Evaluating the cost effectiveness of national program for control of blindness in Jorhat district, India

Abstract

Background: We evaluated the cost of different components of the national program for control of blindness (NPCB) and assess the cost effectiveness of this program. Materials and Methods: An observational study was conducted in Jorhat District of Assam, India from July 2009 to June 2010 for assessing the cost effectiveness of the NPCB. Four broad categories of cost inputs, that is, capital costs, recurrent costs, prime/variable costs, and fixed costs were considered. The cost incurred by the provider was taken as the actual cost of delivery of different component of services to the patients, which was calculated from the costs of labor, material, and capital costs using the time utilization pattern recommended by WHO. Result: The District Blindness Control Society, Jorhat had spent 58.93% of total expense on fixed heads of which 65.86% had been spent for cataract surgery. The medical care cost was found to be Indian rupee (INR) 425 for intracapsular cataract extraction (ICCE), INR 675 for extracapsular cataract extraction + intraocular lens (ECCE + IOL) and INR 225 for refractive error correction. The patient-wise provider cost was estimated to be INR 519 for ICCE, INR 769 for ECCE + IOL implantation and INR 319 for spectacle correction of refractive error. Conclusion: National program for control of blindness is a cost effective means of controlling and treating blindness.

Key words: Blindness, cost effective, national program for control of blindness

INTRODUCTION

Vision is one of the most cherished sensory organs and unfortunately, 45 million people are deprived of this, which is projected to rise to 76 million by 2020.[1] This rising tide of blindness is attributed primarily to the important demographic changes that have taken place in recent decades in the developing countries. The vast majority (>90%) of the world’s blind live in developing countries, where infection, malnutrition and lack of eye care give rise to a high proportion of blindness, particularly in the rural population. Childhood blindness, which is of significant concern, is avoidable in 40% of all cases.[2] Avoidable blindness is responsible for significant social and economic implications. The cost of education rehabilitation and lost productivity adds to impact, which is more upon those who are economically deprived.[3] Access to sight saving health care is essential to ensure social as well as economic progress of a nation. The first-organized national effort to control blindness in India was the National Program for Trachoma launched in 1963. The national program for control of blindness (NPCB) was formally launched in 1976 with the goal of reducing the prevalence of blindness to 0.3% by 2000. The strategies of NPCB were to identify the high prevalence states for special attention, up-gradation of facilities and skills, involving the private sector including NGOs and giving the program the character of a movement through the establishment of a partnership institution in the form
of societies committed to the goal of the program. Cataract being a curable cause of blindness accounts for the maximum disease burden, hence the program has given the highest priority to cataract removal. In North Eastern India, the Program is implemented in all states since 1998. However, its inception cost evaluation of this program in the region was lacking. Due to the current changes in the economic situation and considering the rising burden of the disease to the society, evaluation of the program has become a public health priority. Hence, this study was planned by analyzing the cost of different components of the NPCB and assessing the cost effectiveness of the Program in Jorhat district of Assam.

MATERIALS AND METHODS

An observational study was conducted during July 2009 to June 2010 in Jorhat district, Assam, India. All the data were collected by the investigator. For the evaluation, all the financial records and reports related to the Program were analyzed using suitably designed cost analysis formats. While collecting the cost data, the basic aim was to identify all the inputs to the NPCB and to quantify them. During costing procedure, up to the smallest monetary unit Indian rupee (INR 1/-) was taken to minimize the rounding error.

The inputs costs were considered under four broad categories, viz., capital costs, recurrent costs, prime/variable costs, and fixed costs. For calculation of capital costs, capital goods were identified followed by their costing. Capital goods were defined as those inputs that lasted more than 1 year. Cost for baseline training activities for health personnel that occurs in long intervals, jeep, two-wheelers etc., were categorized under capital cost. For this study, the average annual costs of capital items were established in terms of simple “straight-line” depreciation:

\[ \text{i.e. } C/N = \frac{\text{Current cost of item}}{\text{Working life}} \]

Recurrent costs were defined as costs of those inputs that are used up in the course of a year and are usually purchased regularly. In NPCB, expenses the following categories were considered as recurrent costs: Salaries and allowances of NPCB staff, supplies like ocular drugs, intraocular lens (IOLs), spectacles, chemical reagents, suture materials, cost of vehicle operation and maintenance, office maintenance, reorientation training program etc.

The program cost of production of different services was also divided into two categories of cost: That is, prime/variable costs: They include costs of raw material to produce a service. Here the office expenditure, maintenance of vehicle, welfare of patients, printing of case cards, local purchase of medicines, and miscellaneous expenditure are included. Fixed costs: Costs, which do not vary with changes in volume of output, were put in this category. In NPCB, they included salary and allowances, cost of vehicle, cost of equipments etc.

The cost incurred by the provider was taken as the actual cost of delivery of different component of services to the patients, which was calculated from the costs of labor, material, and capital costs using the time utilization pattern (WHO 1990). All costs were categorized as routine or overhead costs and calculated by dividing the overhead cost by the total number of patients for the year 2009-2010.

RESULTS

Cost analysis of the program

Expenditure of the program in the financial year 2009-2010

The District Blindness Control Society (DBCS), Jorhat had spent 58.93% on fixed heads of which 65.86% had been spent for cataract surgery. Of the variable cost, 96.83% had been utilized for the consumables (Table 1).

Total overhead costs

The overhead costs of the program were calculated by summation of capital costs, material costs, and labor costs as given. For estimation of material costs, the total cost incurred for training, IEC/publicity, vehicle maintenance, equipment maintenance, and contingencies was considered. The total amount spent for disbursement of salary and honorarium was INR 1,60,000 (Labor Cost). The total overhead cost incurred by the program was INR 3,14,092 of which maximum expenditure (50.94%) was incurred by labor costs (Tables 1 and 2).

Routine service costs

The routine service cost was estimated to be approximately Rs. 94/- (Table 3)

\[ \text{Routine service cost per visit} = \frac{\text{Total overhead cost} - \text{Training cost}}{\text{Number of visits}} \]

Medical care cost

For the year 2009-2010, a total of 2718 patients with cataract received treatment under the program. Out of the 2718 patients, 42 patients underwent intracapsular
cataract extraction (ICCE) while 2676 patients underwent extracapsular cataract extraction (ECCE) with IOL implantation. The medical care cost per treatment modality, incurred by DBCS, Jorhat was accordingly calculated and

Table 1: Calculation of total cost for DBCS, Jorhat during the financial year 2009–2010

| Budget heads               | Fixed cost     | Variable costs (%) | Total costs    |
|----------------------------|----------------|--------------------|----------------|
| Treatment expenses         |                |                    |                |
| Cataract surgery           | 2,021,000 (65.8) | —                  | 2,021,000      |
| Spectacle correction       | 17,500 (0.57)  | —                  | 17,500         |
| Spectacles + SES* + postoperative care | — | 3877 (0.18) | 3877 |
| Consumables                | —              | 2,070,500 (96.83)  | 2,070,500      |
| Equipment maintenance      | —              | 8748 (0.41)        | 8748           |
| Support activities         |                |                    |                |
| IEC/publicity              | —              | 4500 (0.21)        | 4500           |
| Training                   | —              | 26,573 (1.24)      | 26,573         |
| Vehicle purchase           | 750,000 (24.44)| —                  | 750,000        |
| Building cost              | 120,000 (3.91) | —                  | 120,000        |
| Salary + honorarium        | 160,000 (5.21) | —                  | 160,000        |
| Contingency                | —              | 17,863 (0.84)      | 17,863         |
| Total                      | 3,068,500 (58.93)| 2,138,295 (41.07)| 5,206,795      |

*SES: School eye screening. All costs reported are in INR (lakhs). DBCS: District blindness control society, IEC: Information education and communication

Table 2: Calculation of equivalent annual cost of capital goods by simple straight line depreciation method

| Capital goods                  | Present market value (INR) (M) | Useful working life (in years) (L) | Equivalent annual cost (INR) (M/L) |
|--------------------------------|--------------------------------|------------------------------------|------------------------------------|
| One generator (petrol operated)| 18,550                         | 10                                 | 1855                               |
| One steel table                | 5641                           | 10                                 | 564                                |
| Wardrobe without mirror        | 7544                           | 10                                 | 754                                |
| One van of DMU                 | 750,000                        | 10                                 | 75,000                             |
| Building cost                  | 120,000                        | 10                                 | 12,000                             |
| Total                          | 90,174                         |                                    | 90,174                             |

DMU: District mobile unit

Table 3: Total number of patient visits and routine service costs for the financial year 2009-2010

| Patients registered | Number of visits by 1 patient | Total number of visits | Routine service cost per visit   |
|--------------------|-------------------------------|------------------------|--------------------------------|
| With cataract      | 2718                          | 2718 days              | 314092 – 26573                  |
|                    |                               |                        | 3068                            |
| With refractive error| 350                          | 350 days               | INR 93.71                       |
| Total              | 3068                          | 3068 days              | INR 94 (rounded off)            |

Table 4: Medical care cost for the different treatment modality

| Heads of expenditure | ICCE | ECCE + IOL | Refractive error correction |
|----------------------|------|------------|-----------------------------|
| Drugs and consumables| INR 150 | INR 200 | —                           |
| Sutures              | INR 50 | INR 50    | —                           |
| Spectacles           | INR 125 | INR 125 | INR 125                     |
| Transport and POL    | INR 100 | INR 100 | INR 100                     |
| IOL/viscoelastics and addl. consumables | — | INR 200 | —                           |
| Total                | INR 425 | INR 675 | INR 225                     |

ICCE: Intracapsular cataract extraction, ECCE: Extracapsular cataract extraction, IOL: Intraocular lens, POL: Petroleum and other liquids

Table 5: Patient wise provider cost (ICCE/ECCE + IOL/spectacle correction)

| Type of visual impairment | Type of correction       | Costs (in rupees) | Total |
|----------------------------|--------------------------|-------------------|-------|
|                            | Routine service cost (per patient)| Medical care cost (per patient) |       |
| Cataract                   | ICCE                     | INR 94            | INR 425 | INR 519 |
| Refractive error           | ECCE + IOL               | INR 94            | INR 675 | INR 769 |
|                            | Spectacle correction     | INR 94            | INR 225 | INR 319 |

ICCE: Intracapsular cataract extraction, ECCE: Extracapsular cataract extraction, IOL: Intraocular lens
found to be INR 425 for ICCE, INR 675 for ECCE + IOL, and INR 225 for refractive error correction [Table 4].

**Total provider costs**
The patient-wise provider cost (total routine cost + total medical care cost) was estimated to be INR 519 for ICCE, INR 769 for ECCE + IOL implantation and INR 319 for spectacle correction of refractive error [Table 5].

**DISCUSSION**
The routine service cost per patient per visit in the nonproject states of the country was INR 79. [8] The slight increase in the routine service cost in our study may be attributed to the time gap between the two studies during which there might have been slight fluctuations in the monetary value. Performing ECCE + IOL implantation for treatment of cataract in the current situation was found to be more cost effective as compared to the findings of cost benefit analysis of the World Bank assisted Cataract Control Project in India, wherein the cost incurred in screening and then performing ICCE for a cataract patient in a base hospital was INR 1128 per operation. [9] Thus, it can be concluded that considering the cost effectiveness of NPCB in treating avoidable blindness by ECCE + IOL implantation and spectacle correction, its proper implementation in the district would greatly reduce the disease burden on families, in particular and society, in general.

**REFERENCES**

1. World Health Organization. The World Health Report; Report of the Director General. Editorial. Geneva: WHO; 1997. p. 68-121.
2. World Health Organization. Third World Health Assembly Resolution, WHA 3.22; Handbook of Resolutions and Decisions of the World Health Assembly and Executive Board, 1948-1972. Vol. 1. Geneva: WHO; 1973. p. 98.
3. Yorston D. The global initiative, vision 2020: The right to sight childhood blindness. Int J Community Eye Health 1999;12:44.
4. Govt. of India Annual Report (1997-98). Department of Health and Family Welfare: Ministry of Health and Family Welfare; available from: www.mohfw.nic.in, [Last accessed on 2011 Dec 23].
5. Kishore J. National Health Programmes of India: National Policies and Legislations Related to Health. 6th ed. 2006. p. 267-72.
6. Available from: http://www.who.int/immunization_financing/data/about/terminology/en. [Last accessed on 2013 Apr 24].
7. Thulasiraj RD, Sivakumar AK. Cost containment in eye care. Community Eye Health 2001;14:4-6.
8. Department of Health and Family welfare, Ministry of Health and Family Welfare (2002): Report No.3 (Role of Civil Societies), Government of India, available from www.mohfw.nic.in. [Last accessed on 2011 March 20].
9. Dua AS. National Commission on Macroeconomics and Health, Ministry of Health and Family Welfare, Govt. of India, Background paper on Disease Burden in India; 2005. p. 299-305, printed at Shree Om Enterprises Pvt. Ltd., A-98/3 Okhla Industrial Area, Phase II, New Delhi 110020, Available from: www.mohfw.nic.in. [Last accessed on 2010 Dec 28].

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