PRINCIPLES
OF
PREVENTION
OF
BLINDNESS
DEFINITION OF BLINDNESS AND LOW VISION

There are 4 important questions to be asked when considering prevention of blindness:

What is blindness? - DEFINITION
How many are blind? - MAGNITUDE
Why are people blind? - AETIOLOGY
What can we do? - CONTROL

The World Health Organization has classified vision into 4 categories. They are based on the Snellen visual acuity. They are the vision in the better eye with available correction.

The 4 categories are –

- 6/6-6/18 “Normal”
- <6/18-6/60 “Visual impairment”
- <6/60-3/60 “Severe visual impairment”
- <3/60-NPL “Blind”.

In addition –
Blindness also includes –
A visual field constricted to <10 degrees around central fixation in the better eye.

Low vision also includes –
A visual field constricted to <20 degrees around central fixation in the better eye.

“Blindness” is therefore defined as –

1. Snellen acuity <3/60 in the better eye with available correction
2. Visual field <10 degrees around central fixation in the better eye.
### EXERCISE
**PLANNING AND IMPLEMENTATION OF VISION 2020 PROGRAMMES**
**PRINCIPLES OF PREVENTION OF BLINDNESS**
**DEFINITION OF BLINDNESS AND LOW VISION**

In a survey of blindness and low vision, the visual acuities in a sample of 10 people surveyed are:

<table>
<thead>
<tr>
<th>Right eye</th>
<th>Left eye</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 6/6</td>
<td>6/6</td>
</tr>
<tr>
<td>2. 6/9</td>
<td>6/12</td>
</tr>
<tr>
<td>3. 6/18</td>
<td>6/6</td>
</tr>
<tr>
<td>4. CF</td>
<td>6/6</td>
</tr>
<tr>
<td>5. 6/60</td>
<td>6/24</td>
</tr>
<tr>
<td>6. 5/60</td>
<td>3/60</td>
</tr>
<tr>
<td>7. 2/60</td>
<td>PL</td>
</tr>
<tr>
<td>8. PL</td>
<td>3/60</td>
</tr>
<tr>
<td>9. HM</td>
<td>6/6</td>
</tr>
<tr>
<td>10. 6/24</td>
<td>6/24</td>
</tr>
</tbody>
</table>

**What are the categories of the vision in each eye and in each person?**

**How many people have “normal vision”?**

**“Visual Impairment”?**

**“Severe Visual Impairment”?**

**How many people are blind?**

**What is the prevalence of blindness in this sample?**
MAGNITUDE + DISTRIBUTION OF BLINDNESS IN THE WORLD

Global Blindness – Prevalence (Backlog)

In the year 2000, the estimated number of people who were blind, severely visually impaired, and visually impaired were –

<table>
<thead>
<tr>
<th>CATEGORY OF VISION</th>
<th>NUMBER</th>
<th>VISUAL ACUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind</td>
<td>50 million people</td>
<td>&lt;3/60</td>
</tr>
<tr>
<td>SVI</td>
<td>25 million people</td>
<td>&lt;6/60-3/60</td>
</tr>
<tr>
<td>VI</td>
<td>125 million people</td>
<td>&lt;6/18-6/60</td>
</tr>
<tr>
<td>Normal</td>
<td>5 800 million people</td>
<td>6/6 –6/18</td>
</tr>
<tr>
<td></td>
<td>6 000 million people total</td>
<td></td>
</tr>
</tbody>
</table>

In the year 2002, the estimated numbers were –

<table>
<thead>
<tr>
<th>CATEGORY OF VISION</th>
<th>NUMBER</th>
<th>VISUAL ACUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind</td>
<td>36,9 million people</td>
<td>&lt;3/60</td>
</tr>
<tr>
<td>Low vision</td>
<td>124,3 million people</td>
<td>&lt;6/18-3/60</td>
</tr>
<tr>
<td>Visual impairment</td>
<td>161,2 million people</td>
<td>&lt;6/18</td>
</tr>
<tr>
<td>Normal</td>
<td>6 052,7 million people</td>
<td>6/6 –6/18</td>
</tr>
<tr>
<td></td>
<td>6 213,9 million people total</td>
<td></td>
</tr>
</tbody>
</table>
The prevalence of blindness in different countries and in different regions correlates with the economy and level of health care -

<table>
<thead>
<tr>
<th>ECONOMY/HEALTHCARE</th>
<th>% BLIND</th>
<th>NUMBER BLIND PER MILLION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>0,25</td>
<td>2 500</td>
</tr>
<tr>
<td>OK</td>
<td>0,50</td>
<td>5 000</td>
</tr>
<tr>
<td>Poor</td>
<td>0,75</td>
<td>7 500</td>
</tr>
<tr>
<td>Very poor</td>
<td>1,00+</td>
<td>10 000+</td>
</tr>
</tbody>
</table>

The prevalence of blindness increases with increasing age -

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Prevalence of Blindness (Number Per Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>800</td>
</tr>
<tr>
<td>15-44</td>
<td>1000</td>
</tr>
<tr>
<td>45-59</td>
<td>19000</td>
</tr>
<tr>
<td>60+</td>
<td>44000</td>
</tr>
</tbody>
</table>

Since 1975, there has been an exponential increase in the numbers of blind people in the world.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number Blind (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>28</td>
</tr>
<tr>
<td>1980</td>
<td>30</td>
</tr>
<tr>
<td>1984</td>
<td>31</td>
</tr>
<tr>
<td>1990</td>
<td>38</td>
</tr>
<tr>
<td>1995</td>
<td>45</td>
</tr>
<tr>
<td>2000</td>
<td>50</td>
</tr>
</tbody>
</table>
If present trends and present blindness prevention activities continue, this exponential increase is set to continue to 75 million by the year 2020 -

<table>
<thead>
<tr>
<th>Year</th>
<th>Number Blind (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>30</td>
</tr>
<tr>
<td>1990</td>
<td>38</td>
</tr>
<tr>
<td>2000</td>
<td>50</td>
</tr>
<tr>
<td>2010</td>
<td>60</td>
</tr>
<tr>
<td>2020</td>
<td>75</td>
</tr>
</tbody>
</table>

The increase is due to –
1. Increase in size of population.
2. Ageing population.
3. Inadequate eye care services in poor communities.

The projected number of blind people in 2002 was 52 million. The lower estimate of 37 million is due to 2 factors –
1. More data from population based studies on visual impairment carried out over the last decade are available, allowing for more accurate estimates to be made.
2. With the launch of Vision 2020 in 1999, significant achievements have been made in the prevention and management of avoidable blindness due to a number of diseases in a number of regions.

**Global Blindness - Incidence**

The current estimate is –

Incidence - 6 million per year
Treatment - 1 million per year
Mortality - 4 million per year

Therefore, net increase in prevalence (backlog) - 1 million per year.
Global Blindness – Distribution

The 2002 global estimate of visual impairment by WHO regions is –

<table>
<thead>
<tr>
<th></th>
<th>Africa</th>
<th>Americas</th>
<th>Eastern Med.</th>
<th>Europe</th>
<th>South East Asia</th>
<th>Western Pacific</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (millions)</td>
<td>672.2</td>
<td>852.6</td>
<td>502.8</td>
<td>877.9</td>
<td>1590.8</td>
<td>1717.5</td>
<td>6213.9</td>
</tr>
<tr>
<td>No. of blind people</td>
<td>6.8</td>
<td>2.4</td>
<td>4.0</td>
<td>2.7</td>
<td>11.6</td>
<td>9.3</td>
<td>36.9</td>
</tr>
<tr>
<td>% of total blind</td>
<td>18%</td>
<td>7%</td>
<td>11%</td>
<td>7%</td>
<td>32%</td>
<td>25%</td>
<td>100%</td>
</tr>
<tr>
<td>No. with low vision</td>
<td>20.0</td>
<td>13.1</td>
<td>12.4</td>
<td>12.8</td>
<td>33.5</td>
<td>32.5</td>
<td>124.3</td>
</tr>
<tr>
<td>No. with visual impairment</td>
<td>26.8</td>
<td>15.5</td>
<td>16.5</td>
<td>15.5</td>
<td>45.1</td>
<td>41.8</td>
<td>161.2</td>
</tr>
<tr>
<td>% of total visually impaired</td>
<td>17%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>27%</td>
<td>26%</td>
<td>100%</td>
</tr>
</tbody>
</table>

75% of blind people live in 3 regions – Africa, South east Asia, and Western Pacific.
CAUSES OF BLINDNESS IN THE WORLD

The estimates for 2000 are –

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number Blind (millions)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract</td>
<td>17.6</td>
<td>47.8%</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>4.5</td>
<td>12.3%</td>
</tr>
<tr>
<td>AMD</td>
<td>3.2</td>
<td>8.7%</td>
</tr>
<tr>
<td>Corneal scar</td>
<td>1.9</td>
<td>5.1%</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>1.8</td>
<td>4.8%</td>
</tr>
<tr>
<td>Childhood blindness</td>
<td>1.4</td>
<td>3.9%</td>
</tr>
<tr>
<td>Trachoma</td>
<td>1.3</td>
<td>3.6%</td>
</tr>
<tr>
<td>Onchocerciasis</td>
<td>0.3</td>
<td>0.8%</td>
</tr>
<tr>
<td>Other</td>
<td>4.8</td>
<td>13%</td>
</tr>
</tbody>
</table>

Except for the most developed countries, cataract remains the leading cause of blindness in all regions of the world. Glaucoma is the second leading cause of blindness globally as well as in most regions. Age related macular degeneration is the third leading cause of blindness globally. It is the leading cause of blindness in developed countries.

The major causes of blindness in Africa and Asia are –
- Cataract
- Glaucoma
- Trachoma
- Other corneal opacity
- Onchocerciasis (Africa).

The major causes of blindness in Latin America are –
- Cataract
- Glaucoma
- Diabetic retinopathy.

The major causes of blindness in North America and Europe are –
- Age related macular degeneration
- Diabetic retinopathy
Glaucoma.

Up to 75% of all blindness is avoidable. Only about 50% of childhood blindness is avoidable.

The numbers and proportions of the different causes vary in different countries and regions, depending on their economies and levels of health care –

<table>
<thead>
<tr>
<th>CAUSE OF BLINDNESS</th>
<th>VERY POOR ECONOMY (NUMBER BLIND PER MILLION)</th>
<th>POOR ECONOMY (NUMBER BLIND PER MILLION)</th>
<th>OKAY ECONOMY (NUMBER BLIND PER MILLION)</th>
<th>GOOD ECONOMY (NUMBER BLIND PER MILLION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract</td>
<td>5 000</td>
<td>4 000</td>
<td>2 000</td>
<td>-</td>
</tr>
<tr>
<td>Corneal scar</td>
<td>3 000</td>
<td>1 500</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>1 000</td>
<td>1 000</td>
<td>1 000</td>
<td>500</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>-</td>
<td>-</td>
<td>1 000</td>
<td>500</td>
</tr>
<tr>
<td>Other retinal disease</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1 000</td>
</tr>
<tr>
<td>Other</td>
<td>1 000</td>
<td>1 000</td>
<td>1 000</td>
<td>500</td>
</tr>
<tr>
<td>Total adult blind</td>
<td>10 000+</td>
<td>7 500</td>
<td>5 000</td>
<td>2 500</td>
</tr>
<tr>
<td>Blind children</td>
<td>250</td>
<td>200</td>
<td>150</td>
<td>100</td>
</tr>
</tbody>
</table>
Blind Person Years

Blind person years is a measure of disability over time.

Blind person years = number blind x average number of years a person lives blind with this disease.

The global figures for the year 2002 are -

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number Blind</th>
<th>Average Years</th>
<th>Blind Person Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract</td>
<td>17.6 million</td>
<td>5 yrs</td>
<td>88</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>4.5 million</td>
<td>8 yrs</td>
<td>36</td>
</tr>
<tr>
<td>AMD</td>
<td>3.2 million</td>
<td>8 yrs</td>
<td>25.6</td>
</tr>
<tr>
<td>Corneal scar</td>
<td>1.9 million</td>
<td>8 yrs</td>
<td>15.2</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>1.8 million</td>
<td>5 yrs</td>
<td>9</td>
</tr>
<tr>
<td>Trachoma</td>
<td>1.3 million</td>
<td>8 yrs</td>
<td>10.4</td>
</tr>
<tr>
<td>Onchocerciasis</td>
<td>0.3 million</td>
<td>15 yrs</td>
<td>4.5</td>
</tr>
<tr>
<td>Childhood blindness</td>
<td>1.4 million</td>
<td>50 yrs</td>
<td>70</td>
</tr>
</tbody>
</table>

When blind person years is considered, childhood blindness ranks second in importance after cataract.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
PRINCIPLES OF PREVENTION OF BLINDNESS
BLIND PERSON YEARS

IN A HEALTH DISTRICT OF 1 000 000 PEOPLE –

THE PREVALENCE OF BLINDNESS IS 1%

CATARACT IS RESPONSIBLE FOR 50% OF BLINDNESS

GLAUCOMA IS RESPONSIBLE FOR 10% OF BLINDNESS

CHILDHOOD BLINDNESS IS RESPONSIBLE FOR 2% OF BLINDNESS

HOW MANY PEOPLE ARE BLIND DUE TO CATARACT?

HOW MANY PEOPLE ARE BLIND DUE TO GLAUCOMA?

HOW MANY CHILDREN ARE BLIND?

HOW MANY BLIND PERSON YEARS ARE DUE TO CATARACT?

HOW MANY BLIND PERSON YEARS ARE DUE TO GLAUCOMA?

HOW MANY BLIND PERSON YEARS ARE DUE TO CHILDHOOD BLINDNESS?
### Summary Of Blinding Eye Diseases

| Blinding Eye Disease                      | \[ | Cataract | Glaucoma | Diabetic Retinopathy | Trachoma | Onchocerciasis | Vitamin A Deficiency |
|------------------------------------------|---|---------|----------------------|----------|-----------------|----------------------|
| Occur everywhere                        | \[ | Focal diseases |                      |          |                 |                      |
| Affect individuals                      | \[ | Affect communities |                      |          |                 |                      |
| Affect mainly adults                    | \[ | Start in children |                      |          |                 |                      |
| Require surgery / laser                 | \[ | Require medicine  |                      |          |                 |                      |
| Need an eye doctor                      | \[ | Do not need an eye doctor |    |          |                 |                      |

Both hospital based services and community based services are essential for the provision of comprehensive services in a Vision 2020 programme.
## MAGNITUDE OF BLINDNESS IN SOUTHERN AFRICA

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>POPULATION (MILLIONS)</th>
<th>ESTIMATED PREVALENCE OF BLINDNESS (%)</th>
<th>ESTIMATED PREVALENCE OF BLINDNESS (NUMBER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>13</td>
<td>1,00</td>
<td>130 000</td>
</tr>
<tr>
<td>Botswana</td>
<td>1,8</td>
<td>1,00</td>
<td>18 000</td>
</tr>
<tr>
<td>Lesotho</td>
<td>2</td>
<td>1,00</td>
<td>20 000</td>
</tr>
<tr>
<td>Madagascar</td>
<td>16</td>
<td>1,00</td>
<td>160 000</td>
</tr>
<tr>
<td>Malawi</td>
<td>11</td>
<td>1,00</td>
<td>110 000</td>
</tr>
<tr>
<td>Mauritius</td>
<td>1,2</td>
<td>0,50</td>
<td>60 000</td>
</tr>
<tr>
<td>Mocambique</td>
<td>20</td>
<td>1,00</td>
<td>200 000</td>
</tr>
<tr>
<td>Namibia</td>
<td>2,4</td>
<td>1,00</td>
<td>24 000</td>
</tr>
<tr>
<td>South Africa</td>
<td>32</td>
<td>0,75</td>
<td>240 000</td>
</tr>
<tr>
<td>Swaziland</td>
<td>1,1</td>
<td>1,00</td>
<td>11 000</td>
</tr>
<tr>
<td>Zambia</td>
<td>12</td>
<td>1,00</td>
<td>120 000</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>13</td>
<td>1,00</td>
<td>130 000</td>
</tr>
</tbody>
</table>
## Causes of Blindness in Southern Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>Cause 1</th>
<th>Cause 2</th>
<th>Cause 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Corneal scar</td>
</tr>
<tr>
<td>Botswana</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Diabetic ret.</td>
</tr>
<tr>
<td>Lesotho</td>
<td>Cataract – 0,5%</td>
<td>Glaucoma</td>
<td>Corneal scar</td>
</tr>
<tr>
<td>Madagascar</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Corneal scar</td>
</tr>
<tr>
<td>Malawi</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Corneal scar</td>
</tr>
<tr>
<td>Mauritius</td>
<td>Cataract – 0,25%</td>
<td>Glaucoma</td>
<td>Diabetic ret.</td>
</tr>
<tr>
<td>Mocambique</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Corneal scar</td>
</tr>
<tr>
<td>Namibia</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Diabetic ret.</td>
</tr>
<tr>
<td>South Africa</td>
<td>Cataract – 0,40%</td>
<td>Glaucoma</td>
<td>Diabetic ret.</td>
</tr>
<tr>
<td>Swaziland</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Diabetic ret.</td>
</tr>
<tr>
<td>Zambia</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Corneal scar</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Cataract – 0,50%</td>
<td>Glaucoma</td>
<td>Corneal scar</td>
</tr>
</tbody>
</table>
MAGNITUDE AND CAUSES OF BLINDNESS IN SOUTH AFRICA

Introduction

The data recommended for the planning and implementation of Vision 2020 programmes in South Africa are reliable, conservative estimates, based on surveys conducted in South Africa and extrapolated from data from elsewhere.

Population

The population data used are from the 2001 census. The Department of Health recommends that 80% of the population be considered as indigent, and 20% as having access to private health care. Our Vision 2020 programmes are for our indigent population, and we should use population x 80% for our planning. The data are available for each province and for each district. 34% of the population is under the age of 16 years. 22% of the population is over the age of 40 years.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>TOTAL POPULATION</th>
<th>INDIGENT POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>6 436 763</td>
<td>5 149 410</td>
</tr>
<tr>
<td>Free State</td>
<td>2 706 775</td>
<td>2 165 420</td>
</tr>
<tr>
<td>Gauteng</td>
<td>8 837 178</td>
<td>7 069 742</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>9 426 017</td>
<td>7 540 813</td>
</tr>
<tr>
<td>Limpopo</td>
<td>5 273 642</td>
<td>4 218 913</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>3 122 990</td>
<td>2 498 392</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>822 727</td>
<td>658 181</td>
</tr>
<tr>
<td>North West</td>
<td>3 669 349</td>
<td>2 935 479</td>
</tr>
<tr>
<td>Western Cape</td>
<td>4 524 335</td>
<td>3 619 468</td>
</tr>
<tr>
<td>TOTALS FOR SOUTH AFRICA</td>
<td>44 819 778</td>
<td>35 855 822</td>
</tr>
</tbody>
</table>
PREVALENCE AND CAUSES OF BLINDNESS

There have been 2 population based surveys of the prevalence and causes of blindness in South Africa –

1. Elim district, Limpopo, 1985
Blindness prevalence 0.57%; Cataract 55%; Trachoma corneal scarring 10%; Uncorrected aphakia 9%; Open angle glaucoma 6%

2. Ingwavuma district, KwaZulu-Natal, 1991
Blindness prevalence 1.00%; Cataract 59%; Chronic glaucoma 23%

Four our planning purposes –
Prevalence of blindness = 0.75%
Cataract causes 55% of blindness. This is 55% x 0.75% = 0.40% of the population
Glaucoma causes 14% of blindness. This is 14% x 0.75% = 0.10% of the population

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>INDIGENT POPULATION</th>
<th>NUMBER OF BLIND PEOPLE (INDIGENT POPULATION X 0.75%)</th>
<th>NUMBER OF PEOPLE BLIND DUE TO CATARACT (INDIGENT POPULATION X 0.40%)</th>
<th>NUMBER OF PEOPLE BLIND DUE TO GLAUCOMA (INDIGENT POPULATION X 0.10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E Cape</td>
<td>5 149 410</td>
<td>38 620</td>
<td>20 597</td>
<td>5 149</td>
</tr>
<tr>
<td>Free State</td>
<td>2 165 420</td>
<td>16 240</td>
<td>8 661</td>
<td>2 165</td>
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<tr>
<td>Gauteng</td>
<td>7 069 742</td>
<td>53 023</td>
<td>28 279</td>
<td>7 069</td>
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<tr>
<td>KZ-Natal</td>
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<td>56 556</td>
<td>30 160</td>
<td>7 540</td>
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<tr>
<td>Limpopo</td>
<td>4 218 913</td>
<td>31 641</td>
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<td>4 218</td>
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<tr>
<td>Mpumalanga</td>
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<td>18 737</td>
<td>9 992</td>
<td>2 498</td>
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<tr>
<td>N Cape</td>
<td>658 181</td>
<td>4 936</td>
<td>2 632</td>
<td>658</td>
</tr>
<tr>
<td>N West</td>
<td>2 935 479</td>
<td>22 016</td>
<td>11 744</td>
<td>2 935</td>
</tr>
<tr>
<td>W Cape</td>
<td>3 619 468</td>
<td>27 146</td>
<td>14 476</td>
<td>3 619</td>
</tr>
<tr>
<td>Totals for South Africa</td>
<td>35 855 822</td>
<td>268 918</td>
<td>143 424</td>
<td>35 856</td>
</tr>
</tbody>
</table>
These numbers should be rounded off.

For South Africa –

Indigent population = 36 million
Number of blind people = 269 000
Number of people blind due to cataract = 143 000
Number of people blind due to glaucoma = 36 000.

For a health district in South Africa of 1 million –

Number of blind people = 7 500
Number of people blind due to cataract = 4 000
Number of people blind due to glaucoma = 1 000.
EXERCISE
PLANNING AND IMPLEMENTATION OF
VISION 2020 PROGRAMMES
PRINCIPLES OF PREVENTION OF BLINDNESS
MAGNITUDE AND CAUSES OF BLINDNESS
IN SOUTH AFRICA

FOR OUR PLANNING PURPOSES –

80% OF OUR POPULATION IS INDIGENT.

THE PREVALENCE OF BLINDNESS AMONGST OUR INDIGENT POPULATION IN SOUTH AFRICA IS 0,75%

WHAT IS THE POPULATION OF YOUR HEALTH DISTRICT?

WHAT IS THE INDIGENT POPULATION OF YOUR HEALTH DISTRICT?

HOW MANY BLIND INDIGENT PEOPLE ARE THERE IN YOUR HEALTH DISTRICT?

FOR OUR PLANNING PURPOSES, THE CAUSES OF BLINDNESS IN SOUTH AFRICA ARE

CATARACT 0,40% OF INDIGENT POPULATION

GLAUCOMA 0,10% OF INDIGENT POPULATION

OTHER 0,25% OF INDIGENT POPULATION

HOW MANY INDIGENT PEOPLE IN YOUR HEALTH DISTRICT ARE BLIND DUE TO-

CATARACT?

GLAUCOMA ?

OTHER CAUSE?
FOR OUR PLANNING PURPOSES, THE PREVALENCE OF BLINDNESS IN YOUR COUNTRY IS 1,00%.

WHAT IS THE POPULATION OF YOUR HEALTH DISTRICT?

HOW MANY BLIND INDIGENT PEOPLE ARE THERE IN YOUR HEALTH DISTRICT?

FOR OUR PLANNING PURPOSES, THE CAUSES OF BLINDNESS IN YOUR COUNTRY ARE

CATARACT 0,50%
GLAUCOMA 0,10%
OTHER 0,40%

HOW MANY PEOPLE IN YOUR HEALTH DISTRICT – ARE BLIND DUE TO CATARACT?
ARE BLIND DUE TO GLAUCOMA?
ARE BLIND DUE TO OTHER CAUSE?
PROVINCIAL AND DISTRICT HEALTH SERVICE STRUCTURES IN SOUTH AFRICA

Any Vision 2020 programme should be horizontal, integrated into the existing health service structures.

This is important for sustainability.

The health service in South Africa is based on the health district, structured as –

National

Provincial (9 provinces)

District (about 40 regions)

Sub district

The levels of health care are –

Primary- Sub district - Primary health care clinics
Community health centres
District hospitals

Secondary- District - Regional hospitals

Tertiary- Provincial tertiary hospitals

Quaternary – National central hospitals.
DILEMMAS – OPHTHALMOLOGY OR BLINDNESS PREVENTION

There are certain dilemmas (difficulties in decision making) to consider before discussing prevention of blindness.

These are:

1. The Practice of Ophthalmology or Blindness Prevention. There is a difference between the practice of ophthalmology in a clinic and the provision of eye care at all levels of health care delivery. Eye care will include health education and prevention of diseases such as vitamin A deficiency and trachoma.

2. Individual Approach or Community Approach. Clinical medicine is targeted at the care of the individual. Prevention of blindness involves assessment, planning, and delivery of services for communities as well as individuals.

3. Business Approach or Service Approach. Private practice is a business, with profit an important component. Prevention of blindness is a service, often to people in rural and poor areas, for which financial resources (subsidies) may be required to assist poor patients.
TERMINOLOGIES – PRIMARY, SECONDARY, AND TERTIARY PREVENTION

In considering Prevention of Blindness we need to be aware of the terminology (descriptive terms) that is used.

1. Primary Prevention
   Prevent the disease ever occurring

   Examples:
   Vitamin A deficiency good nutrition
   Trachoma good water and sanitation
   Rubella and measles immunisation

2. Secondary Prevention
   Prevent loss of vision from established disease

   Examples:
   Cataract surgery when vision is down but better than <3/60
   Glaucoma sight preservation from surgical or medical treatment
   Diabetic retinopathy sight preserving laser treatment
   Vitamin A deficiency if keratomalacia, saving the sight of the other eye
   Onchocerciasis treatment with ivermectin

3. Tertiary Prevention
   Restore vision to a blind patient

   Examples:
   Cataract surgery when vision is <3/60
   Corneal scarring keratoplasty
   Low Vision low vision aids.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISISON 2020
PROGRAMMES
PRINCIPLES OF PREVENTION OF BLINDNESS
CONTROL OF BLINDNESS – TERMINOLOGIES

COMPLETE THE FOLLOWING TABLE –

<table>
<thead>
<tr>
<th></th>
<th>PRIMARY PREVENTION</th>
<th>SECONDARY PREVENTION</th>
<th>TERTIARY PREVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATARACT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GLAUCOMA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIABETIC RETINOPATHY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRACHOMA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REFRACTIVE ERROR</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STRATEGIES FOR EYE CARE PROGRAMMES

In planning an eye care service or prevention of blindness programme, there are different possible strategies or approaches:

DISEASE ORIENTATED APPROACH

SERVICE ORIENTATED APPROACH

STRATEGY ORIENTATED APPROACH

COMMUNITY ORIENTATED APPROACH

GENERAL INTEGRATED APPROACH.

Each approach has advantages and disadvantages.

On balance, the general integrated approach applied to a health district is the best model to use.

It is important for the district programme to be a horizontal programme that is integrated into the existing health service.

The advantages of this are –

It is sustainable.
It is owned by the district health service.
It is inexpensive.
A. Disease Oriented Approach

This vertical approach considers strategies to deal with individual diseases.

CATARACT
GLAUCOMA
DIABETIC RETINOPATHY
REFRACTIVE ERRORS
TRACHOMA.

Each disease has its own strategy, or alternative strategies for its control.
For example –
What type of cataract operation we should do.
How we should treat glaucoma.
How we should screen for diabetic retinopathy.
How we should screen for refractive errors in school children.
How we should implement face washing to prevent trachoma.

B. Service Orientated Approach

Tertiary Eye Care  
(Referral Hospital)

Training
Supervision
Support

Secondary Eye Care  
(District Hospital)

Primary Eye Care  
(Clinic)

This horizontal approach considers the levels of health intervention. Health services are usually administered centrally (Ministry of Health), and implemented in referral teaching hospitals (tertiary), district hospitals (secondary) and in the primary care clinics (primary).

There is a chain of training-supervision-support-referral that extends from the tertiary to the secondary to the primary level.
C. Strategy Orientated Approach

This approach considers promotive, preventive, curative, and rehabilitative strategies.

Examples are –

PROMOTIVE  Health education
PREVENTIVE  Immunisation (measles, rubella)
CURATIVE    Treatment of cataract, glaucoma, refractive errors, diabetic retinopathy
REHABILITATIVE  Assessment, education, integration, vocational training for incurably blind.

D. Community Orientated Approach

This approach considers the services that are needed by specific target groups in the community.

Examples are -

NEONATES
- Prevention of ophthalmia neonatorum
- Screening for congenital cataract
- Screening for retinopathy of prematurity (ROP) in neonatal units

PRE-SCHOOL CHILDREN
- Vitamin A deficiency prevention
- Trachoma prevention
- Strabismus and amblyopia diagnosis

SCHOOL CHILDREN
- Education about eye health and disease
- Trachoma prevention
- Screening for refractive errors

WORKING AGE GROUP
- Occupational health services
- Agricultural injuries

AGE GROUP : 45 YEARS +
- Treatment of cataract
- Treatment of glaucoma
- Treatment of presbyopia

AGE GROUP : 65 years +
- Treatment of age related macular degeneration.
E. General Integrated Approach

This approach integrates the strategies identified in each of the other 4 approaches (disease orientated, service orientated, strategy orientated, and community orientated). It incorporates both horizontal and vertical components. It is the approach recommended for our Vision 2020 programmes.

The planning process involves –

1. Assess the needs
2. Analyse the resources and their utilisation
3. Define the aim
4. Set the objectives
5. Decide the activities to reach the objectives
6. Allocate the budget.

The implementation process involves –

7. Manage the resources
8. Monitor the performance.
VISION 2020 – THE CONCEPT

Vision 2020 – The Aim

Vision 2020 is an initiative by the International Agency For the Prevention of Blindness (IAPB) in partnership with the WHO Blindness Prevention Programme and with governments and INGOS around the world, for the elimination of avoidable blindness throughout the world (by the year 2020).

SITUATIONAL ANALYSIS – THE NEED
SUMMARY OF GLOBAL BLINDNESS IN THE YEAR 2000

There are approximately 37 million blind people in the world. This number is currently increasing by 1-2 million each year. 75% of the world’s blind people live in Africa, SE Asia, and W Pacific. 80% of blindness is avoidable – 60% is treatable and 20% is preventable. In spite of our best efforts, global blindness is increasing exponentially and is likely to reach 75 million by 2020.

SITUATIONAL ANALYSIS – RESOURCES AND PRESENT ACTIVITIES
WHAT IS CURRENTLY BEING DONE TO TACKLE THE PROBLEM?

Cataract surgery is increasing (currently about 10 million surgeries per year). Endemic areas for trachoma are decreasing. Onchocerciasis is being brought under control. Vitamin A deficiency is becoming less common. A group of 50 non government organizations collaborate on priorities in prevention of blindness, and contribute approximately US$100 million per year. Over 100 countries have established prevention of blindness programmes.

VISION 2020 – THE AIM

The elimination of avoidable blindness (by the year 2020).
VISION 2020 – THE REQUIREMENTS

1. The know how (strategy).
2. The resources.
3. The motivation (ownership).

VISION 2020 – THE STRATEGY

1. Human resource development.
2. Infrastructure development.
3. Disease control.

VISION 2020 – THE RESOURCES

1. People.
2. Dollars.
3. Effective utilization of people + dollars.

VISION 2020 – THE HUMAN RESOURCES

Primary level –
Clinic nurse – 1 per 10 000 recommended

Secondary level –
Eye nurse – 1 per 100 000 recommended
Optometrist or refractionist - 1 per 250 000 recommended

Tertiary level –
Ophthalmologist or ophthalmic medical officer – 1 per 500 000 recommended

Ancillary / support –
Programme manager – 1 per programme recommended
Instrument technician – 1 per programme recommended.

Vision 2020 – The Cost

US$ 1 million would fund a Vision 2020 programme for 1 million people for 5 years.
50 INGDOs currently spend US$100 million per year on blindness prevention activities.
If governments would share the costs on an equal basis, 200 Vision 2020 programmes could be established each year (4000 over 20 years).
VISION 2020 – OWNERSHIP

1. WHO + ministries of health
2. INGDOs + professional groups
3. People involved in eye care delivery.

VISION 2020 – ADVOCACY, PLANNING, AND IMPLEMENTATION

1. Advocacy – By the Task Force of the International Agency for the Prevention of Blindness
2. Planning – By national PBL programmes
   By national training centres.
   Community eye care.

Vision 2020 – Priorities For Phase One

The diseases that are prioritized for phase 1 are –
   Cataract
   Refractive error + low vision
   Trachoma
   Onchocerciasis
   Vitamin A deficiency.

Vision 2020 – Priorities For Phase Two

Once strategies are in place for the elimination of blindness due to these diseases, the diseases that should be included in phase 2 are
   Glaucoma
   Diabetic retinopathy.

Vision 2020 – The Result (Hopefully!)

If successfully implemented, we might hope to see a decrease in global blindness to 20 million by the year 2020, instead of the projected increase to 75 million.
VISION 2020 – THE MODEL PROGRAMME

The Priorities

Phase 1 – Prioritise cataract, refractive errors, trachoma, vitamin A deficiency, and onchocerciasis.

Phase 2 - Include also glaucoma and diabetic retinopathy.

The Target Population

1 million.

The Eye Care Team

Community level –
Traditional healers
Community health workers

Primary level –
 Clinic nurses

Secondary level –
Eye nurses
Optometrists or refractionists

Tertiary level –
Ophthalmologists or ophthalmic medical officers

Ancillary / support -
Programme manager
Instrument technician.

The Instruments, Equipment, And Consumables

Instruments and consumables are needed for the different levels of eye care.
For example –

PRIMARY (CLINICS) – SCREENING OF COMMUNITY –
Visual acuity chart
Torch.
SECONDARY (EYE NURSES) -SELECTION OF TREATABLE INDIVIDUALS –
As above +
Ophthalmoscope
Tonometer
Trial lens set
Retinoscope
Drugs
Glasses.

TERTIARY (OPHTHALMOLOGIST / OPHTHALMIC MEDICAL OFFICER)
– SERVICE DELIVERY –
As above +
Indirect ophthalmoscope
Slit lamp microscope
Operating microscope
Microsurgical instruments
Surgical consumables
Drugs
Glasses.

The Delivery Of Eye Care

This can be done at different levels by different categories of personnel.
Screening and selection should take place at the primary and secondary level (community eye care).
Service delivery should take place at the tertiary level (Vision 2020 surgical centre).

SCREEN the population –
Visual acuity measurement
Examine with a torch

SELECT treatable individuals –
Cataract
Refractive errors
Trachoma

SERVICE delivery –
Cataract surgery
Glasses for refractive errors
Antibiotics and surgery for trachoma.
The Capacity Of A Vision 2020 Surgical Centre

OUTPATIENTS – At least 400 patients per week → 20 000 patients per year.
SURGERY – At least 40 cataract surgeries per week → 2 000 cataract surgeries per year.
VISION 2020 – SUMMARY OF SERVICE DELIVERY

FOR A DISTRICT OF 1 000 000 POPULATION –

<table>
<thead>
<tr>
<th>MANPOWER</th>
<th>FACILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPHTHALMOLOGIST OR OPHTHALMIC MEDICAL OFFICER</td>
<td>3</td>
</tr>
<tr>
<td>(1 PER 500 000)</td>
<td>VISION 2020 SURGICAL CENTRE</td>
</tr>
<tr>
<td>OPTHALMIC NURSE (1 PER 100 000)</td>
<td>2</td>
</tr>
<tr>
<td>OPTOMETRIST OR REFRACTIONIST (1 PER 250 000)</td>
<td>DISTRICT EYE CLINIC</td>
</tr>
<tr>
<td>CLINIC NURSE (1 PER 10 000)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>DISTRICT COMMUNITY HEALTH CENTRE</td>
</tr>
<tr>
<td></td>
<td>DISTRICT PRIMARY HEALTH CARE CLINIC</td>
</tr>
</tbody>
</table>

| CATARACT                                      | 2 000-3 000 CATARACT OPERATIONS PER YEAR |
| REFRACTIVE ERROR                              | 50 000 SCHOOL CHILDREN SCREENED PER YEAR |
|                                               | 5 000 GLASSES DISPENSED PER YEAR          |
| TRACHOMA                                      | “SAFE” IN AFFECTED DISTRICTS             |
| LOW VISION                                    | 200 LOW VISION TREATMENTS PER YEAR       |
| GLAUCOMA                                      | TRABECULECTOMIES FOR 500 PATIENTS PER YEAR |
| DIABETIC RETINOPATHY                          | RETINAL LASER TREATMENTS FOR 500 PATIENTS PER YEAR |
CATARACT
BLINDNESS
CLINICAL OVERVIEW OF CATARACT

Definition
Opacification of the crystalline lens that interferes with vision.

Classification
1. Developmental.
2. Age related.
3. Traumatic.

Aetiology Of Age Related Cataract
1. Daylight (ultra-violet light).
2. Diet (riboflavin deficiency).
3. Dehydration (recurrent episodes of dehydration).
4. Drugs (smoking).

Clinical Features Of Age Related Cataract
Symptom –
Poor vision.

Signs –
Decreased visual acuity.
Leucocoria.
Decreased or absent red reflex.
Visible opacification of the crystalline lens.

Surgical Options For Age Related Cataract
1. Couching.
2. Intracapsular lens extraction.
3. Conventional extracapsular lens extraction.
4. Extracapsular lens extraction with phacoemulsification.

Options For Correction Of Aphakia Following Removal Of A Cataractous Lens
1. +10 glasses.
2. Contact lens.
3. Intraocular lens.
PREVALENCE AND INCIDENCE OF AGE RELATED CATARACT

A. PREVALENCE (BACKLOG)

1. PEOPLE BLIND DUE TO CATARACT

1.1. South Africa
People with visual acuity <3/60 in the better eye.
0.40%.
4 000 per million population.

1.2. Other Southern Africa –
People with visual acuity <3/60 in the better eye.
0.50%.
5 000 per million population.

2. PEOPLE NOT BLIND DUE TO CATARACT BUT REQUIRING CATARACT SURGERY

People with visual acuity 5/60-3/60 in the better eye (severe visual impairment).
People with unilateral cataract.
People with second eyes for surgery.
4 X prevalence of cataract blindness.

2.1. South Africa -
1.60%.
16 000 per million population.

2.2. Other Southern Africa –
2.00%.
20 000 per million population.

3. TOTAL BACKLOG OF PEOPLE REQUIRING SURGERY

3.1. South Africa –
2.00%.
20 000 per million population.

3.2. Other Southern Africa –
2.5%.
25 000 per million population.
B. INCIDENCE (NEW CASES)

Annual incidence approximates to –
25% of the prevalence in South Africa
20% of the prevalence in other Southern Africa.

1. PEOPLE BLIND DUE TO CATARACT
0,1%.
1 000 per million population per year.

2. PEOPLE NOT BLIND DUE TO CATARACT BUT REQUIRING CATARACT SURGERY
4 X incidence of cataract blindness.
0,4%.
4 000 per million population per year.

3. TOTAL NUMBER OF NEW CASES REQUIRING SURGERY EACH YEAR
0,50%.
5 000 per million population per year.
WHAT IS THE POPULATION OF YOUR HEALTH DISTRICT?

HOW MANY PEOPLE IN YOUR HEALTH DISTRICT ARE BLIND DUE TO CATARACT?
THIS IS THE PREVALENCE (BACKLOG) OF PEOPLE WHO ARE BLIND DUE TO CATARACT.

HOW MANY PEOPLE IN YOUR HEALTH DISTRICT BECOME BLIND DUE TO CATARACT EACH YEAR?
THIS IS THE INCIDENCE (NEW CASES) OF BLINDNESS DUE TO CATARACT EACH YEAR.

HOW MANY PEOPLE IN YOUR HEALTH DISTRICT ARE NOT BLIND DUE TO CATARACT, BUT NEED CATARACT SURGERY?

HOW MANY NEW PEOPLE IN YOUR HEALTH DISTRICT NEED CATARACT SURGERY EACH YEAR, EVEN THOUGH THEY ARE NOT BLIND?

WHAT IS THE TOTAL BACKLOG OF CASES IN YOUR HEALTH DISTRICT NEEDING CATARACT SURGERY?

WHAT IS THE TOTAL NUMBER OF NEW CASES IN YOUR HEALTH DISTRICT NEEDING CATARACT SURGERY EACH YEAR?
EXERCISE
PLANNING AND IMPLEMENTATION OF VISISON 2020
PROGRAMMES
CATARACT BLINDNESS
PREVALENCE AND INCIDENCE (CATARACT CAN)

COMPLETE THE NUMBERS IN THE CATARACT CAN FOR YOUR
HEALTH DISTRICT.
Cataract can
CATARACT SURGERY RATE

Cataract surgery rate (CSR) = number of cataract operations per million population per year.

CSR allows comparison between different districts and different countries with differing population sizes.

What should the CSR be in order to eliminate blindness due to cataract?

In order to eliminate blindness due to cataract, the CSR needs to equal the incidence (new cases) of cataract blindness.

Because not all the surgery that is done is on people who are blind due to cataract, it needs to be somewhere between 1 000 and 5 000.

If the proportion of surgeries that are done on blind people is around 30-50%, the CSR that is required to equal the incidence is 2000-3000 cataract operations per million population per year.

If the CSR is less than 2 000, the surgery rate will not keep up with the incidence (new cases), people who become blind due to cataract will remain untreated and will remain blind until they die, and the backlog will continue to increase.

If the CSR is 3 000 or more, the CSR will keep up with the incidence, people who become blind due to cataract will be treated and will be cured of their blindness, and the backlog will be abolished over a period of 5 years.

This applies if we use <6/60 as the indication for cataract surgery.

If a better visual acuity is used as the indication, the required CSR increases –

<table>
<thead>
<tr>
<th>VISUAL ACUITY INDICATION FOR CATARACT SURGERY</th>
<th>CSR REQUIRED TO ELIMINATE CATARACT BLINDNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6/60</td>
<td>2 000</td>
</tr>
<tr>
<td>&lt;6/36</td>
<td>2 500</td>
</tr>
<tr>
<td>&lt;6/24</td>
<td>5 000</td>
</tr>
<tr>
<td>&lt;6/18</td>
<td>10 000</td>
</tr>
<tr>
<td>&lt; 6/12</td>
<td>20 000</td>
</tr>
</tbody>
</table>
The estimated 1999 CSRs in all the WHO regions are –

<table>
<thead>
<tr>
<th>WHO REGION</th>
<th>POPULATION (MILLIONS)</th>
<th>OPERATIONS (MILLIONS)</th>
<th>CATARACT SURGERY RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>650</td>
<td>0,20</td>
<td>300</td>
</tr>
<tr>
<td>Americas</td>
<td>800</td>
<td>2,15</td>
<td>2 700</td>
</tr>
<tr>
<td>North</td>
<td>300</td>
<td>1,65</td>
<td>5 500</td>
</tr>
<tr>
<td>Central + South</td>
<td>500</td>
<td>0,5</td>
<td>1 000</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>500</td>
<td>0,5</td>
<td>1 000</td>
</tr>
<tr>
<td>Europe</td>
<td>900</td>
<td>2,1</td>
<td>2 300</td>
</tr>
<tr>
<td>Western</td>
<td>400</td>
<td>1,6</td>
<td>4 000</td>
</tr>
<tr>
<td>East + Central</td>
<td>500</td>
<td>0,5</td>
<td>1 000</td>
</tr>
<tr>
<td>South East Asia</td>
<td>1 500</td>
<td>3,6</td>
<td>2 400</td>
</tr>
<tr>
<td>India</td>
<td>1 000</td>
<td>3,1</td>
<td>3 100</td>
</tr>
<tr>
<td>Rest</td>
<td>500</td>
<td>0,5</td>
<td>1 000</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>1 650</td>
<td>1,65</td>
<td>1 000</td>
</tr>
<tr>
<td>Australia + Japan</td>
<td>150</td>
<td>0,8</td>
<td>5 300</td>
</tr>
<tr>
<td>China</td>
<td>1 250</td>
<td>0,6</td>
<td>500</td>
</tr>
<tr>
<td>Rest</td>
<td>250</td>
<td>0,25</td>
<td>1 000</td>
</tr>
<tr>
<td>Total</td>
<td>6 000</td>
<td>10,2</td>
<td>1 700</td>
</tr>
</tbody>
</table>
The CSRs in 5 representative countries are –

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>CATARACT SURGERY RATE PER MILLION POPULATION PER YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>6 000</td>
</tr>
<tr>
<td>UK</td>
<td>3 000</td>
</tr>
<tr>
<td>India</td>
<td>3 100</td>
</tr>
<tr>
<td>China</td>
<td>300</td>
</tr>
<tr>
<td>Angola</td>
<td>90</td>
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</tbody>
</table>
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
CATARACT SURGERY RATE

THE FOLLOWING TABLES SHOW THE POPULATIONS AND CATARACT SURGERIES FOR THE LAST CALENDAR YEAR FOR THE COUNTRIES OF SOUTHERN AFRICA AND FOR THE PROVINCES OF SOUTH AFRICA.

CALCULATE THE CSR FOR EACH COUNTRY IN THE REGION AND FOR EACH PROVINCE IN SOUTH AFRICA.

WHAT SHOULD THE CSR BE?

WHICH COUNTRY AND WHICH PROVINCE HAVE THE HIGHEST CSR?

WHICH COUNTRY AND WHICH PROVINCE HAVE THE LOWEST CSR?

WHICH COUNTRY AND WHICH PROVINCE SHOULD BE PRIORITISED FOR VISION 2020 RESOURCES?

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<thead>
<tr>
<th>COUNTRY</th>
<th>POPULATION (MILLIONS)</th>
<th>NUMBER OF CATARACT SURGERIES</th>
<th>CSR PER MILLION POPULATION</th>
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EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
CATARACT SURGERY RATE

WHAT IS THE POPULATION OF YOUR HEALTH DISTRICT?

HOW MANY CATARACT OPERATIONS WERE DONE IN YOUR HEALTH DISTRICT IN THE LAST CALENDAR YEAR?

WHAT IS THE CSR?

WHAT SHOULD THE CSR BE?

IN ORDER TO ACHIEVE THIS, HOW MANY CATARACT OPERATIONS SHOULD BE DONE?
OVERCOMING THE BARRIERS

Barriers

In Sub-Saharan Africa –

Only 1 out of 10 people who are blind due to cataract attend for surgery

Only 1 out of 20 people with cataract who are not blind but who should have surgery attend for surgery

There are 2 problems:

1. The blind cannot see and stay at home
2. Eye workers stay in their clinics and do not see the blind!

The barriers precluding attendance for surgery can be –

- On the side of the patient
- On the side of the family
- On the side of the community
- On the side of the eye hospital

The barriers on the side of the patient, family and community may be summarised as –

A wareness (lack of)
B ad service
C ost
D istance
E xpectation (lack of)
F ear

Strategies to Overcome the Barriers

1. Publicity campaigns (radio, newspapers)
2. Outreach clinics
3. Networking with other organisations & agencies
4. Use of pseudophakic motivators
5. Cataract Case Finders
**Cataract Case Finders**

Cataract case finders can provide an important bridge between the community and the surgical centre.

Cataract case finders are trained and employed to identify people with cataract in the community and to refer them to the surgical centre.

The cataract case finder works on all the strategies with the guidance/support of the surgical centre.

How many are required? 1 per 250 000 is recommended

In selecting people for training, careful consideration should be given to the most suitable age, gender, social background and education/work background.

How should they be trained? A 1-week workshop with lots of practice is recommended.

In employing cataract case finders, careful consideration should be given to the most suitable method for their supervision, support and remuneration.

10% of the cataract surgery budget should be allocated to cataract case finding activities.

The decision whether cataract case finding is important is based upon the capacity of the surgical centre.

1. If there is capacity – start to cataract case find
2. If there is no capacity – increase the capacity first
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
OVERCOMING THE BARRIERS

WHAT ARE THE BARRIERS PRECLUDING CATARACT SURGERY UPTAKE IN YOUR DISTRICT?

WHAT STRATEGIES DO YOU PROPOSE TO OVERCOME THESE BARRIERS?
CATARACT SURGERY COVERAGE

Cataract surgery coverage = Number of pseudophakic people / Number of pseudophakic people + Number of people with cataract requiring surgery.

CSC = P / P+C

Cataract surgery coverage is a measure of the proportion of people in the district who need to have surgery who have actually had surgery.

We would like it to be 100%.
It may be as low as 10% in some districts.

CSR is a hospital based quantitative measure of cataract surgery delivery.

CSC is a community based quantitative measure of cataract surgery delivery.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
CATARACT SURGERY COVERAGE

IN A HEALTH DISTRICT OF 1 000 000 –
A RANDOM SAMPLE OF 1 000 PEOPLE AGED 40 YEARS AND OVER
WERE SCREENED.
10 HAD HAD CATARACT SURGERY.
90 HAD CATARACT NEEDING SURGERY.

CALCULATE THE CATARACT SURGERY COVERAGE IN THIS
DISTRICT.
RAPID ASSESSMENT OF CATARACT SERVICES (RACS) - CATARACT SURGERY COVERAGE, BARRIERS, SURGERY OUTCOME; CATARACT CASE FINDING; MARKETING OF CATARACT SURGERY

1. The district eye nurse visits the pension pay points in the district with 2 nursing assistants and a pensioner who has had successful cataract surgery.

2. The nursing assistants screen the pensioners by –
   - Testing whether or not the visual acuity in each eye is 6/60 or better
   - Asking whether or not they have had an eye operation.

3. All the pensioners whose visual acuity in 1 or both eyes is less than 6/60 or who report having had an eye operation are referred to the eye nurse for examination.

4. The eye nurse examines those people referred by –
   - Retesting the visual acuity in each eye
   - Examining the eyes with a torch and / or ophthalmoscope, to ascertain whether or not there is a cataract or other significant eye pathology
   - Whether or not the eye has had cataract surgery, and, if so, what the outcome is.

5. Those people who are found to have cataract who have not had surgery are interviewed to ascertain why they have not attended for surgery.

6. Those people who are found to have had surgery are interviewed to ascertain whether or not they are satisfied with the results of their surgery.

7. The cataract surgical coverage is calculated as –
   \[ \text{CSC} = \frac{\text{number of people that have had surgery}}{\text{number of people that have had surgery} + \text{number of people that require surgery}} \]

8. The pensioner who has had successful surgery speaks to those people who need surgery about the availability and benefits of the surgery.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
RAPID ASSESSMENT OF CSC, BARRIERS, SURGERY OUTCOME

THE DATA FROM A RAPID ASSESSMENT SURVEY CONDUCTED IN A HEALTH DISTRICT IN SOUTH AFRICA ARE –

20 PENSION PAY POINTS WERE VISITED
1000 PENSIONERS WERE SCREENED

OF THOSE REFERRED –
156 WERE BLIND DUE TO CATARACT
56 HAD HAD CATARACT SURGERY

OF THOSE WHO HAD HAD CATARACT SURGERY –
15 HAD A VISUAL ACUITY <6/60
29 HAD A VISUAL ACUITY 6/24 – 6/60
12 HAD A VISUAL ACUITY 6/6 – 6/18

OF THOSE WITH CATARACT WHO HAD NOT HAD SURGERY –
81 SAID THEY WERE NOT AWARE OF THE AVAILABILITY OF SURGERY
14 SAID THEY WERE AFRAID OF HAVING SURGERY
11 SAID THEY COULD NOT AFFORD TO GO FOR SURGERY
11 SAID THEY HAD NO TRANSPORT TO ATTEND FOR SURGERY
39 GAVE OTHER REASONS FOR NOT HAVING SURGERY.

WHAT IS THE CATARACT SURGERY COVERAGE IN THE DISTRICT?
WHAT ARE THE BARRIERS TO CATARACT SURGERY IN THE DISTRICT?
WHAT IS THE “SUCCESS RATE” OF CATARACT SURGERY IN THE DISTRICT?
INCREASING SURGERY CAPACITY

What Should Be The Capacity Of A District Vision 2020 Surgery Centre?

In order to implement Vision 2020 and to eliminate blindness due to cataract, it is necessary to achieve a cataract surgery rate of 2 000 per million population per year.

The capacity of a Vision 2020 surgery centre for a district of 1 000 000 population should be 2 000 cataract surgeries per year, which is 40 cataract surgeries per week.

Demand And Capacity

"Demand" and "capacity" need to be in balance.

"Demand" > "capacity"  \rightarrow  waiting lists.

"Demand" < "capacity"  \rightarrow  under-utilised resources.

Surgery Efficiency And Surgery Volume

Efficiency = number of cases per hour per surgeon.  
Low efficiency = 1 case per hour per surgeon.  
Medium efficiency = 2-3 cases per hour per surgeon.  
High efficiency = 4+ cases per hour per surgeon.

Volume = efficiency \times \text{time} \times \text{number of surgeons}.

Factors Affecting Surgery Capacity

1. Surgeon –  
   Number of surgeons  
   Number of surgeries per surgeon per day

2. OR Staff –  
   Number of OR staff  
   Job descriptions of OR staff

3. Operating Room Routine –  
   Number of days per week  
   Number of hours per day  
   Number of tables
4. Ward –
Number of nights admission per patient
Number of beds available

5. Surgery –
Number of cataract surgeries per day
Number of other surgeries per day
Surgery time per case
Turn around time per case.

**Principles Of An Efficient Cataract Surgical Service**

1. Committed OR team
2. Staff well trained and well motivated, with clear job descriptions
3. OR appropriately laid out (1 operating microscope + 2 tables)
4. Good patient flow system ward – preparation room – operating room – recovery room – ward)
5. Good standard surgical technique
6. Good standard surgical instruments
7. Good quality microscope
8. Good spares back-up, especially of essential instruments
9. Good power back-up
10. Regular internal monitoring of the OR organisation
11. Adequate stock of consumables
12. Instrument technician available on stand by.

**Staffing Of Preparation Room + Recovery Room**

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<tr>
<th>CADRE</th>
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<th>JOB DESCRIPTION</th>
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<tbody>
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<td>Local anaesthesia</td>
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<tr>
<td>Nurse assistant</td>
<td>1</td>
<td>Check consent</td>
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<td>Pupil dilation</td>
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<td>Clean eyes</td>
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<td></td>
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<td>IOP reducer</td>
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<td>Pre+post op counselling</td>
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Staffing Of Operating Room

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<th>JOB DESCRIPTION</th>
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<td>1</td>
<td>Assisting surgeon</td>
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<tr>
<td>Circulating nurse</td>
<td>1</td>
<td>Cleaning and autoclaving of instruments</td>
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<td></td>
<td></td>
<td>Preparation of instruments trays</td>
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<tr>
<td></td>
<td></td>
<td>Passing of consumables</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Music</td>
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<td></td>
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<td>SOS</td>
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<td>Patient flow</td>
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<td>Removal of waste</td>
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<td>Cleaning of OR</td>
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</tbody>
</table>

Post Surgery Activities

1. Cleaning of OR
2. Cleaning of instruments
3. Disposal of waste
4. Replacement of laundry
5. Checking of consumable stocks.
Recommended Model For A Vision 2020 Surgery Centre Doing 2 000 Cataract Surgeries Per Year

1. Surgeon –
Number of surgeons – 2; 1 in OR and 1 in OPD each day.
Number of surgeries per surgeon per day – 10.

2. Preparation / Recovery Room Staff –
Number of staff – 2; 1 nurse technician + 1 nurse assistant.

3. OR Staff –
Number of staff – 3; 2 nurses + 1 porter.

4. Operating Room Routine –
Number of days per week – 5; Monday to Friday.
Number of hours per day – 8; 5 hours for surgery + 3 hours for cleaning and preparation of packs.
Number of tables – 2.

5. Ward –
Number of nights admission per patient – 2; 1 pre op + 1 post op.
Number of beds available – 35.

6. Surgery –
Number of cataract surgeries per day – 8.
Number of other surgeries per day – 2.
Surgery time per case – 25 minutes.
Turn around time per case – 5 minutes.
MONITORING OF CATARACT SERVICES

Why Should We Monitor Our Cataract Services?

To improve services.

The aim is -

To increase the quantity (output)
To improve the quality (outcome)
At a cost which is sustainable (outlay).

The indicators are not to be used to compare one hospital with another, or one surgeon with another. They are to be used to compare the same hospital or surgeon over time. This will monitor the trend in services over time.

Monitoring Of Output (Quantity)

1. Number of cataract operations per year.
2. Number of cataract operations on blind people.
3. Cataract surgery rate.

Monitoring Of Outcome (Quality)

1. “Success rate” (% eyes achieving 6/18 or better, or 6/60 or better).
2. “Failure rate” (% eyes achieving less than 6/60).

Monitoring Of Outlay (Cost)

1. Number of cataract operations per surgeon per year.
2. Number of cataract operations per bed per year.
3. Cost of consumables per surgery.
QUALITATIVE MONITORING OF CATARACT SURGERY

Method

Record any intraoperative complications in all patients after surgery. Record the vision in the operated eye of all patients on day 1 after surgery + of all patients who return for follow up after 8 or more weeks. The forms for this are attached.

Analysis

Analyse the results on a regular basis. The analysis can be done for individual surgeons, or for the unit as a whole.

The recommendations for acceptable outcomes are –

1. Intraoperative complications -<5%

2. Visual acuity day 1 post op –

<table>
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<tr>
<th>Visual Acuity</th>
<th>Result</th>
<th>%</th>
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<tr>
<td>6/6 – 6/18</td>
<td>Good</td>
<td>40% +</td>
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<td>6/24 – 6/60</td>
<td>Okay</td>
<td>50%</td>
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<tr>
<td>&lt;6/60</td>
<td>Poor</td>
<td>10% - (5% due to surgical complications)</td>
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3. Visual acuity week 8 post op –

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<th>Visual Acuity</th>
<th>Result</th>
<th>%</th>
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<td>Good</td>
<td>85% +</td>
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<tr>
<td>6/24 – 6/60</td>
<td>Okay</td>
<td>10%</td>
</tr>
<tr>
<td>&lt;6/60</td>
<td>Poor</td>
<td>5% -</td>
</tr>
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Purpose

Monitoring of outcome is for self-comparison over time. It is not for comparison of one surgeon or hospital with another. The purpose is to improve the quality of outcome over time. It is guaranteed to facilitate an improvement in the quality of outcome.
Cataract form A
Cataract form B
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
MONITORING OF CATARACT SERVICES

THE DISCHARGE VISUAL ACUITIES FOR 20 CATARACT SURGERIES DONE BY 2 SURGEONS AT A VISION 2020 SURGICAL CENTRE ARE SHOWN ON THE ATTACHED MONITORING FORMS.

WHAT PERCENTAGE HAVE A GOOD OUTCOME?
WHAT PERCENTAGE HAVE A POOR OUTCOME?
WHAT PERCENTAGE OF POOR OUTCOME IS DUE TO SELECTION?
WHAT PERCENTAGE OF POOR OUTCOME IS DUE TO SURGERY?
WHAT PERCENTAGE OF POOR OUTCOME IS DUE TO REFRACTIVE ERROR?

WHICH SURGEON HAS THE BETTER RESULTS?
WHICH IS THE BETTER SURGEON?
IS THE OUTCOME WITHIN WHO RECOMMENDATIONS?
WHAT RECOMMENDATIONS MIGHT YOU MAKE TO IMPROVE THE OUTCOME?
Form B
COSTS OF CATARACT SURGERY

How can we make cataract surgery more affordable?
Step 1 – Cost containment
Step 2 – Cost recovery
Step 3 – Income generation.

Cost And Price

Cost = cost of surgery to the provider
Price = price of surgery to the receiver
Price < cost -> subsidy
Price > cost -> profit
Price = cost -> break even.

Breakdown Of Cost For Cataract Surgery

Capital - Buildings
            Instruments + equipment
Running - Fixed / overheads - Salaries
            Utilities
            Variable - Consumables

Cost Containment – Increased Productivity

1. Numbers of surgeries (economy of scale) –
The fixed / overhead costs remain the same, however many operations are done.
Therefore, increased productivity -> decreased unit cost per surgery.

Cost per case

Number of cases

1. Efficient utilisation of staff and other resources –
An efficient arrangement is 1 surgeon operating with 2 operating tables + 5 assistants.
Cost Containment – Purchase Of Cheap Consumables

Strategies include –
Low cost technologies
Sourcing of cheap consumables
Bulk purchase.

Cost Recovery

A model from LV Prasad Institute in Hyderabad, India for cost recovery and cost sharing is

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<td>$100</td>
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<td>Profit</td>
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<tr>
<td>De luxe</td>
<td>$60</td>
<td>10%</td>
<td>Profit</td>
</tr>
<tr>
<td>Economy</td>
<td>$30</td>
<td>20%</td>
<td>Break even</td>
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<tr>
<td>Non-paying</td>
<td>Free</td>
<td>65%</td>
<td>Subsidy</td>
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The non clinical care varies between the 4 grades
The clinical care is standardised for all 4 grades.

Subsidy And Income Generation

Subsidy - Income generation (independent)
Fees from rich patients
Fees for less essential services –
Non surgical - Eye drops
Glasses
Surgical - Pterygium excision
Squint repair

External support (dependent)
Local NGOs + government
INGOs

Income generation should be used to cover running costs.
External support should be used for capital costs.

Cost Of Cataract Surgery And Vision 2020

1. The total cost per cataract surgery should be US$100 (2000 cataract surgeries per year, US$1million total cost to fund a Vision 2020 programme for 5 years).
2. This cost should be shared 50-50 between MOH and the NGO / donor agency, with increasing financial responsibility being taken by the MOH over a 5 year period, so that donor funding can be withdrawn after 5 years.
3. Because of economy of scale and the exponential increase in unit costs with decreased numbers of surgeries done, it is not possible to reduce the unit cost of cataract surgery to an acceptable level of US$100 if the cataract surgery numbers are less than 2000.
Costs of Cataract Surgery In South Africa

1. Provincial Regional Hospitals –
   a. Costs of consumables –
      ECCE + PMMA IOL – R250
      Phaco + foldable IOL – R750.

   b. Annual overhead / fixed costs –
      Salaries 80% - R900 000
      All other overheads 20% - R225 000
      Total – R1 125 000.

   c. Total cost for each operation (ECCE + PC IOL, 500 surgeries per year) – R2 500.

2. Bureau for the Prevention of Blindness Sight Saver Clinic -
   Total cost to the Bureau for each operation – R1000.

3. Non Profit Mission Hospital -
   Total cost for each operation (phaco + foldable IOL, 500 surgeries per year) – R2750.

4. Private Hospital –
   Total cost to the private patient for each operation (phaco + foldable IOL) – R7 500 – R15 000.
Models For Payment For Cataract Surgery In South Africa

1. Paying Abilities in South Africa
   a. Rich 20% - 20% of the population have medical insurance and can afford private health care (R7 500 – R15 000 per cataract surgery).
   b. Middle 30% - 30% of the population have no medical insurance. At present, they are obliged to use the provincial health services, but they can afford and might prefer semi-private health care (R2 500 per cataract surgery).
   c. Poor 50% - 50% of the population have no medical insurance and are indigent. But they are eligible for a government old age pension after the age of 60 years in women and 65 years in men, and could afford to pay R250 per cataract surgery.

2. Some Possible Options
   a. Implement a system for cost recovery (R250) from indigent patients at provincial hospitals. This would cover the costs of the consumables and would ensure sustainability of the service at provincial hospitals.
   b. Implement a system for surgery at cost (R2 500) by private ophthalmologists at private hospitals. 100 private ophthalmologists each doing 2 surgeries per week would do 10 000 surgeries per year.
   c. Establish non government non profit eye hospitals with a 3 tier system –
      Private – R7 500, R5 000 profit
      Middle income – R2 500 break even
      Indigent – R250, subsidised.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
COSTS OF CATARACT SURGERY

BECAUSE OF BUDGET CONSTRAINTS, ALL ELECTIVE SURGERY AT
THE REGIONAL HOSPITAL IN A HEALTH DISTRICT HAVE HAD TO BE
CURTAILED. THE POPULATION OF THE HEALTH DISTRICT IS 2
MILLION.
LAST YEAR, 748 CATARACT SURGERIES WERE DONE.
THIS YEAR, THE EYE DOCTOR HAS BEEN RESTRICTED TO DOING
20 CATARACT OPERATIONS PER MONTH.
THE COST OF THE CONSUMABLES FOR EACH OPERATION IS R250.
THE ESTIMATED ANNUAL FIXED COSTS (OVERHEADS) ARE
R1 125 000.

1. WHAT SHOULD THE CSR BE FOR THE DISTRICT?
WHAT WAS THE CSR LAST YEAR?
WHAT WILL THE CSR BE THIS YEAR?

2. WHAT WAS THE TOTAL COST FOR CATARACT SURGERY LAST
YEAR?
WHAT WILL THE TOTAL COST FOR CATARACT SURGERY BE THIS
YEAR?
HOW MUCH MONEY WILL THE HOSPITAL SAVE?

3. WHAT WAS THE COST PER CATARACT OPERATION LAST
YEAR?
WHAT WILL THE COST PER CATARACT OPERATION BE THIS YEAR?
WHAT WOULD THE COST PER CATARACT OPERATION BE IF –
250 CATARACT OPERATIONS WERE DONE
500 CATARACT OPERATIONS WERE DONE
750 CATARACT OPERATIONS WERE DONE
1000 CATARACT OPERATIONS WERE DONE?
PLOT THESE COSTS ON A GRAPH.

4. TO BE COST EFFECTIVE, WHAT IS THE MINIMUM NUMBER
OF CATARACT OPERATIONS THAT SHOULD BE DONE BY THE EYE
SERVICES AT THE HOSPITAL?

5. WHAT RECOMMENDATION WOULD YOU MAKE TO THE
HOSPITAL MANAGEMENT?
IMPROVING CATARACT SERVICES

Recommendations

1. OUTPUT (QUANTITY)
   2000 per million population per year.

2. OUTCOME (QUALITY)
   Day 1 visual acuity
   - 6/6 – 6/18: 40% +
   - 6/24 – 6/60: 50%
   - <6/60: 10% - (5% due to surgical complication)

   Week 8 visual acuity
   - 6/6 – 6/18: 85% +
   - 6/24-6/60: 10%
   - <6/60: 5%

3. OUTLAY (COST) –
   US$30 per surgery (consumables)
   US$100 per surgery (total cost of the Vision 2020 programme).
   Self sustaining, with no external support.

Improving Output

Is there a waiting list?

No -> Increase demand -> Consider barriers to uptake
   Consider cataract case finding

Yes -> Increase capacity -> Consider volume of surgery
   Consider efficiency of surgery.

Improving Outcome

1. Include biometry.
2. Convert to small incision surgery.
3. Ensure each surgeon does a minimum of 500 surgeries per year.
4. Monitor outcome NB NB NB.
Reducing Cost

1. Cost containment – Increase productivity - Improve efficiency
   Increase volume
   Purchase cheap consumables.

2. Cost recovery + cost sharing – Multi tier system, with cross subsidisation.

3. Income generation from other sources.

4. External support, only as a last resort.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CATARACT BLINDNESS
IMPROVING CATARACT SERVICES

AS A VISION 2020 PROGRAMME MANAGER, YOU HAVE THE TASK
OF IMPROVING THE CATARACT SURGERY SERVICES IN YOUR
DISTRICT – QUALITY, QUANTITY (UPTAKE + CAPACITY), COST.

HOW DO YOU PLAN TO DO THIS?
REFRACTIVE ERROR
REFRACTIVE ERROR
CLINICAL OVERVIEW

Refractive errors occur when the eye is not the right shape or size so that light cannot focus on the retina. Vision is blurry and sight can usually be restored with spectacles.

Classification

Emmetropia

Ametropia - Myopia
Hypermetropia
Astigmatism
Presbyopia

Optics

Emmetropia –

The eyeball is the correct size and the light rays are bent (refracted) the correct amount by the eye. Parallel rays of light from a distance pass through the cornea and lens then focus on the retina in a precise way without blurring - just as a camera lens focuses light onto a film.

Myopia (Near Sight) –

The eyeball is too long and/or the light rays are bent too much by the eye (the eye is too strong). Parallel rays of light from a distance pass through the cornea and lens then are brought to a focus in front of the retina making a blurred image.

A concave lens, such as spectacles or contact lens, makes the light focus over a longer distance so that the image falls on the retina
and is seen clearly. A concave lens (minus power) makes the eye weaker in power.

**Hypermetropia (Far Sight) -**

The eyeball is too short and/or the light rays are not bent enough by the eye (the eye is too weak). Parallel rays of light from a distance pass through the cornea and lens then are brought to a focus behind the retina making a blurred image.

![Eye Diagram](image)

A convex lens, such as spectacles or contact lens, makes the light focus over a shorter distance so that the image falls on the retina and is seen clearly. A convex lens (positive power) makes the eye stronger in power. Alternatively, the eye may accommodate and this will have the same effect as the convex lens.

**Astigmatism –**

Astigmatism occurs when the front of the eye is not rounded like a football but is squashed so that it is curved more in one direction than the other, like a rugby ball. This makes the image on the retina blurred in one direction. Astigmatism can also occur with long or short sightedness.

![Eye Diagram](image)

A cylindrical lens makes the light focus in that direction so that all of the image becomes clear again.
Presbyopia (Mature Sight) –

Because the crystalline lens loses its elasticity with age, after the age of 40 the eyeball starts to lose its ability to accommodate for near.

A convex lens, such as spectacles, makes the light focus over a shorter distance so that the image falls on the retina and is seen clearly. A convex lens (positive power) replaces the eyes inability to accommodate.

**Clinical features & Treatment**

<table>
<thead>
<tr>
<th></th>
<th>Myopia</th>
<th>Hypermetropia</th>
<th>Astigmatism</th>
<th>Presbyopia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance vision</td>
<td>Poor</td>
<td>Good</td>
<td>Poor</td>
<td>Good</td>
</tr>
<tr>
<td>Near vision</td>
<td>Good</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>Headache</td>
<td>Rarely</td>
<td>Usually</td>
<td>Usually</td>
<td>Usually</td>
</tr>
<tr>
<td>Age</td>
<td>All ages</td>
<td>All ages</td>
<td>All ages</td>
<td>Above 40</td>
</tr>
<tr>
<td>Treatment</td>
<td>Minus spherical lenses</td>
<td>Plus spherical lenses</td>
<td>Toric lenses</td>
<td>Plus spherical lenses</td>
</tr>
</tbody>
</table>

**Ready made spectacles**

70% of all refractive errors can be treated with ready-made spectacles. It is now possible to source affordable, good quality ready-mades.

Criteria for ready-mades: -

- For anisometropia (difference in eye powers) of 0.50DS or less
- For astigmatism of 0.75DC or less
- For prism (for straightening eyes) of 0.50△ or less

30% of refractive errors do not meet these criteria and require prescription spectacles.
IMPACT OF REFRACTIVE ERROR

Visual impairment due to refractive error in any population suggests that eye care services in that area are not adequate.

Treatment of refractive error is one of the simplest and most cost effective forms of eye care.

Uncorrected refractive error can impact in many ways: -

- It can hinder education
- It can effect personality development
- It can limit career opportunities
- It causes an economic burden on society

DEFINITION AND MAGNITUDE

Refractive error as a cause of blindness has been recognised only recently with the increasing use of ‘presenting visual acuity’ for defining blindness.

It is estimated that there are approximately 100 million people in the world with uncorrected refractive errors or inappropriate refractive correction and it is increasing.

**Definition of Significant Refractive Error**

<table>
<thead>
<tr>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6/18 binocularly</td>
<td>&lt; 6/12 binocularly</td>
</tr>
<tr>
<td>Myopia of –1.00DS or more in both eyes</td>
<td>Myopia of –0.50DS or more in both eyes</td>
</tr>
<tr>
<td>Astigmatism of 1.50DC or more in both eyes</td>
<td>Astigmatism of 1.00DC or more in both eyes</td>
</tr>
<tr>
<td>Hypermetropia of +3.00DS or more in both eyes</td>
<td>Hypermetropia of +3.00DS or more in both eyes</td>
</tr>
</tbody>
</table>

In practical terms, significant refractive error is present if the patient is given the correct spectacles and he/she wears them. This depends on the activities and lifestyle of the individual.
Magnitude Of Significant Refractive Error

From population bases prevalence surveys conducted in China, Chile, India, Nepal, and South Africa, the prevalence (% of children + number per million total population) of significant refractive error in children varies in different regions and different population groups –

<table>
<thead>
<tr>
<th>Country</th>
<th>Myopia -1,00DS or more</th>
<th>Hypermetropia + 3,00DS or more</th>
<th>Astigmatism 1,50DC or more</th>
<th>Total significant refractive error</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nepal (5-15 years)</strong></td>
<td>0,7% 3000</td>
<td>0,4% 1 500</td>
<td>1,0% 4 000</td>
<td>2,1% 8 500</td>
</tr>
<tr>
<td><strong>Chile (5-15 years)</strong></td>
<td>4,6% 18 500</td>
<td>5,6% 22 500</td>
<td>14,9% 59 500</td>
<td>25,1% 100 500</td>
</tr>
<tr>
<td><strong>China (5-15 years)</strong></td>
<td>13,6% 54 000</td>
<td>1,3% 5 000</td>
<td>2,0% 8 000</td>
<td>16,9% 67 000</td>
</tr>
<tr>
<td><strong>Urban India (5-15 years)</strong></td>
<td>4,2% 17 000</td>
<td>1,9% 7 500</td>
<td>3,8% 15 000</td>
<td>9,9% 39 500</td>
</tr>
<tr>
<td><strong>Rural India (7-15 years)</strong></td>
<td>2,8% 11 000</td>
<td>0,3% 1 000</td>
<td>1,8% 7000</td>
<td>4,9% 19 000</td>
</tr>
<tr>
<td><strong>South Africa</strong></td>
<td>0,5% 2 000</td>
<td>1,0% 4 000</td>
<td>1,0% 4 000</td>
<td>2,5% 10 000</td>
</tr>
</tbody>
</table>

The prevalence of significant refractive error in children in Southern Africa appears low compared with other regions.

The studies had one thing in common: -

Refractive errors in children tended to peak in the age group 11 – 14 years.
REFRACTIVE ERROR
HUMAN RESOURCES

- Good health economy countries - 1 optometrist: 10 000
- Poor health economy countries - 1 optometrist: 600 000
  (and worse in rural areas)

Recommendations:

- 1 optometrist per 250 000 (by year now!)
- 1 optometrist per 100 000 (by 2010)
- 1 optometrist per 50 000 (by 2020)

For purposes of Vision 2020, an optometrist is defined as a person who can:

- provide refractive services
- determine and provide appropriate optical correction
- conduct eye examination and identify eye conditions requiring appropriate referral

Integration of services:

Refractive error and its correction should be developed at secondary level first and then at community and primary level services second. It should be established within the eye care team (vertical approach) and within other health care and community efforts (horizontal approach).

3 cadres are required with increasingly sophisticated refraction skills linked through referral networks.

1. **Community Based Workers**: (health workers, teachers) who direct local screening programmes and oversee the selection of reading spectacles.
2. **Mid Level Workers**: (such as nurses) who carry out basic refraction, complimented with training in the detection and management of common eye diseases
3. **Eye Care Professionals**: (optometrists, ophthalmologists) who are responsible for developing and teaching training programmes and delivery of full vision services
REFRACTIVE ERROR
SCHOOL SCREENING

Aim

To detect significant refractive errors in children requiring spectacle correction.

School Screening – Strategy

1. Screen all children once between ages 5 and 9 years (25 000 children per million population) and screen all children again once between ages 11 – 15 years (25 000 children per million population) (50 000 children screened each year).

2. Use a binocular vision of less than 6/12 to screen for significant refractive errors, but test monocular.

3. Screening should be done by trained teachers, trained health care workers or school nurses, using a 6/12 E chart with 4 letters.

4. Refer identified cases to an optometrist, refractionist, or eye nurse. (To school or clinic?)

5. Refract. (Retinoscopy + subjective, with cycloplegia when necessary). Autorefractor shall have a role to play in the future.

6. Spectacles should be prescribed and dispensed for - myopia – 1,0 dioptre sphere or more both eyes astigmatism 1,5 dioptre cylinder or more both eyes hypermetropia + 3,0 dioptre sphere or more both eyes.

Only start school screening when you know that the appropriate resources for follow-up refraction and the delivery of spectacles are available.
School Screening – Monitoring

Quantitative –

1. Number of schools screened
2. Number/proportion of children in the school screened
3. Number/proportion of children referred
4. Number/proportion of referred children seen (transferred)
5. Number proportion of children seen prescribed spectacles
6. Number/proportion of children prescribed spectacles issued spectacles

Qualitative –

1. Number/proportion of children issued spectacles who wear them regularly.
2. Number/proportion of children wearing spectacles whose vision is improved.

Rapid assessment in schools to assess the need

Before embarking on a fully-fledged school-screening programme, the eye care programme may first want to establish if it is a priority (is there a need?)

Methodology: Assess 100 children in age group 11 – 15 years as random cluster samples (50 clusters)

<table>
<thead>
<tr>
<th>Priority</th>
<th>&lt;6/12 (Children)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>&gt; 5%</td>
</tr>
<tr>
<td>Moderate</td>
<td>2 – 5%</td>
</tr>
<tr>
<td>Low</td>
<td>&lt; 2%</td>
</tr>
</tbody>
</table>

School screening makes an assumption that school aged children are school going children. This is not always the case, especially in poorer communities.

A community screening approach will be more effective to identify all children with refractive errors. However, it is more expensive (time and money) and needs more manpower.
REFRACTIVE ERROR
PRESBYOPIA

Provision of spectacles for presbyopia will benefit a huge number of people. Such a service will be greatly appreciated by the community and is a very good way in to a community to develop comprehensive eye care services. It is also an excellent way of identifying blinding eye conditions.

If the distance vision is >6/18 in both eyes: prescribe near vision spectacles at primary level, usually as ready-mades.

If the distance vision is < 6/18 in both eyes: refer to secondary level since patient may have another eye condition e.g. cataract.

Rapid assessment in communities to assess the need

Before embarking on a fully-fledged presbyopia-screening programme, the eye care programme may first want to establish if it is a priority (is there a need?)

Methodology: Assess 100 adults in age group 45 years and above as random cluster samples (50 clusters)

<table>
<thead>
<tr>
<th>Priority</th>
<th>Proportion with correct reading spectacles</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>&lt; 33%</td>
</tr>
<tr>
<td>Moderate</td>
<td>&gt; 33% - &lt; 67%</td>
</tr>
<tr>
<td>Low</td>
<td>&gt; 67%</td>
</tr>
</tbody>
</table>
EXERCISE

PLANNING AND IMPLEMENTATION OF VISION 2020 PROGRAMMES
REFRACTIVE ERROR

AS A VISION 2020 PROGRAMME MANAGER, YOU HAVE THE TASK OF ORGANISING AND SETTING UP A REFRACTIVE ERROR SERVICE AND A SCHOOL SCREENING PROGRAMME IN YOUR DISTRICT.

HOW DO YOU PLAN TO IMPLEMENT THESE?
LOW VISION
LOW VISION
CLINICAL OVERVIEW

Definition

1. **Survey definition:** Visual acuity 6/24 – 3/60 (visual impairment + severe visual impairment) (corrected in the better eye).
2. **Functional definition:** A person with low vision is someone who after treatment and with best optical correction has a visual acuity in the better eye of 6/24 – PL, and/or a visual field < 10 degrees from fixation but who uses or has the potential to use vision for the planning and/or execution of a task.

Global Magnitude

According to WHO estimations, the magnitude of “low vision” is 3-4 times the magnitude of blindness. This is before sight restoring interventions eg. cataract surgery. Once sight has been restored to those who can benefit, it is estimated that 40% of the total number of visually impaired will need low vision services of one kind or another.

The diagram below best explains the description of need: -
Therefore, we can estimate that globally there are 37 million blind and 124 million with “low vision.” A total of 161 million with visual impairment. 40% of these will remain in need of low vision services = 65 million. The number who will actually demand LV services is not known.

**Magnitude in Southern Africa**

The magnitude of low vision is 3 – 4 times the magnitude of blindness.

There are approximately 200 blind children per million population (after standard refractive correction and/or treatment). This is based on a prevalence of 0.5 per 1000 children (linked to U5 mortality rate).

There are approximately 600 – 800 children per million population with visual acuity 6/24 – 3/60 (after standard refractive correction and/or treatment).

**Need Versus Demand**

Of the number in need of low vision services, not all will demand them. This will be influenced by their socio-economic status, literacy, age, vision requirements, acceptability of LVD’s etc.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
LOW VISION

FOR YOUR PLANNING REGION, WHAT IS: -

1. THE NUMBER OF BLIND PEOPLE?

2. THE NUMBER OF PEOPLE WITH LOW VISION?

3. THE NUMBER OF PEOPLE WHO NEED LOW VISION SERVICES?

4. THE % OF THE POPULATION AGED 0 – 15 YEARS?

5. THE NUMBER OF BLIND CHILDREN?

6. THE NUMBER OF CHILDREN WITH LOW VISION?
Aetiology

Common causes in children in Africa are –
Corneal scarring
Aphakia
Albinism
Glaucoma
Retinal dystrophy.

Common causes in adults in Africa are –
Glaucoma
Diabetic retinopathy
Retinal dystrophy.

LOW VISION MANAGEMENT

Rationale For Low Vision Services

1. Many children in schools for the blind with visual acuity 6/24-6/60 can manage in mainstream schools with appropriate refraction correction and/or low vision devices.
2. Many children in schools for the blind with visual acuity 5/60 – 1/60 can read normal size print with appropriate refraction correction and/or low vision devices.
3. Many children in schools for the blind with visual acuity <1/60 can read print (instead of Braille) with appropriate refraction correction and/or low vision devices.
4. Good quality low vision devices (magnifiers and telescopes) are now available at low cost.

In Kenya, studies in the schools for the blind and integrated programmes indicated that 68% of the children had low vision, 55% had sufficient vision to read print and 30% benefited from a low vision device. There is no reason why this data cannot be extrapolated to Southern Africa.

Strategy For Low Vision Services

1. Detect cases
   In schools for the blind
   From ophthalmologists.

2. Assessment
   Ophthalmologist – diagnosis, prognosis
   Optometrist – refraction, +/- magnification needs
Low vision therapist – +/- magnification needs, skill/function needs eg reading distance from blackboard, etc.

3. Prescription
   Near, medium or distance
   Spectacles, hand or stand magnifier, telescope, reading stand

4. Education, rehabilitation, motivation and follow-up
   (multidiscipline approach)

**Types of Magnification**

<table>
<thead>
<tr>
<th>Name</th>
<th>Method</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Size Magnification</td>
<td>Increasing the actual size of the object being viewed</td>
<td>Large print material</td>
</tr>
<tr>
<td>Relative Distance Magnification</td>
<td>Reducing the distance between the object and the eye</td>
<td>Move object closer to the eye</td>
</tr>
<tr>
<td>Angular Magnification</td>
<td>Increasing angular subtense of the image being viewed</td>
<td>Telescope, magnifier</td>
</tr>
</tbody>
</table>

**Non Optical Interventions** – supplementary devices that do not use optical lenses

**L**arger - Write with felt pens or charcoal
Use large font computers or enlarging photocopiers

**L**ighting - More: Sit near a window
   Use a higher watt bulb
   Use a light over the shoulder projected onto the page
Less: Use dark spectacles
   Use a hat with a brim

**L**ines - To find the beginning and end of a row of text
To mark the edge of steps or of a path
**Closer** - Holding things closer makes them bigger
   Use a tilted reading/writing surface

**Colour** - Use colour coding
   Use contrasting colours

**Contrast** - White writing on a black background is best

**Optical Interventions** – incorporating lenses of optical magnification

1. **Definition of low vision devices** –
   Any device more than 4D for near.
   Any magnification for distance.

2. **Types of low vision devices** –
   Near: bar prism; hand held magnifier; stand magnifier; high plus reading spectacles.
   Distance – telescopes.

3. **Principles of prescribing optical devices** –
   Most of the need is for near vision.
   High magnification results in decreased field of view
   The lowest power that fulfils the need should be prescribed.
   The patient will need to be shown how to use the device and how to look after it.
   The patient will need motivation and follow-up.

4. **Low cost good quality low vision devices** –
   These are available from Hong Kong Society For The Blind Resource Centre (www.hksb.org)

**Environmental modifications**
Much can be done to improve the mobility of persons with low vision by modifying the environment through use of contrast, lighting, colour etc. Schools for the blind are generally not well designed, decorated to take this in to account.

**Neglect of low vision care**

- Lack of awareness among eye care professionals
- Limited outlook on patient care – “eye” oriented, not “whole person” oriented
- Disinterest because of time required and poor financial returns
Human Resources & Infrastructure

Aim of Vision 2020: Train at least one low vision worker for every 20 million children, by 2010, and for every 5 million by 2020

Training of low vision workers should include the following: -

- Impact of low vision
- Visual development
- Assessment & management of infants, children and adults with low vision
- Follow-up training and referral

Levels of service can be offered at primary, secondary and tertiary levels.

30% of low vision services can be satisfied at primary level
50% of low vision services can be satisfied at secondary level
20% of low vision services can be satisfied at tertiary level
AS A VISION 2020 PROGRAMME MANAGER, YOU HAVE THE TASK OF ORGANISING AND SETTING UP A LOW VISION SERVICE IN YOUR DISTRICT.

HOW DO YOU PLAN TO IMPLEMENT THIS?
CHILDHOOD BLINDNESS
INTRODUCTION

There are 4 important questions to be asked when considering childhood blindness.

These are –

What is childhood blindness? - DEFINITION
How many children are blind? - MAGNITUDE
Why are children blind? - AETIOLOGY
What can we do? - CONTROL

DEFINITION OF CHILDHOOD BLINDNESS

Childhood is defined as age 0 to 15 years.

Blindness is defined as a best corrected visual acuity of <3/60 in the better eye with available correction.

GLOBAL MAGNITUDE OF CHILDHOOD BLINDNESS

A. PREVALENCE

The global prevalence is estimated to be 1,4 million (7,5 per 10 000 children).

The prevalence in individual countries correlates with the level of economic development of the country and the under 5 mortality rate.

<table>
<thead>
<tr>
<th>Level of economic Development</th>
<th>U5MR (per 1000 children)</th>
<th>Estimated childhood blindness (per 1000 children)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialised</td>
<td>20</td>
<td>0,3</td>
</tr>
<tr>
<td>Middle developing</td>
<td>100</td>
<td>0,6</td>
</tr>
<tr>
<td>Poor developing</td>
<td>200</td>
<td>0,9</td>
</tr>
<tr>
<td>Very poor</td>
<td>300</td>
<td>1,2</td>
</tr>
</tbody>
</table>
The prevalence in different regions of the world varies.

<table>
<thead>
<tr>
<th>World bank region</th>
<th>Number of children (millions)</th>
<th>Prevalence of blindness per 1000 children</th>
<th>Number of blind children</th>
<th>% of total blind children</th>
</tr>
</thead>
<tbody>
<tr>
<td>EME</td>
<td>170</td>
<td>0,30</td>
<td>50 000</td>
<td>3,6</td>
</tr>
<tr>
<td>FSE</td>
<td>78</td>
<td>0,51</td>
<td>40 000</td>
<td>2,9</td>
</tr>
<tr>
<td>LAC</td>
<td>170</td>
<td>0,62</td>
<td>100 000</td>
<td>7,1</td>
</tr>
<tr>
<td>MEC</td>
<td>240</td>
<td>0,80</td>
<td>190 000</td>
<td>13,6</td>
</tr>
<tr>
<td>China</td>
<td>340</td>
<td>0,50</td>
<td>210 000</td>
<td>15,0</td>
</tr>
<tr>
<td>India</td>
<td>350</td>
<td>0,80</td>
<td>270 000</td>
<td>19,3</td>
</tr>
<tr>
<td>OAI</td>
<td>260</td>
<td>0,83</td>
<td>220 000</td>
<td>15,6</td>
</tr>
<tr>
<td>SSA</td>
<td>260</td>
<td>1,24</td>
<td>320 000</td>
<td>22,9</td>
</tr>
<tr>
<td>Total</td>
<td>1868</td>
<td>0,75</td>
<td>1 400 000</td>
<td>100</td>
</tr>
</tbody>
</table>

B. INCIDENCE

The incidence is unknown.

The global incidence is estimated to be 500 000 new cases per year. This is 1 new case each minute.
Over 50% die within 1-2 years of becoming blind.
The prevalence under-estimates the magnitude of the problem, as this only takes account of the children who survive.
MAGNITUDE OF CHILDHOOD BLINDNESS IN SOUTHERN AFRICA

The estimated prevalences of childhood blindness in Southern African countries are –

<table>
<thead>
<tr>
<th>Country</th>
<th>Total population (millions)</th>
<th>U5MR (per 1000 children)</th>
<th>Estimated number of blind children (per 1000 children)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>13</td>
<td>292</td>
<td>1.2</td>
</tr>
<tr>
<td>Botswana</td>
<td>1.8</td>
<td>101</td>
<td>0.6</td>
</tr>
<tr>
<td>Lesotho</td>
<td>2</td>
<td>156</td>
<td>0.75</td>
</tr>
<tr>
<td>Madagascar</td>
<td>16</td>
<td>164</td>
<td>0.75</td>
</tr>
<tr>
<td>Malawi</td>
<td>11</td>
<td>221</td>
<td>1.0</td>
</tr>
<tr>
<td>Mauritius</td>
<td>1.2</td>
<td>20</td>
<td>0.3</td>
</tr>
<tr>
<td>Mocambique</td>
<td>20</td>
<td>227</td>
<td>1.2</td>
</tr>
<tr>
<td>Namibia</td>
<td>2.4</td>
<td>78</td>
<td>0.5</td>
</tr>
<tr>
<td>South Africa</td>
<td>43</td>
<td>68</td>
<td>0.5</td>
</tr>
<tr>
<td>Swaziland</td>
<td>1.1</td>
<td>107</td>
<td>0.6</td>
</tr>
<tr>
<td>Zambia</td>
<td>12</td>
<td>203</td>
<td>0.9</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>13</td>
<td>81</td>
<td>0.6</td>
</tr>
</tbody>
</table>
In South Africa, the estimated prevalences of childhood blindness are

<table>
<thead>
<tr>
<th>Area/Ethnic Group/Province</th>
<th>U5MR (per 1000 children)</th>
<th>Estimated number of blind children (per 1000 children)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>43.2</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>71.2</td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>63.6</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>?</td>
<td></td>
</tr>
<tr>
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<td>Western Cape</td>
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</table>

In countries in Southern Africa, 40% of the population is aged 0-15 years. The total number of blind children in each of these countries, or the number of blind children per million population, can be calculated.

For example, for a health district of 1 000 000 in South Africa –
Population 1 000 000
40% of population aged 0-15 years
Prevalence 0.5 per 1 000 children
Number of blind children = 1 000 000 x 40 / 100 x 0.5 / 1000
= 200 blind children.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CHILDHOOD BLINDNESS
PREVALENCE OF CHILDHOOD BLINDESS

WHAT IS THE POPULATION OF YOUR HEALTH DISTRICT?

WHAT PROPORTION OF THE POPULATION ARE CHILDREN (AGED 0-15 YEARS)?

WHAT IS THE UNDER 5 MORTALITY RATE IN YOUR HEALTH DISTRICT?

CALCULATE THE NUMBER OF BLIND CHILDREN IN YOUR HEALTH DISTRICT.
CAUSES OF CHILDHOOD BLINDNESS

The causes of childhood blindness can be classified in two ways:

a) **Anatomically** – according to the anatomical site of the lesion in the eye.
   i) cornea
   ii) lens
   iii) uvea
   iv) retina
   v) optic nerve
   vi) glaucoma
   vii) globe
   viii) CNS

b) **Aetiologically** – relating to when the insult occurred which resulted in blindness.
   i) hereditary
   ii) intra-uterine
   iii) peri-natal
   iv) childhood

How do we determine the causes of childhood blindness in any particular country or health district?

There are 2 options –

A. **Population based survey** – The problems with this are –
   1. Low prevalence, therefore a large sample is required.
   2. Case definition in babies and infants is often difficult.
   3. Lost “cases” in institutions.

B. **Blind schools survey** – The problems with this are –
   1. Selection bias against rural blind.
   2. Selection bias against pre-school blind.
   3. Selection bias against children with multiple disabilities.

The simplest way to estimate the causes of childhood blindness is to examine approximately 200 blind children in blind schools and / or at hospital clinics.
From data from 45 blind school surveys of over 9000 children around the world

a) Causes of blindness (anatomical classification)

<table>
<thead>
<tr>
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<th>EME</th>
<th>FSE</th>
<th>LAC</th>
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</table>

"Globe" is an important cause in Asia, but not in Africa.
"Cornea" is an important cause in all the poor regions.
"Retina" is an important cause everywhere.
"Optic nerve" is an important cause in rich countries.

b) Causes of blindness (aetiological classification)

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Hereditary causes are important everywhere.
Perinatal causes are important in richer regions.
Childhood causes are important in poorer regions.
The proportions of the main causes in different socio-economic groups can be summarised as –

In affluent communities –
For every 1 million population –
20% 0-15 years = 0,2 million.
Prevalence = 0,3 per 1000 = 60 blind.
Scar – 0% - 0.
Cataract + glaucoma – 10% - 6
ROP – 10% - 6

In middle income communities –
For every 1 million population –
30% 0-15 years = 0,3 million.
Prevalence = 0,6 per 1000 = 180 blind.
Scar – 0% - 0.
Cataract + glaucoma – 20% - 36
ROP – 25% - 45
Others – 55% - 95.

In poor communities -
For every 1 million population –
40% 0-15 years = 0,4 million.
Prevalence = 0,9 per 1000 = 360 blind.
Scar – 20% - 72.
Cataract + glaucoma – 20% - 72
ROP – 0% - 0
Others – 60% - 216.

In very poor communities-
For every 1 million population –
50% 0-15 years = 0,5 million.
Prevalence = 1,2 per 1000 = 600 blind.
Scar – 50% - 300.
Cataract + glaucoma – 15% - 90
ROP – 0% - 0
CAUSES OF CHILDHOOD BLINDNESS IN SOUTH AFRICA


This was a cross sectional survey of children in blind schools in South Africa.

The children in 15 of 16 blind schools were examined.
1311 of 1615 children were examined.

The results of this survey are as follows –

1. Ethnic Groups –
   57% African.
   25% Caucasian.
   13% Coloured.
   4% Indian.

2. Categories of Vision –
   30,4% blind.
   12,6% SVI
   42,3% VI
   12,0% normal.
   2,7% could not be tested.

3. Only 10% of blind children in South Africa are in schools for the blind (94% of Caucasians, 6% of Africans).

4. 54% of children in schools for the blind have visual impairment or normal vision.
   Some of these children could be integrated into main stream schooling.

5. Causes of Blindness –
   a. By anatomical site –
      Retina (dystrophy, ROP, albinism) 38,5%
      Optic nerve (optic atrophy) 15,2%
      Cornea (scar, staphyloma) 11,2%
      Retinal conditions are more common in Caucasians
      Corneal conditions are more common in Africans.
   b. By aetiology –
      Unknown (cataract, glaucoma, retinoblastoma, congenital abnormality) 41,5%
      Hereditary (albinism, retinal dystrophy) 33%
      Intrauterine (toxoplasmosis, rubella) 0,9%
      Perinatal (ROP, ophthalmia neonatorum) 13,1%
      Childhood (VAD / measles corneal scar, trauma) 11,5%
ROP is more common in Caucasians and Indians
Albinism is more common in Africans
Glaucoma is more common in Africans
VAD/measles corneal scar is more common in Africans.
Ophthalmia neonatorum is more common in Africans.

27.5% of blindness is preventable.
11.4% of blindness is treatable
38% of blindness is avoidable.

6. Cataract –
No unoperated cataract was seen in Caucasians or Indians.
14 African children needed cataract surgery.
Cataract is a potentially treatable cause of blindness, particularly in Africans.

7. VAD/Measles Corneal Scar –
This is the most common cause in blind school surveys in other African countries (27 – 67%).
It is responsible for only 5% in South Africa.
It is still a significant cause of preventable blindness in Africans and Coloureds.

8. Glaucoma –
This is a potentially treatable cause of blindness, particularly in African children.

9. ROP –
No ROP is seen in other African countries
It is the major cause in South American countries
It is responsible for 11% of blindness in South Africa
It is most common in Caucasians and Indians.
It is an emerging and preventable cause of blindness in South Africa.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
CHILDHOOD BLINDNESS
CAUSES OF CHILDHOOD BLINDESS

WHAT IS THE POPULATION OF YOUR HEALTH DISTRICT?

WHAT PROPORTION OF THE POPULATION ARE CHILDREN (AGED 0-15 YEARS)?

WHAT IS THE UNDER 5 MORTALITY RATE IN YOUR HEALTH DISTRICT?

WHAT IS THE NUMBER OF BLIND CHILDREN IN YOUR HEALTH DISTRICT?

ESTIMATE THE NUMBERS OF CHILDREN WHO ARE BLIND DUE TO –
SCAR
CATARACT
ROP
OTHER.
CATARACT IN CHILDREN – CLINICAL OVERVIEW

DEFINITION

Childhood cataract can be classified in different ways –
1. Age of onset – congenital, infantile, juvenile.
2. Morphology of the lens – nuclear, cortical, etc.
3. Aetiology – genetic, intrauterine infection, etc.

MAGNITUDE

Prevalence –
Globally, 15% of childhood blindness = 30 children / million population are blind.
It varies from 10% (= 6 children per million population) in affluent communities, to 20% (=90 children per million population) in very poor communities.

Incidence –
At least 10 new cases / million population / year
At least 1 per 2000 live births / year.

CAUSES

Non-traumatic
   Hereditary (autosomal dominant) 25%
   Rubella 20%
   Others 5%
   Unknown 50%

Traumatic (usually 1 eye).

CLINICAL FEATURES

Symptom –
Poor vision.

Signs –
Decreased visual acuity
Leucocoria
Decreased or absent red reflex
Visible opacification of the crystalline lens.
CATARACT IN CHILDREN - CONTROL

PRIMARY PREVENTION –

Genetic counselling.
Rubella immunisation.

SECONDARY PREVENTION –

Nil.

TERTIARY PREVENTION –

Surgery + refractive correction
Low vision services.

In order to prevent irreversible amblyopia, it is important to provide –
Early good quality surgery
Early good quality correction of aphakia
Careful follow-up, to detect and treat amblyopia, and to provide low vision services where needed.

The surgery that is recommended is –
Lensectomy with anterior vitrectomy.

The correction of aphakia that is recommended is –
Fitting of an extended wear contact lens in children under 3 years of age.
Implantation of an IOL in children 3 years and older.

The management of these patients (surgery, refractive correction, and follow up) should be done by a paediatric ophthalmology team (ophthalmologist, refractionist and contact lens practitioner, orthoptist, anaesthetist, etc) working in a paediatric ophthalmology unit with appropriate instruments and equipment.

This treatment cannot be provided at each district Vision 2020 surgical centre.

One quaternary paediatric ophthalmology unit is recommended for every 10 million population.
CORNEAL SCARRING IN CHILDREN – CLINICAL OVERVIEW

DEFINITION

A corneal scar which reduces vision in a child.

MAGNITUDE

Globally, 15% of childhood blindness = 30 children / million population are blind.
It varies from 0% in affluent communities to 50% (=300 children per million population) in very poor communities.

CAUSES

Ophthalmia neonatorum
Measles
Bacterial keratitis
Vitamin A deficiency
Traditional eye medicines
Trauma (usually 1 eye).

OPHTHALMIA NEONATORUM

Aetiology: Ophthalmia neonatorum is caused by a gonorrhoea infection of the eyes during delivery.

Pathology: This results in a severe purulent conjunctivitis and keratitis, with peripheral corneal ulceration and perforation.

Clinical Features: The onset of the infection is usually within the first 5 days after delivery.
There is a severe bilateral purulent conjunctivitis, with a profuse purulent discharge.
The corneal ulceration is often difficult to see because it involves the peripheral cornea and is often obscured by pus.
It may rapidly lead to corneal perforation, with subsequent corneal scarring.

VITAMIN A DEFICIENCY (XEROPHTHALMIA)

Pathology: Vitamin A is necessary for the maintenance of healthy nonkeratinised squamous epithelium. Deficiency results in keratinising metaplasia of this epithelium.

Clinical Features – Classification:
XN – Night blindness. This is due to lack of rhodopsin in the rods.
X1A – Conjunctival xerosis. This is due to loss of goblet cells and keratinising squamous metaplasia.
X1B – Bitot’s spot. This is due to keratinisation of the conjunctiva and secondary infection with Cornebacterium xerosis.
X2 – Corneal xerosis. This is due to keratinisation of the corneal epithelium.
X3A – Keratomalacia, affecting <1/3rd of the cornea.
X3B – Keratomalacia, affecting >1/3rd of the cornea. This is due to necrosis of the corneal stromal collagen.
XS – Corneal scar.
XF – Xerophthalmia fundus. This is due to depigmentation of the retinal pigment epithelium in the peripheral retina.

MEASLES KERATITIS

Aetiology:
Measles is caused by the measles virus. It is a very contagious disease, and usually affects children.

Clinical Features:
Keratoconjunctivitis occurs as a normal feature of the disease.
In Africa, corneal ulceration occurs in 1-4% of children.
The factors contributing to the development of corneal ulceration are –
4. Vitamin A deficiency; from increased demand and reduced intake; resulting in keratomalacia.
5. Herpes simplex keratitis; from reduced immunity.
6. Exposure keratitis; from dehydration; resulting in secondary infection.
7. Use of traditional eye medicines; from parental fear and inaccessible eye services; resulting in mechanical trauma, chemical injury, and secondary infection.
Corneal ulceration may result in corneal perforation with loss of the eye. It usually results in corneal scarring.

TRADITIONAL EYE MEDICINES

Traditional eye medicines, remedies, or practices may be harmful, beneficial, or neutral in their effect. Attending a traditional healer and using traditional eye medicines often results in delayed presentation for diagnosis and appropriate treatment. There is considerable variation in the types of treatment used by different healers.

From studies done in Malawi and Tanzania –
About 25% of children with corneal ulcers have used traditional eye medicines
About 20% of children in blind school are blind because of the use of traditional eye medicines.

The mechanisms of damage to the eye are –
1. Infection – For example, gonococcus from urine, fungus from plant material.
2. Physical trauma - For example, abrasions from objects or plant material put in the eye or under the lids, coughing, trauma from enforced lid opening.
3. Chemical burns – Due alkalis, acids, and concentrated solutions.
4. Thermal burns – Due to steam, hot fluids, or hot objects.

The factors predisposing to the use of traditional medicines include – Measles
Epidemic and acute conjunctivitis
Lack of affordable health care facilities with reliable staff and supplies
Traditional beliefs.
CORNEAL SCARRING IN CHILDREN – CONTROL

PRIMARY PREVENTION -

1. Ophthalmia neonatorum prophylaxis - Ophthalmia neonatorum is prevented by cleaning the eyes with a swab and instilling antibiotic ointment at delivery.

2. Measles immunisation

3. Nutrition education - Food sources rich in vitamin A are eggs, fish, liver, and vegetables rich in carotenes.

4. Vitamin A supplementation - 200 000 IU every 6 months orally to children >1 year and lactating mothers, 100 000 IU every 6 months to children <1 year.

5. Health education about the harmful effects of traditional eye medicines – It is recommended that attempts should be made to collaborate with traditional healers in the provision of primary eye care. The aim should be to dissuade them from using practices that are harmful and to train them to identify cataract blind patients who need referral.

SECONDARY PREVENTION -

1. Treatment of ophthalmia neonatorum - Ceftriaxone 125mg intramuscular injection stat Chloramphenicol ointment.

2. Treatment of vitamin A deficiency – Children >1 year – 200 000 IU on day 1, day 2, and day 14. Children <1 year or <8kg – 100 000 on day 1, day 2, and day 14.

3. Treatment of measles keratitis – Vitamin A 200 000 IU on day 1, day 2, and day 14. Topical antibiotics.

TERTIARY PREVENTION

? Optical iridectomy
? Keratoplasty.

The emphasis of the control of corneal scarring is on primary and secondary prevention, which are largely community based strategies.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020 PROGRAMMES
CHILDHOOD BLINDNESS
CATARACT + CORNEAL SCAR

TABULATE THE POSSIBLE STRATEGIES IN YOUR HEALTH DISTRICT FOR THE PRIMARY, SECONDARY, AND TERTIARY CONTROL OF CHILDHOOD BLINDNESS DUE TO CATARACT AND CORNEAL SCAR

<table>
<thead>
<tr>
<th></th>
<th>PRIMARY (PREVENT THE DISEASE)</th>
<th>SECONDARY (PREVENT VISUAL LOSS)</th>
<th>TERTIARY (RESTORE VISION)</th>
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<tbody>
<tr>
<td>CATARACT</td>
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<tr>
<td>CORNEAL SCAR</td>
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</tbody>
</table>
GLAUCOMA IN CHILDREN – CLINICAL OVERVIEW

DEFINITION

Raised intraocular pressure leading to optic nerve damage and decreased vision.

MAGNITUDE

Prevalence –
1-10% of childhood blindness = 2-20 children / million population are blind.

Incidence –
1/1000 live births = 1-2 cases / million population / year.

CAUSES

Primary
   Hereditary
   Unknown

Secondary
   Rubella
   Anomalies (e.g., iris root abnormalities)

CLINICAL FEATURES

Symptoms –
   Early – Epiphora
   Late - Visible enlargement of the globe (buphthalmos)
       Decreased vision.

Signs –
   Decreased visual acuity.
   Buphthalmos.
   Raised intraocular pressure.
   Disc cupping.
GLAUCOMA IN CHILDREN – CONTROL

PRIMARY PREVENTION –

Rubella immunisation
Genetic counselling.

SECONDARY PREVENTION –

Early diagnosis and surgery
Treat amblyopia + refractive errors.

TERTIARY PREVENTION –

Low vision services.

As for paediatric cataract, paediatric glaucoma should be managed in a quaternary paediatric ophthalmology unit.
RETINOPATHY OF PREMATURITY – CLINICAL OVERVIEW

AETIOLOGY

Vascularisation of the temporal peripheral retina is only completed at 9 months gestation. The temporal peripheral retina is therefore immature at birth. Low birth weight or premature neonates nursed in incubators with oxygen supplementation may have vasoconstriction of the arterioles in the temporal peripheral retina, which results in vasoconstriction of the arterioles and ischaemia of the affected retina.

PATHOLOGY

The retinal ischaemia results in retinal neovascularisation. This may result in retinal and vitreous haemorrhage, retinal traction, retinal detachment, and blindness.

MAGNITUDE

ROP is a disease of neonatal units where oxygen therapy is inadequately monitored. It does not occur in very poor and in poor communities, with poor health care, where low birth weight and premature neonates do not survive. It is less common in affluent communities, with good health care, where low birth weight and premature neonates do survive, and where oxygen therapy administered to those neonates is adequately monitored. It is more common in middle income communities, with reasonable health care, where low birth weight and premature neonates do survive, but where oxygen therapy administered to those neonates is inadequately monitored.

It is an important cause of childhood blindness in South America and in South Africa.

CLINICAL FEATURES - CLASSIFICATION

By Stage :

1. Demarcation line – thin white line within the retina separating avascular and vascular retinal regions.
2. Ridge – the line is larger than a demarcation line and raised out of the plane of the retina.
3. Ridge with extra retinal fibrovascular proliferation – the raised line is associated with fibrovascular proliferation out of the retina.
4. Sub-total retinal detachment
5. Total retinal detachment.

Plus disease – tortuosity of the posterior pole retinal vessels which may be associated with iris engorgement and vitreous haze.
By Zone:

Zone 1 - posterior pole (within a circle whose radius is 2x the distance from the disc to the macula).
Zone 2 - from the edge of zone 1 to the nasal ora serrata and the temporal equator.
Zone 3 - temporal crescent anterior to zone 2.

The more posterior (by zone) the ROP, the greater the likelihood of progression to stage 3. ROP totally confined to zone 3 does not progress to stage 3.

By Clock Hours:

Each clock hour represents a 30 degree segment of the 360 degree circle. The more extensive the ROP by clock hours, the greater the tendency to progress.

STAGE 3 PLUS DISEASE IDENTIFIES A CHILD IN NEED OF TREATMENT WHEN THERE ARE 5 OR MORE CLOCK HOURS OF CONTINUOUS, OR 8 OR MORE CUMULATIVE CLOCK HOURS, OF STAGE 3 DISEASE. THIS IS KNOWN AS ‘THRESHOLD DISEASE’.
RETINOPATHY OF PREMATURITY – CONTROL

PREVENTION

ROP can be prevented by adequate monitoring of oxygen therapy in neonatal units.

SCREENING

Should screening for ROP be implemented?
Consider screening:
If ROP accounts for more than 10% of new admissions / registrations of blind children.
Or
If there is a neonatal unit where, each year, 100 babies or more with birth weights of less than 1500gms are surviving to 6 weeks of age.

Which neonates should be screened?
< 2 000 gm birth weight
and / or
< 32 weeks gestation.

When should they be examined?
The first examination should be 6-7 weeks after birth.

How should they be examined?
By indirect ophthalmoscopy
With dilated pupils
By a skilled ophthalmologist.

For how long should they be checked?
Until there is either regression or vascularisation.

TREATMENT

Stage 3 plus threshold disease should be treated as soon as possible after diagnosis and within 1 week at the latest. The time window available for treatment, and re-treatment if necessary, is short (about 2-3 weeks). Treatment is usually around 36-44 weeks postconceptual age (mean 37.7 weeks).

Cryotherapy or laser is applied to the whole of the area of avascular retina.

Treatment for stage 3 plus disease reduces the progression to stage 4 and 5 disease from approximately 50% to 25%.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020 PROGRAMMES
CHILDHOOD BLINDNESS
GLAUCOMA + ROP

TABULATE THE POSSIBLE STRATEGIES IN YOUR HEALTH DISTRICT
FOR THE PRIMARY, SECONDARY, AND TERTIARY CONTROL OF
CHILDHOOD BLINDNESS DUE TO GLAUCOMA AND ROP

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<tr>
<td>ROP</td>
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CONTROL OF CHILDHOOD BLINDNESS - SUMMARY

1. Why are children blind?
   Examine 200 blind children.

2. Which causes are avoidable?
   Which can be prevented?
   Which can be treated?

3. How can we prevent these diseases?
   Primary prevention – prevent disease occurring
   Secondary prevention – prevent visual loss from disease
   Tertiary prevention – restore vision.

4. Methods of control
   a. Integration in health care system
   b. Specific disease control

The principal strategies for prevention of blindness due to corneal scar are based in the community. They include –
- Ophthalmia neonatorum prophylaxis
- Measles immunisation
- Nutrition education
- Health education about harmful effects of traditional eye medicines.
- Prompt treatment of infection.

The principal strategies for prevention of blindness due to cataract, glaucoma, and ROP are based in a quaternary paediatric ophthalmology unit and include
- Screening for ROP.
- Treatment of ROP.
- Surgery for cataract.
- Surgery for glaucoma.
- Refractive correction of aphakia after cataract surgery.
- Refractive correction for glaucoma.
- Low vision treatment as necessary.

The team in the paediatric unit comprises –
- Paediatric ophthalmologist.
- Paediatric anaesthetist.
- Refractionist and contact lens practitioner.
- Orthoptist.
- Low vision therapist.

In addition to the instruments and equipment needed in a district Vision 2020 surgical centre, the additional instruments and equipment needed include –
- Portable indirect ophthalmoscope
- Portable cryo unit or laser
- Anaesthesia equipment for children
- Instruments for cataract and glaucoma surgery
- Glasses and contact lenses
- Low vision devices.
## Summary of Control of Childhood Blindness (By Disease)

<table>
<thead>
<tr>
<th>Anatomical level</th>
<th>Number per million population</th>
<th>Primary (prevent the disease)</th>
<th>Secondary (prevent visual loss)</th>
<th>Tertiary (restore vision)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornea</td>
<td>20</td>
<td>Nutrition Education Measles Immunisation</td>
<td>Early treatment of corneal disease</td>
<td>Corneal grafting Low vision services</td>
</tr>
<tr>
<td>Lens</td>
<td>30</td>
<td>Rubella immunisation Genetic counselling</td>
<td>Early good surgery Early good refractive correction Amblyopia treatment</td>
<td>Early good surgery Early good refractive correction Amblyopia treatment Low vision services</td>
</tr>
<tr>
<td>Retina</td>
<td>80</td>
<td>Avoid low birth weight Avoid hyperoxia (monitor oxygen therapy)</td>
<td>Screening for ROP Treatment for ROP</td>
<td>Low vision services</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>20</td>
<td>Rubella immunisation Genetic counselling</td>
<td>Early good surgery Early good refractive correction</td>
<td>Low vision services</td>
</tr>
<tr>
<td>Optic nerve</td>
<td>20</td>
<td>Good ante-natal and perinatal care</td>
<td></td>
<td>Low vision services</td>
</tr>
<tr>
<td>Whole globe</td>
<td>30</td>
<td>Genetic counselling Avoid medication in pregnancy</td>
<td></td>
<td>Low vision services</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200 per million population / 0.5 per 1000 children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Summary of Control of Childhood Blindness (By Age And Health Service)

<table>
<thead>
<tr>
<th>Level</th>
<th>Neonate</th>
<th>Pre-School</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Prevent ophthalmia neonatorum</td>
<td>Prevent amblyopia</td>
<td>Prevent xerophthalmia</td>
</tr>
<tr>
<td>(Community)</td>
<td>Examine neonate eyes</td>
<td>Screen for amblyopia</td>
<td>Screen visual acuity</td>
</tr>
<tr>
<td>Secondary (Mid level)</td>
<td>Refer cataract and glaucoma</td>
<td>Treat corneal disease</td>
<td>Provide spectacles</td>
</tr>
<tr>
<td>Tertiary (Referral)</td>
<td>Screen and treat ROP</td>
<td>Low vision services</td>
<td>Low vision services</td>
</tr>
<tr>
<td></td>
<td>Treat cataract and glaucoma</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AS A VISION 2020 PROGRAMME MANAGER, YOU HAVE THE TASK OF PLANNING AND IMPLEMENTING A PROGRAMME TO DEAL WITH CHILDHOOD BLINDNESS IN YOUR DISTRICT.

HOW DO YOU PLAN TO DO THIS?
OTHER
BLINDING EYE DISEASES
GLAUCOMA
GLAUCOMA BLINDNESS
CLINICAL OVERVIEW

Definition And Classification

Definition

A level of intraocular pressure in the eye (often raised) which leads to damage of the optic nerve (pathological cupping and optic atrophy) resulting in loss of vision (visual field, then visual acuity).

Simple Clinical Classification

Acute
Chronic

Aetiological Classification

Congenital
Primary closed angle
Primary open angle
Secondary closed angle
Secondary open angle

Magnitude


<table>
<thead>
<tr>
<th>TYPE</th>
<th>NUMBER OF CASES</th>
<th>NUMBER BLIND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open angle</td>
<td>33 million</td>
<td>3.3 million</td>
</tr>
<tr>
<td>Closed angle</td>
<td>17 million</td>
<td>1.7 million</td>
</tr>
<tr>
<td>Total</td>
<td>50 million</td>
<td>5.0 million</td>
</tr>
</tbody>
</table>

(10% global blind)
**Global Distribution Of POAG (1990)**

<table>
<thead>
<tr>
<th>COUNTRY / REGION</th>
<th>NUMBER OF CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>China 20%</td>
<td>2.5 million cases</td>
</tr>
<tr>
<td>Sub-Saharan Africa 20%</td>
<td>2.5 million cases</td>
</tr>
<tr>
<td>Western World 18%</td>
<td>2.5 million cases</td>
</tr>
<tr>
<td>India 13%</td>
<td>2 million cases</td>
</tr>
<tr>
<td>Eastern Europe 7%</td>
<td>1 million cases</td>
</tr>
<tr>
<td>Middle East 5%</td>
<td>0.5 million cases</td>
</tr>
<tr>
<td>East Asia/Pacific 10%</td>
<td>1.5 million cases</td>
</tr>
<tr>
<td>Latin America 7%</td>
<td>1.0 million cases</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13.5 million cases</strong></td>
</tr>
</tbody>
</table>

**Global Age + Race Prevalence of POAG (1990)**

<table>
<thead>
<tr>
<th>AGE</th>
<th>UK</th>
<th>USA</th>
<th>AFRICA CARIBBEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>Rare</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>1%</td>
<td>2-3%</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>2%</td>
<td>5-6%</td>
<td></td>
</tr>
<tr>
<td>60+</td>
<td>3%</td>
<td>6-10%</td>
<td></td>
</tr>
</tbody>
</table>
Prevalence Of Chronic Glaucoma in Age Group 40+ In South African Surveys

<table>
<thead>
<tr>
<th>SURVEY</th>
<th>PREVALENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Cape</td>
<td>2.57%</td>
</tr>
<tr>
<td>Pondo</td>
<td>3.00%</td>
</tr>
<tr>
<td>Mamre</td>
<td>4.5%</td>
</tr>
<tr>
<td>Hlabisa</td>
<td>6.5%</td>
</tr>
<tr>
<td>Temba</td>
<td>6.78%</td>
</tr>
</tbody>
</table>

Up to 50% of cases are already blind.
Up to 90% of cases are not diagnosed.

Prevalence Of Chronic Glaucoma In Southern Africa

For our planning purposes-

The prevalence of chronic glaucoma in the age group 40+ in Southern Africa is 4%.

The prevalence of chronic glaucoma in the total population in Southern Africa is 1%.
**Aetiology**

Risk Factors for the Glaucomas

<table>
<thead>
<tr>
<th>Primary Open Angle Glaucoma</th>
<th>Primary Closed Angle Glaucoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Increasing 4-5x from 40 to 70 yrs)</td>
<td>Age (Increasing with age)</td>
</tr>
<tr>
<td>Race (Africans 3-4 x more likely than Europeans)</td>
<td>Race (Inuit and Chinese 5x more likely than Europeans) (Africans rare)</td>
</tr>
<tr>
<td>Family History (Positive family history 5x more likely)</td>
<td>Gender (Females 3-4x more common than males)</td>
</tr>
<tr>
<td>Intraocular pressure (IOP over 20mms 5x more likely)</td>
<td>Hypermetropia (Increased risk)</td>
</tr>
<tr>
<td>Many others but less important</td>
<td>Shallow anterior chamber (&lt;2.5mm)</td>
</tr>
</tbody>
</table>
GLAUCOMA BLINDNESS
CASE DETECTION OF GLAUCOMA

Diagnosis Of Chronic Glaucoma

There are 3 classical features of chronic glaucoma –
1. Raised IOP (25% to 50% can have normal IOP.
2. Pathological cupping of the optic nerve head.
3. Typical visual field loss.

The later (more advanced) the disease, the easier the diagnosis.

The later (more advanced) the disease, the greater the visual loss.

No one test is sufficient in early cases to diagnose the disease.

Loss of vision is usually slowly progressive in both eyes, but usually one eye is more affected than the other.

Patients therefore present late. The time of presentation depends on the availability of eye care services.

Screening

There are 10 questions to be considered before starting a screening programme.
1. The condition should be an important public health problem.
2. There should be an accepted treatment.
3. Facilities for diagnosis and treatment should be available.
4. There should be a recognisable latent stage when early detection and treatment will provide an improved outcome.
5. There should be a suitable screening test in terms of validity (sensitivity and specificity).
6. The test should be acceptable to the population.
7. The natural history of the disease should be adequately understood.
8. There should be an agreed policy on whom to treat.
9. Screening and treatment should be cost effective.
10. Case finding should be an ongoing process.

Glaucoma does not meet the criteria for a screening programme.
Case Detection Of Glaucoma In A Community

Glaucoma does not meet the criteria for a community based screening programme.

Opportunistic case detection may be considered if it is prioritized for a Vision 2020 programme.

Testing the pinhole visual acuity and using a cut point of 6/18 in one or both eyes has a sensitivity >90% and a specificity >90% for detection of cataract and glaucoma. This test would be suitable for use by nurses working in a primary care clinic.

Examining the optic disc with a lens free direct ophthalmoscope and using a cut point of 0.7 vertical cup : disc ratio has a sensitivity >90% and a specificity >90% in those eyes in which the disc can be seen for detection of glaucoma. Combining this test with testing for an afferent pupil defect has a sensitivity >90% and a specificity >90% in all eyes, including those in which discoscopy is not possible. This combination of tests would be suitable for use by ophthalmic nurses working in secondary level eye clinics.
GLAUCOMA BLINDNESS
MANAGEMENT OF GLAUCOMA

Possible Strategies

1. Medical therapy
2. Laser trabeculoplasty
3. Filtration surgery

Each strategy has its advantages and disadvantages

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>‘Easy’ for doctor</td>
<td>Patient compliance often poor</td>
</tr>
<tr>
<td></td>
<td>‘Easy’ for patient</td>
<td>Cost high</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Efficacy uncertain</td>
</tr>
<tr>
<td>Laser</td>
<td>Satisfactory for doctor</td>
<td>Efficacy wears off</td>
</tr>
<tr>
<td></td>
<td>Satisfactory for patient</td>
<td>Laser is required</td>
</tr>
<tr>
<td>Surgery</td>
<td>One time treatment</td>
<td>‘Difficult’ for doctor</td>
</tr>
<tr>
<td></td>
<td>Best efficacy</td>
<td>“difficult” for patient</td>
</tr>
</tbody>
</table>

Surgical Versus Medical Treatment

A number of recent clinical trials have compared the efficacy of surgical and medical treatment.

The findings include:
1. There is lower IOP following surgery than with medical treatment.
2. There is less visual field loss following surgery than with medical treatment.
3. Primary surgery is more successful than surgery following a period of medical treatment.

Conclusion

Primary trabeculectomy should be the treatment of choice, with adjunct if there is a risk factor for failure of surgery. Medical treatment should be added if there is inadequate IOP control.
GLAUCOMA BLINDNESS
GLAUCOMA SURGERY RATE

For a population of 1 million people –

Population at risk (those aged over 40 years) = 25% = 250 000.

Prevalence rate in this group = 4% = 10 000 cases

Of the 10 000 cases –

<table>
<thead>
<tr>
<th>EARLY 4 000</th>
<th>INTERMEDIATE MODERATE DETECTABLE TREATABLE 5 000</th>
<th>LATE 1 000</th>
</tr>
</thead>
</table>

40% (4 000) have early glaucoma

10% (1 000) are already blind

50% (5 000) have moderate, detectable, treatable glaucoma

This is the priority target group for case detection and treatment.

Assuming a rate of progression of 10 years from onset of moderate disease to blindness, and an incidence of 500 new cases per year, the glaucoma surgery rate should be –

Trabeculectomies for 500 patients per million population per year.
GLAUCOMA BLINDNESS
RECOMMENDATIONS FOR GLAUCOMA
PROGRAMMES IN SOUTHERN AFRICA

1. All people aged 40 years and over seen in primary care clinics should have their visual acuity screened once every 2 years. All people aged 60 years and over seen at pension pay points should have their visual acuity screened once every year.

2. If the visual acuity is less than 6/18 in one or both eyes, they should be referred to the eye nurse.

3. The eye nurse should examine the cases referred, and use the optic cup : disc vertical ratio (≥ 0.7) and pupil response (afferent pupil defect) to categorise patients as – normal or suspicious.

4. Suspicious cases should be referred to the eye doctor, who should use visual field testing to confirm the diagnosis.

5. Trabeculectomy should be the first line of treatment. Beta plaque or cytotoxic adjunct should be used if there is a risk factor for failure (black race, age < 40, previous failed trabeculectomy).

6. Medical treatment should be added if there is inadequate iop control following trabeculectomy.

7. Follow up of cases should be done by the eye nurse. A register of diagnosed cases should be kept, so that persons who default on follow up can be traced.

8. Glaucoma surgery should be monitored -
   Quantitative - Numbers of trabeculectomies done per year
   population
   Qualitative - Trabeculectomy success / failure rate.
EXERCISE
PLANNING AND IMPLEMENTATION OF VISION 2020
PROGRAMMES
OTHER BLINDING EYE DISEASES
GLAUCOMA PROGRAMME

AS A VISION 2020 PROGRAMME MANAGER, YOU HAVE THE TASK OF PLANNING AND IMPLEMENTING A PROGRAMME TO DEAL WITH GLAUCOMA IN YOUR DISTRICT.

THIS INVOLVES –
1. CASE FINDING
2. TREATMENT
3. FOLLOW UP.

HOW DO YOU PLAN TO IMPLEMENT THIS PROGRAMME IN YOUR DISTRICT?
DIABETIC RETINOPATHY
## DIABETIC RETINOPATHY
### CLINICAL OVERVIEW

#### Classification

<table>
<thead>
<tr>
<th>Old Descriptive Term</th>
<th>New Term (ETDRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background</td>
<td>Mild Non Proliferative</td>
</tr>
<tr>
<td></td>
<td>Moderate Non Proliferative</td>
</tr>
<tr>
<td>Pre Proliferative</td>
<td>Severe Non Proliferative</td>
</tr>
<tr>
<td></td>
<td>Very Severe Non Proliferative</td>
</tr>
<tr>
<td>Proliferative</td>
<td>Proliferative</td>
</tr>
<tr>
<td>Maculopathy –</td>
<td>Maculopathy-</td>
</tr>
<tr>
<td>Focal exudative</td>
<td>Clinically insignificant</td>
</tr>
<tr>
<td>Diffuse exudative</td>
<td>Clinically significant</td>
</tr>
<tr>
<td>Ischaemic</td>
<td></td>
</tr>
</tbody>
</table>

#### Clinical Features, Natural History, And Management

<table>
<thead>
<tr>
<th>Level of Retinopathy</th>
<th>Clinical Features</th>
<th>Natural History (Rate of progression to PDR at 1 year)</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild non proliferative</td>
<td>Microaneurysms</td>
<td>5%</td>
<td>Review at 12 months</td>
</tr>
<tr>
<td>Moderate non proliferative</td>
<td>Microaneurysms</td>
<td>25%</td>
<td>Review at 6 months</td>
</tr>
<tr>
<td></td>
<td>Haemorrhages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe non proliferative</td>
<td>Microaneurysms</td>
<td>50%</td>
<td>Review at 3 months</td>
</tr>
<tr>
<td></td>
<td>Haemorrhages</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cotton wool spots</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IRMA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proliferative</td>
<td>Neovascularisation</td>
<td></td>
<td>Pan retinal photocoagulation</td>
</tr>
<tr>
<td>Clinically significant maculopathy</td>
<td>Macular oedema</td>
<td></td>
<td>Grid laser to macula</td>
</tr>
<tr>
<td></td>
<td>with visual acuity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>deterioration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Magnitude

1. GENERAL
   • There is an increase in diabetes mellitus throughout the world
   • Diabetic retinopathy is the fifth cause of global blindness (1.8 million people)
   • It accounts for 5-10% of all blindness in economically intermediate countries
   • It is the main cause of blindness in the economically active age group in developed countries
   • It is becoming increasingly important in developing countries.

2. PREVALENCE
   • Diabetic retinopathy is associated with increased mortality
   • 50% of diabetic retinopathy is undiagnosed
   • Prevalence of diabetes mellitus (types 1 and 2) = 3-5% (= 30 000 – 50 000 diabetics per million population)
   • Prevalence of any retinopathy in diabetics = 20% (=6 000 – 10 000 with diabetic retinopathy per million population)
   • Prevalence of blindness among these = 5% (= 300 – 500 blind per million population ie 5% of all blindness)

3. INCIDENCE
   • Of the total population of the USA, 0.03% are new cases of diabetic macular oedema per year
   • Of the total population of the USA, 0.02% are new cases of proliferative retinopathy per year
   • Therefore in the USA, 0.05% of the population develop sight threatening retinopathy per year (= 500 people per million population per year).

Aetiology

RISK FACTORS FOR DIABETES MELLITUS
   • Age
   • Gender (female > male)
   • Obesity
   • Family History

RISK FACTORS FOR DIABETIC RETINOPATHY
   • Age / duration of diabetes
   • Nepropathy
   • Hypertension
• Pregnancy
• Glycaemic control
• Ethnic / genetic determinants
• Smoking

RETINOPATHY BY DURATION OF DIABETES

Type 1 –
25% at 5 years
60% at 10 years
80% at 15 years

Type 2
Some have retinopathy at diagnosis
20% at 15 years.
**DIABETIC RETINOPATHY**

**CASE DETECTION AND MANAGEMENT**

**Screening For Diabetic Retinopathy**

*Who?* - Ophthalmologist / ophthalmic medical officer / optometrist / ophthalmic nurse / general doctor

*How?* - Fundoscopy and / or fundal photography, using ophthalmoscope and / or camera

*When?* - Type 1 – Yearly after puberty
   Type 2 – At diagnosis, then yearly.

**Treatment Of Diabetic Retinopathy**

<table>
<thead>
<tr>
<th>Type</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild + moderate non proliferative</td>
<td>Nil</td>
</tr>
<tr>
<td>Focal exudative maculopathy</td>
<td>Focal laser</td>
</tr>
<tr>
<td>Clinically significant diffuse exudative maculopathy</td>
<td>Grid laser</td>
</tr>
<tr>
<td>Ischaemic maculopathy</td>
<td>Nil</td>
</tr>
<tr>
<td>Proliferative retinopathy</td>
<td>Pan retinal photocoagulation</td>
</tr>
<tr>
<td>Vitreous haemorrhage</td>
<td>Vitrectomy</td>
</tr>
<tr>
<td>Tractional / rhegmatogenous retinal detachment</td>
<td>Vitrectomy / retinal detachment surgery</td>
</tr>
<tr>
<td>Non responsive proliferative retinopathy</td>
<td>Vitrectomy</td>
</tr>
</tbody>
</table>

- Treatment of proliferative retinopathy reduces severe visual loss by 65 – 75%
- Treatment of clinically significant macular oedema reduces visual loss by 50-75%.
DIABETIC RETINOPATHY
SUMMARY OF PROGRAMME FOR DIABETIC RETINOPATHY

• 1 000 000 population

• Prevalence of diabetes = 3% = 30 000

• Screening - Type 1 at puberty and then annually
  Type 2 at diagnosis and then annually

• Referral to ophthalmologist – if retinopathy is diagnosed

• Laser treatment - Focal for focal exudative maculopathy
  Grid for diffuse exudative maculopathy
  Panretinal for proliferative retinopathy

• 500 cases require laser per year (1 000 eyes)

• Vitrectomy – Vitreous haemorrhage or retinal detachment

• 50 cases require vitrectomy per year (100 eyes)

• Without treatment, 300-500 people become blind per year.
AS A VISION 2020 PROGRAMME MANAGER, YOU HAVE THE TASK OF ORGANISING A PROGRAMME TO DEAL WITH DIABETIC RETINOPATHY. THIS INVOLVES –
1. CASE FINDING
2. TREATMENT
3. FOLLOW-UP.

HOW DO YOU PLAN TO DO THIS?
HUMAN RESOURCES FOR VISION 2020
COLLABORATION WITH TRADITIONAL HEALERS

Traditional healers are the most commonly consulted primary health care providers in Southern Africa.

Active collaboration with them should be encouraged in our Vision 2020 programmes.

They are able to market cataract surgery and to case find and refer people needing cataract surgery.

They can be trained in the appropriate primary management of a number of eye conditions.

They can be trained to avoid harmful eye practices.

Their training should be a 1 day workshop, given by the ophthalmic nurses and ophthalmic medical officers.

TRAINING, SUPERVISION, AND SUPPORT OF COMMUNITY HEALTH WORKERS

Community health workers are an important link between the community and the primary care clinics.

They are able to market cataract surgery and to case find and refer people needing cataract surgery.

They can be trained in the appropriate primary management of a number of eye conditions.

Their training should be a 3 day workshop, given by the ophthalmic nurses and ophthalmic medical officers.

TRAINING, SUPERVISION, AND SUPPORT OF CLINIC NURSES

About 60% of eye problems can be dealt with at the primary level.

Clinic nurses should be trained in primary eye care.

Their training should be a 3 day workshop, given by the ophthalmic nurses and ophthalmic medical officers.

It is recommended that there should be 1 clinic nurse per 10 000 population or 1 clinic nurse per clinic trained in primary eye care.
TRAINING OF OPHTHALMIC NURSES AND OPHTHALMIC MEDICAL ASSISTANTS

The number recommended is 1 per 100 000 population.

At least 1 ophthalmic nurse or ophthalmic medical assistant should be trained for each sub-district.

The ophthalmic nurses and ophthalmic medical assistants should form the important central link in the chain of training, supervision, support, and referral, that extends from the primary to the tertiary level.

The training is a 1 year diploma course.

TRAINING OF REFRACTIONISTS AND OPTOMETRISTS

The number recommended is 1 per 250 000 population.

The training for a refractionist is a 1 year course.

The training for an optometrist is a 4 year university degree or technikon diploma.

TRAINING OF OPHTHALMIC MEDICAL OFFICER CATARACT SURGEONS AND OPHTHALMOLOGISTS

The number recommended is 1 per 500 000 population.

The training for an ophthalmic medical officer cataract surgeon is a 6-12 month post-graduate diploma.

The training for an ophthalmologist is a 4 year post-graduate training, leading to a specialist fellowship qualification in ophthalmology.

TRAINING OF ANCILLARY STAFF

There should be 1 programme manager, responsible for the management of the programme. The training recommended is a 1 year diploma.

There should be 1 instrument technician, available for the repair and maintenance of the instruments and equipment. The training recommended is a 4 week in-service training.
### SUMMARY OF RECOMMENDATIONS FOR HUMAN RESOURCE DEVELOPMENT FOR VISION 2020 PROGRAMMES

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>CADRE</th>
<th>NUMBER</th>
<th>TRAINING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>Traditional healer</td>
<td></td>
<td>1 day workshop</td>
</tr>
<tr>
<td></td>
<td>Community health worker</td>
<td></td>
<td>3 day workshop</td>
</tr>
<tr>
<td></td>
<td>Cataract case finder</td>
<td></td>
<td>5 day workshop</td>
</tr>
<tr>
<td>Primary</td>
<td>Clinic nurse</td>
<td>1 per 10 000 / 1 per primary</td>
<td>3 day workshop</td>
</tr>
<tr>
<td></td>
<td>health care clinic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>Ophthalmic nurse / ophthalmic</td>
<td>1 per 100 000</td>
<td>1 year diploma</td>
</tr>
<tr>
<td></td>
<td>medical assistant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refractionist / optometrist</td>
<td>1 per 250 000</td>
<td>1 year diploma / 4 year degree</td>
</tr>
<tr>
<td>Tertiary</td>
<td>Ophthalmic medical officer / ophthalmologist</td>
<td>1 per 500 000</td>
<td>6-12 month post graduate diploma / 4 year fellowship</td>
</tr>
<tr>
<td>Support/Ancillary</td>
<td>Programme manager</td>
<td>1 per programme</td>
<td>1 year diploma</td>
</tr>
<tr>
<td></td>
<td>Instrument technician</td>
<td>1 per programme (part time)</td>
<td>4 week certificate</td>
</tr>
</tbody>
</table>
INFRASTRUCTURE AND SUPPLIES FOR VISION 2020
BUILDINGS

The Eye Unit / Vision 2020 Surgical Centre may be free standing, or may be part of a district / regional / provincial hospital.

The core units required for service delivery are –
OPD
Ward
OR.

FURNISHINGS AND NON TECHNICAL EQUIPMENT

Provision must be made for the required furnishings and non technical equipment.

INSTRUMENTS AND TECHNICAL EQUIPMENT

See the IAPB standard lists of instruments and technical equipment recommended for district Vision 2020 programmes.

Primary level –
The instruments and equipment recommended for the clinic nurses for primary eye care are:
Snellen chart
Torch.

Secondary level –
The instruments and equipment recommended for the eye nurses and ophthalmic medical assistants for secondary eye care are:
Snellen chart, reading chart
Trial lens set, trial frame, cross cylinder, retinoscope
Direct ophthalmoscope
Schiotz tonometer.

Tertiary level –
The instruments and equipment recommended for the ophthalmic medical officers / ophthalmologists for tertiary eye care are:
a) OPD -
Snellen chart, reading card.
Trial lens set, trial frame, cross cylinder, retinoscope
Direct ophthalmoscope
Indirect ophthalmoscope, 20D lens
Slit lamp, applanation tonometer
Gonioscopy lens, fundoscopy lens
b) OR
Operating microscope
Microsurgical instruments x 2 sets
Hot air sterilizer.
DRUGS, GLASSES, AND CONSUMABLES

See the IAPB standard lists of drugs, glasses, and consumables recommended for district Vision 2020 programmes.

The drugs required at the clinics and at the surgical centre are according to the essential drug lists.
Provision needs to be made either for local production (LPED unit), local purchase, or external purchase.

The glasses required are a range of ready made +1 to +3 and −1 to −3 dioptre glasses.
Provision needs to be made either for local production (optical workshop), local purchase, or external purchase.

The surgical consumables required at the surgical centre for (extracapsular cataract) surgery are:
- Blades
- Cauteries
- Intraocular lenses
- Pads
- Shields
- Sponges
- Sutures 4-0 silk + 10-0 nylon.
Provision needs to be made either for local purchase or external purchase.

TRANSPORT

Transport is required for the eye nurses and ophthalmic medical assistants to get to their district clinics, and for the cataract case finder to transport patients to and from the surgical centre for their surgery.

Either private or public transport may be used.
If private transport is used, this could be anything from a bicycle to a 4 wheel drive patient transport vehicle.

MANAGEMENT

The district Vision 2020 programme should be managed by a Vision 2020 programme manager and committee.
PLANNING A VISION 2020 PROGRAMME
### PLANNING A VISION 2020 PROGRAMME

**THE CONCEPT**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Deciding where you are</td>
<td>Situational analysis of need and resources</td>
</tr>
<tr>
<td>2. Deciding where you want to be</td>
<td>Aim and objectives</td>
</tr>
<tr>
<td>3. Deciding how to get there</td>
<td>Activities plan, timetable, budget</td>
</tr>
<tr>
<td>4. Getting there</td>
<td>Management of resources</td>
</tr>
<tr>
<td></td>
<td>Monitoring of progress</td>
</tr>
</tbody>
</table>
ASSESS NEED

TARGET THE POPULATION

The population to be served should be defined as the indigent population of the district.

MAP

The distribution of the population and the characteristics of the district should be known.

PREVALENCE AND CAUSES OF EYE DISEASE AND BLINDNESS

Estimate the prevalence, incidence, and major causes of eye disease and blindness in the district from survey data.

ASSESS RESOURCES AND CURRENT EYE CARE ACTIVITIES

MANPOWER
Community level
Primary level (district clinics)
Secondary level (district hospitals)
Tertiary level (regional hospital)
Support services

MATERIALS
Hard (instruments and equipment) (eye OPD, eye OR)
Soft (drugs, glasses, and surgery consumables)

MOBILITY
Transport available for outreach

MANAGEMENT
Vision 2020 district manager
Vision 2020 committee

MONEY
Budget available for Vision 2020

MOVEMENT
Current eye care and blindness prevention activities.
DEFINE AIM

The elimination of avoidable blindness in the district.

SPECIFY OBJECTIVES

These are the stepping stones to reach the aim.
They should be measurable and time limited.
They may include items under each of the following headings:

1. Human resource development
2. Infrastructure development
3. Disease control.

DECIDE ACTIVITIES + TIMETABLE

The activities to achieve the objectives should be listed according to the attached template / matrix.
The person(s) responsible should be specified.
The time frames should be specified.

The activities should be listed under the following headings:

HUMAN RESOURCE DEVELOPMENT

Community level
Primary level
Secondary level
Tertiary level
Support services

INFRASTRUCTURE DEVELOPMENT

Buildings (OPD, ward, OR, other)
Furnishings and non technical equipment
Instruments and technical equipment
Drugs, glasses, and consumables
Transport
Management

DISEASE CONTROL - CATARACT

Case finding
Surgery – quantity
Surgery – quality
Surgery – cost
DISEASE CONTROL – REFRACTIVE ERROR

School screening
Refractions – quantity
Refractions – quality
Provision of glasses

DISEASE CONTROL – TRACHOMA

Rapid assessment
Trichiasis surgery
Antibiotic treatment
Face washing
Environmental hygiene

DISEASE CONTROL – GLAUCOMA

Case detection
Surgery – quantity
Surgery – quality
Follow up

DISEASE CONTROL – DIABETIC RETINOPATHY

Screening
Laser treatment
Vitreo-retinal surgery

DISEASE CONTROL – CHILDHOOD BLINDNESS

Corneal scar
Cataract
Glaucoma
ROP
Low vision.

PREPARE BUDGET

The budget required for the running of the programme and for each of the programme activities should be prepared according to the attached template / matrix. The source of the funding should be specified. The budget items should be listed under the following headings:

RUNNING COSTS

Personnel (salaries)
Administration (taxes, rents, utilities, insurances, office expenses)
Transport (vehicle operation, vehicle maintenance, vehicle insurance, public transport, other travel expenses)
Subsidies (poor patients).

CAPITAL COSTS

Personnel (training)
Physical facilities (construction, renovation, extension, furnishings, non technical equipment, machinery)
Instruments and technical equipment (outpatient department, operating room, local production of eye drops unit, optical workshop, audiovisual)
Drugs, glasses, and consumables (drugs, materials for local production of eye drops, glasses, optical consumables, surgery consumables, other hospital consumables)
Transport (motor vehicles).

Management

Appoint a district Vision 2020 manager.
Form a Visio 2020 committee.

Monitor resource utilisation to improve efficiency.

MANPOWER
- job descriptions
- education and training
- motivation

MATERIALS
- consumables (soft) + capital (hard)
- stock keeping, ordering
- utilization

MONEY
- budget
- accounting
- cost containment

MOBILITY
- community eye care
- outreach / mobile services

MOTIVATION
- meetings
- workshops
- incentives
Monitoring

Keep and analyse specific statistics to monitor progress of the programme over time.

Options include:
Number of outpatients seen
Number of glasses dispensed
Number of cataract operations done
Number of glaucoma operations done
Number of other operations done
Quality of cataract surgery – visual outcome
Quality of refractions – visual outcome
Quality of glaucoma surgery – iop control
Costs of cataract surgery
Number of children referred for surgery.

Assessing the needs and resources will enable you to decide your aim, objectives, activities plan, and budget. This is necessary for **effectiveness**, i.e. doing the right thing.

Managing the resources (time, people, money) and monitoring the progress is necessary for **efficiency** i.e. doing things in the right way.

A good Vision 2020 programme is both **effective** and **efficient**.