Chapter 2

Blindness and Visual impairment in the Republic of Suriname

Janna Minderhoud
Jerrel C. Pawiroredjo
Herman C.I. Themen
Anne-Marie T. Bueno de Mesquita-Voigt
Michael R. Siban
Cindy M. Forster-Pawiroredjo
Hans Limburg
Ruth M.A. van Nispen
Dennis R.A. Mans
Annette C. Moll.

This chapter was published as a short report:

Abstract

**Objective:** To assess the prevalence and causes of blindness and visual impairment (VI) in older adults in Suriname.

**Design:** Population-based cross-sectional survey.

**Participants:** A total of 2,998 non-institutional residents aged ≥50 years.

**Methods:** Fifty clusters of 60 people were randomly selected with a probability proportional to the size of the population unit. Eligible persons were randomly selected through compact segment sampling and examined in their own house using the standard Rapid Assessment of Avoidable Blindness (RAAB) protocol. Presenting distance visual acuity (PVA) was tested and the primary cause of blindness and VI was assessed by an ophthalmologist in people with a visual acuity (VA) <20/60 in either eye.

**Main Outcome Measures:** Prevalence and causes of blindness (PVA <3/60), severe VI (SVI; PVA <6/60 – 3/60), and moderate VI (MVI; PVA <6/18 – 6/60) were assessed. Cataract surgical coverage (CSC), main barriers to the uptake of cataract surgery, and outcomes after cataract surgery were evaluated.

**Results:** A total of 2,806 individuals were examined (response 93.6%). The standardized prevalence of blindness was 1.9% (95% CI: 1.0-2.8). Prevalence’s of SVI and MVI were 1.1% (95% CI: 0.6-1.6) and 5.6% (95% CI: 4.1-7.0), respectively. Untreated cataract was the most common cause of bilateral blindness (54.0%), followed by glaucoma (23.8%). Cataract also accounted for most cases of bilateral SVI (57.9%). The main causes of MVI were uncorrected refractive errors (48.6%) and untreated cataract (33.7%). The CSC for VA <3/60 was 88.1% when calculated by eye and 94.3% by individual. ‘Cannot access treatment’ was the most common barrier (28.9%) for cataract surgery. Of the eyes that received surgery, 80.5% had a good outcome (PVA >6/18) and 9.8% had a poor outcome (< 6/60).

**Conclusions:** The prevalence of blindness in Suriname is comparable to other South American and Caribbean countries. Of all bilaterally blind cases, 87.3% is considered avoidable. Although the CSC is already high for all VA levels, the main intervention strategies to reduce avoidable blindness are cataract surgery, followed by the development of optical and special glaucoma services, as these are the most cost-effective interventions.

Introduction

Prevention of blindness and visual impairment (VI) receives a high priority in health programmes of many countries throughout the world. In the year 2010, the global number of visually impaired individuals was estimated at 285 million, 39 million of whom were blind. [1] The most recent global estimates suggest numbers of 3.2 million blind and 26.6 million visually impaired people in the Americas.[1] In order to achieve the goals of VISION 2020 (initiated by the World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB)), national assessments of the magnitude and causes of VI are essential.[1] Regular population-based surveys are crucial to provide an updated characterization of the visual problems, establish local eye care programmes, and initiate future eye care planning.[1]

The Rapid Assessment of Avoidable Blindness (RAAB) survey is a rapid, simple, and inexpensive standardized methodology to assess the prevalence and causes of blindness in people aged 50 years and older in a specific geographic area.[2] RAAB focuses primarily on the prevalence of avoidable causes of blindness such as cataract, refractive errors, and corneal scarring.[2] So far, RAAB has been successfully undertaken in more than 60 countries worldwide.[3] Due to its standardized methodology, results between countries can reliably be compared. Furthermore, the findings from a specific country can be used to prioritize the specific needs for ophthalmic care of the communities in that country. Importantly, after the intervention programs, RAAB can be used to assess achievements over time and make adjustments where necessary.[2] The majority of RAAB surveys have shown that cataract was the most important cause of blindness. [3] This indicates that improvements in the in-
The infrastructure of cataract surgery are important interventions for reducing avoidable blindness. Indeed, cataract surgical coverage (CSC) can serve as a reliable parameter of cataract status and the impact of cataract intervention programmes in a specific area.[4]

The Republic of Suriname, an independent state situated on the north-east coast of South America, is an example of a developing country where avoidable and treatable blindness remains an important public health problem. [5] The population size of Suriname for 2014 is estimated at 573,311.[6] Around 90% of the population lives in the capital city Paramaribo and in other cities located in the narrow coastal zone in the northern part of the country.[7] The remaining 10% inhabits the interior, which comprises more than three-quarters of Suriname's land surface and consists largely of tropical rain forest.[7] Suriname has a gross national income per capita of US$ 9,370 and is an upper middle-income country according to World Bank criteria.[8] The country belongs to the Caribbean, is part of the WHO Americas-B (AMR-B) sub-region and is a member of the South American and Pan American Health Organization (PAHO) that represents the WHO in the region.[9] Specialized ophthalmic care in Suriname is mainly provided by the Suriname Eye Centre (SEC) at the Academic Hospital Paramaribo (AZP). Eye care in the interior and in the rural districts is provided by regular visits (Eye Bus) and cataract surgical missions by ophthalmologists from the SEC.[5,10] Nevertheless, every day new patients from the city as well as the surrounding districts arrive at the SEC with severe, sometimes end-stage eye disease. Obviously, treatment possibilities for such patients are limited despite the high-quality eye care offered by the local ophthalmologists. Particularly older individuals from rural parts of Suriname are not always able to reach the SEC. As a result, a high burden of avoidable blindness can be expected in these populations.[5]

Between 1980 and 2012, only six nationally representative studies on the prevalence of blindness and VI were available for Latin America and the Caribbean and so far, no nationally representative data have been reported for Suriname.[11] This makes it difficult to estimate the extent of preventive or therapeutic eye care needed, or how it should be designed and conducted within the SEC or throughout the country. For this reason, we decided to investigate the prevalence and causes of blindness and VI in Suriname by using the RAAB methodology, and to assess CSC, cataract surgical outcomes, and the barriers to undergo cataract surgery.

Patients and methods

The RAAB was conducted by a collaborative partnership between the SEC in Paramaribo, Suriname, and the VU University Medical Centre in Amsterdam, the Netherlands. Ethical approval for the study was obtained from the Ministry of Health of Suriname. The survey was carried out between August 2013 and November 2014 in accordance with the codes of conduct of the Declaration of Helsinki. All subjects were examined and diagnosed during door-to-door visits, and all were asked for written informed or thumb-printed consent. Individuals who required further ophthalmic examination, medical attention, or treatment were referred accordingly to the SEC. People were assured that not participating in the study would have no consequences for current or future treatment.

Sampling

The RAAB only includes individuals aged 50 years and older as that age group has the highest prevalence of blindness.[2] The expected prevalence of blindness in Suriname was estimated on the basis of survey findings in neighbouring countries with a similar population composition, socio-economic situation, and health care facilities, and was estimated at 2.3%.[3] Based on data from the most recent national census (2011), the population size of Suriname during the period of the study could be approximated at 540,000 [7], with 18.7% aged 50 years and older [6], giving a target population of 101,000. For Suriname, a sample size of 3,000 would provide sufficient power to assess an expected blindness prevalence
of 2.3% among people aged ≥50 years, with a precision of 32.5%, at 95% confidence, a design effect of 1.6 and 7% non-response. In total, 50 clusters of 60 residents aged 50 years and older were included in the study.

Population and census data from the latest national census (2011) [7] were obtained from the local policy station Bureau of Statistics. Using the RAAB software, 50 clusters were selected within census enumeration areas (EA) from a sampling frame consisting of the complete list of EAs and their inhabitants with a probability proportional to the size of the population.[2] Within each selected EA, eligible persons were selected through compact segment sampling to minimize selection bias. [2] The selected EA and its boundaries could easily be located with the special EA maps provided by the General Bureau of Statistics in Paramaribo. The survey team conducted door-to-door visits to all households in each EA until 60 subjects were identified. Residents who were not available for examination at the time of visit were examined on another day. If fewer than 60 subjects were present in a specific population unit, the ‘next nearest EA’ was selected to complete the cluster.

Ophthalmic examination
Systemic ophthalmic examination was performed using the Standard Rapid Assessment of Avoidable Blindness Protocol.[2] Training and inter-observer agreement tests were performed before the start of the survey at the SEC and were coordinated by a certified RAAB trainer. Sixty new patients of the SEC were recruited for free screening. Five different survey teams examined all these patients and findings were compared and discussed with the most experienced examiner.

Each survey team included an ophthalmologist, paramedical staff (one per team), and a survey coordinator or local guide. All eligible individuals were interviewed and examined in their own house where the assessment form was completed. In the most isolated areas, the communities were informed in advance about the date, time, and purpose of the survey.

The presenting distance visual acuity (VA) was evaluated using a Snellen tumbling E chart in full daylight. Reflection of blinding sunlight was avoided. Each eye was separately tested with available correction. In case of a VA of less than 20/60, a pinhole VA test was performed. Blindness was defined following WHO criteria as presenting visual acuity (PVA) <3/60 in the better eye with available correction, severe visual impairment (SVI) as PVA <6/60 to ≥3/60, moderate visual impairment (MVI) as PVA<6/18 to ≥6/60, and normal vision as VA≥6/18.[12] The lens was examined by an ophthalmologist using a handheld slit lamp in a shaded area. In subjects with a PVA <6/18, including those who had undergone cataract surgery, the primary cause of VI was assessed with an indirect ophthalmoscope after dilation of the pupil with 2% homatropine and 10% phenylephrine eye drops unless there was a very shallow anterior chamber. If there was significant corneal opacity, obvious severe cataract, or pupillary occlusion, dilation was not necessary for diagnosis. When there were two or more concurrent causes for the visual impairment and it was unclear which of these was the primary cause, the WHO/PBL eye examination record recommends the major cause as the disorder most amenable to treatment or prevention.[13] Participants with VI due to cataract in one or both eyes were asked why cataract surgery had not yet been performed. Cataract-operated individuals were asked about details of their former surgical procedure.

Data processing and statistical analysis
Two trained computer operators independently entered the data from the RAAB survey forms into the RAAB software after completion of the clusters. Consistency checks in the software highlighted any inconsistencies or possible errors, and the ophthalmologist immediately corrected these when possible. Automated analyses included in the RAAB software package were used to analyse the sample and age- and sex-standardized prevalence of blindness, SVI, and MVI (95% confidence
intervals CI). The cluster sampling design was taken into account when CIs were calculated. P values <0.05 were considered statistically significant. In addition, the principal causes of VI were analysed. The reasons for non-response (absence at the time of the survey, refusal to participate, or inability to respond adequately to the examination) were also calculated.

Cataract surgical coverage was calculated for all VA levels and was defined as the proportion of individuals or eyes that had undergone cataract surgery. Descriptive statistics regarding barriers to cataract surgery and outcomes of cataract surgery were reported. Because there was no information about VA before surgery, these calculations were done assuming that only patients with VA levels worse than 6/18 had undergone cataract surgery. Causes of avoidable blindness were classified as treatable (cataract, aphakia and uncorrected refractive errors (URE)), preventable by primary eye care services (corneal opacity, phthisis and pterygium) or preventable by specialized ophthalmic care (such as cataract surgical complications, glaucoma, and diabetic retinopathy (DR)).

Results
A total of 2,998 subjects aged ≥50 years were approached for the survey. Two thousand eight hundred and six (93.6%) of these were actually examined, 134 persons (4.5%) were not available, 30 (1.0%) declined and 28 (0.9%) could not be examined. Two isolated clusters in the interior could not be reached and were replaced by the next nearest EAs. Compared with census data, both for males and females, the older age groups were slightly over-represented (Table 1).

Blindness and visual impairment
The sample prevalence of bilateral blindness was 2.3% (95% CI: 1.4-3.2; Table 2). The sample prevalence of bilateral SVI and MVI in the examined population was 1.4% (0.8-1.9) and 6.5% (5.0-7.9), respectively (Table 3). Age- and sex-standardized prevalence of blindness, SVI, and MVI were 1.9% (1.0-2.8), 1.1% (0.6-1.6), and 5.6% (4.1-7.0), respectively (Table 3). Differences between males and females were statistically not significant. The prevalence of VI and blindness increased rapidly with older age (e.g., bilateral blindness, 0.5% in people aged between 50 and 59 years to 10.2% in 80 years and older; Fig. 1).

Table 1. Age and gender composition of Suriname and sample population

<table>
<thead>
<tr>
<th>Age groups years</th>
<th>Suriname N (% total 50+)</th>
<th>Sample n (% total 50+)</th>
<th>Suriname N (% total 50+)</th>
<th>Sample n (% total 50+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 59</td>
<td>26,335 (54.8%)</td>
<td>532 (42.5%)</td>
<td>26,489 (49.7%)</td>
<td>661 (42.6%)</td>
</tr>
<tr>
<td>60 - 69</td>
<td>12,535 (26.1%)</td>
<td>389 (31.0%)</td>
<td>14,298 (26.8%)</td>
<td>449 (28.9%)</td>
</tr>
<tr>
<td>70 - 79</td>
<td>6,678 (13.9%)</td>
<td>241 (19.2%)</td>
<td>8,756 (16.4%)</td>
<td>307 (19.8%)</td>
</tr>
<tr>
<td>80+</td>
<td>2,470 (5.1%)</td>
<td>91 (7.3%)</td>
<td>3,760 (7.1%)</td>
<td>134 (8.9%)</td>
</tr>
</tbody>
</table>

Table 2. Sample prevalence of blindness, SVI and MVI in adults of 50 years and older

<table>
<thead>
<tr>
<th>Bilateral VA</th>
<th>Males n</th>
<th>% (95%CI)</th>
<th>Females n</th>
<th>% (95%CI)</th>
<th>Total n</th>
<th>% (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blindness (PVA &lt; 3/60)</td>
<td>29</td>
<td>2.3 (1.3-3.3)</td>
<td>35</td>
<td>2.3 (1.1-3.5)</td>
<td>64</td>
<td>2.3 (1.4-3.2)</td>
</tr>
<tr>
<td>SVI (PVA &lt; 6/60 – 3/60)</td>
<td>15</td>
<td>1.2 (0.6-1.8)</td>
<td>23</td>
<td>1.5 (0.8 - 2.2)</td>
<td>38</td>
<td>1.4 (0.8 - 1.9)</td>
</tr>
<tr>
<td>MVI (PVA &lt; 6/18 – 6/60)</td>
<td>84</td>
<td>6.7 (5.0-8.4)</td>
<td>97</td>
<td>6.3 (4.3 - 8.2)</td>
<td>181</td>
<td>6.5 (5.0 - 7.9)</td>
</tr>
</tbody>
</table>

PVA: presenting visual acuity; SVI: severe visual impairment; MVI: moderate visual impairment
Table 4 shows the causes of visual impairment in people aged 50 years and older with bilateral blindness, SVI, and MVI. Untreated cataract was the most common cause of bilateral blindness, occurring in 54.0% of participants, followed by glaucoma (23.8%), other posterior segment disease (7.9%), diabetic retinopathy (3.2%), age-related macular degeneration (ARMD; 3.2%), and surgical complications (3.2%) including posterior capsule opacification (PCO). Overall, posterior segment disease was the cause in 38.1% of cases of blindness, i.e., 55.2% in males and 23.5% in females (p = 0.0486). Blindness due to bilateral cataract seemed to occur more often in females (70.6%) than in males (34.5%; p=0.052), while blindness resulting from glaucoma seemed less common in females (8.8%) when compared to males (41.4%; p=0.0124). Cataract was also the main cause of SVI (57.9% of cases), followed by URE (10.5%), glaucoma and other posterior segment disease (both 7.9%), cataract surgical complications, and ARMD. The main causes of MVI were URE (48.6%) and untreated cataract (33.7%).

Cataract

The age- and sex-standardized prevalence of bilateral blindness due to cataract was 0.8% (0.2-1.3%) in the total population; 0.6% (0.0-1.2) in males and 0.9% (0.1-1.8) in females. The CSC was 88.1% for eyes with VA <3/60 (94.3% by individual), 84.2% for VA <6/60 (91.1% by individual), and 74.9% for VA <6/18 (81.2% by individual). Of the 1,003 eyes that had undergone cataract surgery, 97.2% were pseudophakic, and 2.8% were aphakic. Approximately 98 eyes (9.8%) had a poor outcome (VA <6/60), another 98 eyes had a borderline outcome (VA ≥6/60 and <6/18), and 807 eyes (80.5%) had a good outcome with available correction. Selection (comorbidity) was the main cause of poor outcome (52%), followed by inadequate optical correction (30%) and surgical complications such as PCO (11%). Eighty-seven percent of all cataract surgeries were conducted in a government hospital, 5.8% in a private hospital, 4.8% by other ophthalmic teams, and 2.4% in eye camps. There were no statistically significant differences between males and females in the use of these facilities. The proportion of eyes with a post-operative VA <6/60 (poor outcome) with available correction was lowest in eyes operated in government hospitals (8.5%) and private hospitals (12.1%) when compared to other ophthalmic teams (18.8%) and eye camps (33.3%). The reasons that study participants with VA worse than 6/18 resulting from cataract did not attend surgery were...
‘cannot access treatment’ (28.9%), ‘unawareness that treatment is possible’ (23.7%), ‘need not felt’ (21.1%), ‘fear’ (13.2%), and ‘treatment denied by provider’ (13.2%).

Discussion
This is the first population-based survey on blindness and VI in Suriname. The response rate was high (93.6%) and comparable to that in other recent RAAB surveys in South America.[14–17] The sample prevalence of blindness in adults aged 50 years and older was 2.3% (1.4-3.2) with an age- and sex-standardized prevalence of 1.9% (1.0-2.8). The findings of this survey provide an update on the status of eye care in Suriname, and provide baseline data for the development of a VISION 2020 action plan to improve eye care services and reduce the burden of blindness in the country.

The standardized prevalence of blindness in Suriname in the current study was comparable to estimates for nearby countries in the region with a similar health care infrastructure and socio-economic conditions.[11,14–17] The sample prevalence of blindness in adults aged 50 years and older was 2.3% (1.4-3.2) with an age- and sex-standardized prevalence of 1.9% (1.0-2.8). The findings of this survey provide an update on the status of eye care in Suriname, and provide baseline data for the development of a VISION 2020 action plan to improve eye care services and reduce the burden of blindness in the country.

The standardized prevalence of blindness in Suriname in the current study was comparable to estimates for nearby countries in the region with a similar health care infrastructure and socio-economic conditions.[17,18] In the Caribbean, the age-standardized prevalence of blindness in people aged 50+ years was 1.9% (1.4-2.4)[11], with the highest value in Haiti (4.8%; 2.6-7.7) and the lowest in Puerto Rico (1.1%; 95% CI not reported).[11] In South America, the prevalence of blindness was 3.0% in Panama (2.3-3.6%)[16], 2.0% (1.5-2.5%) in Peru[17], 1.1% (0.6-1.6) in Paraguay[15], and 0.9% (0.5-1.3) in Uruguay.[14] Results of the most recent RAAB survey in Argentina are not yet available. Overall, Suriname seemed to differ only marginally from other Caribbean and South American countries with respect to the prevalence of blindness.

The standardized prevalence of SMVI (severe/moderate visual impairment) in people of 50 years and older in Suriname was quite low (6.7%; 5.8-7.6) comparable to that estimated for other Caribbean or South American countries.[11,14–17] In the Caribbean, the aged-standardized prevalence for those aged 50 years and older was estimated at 11.0% (7.1-13.9).[11] Again, the highest estimate of SMVI in both genders was found in Haiti (21.9%; 8.9-33.9), while the country with the lowest age-standardized modelled prevalence of SMVI was Barbados (7.4%; 3.2-15.0).[11] In the most recent RAAB surveys in South America, the prevalence of SMVI ranged from 8.8% (7.9-9.7) in Uruguay to 11.5% (10.6-12.4) in Peru, 11.9% (10.7-13.1) in Paraguay and 13.1% (12.1-14.1) in Panama.[14–17] The

Table 4. Main causes of blindness, SVI, and MVI in Surinamese individuals aged 50 years and older

<table>
<thead>
<tr>
<th>Condition</th>
<th>Blindness</th>
<th>SVI</th>
<th>MVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Refractive error</td>
<td>1</td>
<td>4</td>
<td>88</td>
</tr>
<tr>
<td>2. Aphakia uncorrected</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3. Cataract untreated</td>
<td>34</td>
<td>22</td>
<td>61</td>
</tr>
<tr>
<td>4. Cataract surgical complications</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Trachomatous corneal opacity</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6. Non Trachomatous corneal opacity</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7. Phthisis</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8. Pterygium</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>9. Glaucoma</td>
<td>15</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>10. Diabetic retinopathy</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>11. ARMD</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>12. Other posterior segment disease</td>
<td>5</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>13. All other globe/CNS abnormalities</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>38</td>
<td>181</td>
</tr>
</tbody>
</table>

CNS: Central Nervous System
low prevalence of SMVI in the current survey could be due to the lower prevalence of URE causing SMVI compared to other surveys. [14–17] This could be a result of the relatively good primary eye care service infrastructure in Suriname (expert opinion JP, AB, HT, MS). Still, URE remained an important cause of SMVI in Suriname and optical services should be improved to overcome this problem.

Although cataract was the most common cause of blindness and SVI in the entire study population, glaucoma was a major problem (23.8%) and was even the main cause of bilateral blindness in men. This propensity could be due to the high proportion of the Surinamese population being of African descent (37.4% Maroon and Creole, 12.5% mixed)[7] and has been reported before for several other Caribbean and South American countries including Cuba, where the proportion of blindness due to glaucoma even amounts to 26.2%. [9] We should take into consideration that central vision often remains intact in patients with glaucoma, even in advanced stages of the disease. This may imply that with so many patients who became blind from glaucoma, the number of patients in Suriname suffering from glaucoma may be even much higher. Unfortunately, these patients may have been overlooked in the current study, as the standard RAAB examination does not include an advanced screening method - such as visual field testing - for glaucoma. The higher prevalence of glaucoma among men was also reported in the Barbados Eye Study[19] and the Rotterdam Study[20] but multiple, large epidemiologic and population-based studies have been conducted around the world with conflicting results regarding the risk for glaucoma development between the genders.[21]

Of all cases of bilateral blindness in Suriname, 87.3% can be considered avoidable: 55.6% is treatable, 1.6% is manageable by primary eye care, and 30.2% is preventable by specialized ophthalmic care. These proportions are comparable to those from recent RAAB surveys in other parts of South America.[14–17] As in the current survey, cataract and glaucoma were the most common causes. [14–17] Barriers to seek treatment for cataract in Suriname were fairly similar for males and females, except for ‘need not felt’, which was more common in females. ‘Cannot access treatment’, the most common barrier, is a major and well-known problem because of difficulties to access the centralized centres for ophthalmic care. The population of the interior in particular is dependent on outreach projects where cataract surgical care is provided. This study shows that, in Suriname blindness was most prevalent in the (interior) Maroon population (6.3%) and more than 60% of blindness due to cataract occurred in this relatively isolated population. This suggests that cataract surgical services in the interior of Suriname have to be expanded. In other RAAB surveys cataract was also more common in relatively poor rural individuals whose access to eye care services was limited.[18] Fortunately, treatment costs did not represent a barrier for cataract surgery in Suriname, as most people of 60 years and older have health care insurance provided by the government.

Overall, compared to other countries, the cataract situation in Suriname is fairly well under control, although more women are blind or visually impaired due to this condition when compared to men. This gender inequity has been reported before for several other countries[22–24] and can probably be explained by the higher life expectancy of women when compared to men.[6] Also, many patients with SMVI due to cataract have undergone surgery. In fact, a CSC of 94.3% for people with VA <3/60 in Suriname is relatively high when compared to other South American and developing countries[25,26], and is even the highest in the region when calculated by individual for VA level <3/60 (ranging from 24% to 91% in Latin America).[25] This holds true for all VA levels and is equal for males and females. However, the proportion of the Surinamese population of 50 years and older is anticipated to grow from 13.2% in 2000 to 26.8% in 2030[6] while the prevalence of cataract in that age group is expected to rise exponentially, increasing the demand for cataract surgery. The current RAAB has assessed the situation approximately halfway through this
period and has provided insight in the ways the eye care services in Suriname are dealing with the increased demand. For instance, in the last eight years, the SEC has significantly invested in further training of manpower and has purchased sophisticated and state-of-the-art equipment. Still, detailed evaluation of the current cataract surgical services is necessary to identify possibilities to increase the cataract surgical rate by at least 10% and to compensate for the above-mentioned demographic trends.

Outcome of cataract surgery differed between different locations and offers room for improvement. On the positive side, visual outcome in the government and private hospitals, where most surgeries were performed (92.8%), usually met the standards from the WHO.[27] However, surgeries done by foreign ophthalmic teams had a poorer outcome in general. Accordingly, although 97.2% of patients who had undergone surgery received an intraocular lens - which is relatively high when compared to other countries[18] - optimization of pre-operative selection procedures, refraction services, and surgical procedures are likely to considerably improve visual outcome.

This study had some limitations related to the selection of the sample. Although selection bias was minimized by compact segment sampling and revisiting people who were absent at the first visit, the older age groups were over-represented in our sample when compared with the most recent census data. This means that the sample prevalence for blindness is likely to be higher than the age- and sex-standardized prevalence, and that the standardized prevalence will be closest to the actual prevalence in the area under investigation. In addition to this, because of the 'no survey without service' statement and the selection of two unreachable clusters by the RAAB software (because of dangerous rapids in the river at the time of the survey and lack of housing for the medical teams) the most isolated areas in the interior of Suriname were not included in the study. These were replaced by the next nearest AEs, which were suitable to examine the participants and to perform cataract surgery in an eye camp setting if necessary.[10] It is possible that cataract prevalence had been underestimated by eliminating the most isolated rural areas where cataract surgical care has not yet been provided.

In summary, the percentage of avoidable blindness in Suriname among people aged 50 years and older was relatively high with cataract being the major cause. Based on the high prevalence of glaucoma in Suriname, care should be taken to develop and expand the uptake of special services for glaucoma by active screening of family members and the expansion of health information on glaucoma and regular check-ups. Still, priority should be given to cataract surgery, followed by the development of optical services and Primary Health Care and Primary Eye Care services, as these are the most cost-effective interventions.
References


