Facts about Asthma in sub-Saharan Africa: Epidemiology and risk factors

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Outline

Introduction

- Definition of asthma
- Asthma pathogenesis
- Diagnosis of asthma
  - Possible, probable, definite

Burden

- Prevalence
- Mortality
- Severe asthma

Determinants

- Genetics of asthma
- Environmental risk factors
- Adult onset asthma
- Occupational asthma
  - Asthma and tropical infection

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Introduction

- Definition of asthma
- Asthma pathogenesis
- Phenotypes an endotypes
- Diagnosis of asthma
  - Possible, probable, definite

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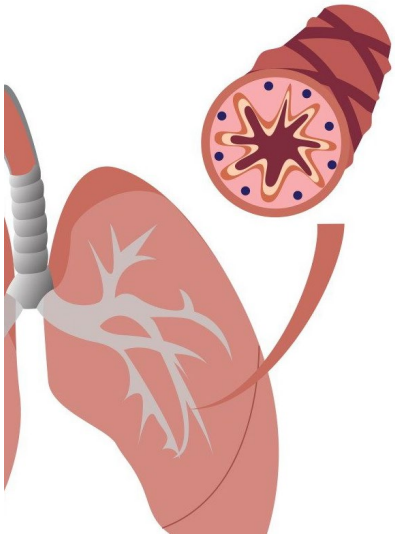
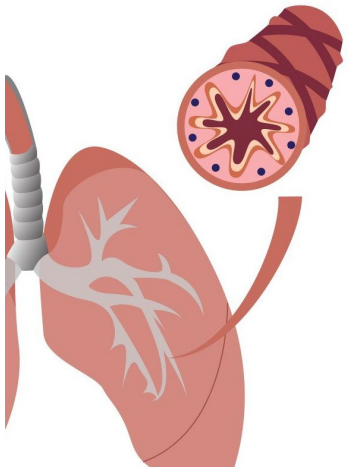
Definition



- Asthma is defined by Global Initiative for asthma (GINA) as a heterogenous disease usually characterized by chronic airway inflammation and accompanied by a history of recurrent or persistent respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable airflow obstruction
- The variation in symptoms and airflow obstruction can in most cases be associated with an identifiable trigger such as allergen exposure, exercise, change in weather or a chest infection
- Symptoms can be absent for several weeks or months following appropriate asthma treatment or even spontaneously

Asthma diagnosis



- The diagnosis of asthma should be based on:
  - A history of characteristic symptom patterns
  - Evidence of variable airflow limitation, from bronchodilator reversibility testing or other tests
- Document evidence for the diagnosis in the patient's notes, preferably before starting controller treatment
  - It is often more difficult to confirm the diagnosis after treatment has been started
- Asthma is usually characterized by airway inflammation and airway hyperresponsiveness, but these are not necessary or sufficient to make the diagnosis of asthma.

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GINA 2017

Box 1-2. Diagnostic criteria for asthma in adults, adolescents, and children 6–11 years

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation.

DIAGNOSTIC FEATURE	CRITERIA FOR MAKING THE DIAGNOSIS OF ASTHMA
1. History of variable respiratory symptoms	
Wheeze, shortness of breath, chest tightness and cough Descriptors may vary between cultures and by age, e.g. children may be described as having heavy breathing	• Generally more than one type of respiratory symptom (in adults, isolated cough is seldom due to asthma) • Symptoms occur variably over time and vary in intensity • Symptoms are often worse at night or on waking • Symptoms are often triggered by exercise, laughter, allergens, cold air • Symptoms often appear or worsen with viral infections
2. Confirmed variable expiratory airflow limitation	
Documented excessive variability in lung function* (one or more of the tests below)	The greater the variations, or the more occasions excess variation is seen, the more confident the diagnosis
AND documented airflow limitation*	At least once during diagnostic process when FEV_1 is low, confirm that FEV_1/FVC is reduced (normally >0.75–0.80 in adults, >0.90 in children)
Positive bronchodilator (BD) reversibility test* (more likely to be positive if BD medication is withheld before test: SABA ≥4 hours, LABA ≥15 hours)	*Adults*: increase in FEV_1 of >12% and >200 mL from baseline, 10–15 minutes after 200–400 mcg albuterol or equivalent (greater confidence if increase is >15% and >400 mL). *Children*: increase in FEV_1 of >12% predicted
Excessive variability in twice-daily PEF over 2 weeks*	*Adults*: average daily diurnal PEF variability >10%** *Children*: average daily diurnal PEF variability >13%**
Significant increase in lung function after 4 weeks of anti-inflammatory treatment	*Adults*: increase in FEV_1 by >12% and >200 mL (or $PEF^{\dagger}$ by >20%) from baseline after 4 weeks of treatment, outside respiratory infections
Positive exercise challenge test*	*Adults*: fall in FEV_1 of >10% and >200 mL from baseline *Children*: fall in FEV_1 of >12% predicted, or PEF >15%
Positive bronchial challenge test (usually only performed in adults)	Fall in FEV_1 from baseline of ≥20% with standard doses of methacholine or histamine, or ≥15% with standardized hyperventilation, hypertonic saline or mannitol challenge
Excessive variation in lung function between visits* (less reliable)	*Adults*: variation in FEV_1 of >12% and >200 mL between visits, outside of respiratory infections *Children*: variation in FEV_1 of >12% in FEV_1 or >15% in $PEF^{\dagger}$ between visits (may include respiratory infections)

BD: bronchodilator (short-acting SABA or rapid-acting LABA); FEV_1: forced expiratory volume in 1 second; LABA: long-acting $beta_2$-agonist; PEF: peak expiratory flow (highest of three readings); SABA: short-acting $beta_2$-agonist. See Box 1-4 for diagnosis in patients already taking controller treatment.

Definite probable and possible asthma

No definitive test

Proposed diagnostic approach

- **Possible asthma=** symptoms alone, response to medications, supportive evidence such as allergy family history etc.
- **Probable asthma=** symptoms, supportive evidence plus significant reversibility (FEV1 of 200 ml or greater and 12% improvement from baseline after inhalation of short acting beta2-agonists) and no airflow limitation (FEV1/FVC ratio<0.70 or LLN)
- **Definite asthma=**evidence of expiratory airflow limitation (FEV1 of 200 ml or greater and 12% improvement from baseline after inhalation of short acting beta2-agonists) plus airflow limitation (FEV1/FVC ratio<0.70 or LLN)

Taylor & Francis

Expert Review of Respiratory Medicine

ISSN: 1747-6348 (Print) 1747-6356 (Online) Journal homepage: http://www.tandfonline.com/loi/ierx20

FEV_1 reversibility for asthma diagnosis: a critical evaluation

Qian Ye, Amy Liao & Anthony D'Urzo

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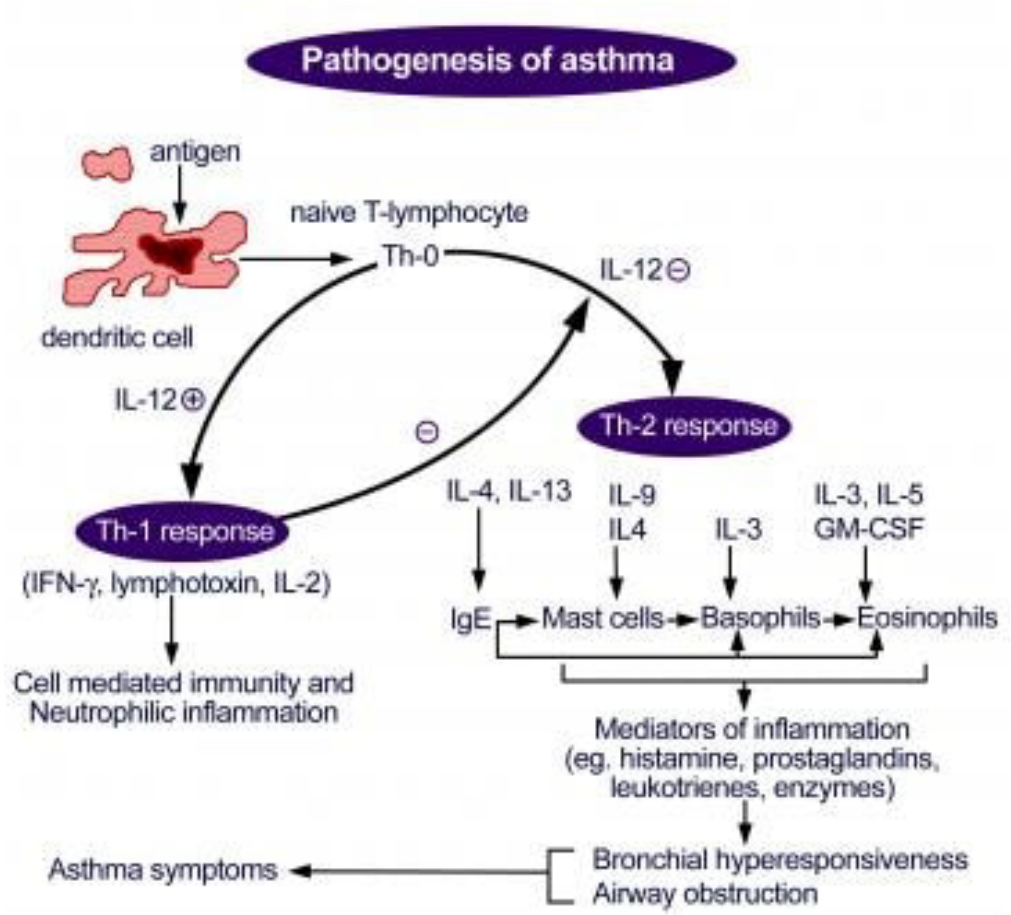
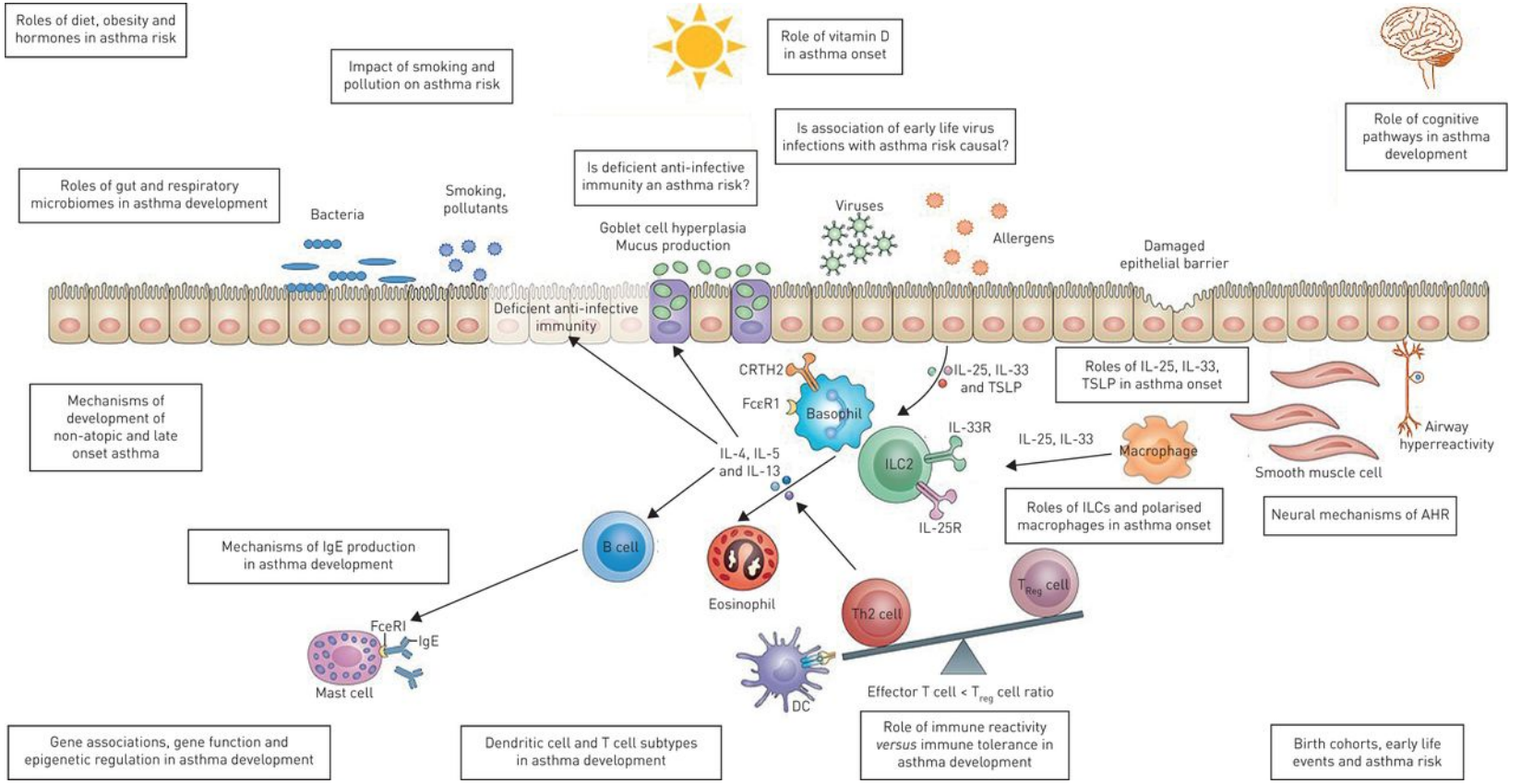
Pathogenesis of asthma

The common pathological pathway in asthma is airway inflammation from multiple cells.

1. Mast cells=histamine, prostaglandin D2, and cysteinyl leukotrienes (LTC4, D4, and E4)= contraction &stimulate reflex neural pathways
2. Eosinophils =basic proteins and cysteinyl leukotrienes
3. T lymphocytes= interleukin-4 (IL-4), IL-5, IL-9 and IL-13 =eosinophilic inflammation
4. Dendritic cells= mobilize allergens from the airway surface into regional lymph nodes=T cell produce production.
5. Structural cells eg epithelial cells=inflammatory proteins, cytokines and chemokines in response to mechanical changes = presence of air pollutants and bacteria and viruses
6. Airway smooth muscle= hyperplasia and hypertrophy and produce cytokines and chemokines
7. Endothelial cells of the bronchial circulation =increased recruitment of inflammatory cells to sites of injury in asthma.
8. Fibroblasts and myofibroblasts=increased production of connective components such collagen
9. Airway nerves =heightened response which result into bronchoconstriction and mucus secretion.

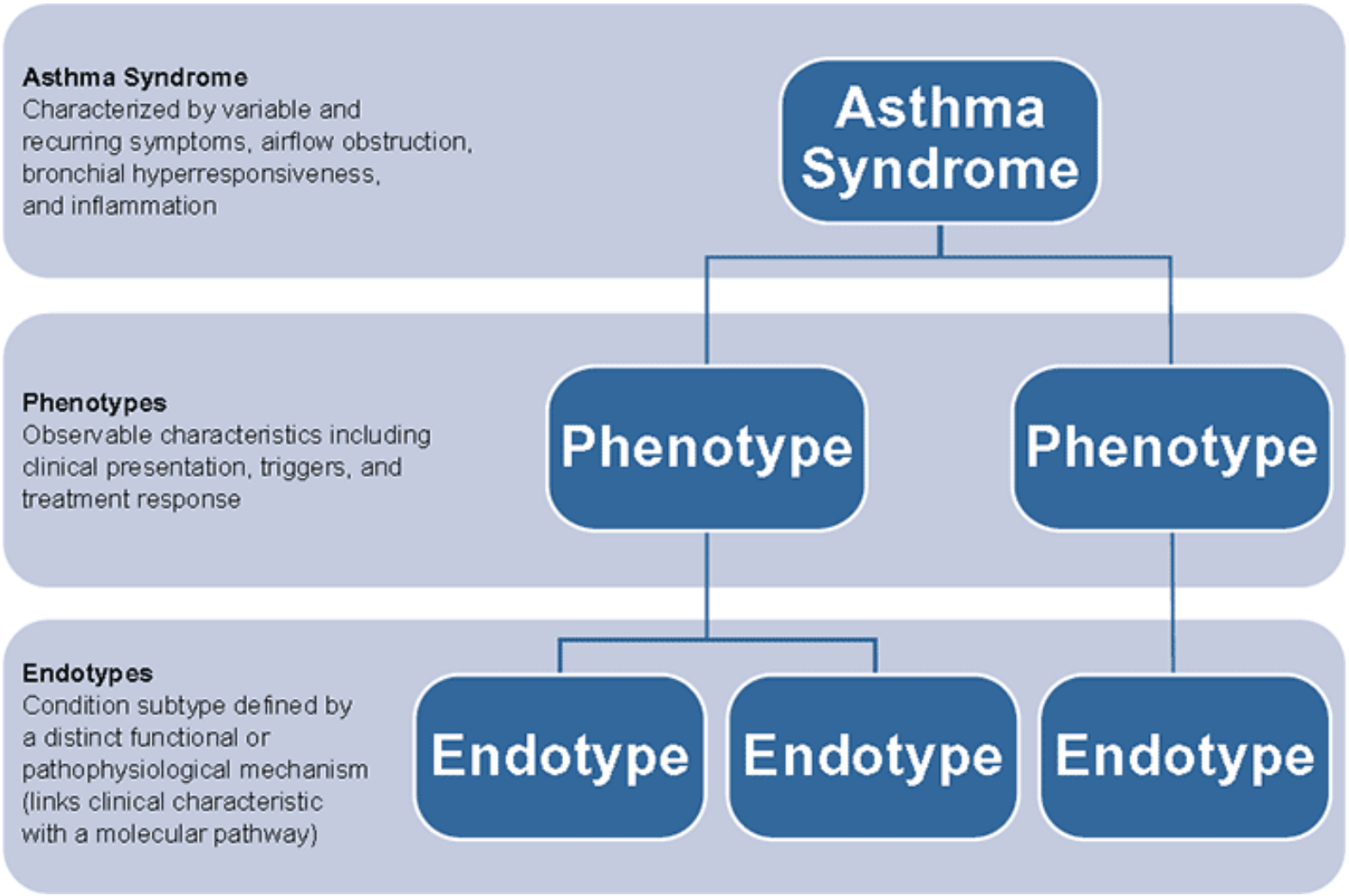


Major mechanisms of asthma onset.

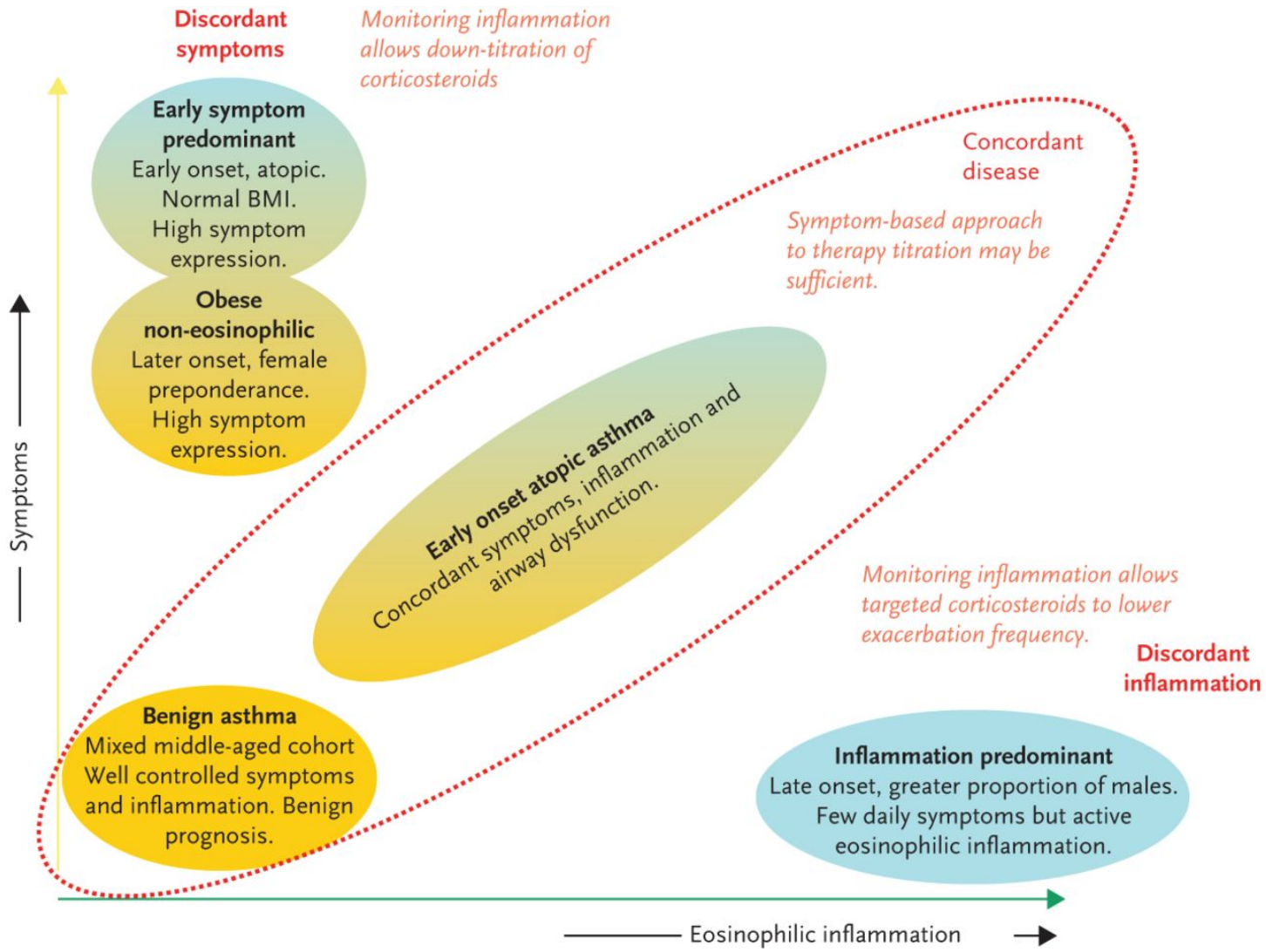


Michael R. Edwards et al. Eur Respir J 2017;49:1602448

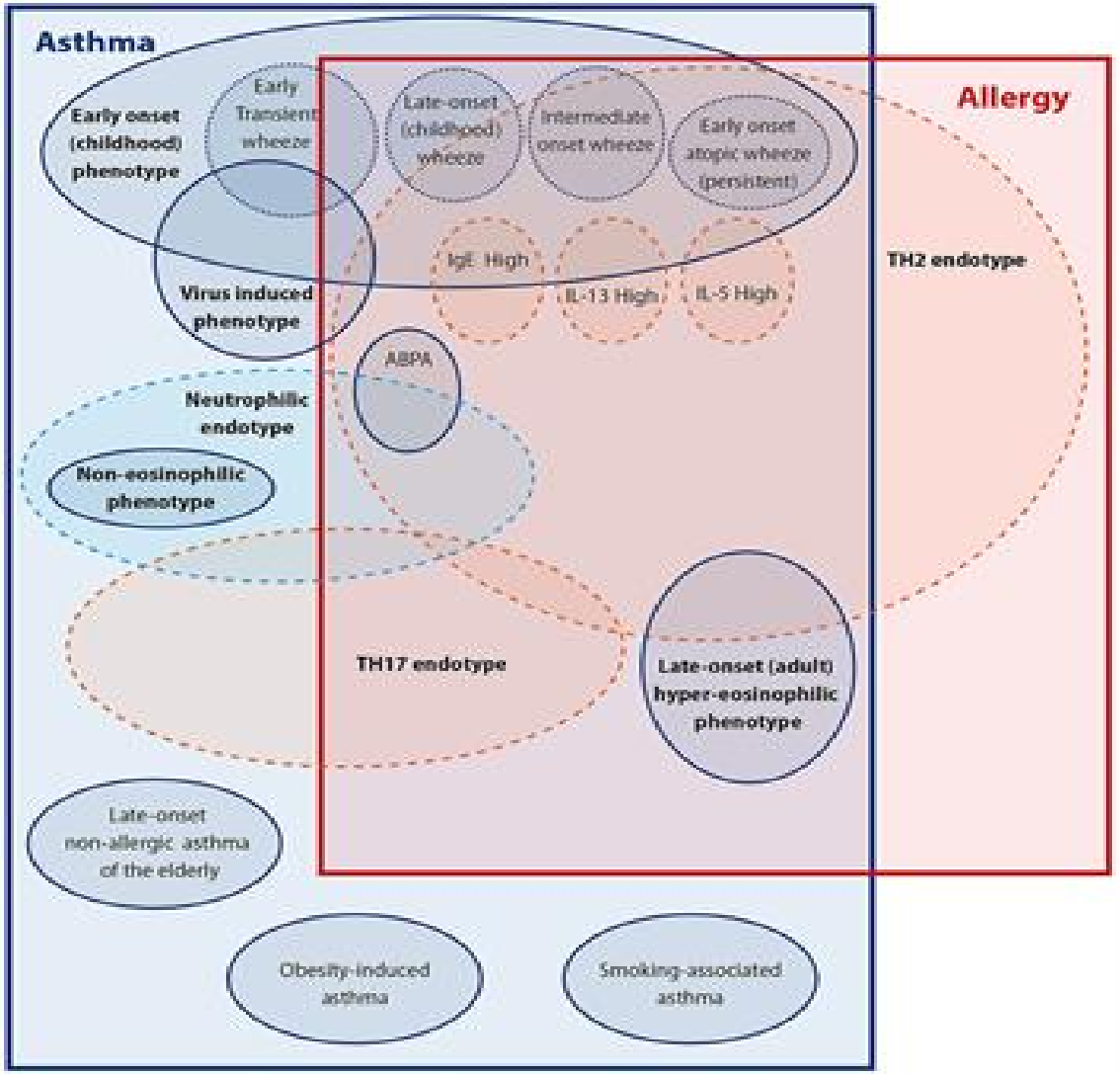
Asthma phenotypes & endotypes



Asthma phenotype?



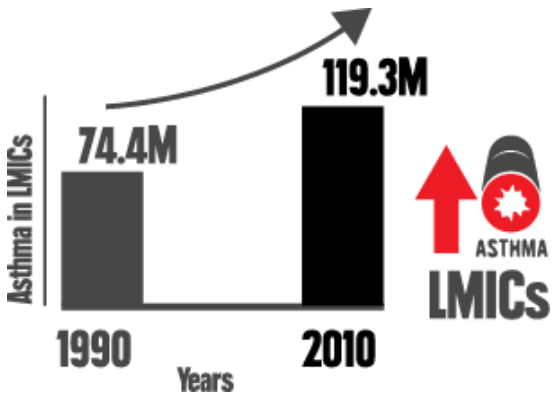
Endotypes


Asthma
Allergy
Early onset (childhood) phenotype
Early Transient wheeze
Late-onset (childhood) wheeze
Intermediate onset wheeze
Early onset atopic wheeze (persistent)
IgE High
IL-13 High
IL-5 High
TH2 endotype
Virus induced phenotype
ABPA
Neutrophilic endotype
Non-eosinophilic phenotype
TH17 endotype
Late-onset (adult) hyper-eosinophilic phenotype
Late-onset non-allergic asthma of the elderly
Obesity-induced asthma
Smoking-associated asthma

Burden

- Prevalence
- Mortality
- Severe asthma

Prevalence of asthma



- 334 million people affected globally;
- Prevalence decreasing in developed western countries
- Increasing in most low and middle income countries (LMIC): 74.4M in 1990, 119.3M 2010

Prevalence of asthma in different Africa countries

		Asthma Prevalence (%)[2]		
Region[1]	**Country**	**Doctor Diagnosed Asthma**	**Clinical Asthma**	**Wheezing Symptoms**
Africa	Burkina Faso	2.02	2.26	5.32
	Chad	3.68	3.94	7.64
	Comoros[3]	7.55	7.80	12.85
	Congo[3]	4.65	4.79	7.93
	Cote d'Iviore[3]	4.22	4.59	7.70
	Ethiopia	2.00	2.00	5.53
	Ghana	3.65	3.77	4.88
	Kenya	2.86	3.12	6.22
	Malawi	4.62	4.67	7.76
	Mali	2.65	2.82	4.77
	Mauritania	6.95	7.54	11.78
	Mauritius	3.88	3.92	6.88
	Namibia	3.16	3.39	8.14
	Senegal	3.43	3.72	8.40
	South Africa[5]	5.92	6.09	12.40
	Swaziland[5]	8.74	9.69	15.37
	Zambia[4]	2.83	2.96	6.25
	Zimbabwe	2.28	2.52	5.48
Regional Sub-total		**3.94**	**4.19**	**7.75**
World wide		**4.27**	**4.46**	**8.61**

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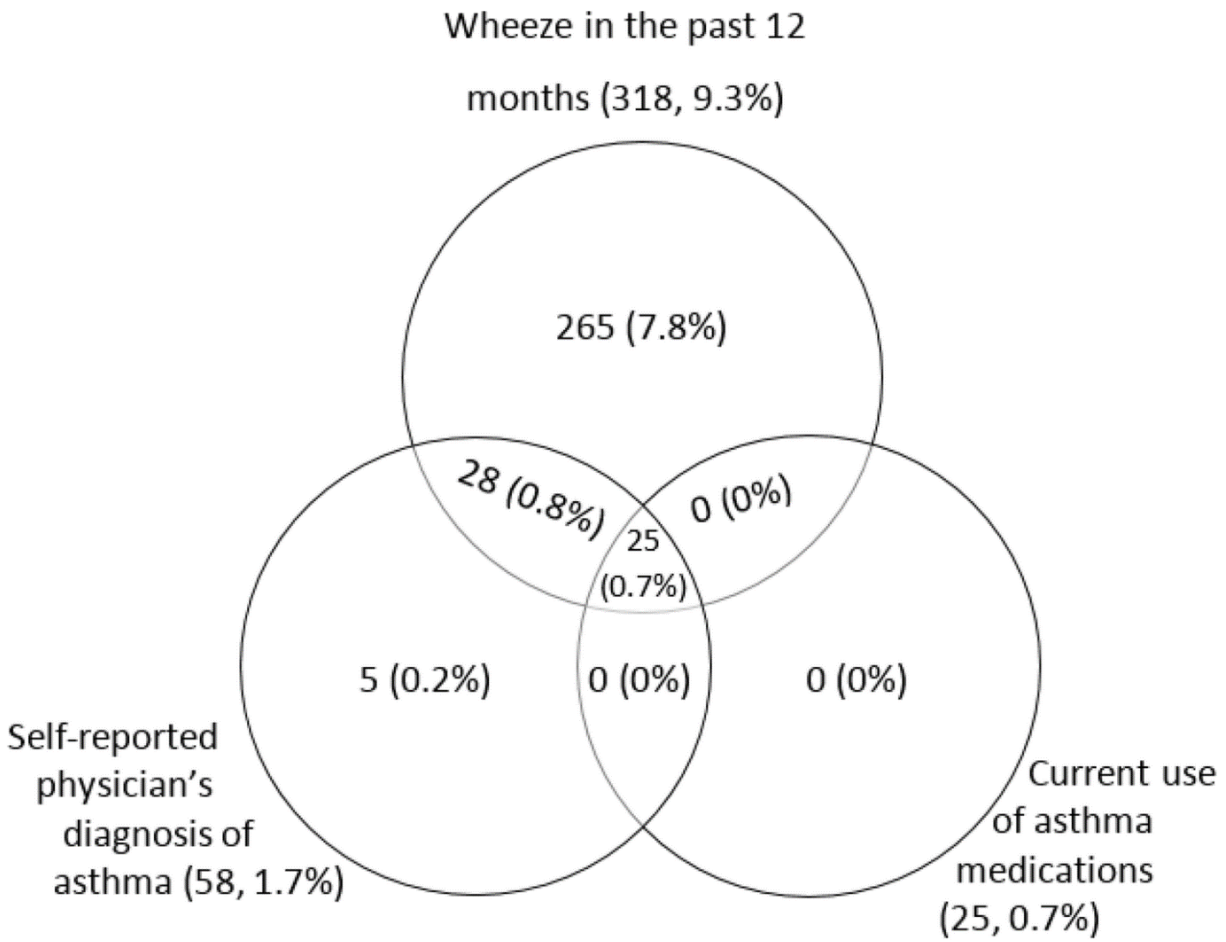
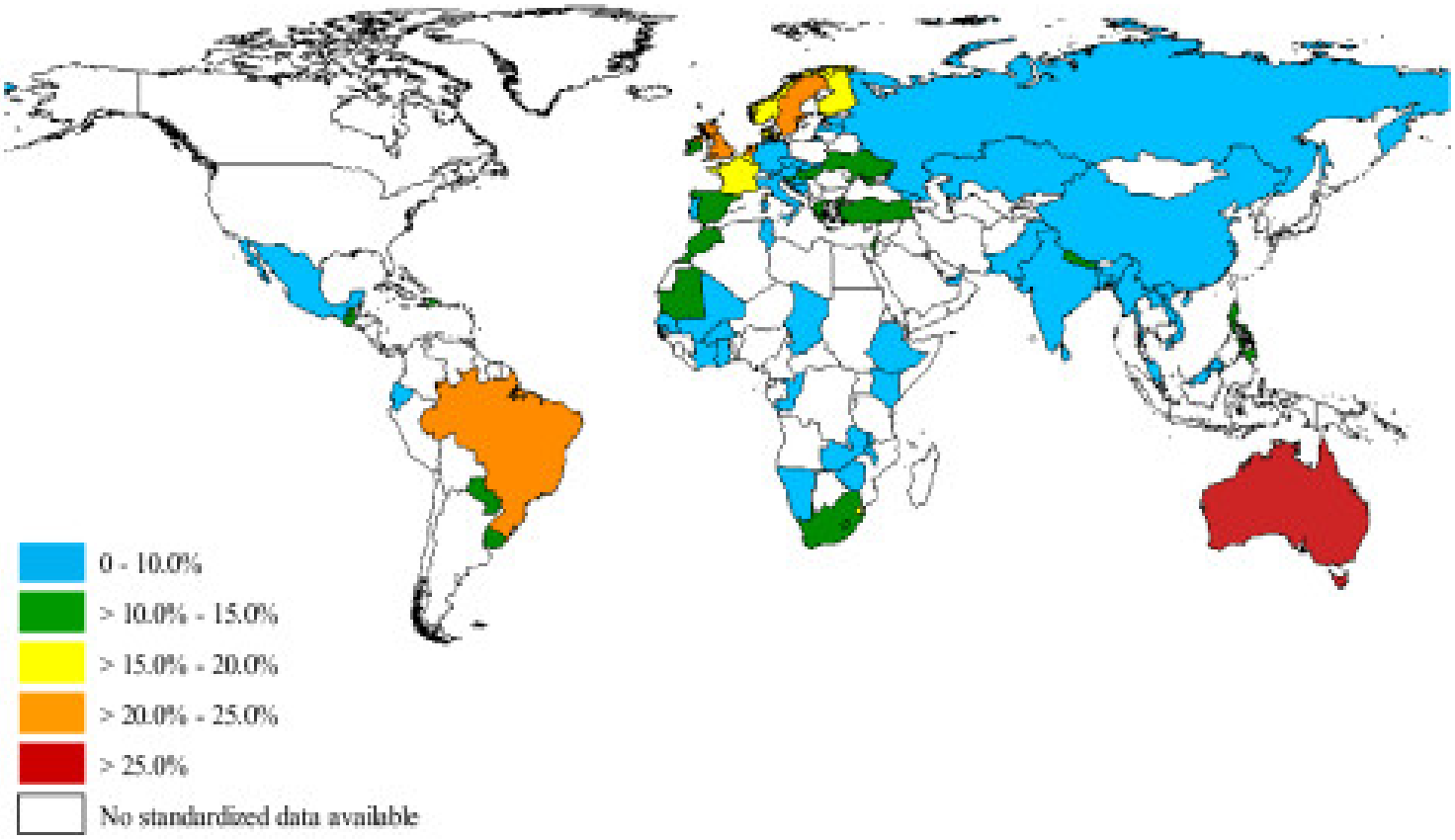
Uganda experience

Kirenga BJ, de Jong C, Katagira W, Kasozi S, Mugenyi L, Boezen M, van der Molen T, Kamya MR. Prevalence and factors associated with asthma among adolescents and adults in Uganda: a general population based survey. BMC public health. 2019 Dec;19(1):1-9.



Worldwide prevalence of wheezing asthma, from To T et al.



Uganda

- Uganda National asthma survey
- Weighted prevalence of asthma 11.02% 95% CI (8.87 – 13.17)
  - males 10.27%
  - females 11.40 %
  - urban 12.99%
  - rural 8.86%
  - Most affected age group 35-44 age group , 14.42%

Asthma Mortality

- **420,000 deaths in 2016 globally** 24.3% lower than that reported in 2006
- Asthma mortality data limited in Africa.
- 449 Ugandan asthmatics followed up for 2 years 17 patients died (3.7%, 27.3 deaths per 1000-person years).
- Mortality associated with FEV_1 OR 0.30 (95% CI: 0.14 – 0.65; p=0.002)

Rates of asthma exacerbations and mortality and associated factors in Uganda: a 2-year prospective cohort study

Bruce J Kirenga,[1,2] Corina de Jong,[3,4] Levicatus Mugenyi,[1,5] Winceslaus Katagira,[2] Abdallah Muhofa,[2] Moses R Kamya,[1] H Marike Boezen,[6] Thys van der Molen[3,4]

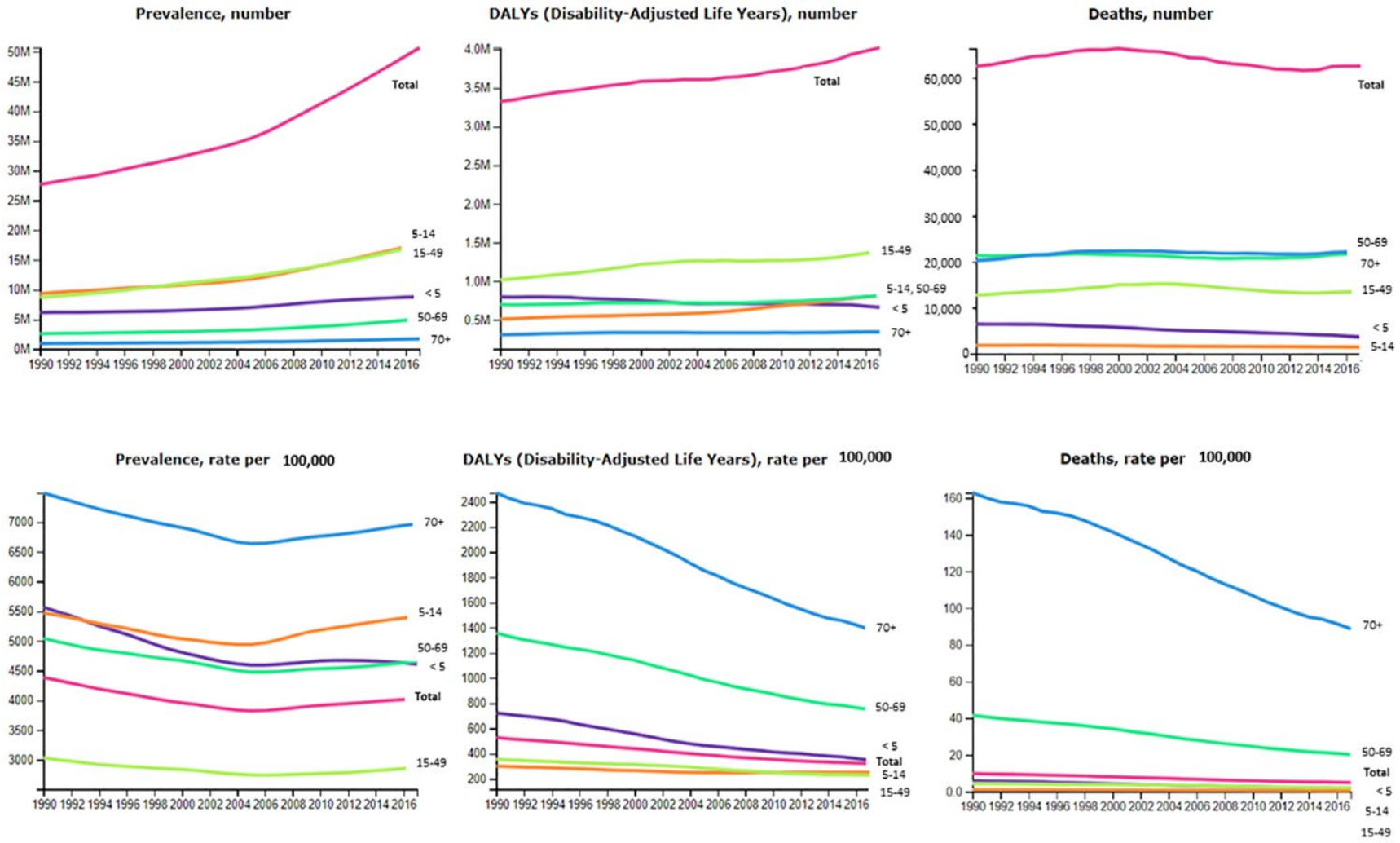
► Additional material is

ABSTRACT

Globally, asthma mortality is estimated at

Thorax: first published as 10.

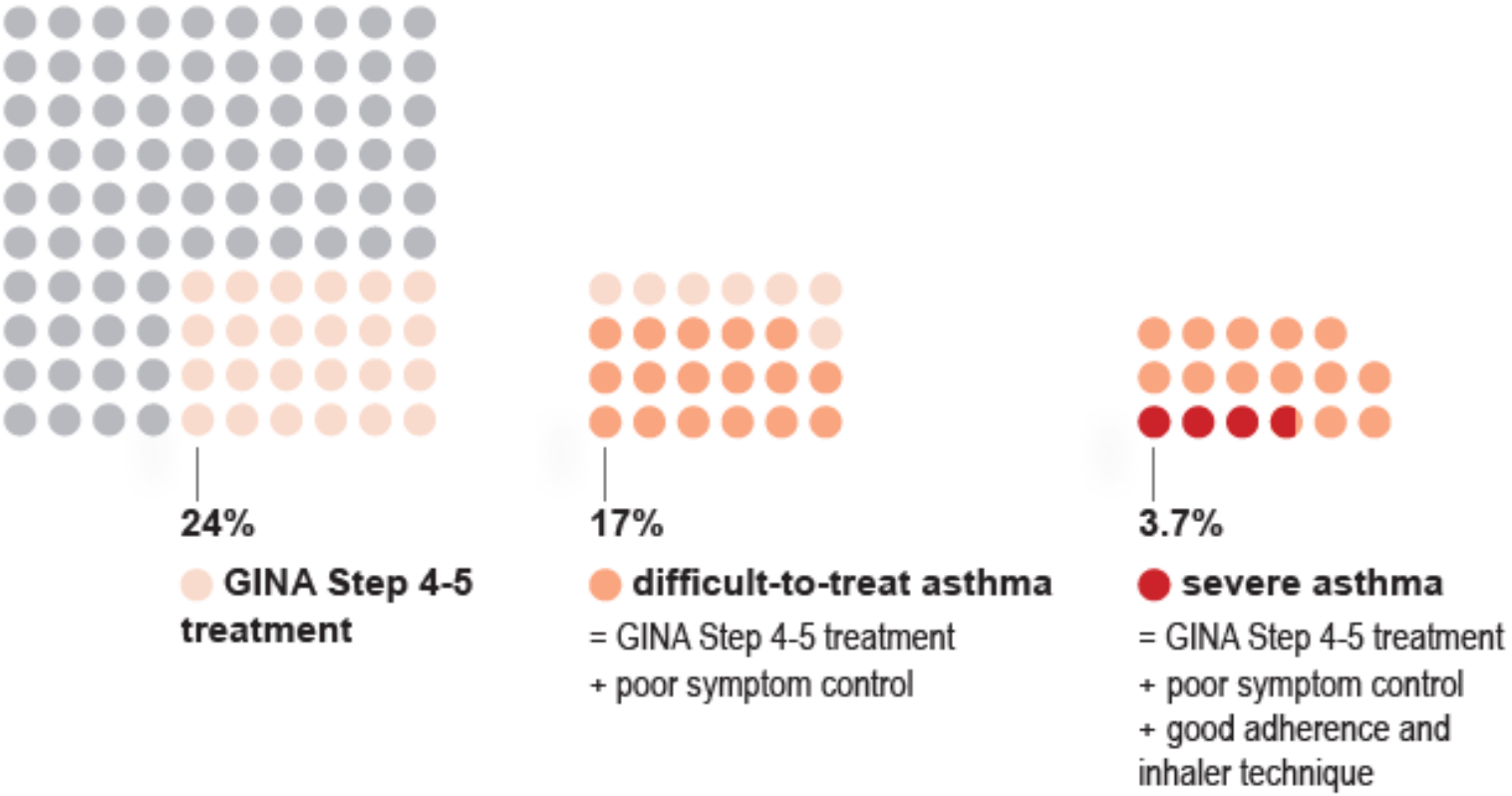
Fig 1. Trends in morbidity and mortality due to asthma in Africa.



Kwizera R, Musaazi J, Meya DB, Worodria W, Bwanga F, et al. (2019) Burden of fungal asthma in Africa: A systematic review and meta-analysis. PLOS ONE 14(5): e0216568. https://doi.org/10.1371/journal.pone.0216568
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0216568

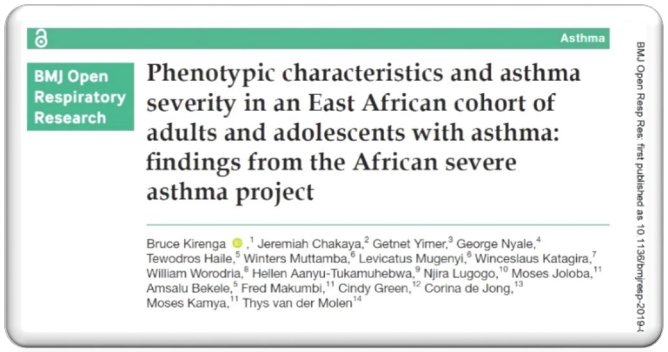
Severe Asthma

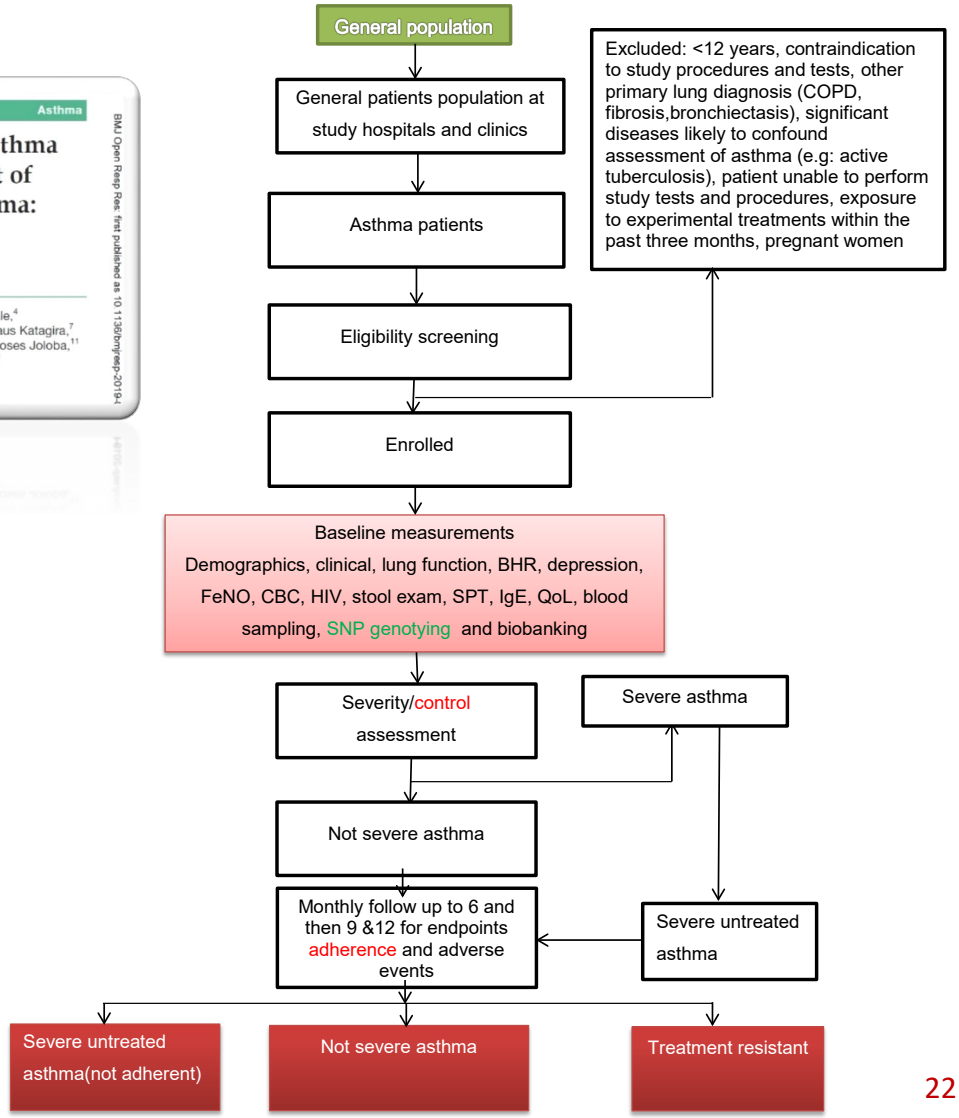
Box 1. What proportion of adults have difficult-to-treat or severe asthma?



These data are from a Dutch population survey of people ≥18 years with asthma[2]

The African severe asthma project experience





Project setting

SITES

- **Uganda**- Mulago Hospital
- **Kenya**-Kenyatta National Hospital
- **Ethiopia**-Black Lion Hospital Addis Ababa
- **Netherlands**- University of Groningen Medical Center

Table 1 Study participants baseline characteristics

Characteristic	All (n=1671)	By country		
		Uganda (n=821)	Kenya (n=431)	Ethiopia (n=419)
Gender: male, n (%)	490 (29.3)	206 (25.1)	109 (25.3)	175 (41.8)
Median age (IQR)	40 (26–52)	31 (20–44)	42 (32–51)	52 (42–60)
Median age at asthma diagnosis (IQR)	25 (14–36)	20 (10–33)	28.5 (16–39)	29 (22–36)
Adult onset asthma (≥19 years)	1050 (62.8)	421 (51.3)	283 (65.66)	346 (82.6)
Family history of asthma, n (%)	869 (52.0)	491 (59.8)	229 (53.1)	149 (35.6)
Smoking (current/former), n (%)	113 (6.8)	39 (4.8)	38 (8.8)	36 (8.6)
Secondhand smoke exposure, n (%)	141 (8.4)	51 (6.2)	67 (15.6)	23 (5.5)
Biomass exposure, n (%)	1221 (73.1)	643 (78.3)	274 (63.6)	304 (72.6)
Cough, n (%)	736 (44.1)	360 (43.9)	187 (43.4)	189 (45.1)
Wheeze, n (%)	664 (39.7)	319 (38.9)	187 (43.4)	158 (37.7)
Median BMI kg/m^2 (IQR)	24.2 (20.9–28.5)	23.7 (20.4–28.4)	26.1 (22.1–30.7)	23.8 (21.1–26.8)
Pre-BD FVC%, median (IQR)	94 (76–109)	101 (84–115)	89 (74–101)	2.3 (1.7–2.9)
Pre-BD FEV_1%, median (IQR)	76 (53–95)	87 (65–103)	76 (58–90)	53 (40–69)
Pre-BD FEV_1/FVC ratio, median (IQR)	0.7 (0.6–0.8)	0.8 (0.7–0.8)	0.7 (0.6–0.8)	0.5 (0.4–0.6)
Bronchodilator reversibility, median (IQR)	19 (12–30.8) n=1077	20.5 (15.0–31.6) n=268	9 (4–19) n=408	24.9 (17.3–41.9) n=401
Ova/cysts	1 (0.2)	1 (0.2)	0 (0.0)	0 (0.0)
Uncontrolled asthma (ACQ >1.5)	957 (57.3)	427 (52.0)	223 (51.7)	307 (73.3)
Number of exacerbations in past year, median (IQR)	3 (1–10)	4 (2–10)	3 (0–10)	2 (0–8)
Number of courses of oral steroids prescribed	1 (0–4)	1 (0–4)	0 (0–2)	1 (0–5)
Three or more exacerbations in the past year, n (%)	984 (59.1)	566 (68.9)	223 (52.0)	195 (47.0)
Any hospitalisation in past year, n (%)	358 (21.4)	204 (24.9)	51 (11.9)	103 (24.6)
On any ICS	230 (14.0)	65 (17.3)	89 (12.7)	76 (13.3)
Not on any asthma medication	206 (12.5)	73 (19.5)	87 (12.6)	46 (8.1)

ACQ, asthma control questionnaire; BMI, body mass index; FEV, forced expiratory volume; FVC, forced vital capacity; ICS, inhaled corticosteroids; pre-BD, pre-bronchodilator.

Patient characteristics

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Phenotypes

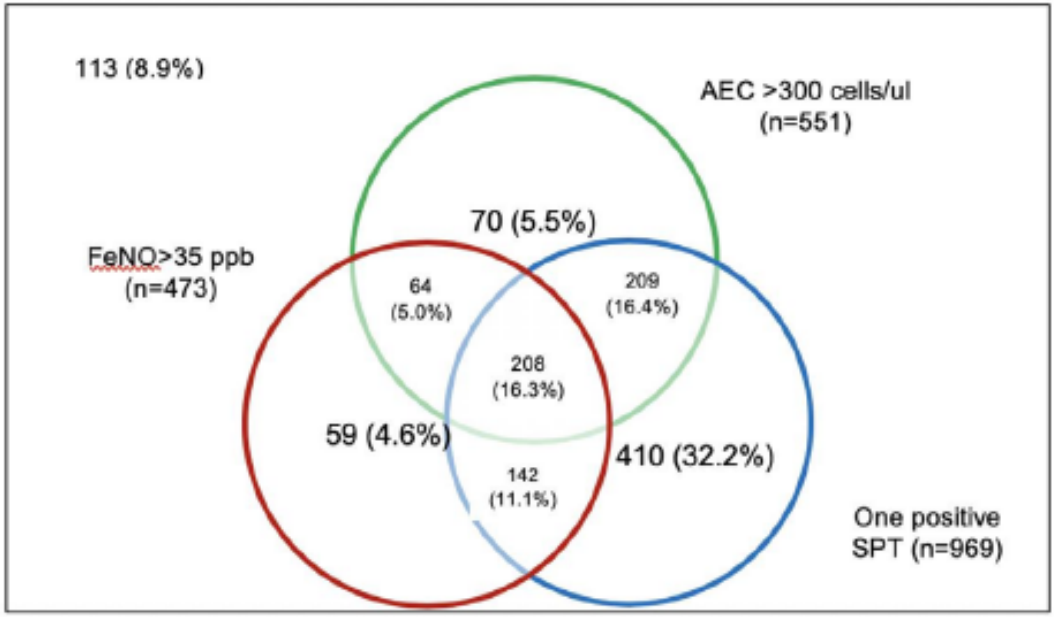

Figure 1 Venn diagram showing overlap between high AEC, high FeNo and ≥1 positive SPT in patients with all three variables measured (n=1275). Of note, 8.9% of the patients did not demonstrate positivity on any of the variables. AEC, absoluteeosinophil count; FeNO, fractional exhaled nitric oxide; SPT, skinprick test.

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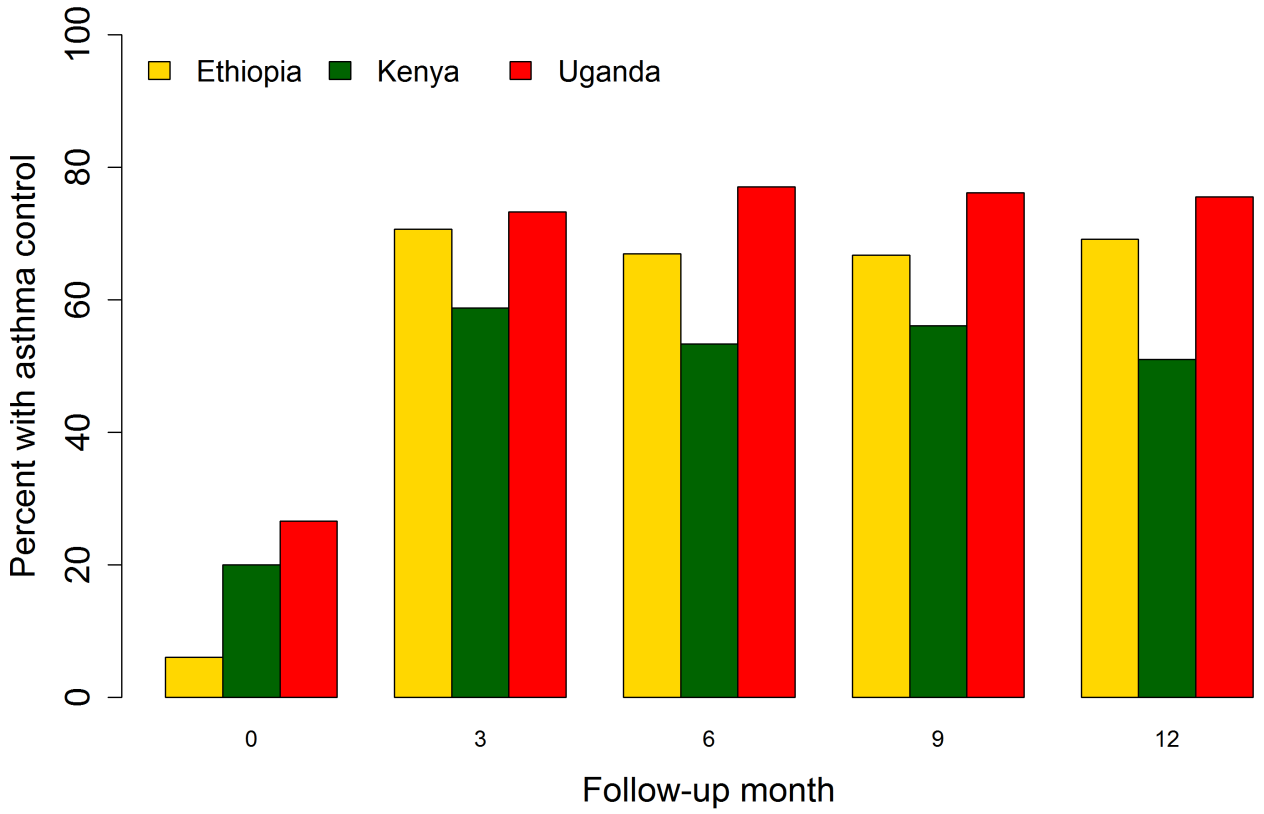
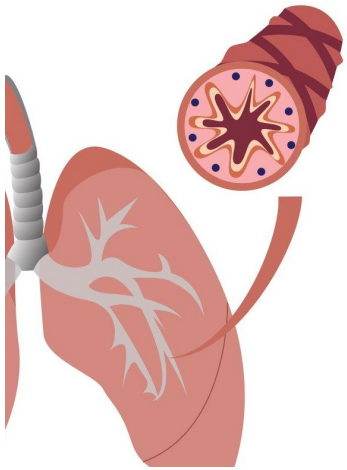
Asthma control in ASAP by country and follow up interval



Determinants

1. Genetics of asthma
2. Environmental risk factors
3. Adult onset asthma
4. Asthma and HIV
5. Occupational asthma

Risk factors for asthma



- Asthma develops from the interaction of host susceptibility factors and environmental factors.
- Host factors include genetics, obesity, sex and prematurity and low birth weight
- environmental factors
- exposure to allergens, occupational sensitizers, respiratory infections, tobacco smoke exposure, indoor and outdoor air pollution, the microbiome, certain diets, pre and perinatal factors and medication use.

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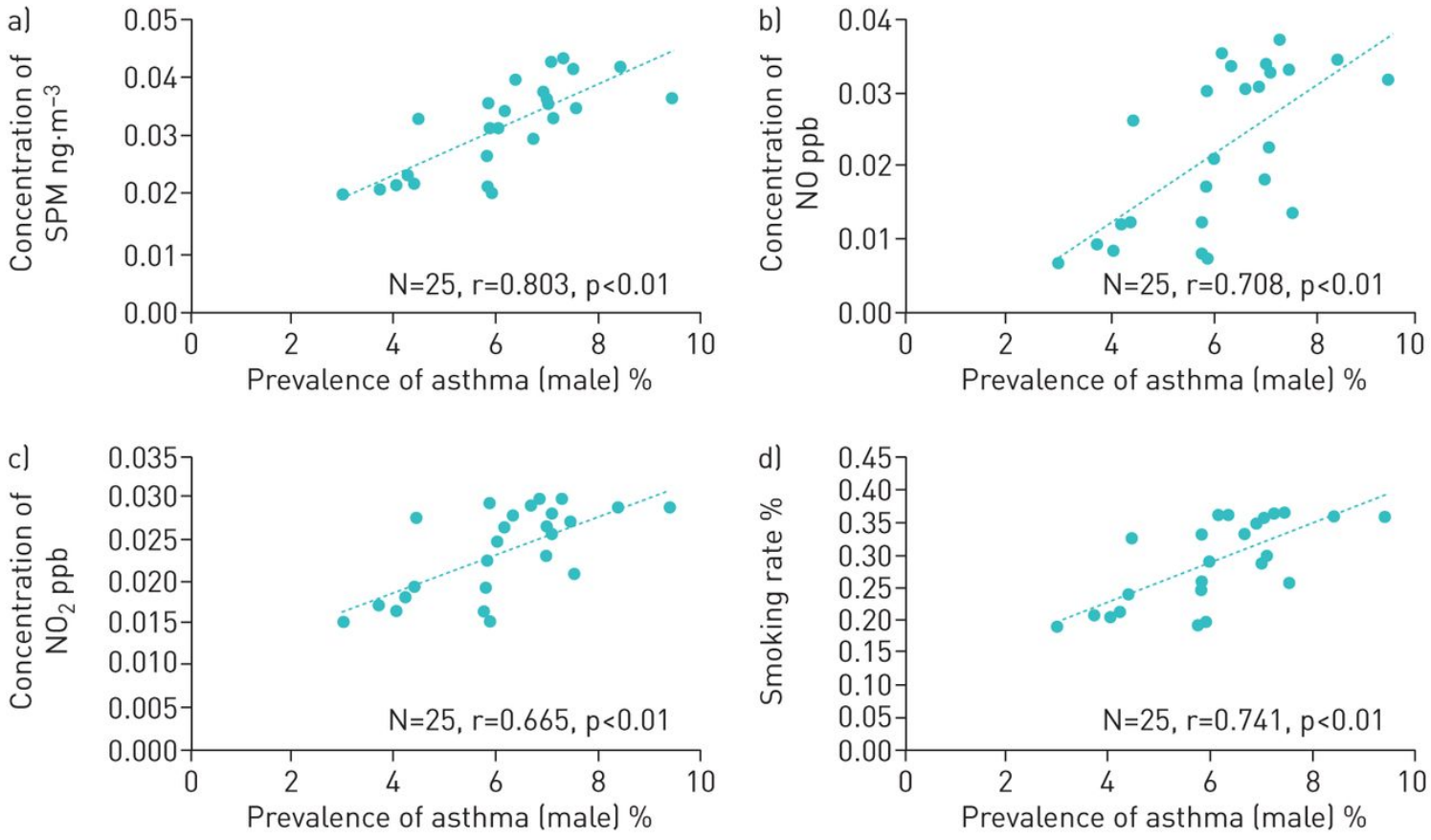
Environmental risk factors



Odajima H, Kawano T, Wakatsuki M, Akaminea Y, Okabe K, Oki T, Matsuzaki H, Murakami Y, Iwata M, Taba N, Motomura C. Annual changes in the prevalence of asthma may be related to air pollution in Fukuoka: 29 years of observation. ERJ Open Research. 2020 Apr 1;6(2).

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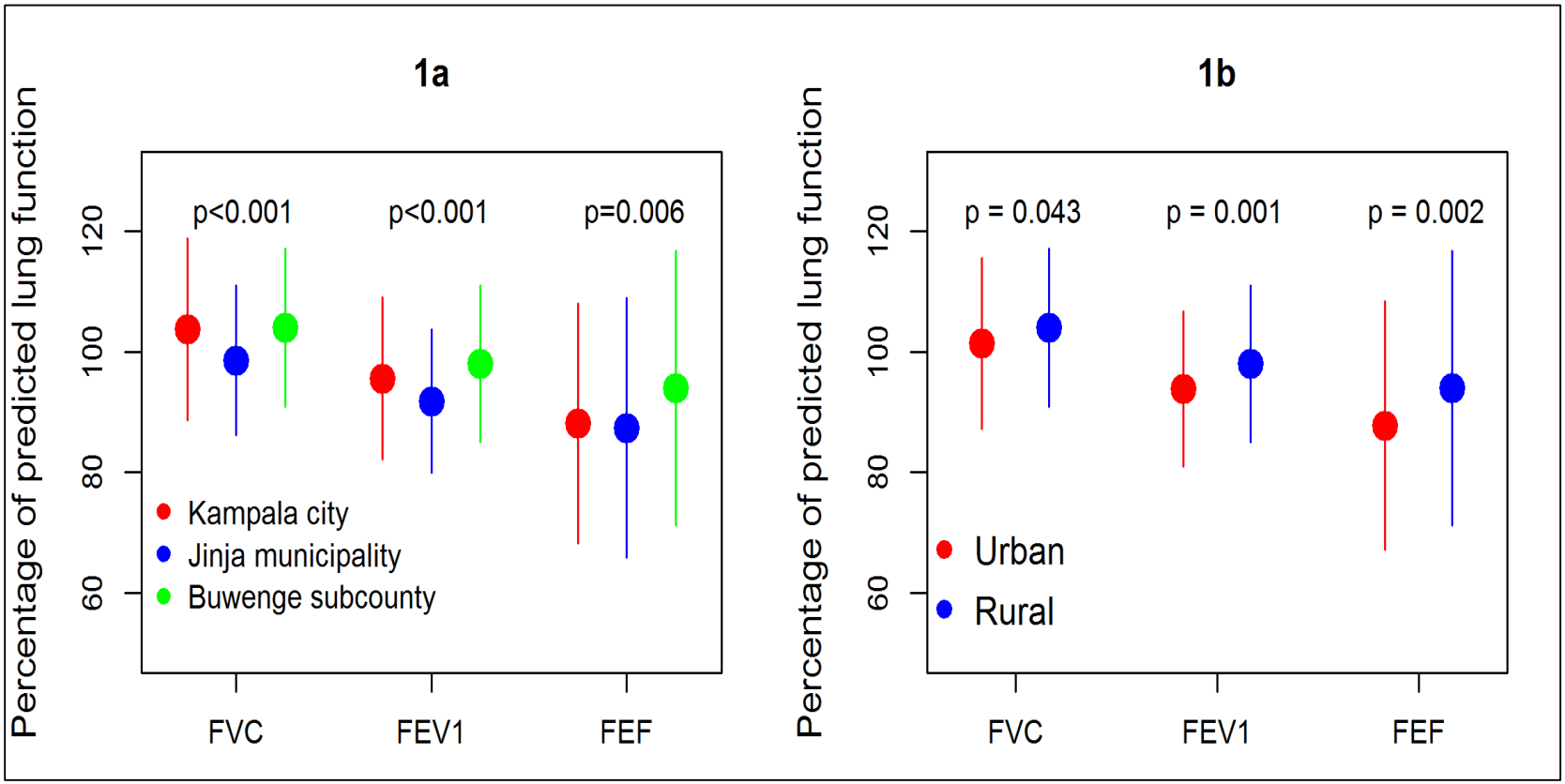
Asthma and Air pollution



Associated factors in Uganda

- adjusted odds ratios (AOR (95% CI), p-value).
  - Smoking= 3.26 (1.96 – 5.41, p <0.001)
  - Family history=2.90 (98 – 4.22 p- <0.001)
  - Nasal congestion=3.56 (2.51 – 5.06, p<0.001)
  - **Biomass exposure** =2.04 (1.29 – 3.21p=0.02)
  - **Urban residence** =2.01(1.23 – 3.27, p=0.05)
  - cough 2.41 (1.66-3.50, p<0.001)
  - shortness of breath 6.84 (4.57-10.23, p<0.001)
  - chest pain 3.00 (2.15-4.19, p<0.001)
  - **Sputum production** 1.81 (1.16-2.88, p=0.009)

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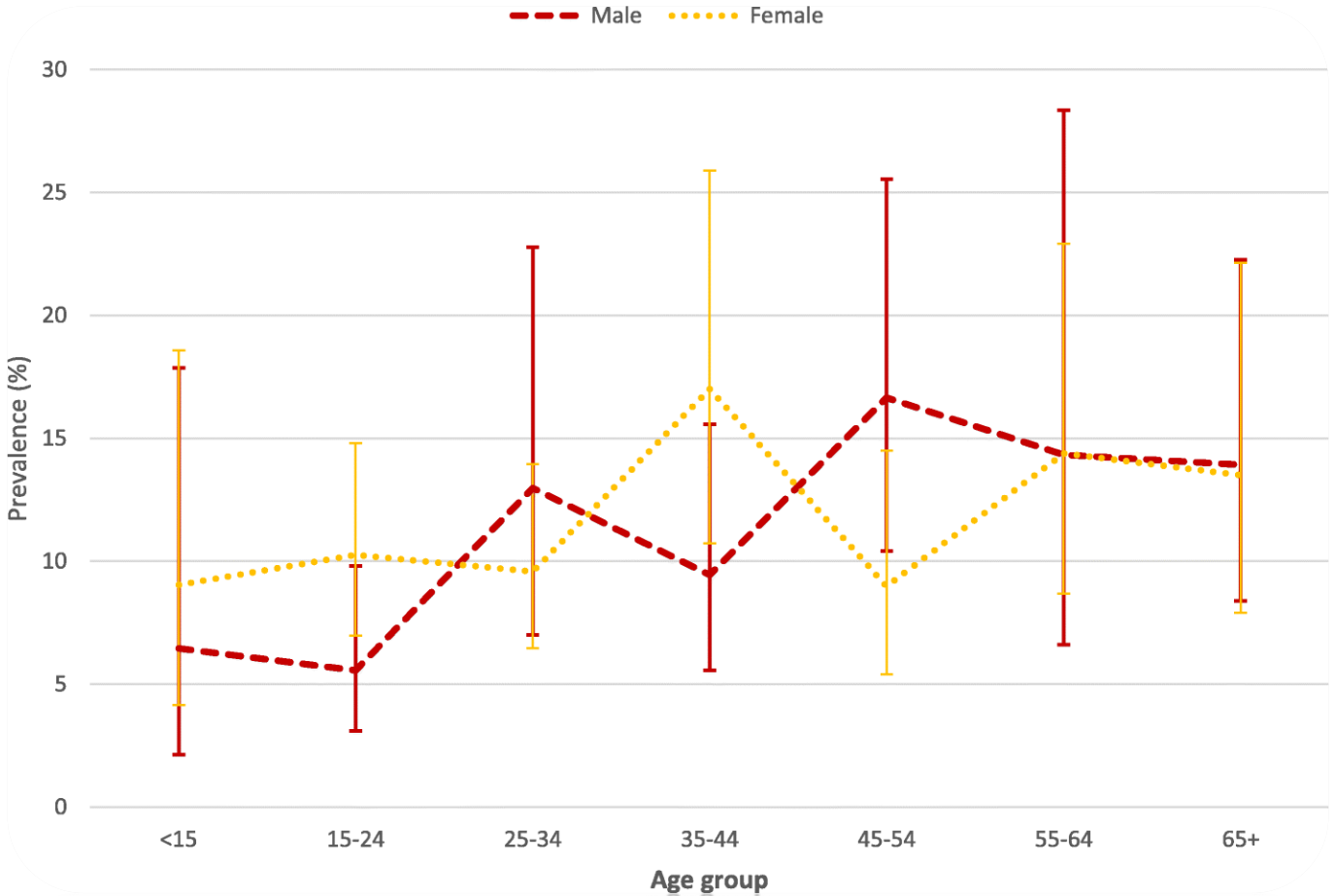
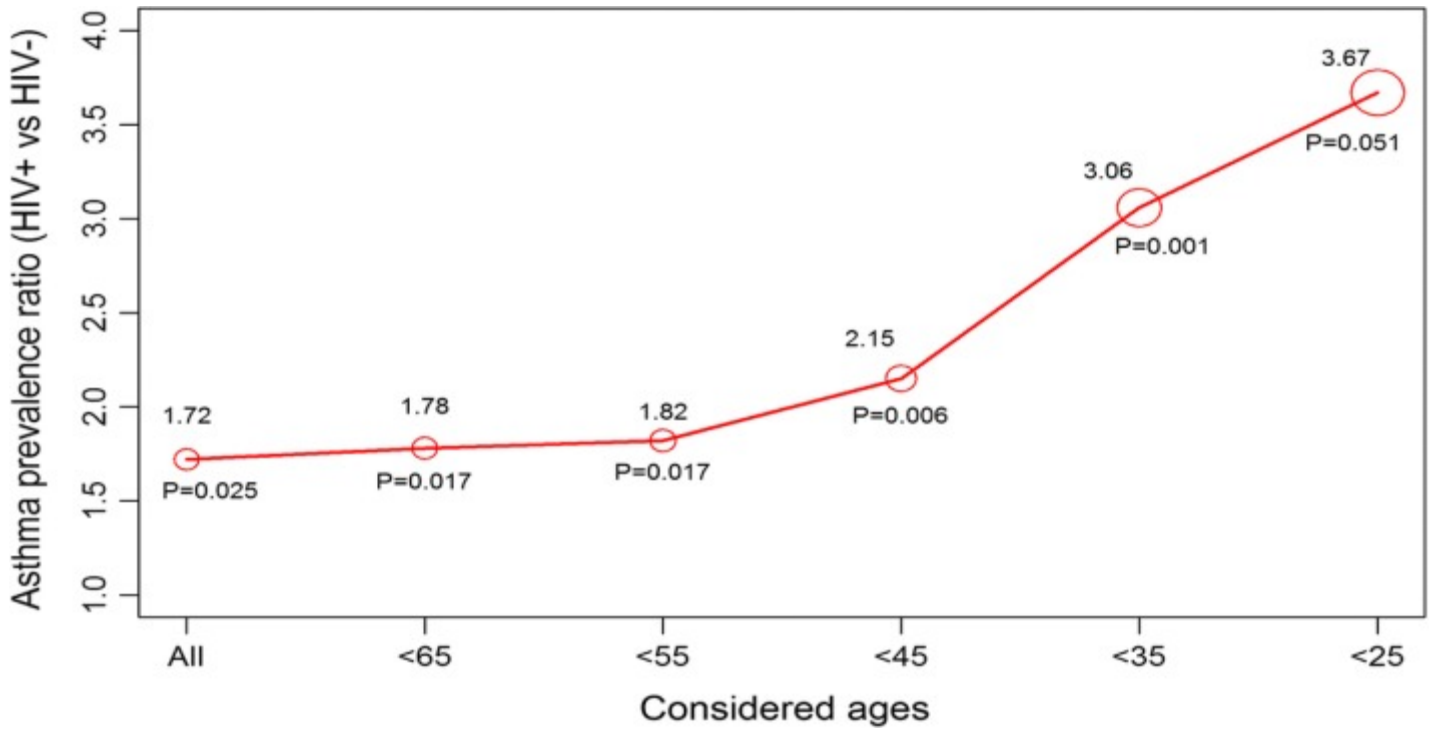
Age and gender



Asthma and HIV



Occupational asthma

- Occupational asthma (OA) is a form of work-related asthma attributable to a particular exposure in the workplace and not due to stimuli encountered outside the workplace
- More than 350 agents have been reported to cause OA
- Occupational asthma accounts for approximately 10 to 25 percent of adult onset asthma
- **Types:**
  - OA caused by workplace sensitizers: allergic or immunological (with a latency period)
  - OA caused by irritants: nonallergic or nonimmunologic, irritant-induced asthma including reactive airways dysfunction syndrome (RADS).

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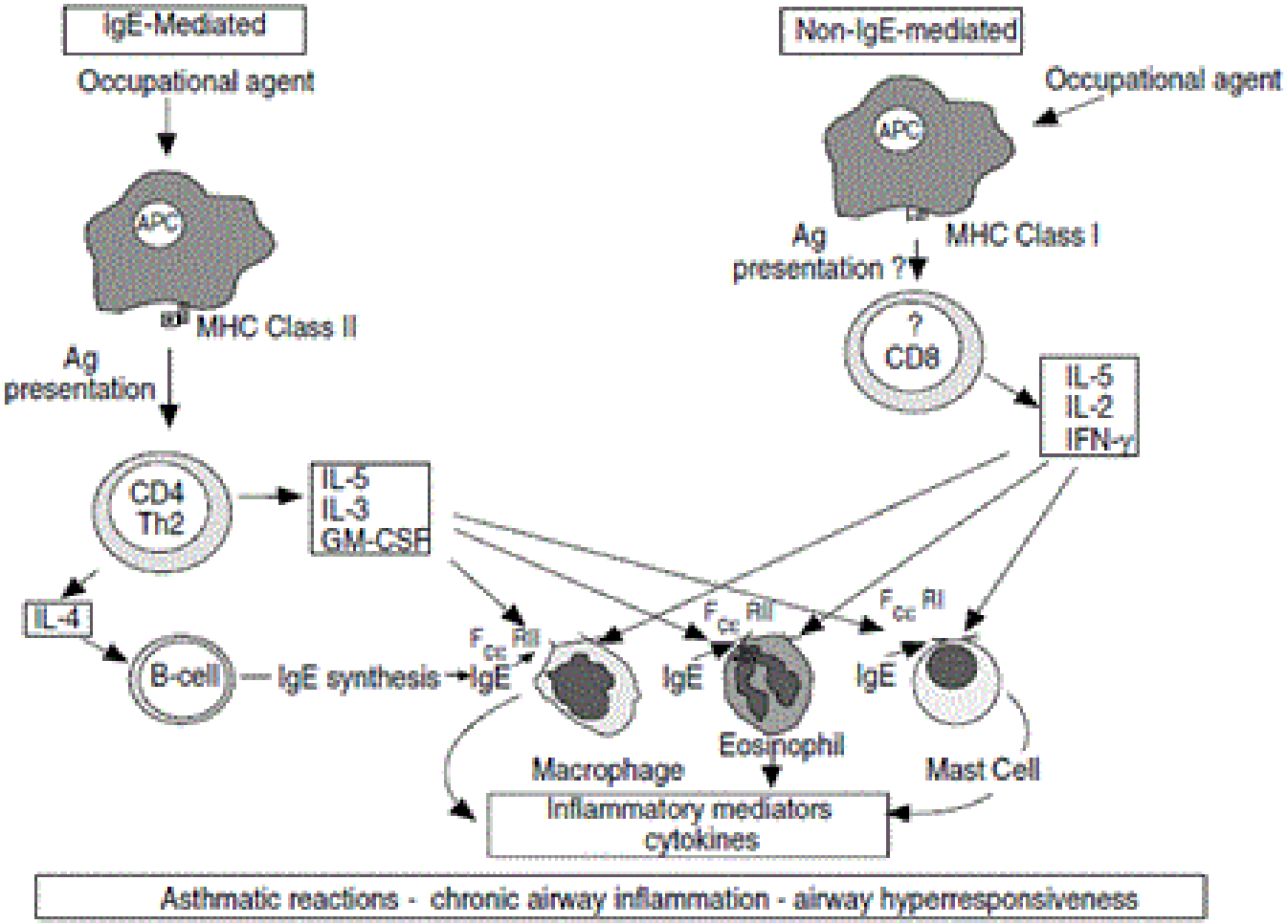
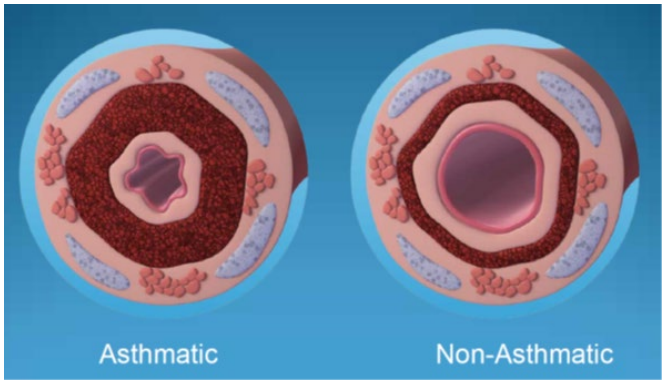
Mechanisms in OA



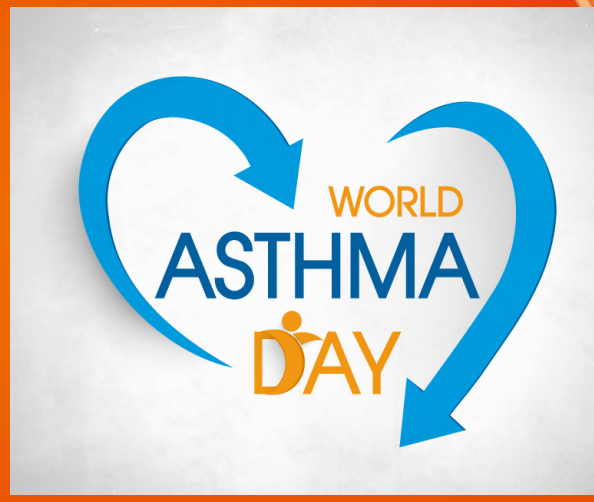


Thank you

If your lungs are not working
nothing else works

THEME:

“Uncovering Asthma Misconceptions”



FACTS ABOUT ASTHMA IN SUB-SAHARAN AFRICA: MANAGEMENT PRINCIPLES

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DISCLOSURES

- No conflicts of interest relevant to this presentation

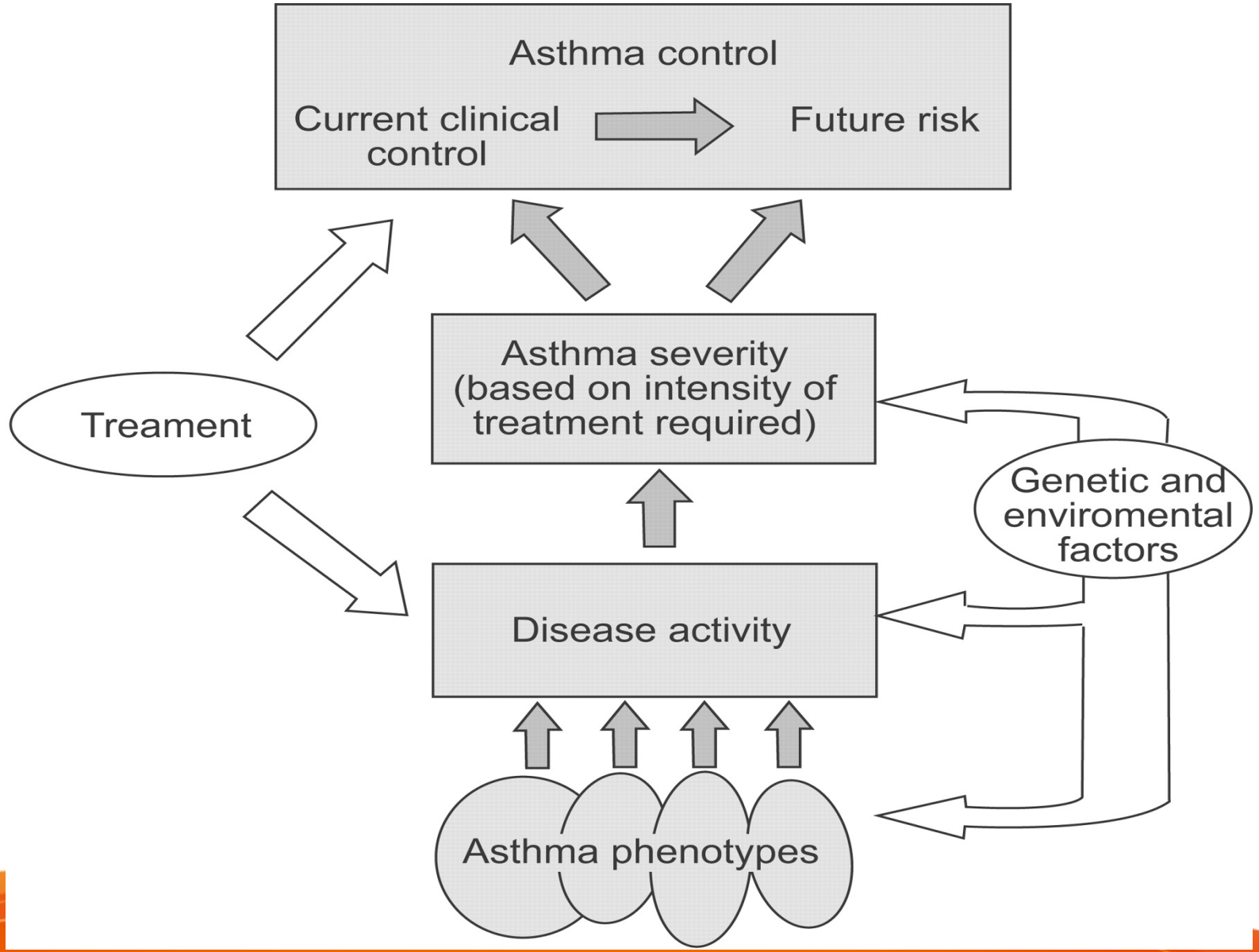
OUTLINE/OBJECTIVES

- Introduction
- Interplay of factors in asthma managment
- Management principles and the related issues
- - diagnosis
- - treatment
- - envronmental manement
- - education/patnership

INTRODUCTION

- Asthma is a chronic disease involving the airways
- Symptoms include: coughing, wheezing, shortness of breath and/or chest tightness.
- Data shows: that there are real asthma management issues and misconceptions in Subsaharan Africa (SSA)

INTERPLAY OF FACTORS IN ASTHMA



....A TRUE STORY ABOUT MWOLOLO

- Mwololo lived in a rural nomadic community in Ghana; got a ‘routine ritual’ exorcism
- During one of such ‘routine rituals’ doctors carrying out studies in that community found 'the spirit of breathlessness' being exorcised from Mwololo and recognized that she was actually having an asthmatic attack
- They were able to administer a bronchodilator with relief to the girl.
- .....

FOUR MAIN ASTHMA MANAGEMENT PRINCIPLES

1. Identify/properly diagnose asthma and classify the severity:

- Symptom assessment using symptom identification and guidelines such as National Asthma Education Program's Expert Panel(NAEPEP)
- Use of objective tools to confirm diagnosis/monitor
  - **Spirometry** (and other lung function tools)

  n.b- in COVID era: put appropriate hygienic protocols in place

  - Asthma control questionnaire tools (**ACT**, cACT, ATAQ, ACQ, GINA)

NAEPEP SUMMARY

Diagnosis of asthma,

- — Episodic symptoms of airflow obstruction/airway hyperresponsiveness
- — Airflow obstruction is at least partially reversible.
- — Alternative diagnoses are excluded.

  Recommended methods — Detailed medical history.

  — Physical exam focusing on the upper respiratory tract, chest, and skin.

  — Spirometry to demonstrate obstruction and assess reversibility, including in children 5 years of age or older.

    - Reversibility is determined either by an increase in FEV1 of ≥12 percent from baseline or by an increase ≥10 percent of predicted FEV1 after inhalation of a short-acting bronchodilator.

- — Additional studies may be necessary to exclude alternate diagnoses.

.....MANAGEMENT PRINCIPLES

2. Pharmacologic therapy/correct adjuncts (spacers) & procedures(pMDI)

3. Control of **environmental factors** and comorbid conditions that affect asthma

4. Education for a partnership in asthma care (which is part of what we are doing today)

DIAGNOSING ASTHMA -studies

Previous spirometry training %(n)	
Formal training	14.1 (9)
Informal training	15.6 (10)
None	70.3 (45)
Knowledge of the existence of GINA%(n)	
Yes	82.8 (53)
No	17.2 (11)
The practice of GINA contents %(n)	
Yes	51.6 (33)
No	48.4 (31)
Uses of any lung function equipment to support asthma diagnosis%(n)	
Yes	59.4 (38)
No	40.6 (26)
Recent management of the patient with asthma%(n)	
Less than three months	56.5 (36)
More than three months	43.8 (28)

Ayuk *et al. BMC Pulmonary Medicine* (2020) 20:258
https://doi.org/10.1186/s12890-020-01291-8

BMC Pulmonary Medicine

RESEARCH ARTICLE Open Access

Spirometry practice and the impact of a phase 1 training workshop among health workers in southern Nigeria: a cross-sectional study

Adaeze Ayuk[1,2*], Chizalu Ndukwu[3], Samuel Uwaezuoke[1,2] and Eno Ekop[4,5]

OBJECTIVE DIAGNOSIS

PanAfrican Medical Journal

Open Access

Research

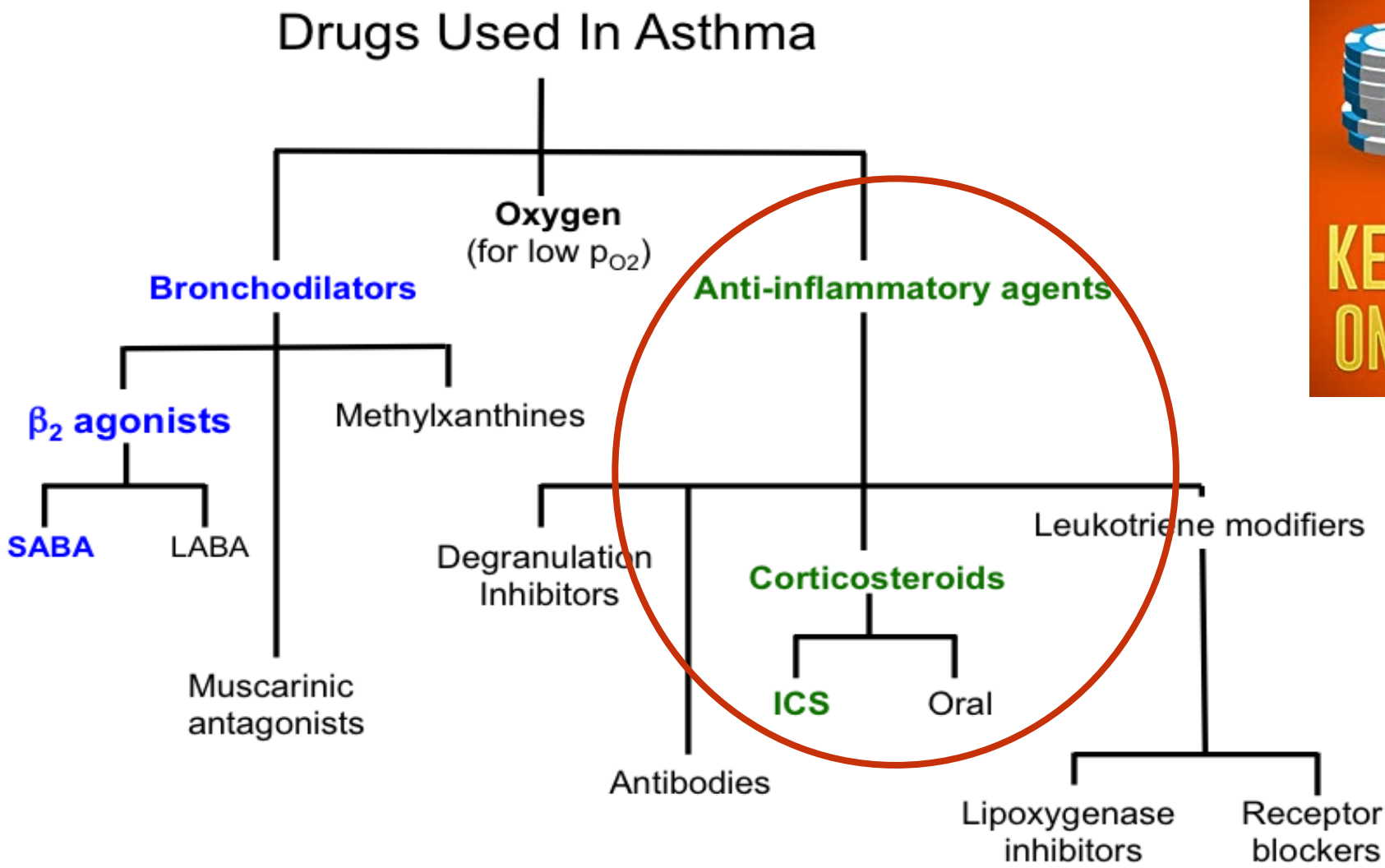
Use of Global initiative for asthma (GINA) guidelines in asthma management among paediatric residents in a Sub Saharan African country: a cross-sectional descriptive study

Adaeze Chikaodinaka Ayuk[1,2,&], Agozie Ubesie[1,2], Chioma Laura Odimegwu[1], Kenechukwu Iloh[1,2]

Table 2: performance of all study participants on clinical practice of asthma management

Clinical practice parameters	**Yes (%)**	**No (%)**
Confirms asthma diagnosis with pulmonary functions tests	31 (47.0)	35 (53.0)
Familiar with peak flow meter	48 (72.7)	18 (27.3)
Familiar with spirometer	12 (18.2)	54 (81.8)
Assesses inhaler technique at each visit	35 (53.0)	31 (47.0)
Assesses treatment adherence at each visit	56 (84.8)	10 (15.2)
Identify triggers and attempt at environmental manipulations	57 (86.4)	9 (13.6)
Uses guideline to assess asthma control	35 (53.0)	31 (47.0)
Addresses patients' concerns	57 (86.4)	10 (15.2)
Insists on spacer with face mask for children <6years	36 (54.5)	30 (45.5)
Routinely provides written asthma action plan	24 (36.4)	42 (63.6)
Prescribes inhaled corticosteroids as initial maintenance therapy	12 (18.2)	54 (81.8)
Prescribes LTRA when ICS only is not available for children	17 (25.8)	49 (74.2)
Prescribes ICS/LABA combination	23 (34.8%)	43 (65.2)
Checks allergy status of patients	12 (18.2)	54 (81.8)
Allows 3 months on current medications before stepping up	31 (47.0)	35 (53.0)
Refers to asthma nurse counsellors	21 (31.8)	45 (68.2)

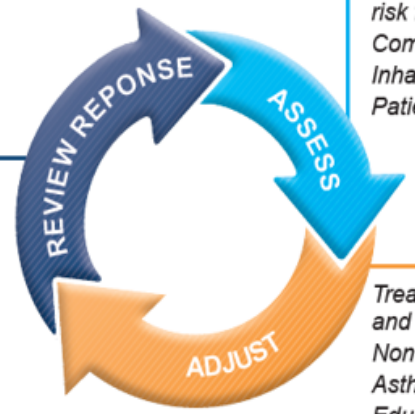
2. PHARMACOLOGIC MANAGEMENT



Box 3-5A

Adults & adolescents 12+ years

Personalized asthma management:
Assess, Adjust, Review response



Confirmation of diagnosis if necessary
Symptom control & modifiable risk factors (including lung function)
Comorbidities
Inhaler technique & adherence
Patient preferences and goals

Symptoms
Exacerbations
Side-effects
Lung function
Patient satisfaction

Treatment of modifiable risk factors and comorbidities
Non-pharmacological strategies
Asthma medications (adjust down or up)
Education & skills training

Asthma medication options:
Adjust treatment up and down for individual patient needs

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
PREFERRED CONTROLLER to prevent exacerbations and control symptoms	As-needed low dose ICS-formoterol *	Daily low dose inhaled corticosteroid (ICS), or as-needed low dose ICS-formoterol *	Low dose ICS-LABA	Medium dose ICS-LABA	High dose ICS-LABA Refer for phenotypic assessment ± add-on therapy, e.g.tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R
Other controller options	*Low dose ICS taken whenever SABA is taken †*	*Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken †*	*Medium dose ICS, or low dose ICS+LTRA #*	*High dose ICS, add-on tiotropium, or add-on LTRA #*	*Add low dose OCS, but consider side-effects*
PREFERRED RELIEVER	As-needed low dose ICS-formoterol *		As-needed low dose ICS-formoterol for patients prescribed maintenance and reliever therapy‡		
Other reliever option	*As-needed short-acting β_2-agonist (SABA)*				

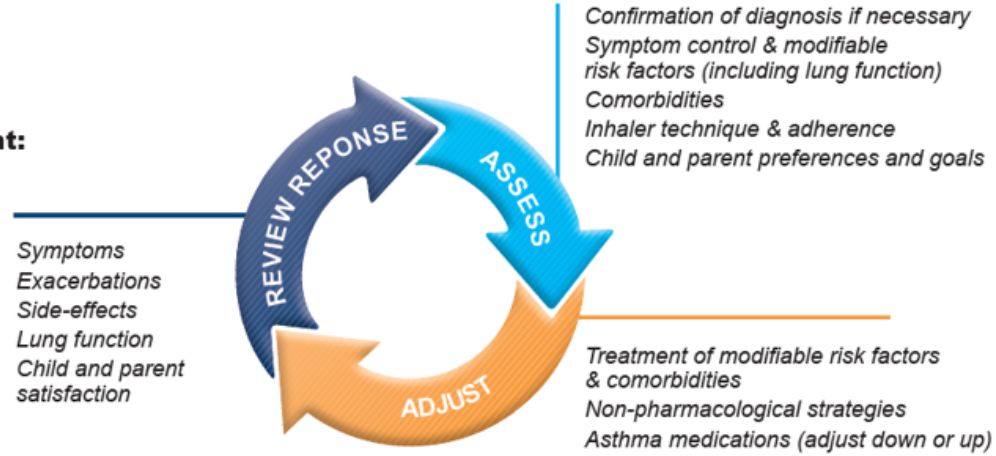
* *Data only with budesonide-formoterol (bud-form)*
† *Separate or combination ICS and SABA inhalers*

‡ *Low-dose ICS-form is the reliever only for patients prescribed bud-form or BDP-form maintenance and reliever therapy*
\# *Consider adding HDM SLIT for sensitized patients with allergic rhinitis and FEV1 >70% predicted*

Box 3-5B

Children 6-11 years

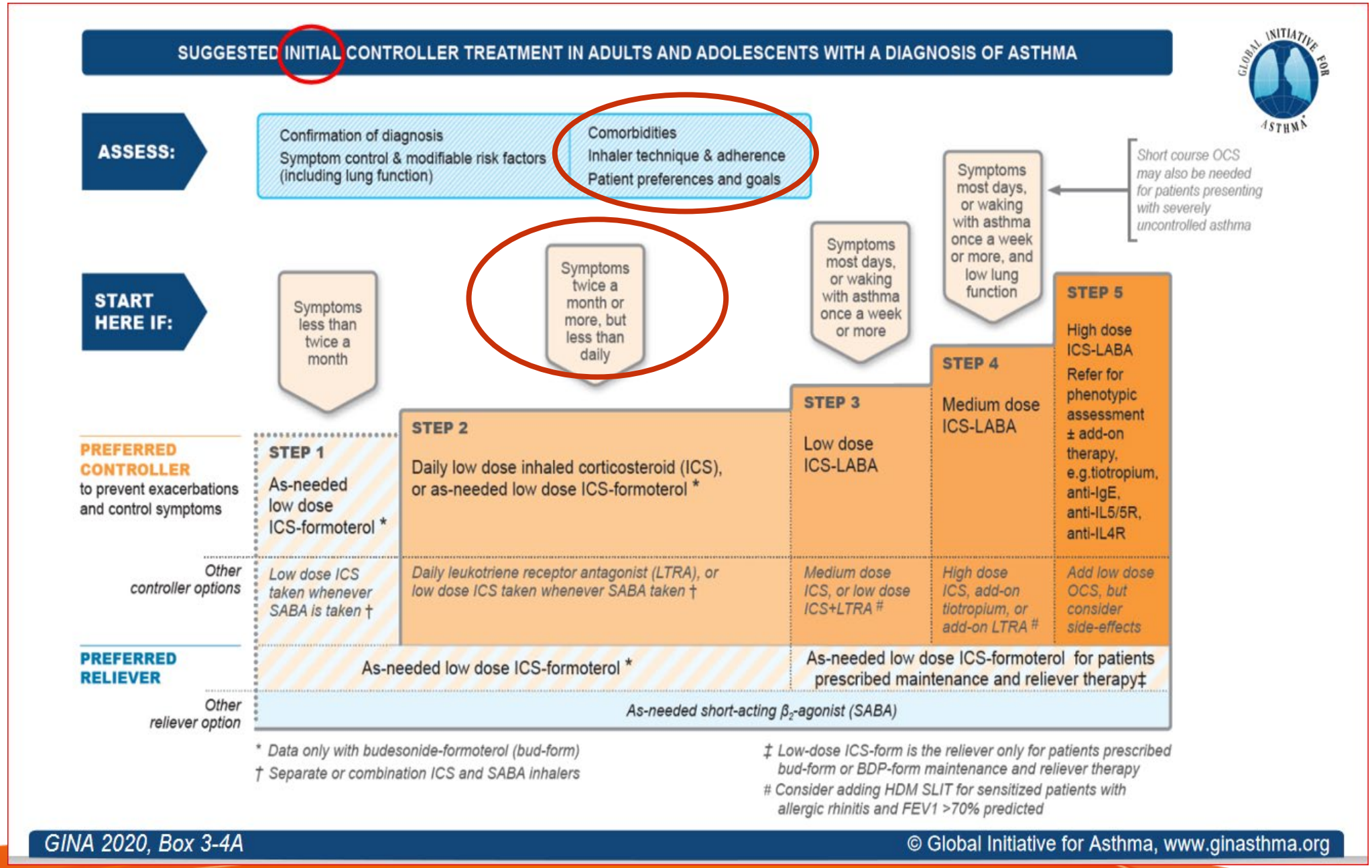
Personalized asthma management:
Assess, Adjust, Review response



Asthma medication options:
Adjust treatment up and down for individual child's needs

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
PREFERRED CONTROLLER to prevent exacerbations and control symptoms		Daily low dose inhaled corticosteroid (ICS) (see table of ICS dose ranges for children)	Low dose ICS-LABA or medium dose ICS	Medium dose ICS-LABA Refer for expert advice	Refer for phenotypic assessment ± add-on therapy, e.g. anti-IgE
Other controller options	*Low dose ICS taken whenever SABA taken*; or daily low dose ICS*	*Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken**	*Low dose ICS + LTRA*	*High dose ICS-LABA, or add-on tiotropium, or add-on LTRA*	*Add-on anti-IL5, or add-on low dose OCS, but consider side-effects*
RELIEVER	*As-needed short-acting β_2-agonist (SABA)*				

* *Separate ICS and SABA inhalers*


SUGGESTED INITIAL CONTROLLER TREATMENT IN ADULTS AND ADOLESCENTS WITH A DIAGNOSIS OF ASTHMA
ASSESS:
Confirmation of diagnosis
Symptom control & modifiable risk factors (including lung function)
Comorbidities
Inhaler technique & adherence
Patient preferences and goals
START HERE IF:
Symptoms less than twice a month
Symptoms twice a month or more, but less than daily
Symptoms most days, or waking with asthma once a week or more
Symptoms most days, or waking with asthma once a week or more, and low lung function
Short course OCS may also be needed for patients presenting with severely uncontrolled asthma
PREFERRED CONTROLLER
to prevent exacerbations and control symptoms
STEP 1
As-needed low dose ICS-formoterol *
STEP 2
Daily low dose inhaled corticosteroid (ICS), or as-needed low dose ICS-formoterol *
STEP 3
Low dose ICS-LABA
STEP 4
Medium dose ICS-LABA
STEP 5
High dose ICS-LABA
Refer for phenotypic assessment ± add-on therapy, e.g.tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R
Other controller options
Low dose ICS taken whenever SABA is taken †
Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken †
Medium dose ICS, or low dose ICS+LTRA #
High dose ICS, add-on tiotropium, or add-on LTRA #
Add low dose OCS, but consider side-effects
PREFERRED RELIEVER
As-needed low dose ICS-formoterol *
As-needed low dose ICS-formoterol for patients prescribed maintenance and reliever therapy‡
Other reliever option
As-needed short-acting β2-agonist (SABA)
* Data only with budesonide-formoterol (bud-form)
† Separate or combination ICS and SABA inhalers
‡ Low-dose ICS-form is the reliever only for patients prescribed bud-form or BDP-form maintenance and reliever therapy
# Consider adding HDM SLIT for sensitized patients with allergic rhinitis and FEV1 >70% predicted
GINA 2020, Box 3-4A
© Global Initiative for Asthma, www.ginasthma.org

ICS DOSE RANGE

Children 6–11 years			
Inhaled corticosteroid	Total daily ICS dose (mcg)		
	Low	Medium	High
Beclometasone dipropionate (pMDI, standard particle, HFA)	100–200	>200–400	>400
Beclometasone dipropionate (pMDI, extrafine particle*, HFA)	50-100	>100-200	>200
Budesonide (DPI)	100–200	>200–400	>400
Budesonide (nebules)	250–500	>500–1000	>1000
Ciclesonide (pMDI, extrafine particle*, HFA)	80	>80-160	>160
Fluticasone furoate (DPI)	50		n.a.
Fluticasone propionate (DPI)	50-100	>100-200	>200
Fluticasone propionate (pMDI, standard particle, HFA)	50-100	>100-200	>200
Mometasone furoate (pMDI, standard particle, HFA)	100		200

Adults and adolescents (12 years and older)			
Inhaled corticosteroid	Total daily ICS dose (mcg)		
	Low	Medium	High
Beclometasone dipropionate (pMDI, standard particle, HFA)	200-500	>500-1000	>1000
Beclometasone dipropionate (pMDI, extrafine particle*, HFA)	100–200	>200–400	>400
Budesonide (DPI)	200–400	>400–800	>800
Ciclesonide (pMDI, extrafine particle*, HFA)	80–160	>160–320	>320
Fluticasone furoate (DPI)	100		200
Fluticasone propionate (DPI)	100–250	>250–500	>500
Fluticasone propionate (pMDI, standard particle, HFA)	100–250	>250–500	>500
Mometasone furoate (DPI)	200		400
Mometasone furoate (pMDI, standard particle, HFA)	200-400		>400

PHARMACOLOGIC MANAGEMENT OF ASTHMA

- Long term use of Inhaled corticosteroids (ICSs) are thus the **cornerstone** for preventive therapy
- Unfortunately the majority of the prescribers worldwide aren't aware of ICs/correct prescription
- Others are afraid because of 'steroidophobia' - including doctors
- All these will promote misconceptions

Journal of Asthma and Allergy

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ORIGINAL RESEARCH

Contributing Factors for Underutilization of Inhaled Corticosteroids Among Asthmatic Patients Attending at Adama Hospital Medical College, Adama, Ethiopia

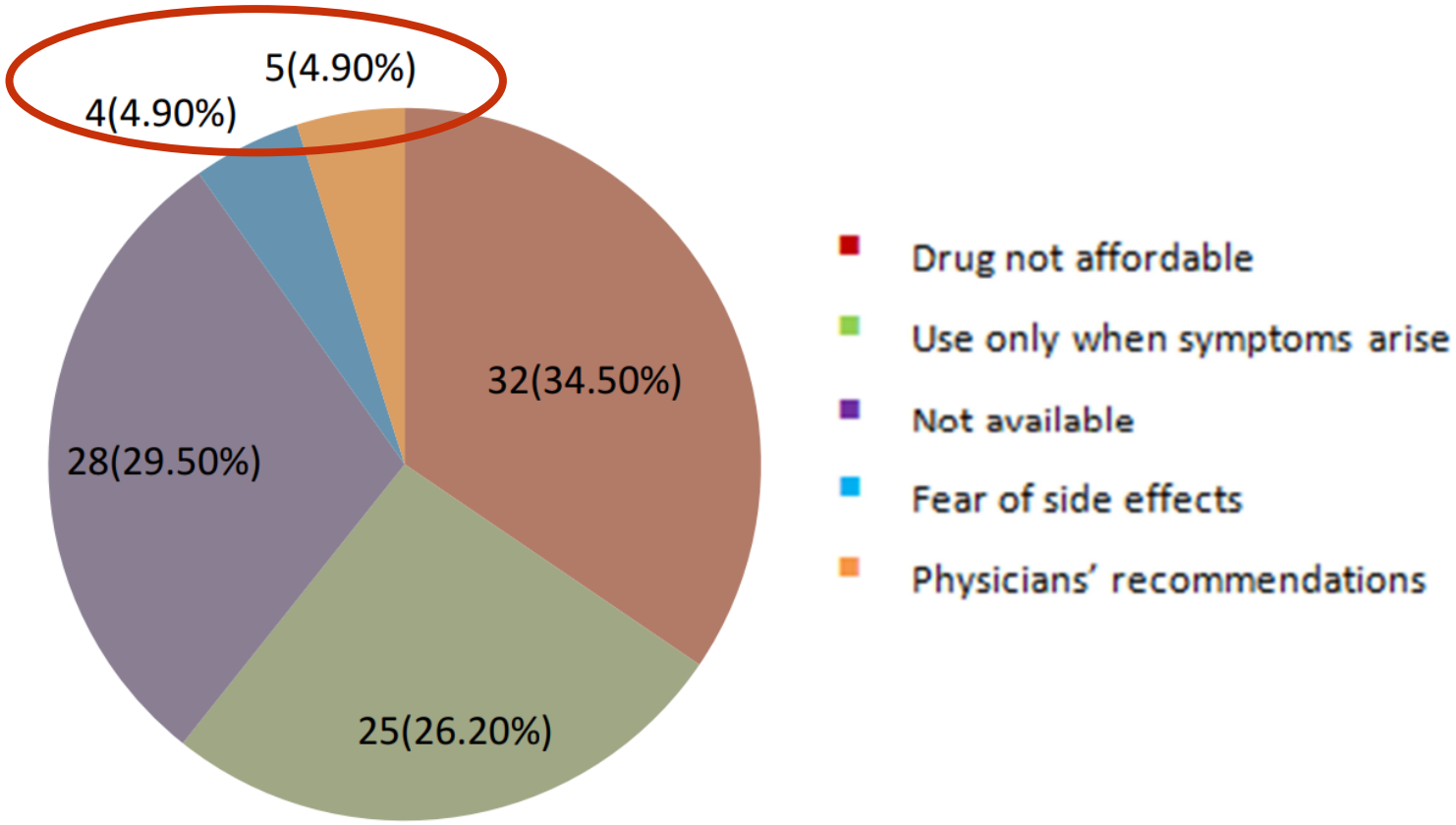

Figure 1 Patient's reasons for underutilization of ICS.

"Knowledge, Attitude, and Practice Assessment of Adult Asthmatic Patients towards Pharmacotherapy of Asthma at **Jimma University** Specialized Hospital". EC Pulmonology and Respiratory Medicine 9.2 (2020): 01-10.

Questions	Frequencies and Percentage				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
If one person has asthma, then all of the families are likely to have asthma as well	15 (11.4)	42 (31.8)	14 (10.6)	40 (30.3)	21 (15.9)
Asthma is contagious	56 (42.2)	37 (28)	4 (3)	27 (20.5)	8 (6.1)
People with asthma cannot do as much physical exercise as other people	30 (22.7)	44 (33.7)	36 (27.3)	15 (11.4)	7 (5.3)
Asthma can be cured	30 (22.7)	32 (24.2)	29 (22)	25 (18.9)	16 (12.1)
Asthma can't be controlled	42 (31.8)	64 (48.5)	7 (5.3)	9 (6.8)	10 (7.6)

Table 4: *Attitude of respondents regarding Asthma (n = 132).*

MISCONCEPTIONS

- Asthma is only controllable with **high dose** steroids.

- The truth: Asthma is **most often** controllable with low dose inhaled steroids
- **n.b:** ICS - in micrograms not mg; lowest possible dose that keeps symptoms under control - so monitor your patients and titrate

"Knowledge, Attitude, and Practice Assessment of Adult Asthmatic Patients towards Pharmacotherapy of Asthma at **Jimma University** Specialized Hospital". EC Pulmonology and Respiratory Medicine 9.2 (2020): 01-10.

	No opinion	17	12.9		
Asthma medicine has to be taken till symptom persist then can be stopped	Agree	93	70.5	70.5	29.5
	Disagree	63	47.7		
	No opinion	17	12.9		
	Agree	93	70.5		

AVAILABILTY/ AFFORDABILITY IN SSA - MEDICATIONS/DIAGNOSTICS

STUDIES	ESSENTIAL MEDICINE LIST	COST
Mendis et al. [15] 6 LMIC (included-**Malawi)**. 20 public and 16 private facilities.	**2** essential medicines (Salbutamol and Beclometasone inhalers)	Availability of **beclometasone**: 0% in public sector and 38% in private sector Affordability of salbutamol and beclometasone combination: **9.2 days' wages**
Kibirige et al. [16] **Uganda** 23 public and 22 private facilities and 85 private pharmacies	17 essential medicines 2 diagnostic tests (Spirometry and peak flow-metry)	Availability of inhaled SABA, oral LTRA, **ICS–LABA combinations**, **ICS**, oral theophylline, inhaled SAMA, inhaled SAMA and SABA combination and inhaled LAMA monotherapy or with LABA: 75, 60.8, **46.9, 45.4,** 16.9, 12.3, 10.8 and 0% respectively Affordability: inhaled salbutamol-**2.2 days' wages, inhaled beclometasone-5.3 days**' wages, inhaled formeterol-beclometasone-6.4 days' wages, oral montelukast-6.9 days' wages, **inhaled salmeterol-fluticasone propionate-10.2 days**' wages, inhaled salbutamol-ipratropium-10.7 days' wages and **17.1 days' wages for formoterol/budesonide** Availability of spirometry and peak flow-metry: 24.4% and 6.7% respectively Affordability of spirometry: **27.8 days' wages**

Armstrong-Hough et al. [20] **Uganda** 196 health facilities	2 essential medicines (Beclometasone and salbutamol inhalers)	Availability of **beclometasone** and salbutamol inhalers was **1.5%** and 19.9% respectively
Babar et al. [18] 52 LMICs (**21 SSA countries**) 2 private retail pharmacies, 1 national procurement centre and 1 public hospital for each participating country	3 essential medicines (Salbutamol, Beclometasone and Budesonide)	Availability of **beclometasone and budesonide**: **0%** in Burundi, Cameroon, Democratic Republic of Congo (DRC), Djibouti, Nigeria, Tanzania and Togo (sites surveyed) **Affordability** of innovator budesonide in Burkina Faso, Mozambique and Republic of Guinea was **48 days' wages, 51 days' wages and 107 days'** wages respectively Affordability of the lowest priced generic beclometasone was < 2 days' wages in Kenya, South Africa, Uganda and Zambia and **> 2 days' wages** in Ethiopia, Madagascar, Malawi, Sudan and Zimbabwe Affordability of the lowest priced generic salbutamol was < 2 days' wages in Burkina Faso, DRC, Kenya, South Africa, Tanzania, Uganda, Zambia and Zimbabwe and ≥ 2 days' wages in Benin, Burundi, Cameroon, Ethiopia, Republic of Guinea, Madagascar, Malawi, Mali, Mozambique and Togo

Nyarko et al. [19]**Ghana** 23 health facilities (92%-public and 8%-private)	3 essential medicines (Salbutamol inhaler, Ipratropium bromide and beclometasone inhaler) 1 diagnostic test (peak flow-metry)	Availability of ipratropium bromide, **beclometasone inhaler** and salbutamol inhaler was 4.5, **17.4** and 39.1% respectively Availability of peak flow-metry was 13%
Desalu et al. [17] **Nigeria** 68 tertiary public hospitals	6 classes of essential medicines and 2 diagnostic tests (Spirometry and peak flow-metry)	Availability of inhaled anti-cholinergics, oral LTRA, **ICS,** SABA nebules, **ICS–LABA combinations**, inhaled SABA and oral theophylline was 2.9%, **5.9%**, 23.5%, 35.3%, **50%**, 76.5%, 76.5% respectively Availability of spirometry and peak flow-metry was 29.4% and 38% respectively
Mendis et al. [22]8 LMICs (**3 SSA countries-Benin, Eriteria and Sudan**) 30 health facilities.	3 essential medicines (beclometasone, salbutamol and ipratropium bromide inhalers)	Availability of **beclometasone inhaler** in Benin, Sudan and Eriteria was 16.7, 21.4 and 33.3% respectively Availability of **salbutamol inhaler** in Benin, Sudan and Eriteria was 33.3, 71.4 and **100%** respectively Availability of **ipratropium bromide** was **0%** in Benin and Eriteria and **14.3%** in Sudan

Mash et al. [23] **South Africa** 46 primary care facilities	1 diagnostic test (**peak flow meter**)	Availability of peak flow-metry was 53.6%
4 DIFFERENT STUDIES: **South Africa Ghana Uganda Nigeria** [17].	SPACER DEVICE AVAILABILITY	In South Africa spacers were available in 72.9% of the surveyed 46 primary healthcare facilities **0% in Ghana**, 1**8.5% and 19.2%** for adult and paediatric spacers respectively in **Uganda** and **20.6% in Nigeria**

Journal of Asthma and Allergy

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ORIGINAL RESEARCH

Contributing Factors for Underutilization of Inhaled Corticosteroids Among Asthmatic Patients Attending at Adama Hospital Medical College, Adama, Ethiopia

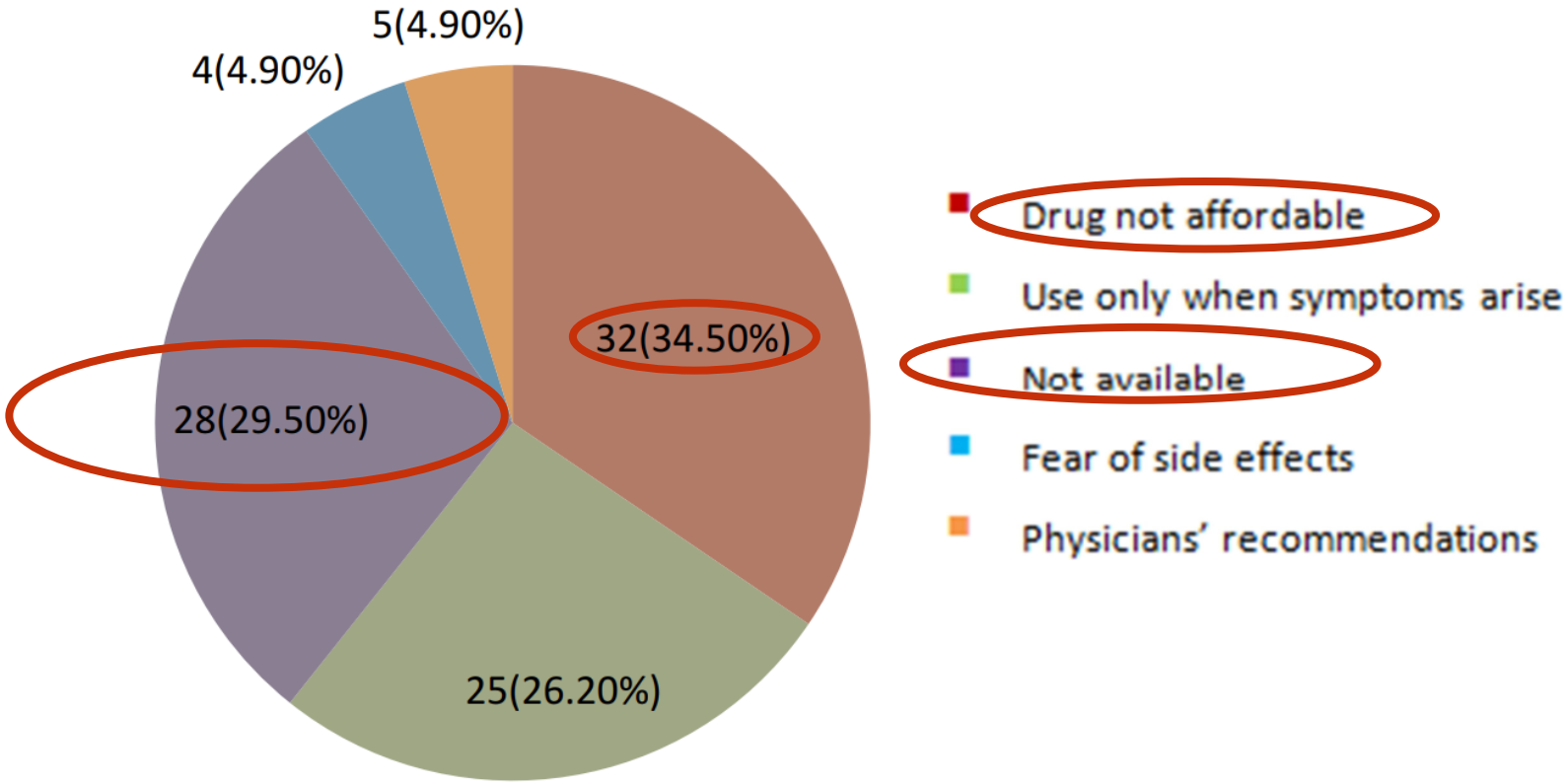

Figure 1 Patient's reasons for underutilization of ICS.

3. ENVIRONMENTAL CONTROL


MODERN GHANA

26.05.2013 ⋮ HEALTH (/SECTION/HEALTH)

Misconception About Asthma

By Diana Esther Wangari, Citizen News Service – CNS

MISCONCEPTION:

There is a cure for asthma/allergies.

TRUTH

- While there is no cure for asthma and allergies, it is **controllable**
  - there are steps to reduce allergy and asthma triggers.
    - Examples include spring cleaning to reduce dust, pollen and other allergens
- Thus enviromental control is an important principle in control of asthma

.....A TRUE STORY ABOUT MWOLOLO

- .....Mwololo was eventually noticed to be allergic to animal fur, a gift she had received for her tenth birthday to shelter her from the cold nights.
- Consequently, an ‘attack’ occurs after spending any night under the fur and only got relief after spending time away from her manyatta, **the same amount of time the healer perfomed his ritual in a different**, **fur-free** shelter.


MODERN GHANA

26.05.2013 | HEALTH (/SECTION/HEALTH)

Misconception About Asthma

By Diana Esther Wangari, Citizen News Service – CNS

3. ENVIRONMENTAL CONTROL

TABLE 5 Environmental exposures and association with severe asthma in African adolescents participating in ISAAC III

	Univariable			Multivariable		
Variables[a]	OR	95%CI	*P*-value	OR	95%CI	*P*-value
Mom smokes	1.63	1.39-1.90	**<0.001**	1.61	1.38-1.89	**<0.001**
Dad smokes	1.15	1.03-1.29	**0.02**			
Smokers at home	1.17	1.03-1. 34	**0.02**			
Electric cooking	1.03	0.82-1.28	0.81			
Gas cooking	1.07	0.93-1.23	0.33			
Fire cooking	1.07	0.91-1.26	0.43			
Electric heating	1.00	0.87-1.14	0.99			
Gas heating	1.02	0.89-1.17	0.77			
Fire heating	1.15	0.94-1.40	0.17			
Older siblings	0.95	0.83-1.09	0.46			
Younger siblings	1.07	0.94-1.20	0.31			
Cat at home	1.17	1.07-1.29	**0.001**	1.14	1.04-1.25	**0.03**
Dog at home	1.11	1.00-1.24	0.06			
≥3 weekly exercise	1.42	1.23-1.63	**<0.001**	1.42	1.23-1.64	**<0.001**
≥5 hour daily television watching	1.12	0.99-1.24	0.07			
≥1 Monthly paracetamol	1.21	1.09-1.36	**0.001**	1.20	1.07-1.34	**<0.001**

Significant *P* values are marked in bold.

ORIGINAL ARTICLE: ASTHMA

WILEY

Environmental risk factors for asthma in 13-14 year old African children

Adaeze C. Ayuk MBBS, FMCPaed[1,2] | Jordache Ramjith BSc, BSc Hons, MSc[3] | Heather J. Zar MB ChB, FCPaeds, FRCP, PhD[1,4]

OVERLOOKED MANAGEMENT PRINCIPLES - RECAP

Clinical practice parameters
Confirms asthma diagnosis with pulmonary functions tests
Familiar with peak flow meter
Familiar with spirometer
Assesses inhaler technique at each visit
Assesses treatment adherence at each visit
Identify triggers and attempt at environmental manipulations
Uses guideline to assess asthma control
Addresses patients' concerns
Insists on spacer with face mask for children <6years
Routinely provides written asthma action plan
Prescribes inhaled corticosteroids as initial maintenance therapy
Prescribes LTRA when ICS only is not available for children
Prescribes ICS/LABA combination
Checks allergy status of patients
Allows 3 months on current medications before stepping up
Refers to asthma nurse counsellors

CONCLUSION

- Health workers in SSA -we need to step up our game!
- Updating health workers on usefulness of objective diagnosis, monitoring and asthma tools is required
- Demystify ICS use to tackle misconceptions
- Respiratory societies lead their governments to update policies/asthma essential drug list to ensure availabilty of inhaled corticosteroids
- Drug companies should have a sense of urgency to correct availiabilty and affordabilty of asthma drugs in SSA
- Education for everyone and patnership in asthma will reduce misconception and all hands must be on deck
- **The time to act is now!**

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