Rapid Assessment of Avoidable Blindness (RAAB 5)

Hans Limburg MD PhD
What is RAAB?

**Rapid Assessment of Avoidable Blindness**

Population-based survey on blindness and visual impairment
Causes of blindness incl. URE

- **Refractive error**
  - 18% 8m
- **Glaucoma**
  - 10% 4.5m
- **AMD**
  - 7% 3.2m
- **Corneal scar**
  - 4% 1.9m
- **Diab. retinopathy**
  - 4% 1.8m
- **Childhood**
  - 3% 1.4m
- **Trachoma**
  - 3% 1.3m
- **Oncho.**
  - 0.7% 0.3m
- **Other causes**
  - 11% 4.8m

**37 million blind**

Characteristics of RAAB:

- provides baseline indicators for planning and monitoring over time
- uses sound epidemiological methodology
- simple, cheap and quick procedure
- basic ophthalmic examination
- carried out by local staff
- can be repeated after 8-12 years to assess change over time (interventions!)

At ‘district’ level (ideally 0.5-5 million pop.)
History

- **1994:** District Rapid Assessments developed in India
  - Required for decentralised eye care services
  - Based on WHO Blindness Survey Form

- **2000:** Modified into Rapid Assessment of Cataract Surgical Services (RACSS)

- **2005:** Modified to Rapid Assessment of Avoidable Blindness (RAAB) with focus on VISION 2020 district level planning

- **2013:** RAAB 5 with reports on URE and optional DR module; Spanish version

- **2013:** VA<6/12 added
Why is it ‘Rapid’?

- Restricted to people aged 50+
- High prevalence → low sample size
- Standard methodology
- Enumeration and examination in one visit
- Basic eye examination
- Special software
  - Calculate sample size
  - Random selection of clusters
  - Inter-observer variation assessment
  - Simple data entry
  - In-built error checks
  - Automatic data analysis: comparable results
Focus on people 50+

- 85% of all blindness in people 50+
- Nearly all cataracts in people 50+
- Prevalence high in people 50+, hence sample size can be small
- Elderly people often not far away from the house
- Generally good cooperation
The Gambia: Blindness by age


85% of blindness in people aged 50+

<table>
<thead>
<tr>
<th>Cause of blindness</th>
<th>Total population</th>
<th>Population 50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract</td>
<td>46%</td>
<td>48%</td>
</tr>
<tr>
<td>Aphakia</td>
<td>13%</td>
<td>15%</td>
</tr>
<tr>
<td>Trachoma/CO</td>
<td>22%</td>
<td>17%</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>Other</td>
<td>11%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Causes in people 50+ reflect causes in total population
# RA versus conventional Survey

<table>
<thead>
<tr>
<th>Blindness survey</th>
<th>Rapid assessment</th>
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</thead>
<tbody>
<tr>
<td>Focus &gt;1 risk group</td>
<td>Focus on 1 risk group</td>
</tr>
<tr>
<td>– lower prevalence</td>
<td>– higher prevalence</td>
</tr>
<tr>
<td>Sample size &gt;15,000</td>
<td>Sample size 2500-5000</td>
</tr>
<tr>
<td>Detailed examination</td>
<td>Basic examination</td>
</tr>
<tr>
<td>Disease intervention</td>
<td>Planning and follow-up</td>
</tr>
<tr>
<td>Expert staff</td>
<td>Local staff</td>
</tr>
<tr>
<td>Large survey population (10-100 mln.)</td>
<td>Smaller survey population (0.5-5 mln.)</td>
</tr>
<tr>
<td>Custom data analysis</td>
<td>Automatic data analysis</td>
</tr>
<tr>
<td>Takes long (years)</td>
<td>Rapid (months)</td>
</tr>
<tr>
<td>Expensive (0.5-10 mln)</td>
<td>Cheap (20-40,000 US$)</td>
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</table>
Indicators used:

- prevalence of all blindness, severe visual impairment (SVI) and moderate visual impairment (MVI)
- main causes of blindness, SVI and VI
- prevalence of cataract blindness
- prevalence of (pseudo)aphakia
- Cataract Surgical Coverage
- prevalence of low vision
- visual outcome after cataract surgery
- cause of poor visual outcome
- barriers to cataract surgery
- prevalence of diabetic retinopathy (optional)
- uncorrected refractive error
- age at time of surgery, place of surgery, type of surgery, costs, cause of poor outcome
Comparing findings of RAAB in 2005 and the 2010 study on posterior segment eye diseases:


Conclusions:
“This survey provides reliable estimates of blindness and VI prevalence in Nakuru…”

“This survey validates the use of RAAB as a method of estimating blindness and VI prevalence…”

“It is also strongly suggestive that the RAAB methodology being used throughout Africa and worldwide is a robust and reliable methodology…”
Where surveys were done

- RACSS
- RAAB
- Custom survey
Where to conduct RAAB?

- Total population ideally 0.5 - 5 million
- Management structure for eye care
- Population composition by gender and by 5-year age groups available
- Population by sub-unit (enumeration area, village, town, neighbourhood, polling station, etc.) available
- Detailed maps available
- Entire area is accessible for survey teams
- No problems with security
Multistage cluster sampling:

1. Randomly select population units by systematic sampling from sampling frame
   - census enumeration areas with population, or
   - list of settlements with population, or
   - other list of geographic distribution of total population

2. Sub-divide selected population unit in segments with equal population, enough to provide 50 people aged 50+

3. Randomly select one segment

4. Visit all households in selected segment

5. Examine all residents aged 50+ in these houses, until 50 are examined

6. If less than 50 residents in segment, continue in next nearest segment
### RAAB survey form

#### A. GENERAL INFORMATION
- Survey area: 
- Year-month: 
- Individual no.: 
- Cluster: 
- Sex: Male: O (1) Female: O (2)
- Age (years): 
- Examination status: 
  - Examined: O (1) (go to B) 
  - Refused: O (3) (go to E) 
  - Not available: O (2) (go to E) 
  - Not able to communicate: O (4) (go to E)
- Always ask: “Did you ever have any problems with your eyes?” 
  - Yes: O (1) 
  - No: O (2)

#### B. VISION
- Using distance glasses: No: O (1) Yes: O (2)
- Using reading glasses: No: O (1) Yes: O (2)
- Presenting vision:
  - Right eye: O (1) Left eye: O (1)
  - Can see 6/18: O (1) Left eye: O (1)
  - Cannot see 6/18 but can see 6/60: O (2) Left eye: O (2)
  - Cannot see 6/60 but can see 3/60: O (3) Left eye: O (3)
  - Cannot see 3/60 but can see 1/60: O (4) Left eye: O (4)
  - Light perception (PL+): O (5) Left eye: O (5)
  - No light perception (PL-): O (6) Left eye: O (6)
- Pinhole vision:
  - Right eye: O (1) Left eye: O (1)
  - Can see 6/18: O (1) Left eye: O (1)
  - Cannot see 6/18 but can see 6/60: O (2) Left eye: O (2)
  - Cannot see 6/60 but can see 3/60: O (3) Left eye: O (3)
  - Cannot see 3/60 but can see 1/60: O (4) Left eye: O (4)
  - Light perception (PL+): O (5) Left eye: O (5)
  - No light perception (PL-): O (6) Left eye: O (6)

#### C. LENS EXAMINATION
- Normal lens / minimal lens opacity: O (1) O (1)
- Obvious lens opacity: O (2) O (2)
- Lens absent (aphakia): O (3) O (3)
- Pseudophakia without PCO: O (4) O (4)
- Pseudophakia with PCO: O (5) O (5)
- No view of lens: O (6) O (6)

#### D. MAIN CAUSE OF PRESENTING VA<6/18
(Mark only one cause for each eye)
- Refractive error: O (1) O (1) O (1)
- Aphakia, uncorrected: O (2) O (2) O (2)
- Cataract, untreated: O (3) O (3) O (3)
- Cataract surgical complication: O (4) O (4) O (4)
- Trachoma corneal opacity: O (5) O (5) O (5)
- Other corneal opacity: O (6) O (6) O (6)
- Phthisis: O (7) O (7) O (7)
- Onchocerciasis: O (8) O (8) O (8)
- Glaucoma: O (9) O (9) O (9)
- Diabetic retinopathy: O (10) O (10) O (10)
- ARMD: O (11) O (11) O (11)
- Other posterior segment: O (12) O (12) O (12)
- All globe/CNS abnormalities: O (13) O (13) O (13)
- Not examined: can see 6/18: O (14) O (14) O (14)
- Principal cause in person

#### E. HISTORY, IF NOT EXAMINED
(From relative or neighbour)
- Believed:
  - Not blind: O (1) O (1)
  - Blind due to cataract: O (2) O (2)
  - Blind due to other causes: O (3) O (3)
  - Operated for cataract: O (4) O (4)

#### F. WHY CATARACT OPERATION WAS NOT DONE
(Mark up to 2 responses, if VA<6/18, not improving with pinhole, with visually impairing lens opacity in one or both eyes)
- Need not felt: O (1)
- Fear for surgery or poor result: O (2)
- Cannot afford operation: O (3)
- Treatment denied by provider: O (4)
- Unaware that treatment is possible: O (5)
- No access to treatment: O (6)
- Local reason (optional): O (7)
- Cause of VA<6/18 after cataract surgery
  - Ocular comorbidity (Selection): O (1) O (1)
  - Operative complications (Surgery): O (2) O (2)
  - Refractive error (Spectacles): O (3) O (3)
  - Longterm complications (Sequela): O (4) O (4)
  - Does not apply - can see 6/18: O (5) O (5)
- Place of operation
  - Government hospital: O (1) O (1)
  - Voluntary / charitable hospital: O (2) O (2)
  - Private hospital: O (3) O (3)
  - Eye camp / improvised setting: O (4) O (4)
  - Traditional setting: O (5) O (5)
- Type of surgery
  - Non IOL: O (1) O (1)
  - IOL implant: O (2) O (2)
  - Coching: O (3) O (3)
- Cost of surgery
  - Totally free: O (1) O (1)
  - Partially free: O (2) O (2)
  - Fully paid: O (3) O (3)
Rapid assessment of avoidable blindness in three counties, Jiangxi Province, China

Baixiang Xiao,1 Hannah Kuper,1 Chunhong Guan,2 Kirsten Bailey,3 Hans Limburg1

1London School of Hygiene & Tropical Medicine, London, UK
2The Fred Hollows Foundation.

ABSTRACT
Background A survey was undertaken in 2007 to assess the prevalence and causes of blindness and visual
administratively divided into 12 prefectures/cities and into 87 counties. Over 95% of the hospitals are
government-owned in Jiangxi, excluding the villages.

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Rapid Assessment of Avoidable Blindness and Diabetic Retinopathy in Chiapas, Mexico

Sarah Polack, MSc, PhD,1 David Yorston, FRCS, FRCOphth,2 Antonio López-Ramos, MD,3
Sergio Lepe-Orta, MD,3 Rogerio Martins Baia, MD,3 Luciano Alves, MD,3 Carlos Grau-Alvidrez, MD,3
Pedro Gomez-Bastar, MD,3 Hannah Kuper, ScD1

Objective: To estimate the prevalence and causes of blindness in Chiapas, Mexico, and to assess the
feasibility of using the Rapid Assessment of Avoidable Blindness framework to estimate diabetic retinopathy (DR).
HỘI NGHỊ LẬP KẾ HOẠCH QUỐC GIA PHÒNG CHỐNG MỤA Lóa, HƯƠNG D démarche "THỊ LÁC 2020"
NATIONAL PLANNING WORKSHOP ON BLINDNESS PREVENTION TOWARD "VISION 2020"
Hà Nội, 01-03/08/2008
Future developments:

• Web-based RAAB repository
• Improve access to RAAB data
• Planning module
• Data entry on smartphone, tablet, PC
• Integration of data entry with examination by ‘eye phone’
Web-based repository of survey sites and findings of RAABs

Repository for population-based surveys on blindness and visual impairment

Search a survey by typing the name of the country, the state/province, division, zone, and the district in the respective search boxes. A search can also be done on the year the survey was conducted. Then click on the "Search" button. The surveys that match the search criteria will be listed in the table. Click on the row of your choice to open a detailed view with contact e-mail, reference to a publication, downloads of reports and raw data and the main findings of the survey. Click on maps to see the location of the matching surveys. Click on the icons on the map to see the name of the survey area. Click again and the detailed view will open.

Principal Investigator: Dr. Baixing Xiao
RAAB Trainer: Dr. Hans Umburg
Download RAAB reports: N/A
Download original data: N/A
Sample size: 4699
Coverage (%): 94
Prevalence PVA <360 (% in 50+): 1.7
Prevalence PVA 46/18 - 6/60 (% in 50+): 8.5
Low vision (% in 50+): 1.4
Cataract (% blind in 50+): 81.4
Refractive errors (% blind in 50+): 2.9
Trachoma (% blind in 50+): 0
Post: segment disease (% blind in 50+): 21.4
Diabetic Retinopathy (% blind in 50+): 0
Cataract Surgical Coverage (%): 62
Visual outcome (%: PVA >=6/18): 55.4
% operated with IOL: 84.8
The Eye-Phone

Modified ophthalmoscope: Used to investigate the interior of the eye (especially the retina)

Smartphone: The prototype used a Nokia N8 with a 12 megapixel camera

The Eye-phone is capable of taking images of the retina of a similar quality to professional desk-mounted ophthalmoscopes costing many thousands of pounds and that weigh in at about 130kg (below)

By contrast the Eye-phone only weighs 625g and costs less than a thousand pounds

The phone is designed to measure vision and the causes of blindness such as cataract or glaucoma

Information can be shared with experts anywhere in the world in real-time or can be stored on Google Maps for location at a later date