

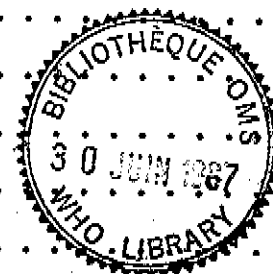


REPORT OF THE INTERREGIONAL MEETING ON THE MANAGEMENT OF  
 CATARACT WITHIN PRIMARY HEALTH CARE SYSTEMS

Denpasar, Indonesia, 15-19 December 1986

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## INTRODUCTION

An Interregional Meeting on the Management of Cataract within Primary Health Care Systems was convened in Denpasar, Indonesia, from 15 to 19 December 1986. The meeting was opened by H.E. the Governor of Bali, Professor I.B. Mantra, on behalf of the Government of Indonesia, and by Dr Suyono Yahya, Director-General of Community Health, on behalf of the Ministry of Health.

Professor Sugana Tjakrasudjatma was unanimously elected Chairman of the meeting, with Dr M.C. Chirambo as Vice-Chairman; Professor B.R. Jones was appointed rapporteur. The participants of this meeting included ophthalmological and public health experts from all WHO regions, together with a large number of representatives of international nongovernmental organizations. The agenda, which was adopted without modification, is attached as Annex 1; the List of Participants will be found as Annex 2.

## 1. THE MAGNITUDE OF CURABLE BLINDNESS DUE TO CATARACT

### 1.1 General overview

Cataract was included as one of the main blinding disorders in the world in a resolution adopted by the World Health Assembly in 1975<sup>1</sup>, but at that time no detailed information was available as to the magnitude of visual loss due to cataract. This condition is of particular importance, however, as it constitutes by far the most common cause of "curable blindness", i.e., sight which can be restored by surgery.

When the WHO Programme for the Prevention of Blindness was established in 1978, increased attention was paid to cataract as a cause of loss of vision, together with the already well-known preventable causes, such as trachoma and xerophthalmia. Since 1980, a number of carefully conducted population-based surveys of blindness and its causes have invariably demonstrated that cataract is the leading cause of blindness. In virtually all recent epidemiological studies of blindness, cataract has been shown to be responsible for between a half and two-thirds of all blindness. If this proportion is applied to the estimated number of blind in the world (calculated to be 28 million in 1979), using the now internationally accepted definition of blindness as the inability to count fingers at a distance of 3 metres, it can be estimated that there are at present some 14 to 17 million blind due to cataract. A major proportion of these blind people could probably have their sight restored, were cataract surgery to be made available to all those in need of it.

Whilst developed countries have managed to control blindness due to cataract by providing adequate services for cataract surgery, the situation in most developing countries is different. The lack of facilities and scarcity of trained manpower have limited the provision of cataract surgery so that, in the majority of developing countries, there is an accumulating backlog of unoperated cases of blindness due to cataract. Furthermore, cataract surgery in these countries is usually confined to urban areas, thus leading to underserved rural areas, where the majority of the population is found. To this should be added the fact that cataract as a cause of visual loss is rapidly increasing in many developing countries, because of the growing proportion of the elderly in the population, cataract being closely related to age. There are also indications that blindness due to cataract may be more common and of earlier onset in some parts of the world, particularly in South-East Asia and possibly in Africa, which further adds to the problem of controlling blindness due to this disorder in many developing countries.

There is also an important time factor to be considered in making cataract surgery available to those needing it. Surgery must be provided within a few years of a cataract reaching maturity, in order to avoid complications, such as secondary glaucoma, which may lead to irreversible visual loss.

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1 Resolution WHA28.54

## 1.2 The African Region

There are no exact prevalence rates available for blindness and visual impairment in most African countries. However, based on results from some of the countries where population-based surveys have been conducted, the overall blindness rate for the Region is estimated to be 1% - 1.5%, thus giving a total of 6 million blind persons and about 24 million people with visual impairment.

Three million of these cases of blindness are due to cataract, which is curable were eye care facilities, trained personnel and financial resources to be made available. National committees for the prevention of blindness have been formed in almost all the countries of the Region. Not all the committees are active, but during the past decade some countries, in collaboration with the World Health Organization and nongovernmental organizations, have developed and implemented national programmes for the prevention of blindness to address the major causes of blindness in general and cataract in particular.

In most countries, the cataract problem is being addressed within an incomplete framework of comprehensive eye care services. At the secondary and tertiary levels, ophthalmologists - as well as non-ophthalmologists in certain countries - provide cataract surgery. At the primary and community level, both mid-level health personnel and village health workers provide eye care services through primary health care systems.

The recent National Survey of Blindness and Blinding Disease in the Gambia demonstrated that in this West African country, with a population of approximately 800 000, there is a crude blindness rate of 0.7% (age-adjusted rate of 1.7% if compared to UK). Untreated cataract accounts for 55% of the blindness and comprises an estimated total of 5500 persons requiring cataract surgery. There is one ophthalmologist in government service.

## 1.3 The Region of the Americas

The region is heterogenous: there are countries, such as Argentina, Chile and Uruguay, that have a well-developed public health service that provides cataract surgery in such a way that no great cataract backlog exists, while in others, such as Brazil and Peru, a cataract backlog has accumulated. A survey in Bolivia of a representative village of 8000 inhabitants showed that the percentage of cataract blind was 0.6%, representing the actual cataract backlog for that community.

In Brazil and in Peru it is projected to create "cataract-free zones" (Campinas and Chimbote respectively); these will involve a total population of over 100 000 being screened and operated as part of an operational research project in an effort to reduce the cataract backlog by 90%. The success of this project will determine whether such a strategy can be replicated throughout the Region.

In North America, cataract surgery is a major activity of ophthalmologists. Because of the accessibility of these services there is little evidence for the existence of a cataract backlog of public health dimensions. From a cost perspective, however, cataract surgery represents a major expenditure of public health.

## 1.4 The Eastern Mediterranean Region

Population-based data on cataract in the Eastern Mediterranean Region are only available from Saudi Arabia and Tunisia. A nationwide stratified cluster random sample from the total population of Saudi Arabia, estimated to be around 9 million, was carried out in 1984. This showed cataract to be the leading cause of blindness (55% of the total blindness), and the second leading cause of visual loss (35%) after refractive errors.

In the age group 60 years and over, 64.5% had significant cataract changes. In the age group 40-59 years, cataract was demonstrated in 24.5% of cases, while in the age group 20-39 years, about 0.6% were affected. There was no statistically significant difference in the prevalence of cataract among males and females. Cataract surgery had been carried out in 26.6% of individuals with cataract, females having a lower rate of cataract

surgery. Complications, unacceptable by modern standards, were demonstrated in 19% of patients who underwent cataract surgery before 1984. Over 40% of those operated still suffered visual loss owing to lack of proper spectacles. The rate of cataract surgery has improved dramatically during the last three years. It is estimated that 7000 operations are carried out annually in Saudi Arabia, over 4000 of which are performed at the King Khaled Eye Specialist Hospital. In a society that, on cultural grounds, shows a traditional aversion to using spectacles, the use of intraocular implants has enhanced the acceptability of cataract surgery.

A population-based survey was carried out in six central and southern governorates of Tunisia in 1979-1980 to determine eye care needs. This survey was limited to the rural population, and included eye examinations of more than 8000 persons. The blindness rate was found to be 3.9%, and although trachoma was endemic in three of the six governorates, cataract and its consequences contributed to visual loss in 60% of cases.

In Jordan, cataract was found to be the leading cause of curable blindness in the West Bank and the Gaza Strip. Cataract has also been demonstrated to be the major cause of blindness in patients attending hospitals throughout the country.

### 1.5 The European Region

Cataract surgery constitutes the main workload in ophthalmic units in Europe, and is provided through existing services. The actual dimension of unrecognized and unoperated cataract has not been determined.

### 1.6 The South-East Asia Region

The South-East Asia Region, comprising eleven developing countries with a total population of over 1 billion, includes four countries in the least developed category with a joint population of nearly 120 million. Available epidemiological data show that the national prevalence rate of blindness ranges from a low of 0.2% to nearly 2%, with areas within some countries having blindness rates of up to 3%. Population-based studies carried out in certain countries point to an average cataract prevalence accounting for over 50% of all blindness. It is estimated that the backlog of cataract blindness in South-East Asia amounts to little under 8 million. The magnitude of the problem of blindness due to cataract and the urgent need for intensified action for sight-restoring intervention has to be viewed against the reported figure of 1.3 million cataract operations performed in 1985 in nine of the eleven countries in the South-East Asia Region along with the anticipated absolute increase of the aging population and age-related cataract in these countries over the next decade or so.

In India, according to a recent survey on the prevalence of cataract, it is estimated that there are 7.5 million eyes with mature and hypermature cataract and 2.4 million eyes with advanced immature cataract.

The clearance of the backlog of cataract is being effected on a priority basis by an active outreach "eye camp" approach within primary health care services. All "camps" are organized with the active participation of the community and in collaboration with voluntary organizations, ensuring equity of coverage. Trained ophthalmic assistants posted in Primary Health Centres assist in the investigation of cases of cataract, the maintenance of records and the organization of eye camps. The cost of surgery is being maintained at between US\$10 and US\$25, in addition to local input. Aphakic glasses costing from US\$0.5 to US\$1.0 are provided free of charge after surgery. Every effort is being made to ensure quality service, while the infrastructure is being strengthened to achieve a target of 2 million operations per year.

In Indonesia, epidemiological surveys have revealed that the prevalence rate of blindness is 1.2%, of which 0.76% of cases were of lenticular origin. This puts the number of persons blind from cataract-related causes at just under 1.5 million. The cataract backlog is estimated at over 1.25 million, all of whom are in need of surgery. The total number of aphakes in the whole country was estimated to be 142 000 in 1982. Since 1979, eye care and prevention of blindness programmes have been integrated into Primary Health

Care systems. Since 1985 a pilot project on cataract relief services has been carried out in provinces of West Java, East Java and Bali, to develop appropriate intervention methods, particularly in elaborating appropriate technology, and fostering community participation and intersectoral collaboration to eradicate the backlog of cataract.

The Nepal National Blindness Survey 1980-1981 revealed that the second most prevalent condition next to trachoma was cataract. In total, an estimated 397 205 people (2.8% of the population) were found with some degree of cataract. Of these, it was the primary disorder in an estimated 312 720 cases, and a secondary disorder in an additional 61 544 cases. Furthermore, there were 22 941 additional cases who suffered from cataract in which the lens had been surgically removed (aphakic), dislocated by couching or after- cataract or other complications. Approximately 26 000 new cases of cataract blindness occur in Nepal each year.

In Sri Lanka, of the estimated 67 000 blind in both eyes, two-thirds, i.e., 46 000, are blind due to cataract. Out of this group of 46 000 people:

16 000 are between 60 and 70 years of age, and  
9 000 are over 70 years of age.

In Thailand, prevention of blindness based on a primary eye care approach was initiated in 1978. Activities are now being phased to integrate with Primary Health Care covering 30 provinces. A survey in 1983 disclosed an average blindness rate of 1.14%, of which blinding cataract constituted 47.3%, corresponding to 270 000 cases. The total number of cataract operations performed in 1985 is estimated at 20 000. A mass intervention scheme on a nationwide scale has already been formulated based on the PHC approach. The field activities began in selected provinces in 1986, aiming at the creation of "blinding cataract-free districts". In addition to the service component, research activities are included in the operational plan at the provincial level.

#### 1.7 The Western Pacific Region

In an estimated total population of over 54 million in the Philippines, some limited surveys have suggested blindness rates of 2.6% for the rural population, and 0.9% for urban dwellers, with a national average of 2.13%. Limited surveys in certain areas have suggested a national cataract prevalence of 1.1%, with rates of 4.35% in a rural area and 0.59% in urban Manila. The estimated backlog of cataract requiring operation is between 300 000 and 900 000 cases. The country has 195 ophthalmologists, of which 97 are based in Manila covering a population of 4.5 million. Most of the cataract in rural areas is being dealt with by ophthalmologists provided by nongovernmental organizations.

No population-based data on blindness and/or cataract are available for the South-West Pacific. In Fiji, with a population of 700 000 scattered over 120 inhabited islands, some 600 cataract operations are performed per year. Control of the cataract backlog has been somewhat strengthened by the integration of primary eye care into the Fiji national primary health care programme. As the majority of qualified ophthalmologists are based in the urban areas, the rural population is underserved. The rural areas are mainly served by nongovernmental organizations. In the other South-West Pacific nations, there are two ophthalmologists working in Western Samoa but no further information is available. The Solomon Islands, Tonga, Kiribati, Vanuatu and Cooks Islands have no local eye services other than the periodic clinics conducted by teams from Australia or New Zealand.

The major problems with eye care services in the South-West Pacific are :

- (a) Relatively small national populations scattered over many islands.
- (b) Low income and costly boat transportation making referral difficult.
- (c) Understaffed medical systems depending on periodic eye clinics conducted by expatriates.

These nations need to be encouraged to be more self-sufficient in this respect.

In Viet Nam, a long-standing trachoma control project has now been converted to include all categories of blindness control under a comprehensive national programme for the prevention of blindness. The primary health care approach is adopted as its key strategy. A recent survey disclosed that the blindness rate is 0.8% of which 4.5% are due to blinding cataract. A five-year programme recently formulated to identify five pilot areas (each of a population of 100 000), including the city of Ho Chi Minh, identified cataract for high priority action through the primary health care approach. The estimated cataract backlog is around 210 000 people. The annual cataract surgery output is about 5000 to 6000.

## 2. THE PUBLIC HEALTH PROBLEM OF CATARACT BLINDNESS IN DEVELOPING COUNTRIES

### 2.1 Introduction

The public health problem of cataract refers to aging-related opacification of the crystalline lens of the eye, impairing vision to an extent that severely restricts occupational and/or other daily activities. This disorder, usually affecting both eyes, has a blinding propensity which, however, is amenable to surgical cure. The resulting blindness commonly constitutes a major public health problem in developing countries, where it needs to be tackled on a priority basis.

In addition to the usually bilaterally blinding cataract, some unilateral cases require early surgery to avert the threat of irreversible complications from hypermaturity of the cataract.

Bilateral congenital cataract is rare in comparison with age-related cataract, but does constitute an important component of blindness in childhood that needs early referral to secondary or tertiary eye care centres.

### 2.2 Epidemiology

By far the most common form of cataract relates to aging. The vast majority of cataract blindness occurs beyond 50 years of age, but severe visual loss may occur between the ages of 40 and 50 years, or even earlier. In some countries it appears to be more common in females, but this may be a result of higher utilization of services for cataract surgery by males. It is important to include data on aphakia when reporting the prevalence of blindness from cataract.

The prevalence of cataract blindness accounts for half or more of the total blindness (in the absence of an additional burden of blindness from hyperendemic onchocerciasis or trachoma).

There is no proven means for preventing cataract blindness. Diabetes is undoubtedly a risk factor for cataract. Its increasing prevalence in certain parts of the world is a matter of concern, but diabetes cannot fully explain the public health problem of cataract blindness. A number of other possible risk factors have been advanced. The sunshine (or ultraviolet light exposure) theory of cataract formation is attractive but lacks definitive epidemiological support. Nutritional factors may be of relevance. Some studies have reported lower prevalence in communities living at high altitude than in lowland communities in the same countries, but other studies have showed the reverse. The relation between cataract and alcohol is also unclear. Episodes of severe dehydration from cholera-like diarrhoea, or heatstroke, may constitute an important risk factor for blinding cataract. These require further investigation in several geographical areas.

## 3. STRATEGIES FOR ACTION AGAINST CATARACT

In countries or regions where cataract blindness poses a problem of significant magnitude, intensified action needs to be taken to provide surgical cure and visual correction.

The strategies for such intervention might include:

- Assessment of the problem
- Identification of cases
- Creation of awareness in the population
- Motivation of those blind to utilize services
- Development of a referral system
- Provision of cost effective surgical services to deal with large numbers
- Provision of optical correction at an affordable cost.

The assessment of the problem is a necessary prerequisite not only for planning the setting up of services, but also for providing baseline data against which the impact of these services could be measured in subsequent evaluations. These assessments could be carried out by simple but epidemiologically sound data gathering. Involving the community in such assessments could also spur the community to take active part in the subsequent development of services. The identification of cases requiring referral for surgery must in the first instance rest with the community. This could be achieved through creating an awareness among the population of the condition and its potential for cure. Such identification, together with motivation of the affected person to utilize services, would help overcome some of the socio-cultural and behavioural constraints to acceptance of surgical treatment. The provision of adequate back-up services, particularly at the intermediate referral level and at outreach facilities, is a basic requirement to ensure credibility in community-based interventions. Such services should be developed and strengthened concurrently with the promotional activities at the community level.

In tackling the vast number of presently underserved persons blind from cataract the organization of cataract relief services on a large scale becomes of paramount importance. Since services may often need to be provided outside the precincts of the traditional eye care institutions, the organization of such services needs careful attention to detail, to ensure both safety and cost effectiveness.

The visual rehabilitation of the person after cataract surgery is perhaps as important as the surgery itself. The provision of aphakic spectacles at an affordable price or even free of charge should be ensured in the context of community-oriented services for cataract.

#### 4. APPLICATION OF CATARACT INTERVENTION SCHEMES WITHIN PRIMARY HEALTH CARE

##### 4.1 Case finding at community level

In many developing countries there is still a need to assess more accurately the magnitude of blindness due to cataract. Personnel at the primary health care level may assist in this endeavour, particularly community health workers, if properly trained. The health worker may carry out house-to-house visits in the search for blind people, and examine those found and establish a simple register, whilst arranging for their referral. The criteria for recognizing blindness presumably due to cataract must be quite simple at this level, the two most relevant criteria being:

- Visual loss (usually inability to count the fingers of a hand at a distance of 3 metres)
- White pupil

Depending on the level of training of the health worker, it may also be possible to include the simple testing of pupillary reaction to light by means of a torch, and this should be carried out when feasible.

#### 4.2 Referral

As a general referral instruction, in addition to visual loss and white pupil, the characteristics of a typical case of blindness due to cataract should be:

- Gradual loss of vision over several years without pain in an elderly patient.

In most situations, the health worker should be instructed to refer blind patients for further examination by more qualified personnel, to assess whether something may be done about the cause of blindness. This, however, presupposes adequate referral facilities; in any event, as a general rule for urgent referral within a primary eye care scheme, priority should be given to cases of sudden loss of vision and/or painful eyes.

One of the problems commonly encountered in the detection of individual cases of blindness due to cataract is the lack of awareness of the fact that cataract surgery may restore sight, and that this surgical procedure is safe and effective. Community health workers can, therefore, play a most important role in conveying this message to the local population, encouraging individuals with loss of vision to come forward for examination and possible referral for surgery. It is important that the health worker himself/herself has gained sufficient understanding about cataract as a cause of blindness, to ensure his/her cooperation and motivation to actively search for those cases, and to convince the community of the benefit in so doing. It should also be explained to the health worker that cataract is usually found in the elderly, and that the history of loss of vision is of importance.

In many countries, blind persons detected by the health worker will be referred to a health centre for further examination before being seen by a specialist for surgery. At the health centre level, more qualified personnel is normally available, such as nurses with some training in eye examinations, or in certain settings higher levels of staff including clinical officers and/or general physicians. At this level it is therefore usually possible to apply stricter diagnostic criteria for blindness due to cataract, to avoid the referral of too many cases of non-curable blindness due to other causes. The following may be tested at the health centre level in most settings :

- visual acuity in each eye separately
- examination for projection of light
- absence or pronounced reduction of the red reflex, commonly together with a white pupil
- normal pupillary reaction to light stimulus.

In some cases, it may also be possible to measure intraocular pressure, provided a tonometer (normally Schiøtz model) is available at the health centre, and that the personnel concerned has been sufficiently trained to obtain reliable readings. If these conditions apply, it is desirable to measure intraocular pressure in order to identify cases of obvious glaucoma with very high ocular tension before any surgery is considered.

#### 4.3 Referral for surgery

The actual referral for surgery will depend not only on the patient's status, but also on access to the provision of cataract surgery. Here, it is of importance that overloading the referral system be avoided, that some kind of recording system be established for referred patients, and that there should be feedback from higher levels of eye care to the health workers at the community level.

As a normal procedure in most situations, there should be a written record, or special form provided for each referred case, giving the name, age, place of residence and date. It is also desirable that the reason for referral is given by the health worker, even if not necessarily as a clearcut diagnosis, as this may also allow for an evaluation of his/her performance and possible need for further training. The feedback from the first referral, or higher, level should be arranged on a continuous basis, either by returning the referral forms with a brief description of action taken, or periodically in briefing sessions between the community health workers and the personnel at higher levels.

#### 4.4 Factors to be considered for large-scale cataract surgery

To deal effectively with the public health problem of a massive backlog of cataract it is essential that safe and streamlined routines be established. These should include the continuing recruitment and training of staff to cover wastage. Other factors requiring consideration include the following:

##### Type of surgical procedure

There is general agreement that the safety, speed and simplicity of the intracapsular extraction under local anaesthesia makes it attractive and economic for the present purpose. Changing to the microsurgical technique of extracapsular extraction would be dependent upon additional surgical skills and the availability of operating microscopes. Furthermore, it would incur a major decrease in surgical output and commonly requires a subsequent surgical procedure in the posterior lens capsule. The insertion of intraocular lenses would further complicate both the surgical procedure and the follow-up care. This would again reduce the number of cases operated upon and, in addition, increase the costs.

In any event, the wound should be closed with at least 5 fine sutures to reduce post-operative complications and allow for short hospitalization.

##### Allocation of adequate operating room space and time

In many situations the limit to surgical output is determined by insufficient availability of operating time and space. In others, the limiting factor is shortage of surgical instruments, drugs and other materials. In these cases all means of overcoming the obstacle should be considered.

##### Team approach to the management of facilities and operating time

In most situations, the development of the team approach to the management of facilities and the flow lines in the surgical procedures will substantially increase the output that a given surgeon can maintain. The provision and training of adequate numbers of nursing and managerial staff in the team will free the surgeon from distracting tasks. Furthermore, it allows for the implementation of fail-safe surveillance routines to minimize the risk of breakdown of sterilization procedures and sterile techniques (see (9)).

#### 4.5 Follow-up procedures after cataract surgery

Cataract surgery may be carried out in a variety of local settings, such as regular eye departments, district hospitals, eye camps, or by the hospitalization of patients in temporary local wards set up for visiting mobile surgical teams. In all these various situations, the period of hospitalization and the arrangements for post-operative care of patients operated for cataract is of great importance. It appears that the world over there is a general trend for shortened periods of hospitalization for cataract surgery, with an increasing amount of out-patient cataract surgery being performed in the most developed countries. In the setting of developing countries and rural populations there are, however, several factors to be taken into consideration :

- the surgical technique must provide a good wound closure to prevent complications in early mobilization of the patient;
- the patient must be able to comply with the post-operative treatment prescribed;
- the patient should normally be available for a daily post-operative assessment for a few days, with a subsequent final examination and provision of spectacles;
- the patient's social and economic status, together with transport problems, may necessitate a certain period of hospitalization.

It seems that, in many developing countries, a period of 5-7 days of hospitalization after cataract surgery is the present rule. There are, however, also examples of shorter periods (3 days) in some countries, but the possible risks of this shortened hospitalization have not yet been fully investigated, in terms of rate of complications or visual outcome. It is, nonetheless, of great importance that such studies be arranged, as a shortened period of hospitalization may allow a significant increase in the numbers of cases operated, provided there is capacity available for more cataract surgery in the locality concerned. This matter should, therefore, be considered a priority for operational research, to increase the output of cataract surgery within existing resources [see further (8)].

Post-operative treatment of cataract patients usually includes mydriatics, antibiotics and often also topical corticosteroids. Personnel at the primary health care level may assist in the provision of such treatment, or the surveillance of patients under treatment.

#### 4.6 Monitoring

In some situations it may be possible and useful to involve health workers or staff at health centres in the monitoring of possible post-operative complications, such as signs of infection or sudden visual loss. This may form part of a system for quality control of the services provided, i.e., an overall assessment of useful vision in operated patients, and its appreciation by the local community. It is of particular importance that every opportunity be taken to enable patients who are experiencing the benefits of cataract surgery to spread this information around in the local setting.

In all events, a system for the recording of complications during and immediately following surgery should form part of the system for provision of cataract surgery. This should preferably be done in a systematic and standardized manner, with regular analysis to permit identification of particular complications, and also to assess the performance of the responsible surgeon or surgical team in the local setting. It is of importance that quality control also be carried out on an independent basis, preferably by the appropriate professional organization.

#### 4.7 The provision of spectacles

Following surgery for cataract, arrangements should be made for patients to obtain spectacles for optimal restoration of sight. This, unfortunately, poses a great problem in many developing countries, where spectacles are often hard to find and are excessively expensive. The following preliminary measures may be taken to remedy this situation:

(a) Cheap and effective technology is available for the local assembly of spectacles from imported, or locally accessible, lenses and frame components. This may be arranged by establishing local optical workshops, where a simple set of tools for the surfacing and cutting of lenses and for the fitting of lenses into frames can easily be arranged at low cost. Bulk import of standardized spectacle components may further reduce the cost. The workshop may employ 2-3 trained technicians, and may be set up as part of a hospital or eye department, or through local nongovernmental organizations. The training period for the technicians is usually around 6 to 8 weeks.

The setting up of optical workshops, as described, has been successfully achieved in a number of countries, particularly in Africa. The initial investment required is approximately US\$15 000 - US\$20 000, including an initial stock of spectacle components. It has been demonstrated that spectacles may be produced in this way at a cost of \$3-\$6, and a small profit may be included to make the system economically viable.

It has also been shown to be useful to involve the Ministry of Finance and/or the Ministry of Commerce in such a venture, as frequently the materials and equipment required can then be imported duty free.

(b) Spectacles may be bought at modest prices from some countries, e.g., India, and then imported into the country concerned. This system may pose problems with respect to the need for foreign currency, and the often high import duties on spectacles. Furthermore, this does not promote the future self-reliance of the importing country.

(c) In countries where there is an existing industry for the production of lenses and frames, it has sometimes been possible to reduce the cost by bulk purchase, and by requesting special prices on a welfare basis, to be used for local assembly of spectacles for operated cataract patients who could not normally afford to buy spectacles.

(d) It may be possible in certain countries to involve the optical industry and opticians in making available spectacles at reduced prices on a special prescription basis for poor patients. This would require consideration of the existing market, in order to ensure cooperation of all parties involved.

(e) Used spectacles or frames may be available as gifts from certain welfare organizations in developed countries. This, however, requires much work to measure all the lenses and classify them accordingly. There is also often the problem of unsuitable correction for astigmatism and anisometropia. Thus, even if the cost may be less for these spectacles, it should be seen as a temporary measure for small-scale projects.

Provision must also be made for the repair of broken spectacles, and to replace lost or scratched lenses. This is again usually most easily arranged in local optical workshops. Standardized frame models would facilitate the repair and replacement of spectacles, but attention must also be paid to the consumers' acceptance of spectacle models and shape of lenses.

#### 5. MANPOWER RESOURCES AND TRAINING OF PERSONNEL

In most countries with an existing backlog of unoperated cases of cataract, there is a serious shortage of trained personnel to deal with the problem. This particularly refers to the availability of cataract surgeons, and this cadre of personnel must be dramatically and rapidly increased to permit the implementation of large-scale cataract intervention schemes in many countries.

There are, in general, four options for increasing the availability of cataract surgeons in a country:

(a) Increase the number of trained ophthalmologists who could assume responsibility for cataract surgery. This would require considerable investment in teaching facilities, and it would only have an impact several years later, in view of the long training period for the specialist level in most countries. Shorter periods of training, such as for a Diploma in Ophthalmology, would ensure the availability of suitably trained manpower to meet the immediate needs within a shorter time-frame. Such training courses, with emphasis on cataract surgery, need to be particularly encouraged and supported to increase the number of qualified ophthalmologists in a number of countries especially in Africa. Nevertheless, an increase in the number of qualified ophthalmologists is badly needed in a number of countries.

(b) Increase the number of cataract surgeons within the existing cadre of ophthalmologists in a country. Often only relatively few ophthalmologists are performing cataract operations in substantial numbers, while the majority perform very little or no surgery. It should be possible to involve more fully the national ophthalmological societies in cataract programmes, mobilizing their members to take a more active part in cataract surgery. This may be arranged on a periodic basis with voluntary work in rural areas, as part of a mobile team, or in fixed settings. Furthermore, more cataract surgery may be performed as part of the duties of junior ophthalmologists who may be posted in underserved areas for a given period.

(c) Increase the number of cataract operations by training new cadres of medical personnel to perform cataract surgery, such as general surgeons or medical officers. Training in cataract surgery may be arranged on an intense training programme basis for periods of 3 to 12 months, depending on previous surgical experience. This option allows a rapid increase in the number of cataract surgeons in a country, and may also facilitate the posting of such surgeons to rural areas.

(d) Training of paramedical personnel, such as ophthalmic assistants, to perform cataract surgery. This proposal is of interest to countries with an acute shortage of trained specialists, but with a rapidly growing backlog of cases of unoperated cataract, such as several countries in the African region.

It is clear that each country will decide on its own policy for prescribing qualifications for a cataract surgeon, but the use of general practitioners/surgeons or medical assistants for this purpose is already in place in some countries with positive results.

#### 6. COMMUNITY INVOLVEMENT AND SUPPORT

The need for community involvement and participation in eye health-related activities cannot be over-emphasized. Such participation should be actively promoted and fostered by providing information and education on the magnitude of the problem of blindness due to cataract in the community and on the curable nature of the condition. In this regard the perceptions of the community should be ascertained and taken into account when planning and implementing interventions.

In most developing countries, traditional medical practitioners are often not only respected members of the community but also serve as the front-line health providers for a large section of the community. Their active support and involvement could facilitate the delivery of cataract relief services. In mobilizing their support, it is necessary to impress upon them the disastrous effect of such procedures as couching for cataract. Provided with appropriate information and education on eye health, traditional medical practitioners could be a potent force in the motivation of the community and in fostering community acceptance of cataract relief services and greater compliance to treatment. While motivating the community to become involved, it would be necessary to identify resources from within the community itself, or from outside, to support the activities planned. Local organizations or philanthropic individuals can often be stimulated into providing support, and examples of such benefactors abound in some countries. Both the direct and indirect costs of surgery vary widely from country to country, and it is considered desirable to compute these costs at a country level using a standardized budgetary format (see Annex 3).

Nongovernmental organizations, both national and international, continue to provide technical and financial support to cataract relief services. In fact, the greater proportion of cataract operations in many developing countries is being carried out with varying support from nongovernmental organizations which have indeed often pioneered action in this field, leading to subsequent governmental involvement and support. The basic strategy of nongovernmental organization support should be to encourage the development of indigenous skills and self-reliance over an appropriate period of time. National resources should be gradually built up so as to sustain these activities even after international nongovernmental organization support is withdrawn.

The WHO Programme for the Prevention of Blindness collaborates closely with several international nongovernmental organizations active in providing cataract relief services in a number of developing countries. Further information on the work of these nongovernmental organizations is available in the reports of the meetings of the WHO Programme Advisory Group on the Prevention of Blindness and the reports of the meetings of the Consultative Group of Nongovernmental Organizations to the WHO Programme for the Prevention of Blindness. Copies of these reports are available on request from the PBL Office at WHO Headquarters, 1211 Geneva 27, Switzerland.

## 7. COORDINATION WITH OTHER HEALTH PROGRAMMES

Health care of the elderly and rehabilitation provide two examples of health programme areas which have a direct impact on blindness prevention programmes in general and cataract intervention in particular. Visual impairment has been identified as one of the more common health problems in the elderly. Besides impeding both domiciliary and selfcare, visual disabilities impair the quality of life of this population group and detract from the independence, self-esteem and the standing of the elderly in the community.

National blindness prevention programmes can establish mutually beneficial linkages with programmes for the health of the elderly in countries where these are active and this could also involve linking up with other nongovernmental organizations.

The programme for rehabilitation of the disabled has increasingly reoriented towards both prevention of disability and community-based rehabilitation services for the disabled.

Such programmes are currently operational in several countries, often with nongovernmental organization support, and include community-based screening for identifying disabled persons and their referral for treatment. Ophthalmological linkages with the rehabilitation programme at national levels should be encouraged.

## 8. ROLE OF OPERATIONS RESEARCH IN PREVENTION OF BLINDNESS ACTIVITIES

The term operations research has been used in a variety of ways with different meanings. Very simply defined, it is a methodology for problem definition, analysis and solution-seeking that considers all the relevant components and their interrelationships. The relevant components include environmental, economic, social and behavioural factors. Operations research within the context of the community applies the scientific method to problem solving in the management and control of community systems using an interdisciplinary team approach in order to best serve the interests of the community as a whole. At the community level, this methodology should be carried out involving maximum community participation. Implicit in this definition is using the appropriate technology that will reach the largest number of individuals affected by the problem, considering how the chosen technology will have an impact on relieving of the problem in relation to available community resources. Further, the definition implies that the scientific method, i.e., definition of the problem, identification of causes and modelling of the potential solutions and evaluation of results, will be applied within the context of the communities' available resources or access to necessary resources at reasonable cost. Hence, operations research is very appropriate as a methodology within the concept of the primary health care system to address causes and solutions to public health problems. The backlog of curable age-related cataract blindness is, of course, one such public health problem.

The first task is to define the problem of blindness properly within the community setting - its dimensions, consequences, causes, characteristics, social dimensions and deterrents to solutions. This must be done at the local level since there is no universally applicable community programme for prevention of these blinding conditions that adequately considers, for example, cultural, social and economic diversity.

Once the problem is defined, a careful analysis and modelling of cause and solution must follow. For the backlog of age-related cataract, only an increase in the number of operations will solve this component of the community blindness problem but there may be many different barriers to accomplishing this. These must be identified and the possible means of overcoming them considered.

Once a community analysis of the problem, its causes and potential solutions has occurred, the next step is to determine from the communities' perspective what the objectives of a specific programme to prevent blindness should be. If community leaders have been involved in the definition and analysis of the problem and its component parts, they will be better able to conceptualize how the problem fits into their total programme of community development and as a result set out precise, realistic goals or objectives for prevention of blindness activities. Based on these objectives, a careful analysis of

available community resources must follow and be considered in balance with those available to meet overall community needs. Finally, the probable impact of the prevention of blindness programme decided upon relative to the needs of the community as a whole should be articulated as a basis for future evaluation.

In summary, operations research provides a strategy or methodology for planning, implementing, and evaluating prevention of blindness activities most of which can be carried out within communities with minimal external assistance. Importantly, those activities that do require external professional, logistical or economic aid can be clearly identified and justified.

In 1986, an international group of experts and representatives of nongovernmental organizations met to discuss issues surrounding the global conquest of cataract blindness.\* The group identified a series of project areas they felt deserved priority attention, among which were a series of operations research projects. These included research :

- to identify and motivate the cataract-blind to seek surgery;
- to improve access to surgery;
- to develop minimum-level surgical facilities;
- to improve operating room efficiency;
- to reduce postoperative hospitalization; and
- to increase the number of ophthalmic personnel.

It is hoped that research projects in these areas within the context of the primary health care system will receive priority consideration.

#### 9. EVALUATION OF CATARACT INTERVENTION SCHEMES

Monitoring and evaluation of cataract intervention services should be an important in-built component of the planning for this activity. While monitoring would provide information on a day-to-day basis on the implementation of the scheme in relation to the planned time-frame, evaluation would indicate the achievement of the activity in relation to identified indicators and targets.

Monitoring should include an "early warning system" to alert the team manager of any untoward complication that might point to a serious breakdown in the established delivery system or sterile surgical technique.

Evaluation should take stock not only of the quantity of services provided but also their quality and costs. Such analysis should be made available at short periodic intervals to the providers of services to enable them to improve their performance as well as to encourage them in their work.

Long-term evaluation may assess the unmet needs in the community in relation to cataract blindness, the impact of the intervention on the eye health status of the community and the well-being of the population. The evaluation should also include an assessment of coverage by the services, and of available resources including trained manpower and infrastructure.

Evaluation assumes particular importance in the context of nongovernmental organization-supported activities both for the establishment of an acceptable accountability for resources provided and to facilitate their future fund-raising efforts.

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\* "To restore sight - the global conquest of cataract blindness". Helen Keller International Inc., 15 West 16th Street, New York, N.Y. 10011, USA

## CONCLUSIONS AND RECOMMENDATIONS

The participants of this Interregional meeting, having reviewed and discussed the following facts:

- that cataract is by far the most common cause of blindness in all countries, usually responsible for some 50% to 70% of all blindness;
- that there are no proven preventive measures against the development of cataract;
- that loss of sight due to cataract can be successfully restored through surgery, and that such surgery is safe, effective and can be carried out at low cost;
- that there is a growing backlog of unoperated cases of cataract reaching public health dimensions in many developing countries,

wish to put forward the following conclusions and recommendations:

1. The magnitude and serious public health problem of blindness due to cataract has been demonstrated in a number of developing countries in recent years, including the existence of a backlog of unoperated cases. There is still, however, a need to assess this problem in other countries; it is, therefore, recommended that this be done as a matter of some urgency to allow for the planning and implementation of intensified action, within national programmes for blindness prevention, for large-scale provision of cataract surgery.
2. It is recommended that a primary health care approach be applied in countries to deal with cataract blindness, particularly for the early detection and referral of cases in need of surgery. These activities should be integrated into existing primary health care systems. In most of the countries concerned it will be necessary to allocate increased resources to overcome the problem of blindness due to cataract, which should form part of the development of general health services at the national level.
3. Whereas at the primary health care level measures to detect and refer cases of cataract in need of surgery can be introduced relatively easily, it will be necessary in many countries to strengthen the intermediate level of eye care, in order to perform a sufficient number of cataract operations. It is recommended that all possible means be sought to achieve this, making use of all applicable options to provide cataract surgery on a large scale, at an accessible distance, and at low cost; options to be considered in this context may include mobile surgical teams, rural eye clinics, eye camps, and in certain areas fixed facilities for high-volume cataract surgery.
4. It is of great importance to promote awareness about cataract surgery and its benefits in afflicted communities, in order to encourage patients to come forward for operation. It is, therefore, recommended that measures be taken in the countries concerned, to spread information and education about cataract as a cause of curable blindness, and that communities are fully aware of and involved in local cataract intervention schemes. It is of particular importance that community health workers and personnel at the primary health care level are correctly informed and well motivated to participate in the promotion of cataract surgery.
5. It is strongly recommended that spectacles for aphakic correction be provided as part of the services for cataract surgery. This will allow optimal restoration of sight and at a modest cost if local schemes for the provision of spectacles at an affordable price are developed simultaneously. Governments should be encouraged to set up or facilitate the establishment of appropriate schemes to ensure that spectacles are made available at affordable cost to all patients operated for cataract.
6. One of the recognized constraints in many countries to gaining acceptance of cataract services has been the cost of surgery and corrective glasses. It is recommended that, while appropriate improvement in managerial and technological skills be adopted to reduce costs, resources be mobilized from the local community and national and international nongovernmental organizations to subsidize the cost of surgery and aphakic spectacles.

7. The professional ophthalmological organizations and academia should be oriented to the national priority for provision of adequate and appropriate surgical services for cataract. It is recommended that targets for the number of cataract operations per annum should be set in countries with a substantial backlog in need of surgery.

8. There is a serious shortage of ophthalmologists in most developing countries. The length and cost of many existing training programmes are such that it is unlikely that these programmes can meet the needs of the countries concerned within the foreseeable future, given existing resource constraints. Additional shorter training schemes should be developed focusing on the needs of surgical services, while maintaining other educational schemes to meet the needs of academia. Governments should assume the responsibility for creating posts and career structures for the personnel thus trained.

9. In some countries, much of the general preventive and curative services are provided by personnel who are trained as clinical officers, through an extended apprenticeship. Certain of these are selected for training including cataract surgery. The quality of their cataract surgery has been shown to be fully acceptable. It is recommended that this pattern be encouraged in countries where the need exists, and where national regulations so permit.

10. The training of personnel for the intermediate level of referral between the primary health workers and the secondary eye care level is recommended. Such personnel can play a vital role in training and supervising peripheral workers in eye health care and the recognition and referral of patients for cataract surgery.

11. Traditional healers play a very important role in providing information, or misinformation, about health, and in referral or non-referral of patients for scientific medical care. In many societies they act as front line health care providers. Their potential role in eye health education should be strengthened. They should be informed about the availability and effectiveness of cataract surgery and discouraged from harmful procedures, particularly couching.

12. There is a great need to use operational research as an effective tool to overcome obstacles to the provision of cataract surgery effectively, on a large scale, and at the lowest possible cost. It is recommended that studies in this respect be conducted in selected countries, including fields such as the consumers' and providers' behaviour in relation to utilization of health services, surgical techniques for optimal safety and cost, management of surgical wards and hospital facilities, and shortened hospitalization.

13. One important aspect of cataract surgery on a large scale is to ensure and maintain a system for quality control. It is recommended that this be included from the outset of national programmes addressing blindness due to cataract. Appropriate records of surgery provided, of complications, if any, and visual results, together with a simple but adequate follow-up reporting system should be developed to this end, involving health personnel at the primary health care level.

14. It is recommended that national programmes including cataract relief services be carefully monitored, and periodically evaluated against established targets. It is of particular importance that progress made be measured against the reduction of any existing backlog of unoperated cases.

15. As part of the search for preventive measures, it is recommended that further research on risk factors for cataract be conducted, with a view to identifying possible environmental or biological determinants, amenable to intervention.

16. It is recommended that every opportunity be taken to measure the impact on eye health, and in particular on cataract, that may result from the implementation of various components of primary health care.

INTERREGIONAL MEETING ON THE MANAGEMENT  
OF CATARACT WITHIN PRIMARY HEALTH CARE SYSTEMS

Denpasar, Indonesia, 15-19 December 1986

DRAFT AGENDA

Opening of the Meeting

Election of Officers

Adoption of the Agenda

1. The magnitude of curable blindness (global and regional assessments)
2. Definition and epidemiology of blinding cataract
3. Strategies for action against cataract
4. Application of cataract intervention schemes within primary health care :
  - case-finding
  - assessment/referral
  - referral for surgery
  - follow-up procedures
  - provision of spectacles
  - quality control
5. Training of personnel in relation to management of cataract
6. Community involvement and support
7. Coordination with other programme areas (care of the elderly)
8. Health systems research needs
9. Evaluation of cataract intervention schemes

Conclusions and Recommendations

Closure of the Meeting

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ANNEX 2

INTERREGIONAL MEETING ON THE MANAGEMENT  
OF CATARACT WITHIN PRIMARY HEALTH CARE SYSTEMS

Denpasar, Indonesia, 15-19 December 1986

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## COST OF MANAGEMENT OF CATARACT IN INDIA

Cost of maintenance of a blind person	=	\$ 0.50 per day
Costs due to loss of production	=	\$ 0.50 per day
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Total loss per day	=	\$ 1.00
Total loss per year	=	\$365.00
Cost of restoration of sight to cataract blind	=	\$ 25.00

## COST OF CATARACT SURGERY

	Paying Ward Patient	General Ward Patient
In Tertiary Care Centres	\$150 to \$200	\$40 to \$50
In Secondary Care Centres	\$40 to \$50	\$20 to \$25
In Eye Camps	-	\$22 to \$28 inclusive of local inputs and cost of cataract glasses. Input made by local community in terms of volunteers and donations made in kind

Data provided by Professor Madan Mohan  
Adviser in Ophthalmology  
Government of India

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