Blindness in children - global perspectives

Gresham College lecture
January 12th 2011

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London School of Hygiene & Tropical Medicine
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Overview

- International Centre for Eye Health
- Challenges of research in developing countries
- What we know about how many children are blind, and why
- How research has strengthened programmes for blinding eye diseases of children:
  - Retinopathy of prematurity (ROP) in Brazil
  - Cataract in Bangladesh

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The International Centre for Eye Health

- Our mission:
  - Research and education to improve eye health and eliminate avoidable visual impairment and blindness, with a focus on low income populations
- WHO Collaborating Centre for blindness prevention
- Activities which focus on major causes of blindness in poor countries:
  - research
  - education
  - information dissemination

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Types of research

- Epidemiology
- Operational
- Health systems
- Health economics
- Qualitative

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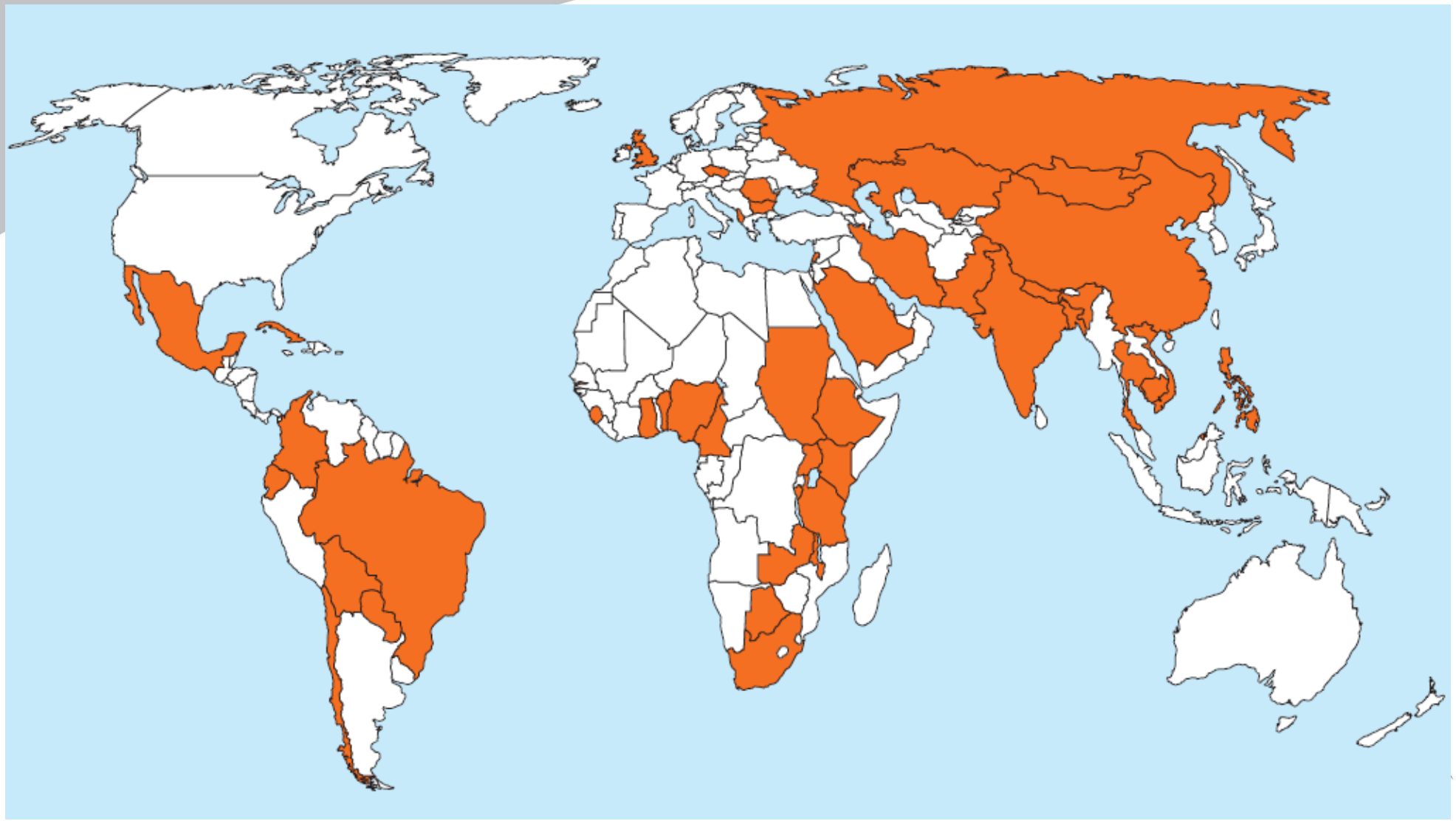
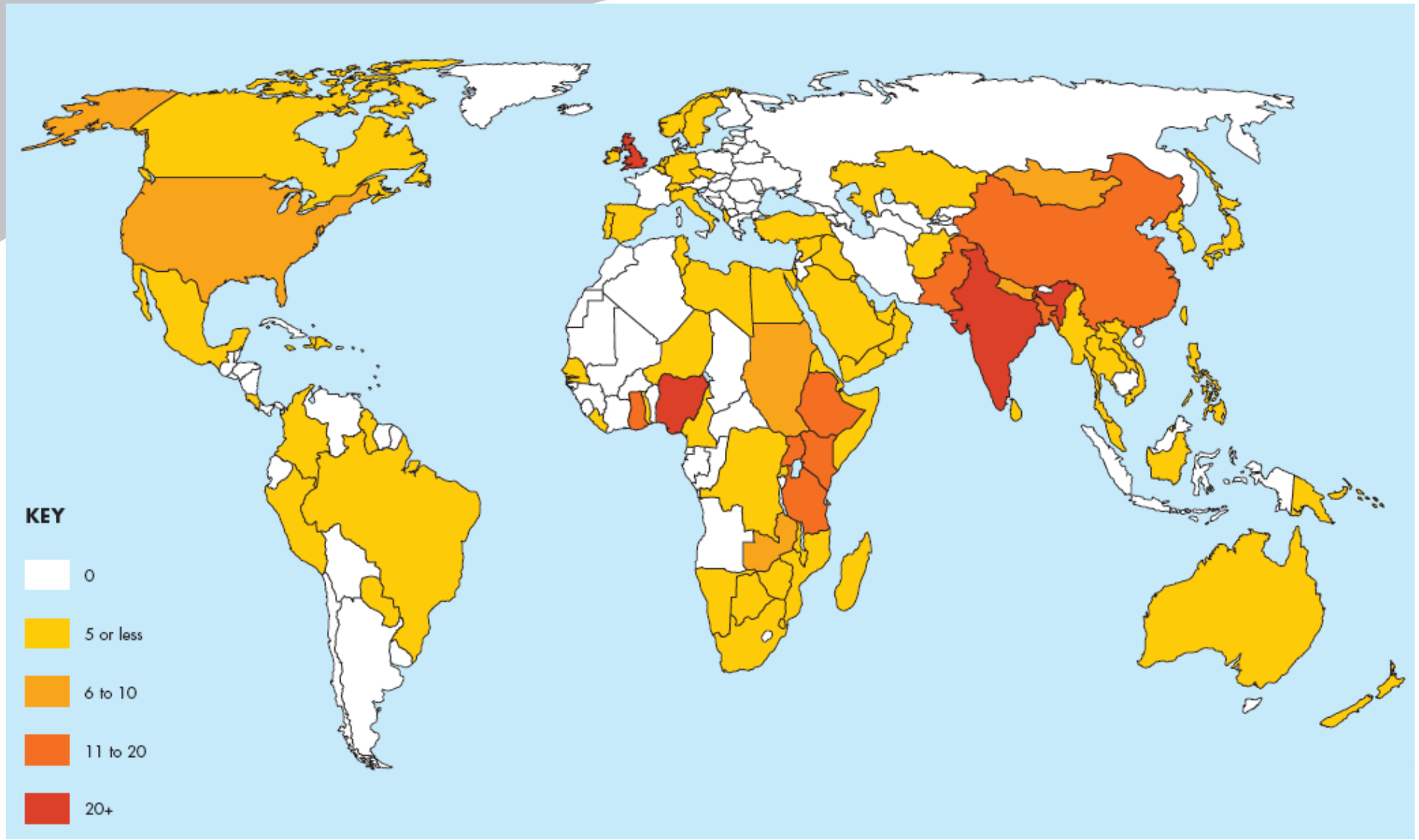
Research: current and recent projects



Education: masters and diploma students



Education: Community Eye Health Journal

Readers in 2009:

English	20,204
Chinese	6,000
French	3,541
Portuguese	3,000
Spanish	2,500
Total:	**35,245**

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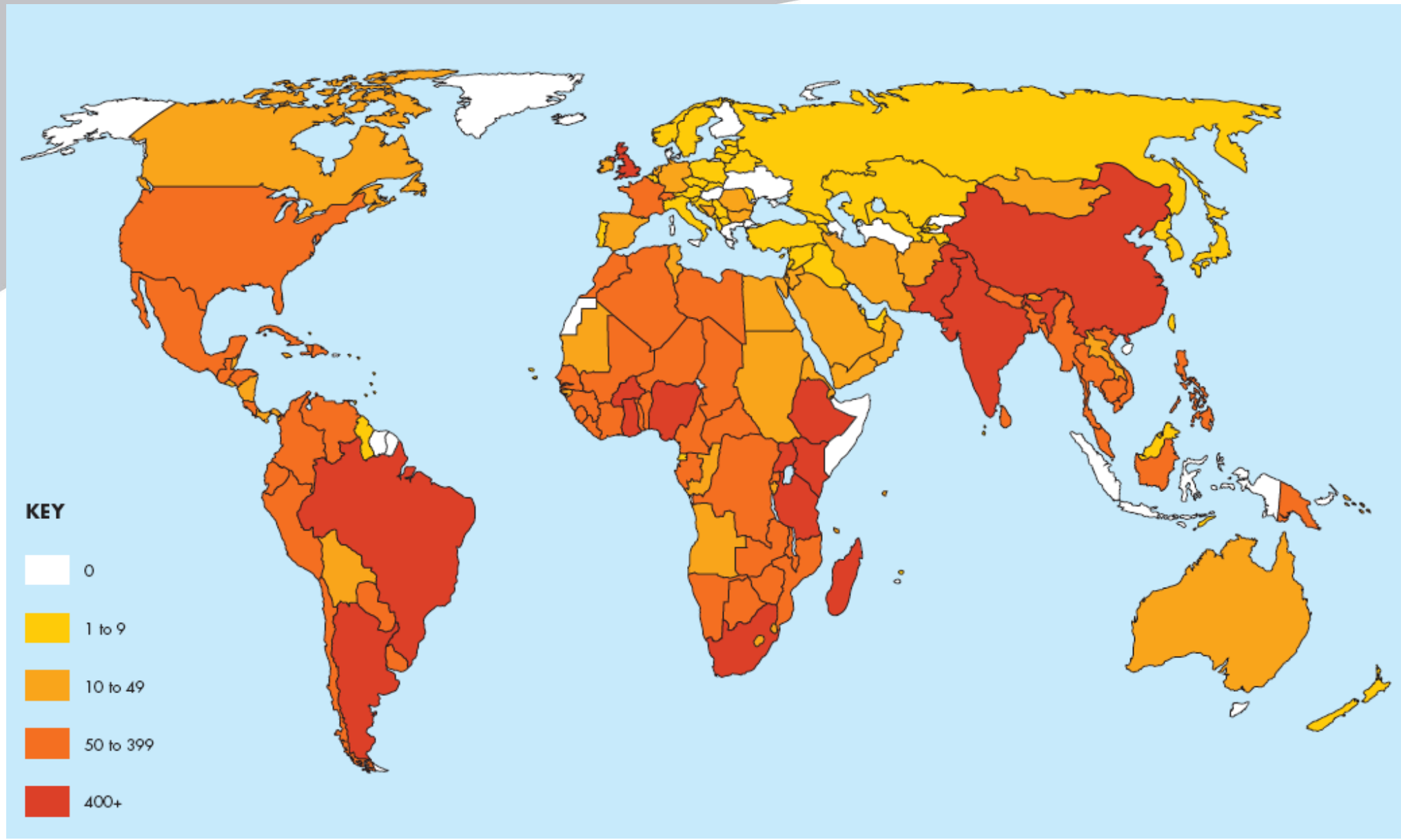
Community Eye Health Journal distribution



Close collaborative relationships with....

- Major international NGOs involved in blindness prevention, and through them to
- Hospitals providing services, and through them to
- Communities and patients in developing countries
- World Health Organization
- International Agency for the Prevention of Blindness
- ...all contribute to our education and research agenda
- ...provide mechanisms for dissemination of results

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Epidemiological research

- How many people in the population have the condition of interest?
  - prevalence (now)
  - incidence (new)
- Who is most affected?
- Why do they have the condition?
- What can be done to prevent or treat it?

Epidemiology of blindness in children

Challenges of research in developing countries

- Weak health systems: data not routinely collected
- More than one service provider
- Lack of subspecialty ophthalmology
- Not a research culture
- Lack of research active institutions / individuals
- Research not a priority when needs are so great
- Impact of other research agendas e.g. HIV/AIDS; TB

Researching blindness in children

- Children do not complain
- They do not like to be examined
- Communication is difficult
- ....standard methods cannot be used
- Blindness is rare so large studies are needed

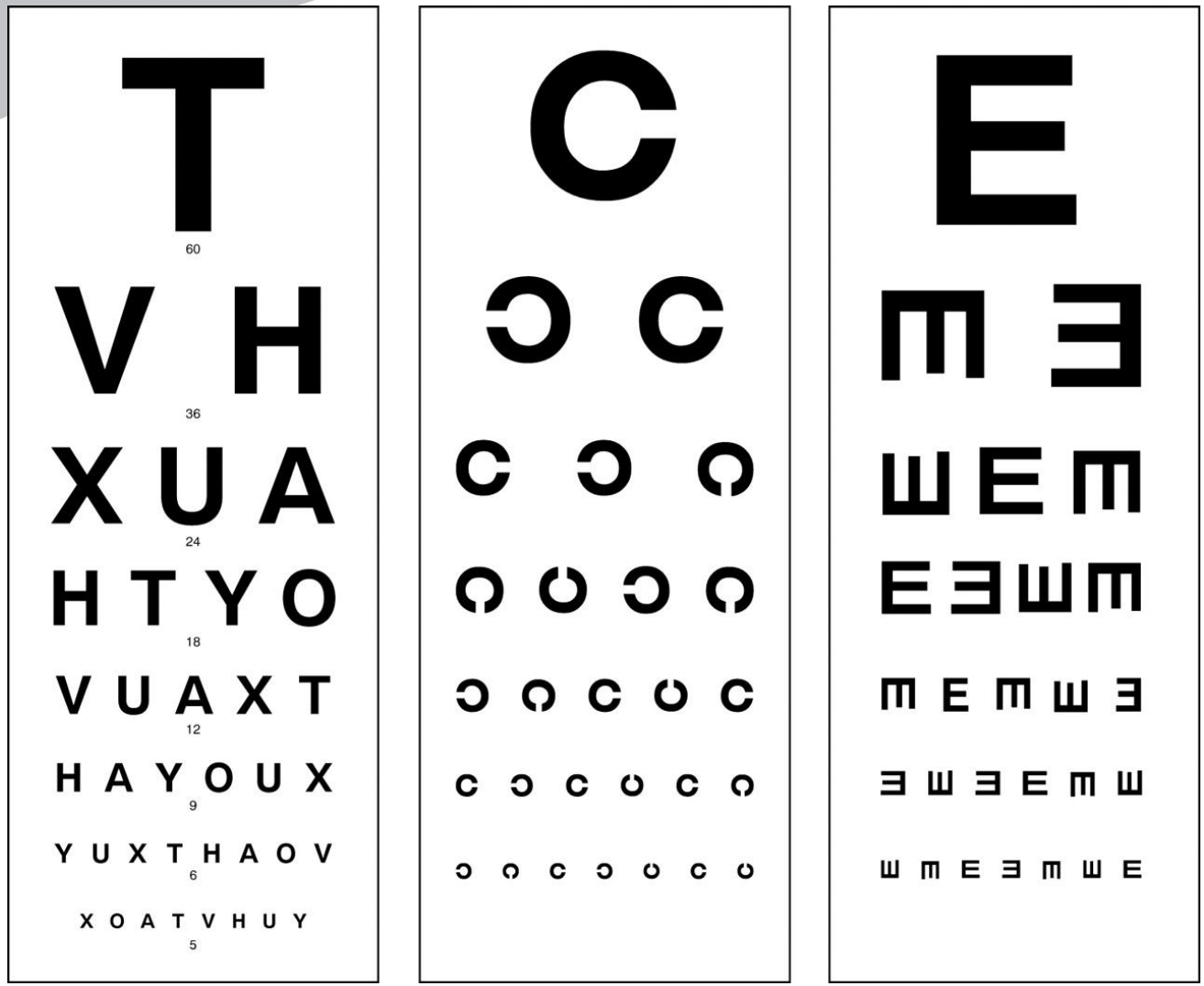
Other approaches/sources used

- Prevalence:
  - population based surveys
    - designed for other conditions
  - key informant method
- Causes:
  - schools for the blind
  - rehabilitation programs
  - key informant method

Definitions

- Childhood: 0-15 years
- Blindness: <3/60 in better eye
- Severe impairment: <6/60 in better eye

Visual acuity charts



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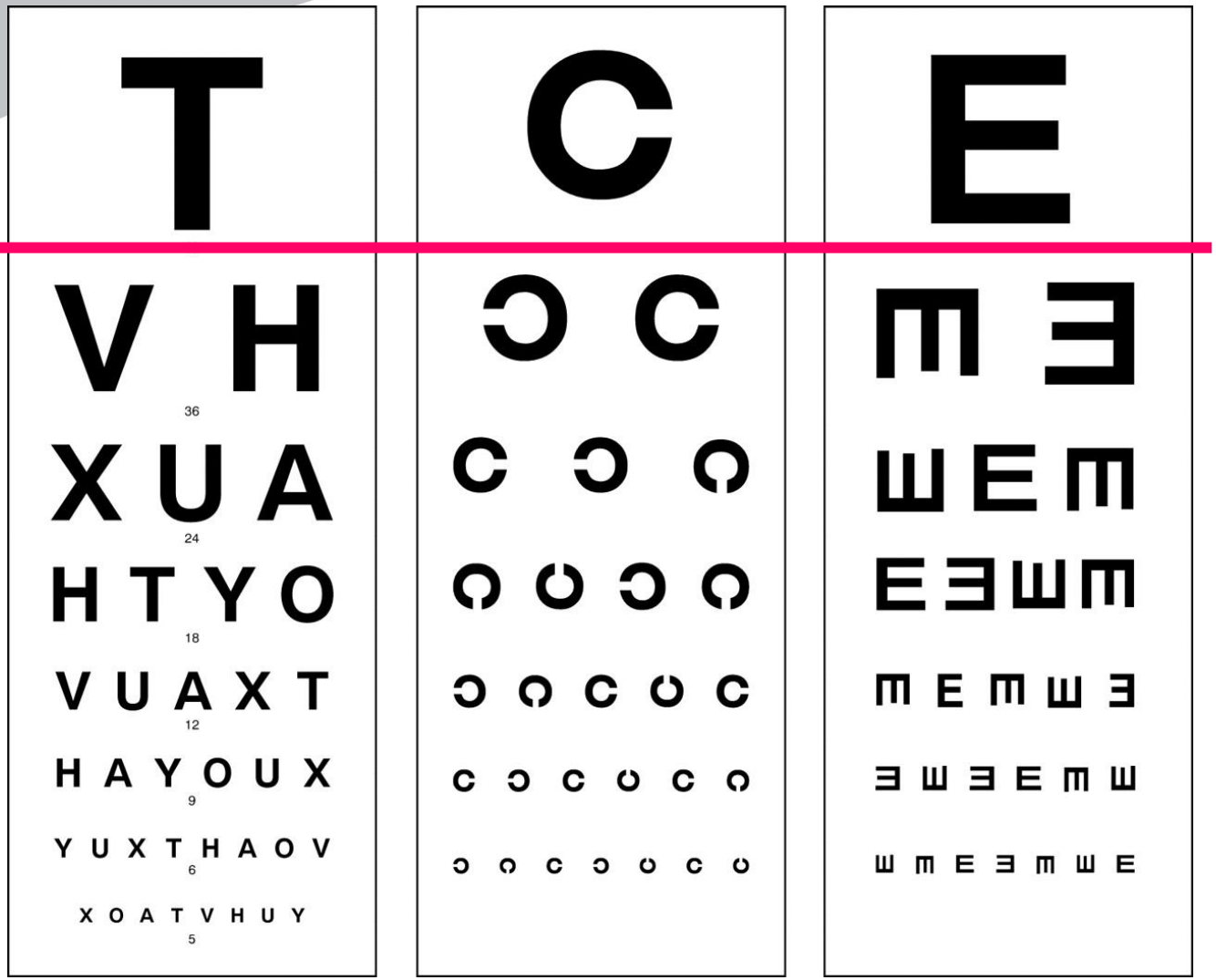
Visual acuity charts



Blind <3/60: cannot see top letter at 3 ms in the better seeing eye

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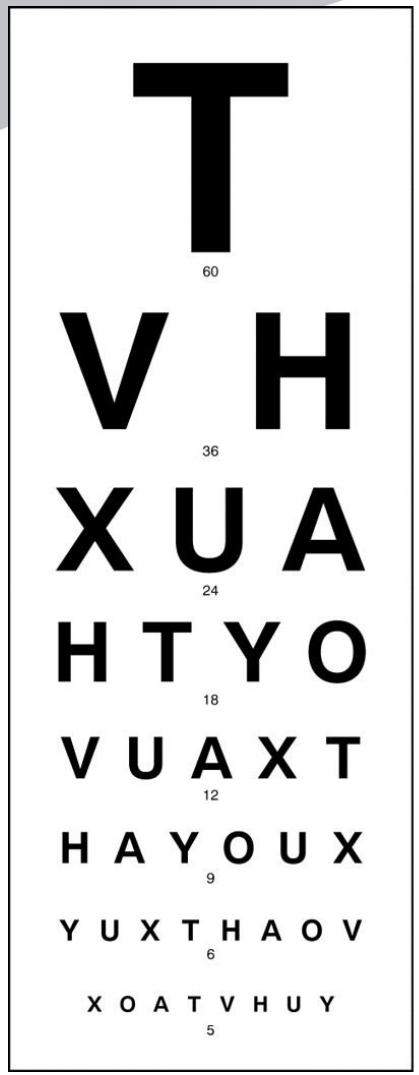
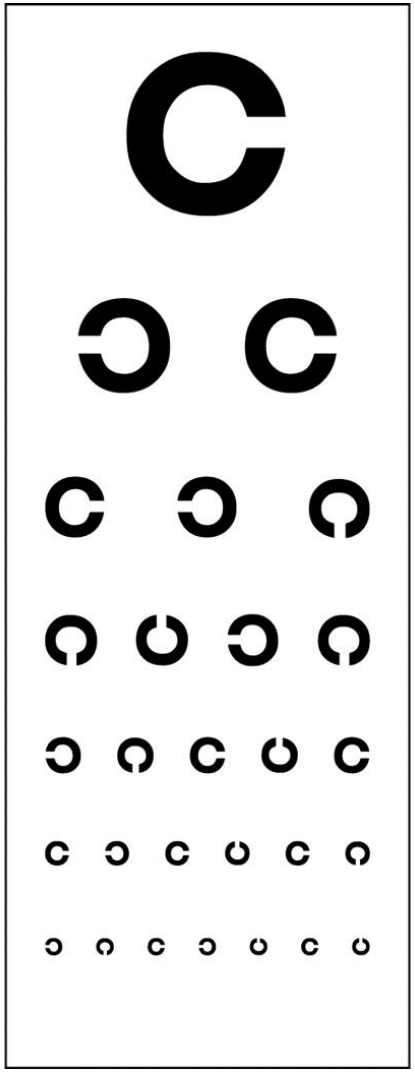
Visual acuity charts

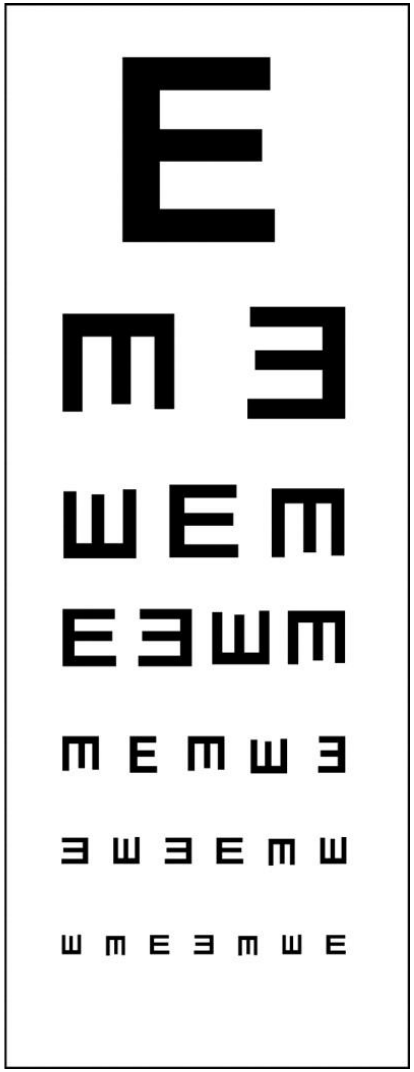
10+ years



5+ years



5+ years



Age at which children can be tested using standard charts

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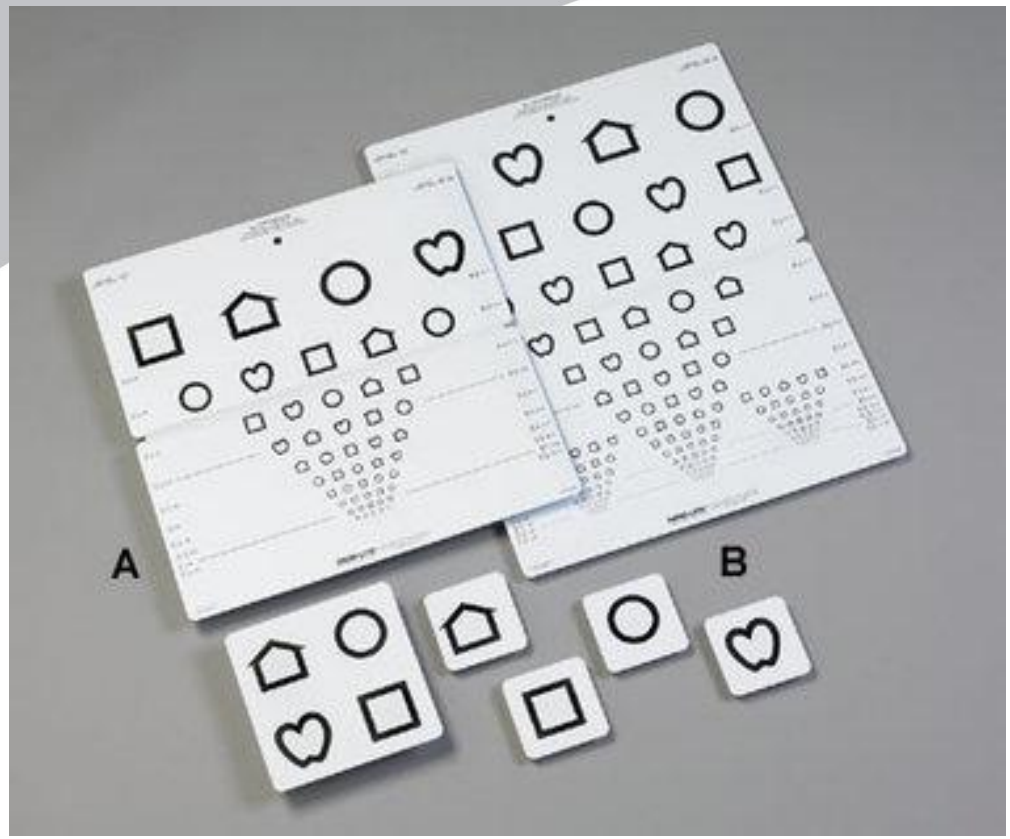
Testing vision in young children: different tests are needed.....



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....and lots of toys

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What do we know about the epidemiology of blindness in children?

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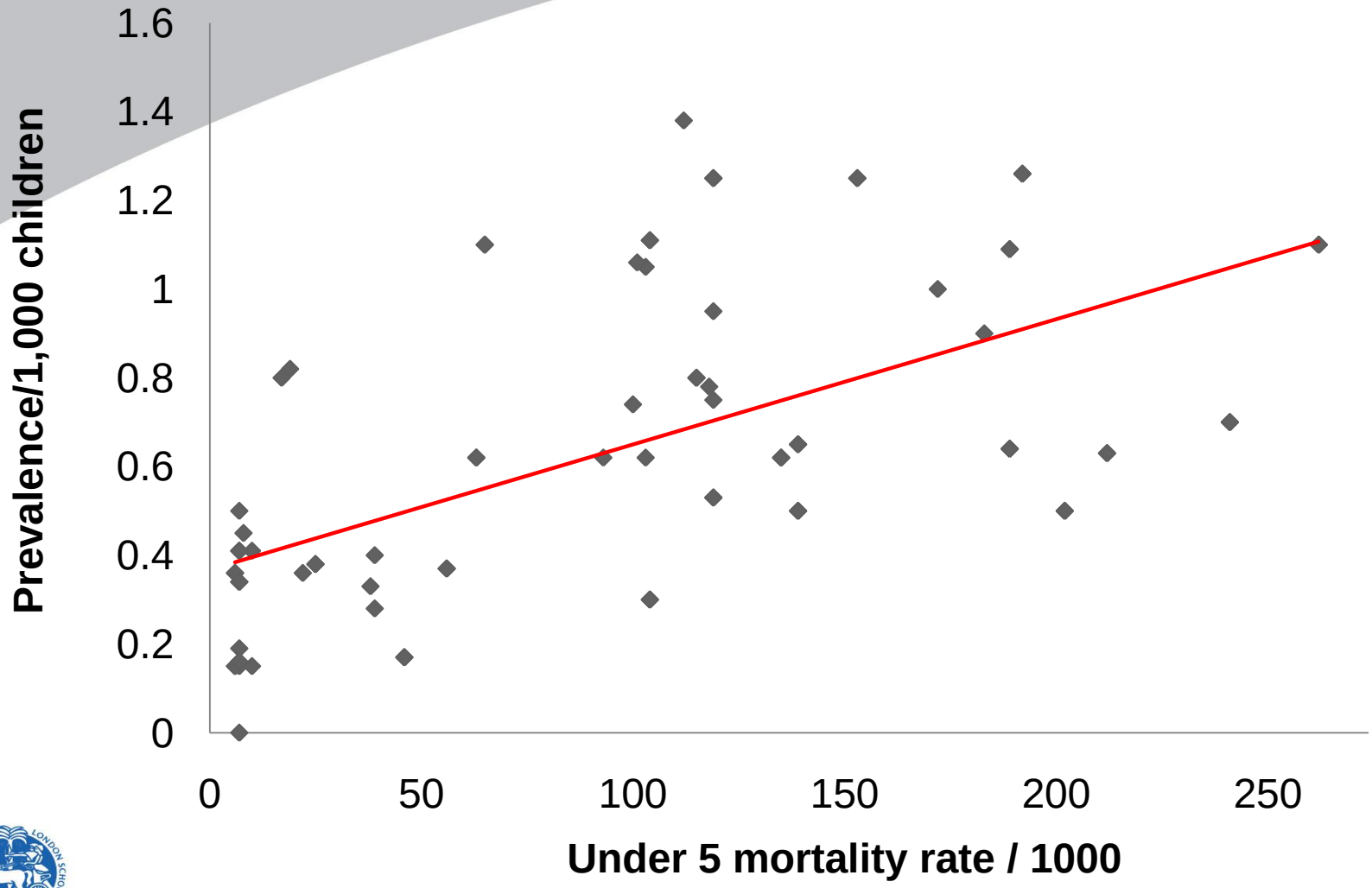
Available data on the prevalence of blindness, by under 5 mortality rate



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Under 5 mortality rates as a proxy for blindness in children: rationale

- Under 5 mortality rates reflect
  - poverty and social determinants of health
  - female education
  - access to services which prevent blindness and mortality e.g.
    - measles immunization
    - vitamin A supplementation
  - Being used to predict whether vitamin A deficiency is a public health problem

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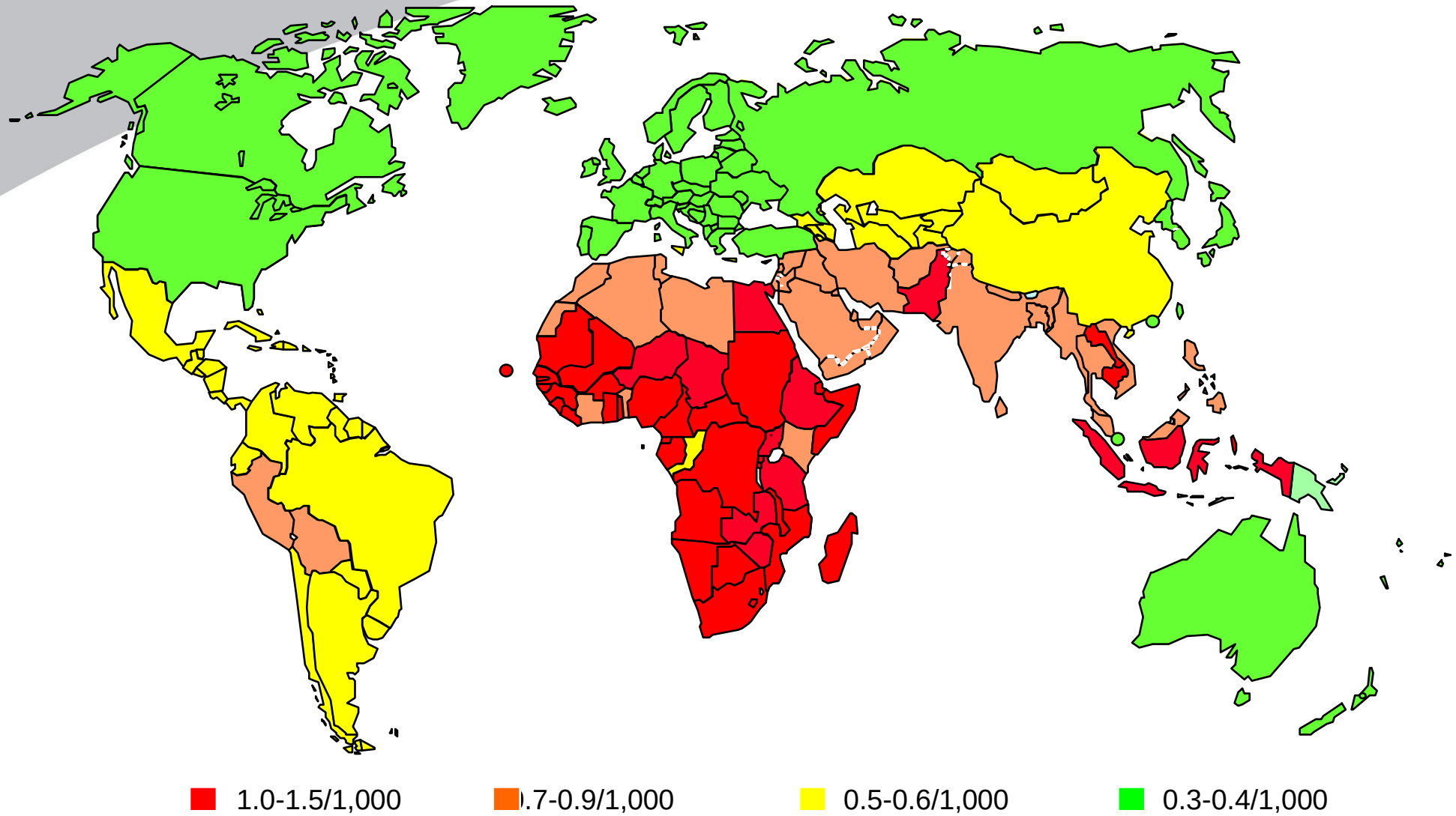
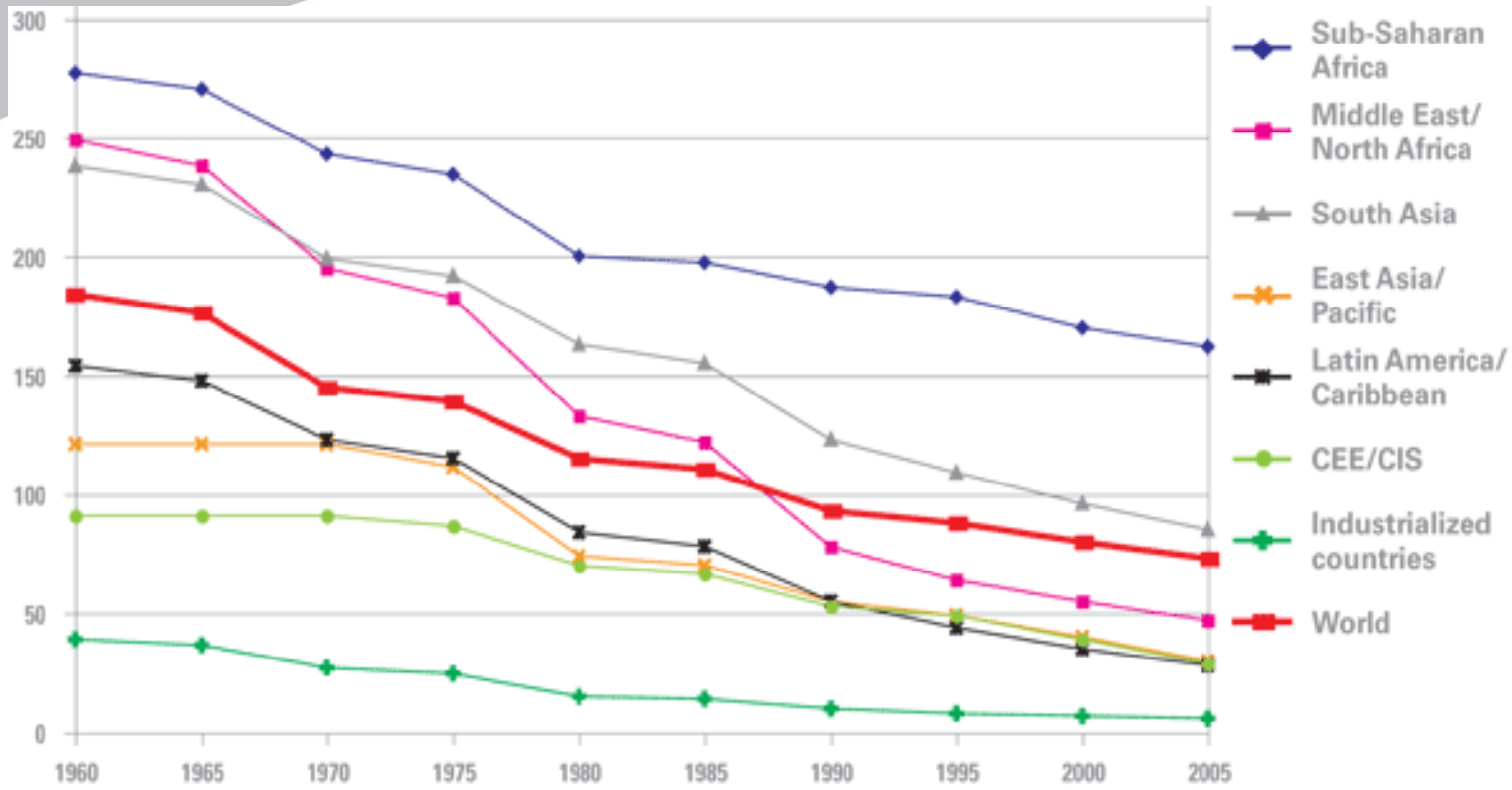
Prevalence of blindness in children: using under 5 mortality rates 1999 estimate



Under 5 mortality rates are declining



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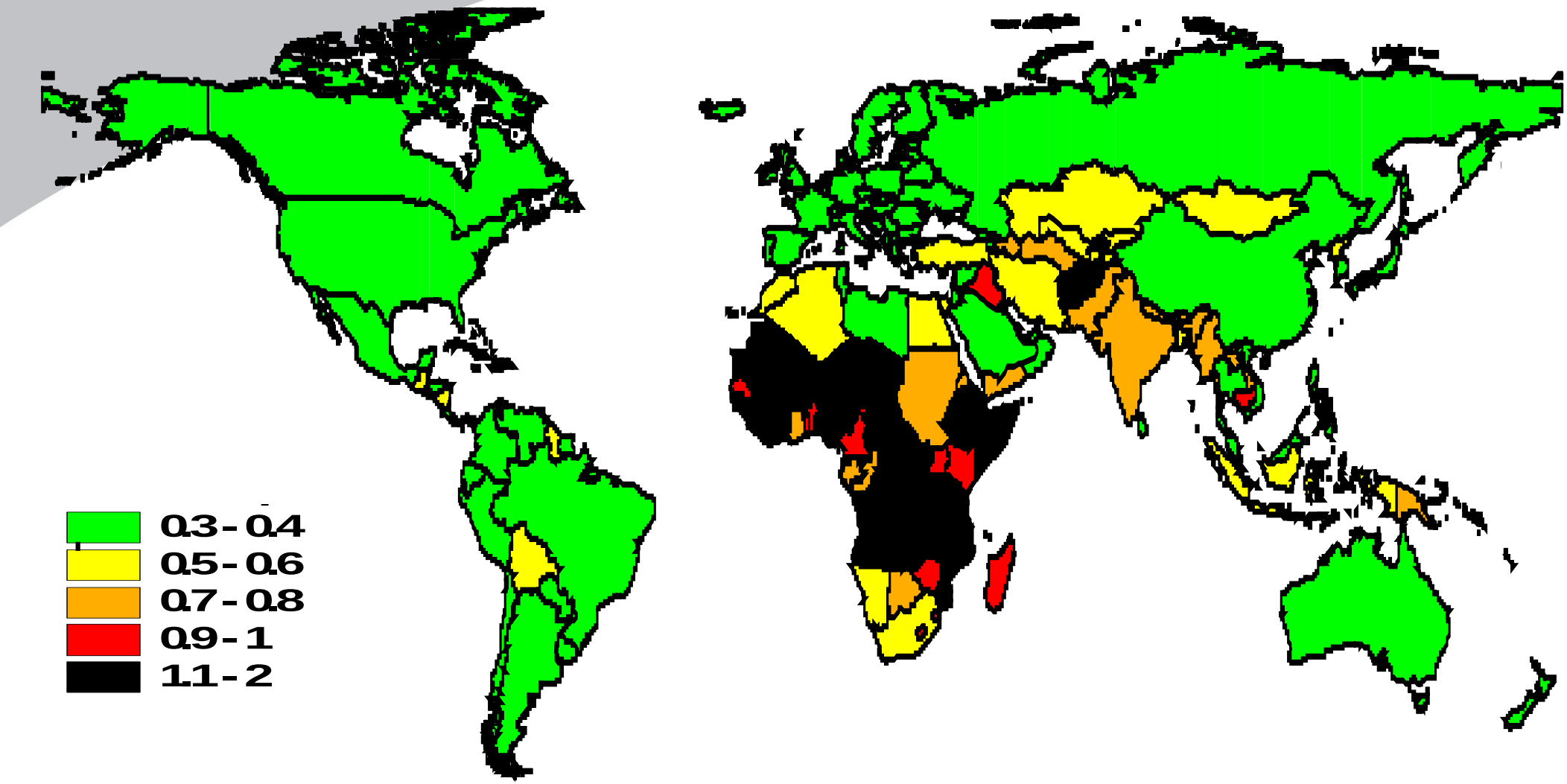
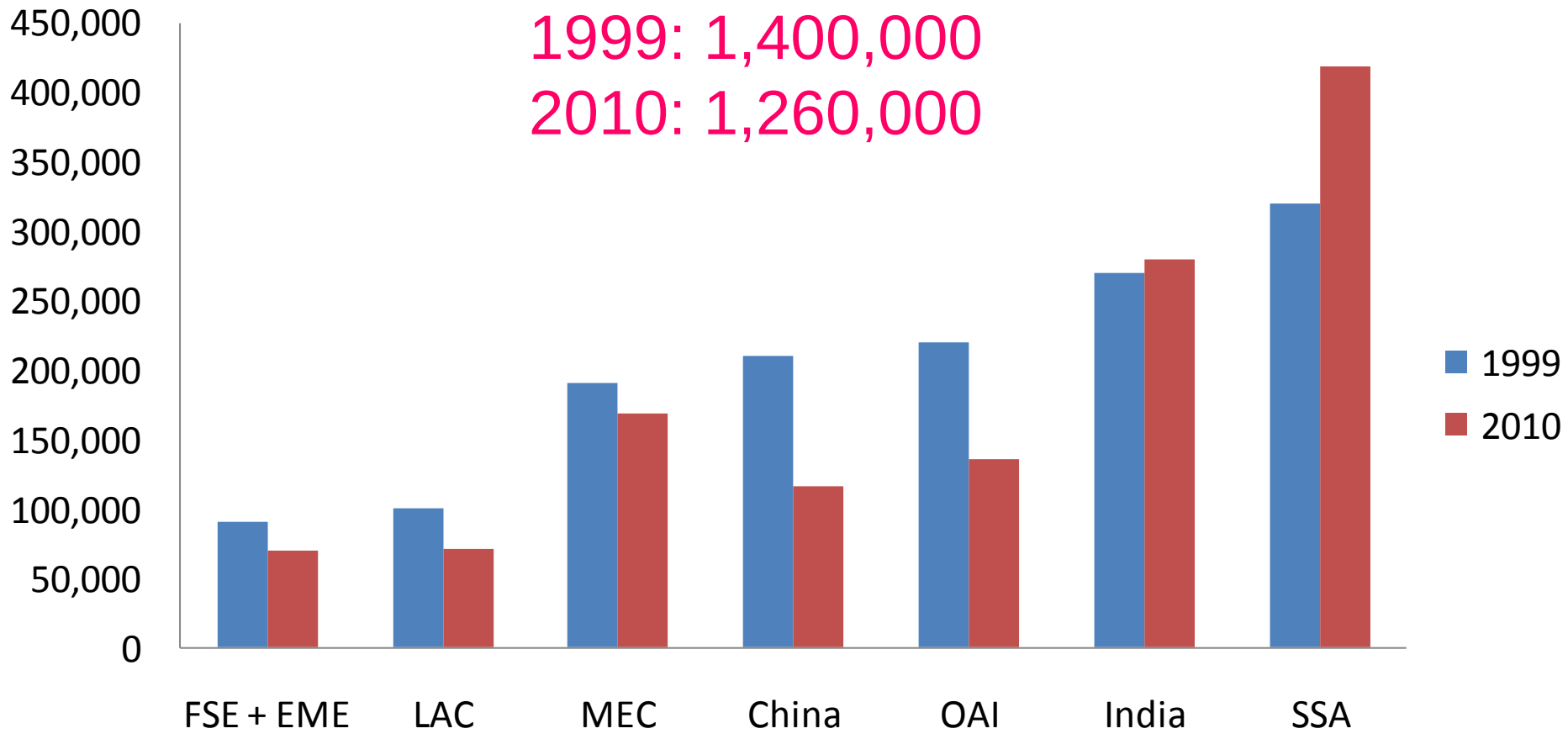
Prevalence of blindness in children: using under 5 mortality rates 2010 estimate



Magnitude estimates in 1999 and 2010, by World Bank region

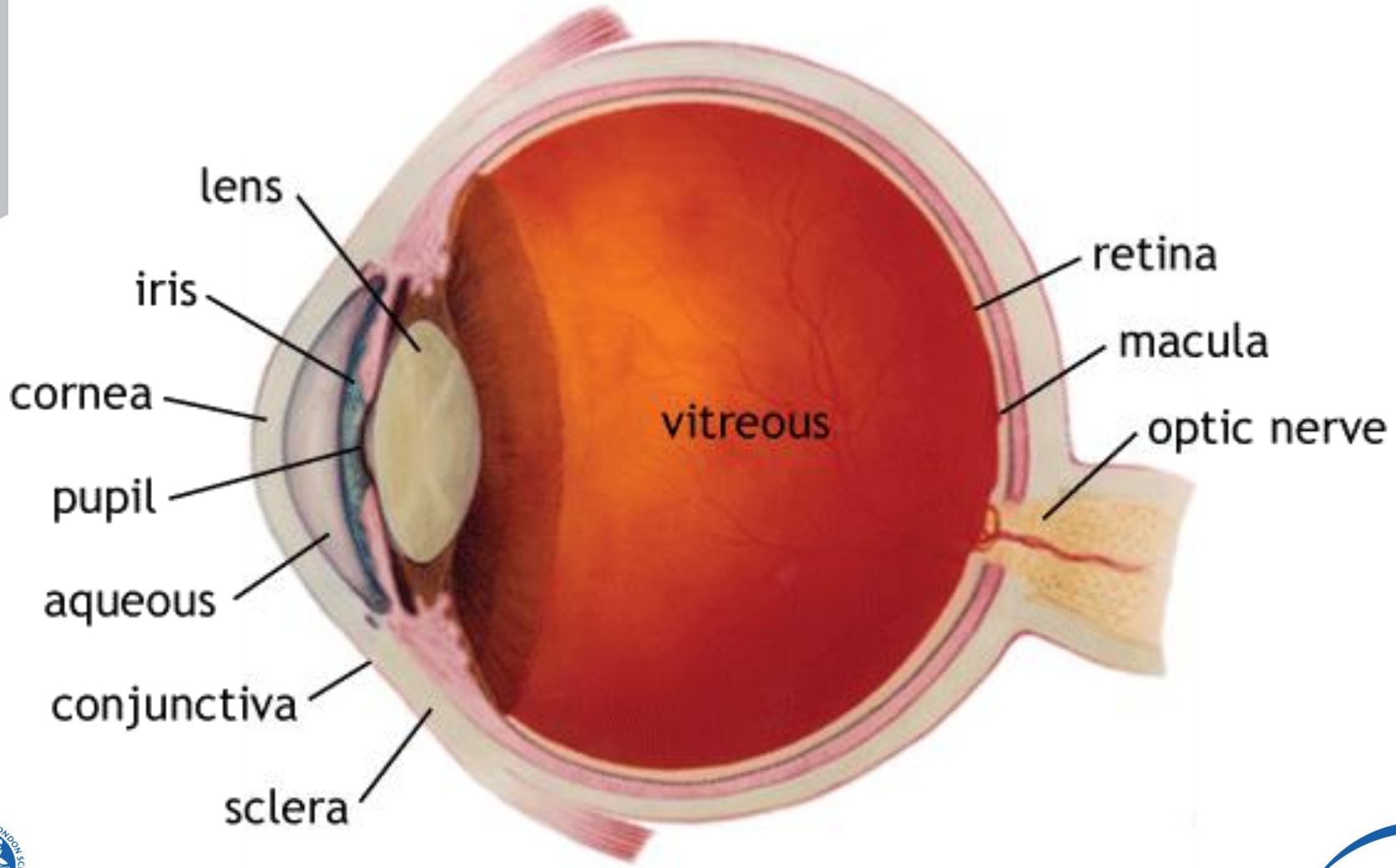


Causes of blindness in children

Classification system:

- Developed by ICEH in 1993
- Adopted by WHO
- Anatomical site of abnormality
  - site in visual pathways most affected
- Aetiology
  - time of onset of condition

Parts of the eye



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Cause by time of onset: life-course approach

Adolescence

Pregnancy

Delivery

Neonate

Childhood

Cause by time of onset: life-course approach

Adolescence

Genetic conditions

Pregnancy

Infections; genes controlling eye development

Newborn

Brain damage

Neonate

Conjunctivitis of the newborn; if premature, ROP

Childhood

Corneal scarring: VADD / measles / TEM; refractive errors; injury; infections

Complex range of interventions and strategies needed for control: from community through to tertiary level

Adolescence

Genetic conditions

Pregnancy

Infections; genes controlling eye development

Newborn

Brain damage

Neonate

Conjunctivitis of the newborn; if premature, ROP

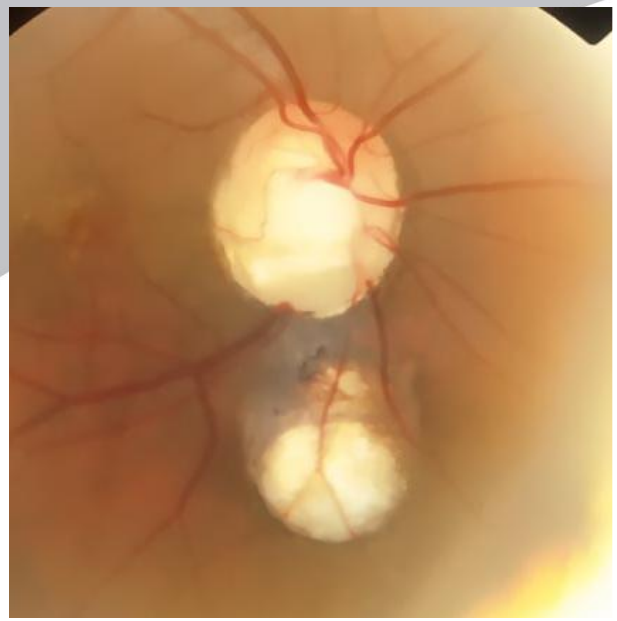
Childhood

Corneal scarring: VADD / measles / TEM; refractive errors; injury; infections

Causes of blindness in children

- Data on 32,000 children from 43 countries
- Marked variation in the major causes

Magnitude and causes: rich communities

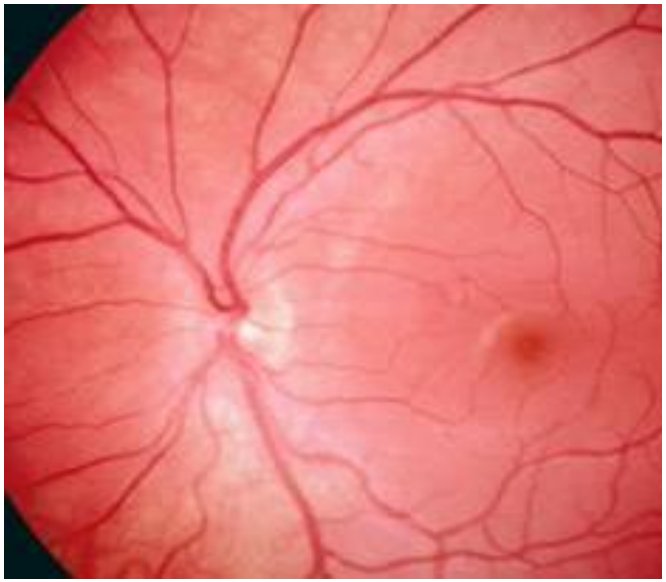


10 million

20% 0-15 = 2 mill

Prev = 0.3/ 1,000

600 blind



Scar 0%

Cat/gl 10%

ROP 10%

Others 80%

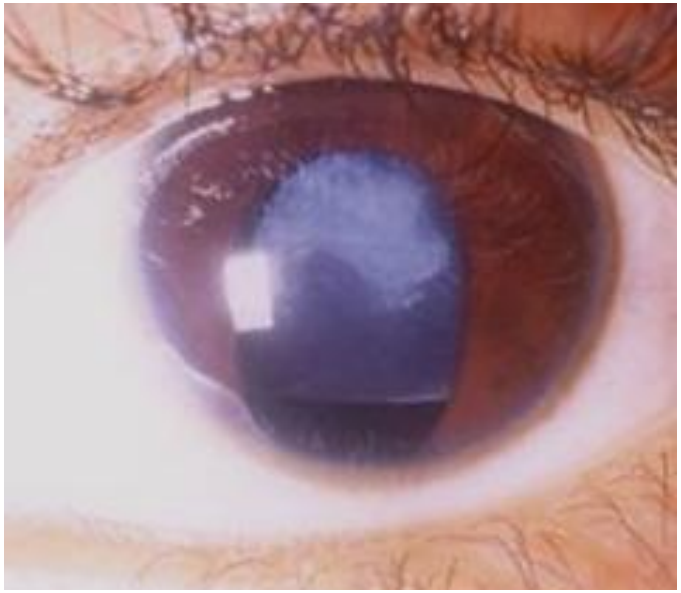
Magnitude and causes: middle income

10 million

30% 0-15 = 3 mill

Prev = 0.6/ 1,000

1,800 blind



Scar 0%

Cat/gl 20%

ROP 25%

Others 55%

Magnitude and causes: poor communities

10 million

40% 0-15 = 4 mill

Prev = 0.9/1,000

3,600 blind

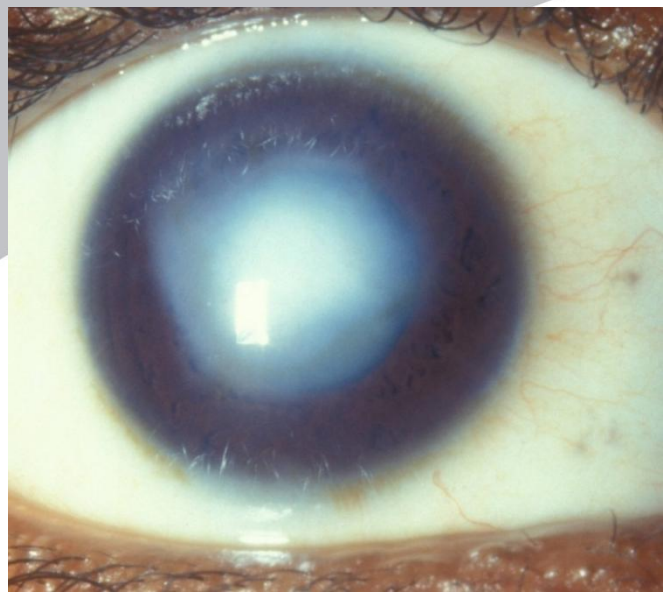
Scar 20%

Cat/gl 20%

ROP 0%

Others 60%

Magnitude and causes: very poor African countries

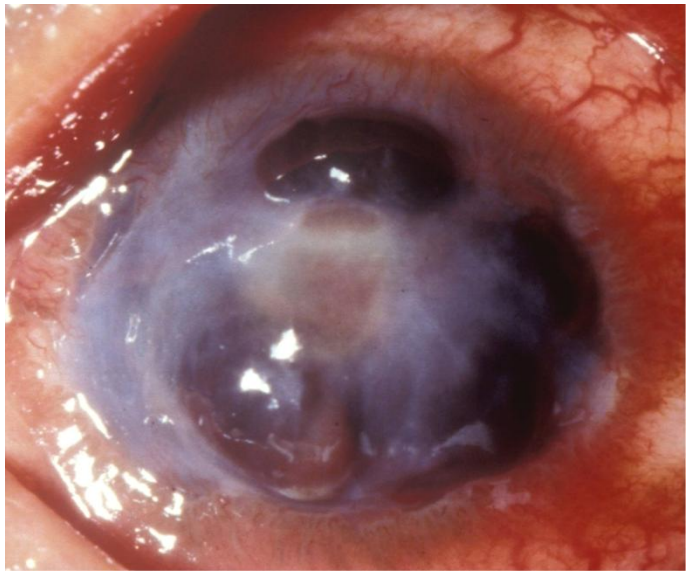


10 million

50% 0-15 = 5 mill

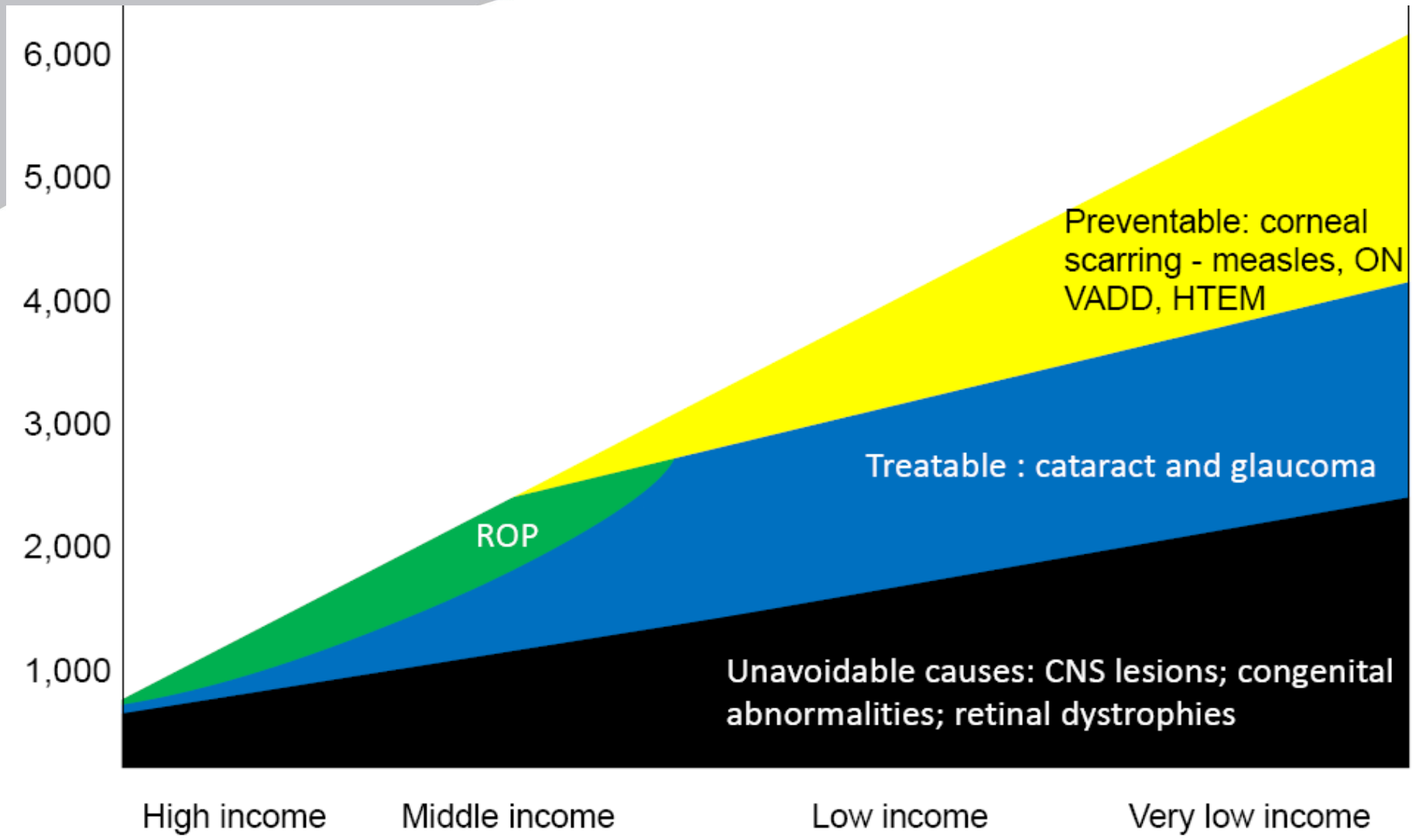
Prev = 1.2/1,000

6,000 blind

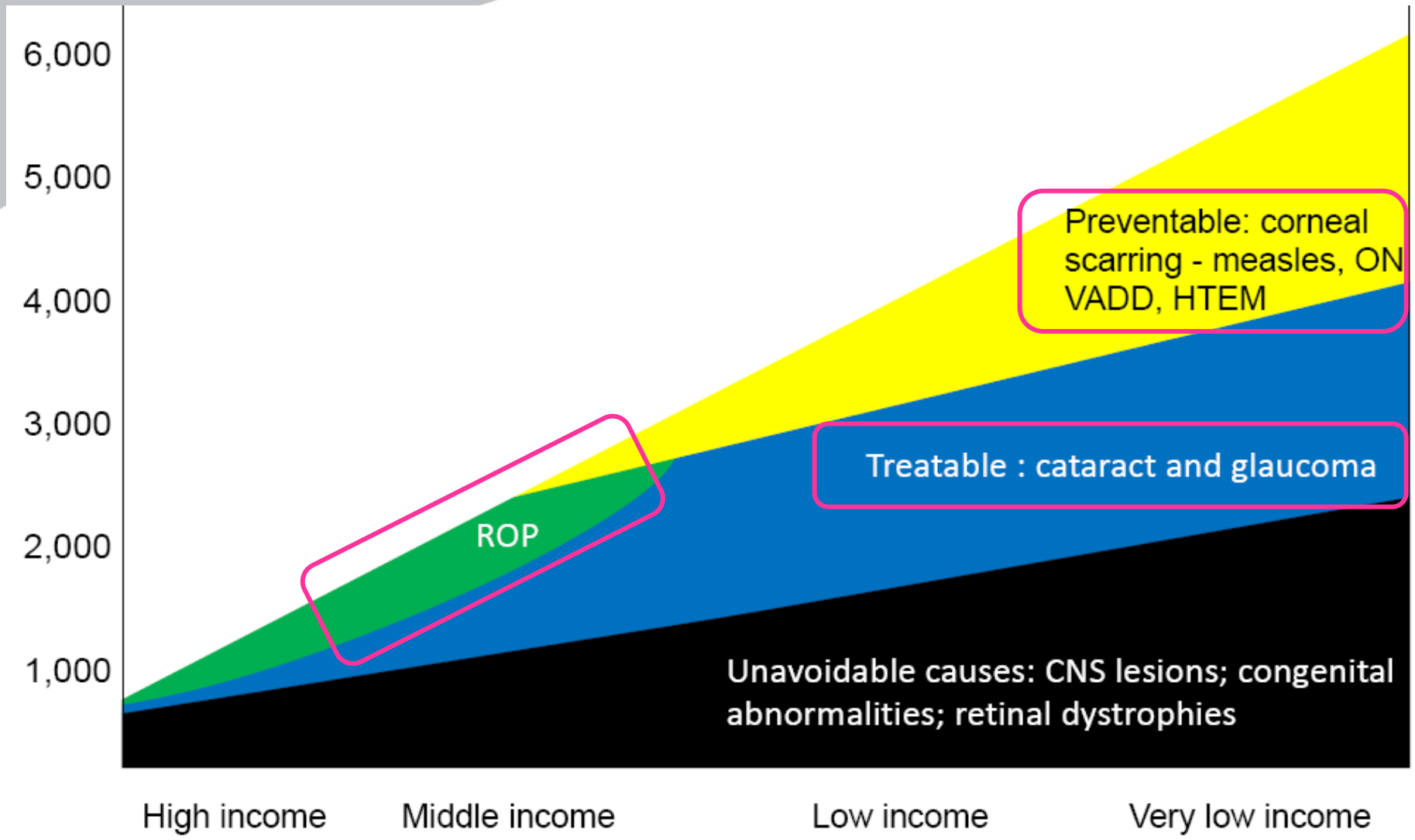


- Scar 50%
- Cat/gl 15%
- ROP 0%
- Others 35%

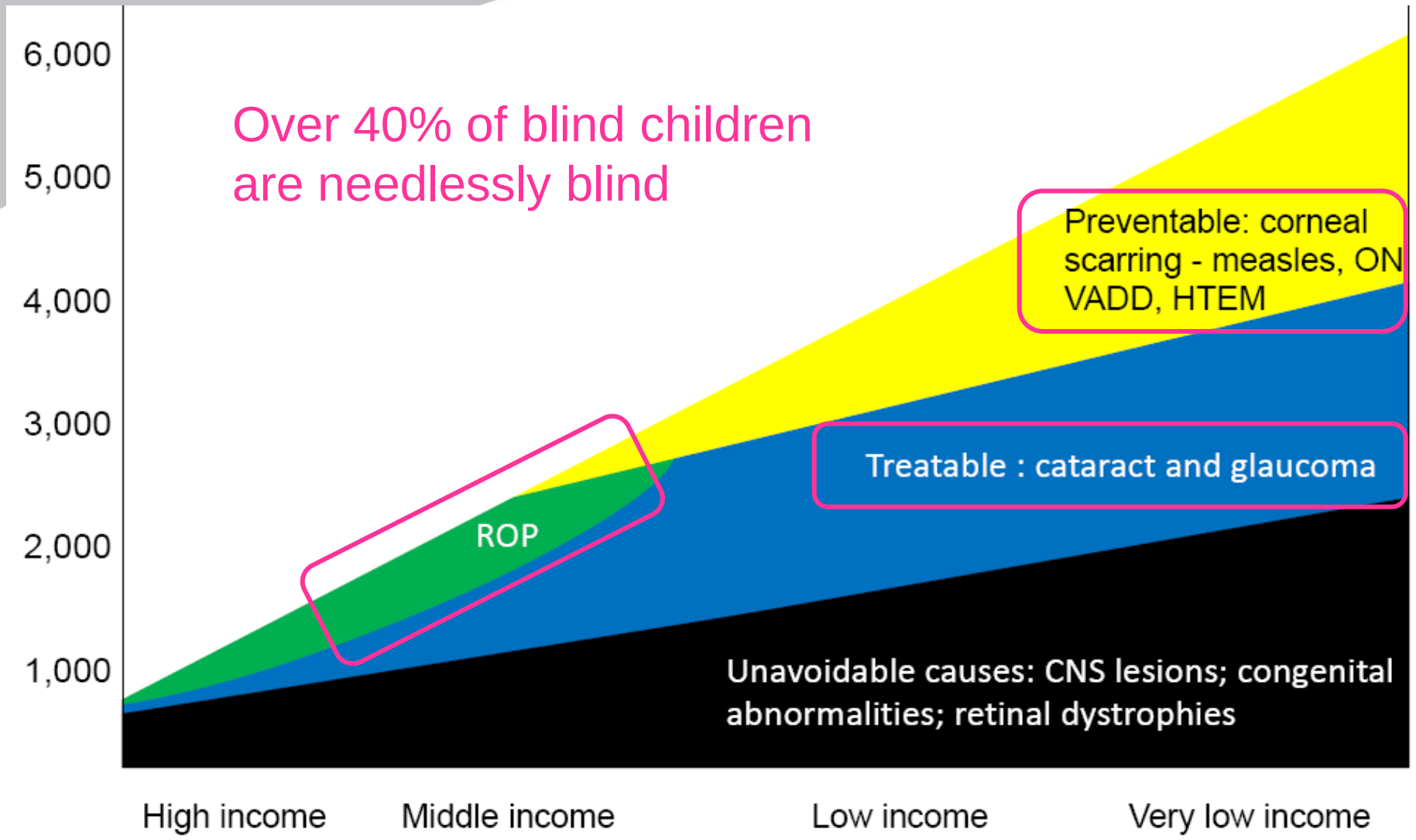
Number of blind children/10 million pop, by cause and level of development



Main avoidable causes



Main avoidable causes



Impact of blindness in childhood

- Can have profound consequences on the child, their family and community
  - developmental delay
  - no schooling
  - family breakdown
  - loss of income

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What is being done about it?

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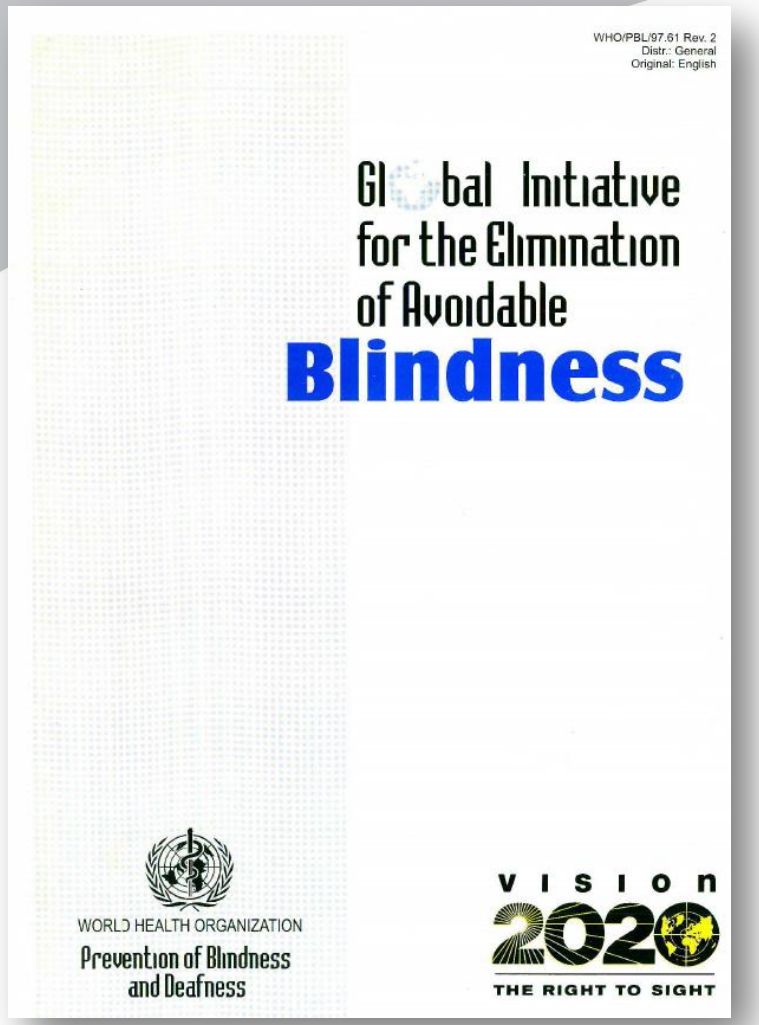
VISION2020: The Right to Sight



- Global initiative for the elimination of avoidable blindness by 2020
- Launched in 1999
- Childhood blindness is a priority....

16

Cause: CHILDHOOD BLINDNESS

Aim: To eliminate avoidable causes of childhood blindness

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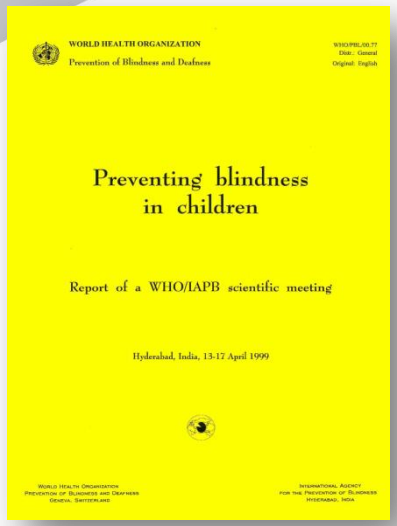

WORLD HEALTH ORGANIZATION
Prevention of Blindness and Deafness
WHO/PBL/00.77
Distr.: General
Original: English
Preventing blindness
in children
Report of a WHO/IAPB scientific meeting

London School of Hygiene & Tropical Medicine

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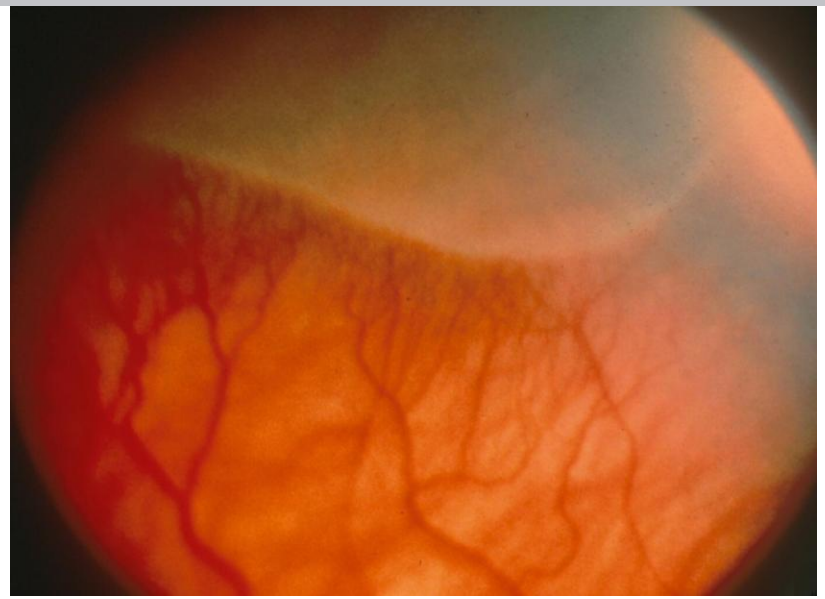
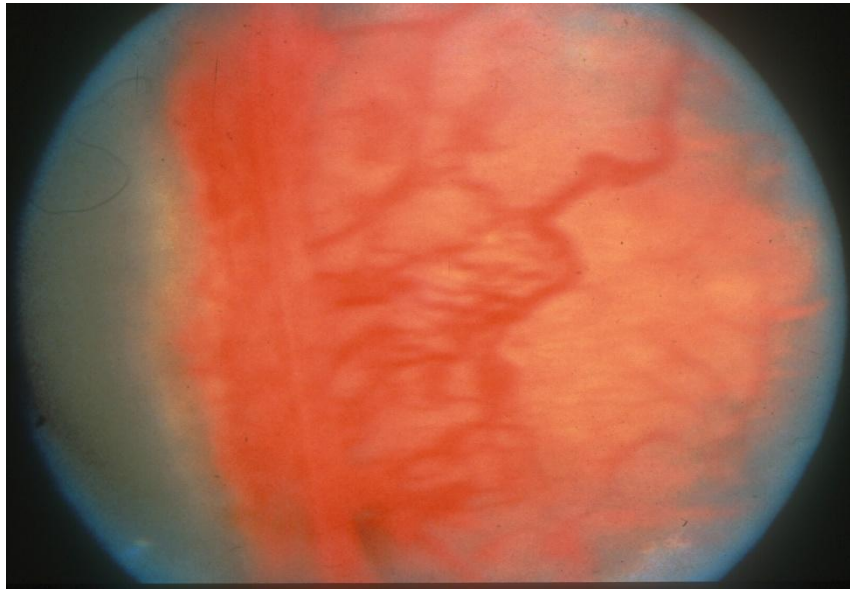
How research has strengthened programmes and influenced policy

- Retinopathy of prematurity (ROP) in Brazil and Latin America
- Childhood cataract in Bangladesh

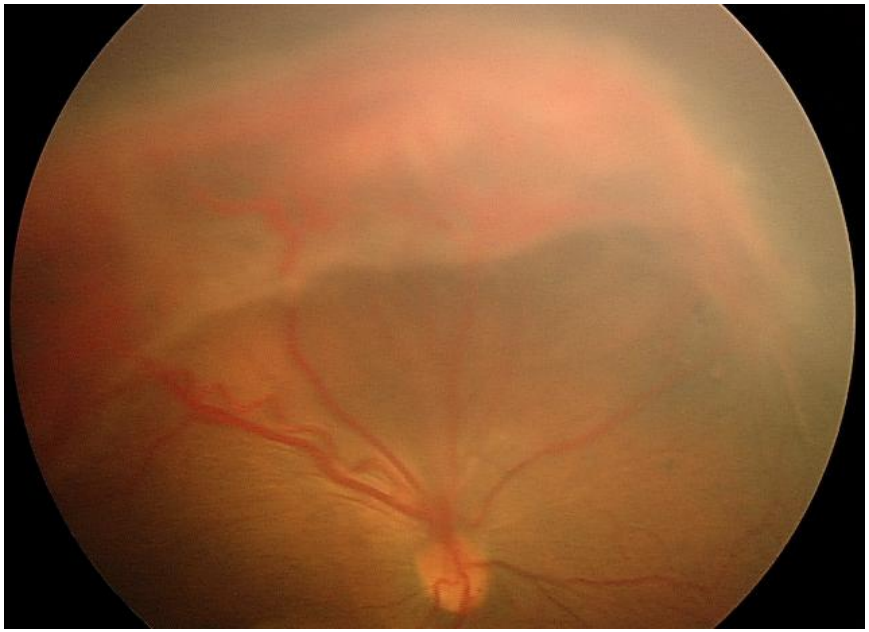
Retinopathy of prematurity (ROP)



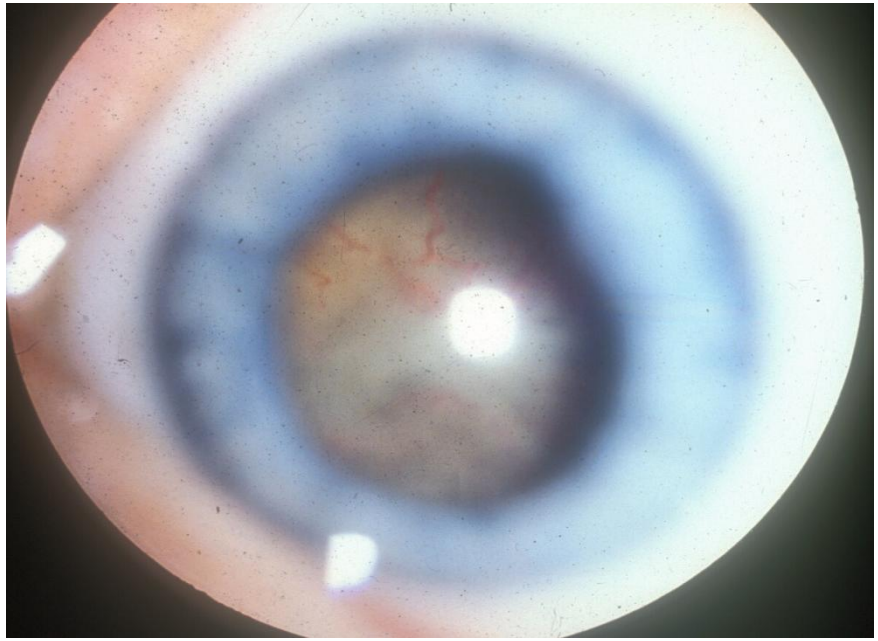
Stage 2: ridge



Stage 3: vascular ridge



Stage 4: subtotal detachment



Stage 5: Total detachment

Examining children in Chile...

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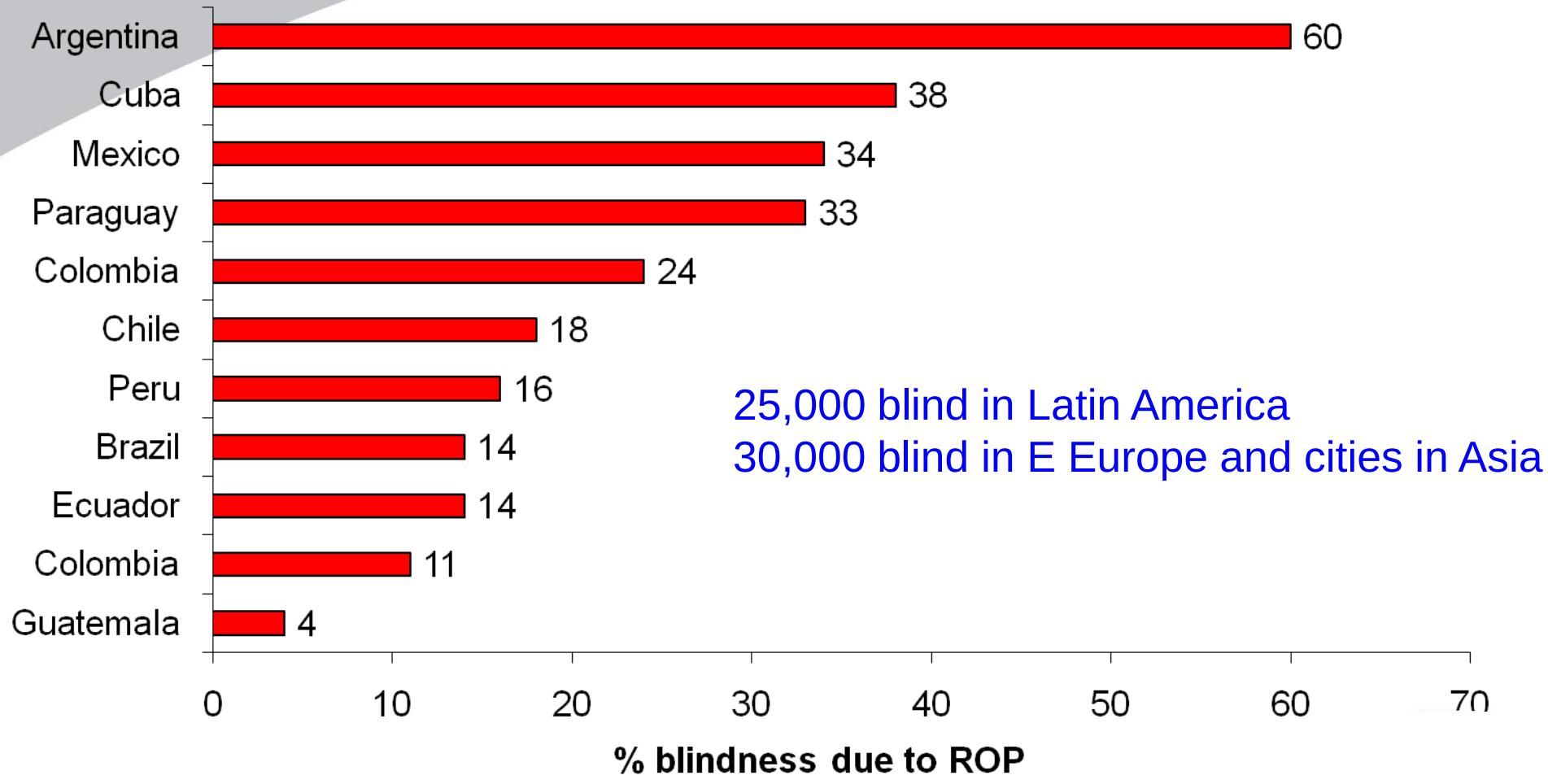
ROP as a cause of blindness in Latin America (%)



25,000 blind in Latin America
30,000 blind in E Europe and cities in Asia

Risk factors for ROP

- Prematurity, prematurity, prematurity!
- But also:
  - inadequately controlled oxygen
  - infection
  - poor early weight gain
- Inadequate services
  - poor staff numbers
  - poor training and low motivation
  - inadequate equipment

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Prevention of blindness from ROP

- Prevent preterm birth (2% in L America)
- Antenatal steroids
- Excellent neonatal care
- Screening of premature babies at risk by eye doctors
  - treat those with advanced disease by laser
  - highly effective at preventing blindness
- ? Which babies should be examined

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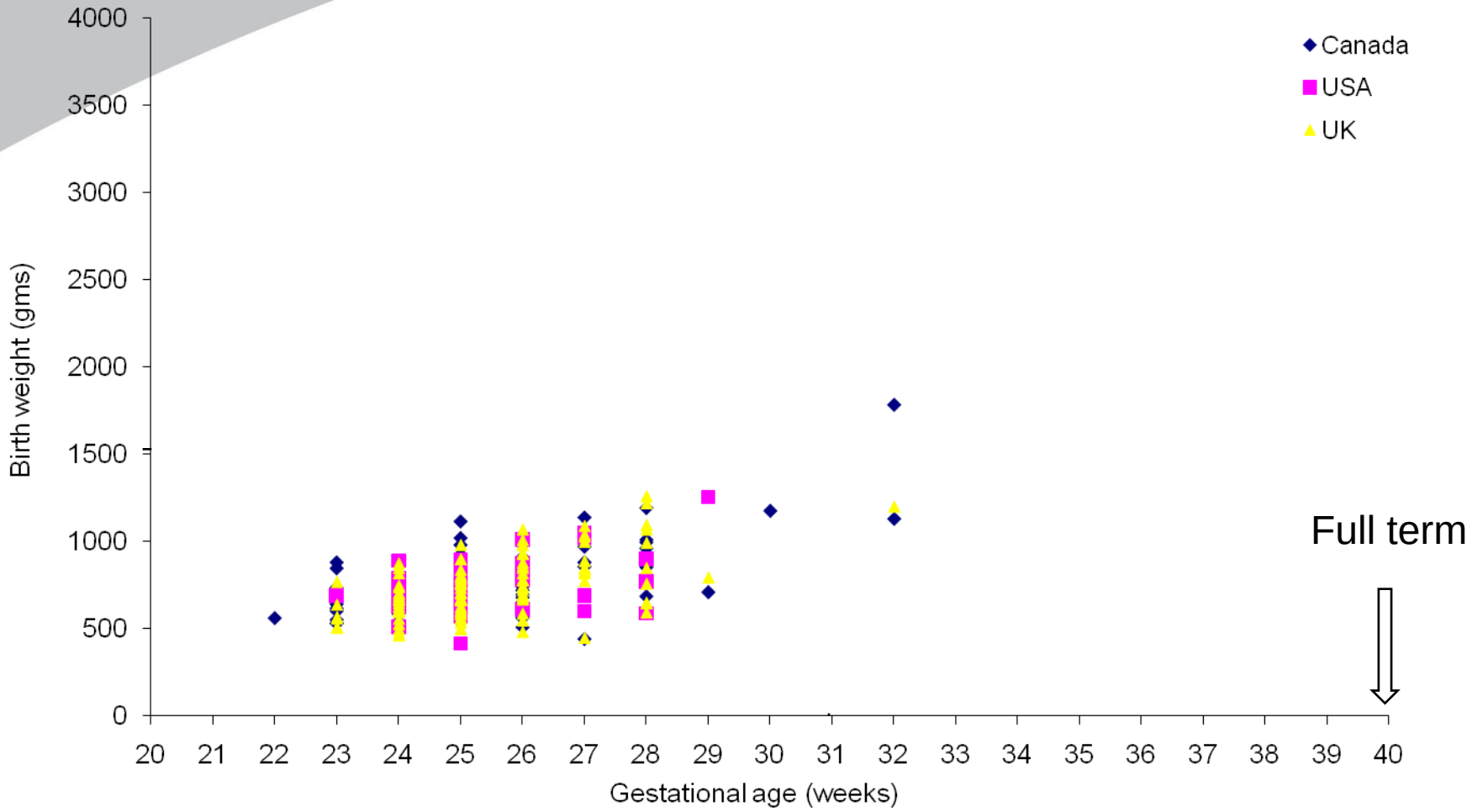
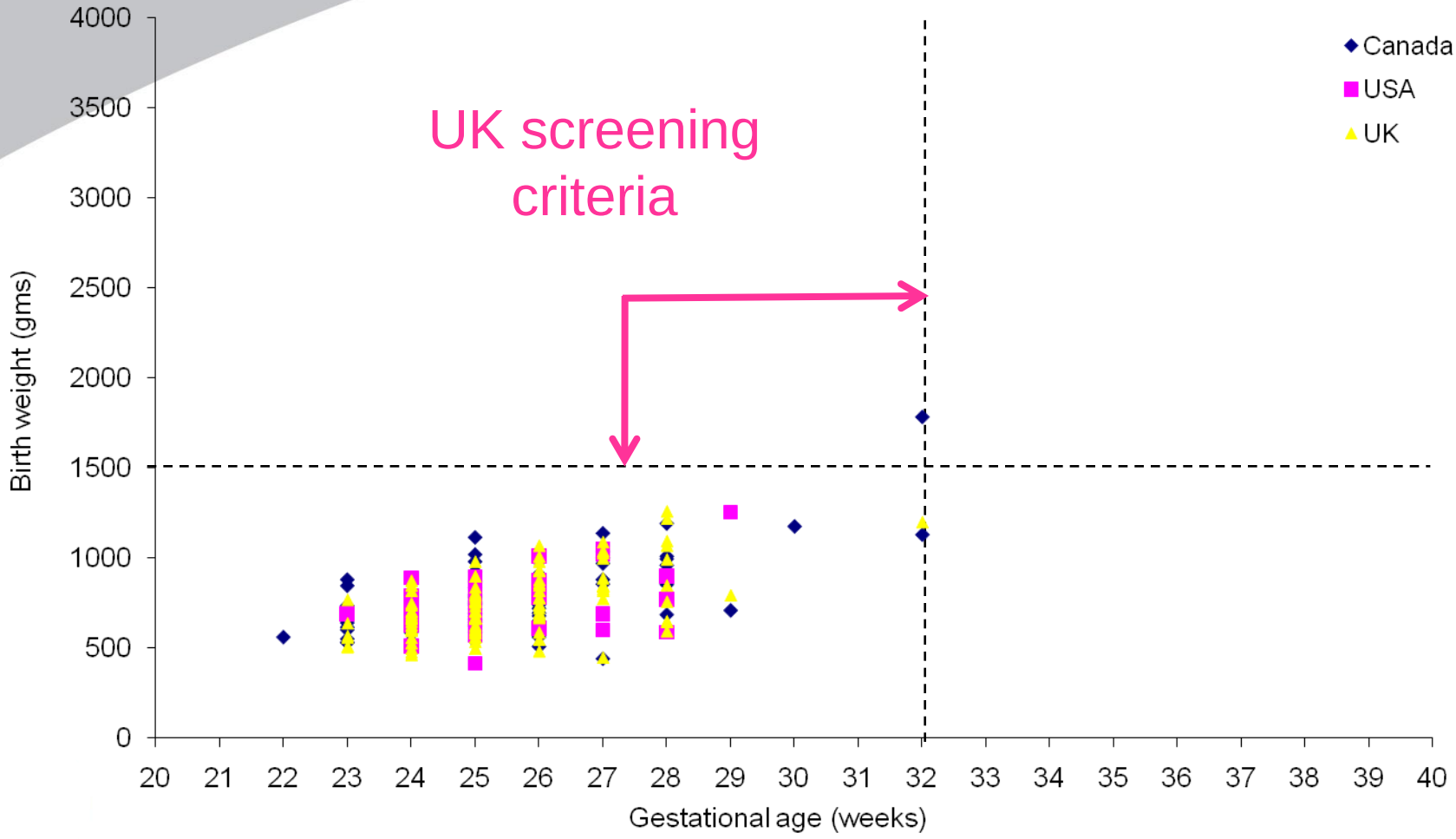
Characteristics of babies with “severe” ROP in UK, USA and Canada



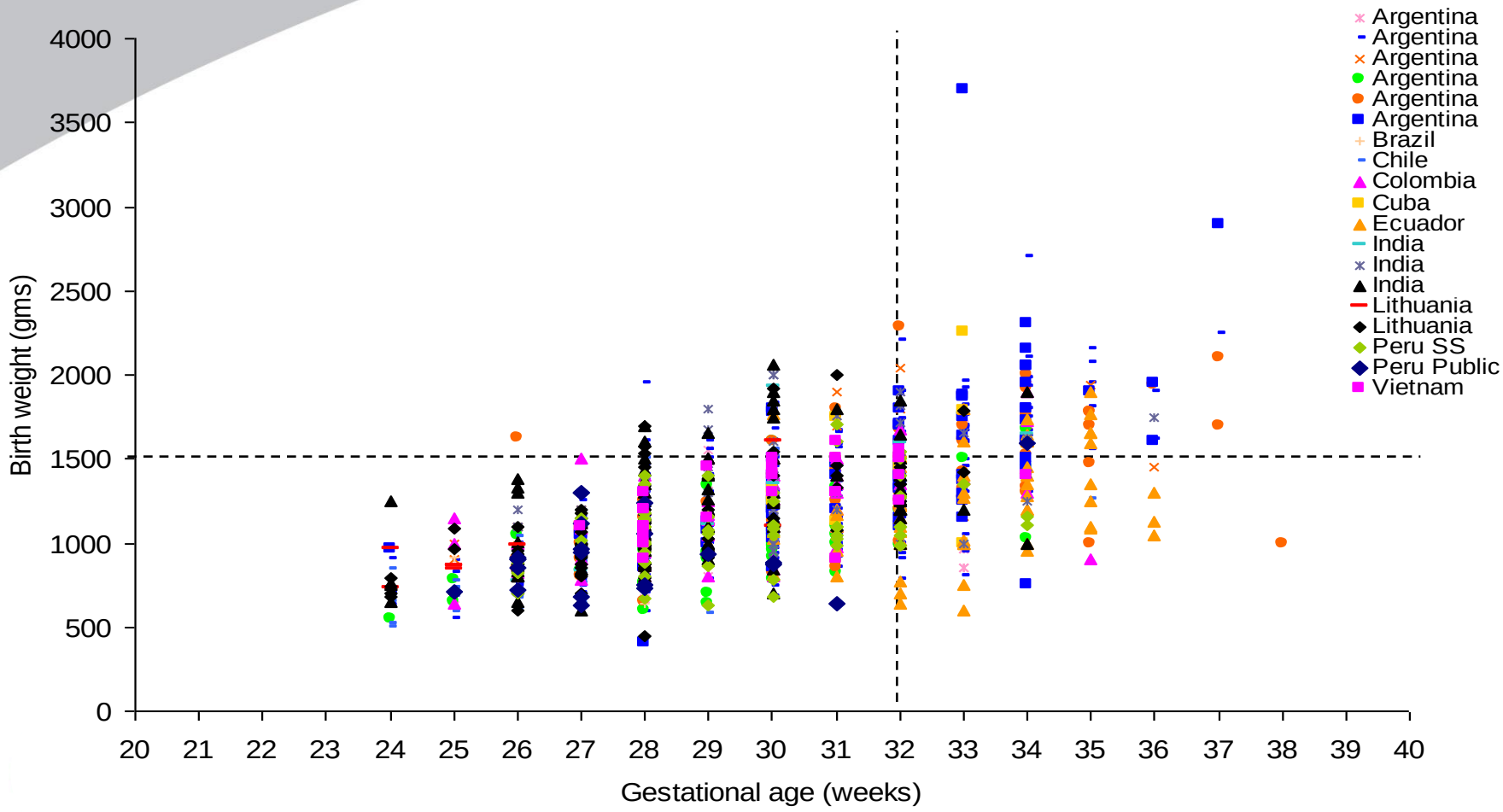
Gilbert et al. Paediatrics 2005 115 518-525

Characteristics of babies with “severe” ROP in UK, USA and Canada



Gilbert et al. Paediatrics 2005 115 518-525

Characteristics of babies with “severe” ROP in low/middle income countries



Gilbert et al. Paediatrics 2005 115 518-525

Varying neonatal care in India - variation in exposure to risk factors for ROP

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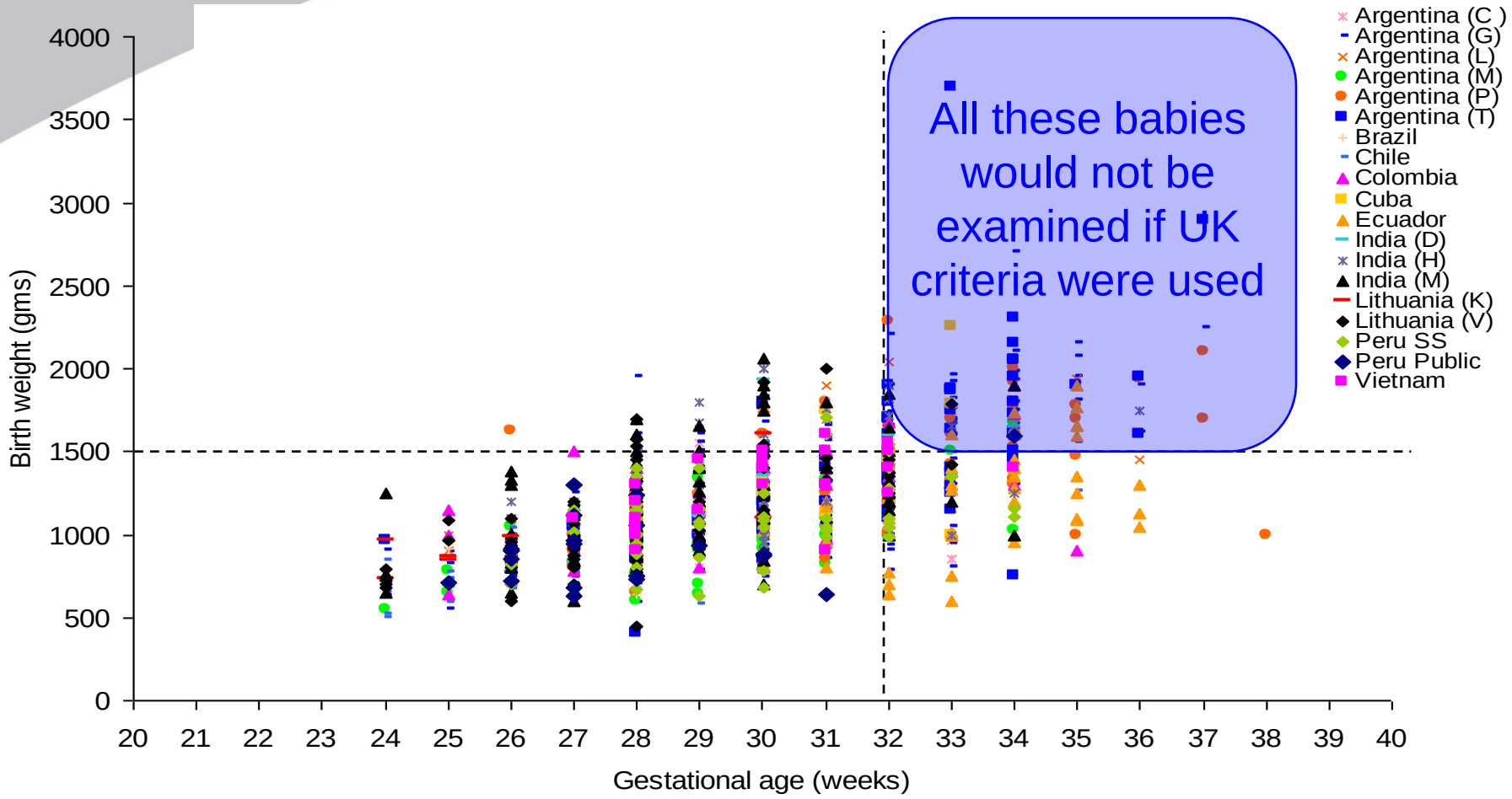
Implications of variability in babies at risk in low / middle income countries



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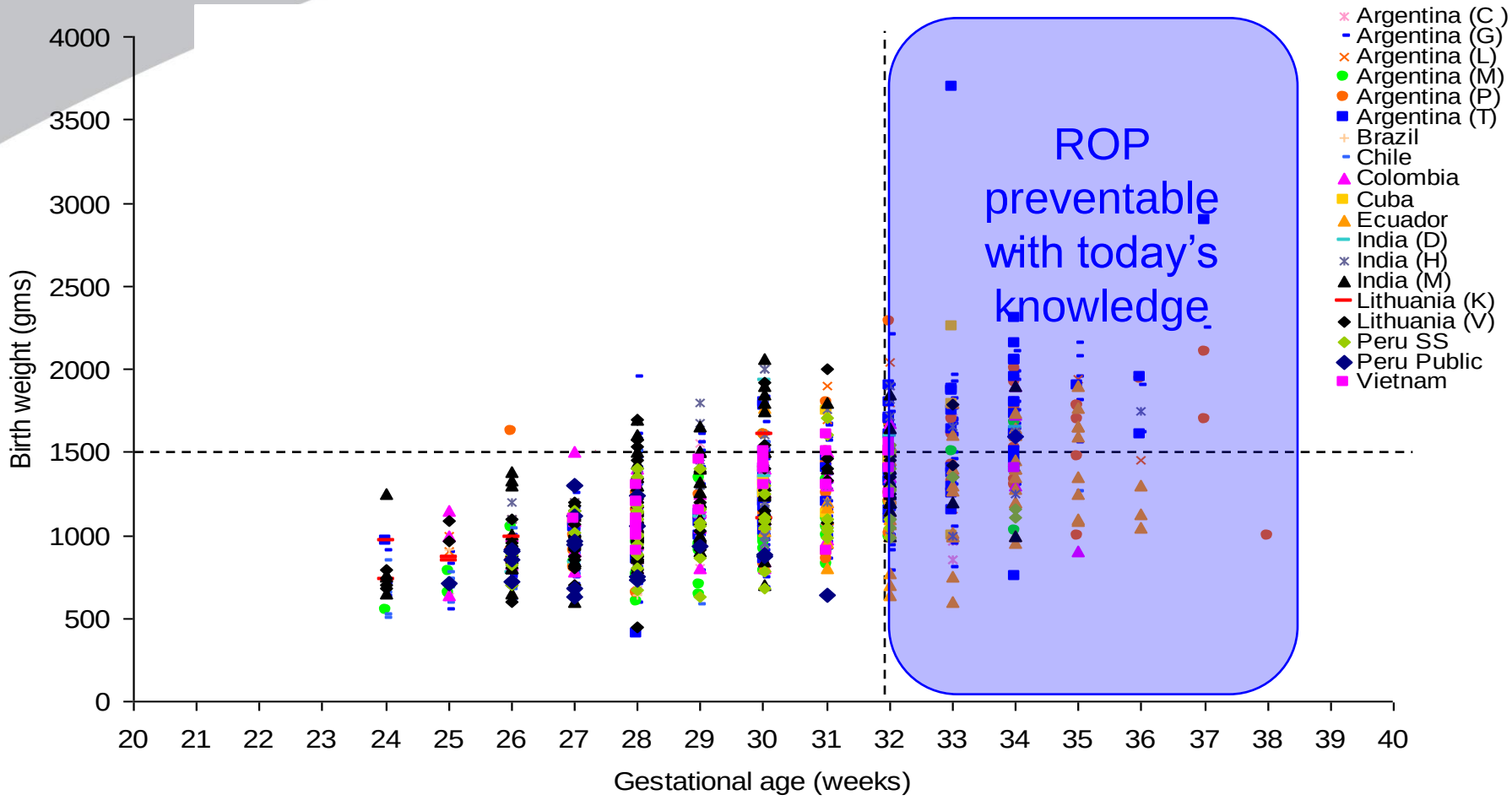

Gilbert et al. Paediatrics 2005 115 518-525

Two projects in Rio de Janeiro

Questions:

- Which criteria should be used in Brazil for eye examination?
- Can ROP be prevented by increasing the knowledge and skills of nurses?

Dr Zin examined preterm babies in the 7 largest units in Rio de Janeiro

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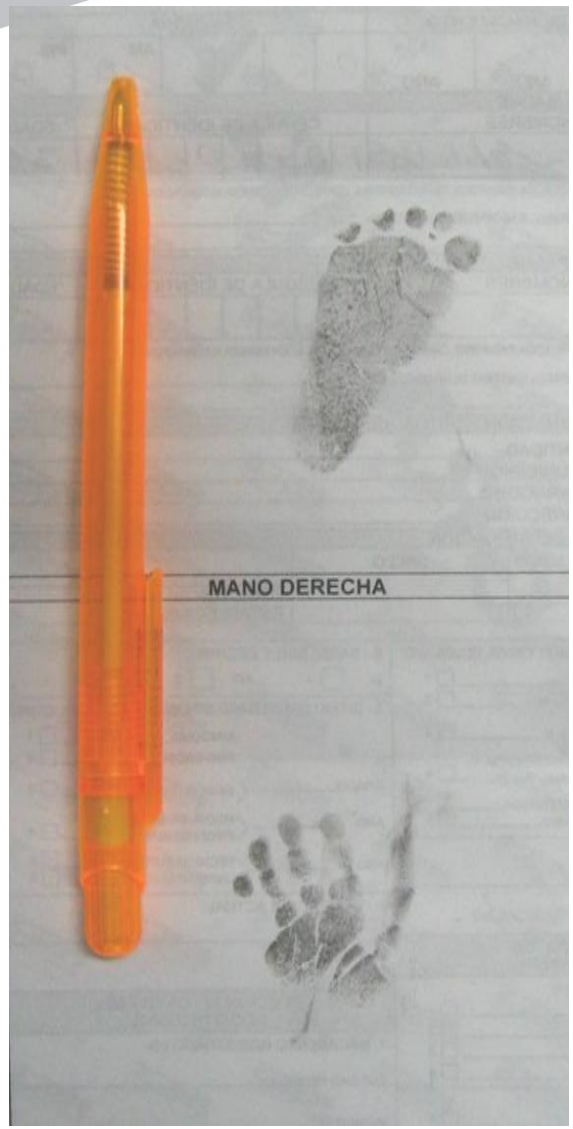
Almost 4,000 babies were examined over 30 months



.....some were very small indeed

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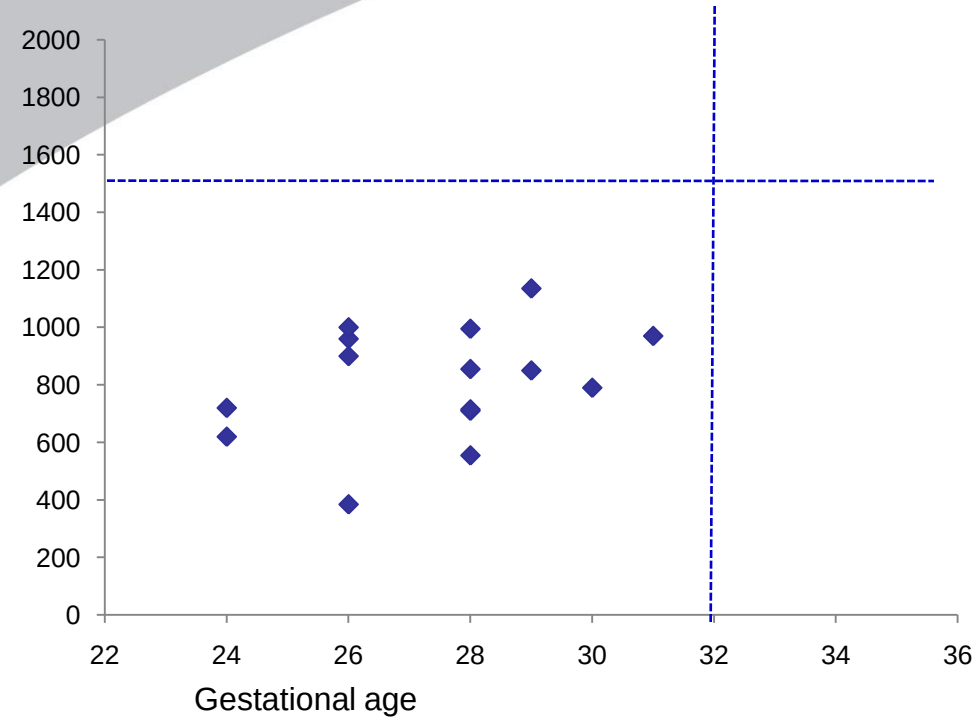
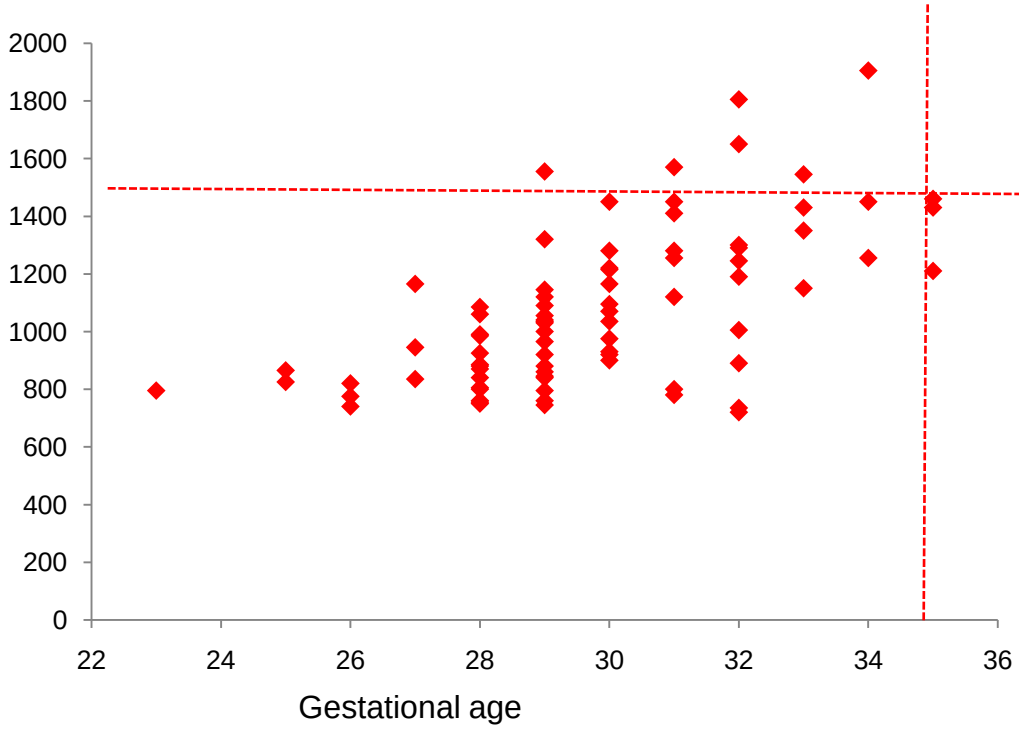
Characteristics of treated babies

Survival of <1500g babies

2 units high survival



5 units low survival



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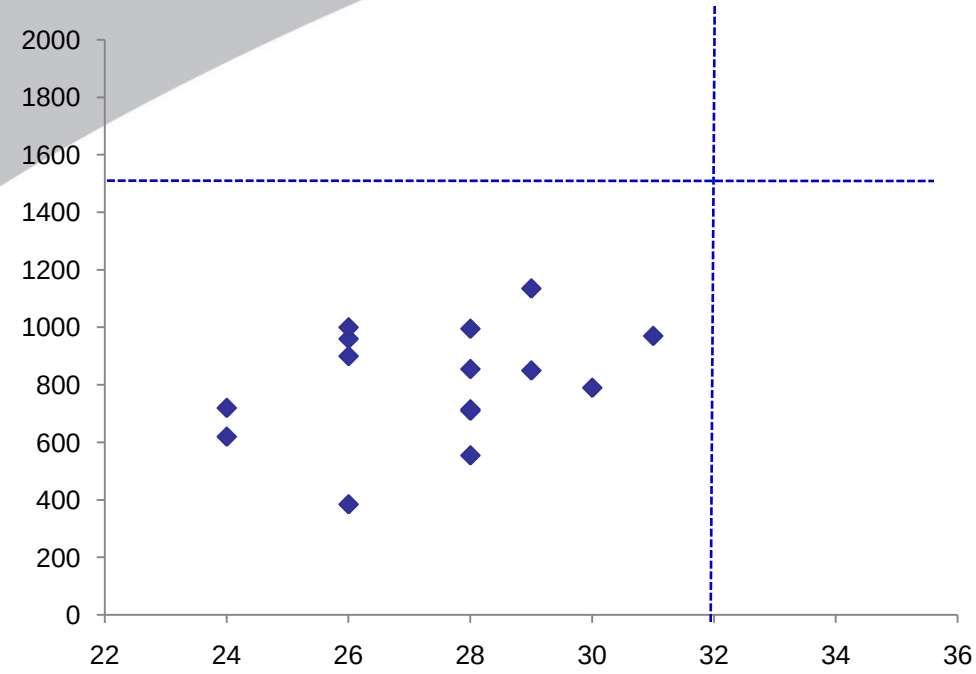
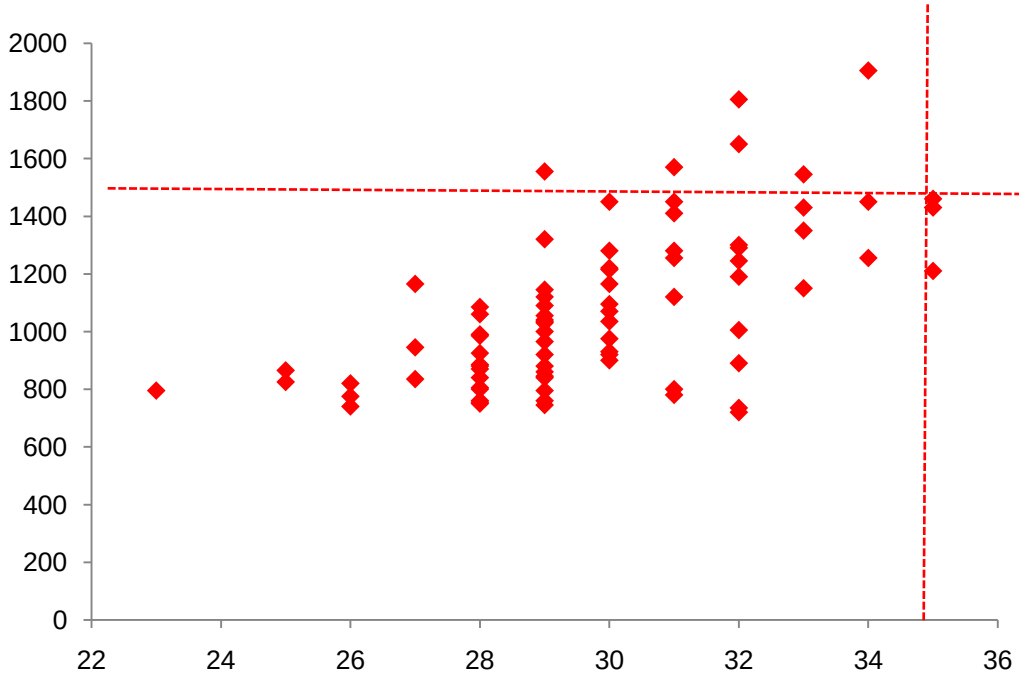


Criteria: ≤1500g or <**32** weeks

5 units low survival



Criteria: ≤1500g or <**35** weeks

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Workload implications of different criteria

- Applying the wide criteria to all units (≤1500g and ≤35 weeks):
  - 20% more babies to be examined but only
  - 12% more examinations

POINTS of Care study (PoC)

- Question:
  - Does training nurses and providing minimal essential equipment improve neonatal outcomes, including ROP?
- Methods:
  - 1 year pre-intervention data collection
  - POINTS of Care training of nurses and equipment
  - 1 year follow up data collection

POINTS of care intervention in 6 units in Rio de Janeiro

Pain

Oxygen

Infection

Nutrition

Temperature

Supportive care

Preliminary results

- No change in ROP or other outcomes
- BUT better nurse practices e.g.
  - monitoring oxygen: 23% correct before training
    52% correct after training
- Exploring reasons:
  - internal “brain drain” of neonatologists and nurses due to staff shortages outside urban areas

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Programmes for ROP in Latin America

In 1997:

- No awareness that ROP was a major cause of blindness
- Workshop in Chile:
  - only a handful of ophthalmologists screening in 2 countries in the region

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Situation now in Latin America

- >30 workshops over last 12 years
- National guidelines and committees in many countries; programmes in virtually all
- NGO support for training, equipment and treatment
- Government policies in Chile, Argentina, Brazil and Peru making examination of preterm babies essential
- PAHO: control of ROP blindness the 2nd Goal in the blindness prevention strategy for the region.....

GOAL 2: REDUCE BLINDNESS AND VISUAL IMPAIRMENT IN CHILDREN

Objective 2.1: Reduce blindness in premature babies due to retinopathy of prematurity (ROP)

....and beyond

- Lithuania 2007 1st World ROP Congress
- India 2009 2nd World ROP Congress
- China 2012 3rd World ROP Congress
- National guidelines in China (2004) and India (2010) and programmes expanding
- Eastern Europe – a big challenge....

Baby treated in India:
12 weeks premature;
weighed 1.1 kg

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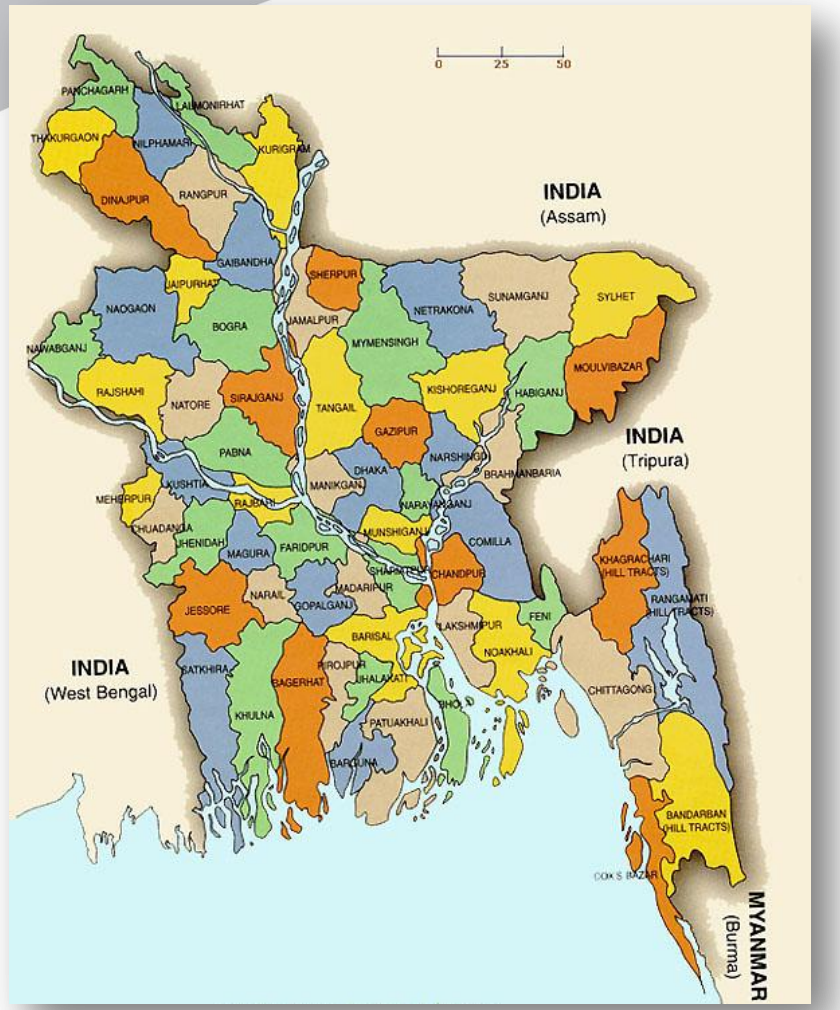
Childhood cataract in Bangladesh
Dr Muhit



50 million children

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Childhood cataract in Bangladesh

Questions:

- How many children are blind?
- What are main the causes of avoidable blindness?
- What can be done about it?

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Study undertaken by Dr Muhit

Steps:

- Development/refinement of “key informant method”
- Applied to populations of 100,000 in all 64 districts
- Used to estimate prevalence
- Provided data on causes

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Training Key Informants: community volunteers

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Key informants identify children with eye/visual problems in the community

Children identified by Key Informants examined in the community

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Children identified by Key Informants examined in the community

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Health education and counselling

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Cataract blind children referred for surgery

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Summary of findings

- 1,935 blind children examined
- Prevalence estimate:
  - 0.75/1,000 children
  - same as estimate using U5MR as a proxy
- Main causes:
  - unoperated cataract 31%*
  - corneal scarring 27%
  - other causes 42%
  - * beliefs that blind children cannot be treated

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Brit J Ophthalmol: 2007 vol 91 pgs 991-999 and 1000-1004

Estimates of numbers blind and causes

- 40,000 blind children in Bangladesh
- 12,000 from bilateral cataract

- In 2004
  - only 1 eye surgeon trained in paediatrics
  - only 3 centres could manage children, 2 in Dhaka
  - less than 300 child cataract operations/year

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Bangladesh Childhood Cataract Campaign: 2004-2010

- Collaborative project: Sightsavers, ORBIS etc
- Targets:
  - find 40,000 blind children
  - operate on 10,000 children with bilateral cataract
  - establish 8-10 Child Eye Care Centres
- Case finding approaches for whole country
  - 1. key informant method
  - 2. house to house visits by volunteers
  - 3. community based rehabilitation

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End of project evaluation (2010)

- 16 trained paediatric ophthalmologists
- 8 Child Eye Care Centres established
- 32,641 blind children found - 9,383 from cataract
- 24,500 cataract operations on children
- Awareness raised as many more children presenting for surgery

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Back in action!

Further studies using key informants

- Blindness in children:
  - Ghana, Iran and Malawi
- Other disabilities in children:
  - Bangladesh

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What next?

- Policy research for ROP in Latin America
- Evaluate the impact of integrating child eye health into government health systems
- Scaling up.....

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BDF New Life

Muslim Aid

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The NO-ROP International group


















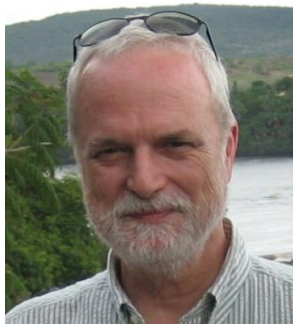


The Great ICEH Team!

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