

# Public health and cataract blindness

# Overview

This presentation covers the following topics:

- Definitions
- Epidemiology of cataract
- Public health approaches to control cataract blindness
- Conclusion

**Notes section** – a more detailed explanation is provided in the notes along with key references.

# Definition and classification of Cataract

## **Definition :**

- Abnormal morphology
- Decreased light transmission
- Decreased visual acuity

## **Aetiology:**

- Age related
- Congenital
- Traumatic
- Secondary

## **Location of the opacity:**

- Cortical
- Nuclear
- Posterior subcapsular

# Cataract grading systems

- **WHO – simplified grading**
  - rapid method
  - designed for surveys
  - undilated pupil
  - very good interobserver agreement
- **LOCSS**
  - photographic method
  - Used in case-control studies/cross sectional surveys
  - dilated pupil
  - very good interobserver agreement

# Magnitude: prevalence of cataract

| Study and location                  | Sample | Years   | Nuclear | Cortical | PSC  |
|-------------------------------------|--------|---------|---------|----------|------|
| Beaver Dam<br>USA 1988-90           | 4926   | 55-64   | 6.6     | 10.9     | 4.3  |
|                                     |        | 65-74   | 27.4    | 25.4     | 8.4  |
|                                     |        | 75-84   | 57.4    | 42.4     | 14.3 |
| Blue Mountains<br>Australia 1992-94 | 3654   | 55-64   | 3.9     | 13.1     | 3.8  |
|                                     |        | 65-74   | 21.8    | 28.4     | 6.5  |
|                                     |        | 75-84   | 48.5    | 46.7     | 11.7 |
| South West, Nigeria<br>2006-07      | 1031   | 50-59   | 11.5    | 9.3      | 3.2  |
|                                     |        | 60-69   | 20.4    | 20.4     | 8.8  |
|                                     |        | 70+     | 29.2    | 22.7     | 15.8 |
|                                     |        | All 50+ | 17.4    | 15.2     | 7.2  |
| INDIEYE: 2 centres<br>2007-08       | 5871   | 60+     | 42.8    | 9.0      | 19.1 |

# Magnitude: prevalence of cataract blindness

Prevalence data from:

1. Prevalence surveys – population based
2. Rapid assessment methods in adults over 50 years of age

In general:

- 50% of all causes of blindness
- 18 million cataract blind
- Higher prevalence in developing countries

# Cataract risk factors

## Modifiable:

- Smoking
- Diabetes
- Steroids MJC1  
13
- Chronic UV exposure

## Non modifiable

- Age
- Female gender
- Genetics

## Slide 7

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- MJC1**      Technically this is modifiable but for some patients on long-term administration it's hard to find an alternative.  
Marissa Carter, 6/2/2011
- I3**          Agree, this point is discussed on the subtext on the primary prevention slide. I have also included it below for further clarity.  
ITD, 7/5/2011

# Management of cataract: surgery

| Technique      | Phaco                        | MSICS                    |
|----------------|------------------------------|--------------------------|
| Visual outcome | Same at 6 weeks postop.      |                          |
| Operating Time | Longer                       | Shorter                  |
| Cost           | Expensive                    | Cheaper                  |
| Training       | Difficult for ECCE surgeons. | Easier for ECCE surgeons |

- MSICS: technique of choice in developing countries
- Phacoemulsification: technique of choice in developed countries

# Public health strategies for cataract

- **Primary prevention:** prevent cataract from forming
- **Secondary prevention:** prevent progression to cataract blindness in patients with cataract
- **Tertiary prevention:** treat the cataract blind

# Primary prevention of cataract

- Health education orientated to modify risk factors which may only delay the development but not prevent it.
  - Smoking: cessation campaigns
  - Diabetes: tight control of blood sugar
  - Steroids: avoid long term treatments if possible
  - UV exposure: use sunglasses and hats

# Secondary prevention of cataract

- Surgery in patients before they are blind from cataract:
  - -awareness campaigns
  - -early surgery is routine in developed countries
  - -in developing countries priority to operate on the cataract blind?
  - Improving accessibility and affordability of services

# Tertiary prevention : surgery to restore sight in blind eyes

- Cataract surgery control strategies:
  1. Cataract output: quantity - how many operations done and in how many blind patients?
  2. Cataract outcome: quality - what are the results and how do we monitor them?
  3. Cataract outlay: cost - what is the cost/cost-effectiveness?

## Slide 12

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**MJC2**

Just a note that compared to other slides, in the notes section there are no comments on points 2 and 3

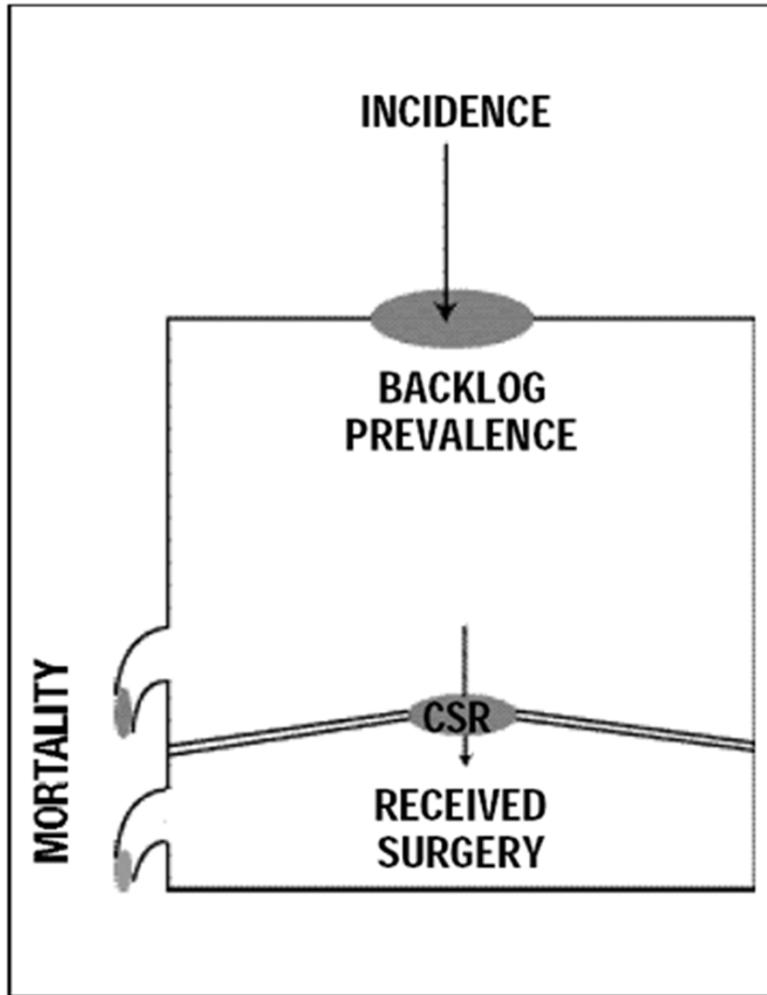
Marissa Carter, 6/2/2011

**I5**

This slide is just an outline of what is discussed in the following ones. No much point on repeating what will be said later, but the small paragraph and references will hopefully aid students structure topic.

ITD, 7/5/2011

# Schematic view of the cataract Burden



- Backlog – number of cataract cases not operated in a given population .
- Backlog can be defined for blindness, or an agreed operable visual acuity cutoff
- Back log + received surgery = burden of cataract
- Incidence – number of new cases developing cataract / year
- CSR – cataract surgical rate – surgeries / million / year

## Slide 13

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**MJC3**

Notes: "In many developed countries this can be at even at 6/6..." Is this a typo? Maybe 6/60? Really should be 6/18 or 20/40.

Marissa Carter, 6/2/2011

**I2**

Not a typo: referring to the fact tha in developed countries patients can get cataract surgery as soon as they are symptomatic, despite of very good visual acuity when measured. 6/6 is probably not so common, I have changed to 6/9 which is not an uncommon scenario in the UK and ammended the comments to make them a bit clearer

ITD, 7/5/2011

# Cataract Output:

## Cataract surgical rate

- CSR: performance indicator - number of surgeries performed per million population per year
- Minimum CSR must be equal to the incidence of operable cataract, but consider that not all operated eyes are blind
- Must include all sectors: private/public/NGO
- Caution when comparing across regions as prevalence and incidence of disease varies.

## Slide 14

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**MJC4** in the Notes section: "It simply indicates the extent of the efforts to control cataract blindness in a particular region. (1)" This may have been what the authors said but I strongly disagree. CSR and blindness due to cataract do not correlate!

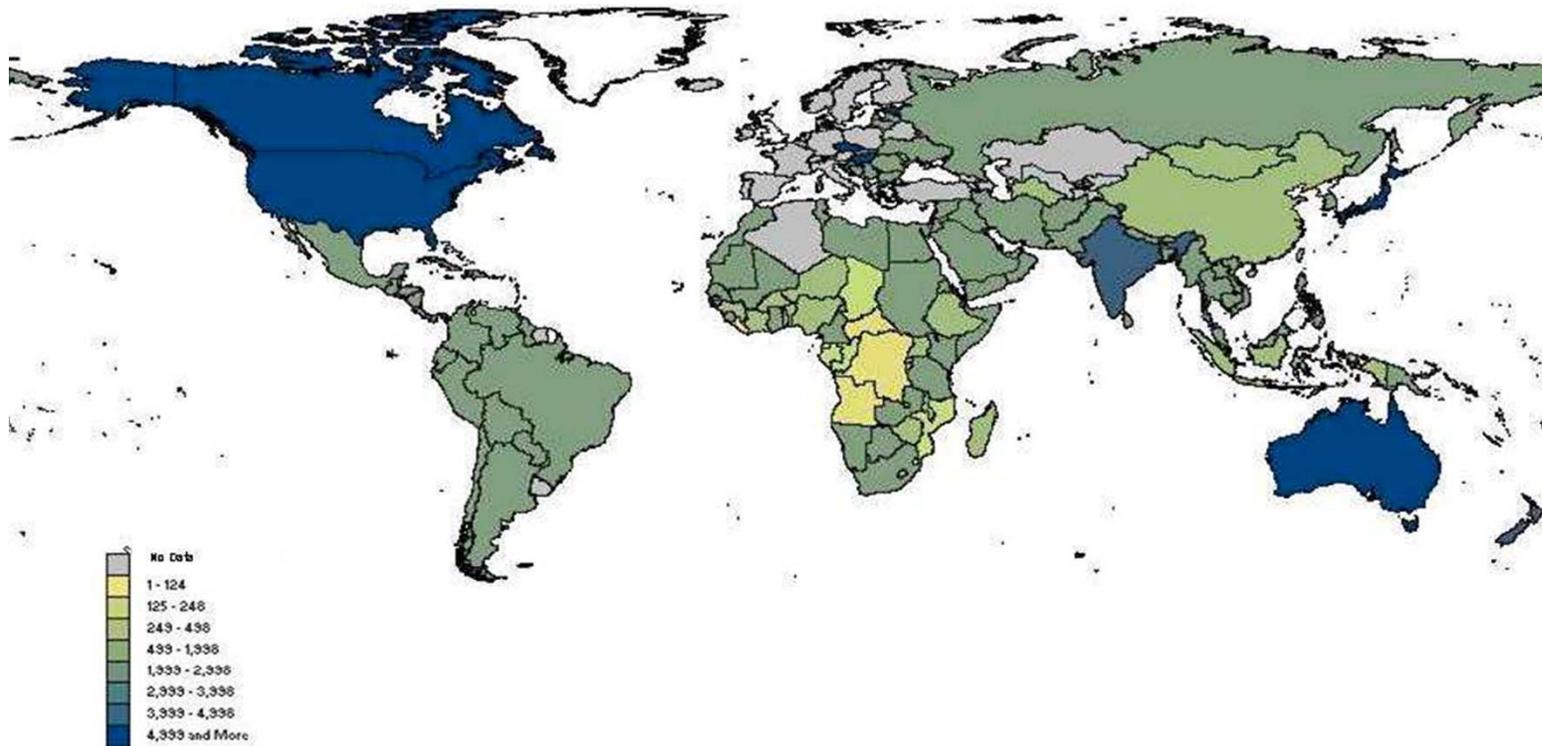
Marissa Carter, 6/2/2011

**I6** I have rephrased this, to account for the fact that most patients are probably not blind preop. Hope it is clearer this way?

ITD, 7/5/2011

# CSR world map 2006

Cataract Surgery Rate 2006



Disclaimer: © World Health Organization. The boundaries and names shown and the designations used on this map do not imply the expression of an opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

# Cataract Output:

## Cataract surgical coverage

- **CSC:** impact indicator: proportion of operable cataract cases operated at a point in time.- survey data
- **CSC for persons** proportion of people, with bilateral operable cataract that have had surgery in one or both eyes at a point in time.
- **CSC for eyes** proportion of eyes that received surgery at a point in time. It relates more to the total surgical workload for the ophthalmologists. If CSC eyes > than CSC person – likely that bilateral surgery was done
- ideal CSC should be about 85% and more

## Slide 16

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**MJC6** Not quite true; also depends on how CSC is calculated at what visual acuity measurement.  
Marissa Carter, 6/2/2011

**I7** Clarified  
ITD, 7/5/2011

# Cataract surgical coverage

$$\text{CSC}(\text{persons})(\text{VA}) = \frac{x+y}{x+y+z} \times 100$$

X= number of persons with unilateral pseudoaphakia and operable cataract in the other eye

Y= number of persons with bilateral pseudoaphakia

Z= number of persons with bilateral operable cataract

$$\text{CSC}(\text{eyes})(\text{VA}) = \frac{a}{a+b} \times 100$$

A = pseudoaphakic eyes      b = eyes with operable cataract

The larger the difference between CSC persons and CSC eyes, the greater the preference that has been given to operate on first eyes above second eyes.

# Cataract outcome

- The change in functional disability as a result of cataract operation. Indicators:
  - Visual outcome: visual acuity
  - Visual functioning: impact of vision in activities of daily life \*
  - Quality of life: well being, mobility, mental outlook\*

# WHO cataract outcome guidelines

| Postoperative acuity    | Available correction | Best correction |
|-------------------------|----------------------|-----------------|
| Good(6/6-6/18)          | >80%                 | >90%            |
| Borderline (<6/18-6/60) | <15%                 | <5%             |
| Poor(<6/60)             | <5%                  | <5%             |

- Additional guidelines:
  - >90% should be IOL surgery
  - Surgical complications <10%: capsular rupture <5% and vitreous loss <5%

# Causes of poor outcome

- Selection: patient-related risk factors
- Surgery: surgical or early postoperative complications
- Spectacles: uncorrected refractive error
- Sequelae: late postoperative complications

Monitoring of cataract surgical outcomes is essential – suitable manual/electronic tools are available

# Cataract outlay

MJC7

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- Cataract surgery is a cost-effective health intervention
- The cost to the provider must be lower than the price to achieve financial sustainability
- Indirect costs to the patient are important
- Cataract surgical services in developing countries must be affordable, sustainable, and available to all
- Cost containment, cost recovery, and income generation strategies help achieve these goals

## Slide 21

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**MJC7**

Should add Lansingh et al 2008 ref in Notes section.

Marissa Carter, 6/2/2011

**I4**

I included the 2007 paper, is this the one you had in mind?

ITD, 7/5/2011

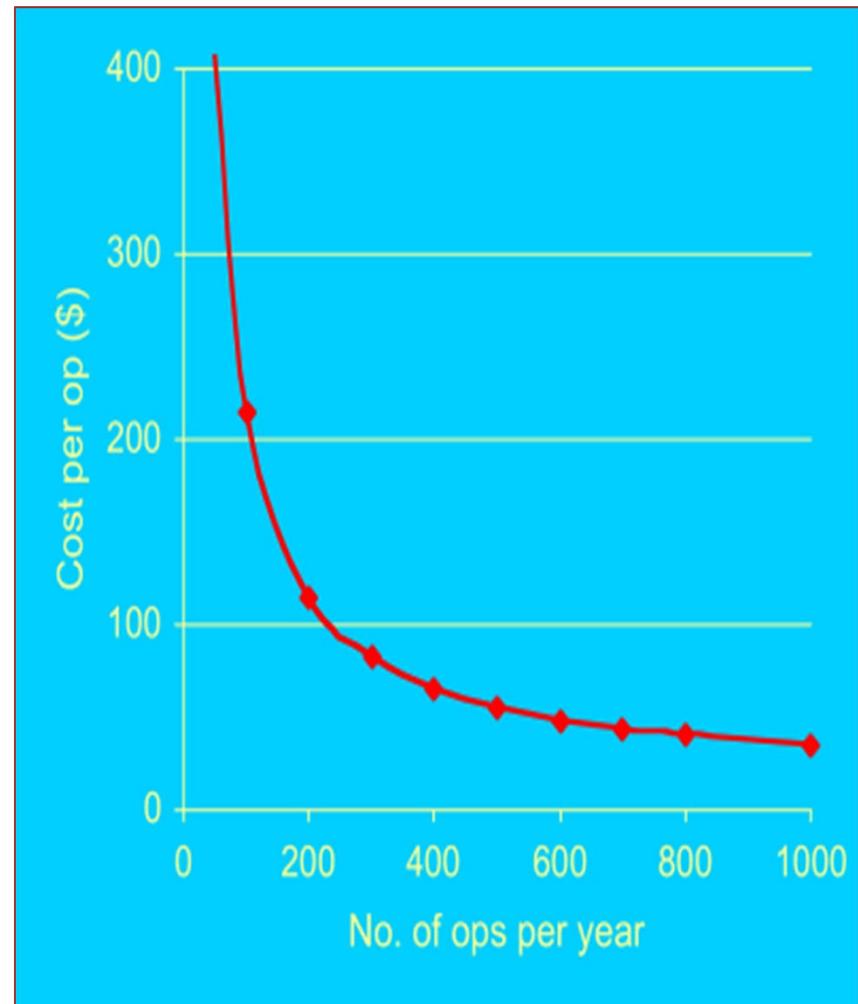
# Cataract outlay

- Cost per unit in cataract surgery =  $F/S + C$

**F**- fixed cost , **S** number of surgeries,  
**C** cost of a consumable

If productivity increases, cost per unit decreases

If the cost of consumables decreases, cost per unit decreases



# Barriers to cataract surgery – must be identified and addressed

## **Consumer barriers:**

- Cost of surgery: Direct and indirect cost
- Distance to hospital
- Social barriers e.g gender issues , no one to accompany patient etc
- Awareness of services
- Trust in outcome of surgery – fear of surgery

## **Provider Barriers :**

- Long waiting list
- Insufficient manpower, materials or money.
- Poor surgical skills and outcomes – affects reputation
- Inaccessible e.g. too far for rural patients
- high cost due to poor management

# Conclusion

- Cataract is the main cause of blindness worldwide
- The prevalence of cataract blindness is higher in developing countries and is increasing with population growth and aging.
- There are no effective prevention strategies for cataract, the major risk factor is age.
- CSR and CSC indicators that measure the output of cataract surgery in populations
- Monitoring of cataract surgical services is essential to maintain quality
- Barriers of different populations have to be addressed to increase demand for services and increase productivity to address the backlog of cataract blindness