

Original Research Article

Assessment of eye health care services of Bangladesh using eye care service assessment tools

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ABSTRACT

Background: Bangladesh is being the commissioner for oaths to vision 2020, a global campaign for elimination of avoidable blindness by 2020, formulated a national eye care plan. This report illustrates the present status of Bangladesh eye health care service using eye care service assessment tool (ECSAT) that assesses an eye health system across six 'building blocks' of a health system.

Methods: The study followed a mixed method to collect data. World health organization (WHO) standard ECSAT was used to gather information on eye care service. A purposive sampling method was used. Data from the assessment were extracted and all the information was cross-checked with leading stakeholders of ministry of health.

Results: Eye care planning is led by the national eye care. There is a national eye health action plan and a national eye health coordination office under the ministry of health. The health delivery system includes primarily government and non-profit facilities with eight hospitals delivering specialist eye care services across the country. A significant proportion of eye care is provided through community outreach camps and a network of primary and community health workers. The national cataract surgical rate (CSR) is estimated at 2600 per million populations per year.

Conclusions: This assessment suggests that although Bangladesh has made some progress towards elimination of avoidable blindness, it would be difficult to retain without further significant investment with a transparent accountability framework in eye health considering all limitation and contemporary challenges.

Keywords: Eye health, ECSAT, Health system, Bangladesh

INTRODUCTION

Vision is the most important sense for human being, and it has a profound implication on life, health, sustainable development, and economy. Worldwide there nearly 250 million people living with vision moderate to severe impairment, among whom 36 million are blind.¹ Over billion people have near vision impairment, simply because they do not have pair of reading spectacles.¹

Bangladesh is a developing country with a population of 165 million (July 2020 estimate).² Moreover, the population density (1,265 people per square kilometer) makes the country one of the world's most densely populated countries.² Almost one-fourth of its population live under the poverty line, with a high concentration towards the rural.³ Over the last few decades, Bangladesh has been facing both demographic and epidemiological transition. Despite tremendous progress in the areas of

health, population, and nutrition, many other public health issues remain unaddressed due to resource or financial restrictions, as well as the country's decrepit health system.⁴ Blindness and visual impairments are such kind of public health emergency in Bangladesh. The WHO global eye health Action plan 2014-2019 intends to minimize avoidable vision problems and ensure that visually impaired people have access to rehabilitation services. It is focused on a health system approach, which includes the integration of eye care services into broader health systems at all levels.⁵

The ECSAT is designed to help with the implementation of evidence-based treatments by collecting data and information on a regular basis in order to assess the impact of interventions, identify trends, and analyze gaps in eye care services at a national level.⁶ ECSAT is a standardized tool that assesses an eye health system across six 'building blocks' of a health system proposed by the WHO; governance, financing, service delivery, human resources for health; medicines and technologies; and health information and management system (HMIS).⁶ This study yields guidance for assessing the status and functionality of Bangladesh's eye care service based on the six areas of the WHO framework for strengthening health systems. The objective of this study is to carry out a comprehensive assessment of eye care services at a national level by using ECSAT tool which will ultimately aid in planning and implementation of decisions regarding eye care services. Findings from this study will assist in refining and updating national plans and strategies for eye care in Bangladesh. ECSAT also helps to identify gaps with a view to assure of comprehensive and integrated eye care service in Bangladesh.

METHODS

Study type

We conducted cross-sectional study using mixed-method research combining both quantitative and qualitative research methods. The mixed-methods design was mostly quantitatively driven; the quantitative data was collected initially main component; then qualitative data-that helped explaining and/or elaborating on quantitative results and allowed triangulation of study findings.

Study place and period

The study was conducted from 10th June to 30th June 2018. Over the study period, quantitative data was collected from 271 eye hospitals across the country. Primarily we have approached 344 eye hospitals in Bangladesh, however due to administrative issues we managed to collect data from 271 eye hospitals. This study was assessing the eye health care system in Bangladesh; therefore, the study was hospital based, and we did not have specific inclusion and exclusion criteria. All the studied hospitals are providing eye health services

across the country. A detailed list of the studied hospitals will be provided upon reasonable request.

Sampling and data collection

A purposive sampling method was used to identify eye care health professionals to conduct data collection procedure, 45 eye professionals from different sectors involved at primary, secondary, and tertiary health care levels invited and attended in data collection procedure.

The following methods were used to gather information: One consultative meeting with the stakeholders, including governmental and non-governmental organizations, is involved in providing eye care services, face to face interview with leading stakeholders like line director of national eye care (NEC), vice president of Asia Pacific academy of ophthalmology, additional director general of health services (Planning and development), director primary health care, telephonic interview with president of ophthalmology society of Bangladesh, chairperson of international NGO forum and documents review with the support of ministry of health (MoH).

Data collection tool

ECSAT 2014 version was used to gather information on the eye health care system. It is a structured open-ended questionnaire where questions on six building blocks of the health system. This instrument was previously used in the different contexts of low and middle-income countries to analyze the eye health care system. The instrument was adjusted as per the Bangladesh context as the health system's structure varies from region to region.

Ethical approval

The ethical approval for the study was obtained from the institutional ethics review committee at interactive research and development, Dhaka, Bangladesh; and the administrative approvals was taken from the directorate general of health services (DGHS), and respective hospital authorities of the study sites.

Data analysis

All information was collected in the paper-based questionnaire. Data from the assessment were extracted and all the information was cross-checked with the leading stakeholders of MoH. All the relevant information of the respective domain was used for analysis using the Microsoft office excel 2010 version.

RESULTS

Demographic data of the studied health facilities

We conducted our study in 271 health hospitals in Bangladesh including government, private, and non-

government organization health facilities. A detail of the distribution of the hospital is provided in Table 1. Majority of the hospital were private health facilities, followed by NGO and government. Most of the facilities were situated in Dhaka division, followed by Chattogram division (Table 1).

Table 1: Distribution of the eye health facilities in Bangladesh according to the division.

Division	Government	Private	NGO	Total
Dhaka	8	42	14	64
Barisal	5	15	7	27
Khulna	2	13	6	21
Sylhet	4	21	11	36
Rajshahi	2	19	8	29
Rangpur	1	13	5	19
Chattogram	6	31	13	51
Mymensingh	2	13	10	25
Total	30	167	74	271

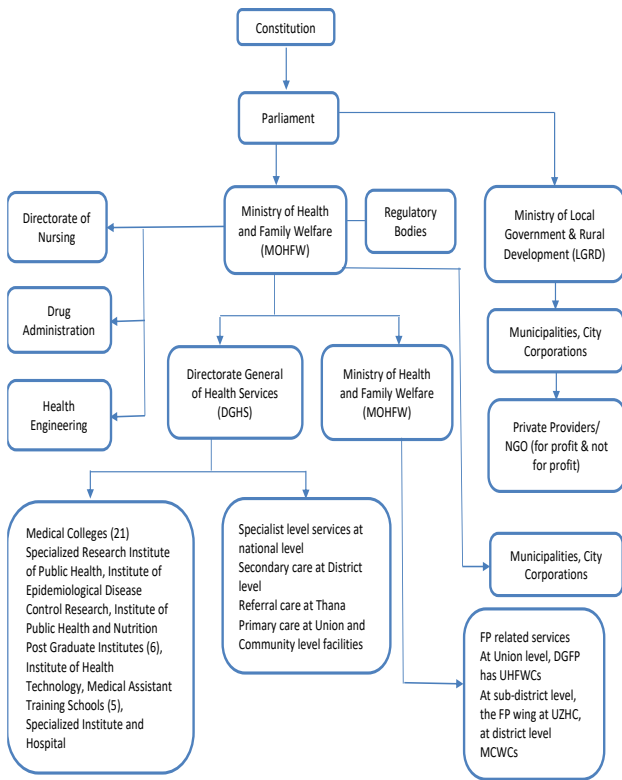


Figure 1: Health system structure of Bangladesh.

Structure of health care service delivery system

Bangladesh's health care system is ruled predominantly by three actors: government, private and non-governmental organizations (NGOs). Nevertheless, another actor, named "Donor," supported the health system in financing and planning. There is a specific constitution to serve the health facilities. Government is

the principal mandate which is accountable for this responsibility (Figure 1).

Bangladesh's health care system has two ministries, one for rural and urban primary care and another for service provision. Under the MoH, there are two wings named directorate of general health services (DGHS) and the ministry of health and family welfare (MOHFW). The DGHS and MOHFW are responsible for simultaneous implementation of health and family planning services, mostly at the secondary and tertiary levels. On the other hand, the ministry of local government and rural development (LGRD) acts for primary-level service provision at the ward and community level of urban areas. However, for rural areas, some non-state actors and private informal providers maintain the primary level of care. All human resources of such as physicians, nurses are appointed by the government (Figure 2).

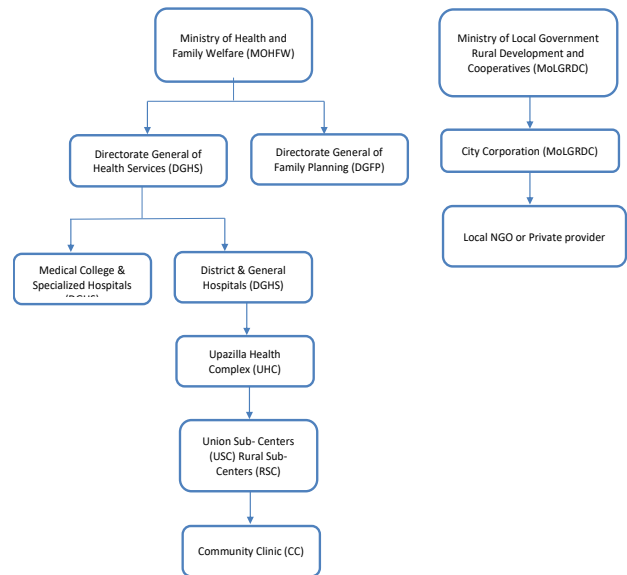


Figure 2: Organizational structure of Bangladesh service delivery system.

Leadership and governance of eye care of Bangladesh

Comprehensive eye care (CEC) encompasses not only treatment of eye diseases, but also prevention, promotion, and rehabilitation of incurable blindness. At present there are many isolated guidelines for eye care but none of them endorsed by national level authorized body. Under the esteemed preeminence of NEC, a nationally accepted guideline yet to be developed for diagnostic and treatment procedures that are provided by primary, secondary and tertiary eye care establishments. Regarding diagnosis and treatment of eye conditions, the range of eye care services specified for ophthalmologists and ophthalmic nurses is endorsed by MoH. The other allied eye healthcare providers e.g., optometrists, opticians work in private sectors but are not legislated by government. The scope of ophthalmology practice legally

authorized and specified by Bangladesh medical and dental council (BMDC), on other hand ophthalmic nurse licensed by state owned Bangladesh nursing council.

Primary eye care includes a basket of services carried out at community level. Government contributes bulk of primary eye care services (90%), that comprises prevention and treatment of the commonest eye conditions and referral for most surgical conditions, such as; cataract and glaucoma surgery. This also covers promoting eye health in the community, screening, case finding and referral, emergency treatment, identifying and referring for rehabilitation those who are already blind, and providing commonly required services like refractive error correction. Secondary-level eye care is comprising primary eye care services plus surgical services for the commonest eye conditions, such as cataract and glaucoma which is provided by licensed ophthalmologists and aided by optometrists and other healthcare providers. Government and non-state actors facilitate majority of the secondary eye care services while rest of the services is provided by the private practitioners which is financed by the out of the pocket payments by the patients. Tertiary eye care services comprise all subspecialty eye care services, including advanced diagnostic, medical and surgical treatment for both children and adults. Facilities for such sophisticated eye care are often available in medical college hospitals or similar institutions. Government and private tertiary eye care centers provide 95% of services of which 70% is covered by the government at free of charges. A detail of the level of eye care provisions at different level by the providers is described in Table 2 (Table 2).

Table 2: Level of eye care provision at primary, secondary and tertiary level.

Level of eye care provision	Primary eye care (%)	Secondary eye care (%)	Tertiary eye care (%)
Eye care provider			
Government	90	50	70
Private practitioners	0	10	5
Non-state actors	10	40	25
Total	100	100	100

Eye care financing

The government of Bangladesh has set aside about 0.05% of total budget, approximately £7.9 million spend on NEC over the next five years, which was four times higher than the previous budget. The money will be used to expand the country’s eye care facilities, improve performance at government-funded hospitals and monitor patients more effectively following their treatment. The government is committed to deliver essential eye care services mostly at free of cost. There are 2 tertiary eye institutions which is dedicated for serving people of all class at free of cost. Only licensed ophthalmologists are eligible to provide eye care services in private practice

under supervision of BMDC. Various non-state actors also provide eye care services in the country where eye care services are free for selected individuals. Majority of the treatment cost is being carried out by out-of-pocket expenditures by the beneficiaries. Provision of spectacles and assistive devices for visual rehabilitation services are typically not covered by the government. Government of Bangladesh provides cataract surgery at free of cost whereas average cost of cataract surgery in private practice is around 235\$ and non-state actors provides at only around 50\$. However, there are also options for low-income citizens to receive surgery for free or at minimal cost in both government and non-State facilities. Health insurance is not a very common service in Bangladesh but there are some financial institutions that typically cover all eye care services which ranges from refraction to intra and extra-ocular surgeries as well as treatment of retinopathy of prematurity. Unfortunately, any cost-benefit analysis study has not been conducted on eye care services for prevention of avoidable visual impairment/blindness and rehabilitation services in Bangladesh.

Eye care workforce

There appears to be very few national human resource information systems in Bangladesh and the data presented here was compiled from the national deployment records by NEC. In NEC, eye care cadres comprised of ophthalmologist, optometrists, ophthalmic nurse and opticians. Ophthalmologists are medically trained physicians who is registered at BMDC and undergone 2-5 years of post-graduate training on ophthalmology. Bangladesh college of physicians and surgeons (BCPS) and Bangabandhu Sheikh Mujib medical university (BSMMU) are the prime academic institutions to formulate syllabus and held examinations on ophthalmology. The total number of registered ophthalmologists at BMDC around 1200 against the need of 1600 and the number of ophthalmologists by subspecialty is not noteworthy. More than half of them is working as general ophthalmologist and cataract and cornea specialists are next in number. On the other hand, optometrist, works under supervision of ophthalmologists at various private eye hospitals, is trained for 1.5 to 3 years at different private institutions. University of Chittagong is the only recognized academic institution who is responsible for preparing curriculum for optometrists and opticians. Ophthalmic nurses are working in both government and private eye hospitals. Nurses are trained for 1-2 years and certified by Bangladesh nursing council. Table 3 describes the distribution of human resources for eye care in Bangladesh (Table 3).

There is a shortage of all types of eye health cadres with 4 times less surgeons, 2.5 times less ophthalmic clinical officers/nurses and nearly 10 times less optometrists than the minimum recommended levels for South Asia. government’s plans or strategies for the development of

human resources for eye health care have not yet been prioritized to address the need of the country. Eye care training institutions (e.g., National institute of ophthalmology, BSMMU, BIRDEM, Ispahani Islamia eye institute and hospital, CEITC) involved in implementing government strategies and plans are very few and majority of them is situated in Dhaka. Approximately 30 ophthalmologists and 20 optometrists from available educational institutes are certified each year.

Eye care service provision

Comprehensive eye care services are available in large urban areas; the costs are partly paid by patients. Populations in rural areas have difficulty in accessing services because of cost and/or transportation. There are 5 tertiary eye care establishments in the country and 4 are located in Dhaka, Capital of Bangladesh, while just one is located in Chattogram district. To compensate for shortages of specialized eye care services, government have tied up with NGOs and implemented innovative approaches (e.g., Outreach program, telemedicine) to reach peoples of remote areas. There is also patient-centered eye care (e.g., diabetic centers providing multidisciplinary health services, including eye services) at BIRDEM. All medical colleges are supported and promoted by the government through health strategies or policies.

We have estimated the total number of cataract surgeries in the 2019 calendar year as an indicator of eye care service delivery. A total of 344 eye care facilities are providing somehow eye health care services in Bangladesh, of which 78 are government facilities, 75 are NGO facilities, and 191 private facilities. Among 344 health facilities, cataract surgeries were conducted in 271 health facilities. A total of 422 905 cataract surgeries was done in 2019 in 271 facilities. We estimated the prevalence of CSR in Bangladesh in 2019 was 2,594, adjusted with Bangladesh's population in 2019 (163.05 million). According to the divisional level and type of facility, the prevalence of CSR is presented in table 4. It was observed that most of the cataract surgery was done in the Dhaka division, followed by Chattogram and Khulna. In all the divisions, most cataract surgery was conducted by NGO health facilities, followed by private and public facilities (Table 4).

Despite of the government's initiative towards accessible eye care for eradication of avoidable blindness, there is still some gaps in the provision of cataract surgery service or in the uptake of the services by patients which includes geographical inaccessibility, unavailability of human resources, lack of awareness, lack of counseling, unaffordability. Refractive error contributes a significant number of visual impairments in Bangladesh. Refractive services are provided by both ophthalmologists and optometrists. On an average 4.00 USD is needed to avail a basic good-quality prescription glasses inclusive of

lenses and frames. Diabetes mellitus (DM) is a global epidemic with significant ocular morbidity. The global burden of visual impairment due to diabetic retinopathy (DR) is on the rise and expected to reach global epidemic proportions in the next few decades. To whip visual impairment due to DR into shape, DGHS espoused national guidelines or programs for detection, treatment, referral, and periodic follow-up of DR. Both the DGHS and Non state actors conduct programs or activities to create awareness among people with DM about the risk for DR. Glaucoma, one of the leading causes of blindness. Sadly, there is no national guidelines or programs for detecting and treating glaucoma. Perimeter is used for standard visual field examination, but it is not adequately available and accessible in Bangladesh. Patients need timely therapy to slow the progression of glaucoma. Regarding the glaucoma treatment, only eye drops are adequately available in the country. The laser procedures, filtering microsurgery is done in very modest number and is limited within tertiary eye hospitals. The cost is fully or partially covered by government funding but in private hospitals patients pay the complete treatment. All newborn infants are not possible to be given routine examinations for congenital and other eye conditions because it requires expert health professionals such as obstetricians, neonatologists, or midwives. There is a guideline for routine, periodic eye examinations for children. The screening for eye conditions in pre-school and school conducted in the country is conducted by school sight test program. There are no guidelines for routine eye examinations of newborn infants at national level, also screening and management of ROP is not widely available at national level. There are 2 cornea banks in the country, one is in Dhaka and the other is in Chattogram, which abided by a set of rules/ legal requirements for donation and use of corneal tissue which is illustrated in national organ transplantation act by Bangladesh government. There are 5 rehabilitation services for blind and visually impaired people available in the country.

Essential medicines, medical products, and technologies for eye care

List of essential medicines, medical products and technologies for eye care are issued by DGHS at the MoH. There are also supporting government policy to ensure rational use of the essential medicines, medical products, and technologies. This list is updated in every 3 years interval which is chalked out on demand from end users and promoted by DGHS. DGHS negotiate and monitor procurement prices for eye medicines and approve their domestic use. None of the imported medicines, medical products and technologies can be used without approval by the government. Domestic pharmaceutical companies contribute bulk of the eye medicines, medical products, or technologies. There are no best practices and case studies for ensuring equitable access to essential medicines for eye care in the country. There are obvious plans to improve equitable access to

essential medicines, medical products, and technologies for eye care.

Health information system

Bangladesh has a management information system (MIS) on national health which is administered by DGHS. DGHS of MoH regularly publish a national comprehensive health statistics report on its website for seemingly easy access to national health information by individual researchers, research institutions and the public. However, NEC holds the authority to decide which health data and information will be collected centrally in the country and usually the source of data are various eye care establishments of government, private

and national or international nongovernmental organizations. National institute of population research and training (NIPORT) conducts survey in 5 years interval and survey had included questions on eye care and eye health. The centrally collected data and information on eye care and eye health in the country disaggregated by the sex, gender, district or other administrative unit, reporting eye care establishment. But the compliance of the people who provide information is not monitored. According to DGHS, national health bulletin is the periodic publication where information on eye care and eye health is routinely collected but it lacks information on the eye conditions in periodical district or national disease surveillance.

Table 3: Distribution of eye care workforce throughout the country.

Eye care professionals	Government	Private	NGO	Total
Ophthalmologists	500	400	300	1200
General ophthalmologists	300	100	200	600
Cataract and corneal surgeons	200	100	200	500
Retinal surgeons	10	5	35	40
Pediatric ophthalmologists	15	0	25	40
*Oculoplastic surgeons	--	--	--	--
*Glaucoma surgeons	--	--	--	--
*Uveal surgeons	--	--	--	--
Optometrists	0	500	200	700
Opticians	0	20	80	100
Ophthalmic nurses	200	0	0	200
Orthoptists	Nil			
Ophthalmic and optometric assistants	200	0	600	800
Ophthalmic and optometric technicians	5	5	0	10
Vision therapists	0	2	0	2
Ocularists	0	0	1	1
Ophthalmic photographers and imagers	2	6	12	20
Ophthalmic administrators	0	100	200	300
*Mid-level ophthalmic paramedics (MLOP)	--	--	--	--
*Counsellor	--	--	--	--

*Information is not available

Table 4: Distribution of number of cataract surgery according to division and type of facility in Bangladesh in 2019.

Division	Public	Private	NGO	Total (%)
Dhaka	27,835	49,457	81,288	158,580 (37.5)
Barisal	388	565	14,964	15,917 (3.8)
Khulna	2127	8416	41,781	52,324 (12.4)
Sylhet	543	7523	19560	27,626 (6.5)
Rajshahi	1331	5274	31862	38,467 (9.1)
Rangpur	1732	8236	35,801	45,769 (10.8)
Chattogram	1521	8443	51,510	61,474 (14.5)
Mymensingh	2355	7127	13266	22,748 (5.4)
Total (%)	37,832 (9)	95,041 (22)	290,032 (69)	422,905 (100)

DISCUSSION

To our best knowledge, this is the first study conducted in Bangladesh using the WHO-recommended ECSAT tool to explore and learn from the strength and weaknesses of the eye health care system in Bangladesh. Studies in the developing countries found that lack of the awareness, availability, accessibility, and affordability of services constitute significant treatment-seeking barriers for eye health care.⁷ These observations also seem to apply for Bangladesh, where 37.5% of patients attended a public health facility for eye/ear/nose/throat diseases. In comparison, 25% of them sought no treatment or sought treatment from traditional healers.⁸

A meta-synthesis of eye health system assessments shows that different Sub-Saharan Countries of Africa have used either ECSAT or EHSA (Eye health system assessment) tool to assess their overall eye care situation. Across the eight countries, findings show considerable progress and improvements in the areas of governance, organization, financing, provision, and coverage while some weaknesses were found those impede quality eye health service planning and delivery.⁹ Assessment of eye care service is essential part for improvement of service delivery quality at the same time it also plays a vital role in integration of eye care service into broader health system. Universal eye health coverage is a long-term goal of a country's public health sector and the government of Bangladesh has put in place important governance mechanisms to ensure eye health system development and its integration in the broader health system. eye health is included in the Bangladesh's health sector strategic plan 2011-2016 and in the essential health package and since its inception, Bangladesh has made significant improvement in all areas whereas other developing countries like Kenya, Malawi, Zambia, Mali are still struggling to make an impact on the eye care service.¹⁰ Similar scenario has also found in Sub-Sahara African countries. Bangladesh has made praiseworthy progression in the field of cataract, diabetic retinopathy, glaucoma and refractive error management. But Malawi and Sierra Leone have not managed to do due to lack of funding and political stability.¹¹

We found a marked improvement in the provision of eye care across the country, which was indicated by CSR's prevalence. The study suggested that at least 3,000 CSR/year/1 million people is needed to control blindness due to cataract. Our study estimated that the CSR in 2019 is 2,594 per 1 million, which was a tremendous achievement in the last 20 years. Several measures initiated by the government, private organizations, and NGOs influenced this achievement.¹² Firstly, community outreach camps and community-level vision centers were established in the rural and remote areas by the government, NGOs, and private sectors to conduct minor treatment and referrals through community clinics. Dedicated Eye operation theatres were established in the

government district hospitals. Trained ophthalmologists and nurses were placed, and equipment was provided to the government district hospitals. Secondly, government health workers and community volunteers received trainings on awareness-raising, identification, and referral services to the eye care facilities. Micro-credit organizations and other NGOs were involved in strengthening awareness-raising and referral services. Use of mass media like billboards, posters, leaflets, radio/television advertisements are being used for awareness-raising.¹³ Thirdly, the government and NGOs like 'Sightsavers' provided free eye care services focusing on cataracts. For instance, 'Sightsavers' alone carried out 41,659 cataract surgeries in 2016.¹⁴ The Fred Hollows foundation are providing free eye care services for cataract, refractive error, and diabetic retinopathy since 2008. Orbis international provides free eye care services to the poor, prescribing glasses and providing training to the workers since 1985. Orbis international is also contributing to cataract, pediatric ophthalmology, diabetic retinopathy and ROP services.¹⁵ Charitable organizations like Lions, Rotary, etc. are providing free eye care services, mainly cataract. Fourthly, national cataract surgical protocol, pediatric clinical protocol, pediatric eye care guideline has been developed and implemented to the eye care facilities. The patient feedback system was introduced, and a regular monitoring visit by NEC and DGHS is being carried out.

However, despite these achievements, a range of systemwide weakness continues to challenge the sustainability. Most importantly, a limited number of health workers compared to the population is below targeted for all clinical cadres. Besides, the unequal distribution of human resources throughout the country, making it more challenging. According to the recent HRD report 2019, an estimated 8.03 health professionals, including doctors, nurses, and midwives for 10,000 populations in Bangladesh with more concentration towards urban secondary and tertiary facilities.¹⁶ The scarcity of human resources is accompanied by short of necessary equipment and supply, which was most severe in the remote areas. Besides, we found a lack of detailed information available through the health system's different building blocks with no proper documentation management, which makes the evaluation ineffective.¹⁷ However, this does not mean that the government officials are reluctant to share information. Instead, our findings suggest an urgent need for enhanced governmental efforts to strengthen the capacity to support the timely sharing of information. Nationally representative data on other visual problems should be collected for future planning on eye health.

Strategies should be adopted by this sector's stakeholders to improve the equitable access of eye medicines and equipment at every level of care. Case studies on this field need to be performed to get the actual scene so that planning can be made to minimize resource wastage. To

ensure universal health coverage, the authorized bodies of primary health care might play a vital role.

Although all information was collected by ECSAT tools, it is important to note that this assessment was limited to the review of the available data. More primary data is necessary for a more comprehensive assessment of the infrastructure, availability of medicines, productivity of eye health personnel and the scope and quality of services available throughout the country.

CONCLUSION

The government has put in place important governance mechanisms to guide the eye health sector development and its integration within the broader health system. Despite the success stories, there is a critical shortage of all types of eye health cadres. This assessment suggests that although Bangladesh has made some progress towards elimination of avoidable blindness, it would be difficult to retain without further significant investment with a transparent accountability framework in eye health considering all limitation and contemporary challenges.

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