

# Estimating the number of cataract surgeries needed in the Chaco province of Argentina using various visual acuity (VA) thresholds and CSC

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## Abstract

**Purpose:** To estimate the number of surgeries needed in the Chaco province of Argentina using various visual acuity (VA) thresholds and CSC (Cataract Surgical Coverage) data based on the recent rapid assessment of cataract surgical services (RACSS) study conducted in the locality of Juan José Castelli.

**Methods:** Population data were obtained from the National Census data from the Institute of Statistics and Census in Argentina. Based on the prevalence of blindness/visual impairment for different VA surgical thresholds in J. J. Castelli, the number of surgeries needed in the province to eliminate the backlog of surgical cases was calculated. A power curve was fitted to literature data so that the cataract surgical rate (CSR) could be predicted for a given visual acuity.

**Results:** At visual acuities of < 6/60 and < 6/18, the CSC was 35.3% and 25.6%, respectively on an eye basis. The prevalence of blindness/visual impairment at these visual acuities was 3.95% and 6.26%, respectively, and the total number eyes needing surgery (representing the current backlog) was calculated at 7,241 and 11,476. For visual acuities of 3/60 and 6/18, the calculated CSRs were 1,331 and 3,810, respectively, translating to 1,384 and 3,973 eyes needing cataract surgery (the annual incidence of new cases).

**Conclusions:** Presently, the focus of surgeries is not on the blind. Furthermore the current number of surgeries conducted annually is not sufficient to clear the backlog of cases and meet the demand for new cases each year, particularly if all blind eyes are not treated first as a priority.

**Key words:** cataract, surgery, cataract surgical coverage, Chaco, Argentina.

## Estimación del número de cirugías de catarata necesarias en la provincia del Chaco, Argentina, usando varios umbrales de agudeza visual y estimando el "Cataract Surgical Coverage"

### Resumen

**Propósito:** Estimar el número de intervenciones quirúrgicas necesarias en la provincia del Chaco de Argentina usando varios umbrales de la agudeza visual (AV) y datos del CDC basados en el estudio RACSS (evaluación rápida de servicios quirúrgicos de catarata) recientemente efectuado en la localidad de Juan José Castelli.

**Métodos:** Los datos de la población fueron obtenidos del Instituto Nacional de Estadística y Censos de la Argentina. Se calculó el número de cirugías necesarias en la provincia para acabar con la lista de espera basado en la prevalencia de ceguera/discapacidad visual para varios umbrales quirúrgicos de AV en J. J. Castelli. Se adaptó una curva de potencia a los datos comunicados en la literatura para pronosticar la tasa de cirugía de catarata (TCC) para cada agudeza visual.

**Resultados:** Tomado ojo por ojo, la TCC fue 35,3% para la agudeza visual de <6/60 y 25,6% para la AV <6/18. La prevalencia de ceguera/discapacidad visual por las AV nombradas fueron 3,95% y 6,26%, respectivamente, mientras que el número de ojos requiriendo cirugía (el rezago real) se calculó en 7.241 y 11.476. Para las agudezas visuales de 3/60 y 6/18, las TCC calculadas eran 1.331 y 3.810, respectivamente, equivalentes a 1.384 y 3.973 ojos requiriendo cirugía de catarata (la incidencia anual de nuevos casos).

**Conclusiones:** Por el momento, las cirugías que se realizan no están necesariamente alcanzando a los ciegos. Además, la tasa actual anual de cirugía no es suficiente para acabar con el rezago de casos ni para hacer frente a la demanda de los nuevos casos de cada año, sobre todo si no se tratan primero a los ojos ciegos como prioridad.

**Palabras clave:** catarata, cirugía, Chaco, Argentina.

## Introduction

In the last decade two commonly used study designs have been employed to estimate cataract surgical coverage (CSC): the rapid assessment of cataract surgical services (RACSS) and the rapid assessment of avoidable blindness (RAAB)<sup>1-2</sup>. The concept behind the CSC is to determine from a population sample the number of individuals who are blind or visually impaired, the number of eyes that are blind or visually impaired, as well as the number of eyes and persons who have received cataract surgery. In essence, it is number of cataract operations performed in relation to the population at risk in given geographic areas within a country. For both RACSS/RAAB study designs the population at risk is that aged 50 years or more.

Once the CSC is known for a geographic area at various visual acuities, calculations can be made to determine how many eyes need surgery at the present time—i.e., the demand. Projections can also be made into the future using models of varying complexity to determine how many cataract surgeries will be needed based on the increase in the population  $\geq 50$  years<sup>3-5</sup>. The object of this brief study was to estimate the number of surgeries needed in the Chaco province of Argentina using various visual acuity (VA) thresholds and CSC data obtained from the recent RACSS study conducted in the town of Juan José Castelli<sup>6</sup>.

## Materials and methods

In 2008, the population of the Chaco province was 1,042,881 of whom 183,328 were aged 50 years or more (National Census data from the Institute of Statistics and Census in Argentina). Based on the prevalence of blindness/visual impairment for J. J. Castelli for different VA surgical thresholds from the RACSS data, the number of surgeries needed in the province to eliminate the backlog of surgical cases was calculated taking into account the population.

A power curve was fitted to the data of Taylor<sup>7</sup> so that calculations could be made to predict the cataract surgical rate (CSR) for a given VA (i.e., the incidence of new cases).

## Results

At visual acuities of  $< 6/60$  and  $< 6/18$ , the CSC was 35.3% and 25.6%, respectively in J. J. Castelli, on an eye basis, and the prevalence of blindness/visual impairment at these visual acuities was 3.95% and 6.26%, respectively. Assuming similar results for the province, the total number eyes needing surgery would be 7,241 and 11,476—a roughly 1.6-fold difference.

The constructed power curve for the data from Taylor had an  $R^2$  of 0.959 (equation:  $Y = 9964.1x^{0.8744}$ ) (Fig. 1).

For visual acuities of  $3/60$  and  $6/18$ , the calculated CSRs are 1,331 and 3,810, respectively, which would translate to 1,384 and 3,973 eyes needing cataract surgery (i.e., the annual incidence of new cases).

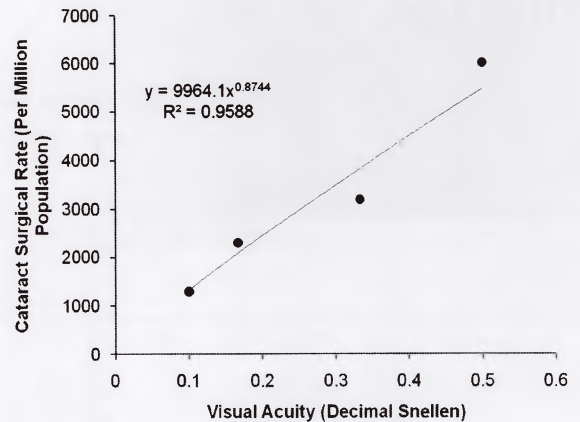


Figure 1. Power curve fitted to the data of Taylor<sup>7</sup> to estimate cataract surgical rates for different visual acuity thresholds.

## Discussion

The town of J. J. Castelli represents a relatively rural area of Argentina in which it might be expected that surgeries may be far less available compared to an urban area. A survey of the country in 2008 showed that the number of ophthalmologists per million population is much less for Chaco compared to the Buenos Aires metropolitan area (approximately 43%; Lansingh and Nano, unpublished data) but the number of ophthalmologists, 54 per million population, is quite high. The theoretical number of surgeries per ophthalmologist in the Chaco province is about 48, which is far less than the 200-250 per ophthalmologist reported in the USA<sup>8</sup>. This suggests that either there are far fewer ophthalmologists in the province performing surgeries, or that on average, an ophthalmologist performs far fewer operations annually compared to their North American colleagues.

The data clearly demonstrate that at a visual acuity threshold of  $< 6/60$  (blindness), the CSC is slightly higher on an eye basis than at a VA of  $< 6/18$ , but the small difference and the absolute numbers indicate that the majority of blind persons are not receiving surgery. In 2008, 2,706 cataract surgeries were performed in the Chaco province (Lansingh and Nano, unpublished data). To clear just the backlog of blind eyes would require more than two and a half times this number of surgeries; at a VA of  $< 6/18$ , the number of surgeries would need to be more than quadruple. Although the current number of surgeries would meet annual demand for blind eyes ( $< 6/60$ ), it will not

meet demand when the visual acuity is much better (i.e., < 6/18). Consequently, if the backlog is to be cleared over the next several years while keeping up with new cases, the focus must be on those persons who are blind rather than visually impaired. Moreover, the number of surgeries must be raised to at least 5,000 per year, otherwise the backlog will continue to increase.

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