Global Asthma Network Survey Suggests More National Asthma Strategies Could Reduce Burden of Asthma

Innes Asher FRACP[1], Tari Haahtela, MD[2], Olof Selroos MD [3], Philippa Ellwood MPH[1], Eamon Ellwood BEd[1] and the Global Asthma Network Study Group[4]

[1]Department of Paediatrics: Child and Youth Health
The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand

[2]Professor Tari Haahtela
Skin and Allergy Hospital,
Helsinki University Hospital
Finland

[3]Professor Olof Selroos
Selroos Medical Consulting (Semeco AB),
Angelholm
Sweden

[4] Listed at the end of the manuscript

Corresponding author:
Professor Innes Asher
Department of Paediatrics: Child and Youth Health
The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand
Phone +6499236454
Fax +6493737486
Email i.asher@auckland.ac.nz

Research in context

Evidence before this study

Several countries or regions within countries have developed effective asthma strategies, which, when consistently implemented, resulted in early detection and, subsequently, the reduction of the burden and cost of asthma to individuals and society. There has been no systematic appraisal of the extent of asthma strategies in the world.

Added value of this study

This study surveyed Global Asthma Network investigators in more than half the world's countries and found only about one in four had a national asthma strategy.

Implications of all the available evidence

There is potential for a large reduction in the global burden of asthma if more countries developed and implemented effective asthma strategies.

Abstract (235/250 words)

Background

Asthma affects about 334 million people globally, many of whom are unnecessarily disabled. Several countries or regions within countries have developed an effective asthma strategy resulting in reduction of the burden of asthma to individuals and society. There has been no systematic appraisal of the extent of asthma strategies in the world.

Methods

The Global Asthma Network (GAN) undertook an email survey of principal investigators of GAN centres in 2013-2015. One of the questions was: *"Has a national asthma strategy been developed in your country for the next five years? For children, for adults?" (Yes/No/Don't Know*). The survey was sent to 276 investigators in 120 countries.

Findings

213 (77.2%) investigators in 112 (93.3%) countries answered this question. Of these countries, 26 (23.2%) reported a national asthma strategy for children and 24 (21.4%) for adults; 22 (19.6%) countries had strategies for both children and adults; 28 (25%) had a strategy for at least one age group. Strategies were more significantly common in countries with high prevalence of current wheeze than low prevalence (11/13 (85%) and 7/31 (22.6%) respectively, $p<0.001$).

Interpretation

In about one in four countries a national asthma strategy was reported. As the global prevalence of asthma has risen, especially in the most populated countries, a large reduction in the global burden of asthma could be achieved potentially, if more countries had effective asthma strategies.

Funding

The International Union against Tuberculosis and Lung Disease

Introduction

Asthma is a common chronic disease affecting about 334 million children and adults in the world (1, 2). The Global Burden of Disease Study 2010 found the asthma was the 14th highest ranked cause of Years Lived with Disability (3). Many people with asthma are unnecessarily disabled, because they are not receiving optimal asthma management (4). In 2010, it was estimated that about 22 million disability-adjusted life years are lost because of asthma (5). The International Study of Asthma and Allergies in Childhood (ISAAC) found that the historical view of asthma being a disease of high-income countries (HICs) no longer holds: most people affected are in low- and middle-income countries (LMICs), and asthma prevalence is estimated to be increasing fastest in those countries (6), where most of the world's people live.

To reduce the burden of asthma, several HICs and LMICs have developed asthma strategies (or asthma programmes which is the terminology used by some countries) at a national or regional level which have resulted in rapid reduction of the ill-effects of asthma (7). The strategies or programmes are formalised with political engagement and commitment. Implementation of such strategies includes relatively simple measures which are consistently applied in the relevant population, to improve early detection of asthma and provide access to effective anti-inflammatory treatment. Extension of this approach to other countries or regions within countries could be of great potential benefit to reducing the burden of asthma in the world.

The first comprehensive national asthma strategy was developed in Finland in 1994 and has served as a model for other countries. They developed and called it a comprehensive nationwide Asthma Programme and over the next decade this lessened the burden of asthma on individuals and society and more than halved the total asthma costs (healthcare, drugs, disability, and productivity loss) (8, 9) and these benefits have continued (10). This model was followed several years later by several other strategies within the European Union (11) including France (12), Portugal (13), and Spain (14). In other places, independent approaches have been used with improved outcomes, including Australia (15, 16), the city of Salvador, Brazil (17), Canada (18), Costa Rica (19), Singapore (20), Tonga (21) and Turkey (22).

There are few reports of such strategies, suggesting that in many countries there is no strategy or it has not been implemented, but there has been no systematic appraisal of the extent of asthma strategies in the world. The Global Asthma Network (GAN) was established in 2012, a collaboration between individuals from ISAAC and the International Union Against

Tuberculosis and Lung Disease (The Union). Its goals are to improve asthma care globally, with a focus on low- and middle-income countries (23), through enhanced surveillance, research collaboration, capacity building and access to quality-assured essential medicines. Given the large number of centres and countries involved with GAN, it was well placed to undertake such a survey.

Based on the low number of national asthma strategies reported in the literature, our hypothesis was that most countries in the world do not have a national asthma strategy. GAN has collaborators in more than half of the world's countries, which enabled a simple survey to be undertaken to answer a question about whether a country had a national asthma strategy for children and adults.

Methods

A cross-sectional survey of GAN centres was carried out between 29 April 2013 and 2 May 2015. A GAN centre was one where an Expression of Interest form had been submitted to the GAN Global Centre (Auckland). The survey was by email survey and was sent to each centre's principal investigator by the GAN Research Manager (PE). The survey was sent to GAN principal investigators in 276 centres in 120 countries, 41 were HICs and 79 LMICs, defined by the criteria used by the World Bank 2015 (24).

The survey form had eight questions, one of which was *"Has a national asthma strategy been developed in your country for the next five years? For children? (Yes/No/Don't Know*), *for adults?" (Yes/No/Don't Know*). The remaining seven questions were about national asthma management guidelines in their country (not included in these analyses).

Where conflicting answers were given by two or more investigators from different centres within a country, the GAN Global Centre staff entered into a discussion via email with the centre investigators until agreement between them was reached.

Country findings were compared with the prevalence of asthma symptoms in 13-14 year olds in countries where this had been estimated in ISAAC Phase Three (25). Countries were categorised as high prevalence if the prevalence of current wheeze was >20%, and low prevalence if the prevalence of current wheeze was <10%. The relationship of national asthma strategies to changes in country prevalence of asthma symptoms in 13-14 year olds in countries where this had been estimated in ISAAC Phase Three (6) was also examined.

The data were entered into an excel spreadsheet and checked for apparent inconsistencies which were reconciled if appropriate. Simple descriptive analyses were undertaken. The Chi-Squared test was used to compare responses about strategies between LMICs and HICs, and high and low prevalence countries with those answering 'Yes' compared with those 'not answering Yes' ('No' or 'Don't know')(26).

Role of the funding source

The funders had no role in study design; in the collection, analyses, and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication.

Findings

Of the 276 centre principal investigators in 120 countries, 213 (77.2%) investigators in 112 (93.3%) countries completed the national asthma strategy questions. There were no responses from eight countries who were approached: three HICs and five LMICs.

Conflicting answers were obtained from two or more centres in 16 countries, and agreement was subsequently reached. Of the 112 countries, 38 (33.9%) were HICs including 42.7% of the world's 89 HICs; 74 (66.1%) were LMICs (Table) including 51.7% of the world's 143 LMICs.

Of those 112 countries where the national asthma strategy questions were answered for children, 12 reported 'Don't Know', 6 in HICs and 6 in LMICs. For adults, 16 reported 'Don't Know', 8 in HICs and 8 in LMICs.

Of the 112 countries, 26 (23.2%) reported a national asthma strategy for children, 24 (21.4%) reported a national asthma strategy for adults, and 22 (19.6%) countries had strategies for both children and adults, and 28 (25%) had a national asthma strategy for at least one age group. These are illustrated in the Figure.

Of the 28 countries who reported a national asthma strategy for at least one age group 13 (46.4%) were HICs and 15 (53.6%) LMICs. Strategies were reported in 13/38 (34.2%) HICs and 15/74 (20.3%) LMICs; these differences between LMICs and HICs were not statistically significant p=0.107.

In 81/112 (72%) countries the prevalence of asthma symptoms had been estimated in ISAAC. Any national asthma strategy was significantly more common in countries with high

prevalence of current wheeze (>20%) than low prevalence (<10%): 11/13 (85%) and 7/31 (22.6%) respectively, p<0.001, with the remaining 37 countries having prevalence 10-20%. Of the 49 countries in whom time-trends in the prevalence of asthma symptoms had been estimated in ISAAC, any national asthma strategy was equally common in those whose prevalence rose (11/30) and in those in whom it fell (6/19) p=0.72 .

Discussion

In this survey of about half the worlds' countries GAN was able to confirm our hypothesis that most countries in the world do not have a national asthma strategy. Only about one in four countries reported that they had a national asthma strategy. Of concern was that the proportion of LMICs with strategies was lower than HICs.

About three in four countries surveyed had the prevalence of asthma symptoms measured in ISAAC, and of these, national asthma strategies were significantly more common in those with high prevalence compared with low prevalence. While on the face of it this seems logical – more asthma, more concern to lessen it, there are three caveats. Firstly, many of the countries with low prevalence of asthma symptoms and no national asthma strategy have very large populations, such as Indonesia, Brazil, Mexico, China, Philippines all in the top 12 most populous countries in the world in 2015, each with >100 million people (27). Small improvements in the management and outcomes for people with asthma in each of these countries would have a relatively big impact on the global burden of asthma. Secondly, in this survey one in four countries had not measured their asthma prevalence, which illustrates their lack of interest in asthma or difficulties engaging in world-wide epidemiological studies. Thirdly, the ISAAC data is already 13 years old (2002-3) and thus not coincident with survey, so the interpretation need caution.

In the review of national and regional asthma strategies in Europe (11), a systematic search of the English literature in 2014 found only eight published national and regional asthma strategies in European Union countries: Finland (9), France (28), Ireland (29), Italy (30), The Netherlands (31), Lodz area of Poland (32), whole of Poland (33) and Portugal (13), with only three strategies having been evaluated (Finland, Poland, Portugal). Outside the European Union, asthma strategies have been identified from only eight other countries (15-22).

There are likely to be many reasons for the low level of publication of national asthma strategies where they exist, including poor preparation with insufficient documentation, dissemination, implementation or evaluation, lack of appropriate training of primary health care professionals in diagnosis and treatment, poor access to quality–assured, essential asthma medicines, poor outcomes, unable to prepare an article for publication in English, and publication bias. The absence of a national asthma strategy may reflect lack of recognition of asthma as a serious health problem including a lack of asthma prevalence , severity and mortality data, lack of government prioritisation of asthma among other non-communicable diseases, lack of national health coordination, or lack of government commitment to improving national health issues.

Not all national asthma strategies have been successful. Components of a successful asthma strategy were identified by Selroos and others : "*An asthma programme should start with the universal commitments of stakeholders at all levels and the programme has to be endorsed by political and governmental bodies. When the national problems have been identified, the goals of the programme have to be clearly defined with measures to evaluate progress. An action plan has to be developed, including defined re-allocation of patients and existing resources, if necessary, between primary care and specialised healthcare units or hospital centres. Patients should be involved in guided self-management education and structured follow-up in relation to disease severity*." (11). However the same authors suggested that good results can also be achieved without formal national asthma programmes, as long as evidence-based guidelines are implemented and widely used (11). This is happening, for example, in Sweden, where recommendations (in Swedish) for diagnosis and treatment have been issued and updated by the National Board of Health and Welfare (34) and the Swedish Asthma and Allergy Foundation has recently issued a comprehensive national strategy document. Global asthma mortality reduced from 380,200 in 1990 to 345,700 in 2010 (1). In Europe asthma mortality decreased from 6441 to 1164 cases (82%) from 1990-2012 (35).

In an earlier review of asthma projects and strategies in Argentina, Australia, Brazil, China, Japan, Mexico, the Philippines, Russia, South Africa, and Turkey discussed in 2009 by a group of experts in asthma care, the Advancing Asthma Care Network (36), all successful asthma strategies seemed to have the following characteristics: 1) improving early diagnosis and the introduction of first-line treatment with anti-inflammatory medication (mainly inhaled corticosteroids), 2) improving long-term disease control, 3) introducing simple means for guided self-management to proactively prevent exacerbations/attacks, and effective education and networking with general practitioners, nurses and pharmacists. A systematic

approach was recommended aiming to motivate and organise, and improvements can be achieved with relatively simple means. When multidisciplinary actions are being planned, all the main stakeholders should be represented.

A more limited approach to improving asthma outcomes has been used successfully in pilot projects in LMICs, using standard case management, a term which "*encompasses diagnosis of asthma, standardisation of treatment according to severity based on asthma guidelines, and patient education, coupled with a simple system for monitoring patient outcomes. Appropriate training of health care workers and availability of essential asthma medicines are key to the effectiveness of standard case management.*" (37). Pilot studies in 2007-8 of the feasibility and effects of standard case management were applied in Benin (38), Haiyuan County, Anhui Province, China (39), Sudan (40) reduced hospitalisations in those completing the study. In El Salvador 2005-2010 (41), by using Practical Approach to Lung Health and essential asthma medicines free of charge, the number of patients being referred from primary to secondary or tertiary level dropped by 60%, with greater convenience for patients, and savings for health services.

Political engagement, leadership and commitment are key components for developing effective national asthma strategies, and these are challenging and may not be easily achieved. The literature supports the view that programmes (strategies) are more likely to be successful where this has occurred; 'lip service' engagement on its own is of no value. The political organisation and health leadership in the country would undoubtedly influence the chance of success, as would co-ordinated access to affordable, quality-assured, essential asthma medicines. Identifying a political champion is a critical factor, and may be easier in some localities than others. In 2011 Global Initiative for Asthma launched a challenge to reduce hospitalisations, but so far the results have been modest (42). The motivation to tackle the asthma burden is not always self-evident, e.g. in places where private health-care dominates and hospitals compete.

In this survey we asked only about national asthma strategies, not local or regional strategies. We know that there have been successful strategies in cities such as Salvador, Brazil (17), and these would have been missed in our survey. The survey asked about national asthma strategies for children separately from adults. Most who reported strategies had them for both age groups. The reasons why there would be separate strategies may include different approaches to the two populations, as often happens with national asthma management guidelines. Or there may have been ascertainment bias, with child–health professionals not being aware that an asthma strategy had been developed for adults and vice versa.

This is a very large study, a high response rate of 93% was achieved, and data was reported from 112 countries, and the countries which responded were about half the world's HICs and LMICs. The response rate was high because of the close relationship between the GAN Global Centre and GAN Principal Investigators.

There may be different interpretations of the term "national asthma strategy". National asthma guidelines alone should not be considered a National Asthma Strategy or Programme, although they are essential part of a Strategy. In this particular survey guidelines alone were unlikely to be confused with strategy, because national asthma management guidelines were asked about in the preceding seven questions in this email survey. However, the survey is likely to have missed asthma strategies which were not country-wide; these would be more likely in a very large country like Brazil or China. Additionally, some national asthma programmes may not have been understood to be strategies for the purpose of this survey.

A successful programme is not expected to affect prevalence and incidence as we do not have effective interventions for these (23). However reduction in disease severity and improved control may be impressive. In Finland in early 1990s, 20% of patients were estimated to have uncontrolled (severe) asthma compared to 10% in 2001 and 4% in 2010 (9, 43). A large reduction in the global burden of asthma and resultant costs could be achieved if more countries had asthma strategies as effective as Finland. The impressive results in Finland have not been replicated to the same extent in other countries to date. If the gains of the Finnish study were replicated by having effective national asthma strategies throughout the world, then the number of emergency visits would be estimated to fall by 24% in adults and 61% in children, hospital days would fall by about 54%, significant disability would decrease by about 76%, costs per patient per year would fall by 36%, and deaths by 31%. Even if half these gains were achieved, there would be a large reduction of the burden and costs of asthma in the world. Such strategies are an appropriate way to address asthma, where the disability numbers and costs are disproportionately high, in contrast with the relatively high mortality found with other non-communicable diseases (23).

We recommend that health authorities with governments in all countries should develop national asthma strategies with national action plans to improve detection of asthma and subsequently improve asthma management and reduce costs (7). Such a within-country public health approach will reach the greatest number of people with asthma in the country, to the greatest benefit.

The components of a successful national asthma strategy are government commitment, management by the health ministry, registry of outcome data before and after implementation (severity, asthma control, hospitalisations, mortality), continued education of health professionals, access to medical care and quality-assured, affordable, essential asthma medicines for everyone with asthma, follow-up programmes, asthma research.

Such strategies should be evaluated, reported, and published. The problems to be addressed may be different in HICs compared to LMICs, and the solutions need to be tailored according to an individual country's local needs, resources and organisation. Knowledge of asthma prevalence and severity and changes over time is fundamental to understanding the burden of asthma within each country and developing a strategy, and this can be acheived using the methodology developed by ISAAC (44, 45) and continued (expanded to include adults) under GAN (46). The global burden of asthma potentially could be markedly reduced if more countries used effective national asthma strategies.

Declarations

The authors declare no conflicts of interest. The corresponding author confirms that she had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Table. Responses to national asthma strategy questions by country.

Country Name	National Asthma Strategy Child	National Asthma Strategy Adult	World Bank Income Category
Albania	No	No	LMIC
Algeria	No	No	LMIC
Argentina	No	No	LMIC
Armenia	No	No	LMIC
Australia	Yes	Yes	HIC
Austria	No	No	HIC
Belarus	No	No	LMIC
Belgium	Don’t Know	Don’t Know	HIC
Benin	No	No	LMIC
Bolivia	No	No	LMIC
Bosnia and Herzegovina	No	Don’t Know	LMIC
Brazil	No	No	LMIC
Bulgaria	No	No	LMIC
Burkina Faso	No	No	LMIC
Cameroon	No	No	LMIC
Canada	Yes	Yes	HIC
Channel Islands	No	Don’t Know	HIC
Chile	Don’t Know	Don’t Know	LMIC
China	Don’t Know	No	LMIC
Colombia	No	No	LMIC
Congo Dem Rep	No	No	LMIC
Costa Rica	Yes	Yes	LMIC
Croatia	Don’t Know	Don’t Know	HIC
Cyprus	No	No	HIC
Denmark	Don’t Know	Don’t Know	HIC
Ecuador	No	No	LMIC
Egypt	No	No	LMIC
El Salvador	Yes	Yes	LMIC
Ethiopia	Don’t Know	Don’t Know	LMIC
Faroe Islands	No	No	HIC
Fiji	No	No	LMIC
Finland	Yes	Yes	HIC
France	Yes	Yes	HIC
French Polynesia	No	No	HIC
Gambia	No	No	LMIC
Georgia	Yes	Yes	LMIC
Germany	No	No	HIC
Ghana	No	No	LMIC
Greece	No	No	HIC
Grenada	No	No	LMIC

Hong Kong	Don’t Know	Don’t Know	HIC
Hungary	No	No	HIC
India	Yes	No	LMIC
Indonesia	No	No	LMIC
Iran	Yes	Yes	LMIC
Ireland	Yes	Yes	HIC
Israel	No	No	HIC
Italy	No	No	HIC
Jamaica	Don’t Know	Don’t Know	LMIC
Japan	Yes	Yes	HIC
Jordan	No	No	LMIC
Kenya	No	No	LMIC
Korea, South	Yes	Yes	HIC
Kosovo	No	No	LMIC
Kuwait	Yes	Don’t Know	HIC
Latvia	No	No	LMIC
Libya	No	No	LMIC
Macedonia	No	No	LMIC
Malawi*	Yes	Yes	LMIC
Malaysia	No	No	LMIC
Mali	No	No	LMIC
Malta	No	No	HIC
Mexico	No	No	LMIC
Netherlands	Don’t Know	Don’t Know	HIC
New Caledonia	No	No	HIC
New Zealand	No	No	HIC
Nicaragua	No	No	LMIC
Nigeria	No	No	LMIC
Niue	Don’t Know	Don’t Know	LMIC
Norway	No	No	HIC
Oman	No	No	HIC
Pakistan	No	No	LMIC
Palau	No	No	LMIC
Palestine	No	No	LMIC
Panama	Yes	Yes	LMIC
Peru	Yes	Yes	LMIC
Philippines	No	No	LMIC
Poland	Don’t Know	Don’t Know	HIC
Portugal	Yes	Yes	HIC
Reunion Island	No	No	HIC
Romania	No	No	LMIC
Russia	Yes	No	LMIC
Samoa	No	No	LMIC
Saudi Arabia	Yes	Yes	HIC
Senegal	No	No	LMIC
Serbia	Yes	Yes	LMIC

Sierra Leone	No	No	LMIC
Singapore	No	Don’t Know	HIC
South Africa	No	No	LMIC
Spain	No	No	HIC
Sri Lanka	No	No	LMIC
Sudan	No	Yes	LMIC
Syrian Arab Republic	No	No	LMIC
Taiwan	Yes	Don’t Know	LMIC
Thailand	No	No	LMIC
Togo	Don’t Know	No	LMIC
Tokelau	No	No	LMIC
Tonga	No	Don’t Know	LMIC
Trinidad and Tobago	No	No	HIC
Tunisia	No	No	LMIC
Turkey	Yes	Yes	LMIC
Tuvalu	No	No	LMIC
Uganda	No	No	LMIC
Ukraine	No	Yes	LMIC
United Arab Emirates	Yes	Yes	HIC
United Kingdom	Yes	Yes	HIC
United States	Yes	Yes	HIC
Uruguay	No	No	LMIC
Vanuatu	No	No	LMIC
Vietnam	Yes	Yes	LMIC
Zambia	No	No	LMIC
Zimbabwe	No	No	LMIC

***** LMIC = Low or Medium Income Country (by World Bank assessment).

[#]HIC = High Income Country(by World Bank assessment).

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Legend for figure

World map showing the countries with national asthma strategies (blue), the ones without (red), don't know (yellow) did not respond (black), or were not in the survey (grey) .

GAN Study Group

GAN Steering Group: Neil Pearce Innes Asher, Nils Billo, Karen Bissell, Philippa Ellwood, Asma El Sony, Luis Garcia-Marcos, Chiang Chen-Yuan, Javier Mallol, Guy Marks, David Strachan and **GAN Principal Investigators for this study:** Albania: A Priftanji (Tiranë); Algeria: R Boukari (Blida), B Benhabylès (Wilaya of Algiers); Argentina: N Salmun (Buenos Aires), FA Castracane (Mendoza), M Gómez (Salta); Armenia: A Baghdasaryan (Yerevan); Australia: A Tai (Adelaide), S Burgess (Brisbane), J Mattes (Newcastle), G Marks (Sydney); Austria: J Riedler (Salzburg), G Haidinger (Urfahr-umgebung); Belarus: A Shpakou (Grodno); Belgium: J Weyler (Antwerp); Benin: M Gninafon (Cotonou); Bolivia: J Aguirre de Abruzzese (Santa Cruz); Bosnia and Herzegovina: S Domuz (Prijedor); Brasil: PA Camargos (Belo Horizonte), N Rosário (Curitiba), HV Brandão (Feira de Santana), AC Porto Neto (Passo Fundo), AM Menezes (Pelotas), GB Fischer (Porto Alegre), M de Britto (Recife), FC Kuschnir (Rio de Janeiro), NF Wandalsen (Santo André), D Solé (São Paulo South); Bulgaria: TB Mustakov (Sofia); Burkina Faso: E Birba (Bobo-Dioulasso); Cameroon: EW Pefura Yone (Bafoussam), BH Mbatchou Ngahane (Douala); Canada: T To (Ontario), DC Rennie (Saskatoon); Channel Islands: P Standring (Guernsey); Chile: MA Calvo Gil (Valdivia); China: Y-Z Chen (Beijing), X Kan (Hefei), Y Lin (Tayuan); Colombia: E Garcia (Bogota), J Niederbacher (Bucaramanga), GA Ordoñez (Cali); Costa Rica: ME Soto-Quirós (Costa Rica); Croatia: S Banac (Rijeka); Cyprus: P Yiallouros (Nicosia); Denmark: L Lochte (Copenhagen); Ecuador: P Cooper (Esmeraldas), S Barba (Quito); Egypt: A Mokhtar (Alexandria), M El Falaki (Cairo); El Salvador: M Figueroa Colorado (San Salvador); Ethiopia: A Berihu (Mekelle); Faroe Islands: P Weihe (Faroe Islands); Fiji: VA Lal (Suva); Finland: M Mäkelä (Helsinki); France: C Raherison (Bordeaux), I Annesi-Maesano (Créteil, West Marne), D Charpin (Marseille) ; Gambia: S Anderson (Fajara); Georgia: M Gotua

(Kutaisi, Tbilisi); Germany: E von Mutius (Munich); Ghana: NF Clement (Accra), EO Addo-Yobo (Kumasi); Greece: C Gratziou (Athens), J Tsanakas (Thessaloniki); Grenada: M Akpinar-Elci (Grenada); Hong Kong: CK Lai (Hong Kong); Hungary: Z Novák (Szeged); India: BK Reddy (Bangalore), M Sabir (Bikaner), M Singh (Chandigarh), R Ilangho (Chennai), V Singh (Jaipur), A Maitra (Kolkata (10)), M Mukherjee (Kolkata (14)), TU Sukumaran (Kottayam), S Awasthi (Lucknow), UA Pai (Mumbai (7)), AV Pherwani (Mumbai (11)), SK Sharma (New Delhi), S Varkki (Vellore); Indonesia: CB Kartasasmita (Bandung); Iran: M Cheraghi (Ahvaz), M-R Masjedi (Birjand, Bushehr, Rasht, Tehran, Zanjan), M Karimi (Yazd); Ireland: P Manning (Ireland); Israel: T Shohat (Israel); Italy: S Bonini (Ascoli Piceno), MG Petronio (Empoli), S La Grutta (Palermo), F Forastiere (Roma), S Piffer (Trento); Jamaica: E Kahwa (Kingston); Japan: H Odajima (Fukuoka), S Yoshihara (Tochigi); Jordan: F Abu-Ekteish (Amman), O Al Omari (Jerash); Kenya: FO Esamai (Eldoret), EI Amukoye (Nairobi); Korea, South: S-J Hong (Seoul); Kosovo: L Neziri-Ahmetaj (Prishtina); Kuwait: JA al-Momen (Kuwait); Latvia: V Svabe (Riga); Libya: M Shenkada (Tripoli); Macedonia: E Vlaski (Skopje); Malawi: K Mortimer (Blantyre); Malaysia: J de Bruyne (Klang Valley); Mali: Y Toloba (Bamako); Malta: S Montefort (Malta); Mexico: R García-Almaráz (Ciudad Victoria), DD Hernández-Colín (Guadalajara), JV Mérida-Palacio (Mexicali), BE Del-Río-Navarro (Mexico City North), SN González-Díaz (Monterrey), CA Jiménez González (San Luis Potosí); Netherlands: B Brunekreef (Utrecht); New Zealand: I Asher (Auckland), C Moyes (Bay of Plenty), P Pattemore (Christchurch), S Currie (Hawkes Bay), R Hancox (Otago), D Graham (Waikato), J Douwes (Wellington); Nicaragua: MZ Cordero Rizo (Matagalpa); Nigeria: B Garba Ilah (Gusau), AG Falade (Ibadan), GE Erhabor (Ife), N Onyia (Lagos), AH Gabdo (Maiduguri); Niue: M Pulu (Niue Island); Norway: W Nystad (Oslo, Tromsø); Nouvelle-Calédonie: I Annesi-Maesano (Nouvelle-Calédonie); Oman: O Al-Rawas (Al-Khod); Pakistan: MO Yusuf (Islamabad); Palau: BM Watson (Republic of Palau); Palestine: N El Sharif (North Gaza, Ramallah); Panama: G Cukier (David-Panamá); Peru: P Chiarella (Lima), W Checkley (Puno, Tumbes); Philippines: R Pagcatipunan (Metro Manila); Poland: G Lis (Kraków); Polynésie française: I Annesi-Maesano (Polynésie française); Portugal: J Rosado Pinto (Lisboa); République démocratique du Congo: B Kabengele Obel (Kinshasa); Réunion Island: I Annesi-Maesano (Reunion Island); Romania: D Deleanu (Cluj-Napoca); Russia: EG Kondiourina (Novosibirsk), E Kamaltynova (Tomsk); Samoa: L Esera-Tulifau (Apia); Saudi Arabia: BR Al-Ghamdi (Abha), A Yousef (Alkhobar); Senegal: NO Toure (Dakar); Serbia: Z Zivkovic (Belgrade), D Višnjevac (Indjija), M Hadnadjev (Novi Sad); Sierra Leone: G Fadlu-Deen (Freetown); Singapore: DY Goh (Singapore); South Africa: HJ Zar (Cape Town), K Voyi (Ekurhuleni, Polokwane),), R Masekela (Pretoria); Spain: I Carvajal-Urueña (Asturias), RM Busquets (Barcelona), C González Díaz (Bilbao), A Rabadán-Asensio (Cádiz), L García-Marcos (Cartagena), A Arnedo-Pena (Castellón), A López-

Silvarrey Varela (La Coruña), C Luna (Madrid), J Wärnberg (Málaga), EG Pérez-Yarza (San sebastián), M Praena-Crespo (Sevilla), MM Morales Suárez-Varela (Valencia); Sri Lanka: KD Gunasekera (Colombo), ST Kudagammana (Peradeniya); Sudan: S Hassanain (Gadarif), A El Sony (Khartoum); Syrian Arab Republic: Y Mohammad (Lattakia); Taiwan: YL Guo (Tainan), J-L Huang (Taipei); Thailand: P Vichyanond (Bangkok), S Phumethum (Chantaburi), M Trakultivakorn (Chiang Mai), J Teeratakulpisarn (Khon Kaen); Togo: O Tidjani (Lome); Tokelau: T Iosefa (Tokelau); Tonga: G Aho (Nuku'alofa); Trinidad and Tobago: D Dookeeram (Trinidad and Tobago); Tunisia: A Hamzaoui (Ariana); Turkey: A Yorgancioglu (Ankara); Tuvalu: N Ituaso-Conway (Funafuti); Uganda: W Worodria (Kampala); Ukraine: O Fedortsiv (Ternopil); United Arab Emirates: B Mahboub (Sharjah); United Kingdom: AH Mansur (Birmingham); United States: RP Doshi (Fort Wayne), K Yeatts (North Carolina), GJ Redding (Seattle), M Akpinar-Elci (Virginia); Uruguay: M Valentin-Rostan (Montevideo); Vanuatu: G Harrison (Port Vila); Vietnam: LT Le (Ho Chi Minh); Zambia: S Wa Somwe (Lusaka); Zimbabwe: P Manangazira (Zimbabwe)

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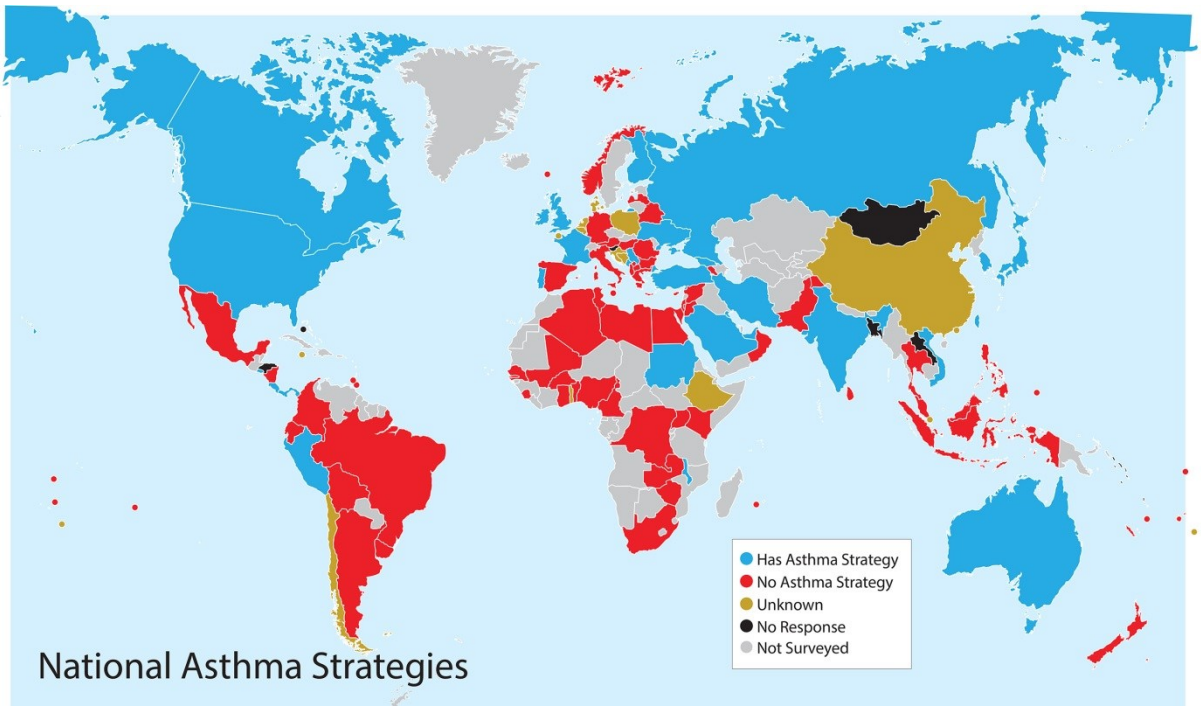
Figure


National Asthma Strategies
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