

# Economic Advice for Providing Cataract Surgery in India

Mr. R. Muralikrishnan, Lions Aravind Institute of Community Ophthalmology, Madurai

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Of late economic principles are gaining importance in the field of health. Many of us are quite familiar with the basic economic concepts but we find it hard to relate it to the different aspects of health and health care. This poses us with a challenge to understand whether providing certain health care programmes are really economical. This article tries to relate to the delivery aspects of cataract surgery in India vis-à-vis economic concepts.

This whole article is designed to argue as well as provide economical advice for providing cataract services. The basic economic concepts dealt are need for cataract surgery, demand, production functions, market structure, and regulations. The economically tested efficient practice of model eye hospitals like Aravind Eye Hospitals, India which have superior technical capabilities are indicators of what can be achieved under the best of circumstances than what might be commonly achieved in a developing country like India<sup>1</sup> have been contemplated in this article.

## Need and justification

The loss of eyesight is one of the most severe and acute misfortunes that can befall a person and exists as a major health problem in India, responsible for a range of burdensome social and economic consequences. However, despite its oppressive implications and the fact that its prevention and cure are the most cost effective health interventions known<sup>2</sup>, it has received relatively little attention in efforts to promote health and “is still only modestly represented in bilateral and multilateral project development schemes”<sup>3</sup>.

The World Health Organization has estimated that globally, there are 38 million persons who are blind and a further 110 million people who have low vision and are at risk of becoming blind<sup>4</sup>. In addition there are some 7 million new cases of blindness each year and that, despite every intervention, blindness in the

world is still increasing by 1 to 2 million cases a year<sup>5</sup>. Estimates indicate that in excess of 90% of blindness occurs in developing countries, with sub-Saharan Africa and India sharing the highest burden. In fact, more than 75% of world blindness currently occurs in Africa and Asia alone, where the high population growth and the rapid increase in the number of elderly contribute to the upward trend<sup>6</sup>.

Estimates of blindness in India are clouded by ambiguity. The formulation of effective policies is made even more problematic by the fact that there is currently no available population based data on the causes of blindness<sup>7</sup>. According to the most recent NPCB/WHO survey of blindness (1986-89), there are approximately 12.5 million blind persons in India<sup>8</sup>, a figure that has increased from 1.40% of the population in 1973 to 1.49%<sup>9</sup>.

Moreover, in addition to being a public health problem, blindness and visual impairment have significant economic implication<sup>10</sup> and can be a major impediment to economic development, particularly in rural communities in India<sup>11</sup>. There are direct financial costs of avoidable blindness including the cost of rehabilitation and care, as well as the indirect costs resulting from the loss of productivity. Researches using the cost-of-illness methodology, calculated the cost of blindness in India, in terms of net loss of GNP for the year 1997 to be US \$ 4.4 billion, which is 1.45% of the total GNP and about 72.5% of what the Indian government spends on health sector per annum<sup>12</sup>.

It is generally estimated that 80% of the blindness in developing countries is avoidable<sup>13</sup> and could be prevented or cured if resources were mobilised and systematic action undertaken. By far, the greatest cause of blindness in the developing world is cataract, which accounts for nearly 50%<sup>14</sup> and is considered to be a form of curable blindness.

In excess of 80% of blindness in India is caused by cataract<sup>15</sup>. Further, it is estimated that 3.8 million persons become blind each year from cataract in India<sup>16,17</sup>. Whilst the annual level of performance has increased from around 0.5 to between 1.6<sup>18</sup> and 2.4 million<sup>19</sup> cataract operations, the number would have to increase to at least 3 to 4 million annually to have a significant impact on the current backlog.

Although significant progress has been made towards identifying risk factors for cataract, there is no proven primary prevention or medical treatment. Surgical removal of cataract remains the only therapy<sup>20</sup>. Outcomes research has clearly shown that modern cataract surgery with Intraocular Lens implantation is a safe and effective means of restoring visual function and improving vision related quality of life in developing countries<sup>21</sup>.

The cost of cataract surgery varies in different settings depending on the clinical protocol, overheads and the operating efficiency of individual programmes. The cost varies from US \$ 17 to US \$ 45. The average can be estimated around US \$ 22. While the cost of interventions are from the providers side, the patients often have to spend by way of transport and other related costs, another US \$ 7-\$10 to get the cataract surgery<sup>22</sup>. Thus for a one time investment of US\$30, one can potentially restore an annual productivity of US\$365, assuming that the loss of productivity per blind person is around US\$1 per day. Basing its decision on their assessments of cataract surgery as the most cost effective investment with an estimated return of 1200% within a year, the World Bank has awarded a loan of US \$ 118 million to India for tackling this problem<sup>23</sup>.

Considering the economic burden, prevalence, incidence and current levels of surgery performance in India, cataract surgery is an intervention worth providing in any part of the country.

## Demand

As the human capital model suggests, cataract surgery is desired as a consumption good which increases utility directly and as an investment good which determines the amount of time available for work and for leisure which in turn is used to produce more 'fundamental commodities' such as health. Studies done in India reports that out of the 99.6% economically productive individuals prior to the onset

of cataract, 75% of them were able to return to some form of economically productive activity after surgery<sup>24</sup>.

Cataract surgery in India is a private good with high levels of excludability. Private goods are those goods whose consumption can be withheld from other individuals. They are excludable according to economists. Individuals who desire excludable goods are willing to reveal their preference for them and the price they are prepared to pay. The patients (principals) according to their preference employ different types of providers (agents) to make decisions on their behalf. The government, NGOs as well as private providers provide surgical services to cataract patients.

Cataract surgeries have uncertainty on clinical outcomes such as quality of vision after surgery. However, the quality can be assured to a great extent by a mechanism of standardising the clinical protocols and procedures so that there are no great variations within a hospital<sup>25</sup>.

Externality issues are present for cataract patients, especially among the aged poor cataract patients. A lot of pressure is on the immediate family members who lose daily income by devoting time to look after the elderly. Quality cataract surgeries if performed on these aged people reduce pressure on family members and induce positive externalities.

Majority of the ophthalmologists in India are in urban areas and are into private practice. Cataract surgeries are provided at user fees usually determined by the ophthalmologist or the hospital. Majority of the urban patients go to private providers for cataract surgery. It is also estimated that over 25% of the Indian population have the capacity and willingness to pay reasonable fees for cataract surgery<sup>26</sup>. Studies done in India also say that private sector is widely being used by all socio-economic strata of the society in terms of utilisation of health services<sup>27</sup>.

According to NCAER India, only a small percentage (10%) of the population are in higher income group for whom price is not a major issue. 30% are in the middle-income group and the rest 60% are in the lower economic group<sup>28</sup>. Majority of the low-income group are illiterates and are not aware of cataract services and most of them will not be able to afford anything. For such people, cataract surgery can be provided free by conducting

community outreach screening camps and transporting them to the hospital for surgery. Public funding from various donors can be availed to conduct such camps. In fact, researches have proved that this strategy is the most cost-effective public funded options for cataract surgery in India <sup>(29)</sup>.

For the middle and the higher income group, user fees can be charged. The middle-income group should be able to pay a fee that covers the true cost. For the higher income group a user fee above the cost can be charged, so that income from this group can subsidise low-income patients. The societal welfare is also maximised and a state of Pareto improvement takes places with the change in distribution making more persons better off without making anyone else worse off. The key aspect here is to show facility differentiation and value for money. Since cataract is a condition that can occur to anyone regardless of their socio-economic status, the demand for cataract surgery as a function will depend on taste and preference of people, price, place of surgery and promotion for cataract services

### Production function

The production function for cataract surgery describes the relationship between inputs and outputs. It can be expressed as follows:

$$Q = f(H, I, E, S)$$

Where Q stands for Output (number of cataract surgeries done)

H Stands for Human Resources (Staff, Composition, Skills, and Working hours)

I Stands for Infrastructure (Number of beds, Operation theatres, Layout of facilities)

E Stands for Instruments and Equipment (Cataract surgical sets, Operating Microscope)

S stands for Supplies and Consumables (IOL, Sutures, Viscoelastics, Surgical drugs)

For example, if there are 100 inpatient beds in an eye hospital and if we consider the length of stay for cataract patients to be 3 days, the maximum possible output would be approximately 12,000 surgeries per year (365 day). To achieve this technically efficient level of output, other inputs like surgeons, paramedical, consumables are also required. If 3 surgeons can perform 6000 surgeries in a year, then it might require another 3 surgeon to reach the technical level of efficiency. However, it might also be possible to make

the surgeon double his/her output if he/she is employed to do only the skilful surgery. All the other works like visual field analysis, refraction, preparing patients, giving local anaesthesia could be done by trained paramedical who are relatively cheaper. Different combinations of inputs are thus possible. To make a decision on the combination to be decided, it is always required to see the economically efficient level or the lowest possible cost combination on the isoquant (possible ways of providing service with combination of inputs shown on a curve) than the technically efficient level. The output to be produced should be decided at levels where marginal costs (additional cost of a very small increase in output) are lower than the average costs.

The cost of producing cataract surgery constitutes fixed costs comprising salaries and overheads as a major portion. The cost of IOLs, sutures and drugs comprises the variable costs. It is often not possible to reduce the fixed costs below a certain minimum level. However, through optimum utilisation of resources, the fixed cost component can be considerably reduced so as to have greater economies of scales (sections in total cost curves where average costs rises less rapidly than output). At peaks of efficiency the total cost can come down by as much as 60% while the fixed cost component can reduce even further<sup>30</sup>. The key here is to produce outputs at points where long run average cost decreases as the level of output increases.

Economies of scope are also possible since some resources like paramedical, medical record technician, accounts and billing, housekeeping, building maintenance, purchase and personnel department can be jointly used to produce other eye care outputs.

### Market structure

In India, cataract surgery is a private good. Though being a private good, it has public provision too, which is provided through government and charitable organisations mostly. With a backlog of 10million and an annual surgical performance of only 1.7 million, the market for cataract surgery is not competitive but is contestable. In other words, the market structure is oligopolistic in nature with few sellers but many buyers.

Since surgery is the only intervention to treat cataract, the entry and exist of other alternate

providers are restricted. This is mainly because cataract surgery is a micro skill based surgery and it takes time and practice to be a good ophthalmic surgeon. There are ophthalmic paramedical reported to perform cataract surgeries illegally but this is not on a large scale and is not a constraint for contesting in the cataract market. Experiences show that high quality cataract surgeries at affordable prices are the ones that have more buyers<sup>31</sup>.

The providers of major inputs for cataract surgery like IOL, sutures and equipment are also oligopolistic in nature and are contestable. The market size for these inputs will depend upon the current level of performance in the country. Indigenous production of high quality IOL, sutures and drugs at very cheap prices are available in Nepal and India<sup>32</sup>. Instruments and equipment are also available in India for cheaper prices. There are international companies also contesting in the market.

One input that can be a constraint is the labour market for ophthalmologist and paramedical. Currently there are roughly 10,000 ophthalmologists in the whole of India and they are in great demand. Through effective human resources management practices, these labours can be retained in the hospital. Training centres for IOL surgery and for paramedical can be set up at the hospital in the long run to ensure supply of labour inputs for the hospital.

## Regulations

Market failure do occur in providing cataract services because majority of the patients (principals) appoint the hospital & doctors (agents) to make a 'purchase decision' on their behalf. Majority of the patients have high uncertainty and asymmetry of information about the surgical techniques, quality standards, pricing, etc. Hence it becomes a moral responsibility of agents to avoid market failure, ensure that there is transparency of pricing structure, good quality surgical practices and good information systems (patient counselling) so that patients will know what to purchase for what price.

Regulations are required in order to maintain good quality surgery. Recruitment and selection procedure for entry of professionals is one area where regulations will be helpful. Only well trained licensed professionals should be selected because good quality inputs translate into good outcomes of final product or service.

Even when good quality professionals are selected, there maybe important variations in the quality of individual professionals. This can have an influence on the final outcome too. In order to reduce this, a standardised system like same surgical protocols for all surgeons needs to be in place.

Quality councils and audit teams can exist in eye hospitals to ensure that professionals do adhere to the regulations. Maintaining good medical records, infection control programmes, surgical complications review meetings can be some regulations enforced to assure quality of surgery. Regulations can also exist for the purchase of quality materials and consumables like IOL, sutures and drugs.

Controls have to be put on all staff levels on operational budgets, equipment and training. Certificate-of-Need (CON) regulations can be used to control the unnecessary expansion of capital facilities and gross investment in new equipment.

For implementing these regulations, transaction costs can be high. So it is better to incorporate these regulations as departmental policies. Cross-functional teams comprising of members of staff can form regulations monitoring teams like quality councils.

Incentives are required for implementing regulations. Staff who adhere to quality assurance protocols and performs well can be given awards, extra holidays and can be recognised with further training and promotions.

## Conclusion

In conclusion, stimulating market forces to come into play through affordable price structures, quality and an accessible delivery mechanism will ensure long-term viability of providing cataract surgeries. The market for the product is contestable. Market failure issues can be tackled by regulations. Looking at the various economic aspects, cataract surgery is an intervention worth providing.

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