

Countering effects on Air Pollution– Impact on Children's Respiratory Health: Community Action

Charlottetown,. Canada 16th -17th October 2016



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Our Bengaluru – Environmental Profile



- 920m above sea level. Fastest growing city in the world (Forbes – 2010)
- Daily temperature – Max:28.9°C
Min:18.9°C (07)
- Average Rainfall – 80.8cm per year
- Growth of Bangalore: 69km² – 1949
741km² – 2007
800 km² – 2011



- We add 20km of built up area per year and loose 20% of green area per year
- Was named as air conditioned city, garden city, pensioners' paradise
What is now?
- Sneezing city, wheezing city and pensioners nightmare city

Bengaluru Urban Agglomeration Zone (BUAZ)

HP



❖ Population:

0.1m	(1880)
1.6m	(1971)
2.92m	(1981)
8.9m	(2011)

❖ Vehicles:

3.7m	(2011)
5.88m	(2015)
70% are 2-wheelers	(2011)
Registration 600 vehicles/day	(2010)
Now 1600 new vehicles/day	(2016)

Fuel Consumption:

3-3 ½ fold increase in consumption
of automobile fuel

❖ Slow traffic emit (10 km/hr) 5 ½
times more CO.

❖ Congestion costs ` 3000-4000 Cr/yr.
Apart from Health cost

Source: IOCL - 2008,; Dept of Transport, GoK, 2011

ENVIRONMENTAL IMPACTS ON HEALTH

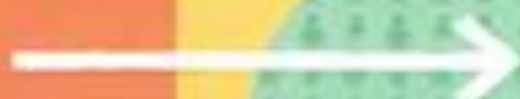
WHAT IS THE BIG PICTURE?

FACT:

23%

of all global deaths are linked to the environment.

That's roughly **12.6 million deaths** a year.



WHERE IS IT HAPPENING?



3.8 million
in South-East Asia Region

3.5 million
in Western Pacific Region

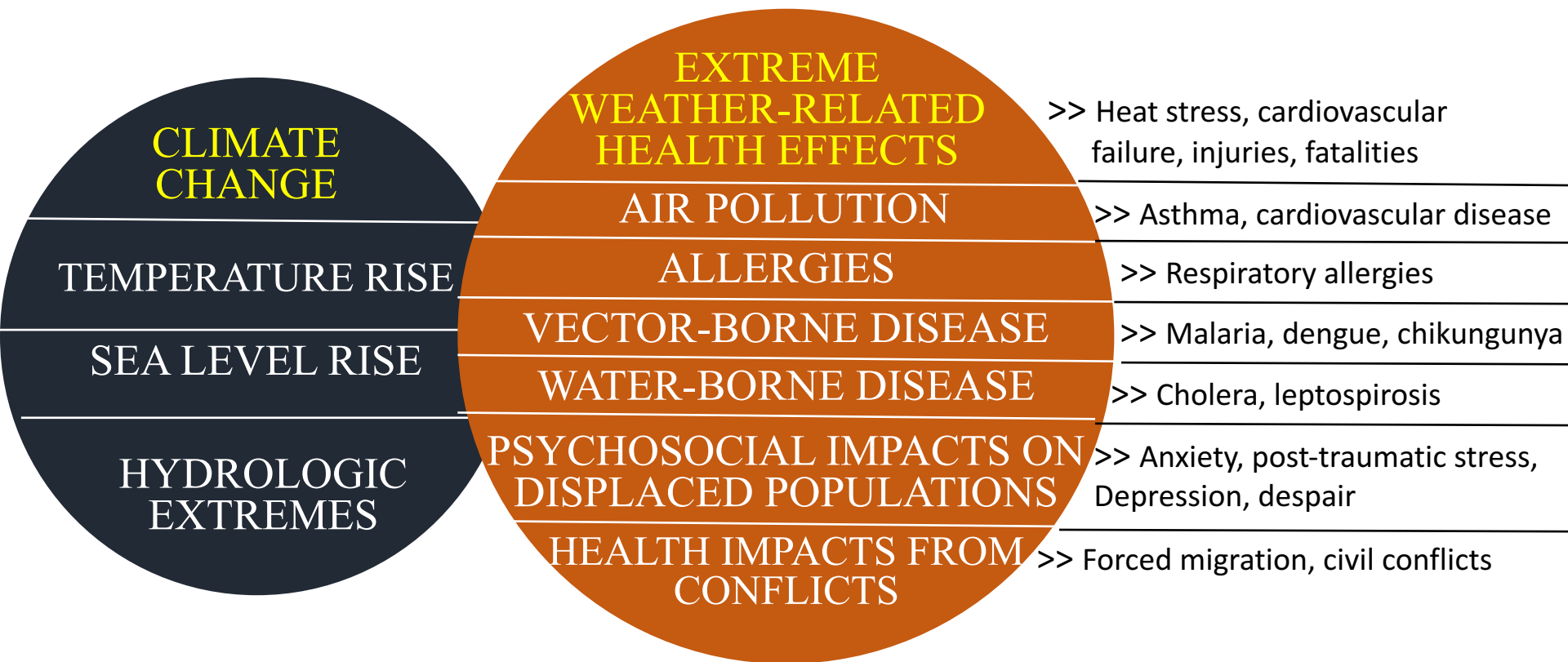
2.2 million
in Africa Region

1.4 million
in Americas Region

854 000
in Eastern Mediterranean Region

827 000
in the Region of the Americas

CLIMATE CHANGE EXAGGERATE ALL THE RISKS OF ENVIRONMENTAL POLLUTION



Info graphics: Chaitanya Chandan; Data sources; National Physical Laboratory, New Delhi; Protecting Human Health from Climate Change' (August 2009), WHO/SEARO; 'Climate Change Impacts on Human Health in India (Keysheet 9), Ministry of Environment and forest and Climate Change

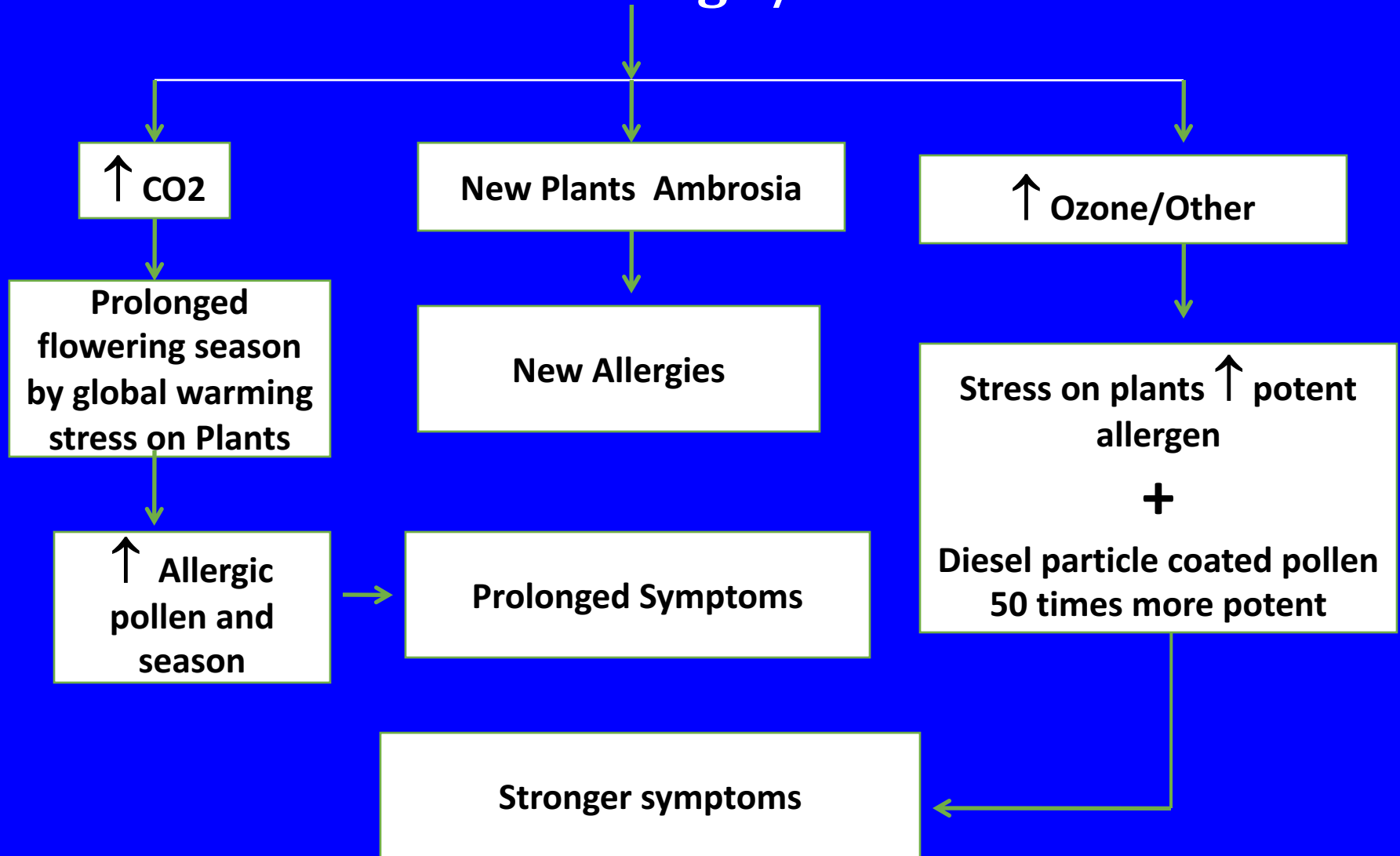
Our Environment (Climate) Our Health

WHO - 2015

- ❑ **Climate change will be the defining issue for health system in the 21st century.**
- ❑ **Adaptation to climate change is essential in primary prevention of health issues**
- ❑ **Climate change will widen the health equity gap within and between countries**
- ❑ **Asthma a global health epidemic > 1billion affected. Anticipate to 4 billion in 2050**
- ❑ **Outdoor air pollution – 3.7M – deaths**
- ❑ **Indoor air pollution 4.3M - deaths**
- ❑ **5.3Trillion (US dollar) annual subsidies are given for fossil fuel industry, which is more than the total health budget of the world.**



Climate Change / Asthma

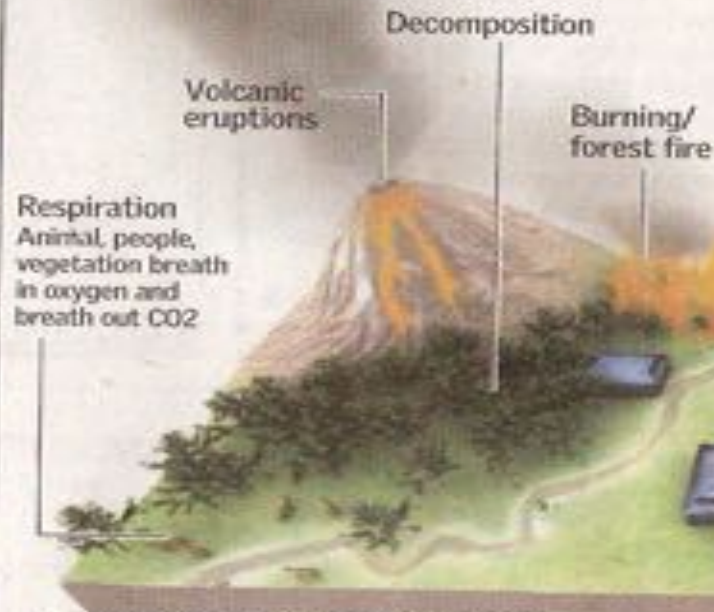


C02 emissions then and now

The global warming theory predicts that increased amounts of carbon dioxide (C02) in the atmosphere enhance the greenhouse effect and thus contribute to global warming.

A look at natural and man-made C02 emitted into the atmosphere:

Pre-industrial time



Today

In addition to natural C02 sources, modern society has increased C02 emissions into the atmosphere:

Deforestation: More C02 escape to atmosphere instead of being converted into oxygen through plants' photosynthesis

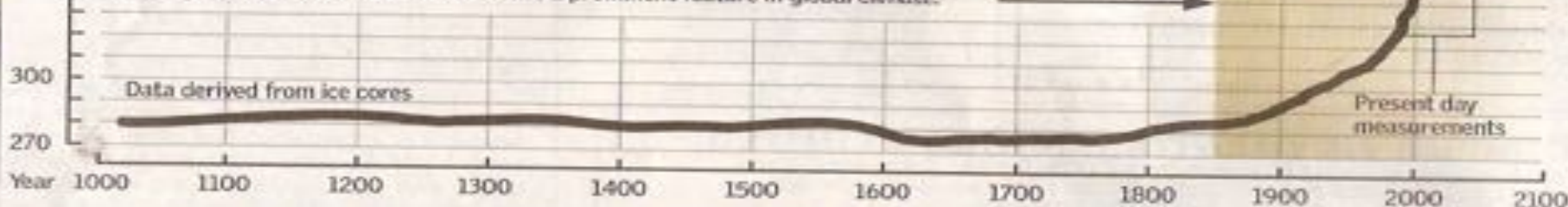


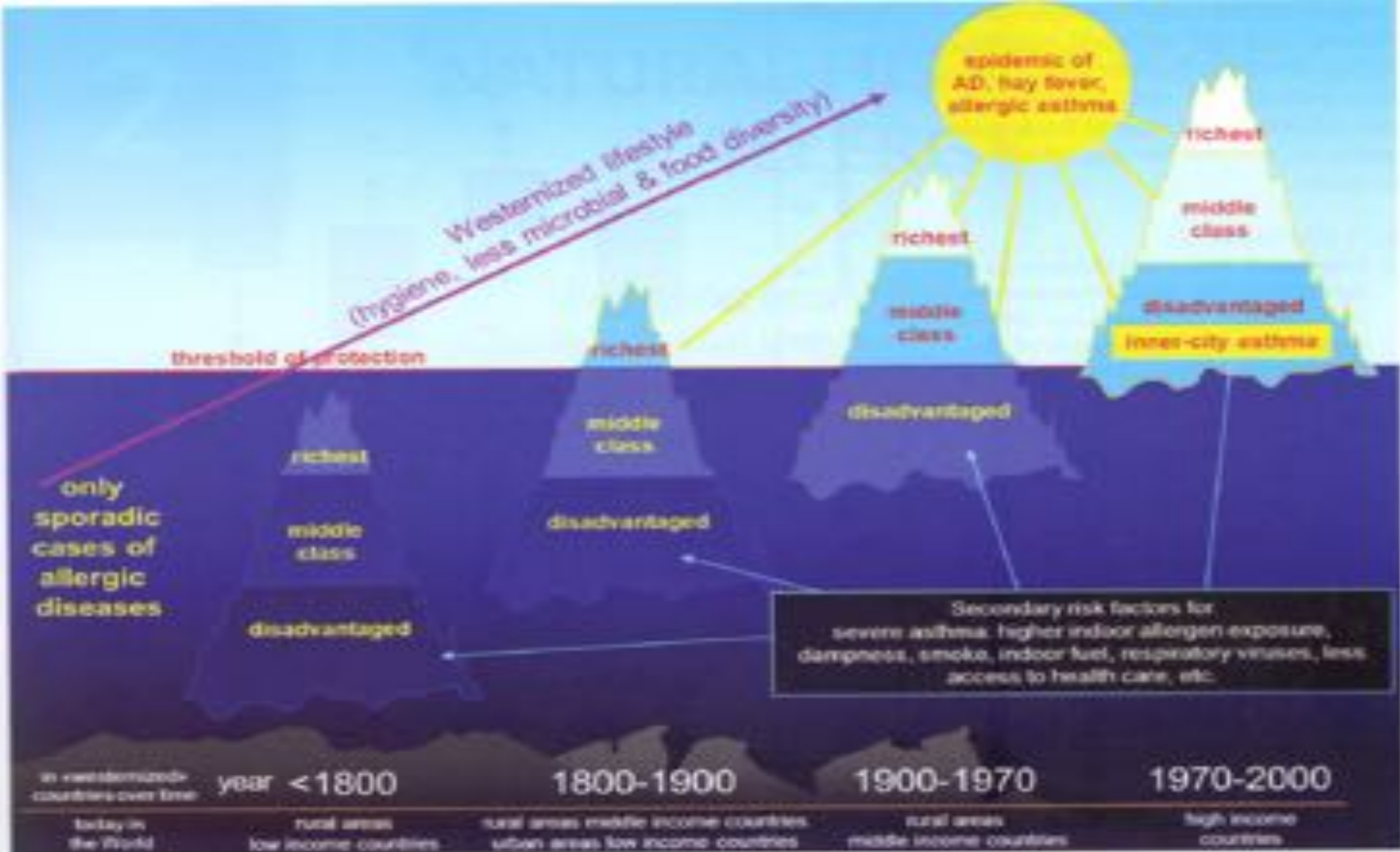
Today Earth's atmospheric C02 concentration is estimated to be around 37% above the pre-industrial average

CO2 particles, per million other particles

Global atmospheric C02 concentration

Dramatic change coincides with the start of the industrial revolution (mid 1800s), when burning of large quantities of fossil fuels became a prominent feature in global climate:



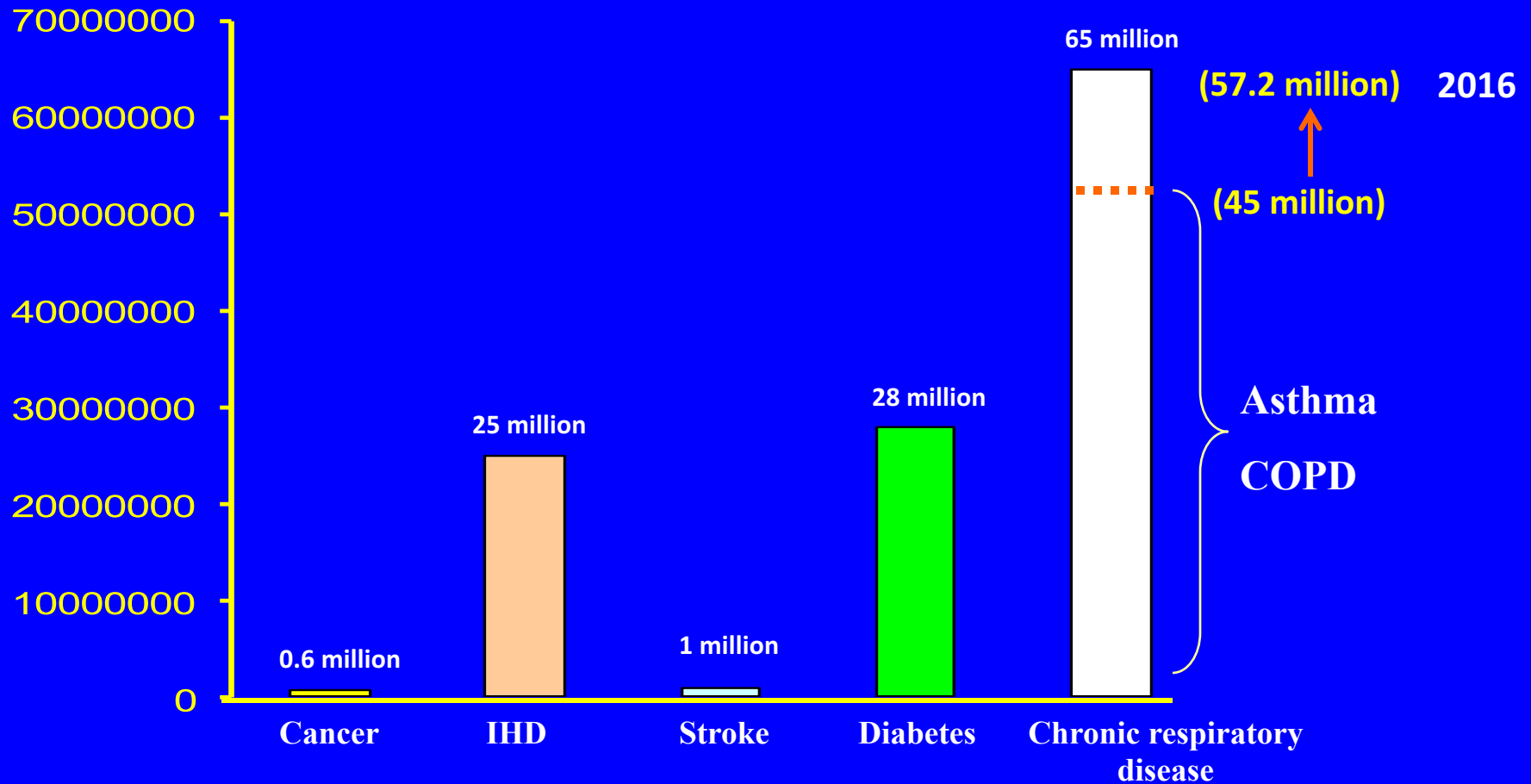


The spread of hay fever and allergic asthma according to socio-economic status and westernization level.

[Reproduced with permission from *Annals of Allergy, Asthma & Immunology*, Vol. 89(S1), Matricardi PM, Bouygue GR, Tripodi S. Inner-city asthma and the hygiene hypothesis, 69-74. Copyright Elsevier 2002.]

ESTIMATED MORBIDITY FOR NON COMMUNICABLE DISEASES BURDEN IN INDIA

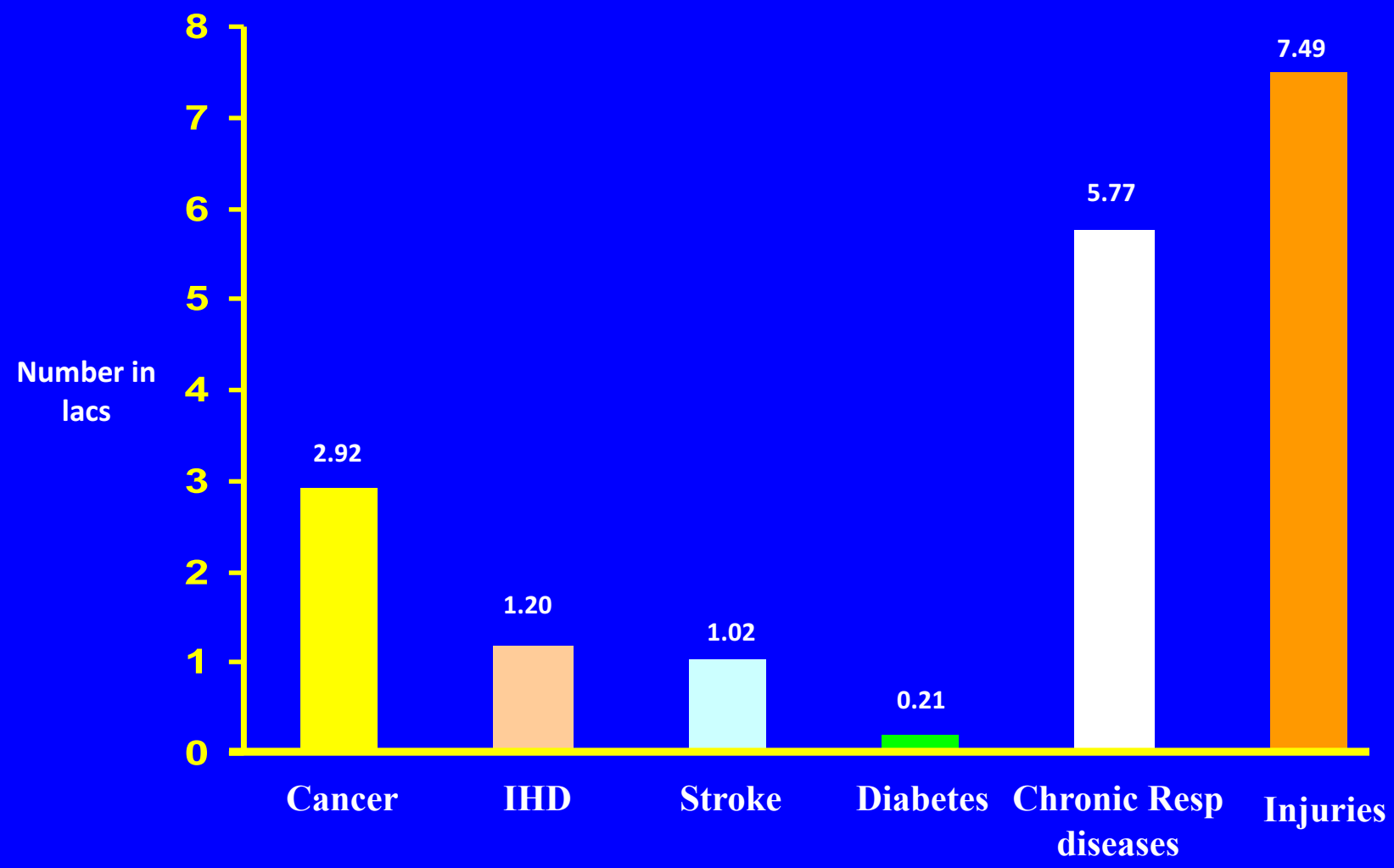
HP



National Commission of Macroeconomics and Health GOI-2005

ESTIMATED MORTALITY FOR NON COMMUNICABLE DISEASES BURDEN IN INDIA

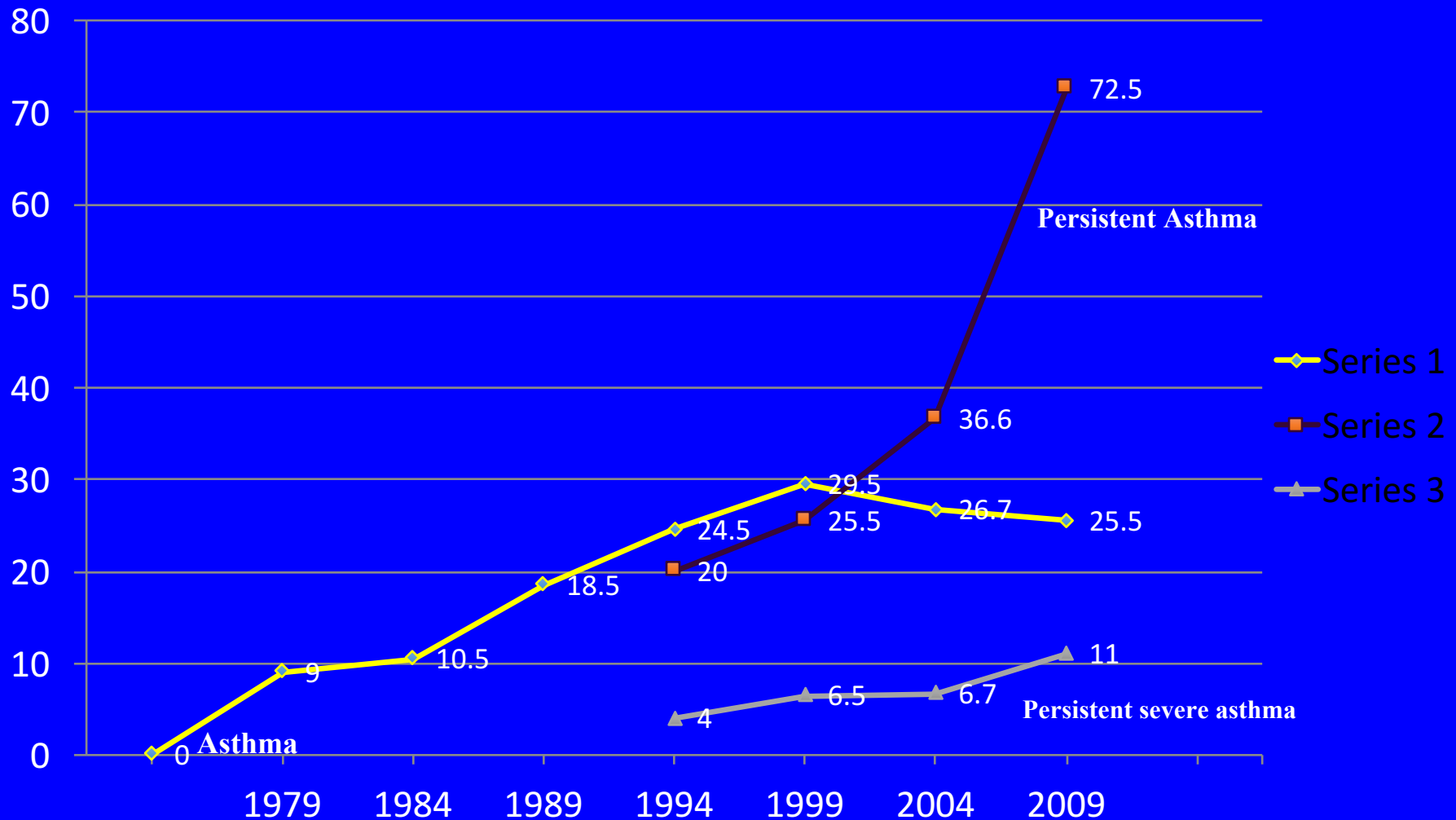
HP



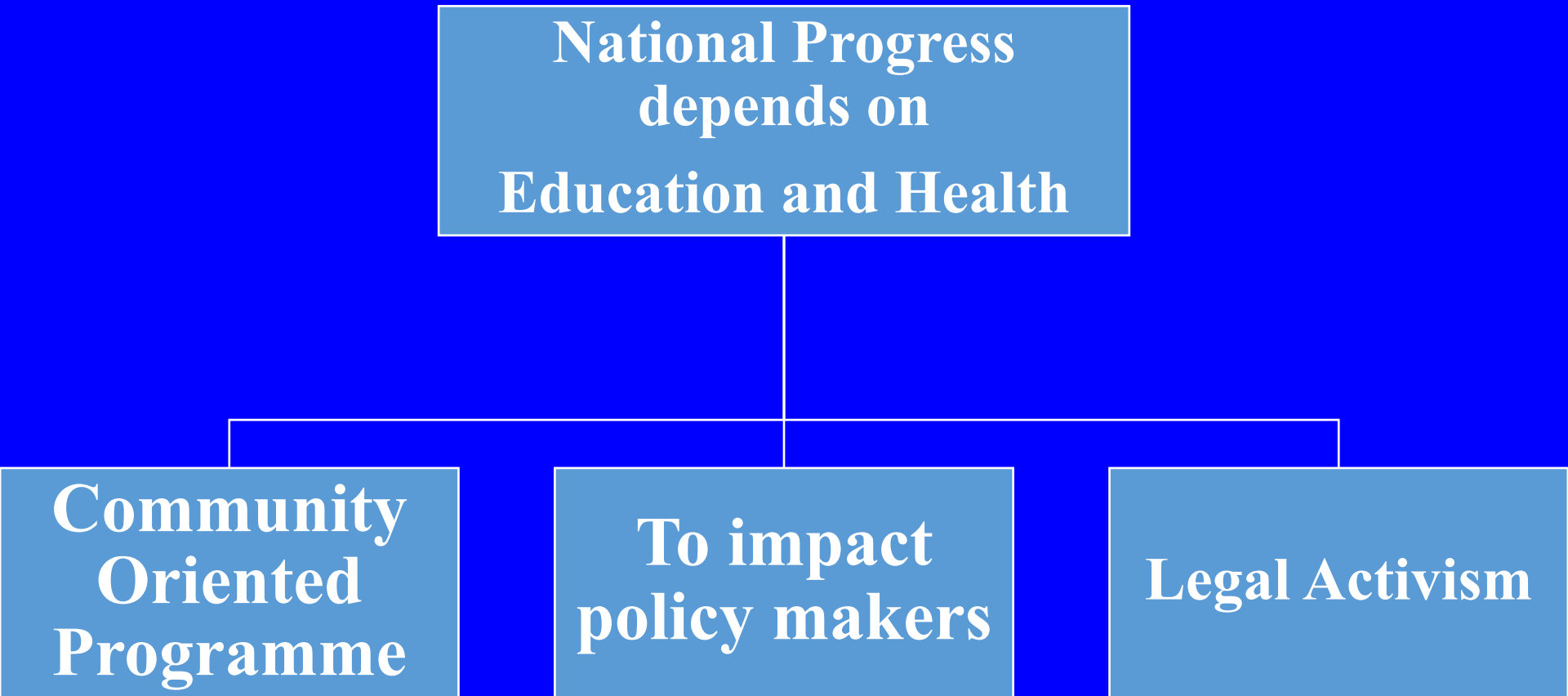
(Nongkynrih B et al, JAPI 2004 Feb; 52: 118-123) WHO, 2002 data

Trends of Asthma Prevalence in Bengaluru

HP



Lakeside Education Trust Community Activities



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Challenges to be addressed in Asthma

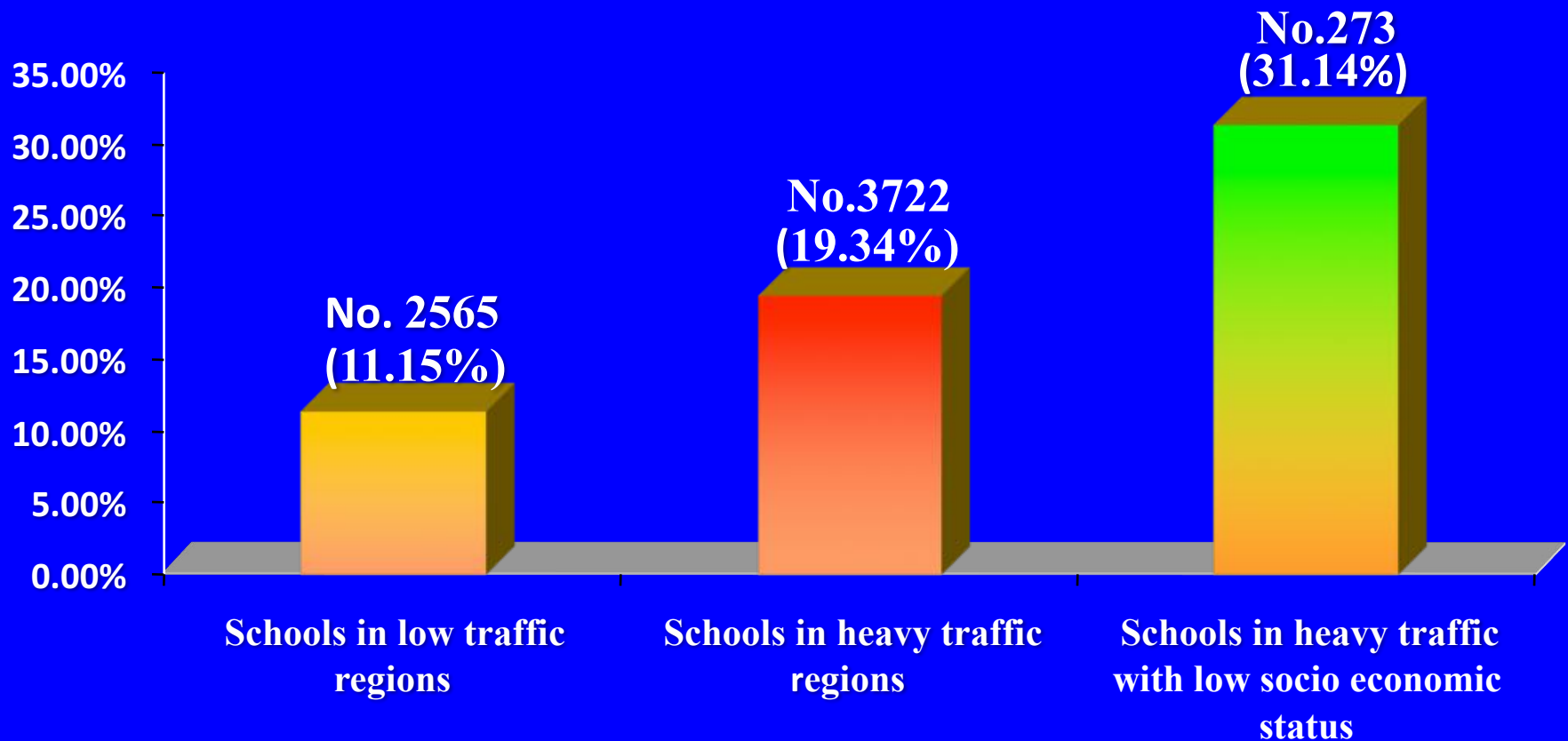
- Avoids to hear the word asthma as diagnosis, more so in girl child
- No one in our family have asthma. Why our child has asthma?
- Contagious
- Worry about long term use of medicines
- Worry about steroids
- Growth of Children
- Inhalation therapy as a last resort
- Adolescent girls avoid inhalers
- Impinge on their freedom
- Embarrassing to take medicine in front of others
- Affordability, Accessibility, Availability, Acceptability
- Single dosage drugs
- Less adverse reaction
- Use Drug covered by insurance

Community education and impact

- Press
- Social media
- Radio
- TV
- School talks
- Text books for physicians
- Working with service organisations-Rotary, Federation of senior citizens etc.
- CME programme 34years



Children of heavy traffic school areas suffer more from asthma it further increases in low socioeconomic children

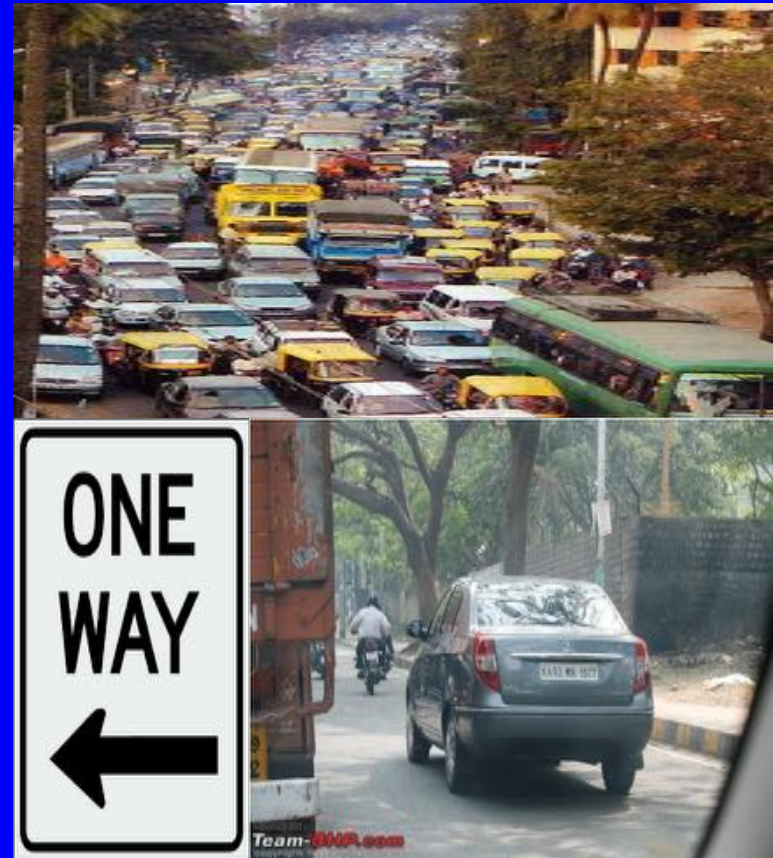


P. Value I, II & III < 0.001.

H. Paramesh, Indian Journal of Pediatrics 2002, 2006

Measures taken

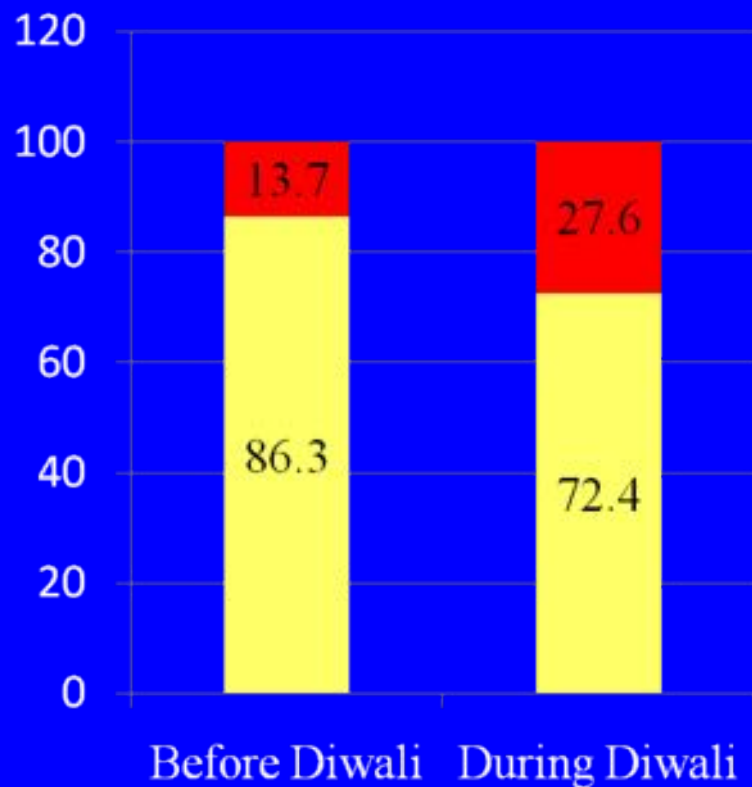
- Decreased usage of private vehicles to drop children at school
- Car pooling
- Public transport
- Increased one way traffic to reduce congestion
- One way traffic reduce Air pollution by 28%



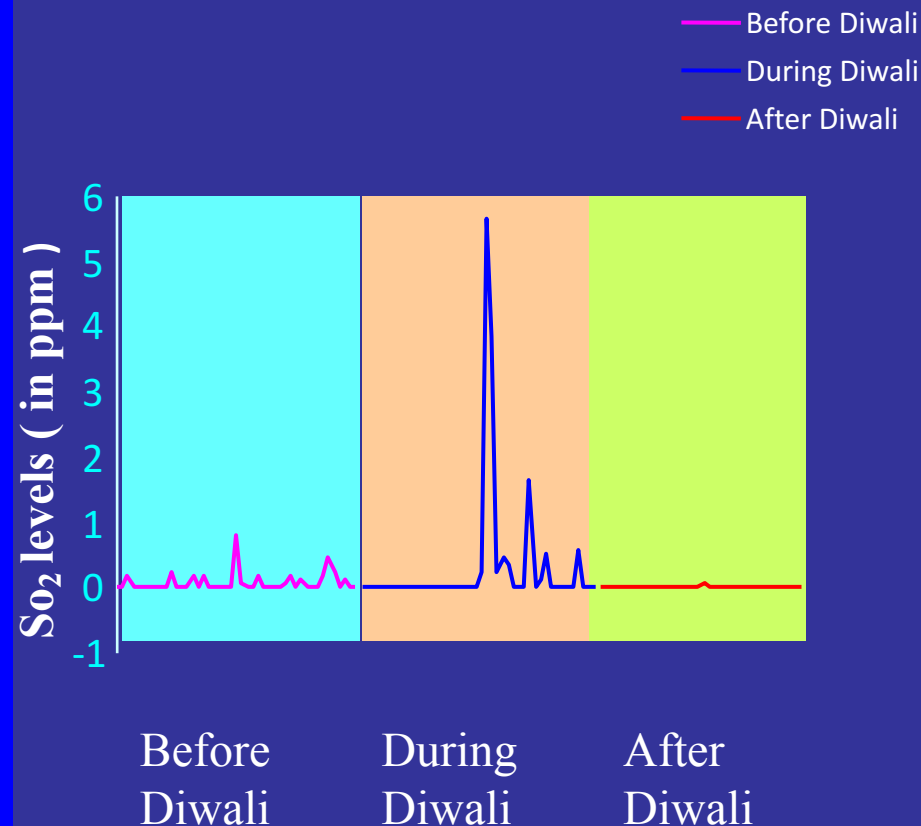
E.R visits for Wheezing During Diwali (Light) Festival increased by 100%



Mean Changes in SO_2 Levels (ppm)



P Value : 0.064



Ambient SO₂ levels reached values **200 times** above the safety limits recommended by WHO

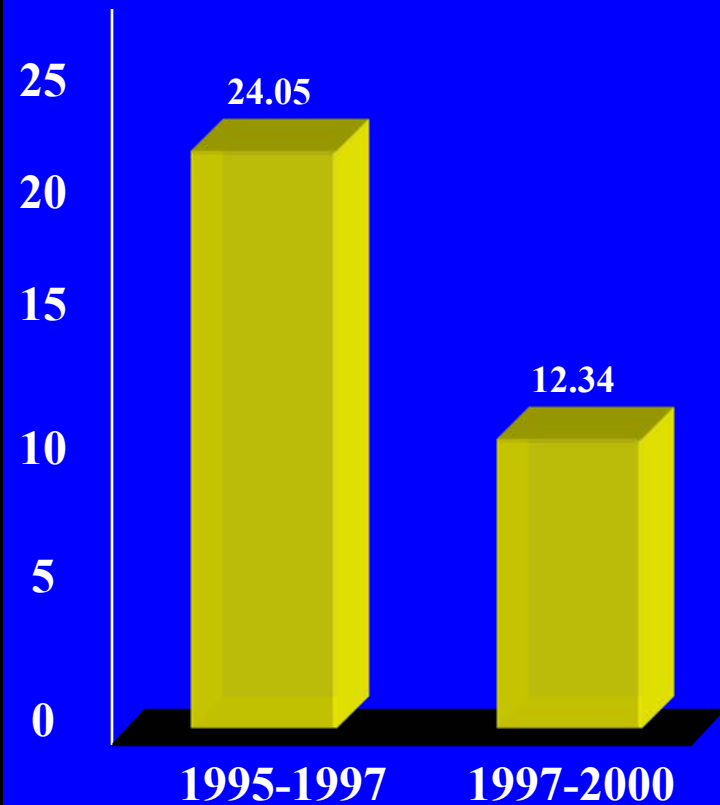
Measures taken

- Education of the society and school children to decrease the usage of Fire Crackers
- Regular Usage of inhalers before bursting crackers
- There is decreased sale of fire crackers
- There is decreased emergency room visits

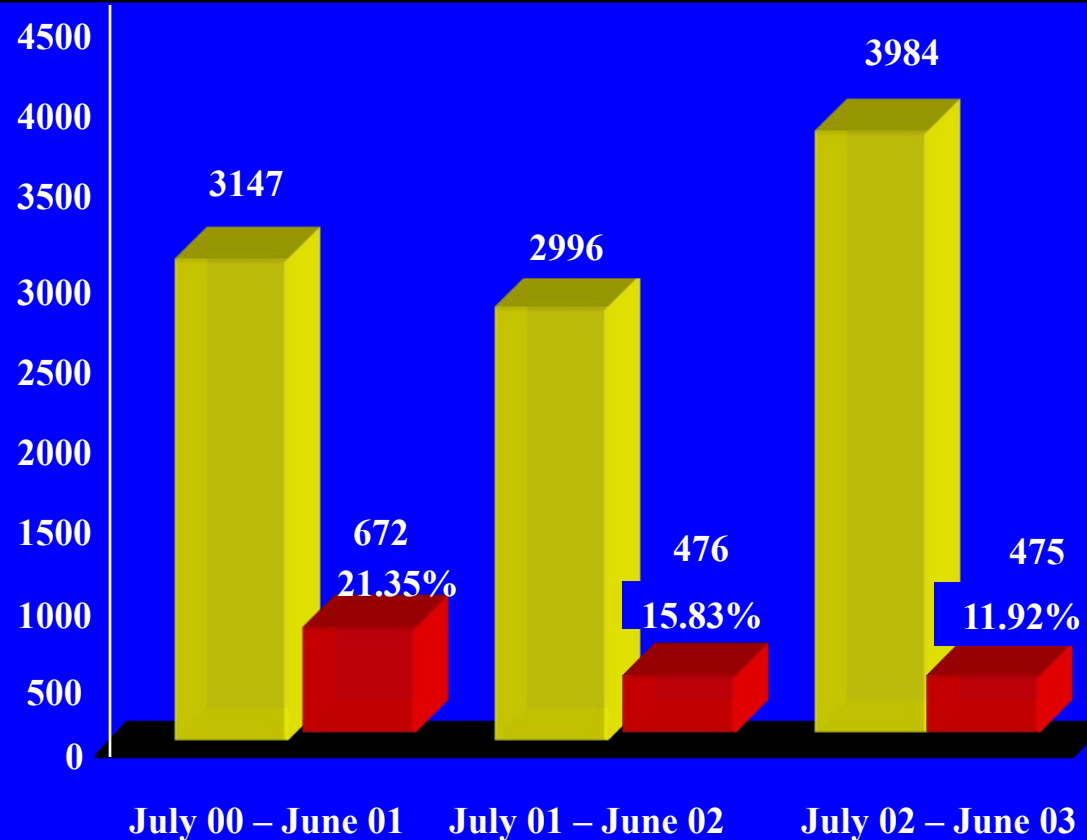


Impact of Education on Asthma

Hospital admission of
Acute severe asthma



E.R. visits of asthma



Lead Poisoning

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- Ingested, inhaled or absorbed through skin
- Source:
 - **86% of atmospheric lead – auto exhaust, leaded petrol**, water pipes, paint, battery storage, crystal glass, ceramic glaze, enamel jewelry, etc .
 - Lead concentration in dust is directly proportional to the volume of traffic
 - Children absorb 50% and adults 10-20% of ingested lead.
 - **Lead in tissue, cord blood correlate with air levels.**
- Effect:
 - GIT, peripheral nerve, central nervous system, **decreased IQ, convulsions, coma, death**
 - Saudi Arabia study – 5000 children – 1989 – using 0.8 G/L of lead in petrol showed no alarming lead poisoning.
 - **Bangalore study – 863 children – using 0.59 G/L of lead in petrol showed – 4.6% of increased lead level over 10µg/dl*.**
- Trend:
 - Use of unleaded petrol will reduce lead pollution. No cause for fear psychosis, however there should not be any complacency in preventive measures.

AVOID MEDIAGENIC DISEASE

Measures to limit the lead poisoning

Ganesha Festival Lead Poisoning

- Banned leaded petrol
- Increased usage of clay idols than painted one
- Increased use of assigned places by municipal authorities for immersion of idols
- Increased usage of immersion at home in the bucket and use the same for garden



Increase greenery

- Giving free saplings of plants with tree guard and having the child's name over it is a very successful programme during World Environmental Day celebrations



Air pollution/ Spinal Health/ School bags

- Decrease Wt. of school bags should not be more than 10% of body wt.
- It is recommended to all the school authorities and education departments
- Encouraged School sports in children with asthma controller medications by using controller medicines to prevent episodes
- Many schools use regularly yoga classes and teach breathing exercises.








- **Global**

- 2.9 billion people (42%) were affected in 2012.
- 4.3 million death per year.
- 58% are women and children.

- **Indian**

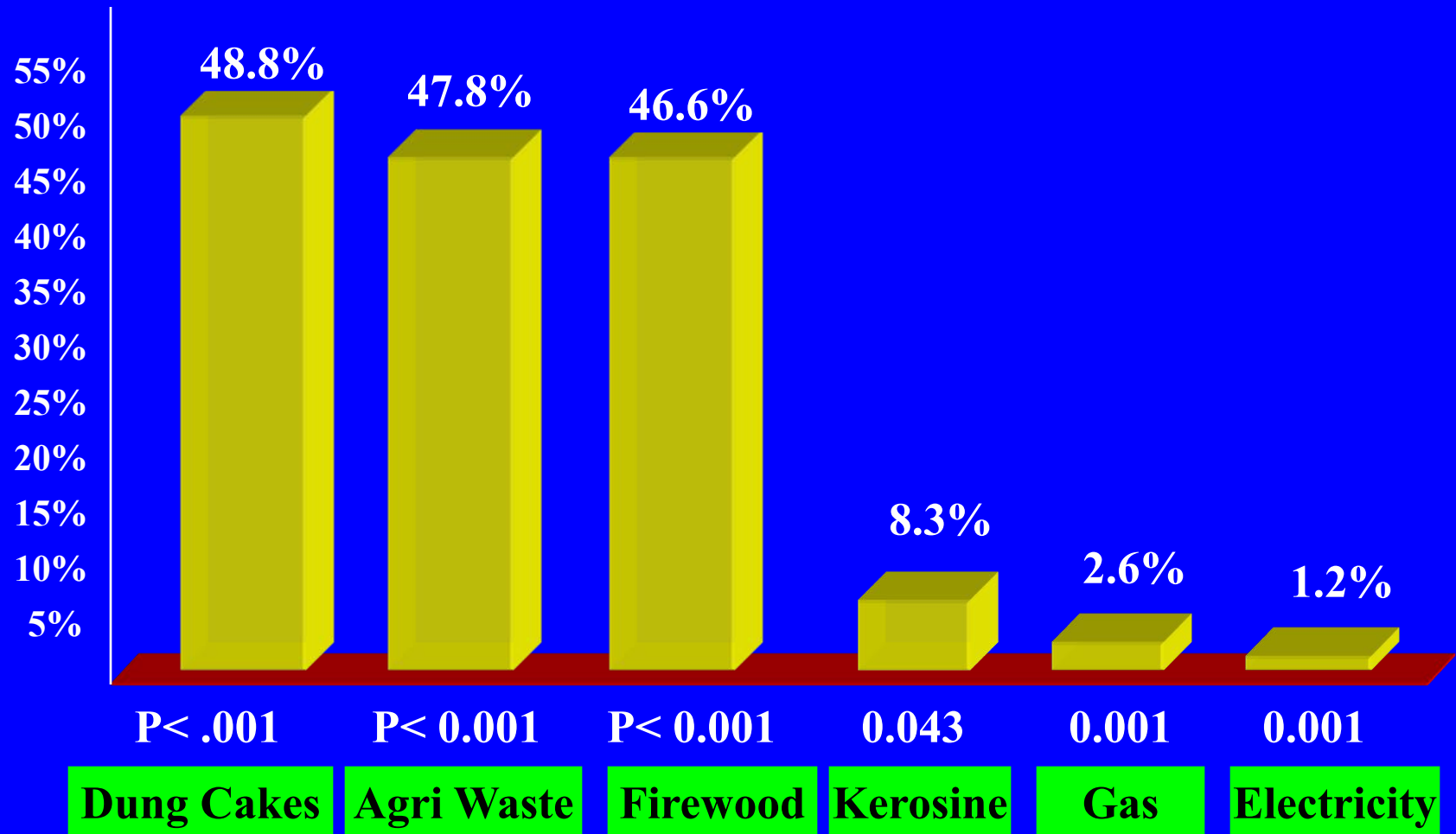
- 1.15 million premature deaths per year.
- 85% of Indian population are mainly women and children (1990).
- Chulhas used in solid cooking fuel, release smoke equivalent to 400 cigarettes per hour.

Allergens

	Allergen		Source	
1	HDM Dermatophagoides pteronyssinus, D. farinae /Blomica Tropicalis	 60%	Bed, blankets, pillows, stuffed toys, Carpets, draperies, upholstered furniture	<ul style="list-style-type: none"> Washing bedding linen in water more than 130°F (55°C) Expose the bedding linen to sunlight once a week
2	Cockroach Blattella germanica, Periplaneta Americana, and Blatella orientalis.	 25%	Kitchen stores, drains, garbage areas, ill maintained houses	
3	Fungus Alternaria, Cladosporium, Aspergillus, Penicillium	 7.5%	Wet, humid, ill ventilated houses, basement, attics, shower curtain, leakages, indoor plants, carpets, furniture	
4	Pollen	 7.5%	<ul style="list-style-type: none"> •Tree pollen Jan-Apr •Grass pollen -July-Nov •Weed pollen - Nov-Jan 	
5	Pets Cats and Dogs	 5%	Cat is more allergenic than dog. Pets are vector for pollens/molds	Pets especially dogs are not the cause for increase prevalence of asthma

Cooking Fuel V/s Prevalence of Asthma in Children

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Cooking fuel

- Better usage of Chulhas
- Encourage the use of commercial cooking fuel in urban area
- Encourage gobar gas (biomass gas) usage in villages
- Usage of solar heating to decrease CO₂
- Govt. subsidy



Tobacco Smoking Habit

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- 41% of urban children – 10-17 yrs (3078)
- 21.8% of rural children – 10-17 yrs (2194)
- 36.0% of urban club going women
- 2.0% of rural farm worker women
- 30.6% of traffic police
- 34.0% of non traffic police
- 14.0% of Poultry farm workers
- 28.0% of Agriculture farm workers



W.H.O will never be on speaking terms with tobacco industry

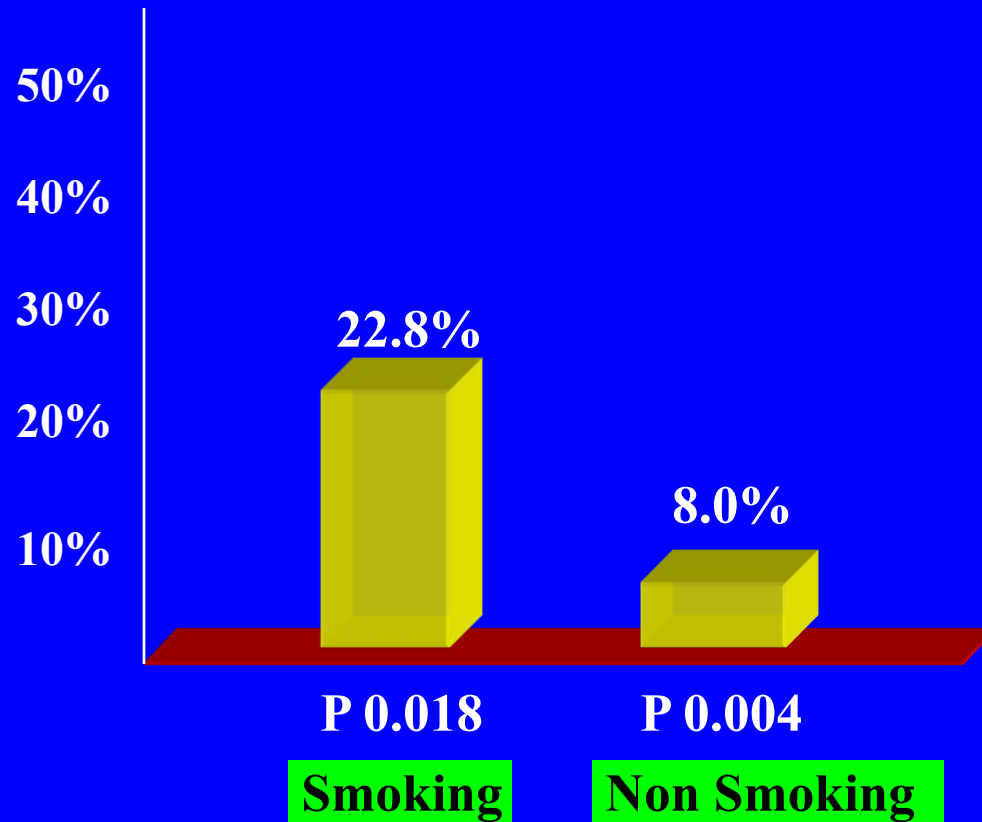
Margaret Chan - 2013



H. Paramesh, E. Cherian; 2nd International Conference on Environment and Health; 2010

Cigarette Smoking Parents V/s Asthma Prevalence in Children

HP



Paramesh H Cherian E 5th International Conference on Environment and Children's health 2010, IAP Text Book of Pediatrics 2016.

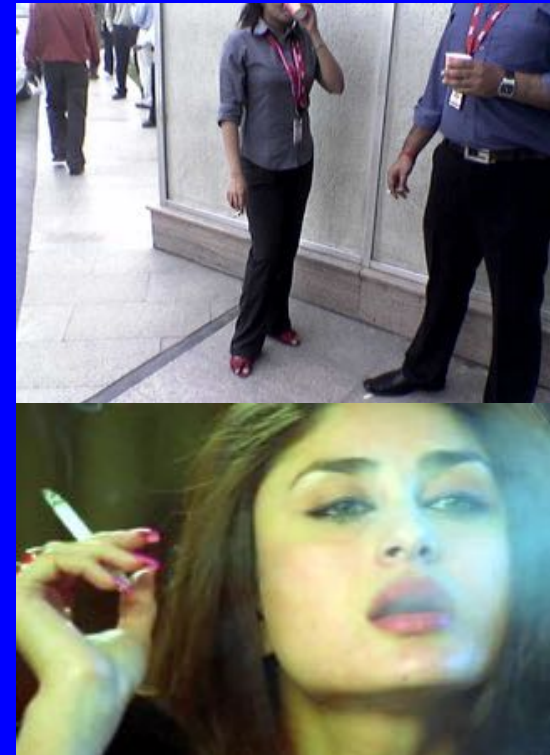
Reason to start Tobacco smoking

(no.1500 High school children)

- Peer Pressure – 29%
- Curiosity – 18%
- Pleasure/Fashion – 16%
- Frustration – 12%
- Status Symbol – 10%
- Relieve tension – 08%
- Concentration – 05%
- Other reasons – 02%

Tobacco smoke

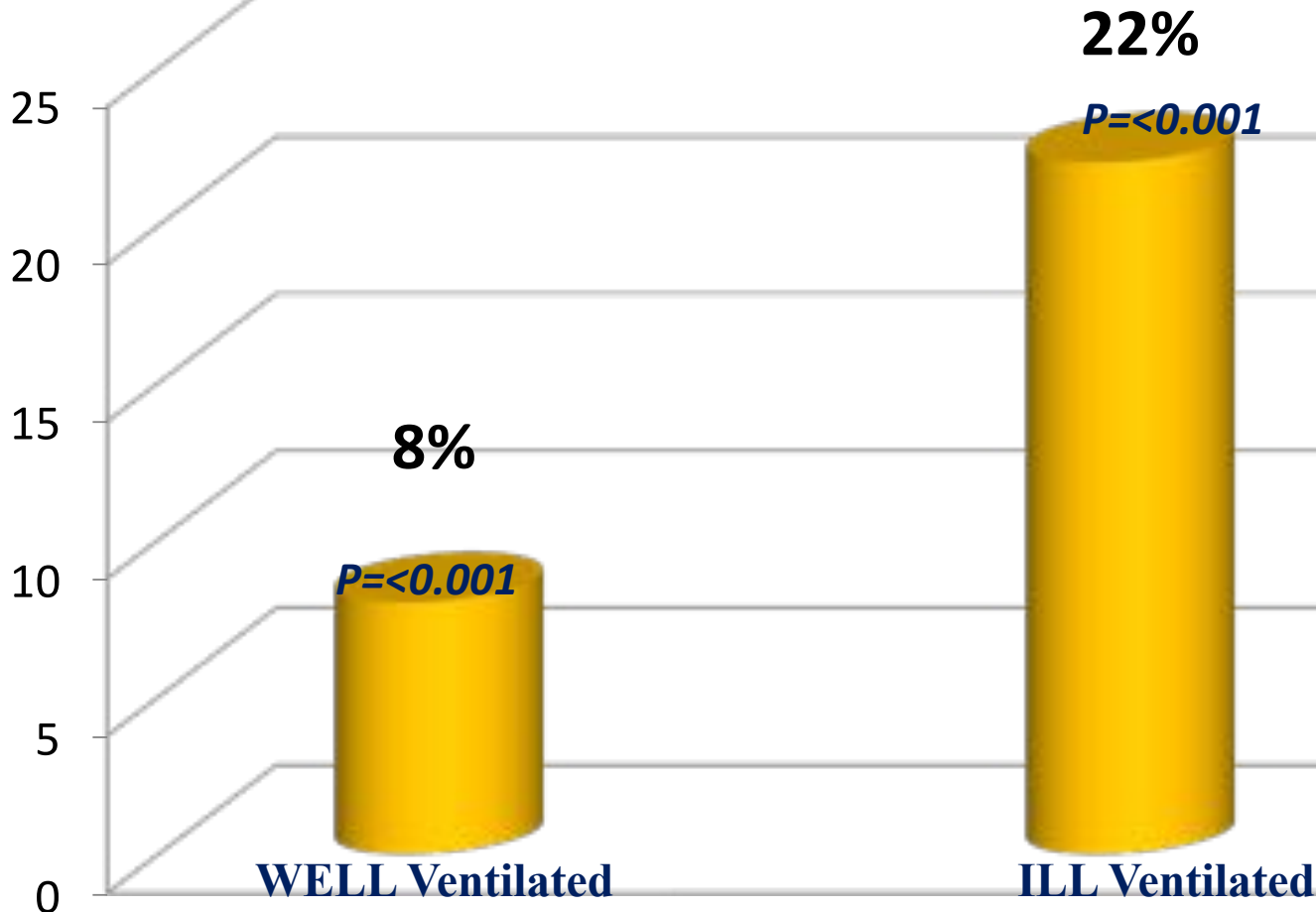
- Banning tobacco smoke in public places – 2001 by Government of Karnataka, before it became a National policy
- Tobacco ban of public sale near schools.
- Awareness programmes in schools, parents education about the ill effect of tobacco smoke.
- There is 38% reduction in usage of tobacco in children and youth 2007-2015.*
- There is 7% increase girl smokers, office goers. Between 2007-2014.*
- There is continued efforts in education



** Study from Lakeside Education Trust in progress*

Ventilation & Asthma

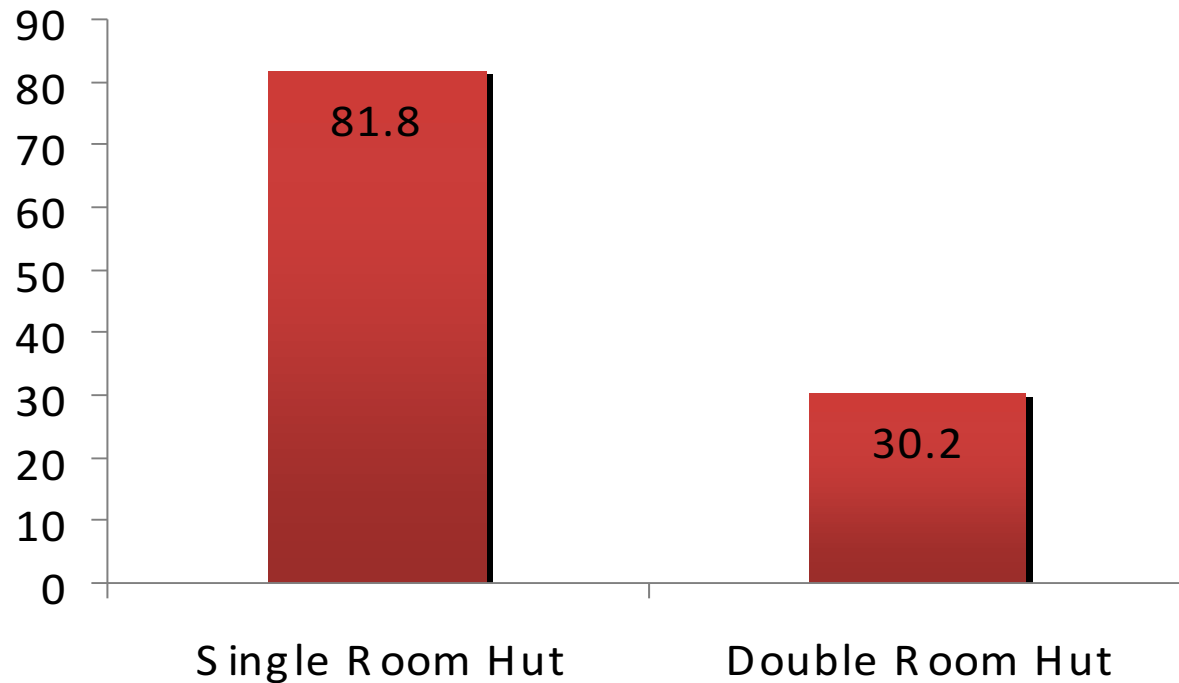
HP



Point Prevalence of respiratory infection/indoor air pollution A Rural Study

HP

No. Of houses 612, children <5 years 301



Children living in single room are 10.5 times more likely to develop respiratory infection when compared to children living in double rooms. $P < 0.001^{**}$

Dr. H. Paramesh, Elizabeth Cherian; International Conference on Environment and Child Health, Vienna, 2007, IAP Text Book of Pediatrics 2016.



Vaastu. What is it?

- ❖ The science of structure and a design of Indian Environment
- ❖ Based on Vedic mathematics
- ❖ It is like Holistic medicine
- ❖ **Good cross ventilation**
 - Avoid Indoor Pollution “Sick building syndrome”
 - Avoid bad odor flies and related diseases
- ❖ **Good Sunlight**
 - To Kill germs
 - To Kill dust mites
- ❖ **Greenery**
 - Soothing effect Gives O_2
 - Absorbs formaldehyde



Hospital Ventilation and Infection Risks.

- Good Ventilated ward should have 6 air changes/hr.
- When windows are closed, it is only 1.5 air change /hr
- Risk of infection is 4 times higher

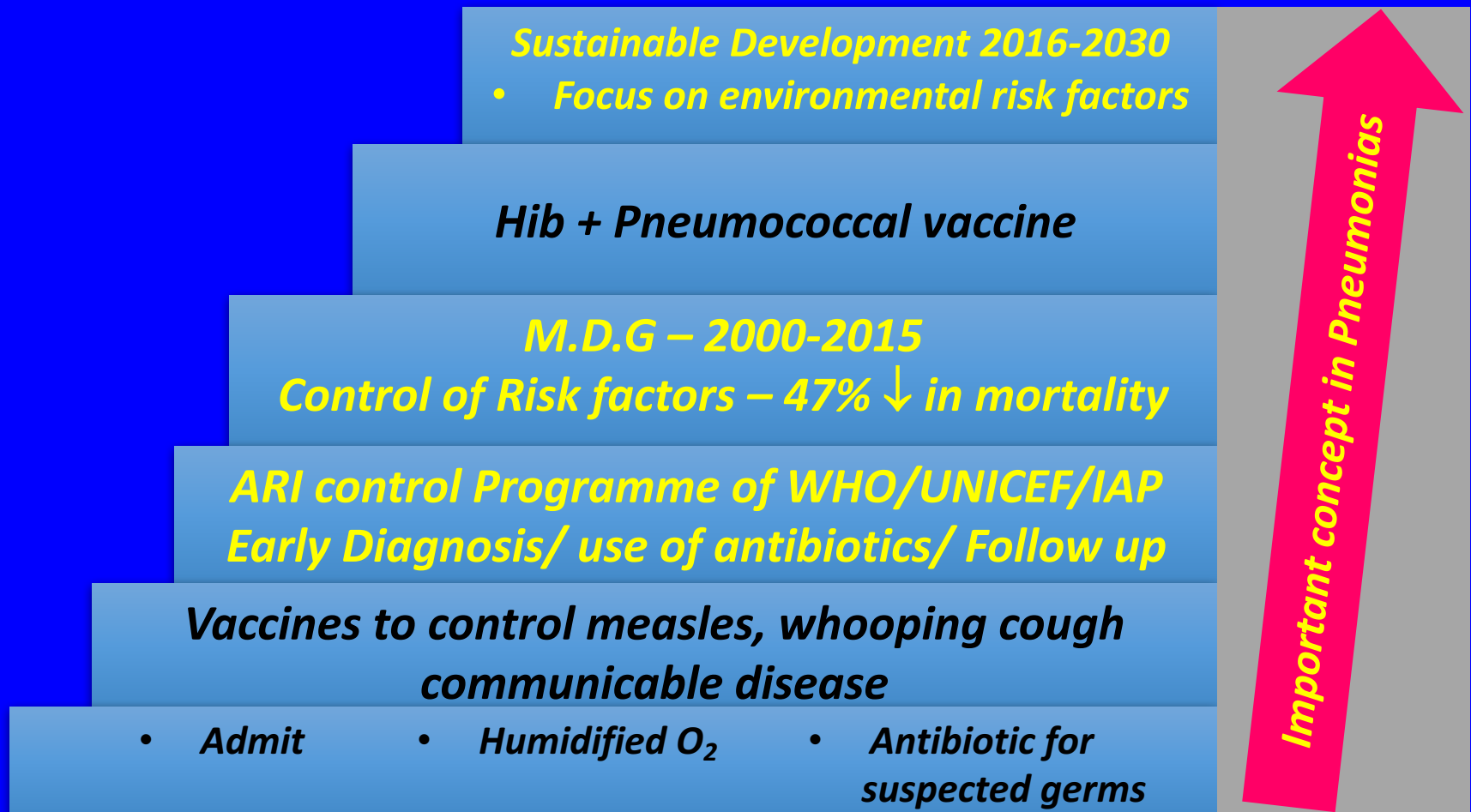
HP

Carl Gilkeson, Cath Noakes, Laura Pickin
Miller Camargo – Valerio. Uni, Leeds. Civil
engineering and National health Services
AalaTimes.com

<http://www.aalatimes.com/2013>. April 21st

Millennium Goal in ARI Control Programme

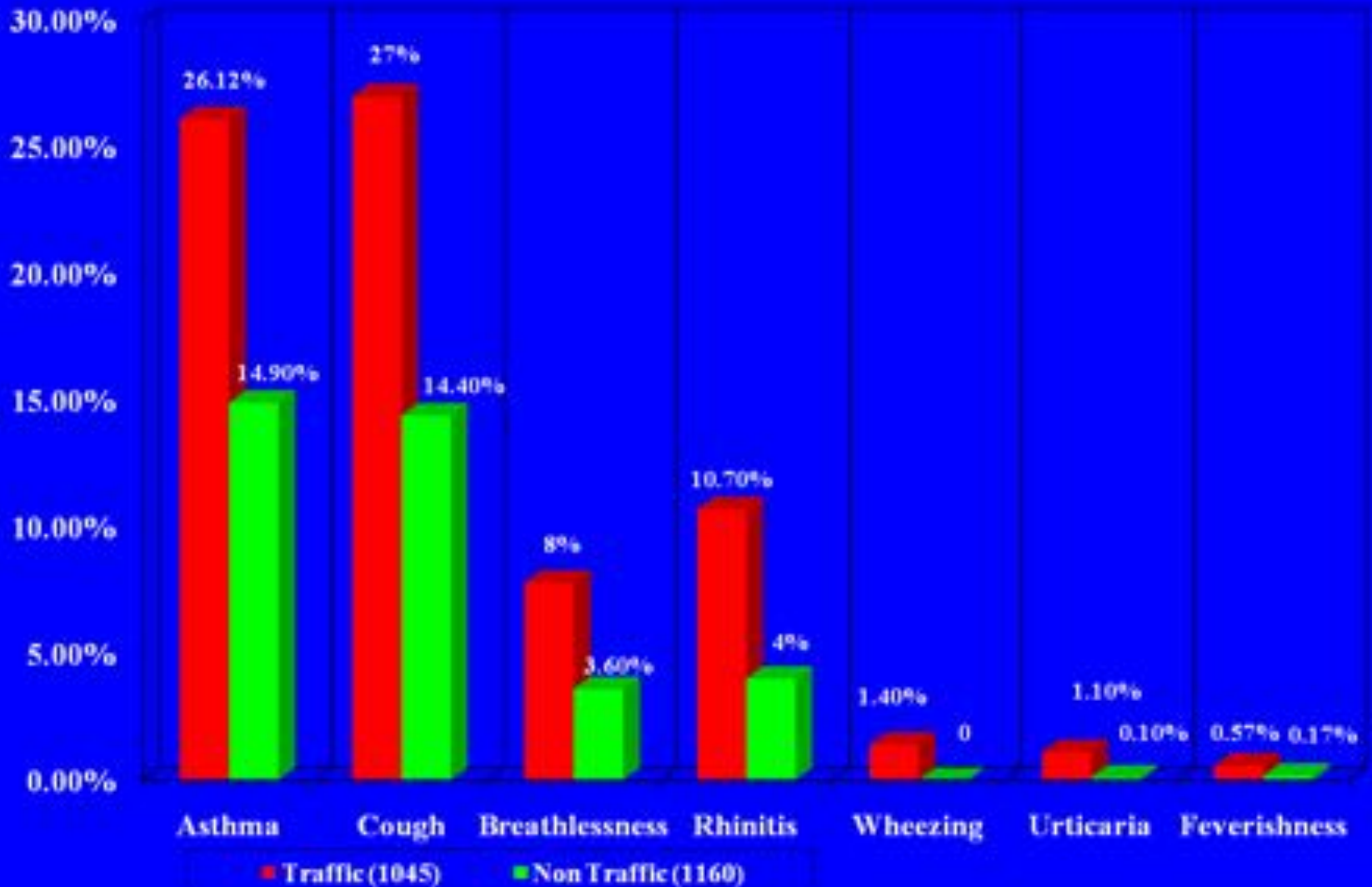
HP



H Paramesh

Traffic Police Suffer More from Air Pollution than Non-Traffic Police

HP



Preventive Measures taken

❖ Discussed in the parliament and recommended-1999

- Use of traffic police masks - shift in duties (policy changes)
- Rotation of jobs
- Regular lung function and advice

Air pollution and Industry Karnataka state

(Chairman TAC Karnataka State Pollution Control Board 2001-05)

- Convincing the industrialists responsibility on health of their employees and the neighbourhood villages which are affected depending on the windrose data of that industry.
- Requested them to spend 1% of their profit for the health, education and social cause.
- Instituted pulmonary function testing, pulse oximetry and compulsory hearing test as an annual checking of the staff and public.



JINDAL VIJAYANAGAR STEEL PLANT

Supreme court of India appointed

Bhurelal committee to tackle Air pollution menace

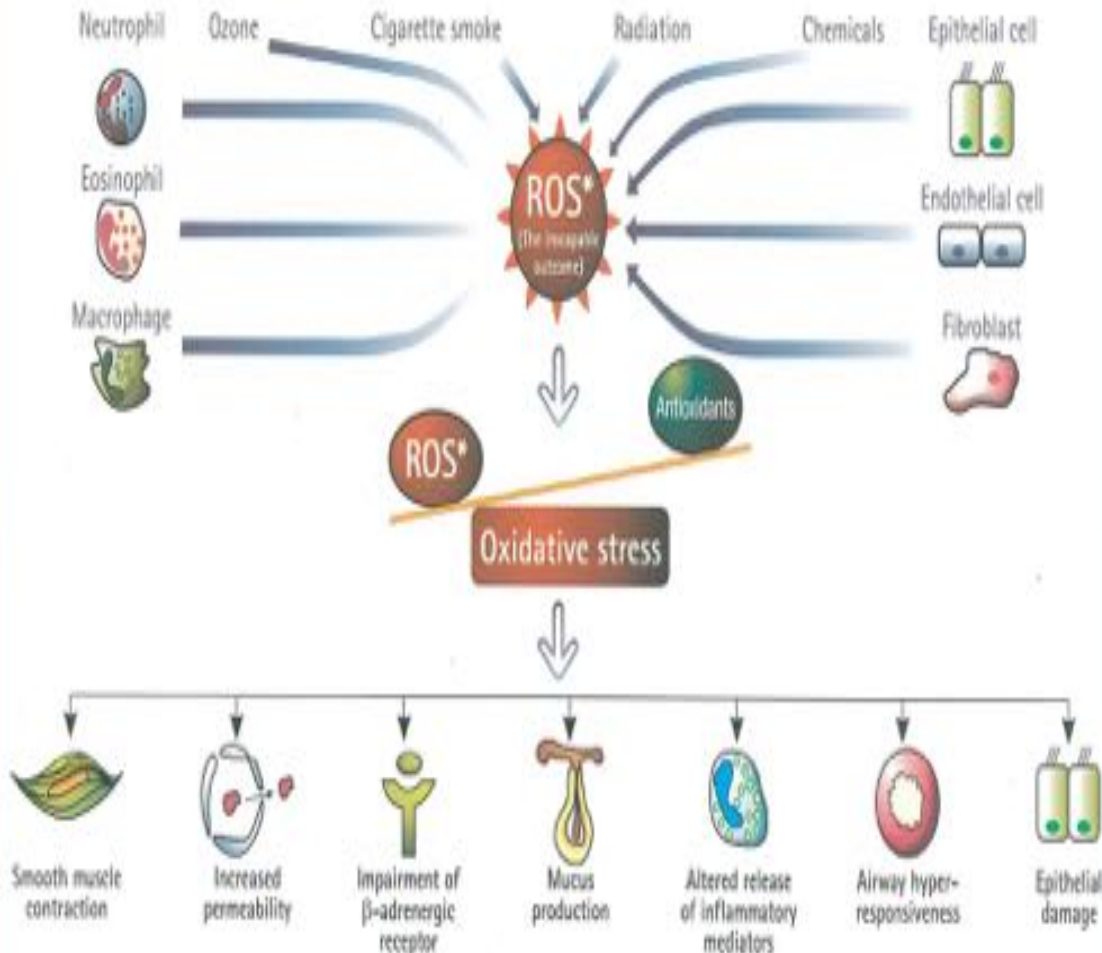
(utilized our data from World Bank Project/Govt. of Karnataka-2003 and commission of Macro Economics and Health, Govt. of India-2005)

- To clean up Mega cities in time bound fashion from Air pollution
- To maintain good school environment
- Clean emission certificates to all vehicles
- Banning old vehicle on the road

Antioxidants

- Fruits
- Vegetables
- Butter
- Curds
- Fish
- Pickles (limited)
- Oils rich in Omega – 3 fatty acids (Fish Oil)
- Wine (limited)
- Encourage traditional food habits

Oxidative Stress – Triggers respiratory conditions



Economic burden of diseases for the policy makers

❖ Global economics on Health*

- 97% is for care
\$ 7,452 billion (2013)
- 03% is for prevention
\$ 272 billion (2013)

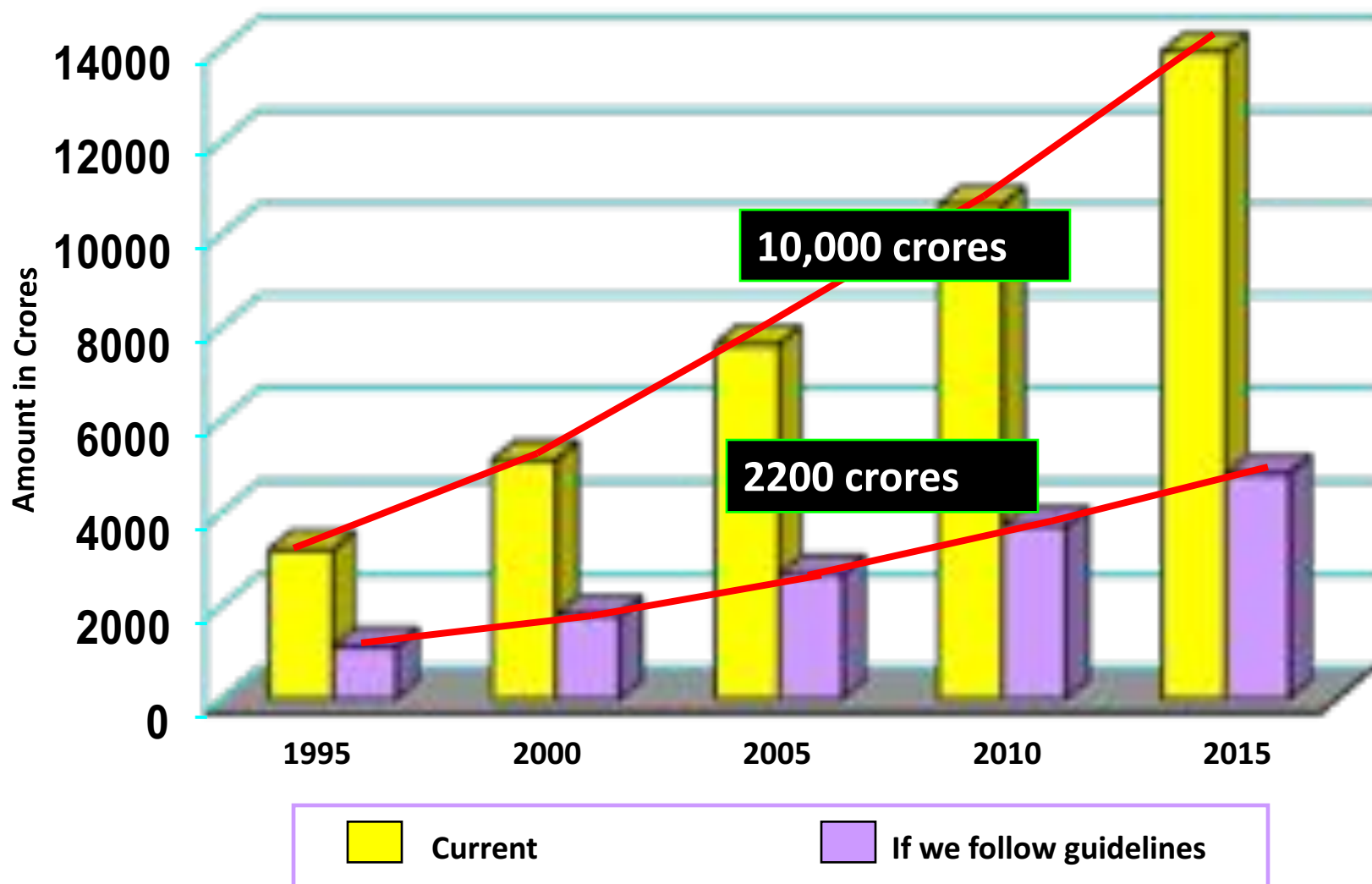
❖ India spends over 52% of total budget on care of persistent asthma and antihistamines**

- ₹ 140 billions for asthma
- ₹ 1 billion for antihistamines

* WHO data

** ADEX module

ECONOMIC BURDEN OF ASTHMA IN INDIA



(NCMH Background Papers, 2005)

POSITION PAPER

International consensus on (ICON) pediatric asthma

N. G. Papadopoulos¹, H. Arakawa², K.-H. Carlsen³, A. Custovic⁴, J. Gern⁵, R. Lemanske⁶,
P. Le Souef⁷, M. Mäkelä⁸, G. Roberts⁹, G. Wong¹⁰, H. Zar¹¹, C. A. Akdis¹², L. B. Bacharier¹³,
E. Baraldi¹⁴, H. P. van Bever¹⁵, J. de Blic¹⁶, A. Boner¹⁷, W. Burks¹⁸, T. B. Casale¹⁹,
J. A. Castro-Rodriguez²⁰, Y. Z. Chen²¹, Y. M. El-Gamal²², M. L. Everard²³, T. Frischer²⁴, M. Geller²⁵,
J. Gereda²⁶, D. Y. Goh²⁷, T. W. Guilbert²⁸, G. Hedlin²⁹, P. W. Heymann³⁰, S. J. Hong³¹,
E. M. Hossny³², J. L. Huang³³, D. J. Jackson³⁴, J. C. de Jongste³⁵, O. Kalayci³⁶, N. Ait-Khaled³⁷,
S. Kling³⁸, P. Kuna³⁹, S. Lau⁴⁰, D. K. Ledford⁴¹, S. I. Lee⁴², A. H. Liu⁴³, R. F. Lockey⁴⁴,
K. Lødrup-Carlsen⁴⁵, J. Lötvall⁴⁶, A. Morikawa⁴⁷, A. Nieto⁴⁸, H. Paramesh⁴⁹, R. Pawankar⁵⁰,
P. Pohunek⁵¹, J. Pongracic⁵², D. Price⁵³, C. Robertson⁵⁴, N. Rosario⁵⁵, L. J. Rossenwasser⁵⁶,
P. D. Sly⁵⁷, R. Stein⁵⁸, S. Stick⁵⁹, S. Szefler⁶⁰, L. M. Taussig⁶¹, E. Valovirta⁶², P. Vichayanond⁶³,
D. Wallace⁶⁴, E. Weinberg⁶⁵, G. Wennergren⁶⁶, J. Wildhaber⁶⁷ & R. S. Zeiger⁶⁸

Airway Diseases Education and Expertise (ADEX) in Pediatrics: Adaptation for Clinical Practice in India

**H PARAMESH, K NAGARAJU, TU SUKUMARAN, SHARAD AGARKHEDKAR, SANTANU BHAKTA, RAJ TILAK,
VIJAYASEKARAN D, VARSHA NARAYANAN, AMEY MANE, ABHAY PHANSALKAR AND GANESH KADHE**

From ADEX working group, Indian Academy of Pediatrics Allergy and Applied Immunology Chapter, Indian Academy of Pediatrics, India.

*Correspondence to: Dr H Paramesh, Sirona Center for Health Promotion, Bengaluru 560094, Karnataka, India.
dr_paramesh1@yahoo.com*

Justification: Asthma and allergic rhinitis together are part of the concept of 'one airway, one disease' or 'united airway disease'. The management of allergic airway diseases should address this united concept and manage the issue by educating the patients and their parents and health care providers, along with environmental control measures, pharmacotherapy and immunotherapy. Here, we present recommendations from the module of 'Airway Diseases Education and Expertise' (ADEX) that focused on allergic rhinitis, asthma and sleep disorder breathing as a single entity or Allergic Airway Disease.

Process: A working committee was formed by the collaboration of Pediatric Allergy Association of India (PAAI) and Indian Academy of Pediatrics (IAP) Allergy and Applied Immunology chapter to develop a training module on united airway disease.

Objectives: To increase awareness, understanding and acceptance of the concept of "United Airway disease" and to educate the primary health care providers for children and public health officials, in the management of united airway diseases.

Recommendations: Recommendations for diagnosis, management and follow-up of Allergic airway disease are presented in this document. A better compliance by linking education of child, parent, grandparents and other health care providers, and scientific progress by collaboration between practitioners, academicians, researchers and pharmaceutical companies is suggested.

Keywords: Allergic rhinitis, Asthma, Education, Guidelines, Management

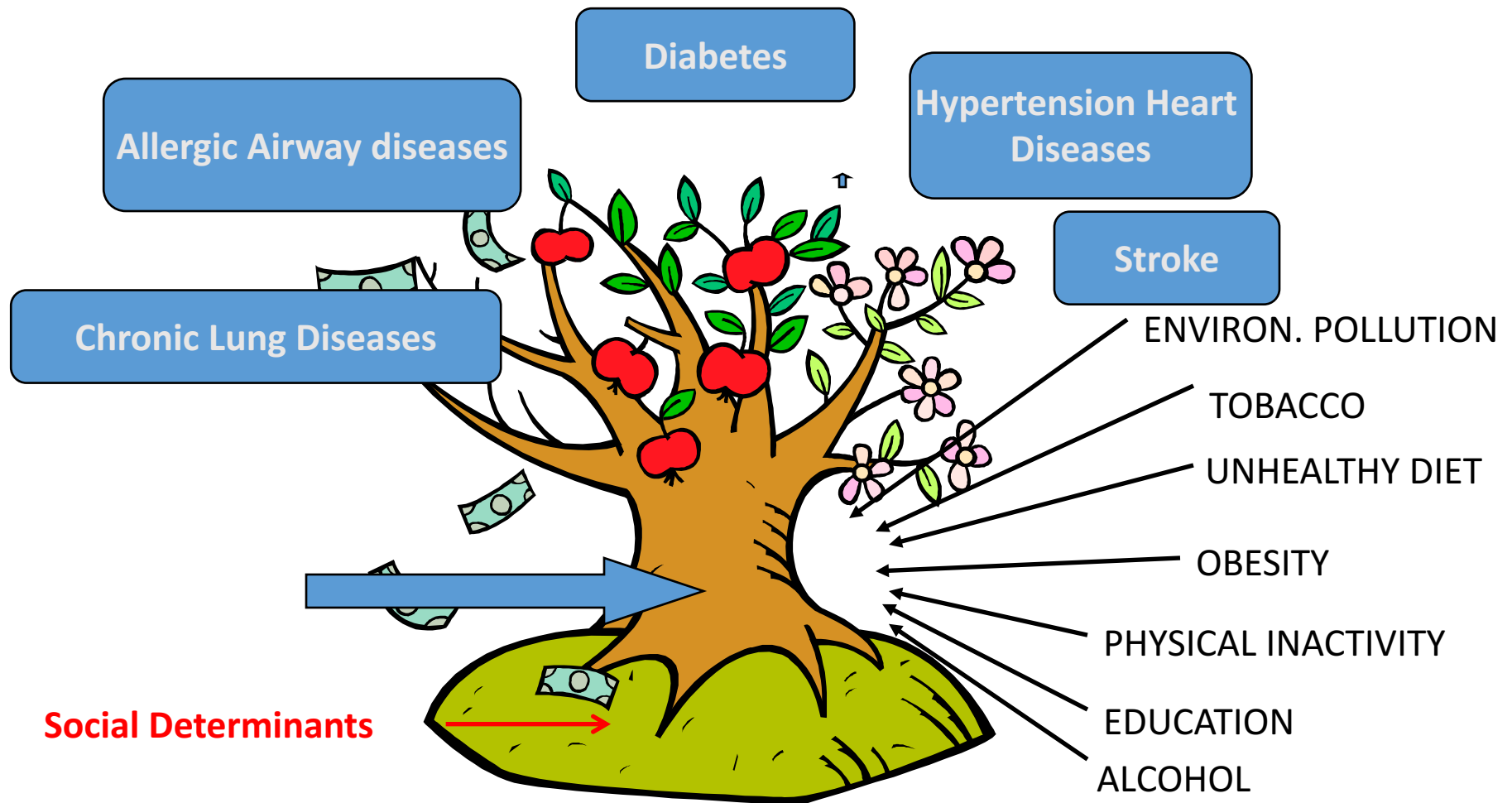
Legal Activism

(Based on our data from our studies)

- **Appointment of Retired Supreme Court Judge Bhurelal Committee to reduce the air pollution in major cities and focus on school environment**
- **Banning tobacco smoke in Public places in our state before Supreme court judgement**
- **Urban slums suffer more than rural population which acted as catalyst in urban slum clearance board for better facilities for the slum dwellers**

H.Paramesh

Disease Prevention and Health Promotion *HP*



Hit the Root & Trunk, branches will fall automatically

WE CAN IMPROVE OUR ENVIRONMENT TO IMPROVE OUR HEALTH

These WIN-WIN
strategies are
fundamental
to achieving the

SUSTAINABLE DEVELOPMENT **GOALS**
17 GOALS TO TRANSFORM OUR WORLD



1. Apply low **carbon strategies** in energy generation, housing and the industry.



2. Use more active and **public transportation**.



3. Introduce **clean fuels** for cooking, heating and lighting and clean technologies.



4. Reduce **occupational exposures** and improve working conditions.



5. Increase access to **safe water** and adequate sanitation and promote hand washing.



6. Change **consumption patterns** to lower the use of harmful chemicals, minimize waste production and save energy.



7. Implement interventions that can increase **sun protective behaviour**.



8. Pass **smoking bans** to reduce exposure to second-hand tobacco smoke.



9. Always use a **health in all policies** approach to create healthier environments and prevent disease.

Let's all work towards a healthier
environment for our health.


Conclusion

The main objective of science is not to open the door to infinite wisdom but to roll back the boundaries of infinite error

Bertold Brecht's Life of Galileo

Nature has provided every one's need not for his greed

Mahatma Gandhi

A photograph of two sparrows perched on a thin, brown branch. The bird on the left is a House Sparrow with a light brown body and dark brown streaks on its wings and back. The bird on the right is a Tree Sparrow with a grey head, black throat, and brown and white streaked wings and back. The background is a soft, out-of-focus blue and brown.

**“ A Healthy Breath will always bring
Healthy life”
“Each one Teach one and
plant one tree”**

Thank You!

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