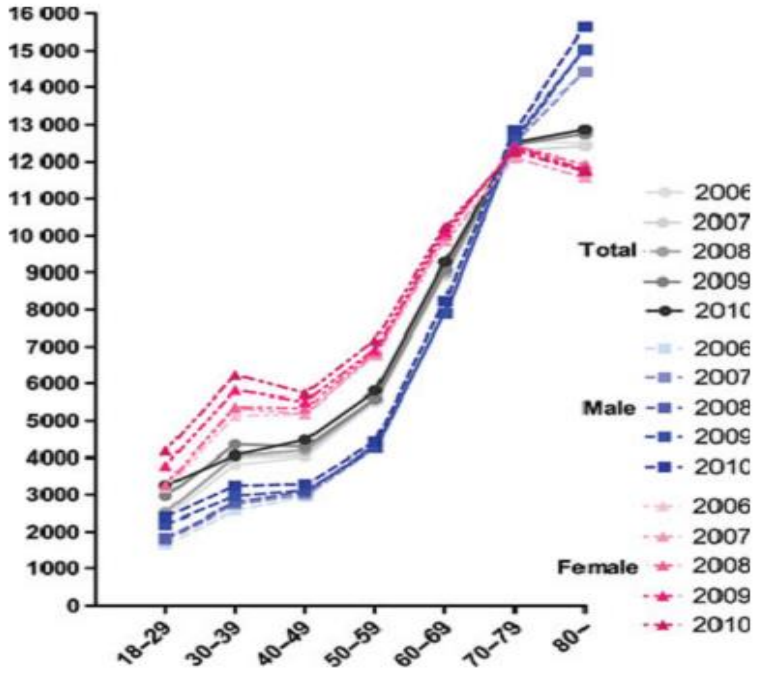
Fig. 1. Prevalence of current wheezing by questionnaire, bronchial hyper-responsiveness to methacholine and current asthma according to age. BHR, bronchial hyper-responsiveness to methacholine.

Kim YK, et al. Clin Exp Allergy, 2002

Prevalence of adult asthma in Korea : NHI data (2006-2010)

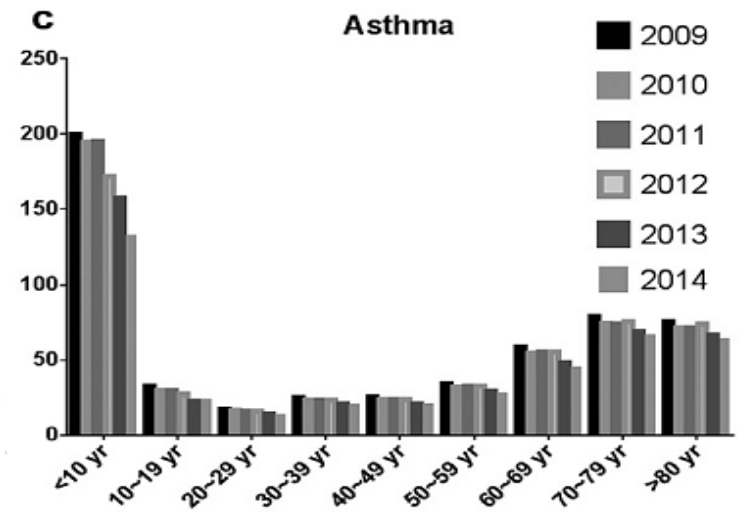
- National Health Insurance (NHI) claim record
- 2006. 1.~ 2010. 12. retrospective population-based study
- Case definition: 18yrs or older, ICD-10 code (J45, J46), at least one asthma-related medication or asthma-related test

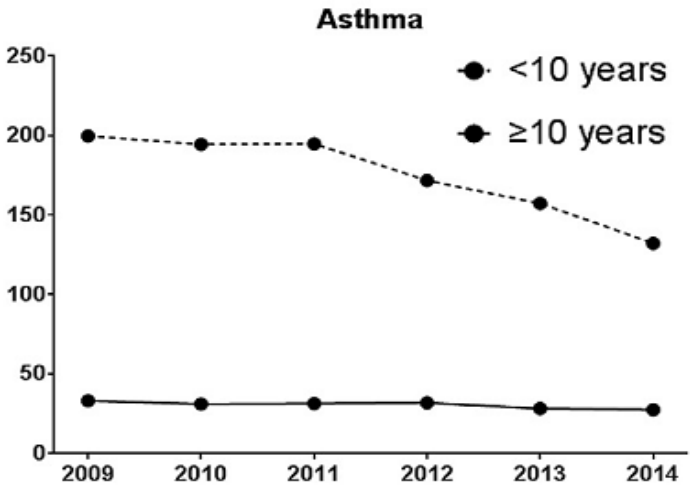


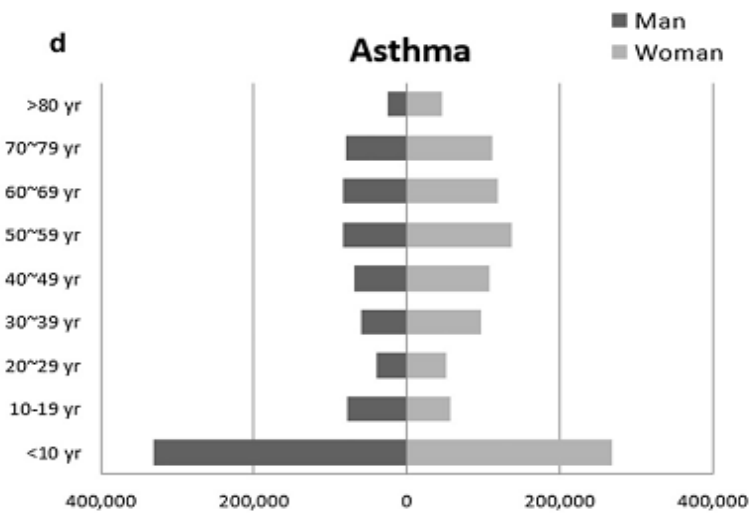


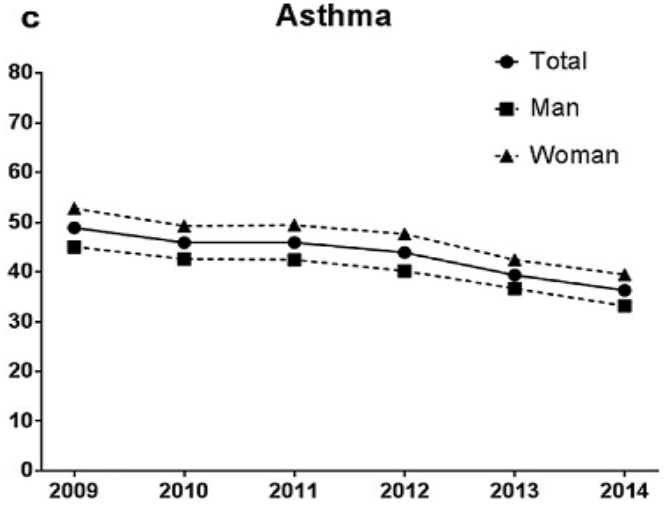
Kim S, et al. Allergy, 2013

Prevalence of adult asthma in Korea : NHI data (2009-2014)





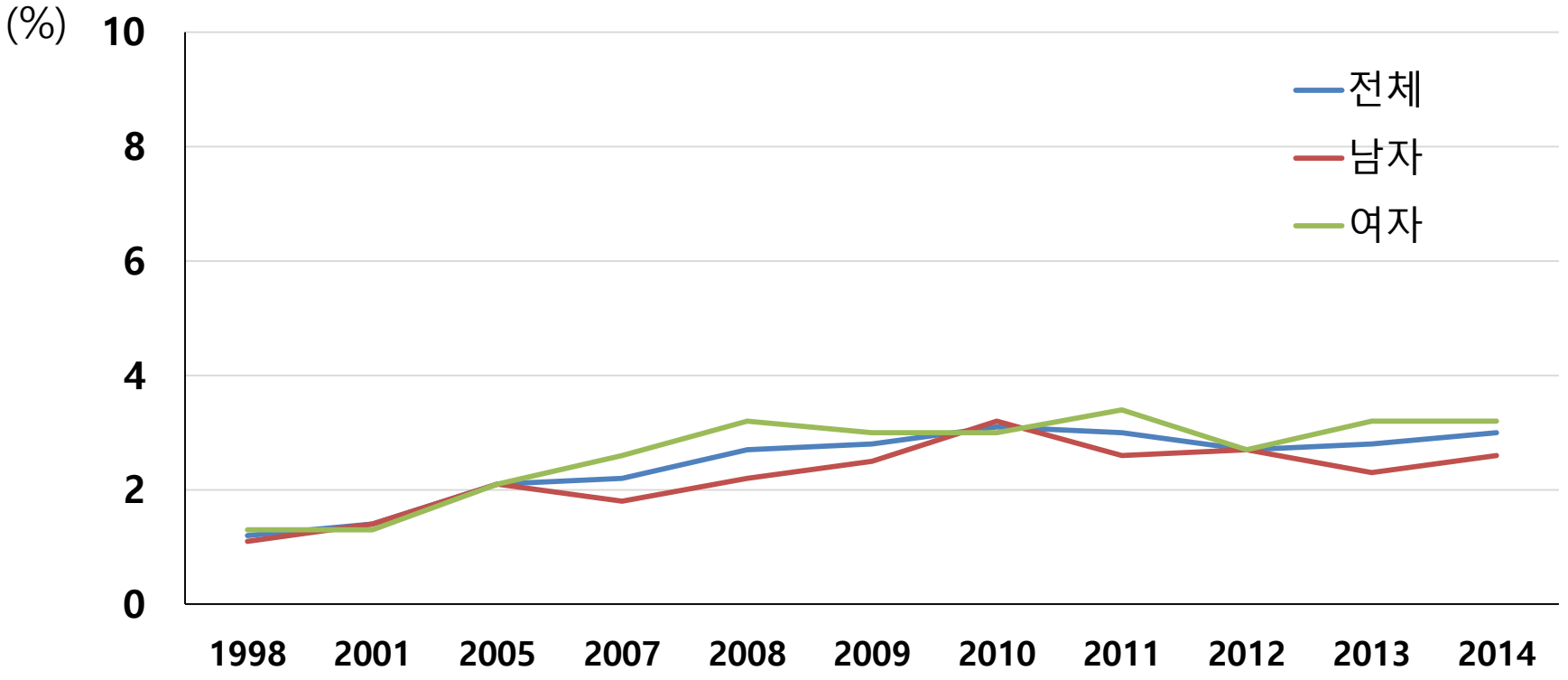




Kim BK et al. Allergology International, 2016

Prevalence of adult asthma in Korea : KNHANES(1)

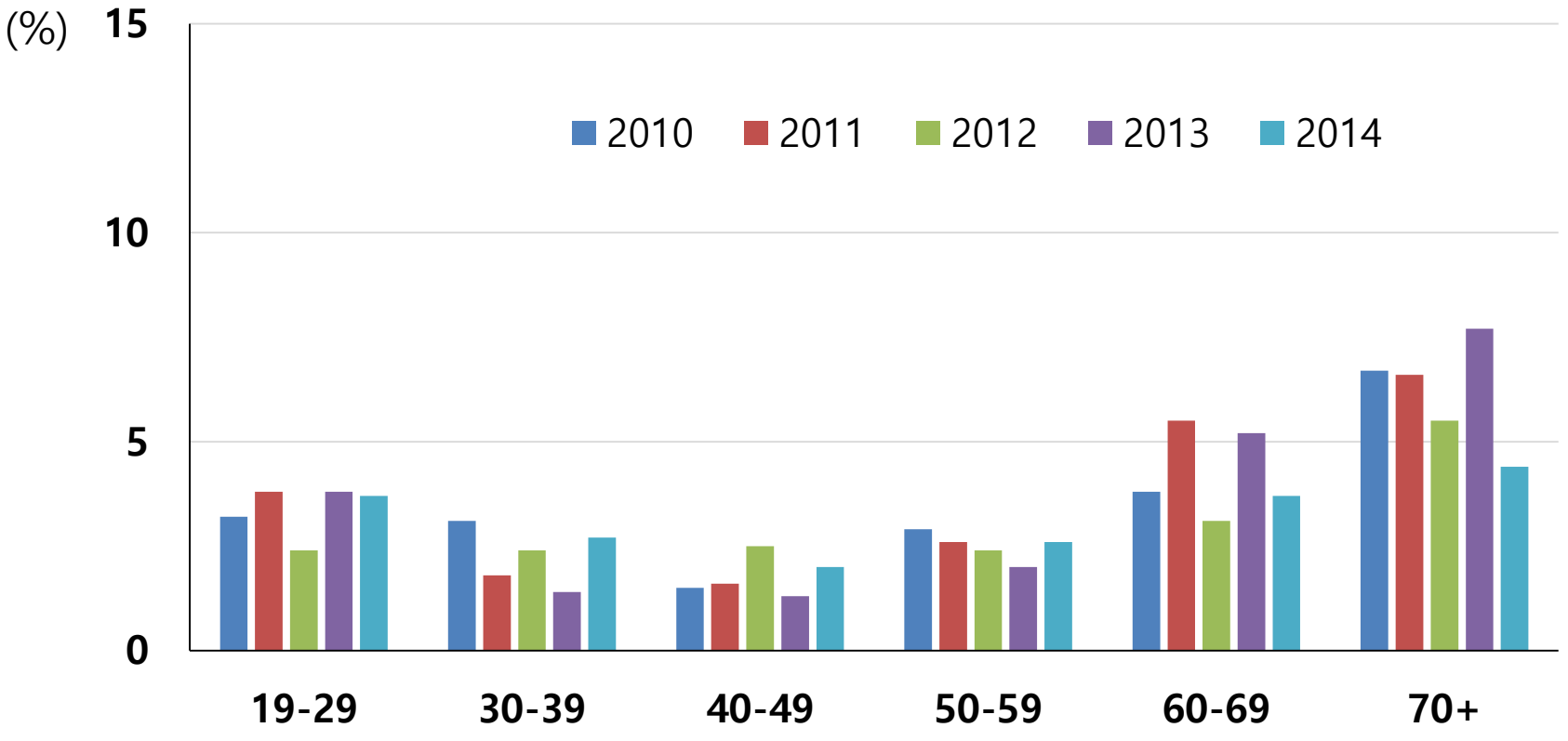
- Age > 18yrs
- Self reported physician-diagnosed asthma



National Health and Nutrition Examination Survey 2014

Prevalence of adult asthma in Korea: KNHANES(2)

- Age > 18yrs
- Self reported physician-diagnosed asthma



National Health and Nutrition Examination Survey 2014

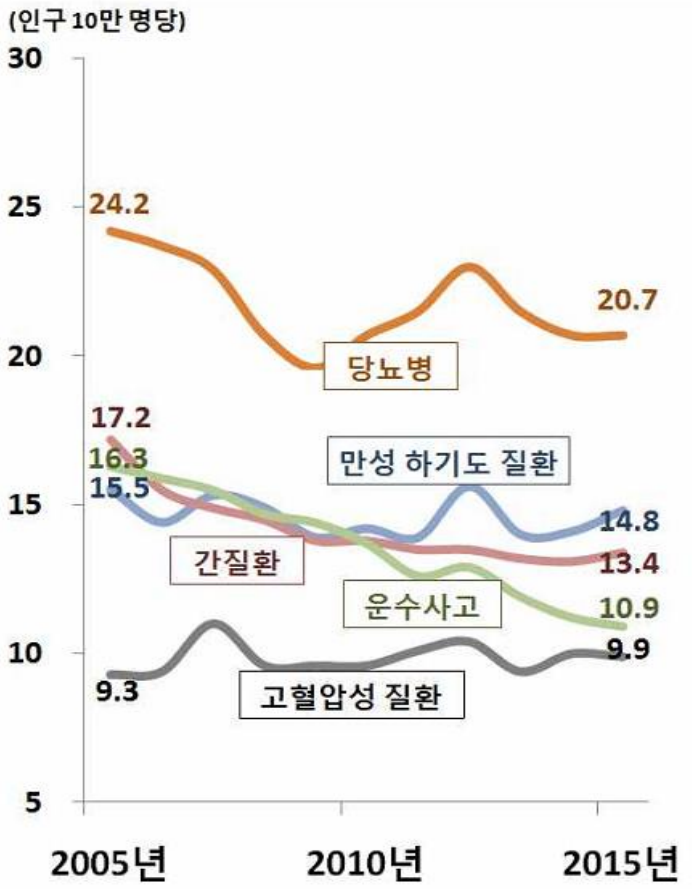
Mortality rate

10대 사망원인 순위 및 사망률, 2015년

(인구 10만 명당)

순위	사망원인	사망률	'14년 순위 대비
1	악성신생물(암)	150.8	-
2	심장 질환	55.6	-
3	뇌혈관 질환	48.0	-
4	폐렴	28.9	⬆ (+1)
5	고의적 자해(자살)	26.5	⬇ (-1)
6	당뇨병	20.7	-
7	만성 하기도 질환	14.8	-
8	간 질환	13.4	-
9	운수사고	10.9	-
10	고혈압성 질환	9.9	-

< 6-10순위 사망원인 >



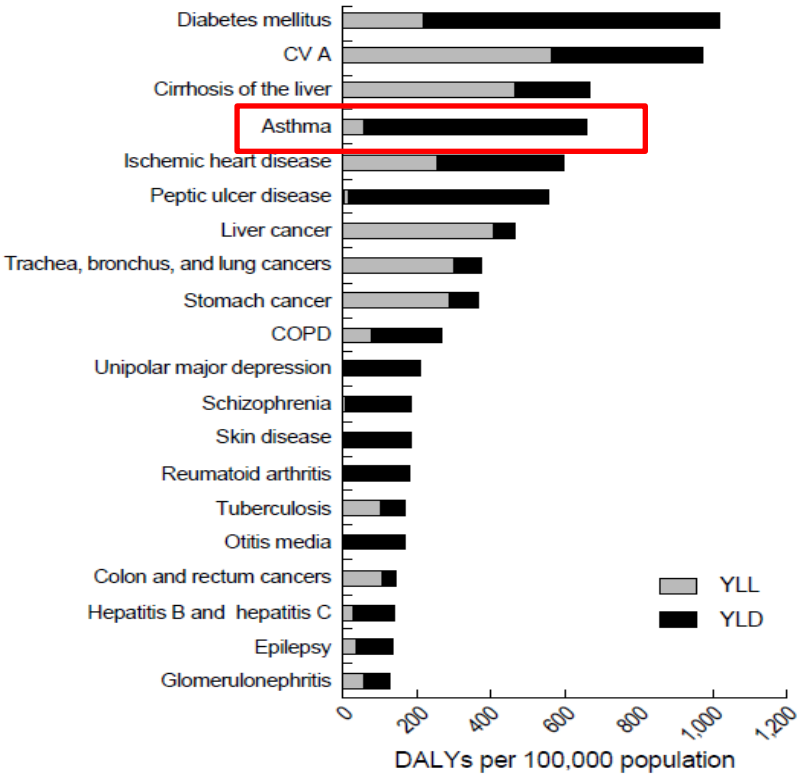
2015년 통계청 사망원인통계

Global mortality rate (5-34yrs)

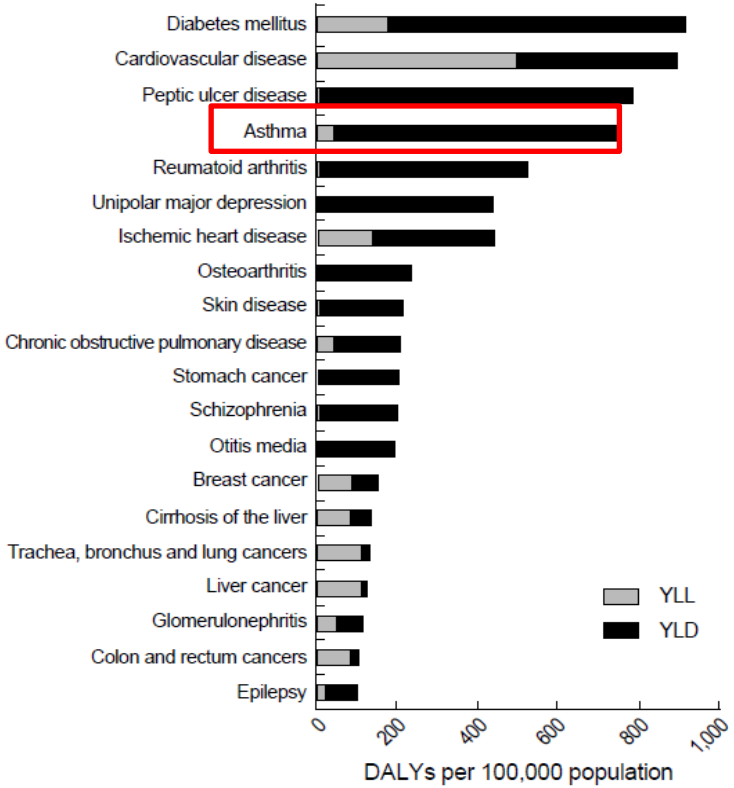
Masoli M et al. Allergy, 2004

Burden of disease in Korea

- The Korean burden of disease (KBoD) study



Top 20 diseases in men



Top 20 diseases in women

- YLL: years of life lost due to premature mortality
- YLD: years of life lost due to disability

Yoon SG et al. J Korean Med Sci, 2007

Socioeconomic cost of asthma in Korea

- Nationwide comprehensive survey in 2004

Table 1. Asthma cost categories and resources used for estimation

Category	Direct formal medical		Direct informal medical	Direct non-medical	Indirect	Intangible
Sub-category	Reimbursed (patient + insurer)	Non-reimbursed	CAMs	Traffic Nursing	Time loss Death	QOL
Data sources	NHIC data	Patient survey	Patient survey	Patient survey & NHIC data	Patient survey & NHIC data	Patient survey (WTP)

CAMs, complementary and alternative medicines; QOL, quality of life; NHIC, National Health Insurance Corporation; WTP, willingness-to-pay.

Table 5. Total costs of asthma in 2004

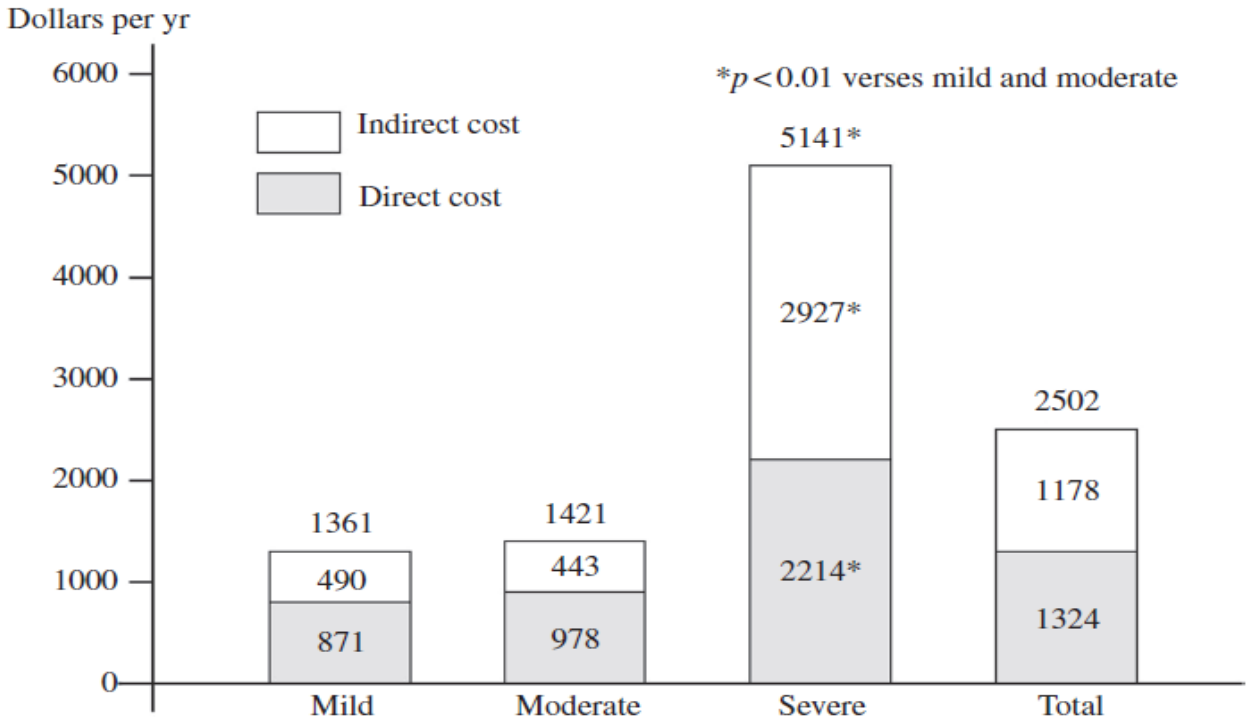
Cost category	Cost ($)*	%
Direct	0.96	46.9†
Indirect	1.08	53.1†
Direct + Indirect	2.04	
Intangible	2.06	
Total	4.11	

*In billions; †Percentage of the sum of direct and indirect costs.

Kim CY, Cho SH, et al. Allergy Asthma Immunol Res, 2011

Economic cost according to asthma severity

- 314 patients with persistent asthma in tertiary hospital
- Analysis of hospital care utilization and expenditure
- Questionnaire survey for nonmedical direct cost and indirect cost



Kim SH, Cho SH et al. J asthma, 2012

Risk factors & triggers

Childhood asthma

- Environmental factors
  - allergens
  - environmental tobacco smoking /active smoking
  - indoor/ambient air pollution
  - viral infections
- Lifestyle factors
  - overweight/ obesity
  - urban life
  - diets
  - breast feeding

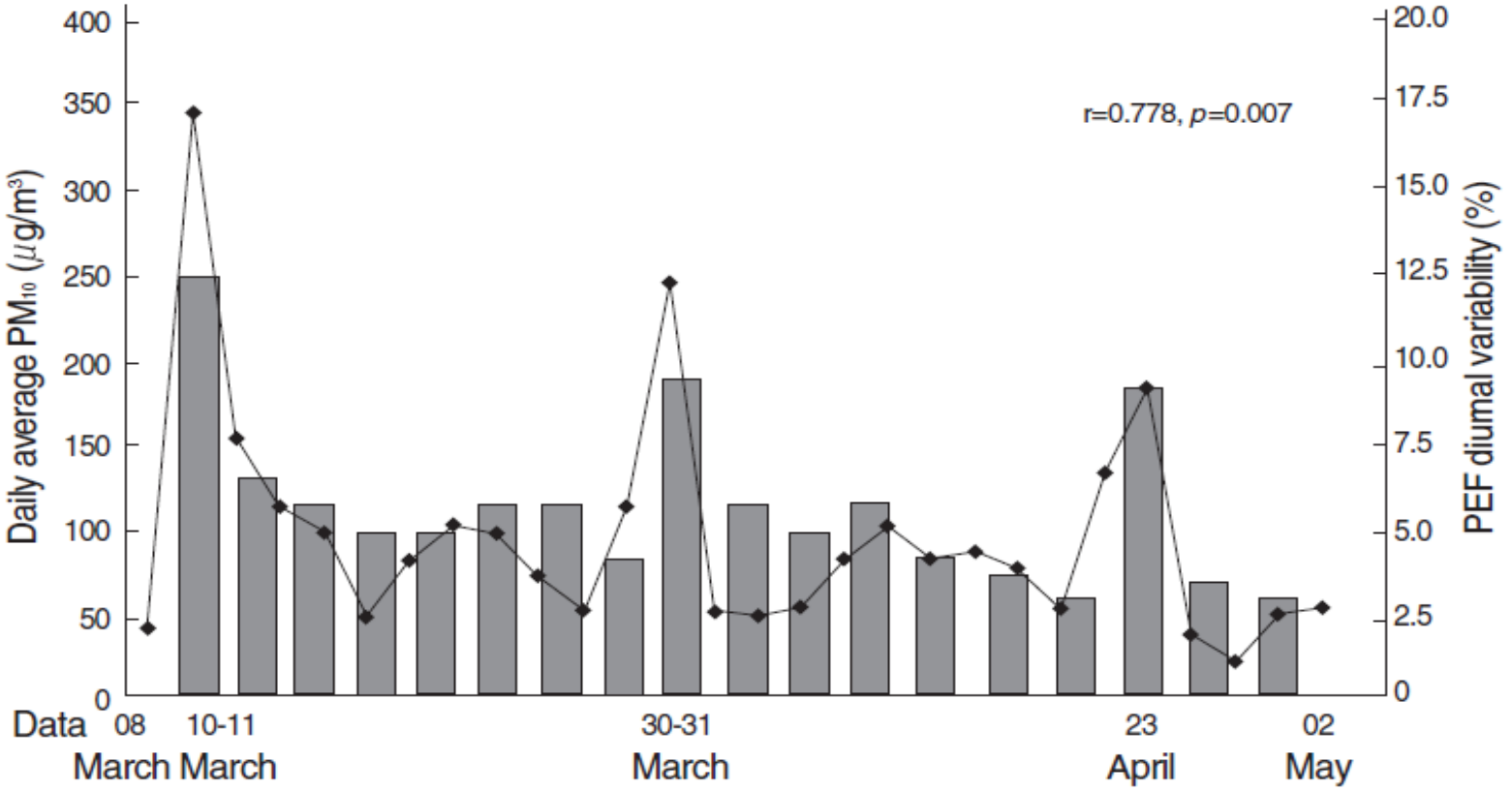
Adult-onset asthma

- Allergen
- Gender/female sex hormone
- Obesity
- Smoking
- Upper airway disease : allergic rhinitis, rhinosinusitis, S. aureus sensitization
- Air pollution
- Respiratory tract infection: viral, chlamydia, mycoplasma
- Aspirin/paracetamol
- Occupational
- Stress/psychological

Risk factors & triggers of adult asthma in Korea

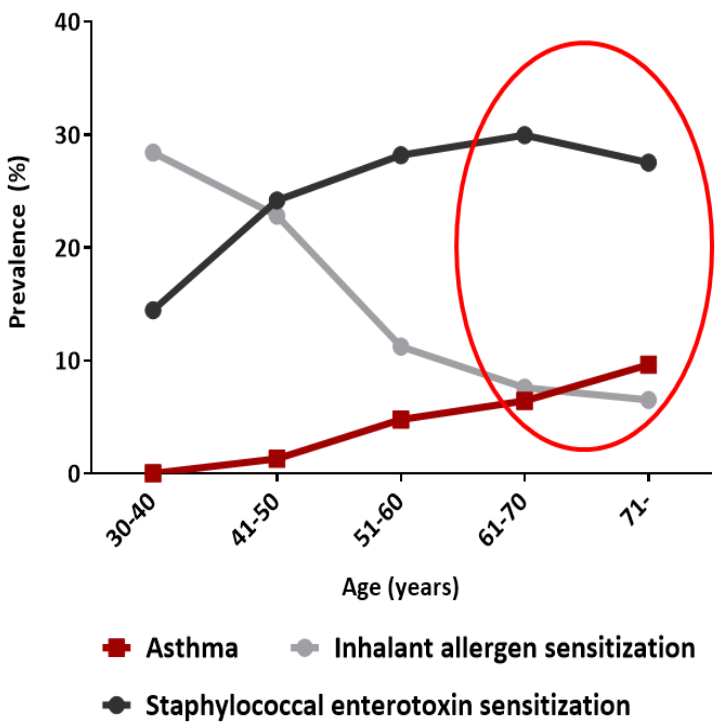
- **Allergen** : indoor perennial allergens (HDM, mold, cockroach, etc.)
- **Obesity** : sarcopenic obesity with abdominal subacutaneous adiposity
- **Smoking**, electronic cigarettes
- **Upper airway disease** : allergic rhinitis, rhinosinusitis, S. aureus sensitization
- **Ambient air pollution:** PM_{10}, O_3, Asian sand dust
- **Climates**
- **Aspirin/NSAIDs**
- **Diet:** fewer consumption of kimchi
- **Occupational** : isocyanate, reactive dye, CRM, TSM, etc.
- **Stress/psychological**

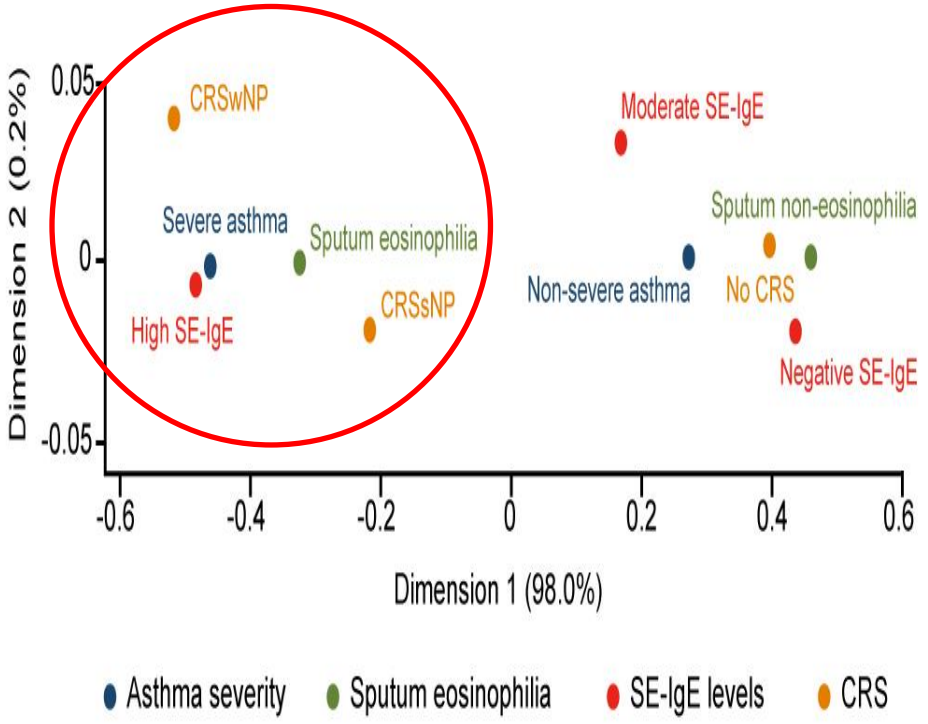
Acute Effects of Asian Dust Events on Respiratory Symptoms and Peak Expiratory Flow in Children with Mild Asthma



Yoo Y, Koh YY, et al. J Korean Med Sci, 2008

Staphylcoccal enterotoxin IgE sensitization : associated with late-onset severe eosinophilic asthma





Song WJ, et al. Clin Exp Allergy, 2014

Song WJ, et al. Clin Exp Allergy, 2016

Causative agent of occupational asthma in Korea

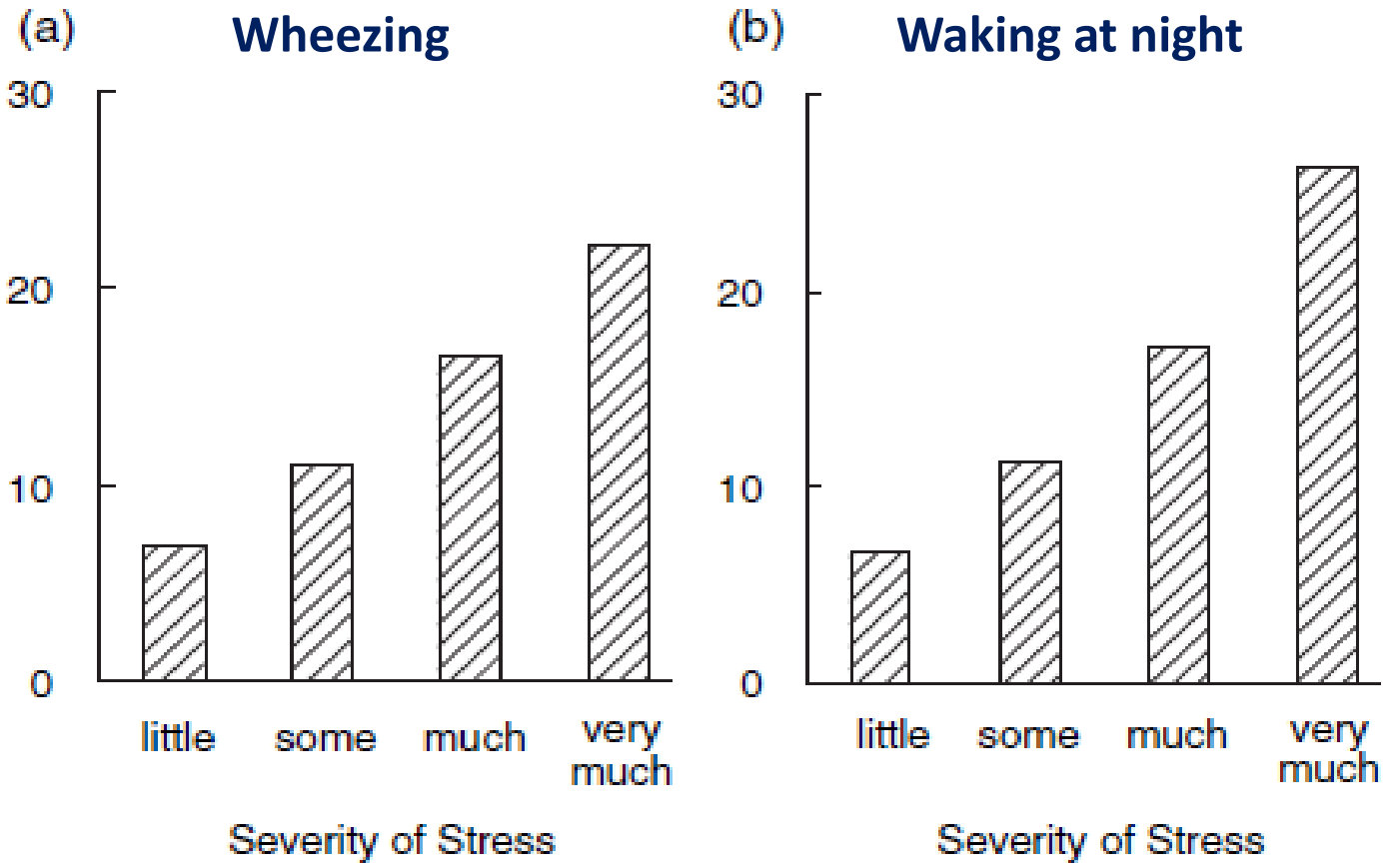
Table 1. Causative agents of occupational asthma by OSHRI

Causative agents	Male	Female	No. of cases	%
Chemical	45	17	62	81.4
Isocyanate	21	17	38	50.0
Reactive dye	11	0	11	14.5
Latex	3	0	3	3.9
Azodicarbonamide	2	0	2	2.6
Formaldehyde	2	0	2	2.6
Phthalate	1	0	1	1.3
Dichlorofluoroethane	1	0	1	1.3
Cashew (paint)	1	0	1	1.3
Solvent	1	0	1	1.3
Exhaust	1	0	1	1.3
PASTE	1	0	1	1.3
Metal	7	0	7	9.2
Welding fumes	4	0	4	5.3
Nickel (fumes)	1	0	1	1.3
Cobalt	1	0	1	1.3
Aluminum	1	0	1	1.3
Wood dust	1	0	1	1.3
Cotton dust	0	1	1	1.3
Grain dust	1	0	1	1.3
Paper dust	0	1	1	1.3
Organic dust	1	0	1	1.3
Undetermined	2	0	2	2.6
Total	57 (75%)	19 (25%)	76	100.0

OSHRI, Occupational Safety & Health Research Institute.

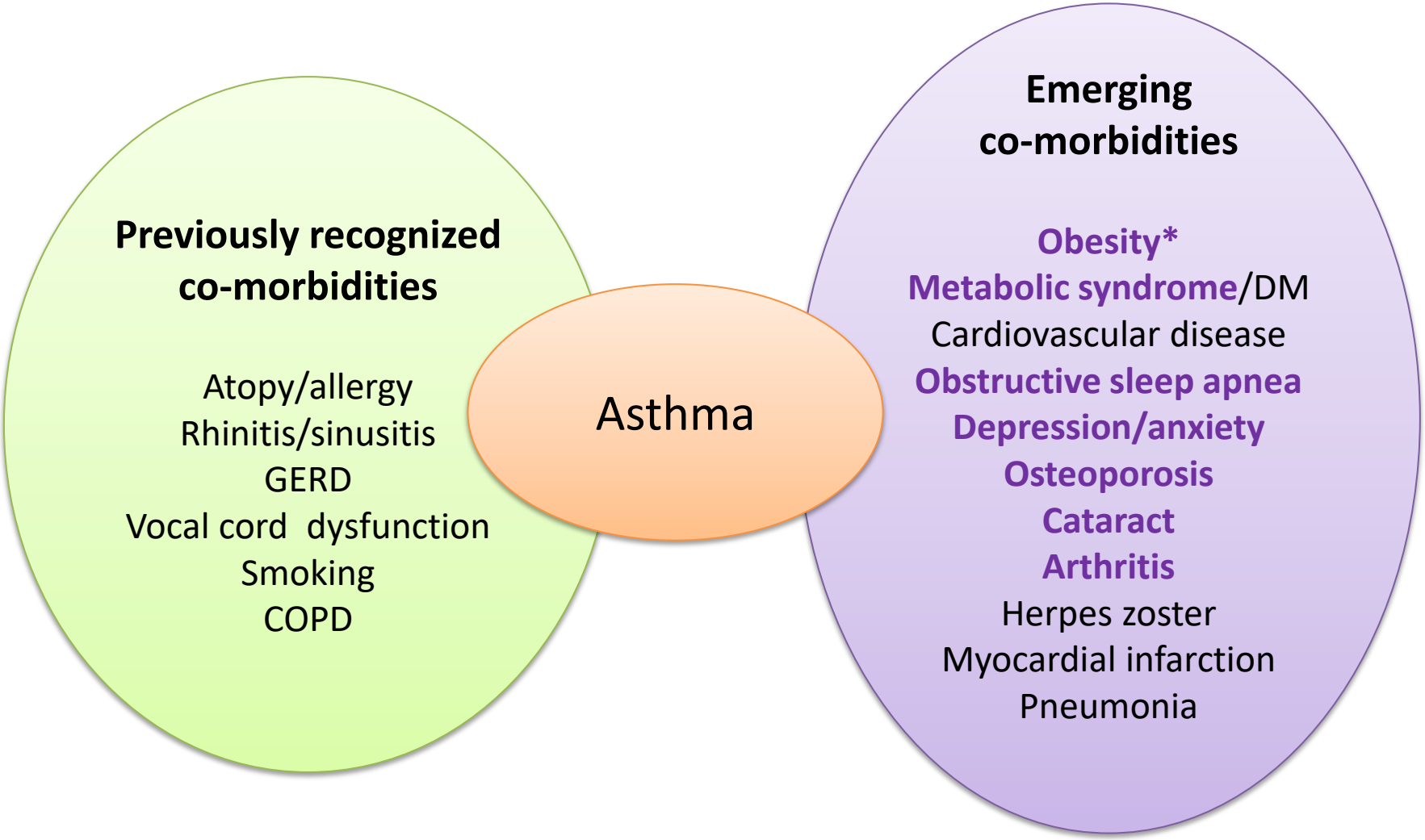
Oh SS, Kim KS, J Korean Med Sci, 2010

Stress as a trigger of asthmatic symptoms



Oh YM, et al. Respirology, 2004

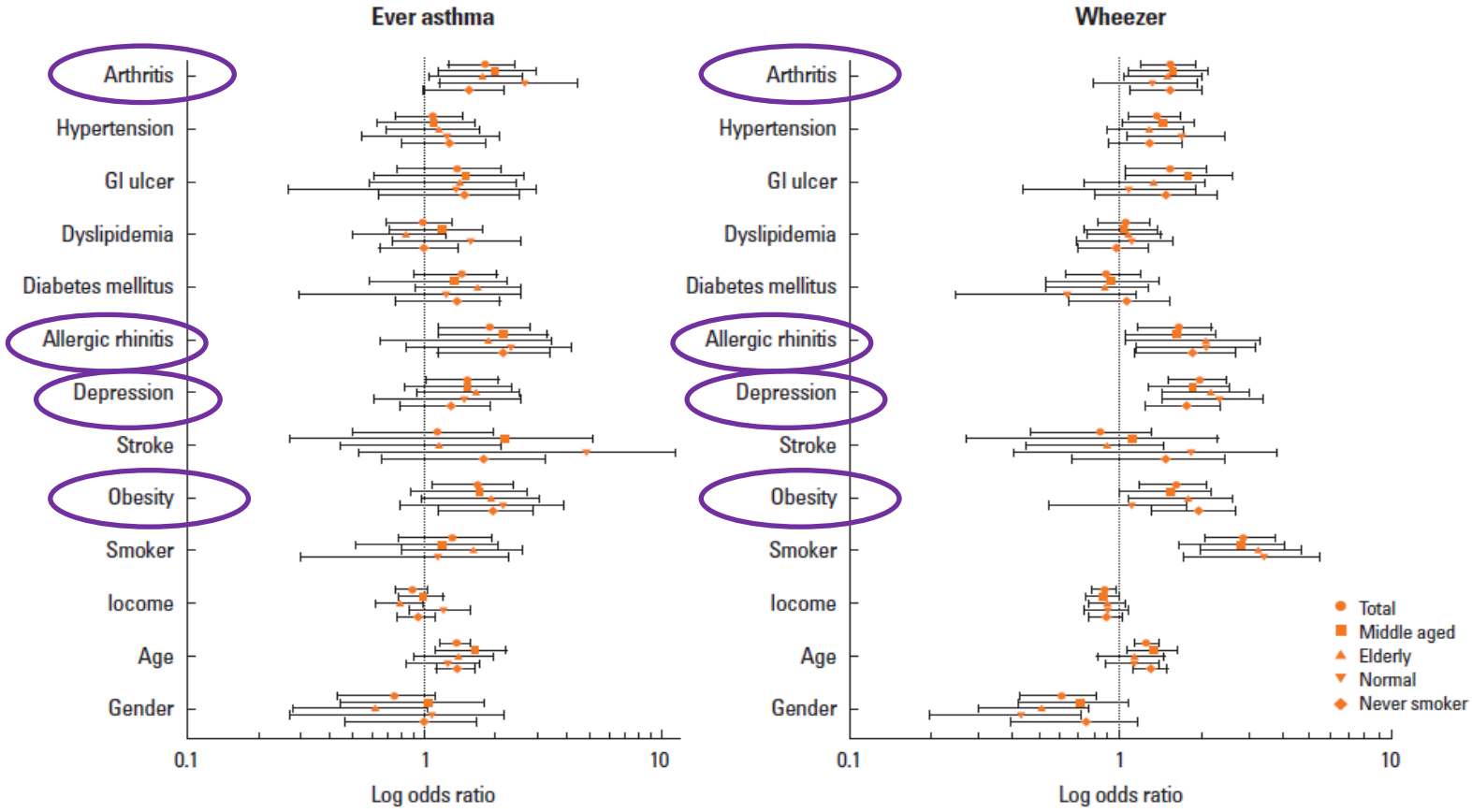
Emerging co-morbidities of adult asthma



**Bold: data published in Korean adult population*

Concomitant diseases with asthma in middle-aged and elderly in Korea

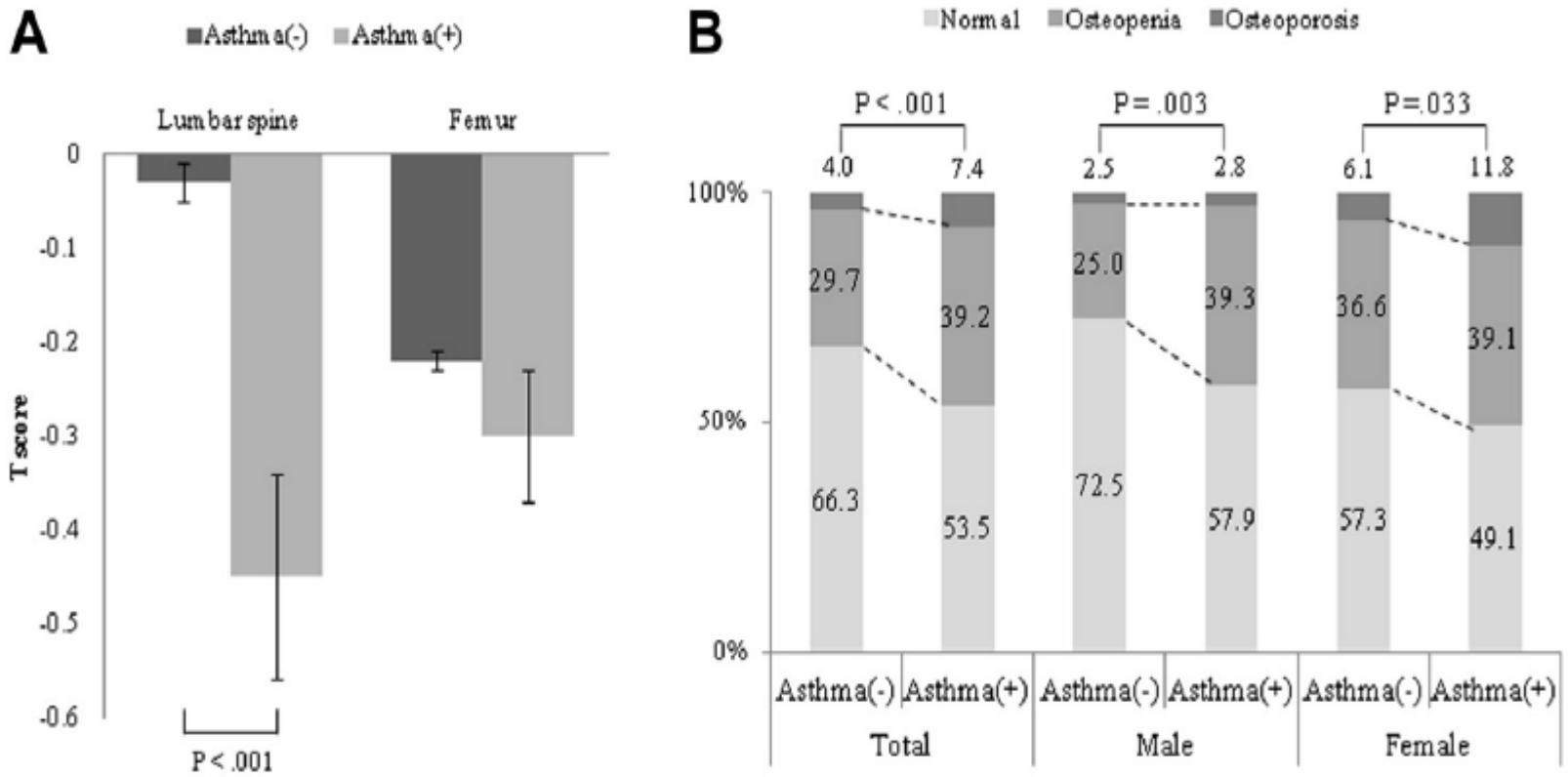
- Retrospective analysis of 4th KNHANS data (4,445 subjects)



Park JK, et al. Asthma Allergy Immunol Res, 2013

Asthma: prone to bone loss

- Retrospective analysis of health checkup program data in SNUH (N=7,034)



Jung JW, Cho SH, et al. Ann Asthma Allergy Immunol,2014

Insights, attitudes and perceptions about asthma and its treatment: Findings from a multinational survey of patients from 8 Asia-Pacific countries and Hong Kong

- Asia-Pacific Asthma Insight and Management (AIM) survey in 2011

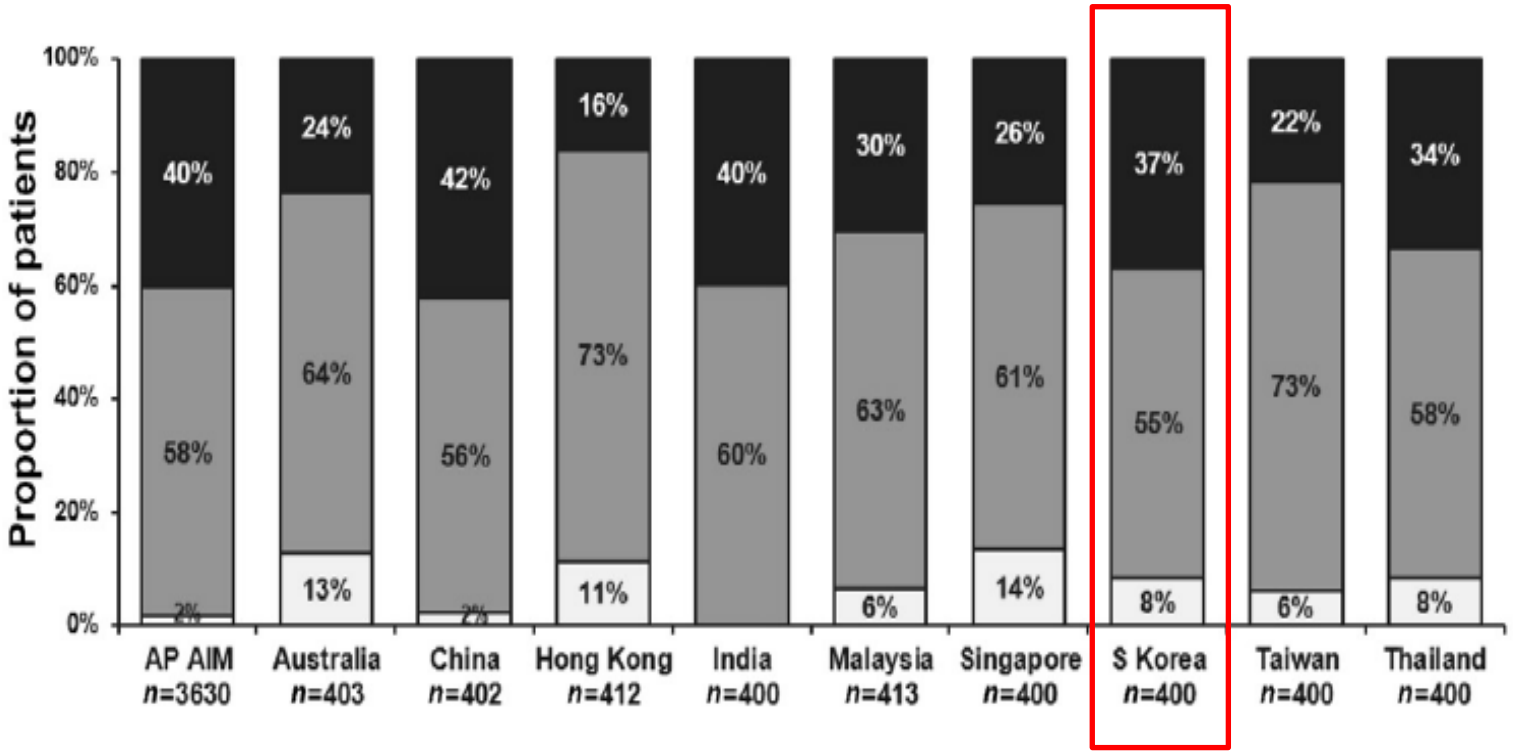
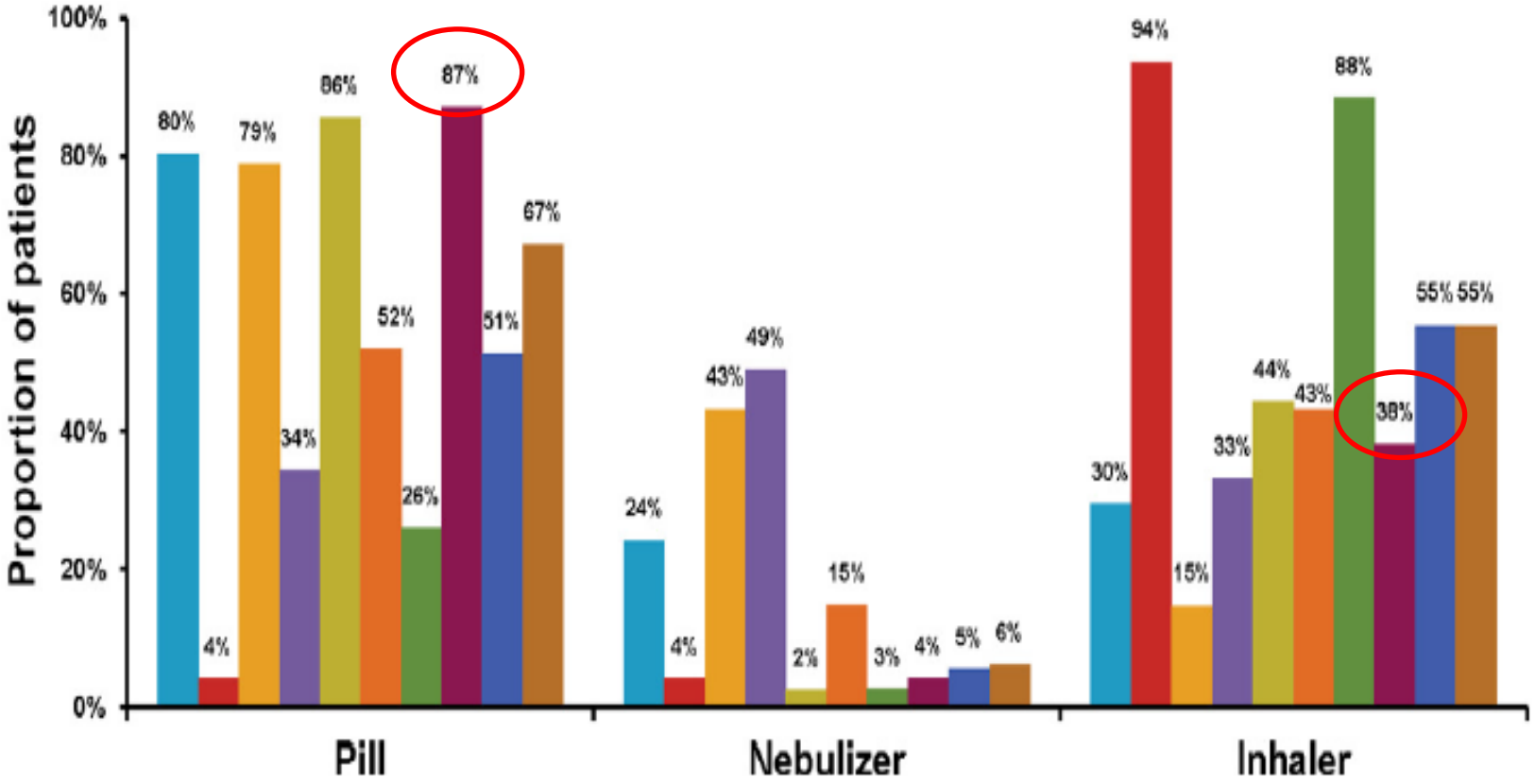


Figure 2 Percentage of patients with completely controlled or well-controlled asthma in the past 4 weeks: (a) as reported by patients; (b) as determined by the Global Initiative for Asthma classification. ■, uncontrolled; ■, partly controlled; □, controlled.

Thompson PJ, Cho YJ, et al, Respirology, 2013

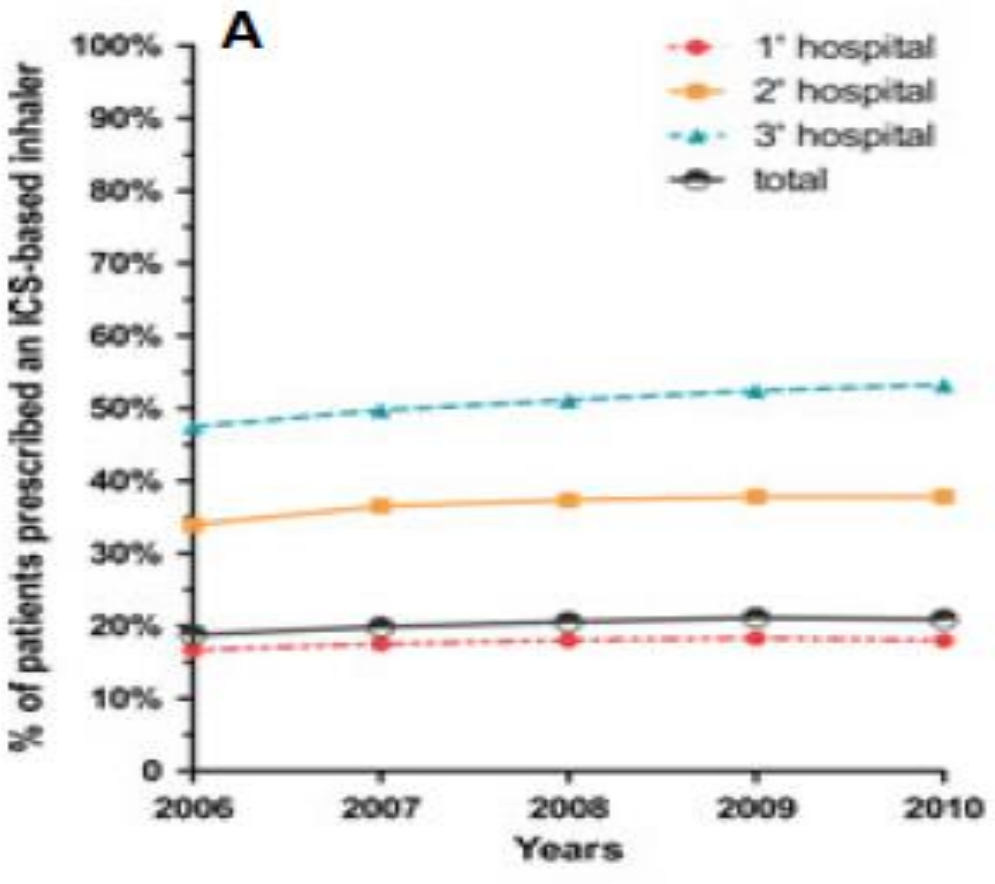
Inhaler use and medication patterns

- Asia-Pacific Asthma Insight and Management (AIM) survey in 2011



Thompson PJ, Cho YJ, et al, Respirology, 2013

ICS prescription by doctors



Kim S, et al. Allergy, 2013

Summary

- Prevalence of asthma has increased in the past decades, but appears to be stationary recently.
- Elderly asthma is expected to be an increasingly important clinical issue in fast ageing society.
- Asthma causes substantial socioeconomic burden. Severe asthma accounts for large amount of the economic cost.
- Numerous risk factors and co-morbidities are involved in the adult and elderly asthma.
- Control status of asthma still does not reach the optimal level in Korea.

Unmet needs and unanswered questions

- Validation of research tools for epidemiologic studies
- New-onset asthma incidence (esp. adult, elderly)
- Prevalence of severe asthma
- Healthcare utilization (ER visit, hospitalization, etc.)
- Outcome changes (prevalence, socioeconomic cost, control status, exacerbation rate, etc.)
- Environmental and lifestyle risk and protective factors related with epidemiological changes in Korea