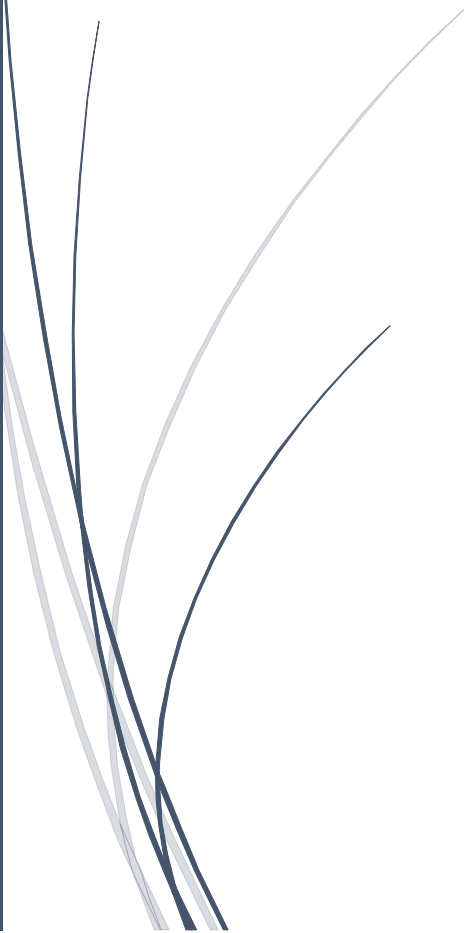




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Integrated Model of Care for Diabetic Retinopathy within the Health System of Pakistan (IMOC-P) Project – Endline Evaluation

Final Evaluation Report - 18th
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Acronyms

AUD	Australian Dollar
BHU	Basic Health Unit
COAVS	College of Ophthalmology and Allied Vision Sciences
DAC	Development Assistance Committee
DC	District Coordinator
DED	Diabetic Eye Disease
DHDC	District Health Development Centre
DHQHs	District Headquarter Hospitals
DR	Diabetic Retinopathy
DRA	Diabetes Risk Assessment
EMR	Eastern Mediterranean Region
EMR	Electronic Medical Record
FGDs	Focus Group Discussions
GTTH	Gurkhi Tertiary Teaching Hospital
HISDU	Health Information and Service Delivery Unit
HMIS	Health Management Information System
IDF	International Diabetes Federation
IDs	In-depth Interviews
IEC	Information Education Communication
IMOC-P	Integrated Model of Care for Diabetic Retinopathy within the health system of Pakistan
IRMNCH	Integrated Reproductive Maternal Newborn and Child Health
KAP	Knowledge Attitudes Practices
LGH	Lahore General Hospital
LHS	Lady Health Supervisor
LHW	Lady Health Worker
M&E	Monitoring and Evaluation
MOs	Medical Officers
NCDs	Non-Communicable Diseases
PKR	Pakistani Rupee
PMU	Project Management Unit
PPHI	People's Primary Health Initiative
PPIU	Provincial Programme Implementation Unit
PPRA	Punjab Procurement Regulatory Authority
RHC	Rural Health Centre
SDGs	Sustainable Development Goals
SH&NS	School Health and Nutrition Supervisor
SIOVS	Sindh Institute of Ophthalmology and Vision Sciences
SIP	Strategic Integration Point

SMS	Short Message Service
SPPRA	Sindh Public Procurement Regulatory Authority
STEPS	STEPwise approach to Surveillance
THQs	Tehsil Headquarter Hospitals
WHO	World Health Organization

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Executive Summary

Background

The Foundation supported a three-year project entitled 'Integrated Model of Care for Diabetic Retinopathy within the Health System of Pakistan (IMOC-P). This project had several programmatic components which included the following:

- **Community awareness and identification and referral of persons with diabetes** – by training community health personnel called Lady Health Workers (LHWs) who were trained to use a diabetes risk assessment guide to identify persons with diabetes or at risk of developing it and refer them to a primary health care facility
- **Initial screening** – by optometrists as part of a screening team that visited first level health facilities called Basic Health Units (BHUs) where LHWs referred their patients
- **Referral system** – the project aimed to develop a referral system from the BHU to the respective tertiary centres with a diabetic clinic and a medical retina service
- **Cooperation between diabetic clinic and eye care for diabetic retinopathy (DR)** – the project planned to develop a collaborative arrangement between diabetes and medical retina clinics to have a joint diabetic eye clinic
- **Data management** – customised software would be developed to help in data management and for patient tracking
- **Operational research component** – that focussed on community knowledge and practices about diabetes, patient satisfaction survey, and a study to ascertain the usefulness of an Arc Light ophthalmoscope as a screening tool

The IMOC-P programme was implemented between 2016-2018 with three main implementing partners - Lahore General Hospital (LGH Lahore), Gurkhi Trust Teaching Hospital (GTTH Lahore) and Sindh Institute of Ophthalmology and Vision Sciences (SIOVS Hyderabad). There were very few activities undertaken in 2016 due to delays in finalising agreements with the respective provincial health authorities.

The programme was located in the following locations:

- Lahore District (Nishtar Town and Wagah Town)
- Matiari District (Hala Taluka and Matiari Taluka)

This is an endline project evaluation conducted between December 2018 - January 2019.

Methodology

The scope of the evaluation was to determine elements of the project that influenced the relevance, effectiveness, efficiency and sustainability of the project. The aim of the evaluation was to inform new project development for DR programming supported by the Foundation in the country.

The methodology involved desk review, site visits, in-depth interviews of key informants and focus group discussions with LHWs.

A systematic, stratified and purposive sampling methodology was used. In total, 3 partner tertiary hospitals and 6 BHUs were visited. Apart from key informants at the partner hospitals and senior health officials, 7 medical officers (MOs) at BHUs and 62 LHWs were interviewed.

Findings

The findings are presented according to DAC criteria.

Relevance

The second national diabetes survey of Pakistan was conducted in 2016-2017. The survey found an overall weighted prevalence of diabetes was 26.3%, of which 19.2% had known diabetes, and 7.1% were newly diagnosed people with diabetes.

The IMOC-P project approach adopted national and provincial strategies in terms of targeting sub-districts and training LHWs in the use of a diabetes risk assessment (DRA) form. It further strengthened the primary and secondary prevention aspects for screening and counselling at BHUs and referral of persons with DR to tertiary centres. In this context, the project inputs and strategies identified were realistic, appropriate and adequate. However, the project had underestimated the prevalence rate based on available evidence at the time of developing the project design and this had the effect of underestimating the disease burden. Therefore the targets set were based on a lower prevalence rate.

The project improved access of persons with diabetes or at risk of developing diabetes, firstly to LHWs and thereafter to BHUs, and secondly to tertiary centres. In normal circumstances, most of these persons would not have had the opportunity of DR screening at the primary health care facility level. The screening teams were able to detect DR and refer the patients to the respective tertiary centres.

In Lahore (Nishtar Town and Wagah Town), the project achieved a coverage of about 18.3% through DRA (total persons screened through DRA divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) and 20.8% (total persons screened at the BHUs divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) at BHUs for persons with diabetes or at risk of developing diabetes.

In Matiari district (Hala Taluka and Matiari Taluka), the project achieved a coverage of about 33.8% through DRA (total persons screened through DRA divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) and 34.9% (total persons screened at the BHUs divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) at BHUs for persons with diabetes or at risk of developing diabetes.

Effectiveness

The project data indicates that most key performance indicators achieved 70% or more of their respective targets. About 111% of LHWs were trained in diabetes and eye health and the use of the DRA form. The project exceeded its target despite the limited availability of LHWs for training activities as they were constantly involved in other programmes like family planning, immunisation and nutrition. The referral uptake of DR referrals from BHUs to

tertiary hospitals in Hyderabad and Lahore was 58% and 60% respectively. Although the project was effectively implemented over two years (2017-2018) with little direct implementation in 2016, the achievement of referral uptake of three-fifths of the referrals is commendable and demonstrates that the referral pathway is effective.

In both Matiari district (Matiari Taluka and Hala Taluka) and Lahore district (Wagah Town and Nishtar Town), there were significant increases in the number of persons referred or screened between 2017 and 2018:

- Matiari district demonstrated an increase of 89% in DRA referrals (an increase in persons referred by LHWs to BHUs using the DRA screening guide between 2017 and 2018) and 93.7% in BHU screenings (an increase in persons screened for diabetes at BHUs between 2017 and 2018)
- Lahore district demonstrated an increase of 77.7% in DRA referrals (an increase in persons referred by LHWs to BHUs using the DRA screening guide between 2017 and 2018) and 53.2% in BHU screenings (an increase in persons screened for diabetes at BHUs between 2017 and 2018)

There was a definite increase in the numbers of both males and females through the DRA screening process and further DR screening at BHUs between 2017 and 2018. The sex-disaggregated impact was more pronounced for women (this was primarily due to the fact that LHWs mainly interacted with female community members):

- In Matiari district, the number of males increased by 41.8% compared to a larger increase in women of 115.2% through the DRA screening process. Furthermore, the number of males increased by 77% compared to a larger increase in women of 102.7% through the BHU DR screening process
- In Lahore district, the number of males increased by 32.2% compared to a larger increase in women of 94.6% through the DRA screening process. Furthermore, the number of males increased by 61.2% compared to a lesser increase in women of 50.9% through the BHU DR screening process

There were three reasons that contributed to these findings. First, the use of LHWs for community screening using the DRA form for identification of persons at risk of developing/having diabetes. Second, the orientation of Medical Officers at the BHUs in diabetes and its complications on the eye and establishing a referral pathway to tertiary hospitals. Third, the cooperation established between the diabetic and eye clinics in the tertiary hospitals. These factors combined contributed to an increase in the screening for persons with diabetes in the community and BHUs and referral of persons with DR to tertiary hospitals. There was also a corresponding increase in the uptake of referrals from the BHUs to the tertiary hospitals.

Efficiency

By training LHWs in use of DRA and developing a referral link to a primary health facility for DR screening achieved a cost-efficient intervention at the primary health care level as both these interventions are sustainable and scalable.

By establishing a diabetic eye clinic in the diabetic clinic, patients with diabetes now have their eyes screened for sight-threatening DR and are promptly referred to the medical retina service in the same hospital for further treatment. This intervention was cost-efficient and an example of good practice.

One of the hallmarks of the M&E system of the IMOC-P project was the electronic medical record used for the health management information system (HMIS) both for the project and by partners. The customised software allowed data entry by screening teams when visiting BHUs and by tertiary hospitals for their DR service. While the project HMIS provided a very useful tracking option for patients referred with DR and treated at the tertiary hospitals, it is dependent on annual subscription fees payable by the project partners to the private vendor. The partners have reported that they are unlikely or unable to pay this cost. This is an issue for the long-term reporting of DR, and some options to address this are outlined in this report.

The management and accountability mechanism was implemented through constitution of Steering Committees in Lahore and Hyderabad, quarterly review visits to partners, monthly project forecasting and reporting, and six-monthly reporting. The decisions of the Steering Committee were disseminated to key stakeholders who were obliged to implement those decisions and to report progress at the next meeting. This ensured an efficient management process.

Sustainability

The project demonstrates varying trends in sustainability.

Community awareness and identification of persons with diabetes is likely to continue by LHWs. As a result of the project, the LHWs curriculum has been modified in Sindh province to include a module on diabetes, while in Punjab, the prevention and control of non-communicable diseases programme 2016-2021 (as a separate initiative not related to the IMOC-P project) plans to train all LHWs in the province in the use of a NCD risk assessment form (which is likely to incorporate several items from the DRA).

Although the screening team set up by the IMOC-P project will not continue, the process of initial DR screening by an optometrist is likely to be taken to scale in Punjab as the government has approved creation of posts of optometrists at rural health centres (RHCs). Once the optometrists are deployed, they can provide a sustainable DR screening service at RHCs with referral links from BHUs and LHWs and to district and tertiary hospitals.

The IMOC-P project tested and proved the viability of the referral pathway from the LHWs to the BHUs of persons with diabetes or suspected to have diabetes. Furthermore, a formal referral link was established between the BHUs in the project sites and the respective tertiary hospitals.

Formal collaboration was also established between the medical retina service and diabetic clinic in all the three tertiary referral hospitals. An optometrist is deployed at each of the three diabetic clinics and screens patients with diabetes for DR. This collaboration is likely to continue and enhance the screening services for DR.

Recommendations

To the National Coordinator, National Eye Health Programme

1. Establish a formal collaboration between the National Eye Health programme and the Punjab programme for prevention and control of NCDs 2016-2021.
2. Extend and expand the scope of diabetic eye clinics at all tertiary teaching hospitals with diabetic and medical retina services.

To Implementing Partners

1. Strengthen, reinforce and sustain the one-stop services provided through the diabetic eye clinic.
2. Develop and maintain a tracking system for patients with diabetic retinopathy referred from primary and secondary levels of health care.
3. Induct and deploy the services of a diabetic educator as part of the medical retina team.
4. Incorporate a mandatory diabetic retinopathy screening module in training programmes for optometry.
5. Ensure inclusion of a module on diabetic retinopathy in hospital information systems to sustain gains made through the data management process developed in the project.

To the Foundation

1. Test and pilot the screening for diabetic retinopathy by optometrists at rural health centres and establishing a referral pathway with an eye unit at a district hospital.
2. Support respective eye care partners for collaboration with the Sindh Lady Health Workers programme and the Punjab programme for prevention and control of non-communicable diseases to enhance the social and health impact of integrated services for diabetic retinopathy.
3. Build partner capacities in the use of computerised financial accounting software and development of financial standard operating procedures for Foundation supported projects.

Background

The Fred Hollows Foundation (Foundation) is an international non-governmental organisation with its head office in Sydney, Australia. The Foundation has a formal presence in Pakistan through its country office and works with government and non-government partners in the country. The Foundation is a member of the National Committee for Eye Health and several of its constituent task forces and sub-committees.

The Foundation has a commitment towards the achievement of the Global Action Plan for Universal Eye Health 2014-2019. Further, it seeks to enhance its preparedness for developing eye health programmes that are compliant with the Sustainable Development Goals (SDGs), especially Goal 3 on Health. International non-governmental organisations like the Foundation in Pakistan have been supporting projects on control of diabetic retinopathy (DR) for over a decade now. The Foundation supported the Integrated Model of Care for Diabetic Retinopathy within the health system of Pakistan (IMOC-P) project which has now come to a close. The Foundation commissioned an evaluation of this project to document key programmatic learning that could help inform a future programme strategy in Pakistan. This is especially important considering that control of diabetes mellitus is one of the priority considerations in the target of non-communicable diseases under SDG Goal 3.

The IMOC-P programme was implemented between 2016-2018 with three main implementing partners:

- Lahore General Hospital (LGH Lahore)
- Gurkhi Trust Teaching Hospital (GTTH Lahore)
- Sindh Institute of Ophthalmology and Vision Sciences (SIOVS Hyderabad)

The programme was located in the following locations:

- Lahore District (Nishtar Town and Wagah Town)
- Matiari District (Hala Taluka and Matiari Taluka)

IMOC-P had the following programme elements:

- **Community awareness and identification and referral of persons with diabetes** – the project trained Lady Health Workers (LHWs) to sensitise the local community about diabetes and DR and convey health messages through health promotion. In addition, they were trained in the use of non-invasive diabetes risk assessment (DRA) to identify and refer known persons with diabetes or those identified to be at risk using the DRA guidelines. The referrals were made to the nearest Basic Health Unit (BHU) or Rural Health Centre (RHC).

- **Initial screening** – this was done by medical officers at BHUs who clustered persons with diabetes for a visit by a screening team. The screening team had an optometrist who performed ophthalmoscopy and referred patients with DR to the implementing partner tertiary centre.
- **Referral system** – patients referred by the LHWs to the BHUs were registered by the visiting screening team. The referral data was communicated to the partner DR centre where uptake of referral was reviewed.
- **Cooperation between diabetic clinic and eye care for DR** – the patients referred to the tertiary centre were either coming to the diabetic clinic where they were reviewed again by an optometrist using image technology and then referred to the partner tertiary centre, or sent directly to the eye clinic for DR assessment
- **Data management** – a custom designed software for managing data (of patients with diabetes referred to the BHU, and then those with DR referred to the tertiary centre) was developed as an online version outsourced to a private company
- **Operational research component** – which looked at the following research themes:
 - Baseline knowledge, attitudes and practice of community members
 - Patient satisfaction and barriers study
 - Report on evaluation of medical officer capabilities of diagnosing DR after training and validity of Arc Light as an effective instrument of diagnosis

Methodology

The scope of the evaluation was to determine elements of the project that influenced the relevance, effectiveness, efficiency and sustainability of the project. The aim of the evaluation was to inform new project development for DR programming supported by the Foundation in the country.

Data and Information Sources

The data and information sources were triangulated and included more than one source of information as follows:

- [Desk Review](#) – a review of the project documents, project log frame, project reports, monitoring reports, impact case studies, sex and age disaggregated data from reports; secondary data, national and international reports and papers, MIS reports, and operational research reports
- [Site visits](#) – onsite visits and use of observation technique of project sites including facilities
- [Key Informant Interviews](#) – in-depth interviews of heads of project partner organisation and participating service providers, medical officers at sampled Basic Health Units (BHUs); key health officials in the Punjab and Sindh Health Departments; Foundation staff
- [Focus Group Discussions](#) – Focus Group Discussions (FGDs) were conducted with a sample of Lady Health Workers (LHWs) and Lady Health Supervisors (LHSs)

Sampling strategies and rationale

The evaluation involved a purposive sampling technique that included all project partners and relevant staff, medical officers at health facilities (BHUs) and community members (LHSs and LHWs).

Data collection procedures and instruments

Semi-structured questionnaires were used for key informant interviews and FGDs, while a checklist was used for observation.

The evaluation framework ([Annex 1](#)) and list of persons interviewed ([Annex 9](#)) are presented in the annexures.

Sampling frame for evaluation

The sampling frame is derived from the information provided by the Foundation. A systematic, stratified and purposive sampling methodology was used.

A purposive sample was taken from the participating BHUs and the number of LHWs attached to those BHUs ([Table 1](#)).

Table 1 - Estimating sample size

Category	Number in purposive sample	Sample for evaluation
Partner tertiary hospitals	3	3
Medical Officers at BHUs	6	5
Lady Health Workers	90	50

Table 2 presents the districts and the facilities that the Evaluators visited for interviews and on-site observation.

Table 2 - Systematic, stratified and purposive sampling frame

District	Tertiary Hospitals N = 3	Medical Officers at BHUs N=7	LHWs/LHSs N=62
Lahore (Nishtar Town)	LGH	Kacha – 1	10
		Leel - 2	13
Lahore (Wagah Town)	GTTH	Dogran Kalan – 1	11
		Minhala - 1	11
Hyderabad and Matiari	SIOVS	RHC Bhit Shah (Hala Taluka) - 1	8
		Odero Lal (Matiari Taluka) - 1	9

Stakeholder engagement and level of involvement

The implementing partners and participating service providers were involved in the interview process.

Limitations

Owing to limitations of time, only a sample of the health facilities could be visited and LHSs/LHWs interviewed. These findings provide trends.

Findings

The findings of the evaluation are presented thematically according to the DAC evaluation criteria of relevance, effectiveness, efficiency and sustainability. The findings have been synthesised from the desk review, project and operational research reports and resource material, site visits, key informant interviews and focus group discussions.

Relevance

To what extent were the inputs and strategies identified realistic, appropriate and adequate to achieve the results?

Recent research reports indicate that the prevalence of diabetes in Pakistan is significantly higher than that estimated by the IDF Diabetes Atlas 8th Edition 2017¹ which indicated an age-adjusted prevalence rate of 8.3%.

The second national diabetes survey² of Pakistan was conducted in 2016-2017. The survey used a multistage clustering technique in all four provinces of Pakistan. Of the estimated sample size of 10 800, an 87% response rate was achieved. The clinical and anthropometric measurements included height, weight, blood pressure, waist circumference and waist-to-hip ratio while the blood tests included Oral Glucose Tolerance Test (OGTT), haemoglobin A1c and fasting lipid profiles. WHO criteria were used for the diagnosis of diabetes and prediabetes. Pakistani nationals aged 20 years or more were included in the survey, whereas pregnant women and those not residents of the selected households were excluded.

The survey revealed the following findings:

- Overall weighted prevalence of diabetes was 26.3%, of which 19.2% had known diabetes, and 7.1% were newly diagnosed people with diabetes
- Prevalence of diabetes in urban and rural areas was 28.3% and 25.3%, respectively
- Prevalence of pre-diabetes was 14.4% (15.5% in urban areas and 13.9% in rural areas)
- Age greater than or equal to 43 years, family history of diabetes, hypertension, obesity and dyslipidaemia were significant associated risk factors for diabetes

The authors concluded that diabetes had reached epidemic proportions and that there was an urgent need of national strategies for early diagnosis and effective management as well as cost-effective diabetes primary prevention programme in Pakistan.

These recent findings indicate a high magnitude of persons with diabetes and pre-diabetes, which would have grave implications for diabetic retinopathy services in the long run.

Institutional context of diabetes mellitus in Pakistan

On a review of the institutional/policy context of non-communicable diseases (NCDs) and the respective health sector strategies in Pakistan, it is evident that the federal and provincial governments have recognised the public health importance of diabetes, but only Punjab has strategies in place to control and prevent the disease. The findings are summarised in **Table 3**.

Table 3 - Health sector strategy and diabetes

Country	Health Sector Strategy	NCD strategy
Federal	<p>Developed a National Health Vision 2016-2025³. Recognises the importance of diabetes as one of the priority NCDs.</p> <p>The Pakistan Health Profile 2015⁴ jointly published document of Ministry of National Health Services, Regulations and Coordination and WHO EMR has recommended the establishment of a noncommunicable diseases and mental health unit at provincial level.</p> <p>The Pakistan Health Research Council conducted a NCD Risk Factor Surveillance Survey⁵ in 2016 using the WHO STEPs methodology. Only STEP1 (questionnaire) and STEP2 (physical measurement) were used. STEP3 (biochemical measurement) was not done. Further, the survey was only conducted in Punjab and Sindh.</p>	The Government developed a National NCD Action Plan in 2004. This was not implemented
Balochistan	Has a Balochistan Comprehensive Development Strategy (BCDS) 2013-2020 ⁶ , which recognises the importance of diabetes as a priority NCD. The BCDS is currently being updated to 2018-2024.	No specific NCD strategy at present
Khyber Pakhtunkhwa	Has a Health Sector Strategy 2010-2017 ⁷ that has identified NCDs as a health objective. This is currently undergoing revision	It recommends inclusion of treatment and management of NCDs in the Minimum Health Services Package for secondary hospitals
Punjab	Has a Health Sector Strategy 2012-2020 ⁸ that has specified a health objective to strengthen prevention and management of non-communicable diseases as part of the Essential Package of Health Services	<p>Punjab has established a Provincial NCD Unit and allocated dedicated funds for prevention and control of NCDs in the province.</p> <p>Punjab Public Health Agency (PPHA) is working with the NCD Program team towards development of a Provincial Action Plan for Prevention and Control of Non-Communicable Diseases and Health Promotion in Punjab that addresses the four major NCDs: cardiovascular diseases, cancer, diabetes and chronic respiratory</p>

		diseases, and the four modifiable risk factors: tobacco use, the harmful use of alcohol, unhealthy diet and physical inactivity
Sindh	Has a Health Sector Strategy 2012-2020 ⁹ which incorporates strategies for control of NCDs	Recommends the establishment of a Provincial Commission on NCDs to guide strategy and planning

The National Committee for Eye Health has identified diabetic retinopathy as a programme priority and has established a National Task Force on Diabetic Retinopathy.

The National Action Plan (NAP) for Prevention and Control of Non-Communicable Diseases and Health Promotion in Pakistan¹⁰ was developed in 2004. Although it was not implemented, it provided strategic actions needed for NCDs including diabetes. These included the following for diabetes:

- **Population approach** – addressing causal risk factors in the primary and secondary prevention settings
- **High-risk approach** – this focuses on addressing risks and intensified case finding in high risk groups, management and patient education. Non-physician healthcare providers can be taught to screen those at high risk of developing diabetes

The IMOC-P project approach adopted these strategies in terms of targeting sub-districts and training Lady Health Workers (LHWs) in the use of a diabetes risk assessment (DRA) form. It further strengthened the primary and secondary prevention aspects for screening and counselling at basic health units (BHUs) and referral of persons with DR to tertiary centres.

The IMOC-P project developed guidelines on diabetes for use at BHUs in consultation with the Pakistan Endocrinology Society. Furthermore, the Pakistan Country Office of the Foundation was the Co-Chair of the DR learning group within the Fred Hollows Foundation, where experiences and learnings from the project were shared in quarterly meetings.

In this context, the project inputs and strategies identified were realistic, appropriate and adequate. However, the project had underestimated the prevalence rate based on available evidence at the time of developing the project design. This has impacted on the access and coverage rate. The project had originally estimated project targets using a prevalence of diabetes of 6.8%. These targets were in effect a fourth of what they should have been considering the actual prevalence of diabetes of 26.3%.

Which components of the project were the most appropriate and effective to inform scalability across Pakistan?

Community awareness

The community awareness component was informed by a baseline Knowledge Attitude and Practice (KAP) study. Community mobilisers were used sensitise target communities and

mobilise them to participate in a screening process. Health education and health promotion material was used to raise awareness about diabetes and its complications. Furthermore, the project utilised other health promotion options like live drama entitled 'Andhair' (darkness), health messages on local radio, and social media like Facebook to create awareness in the project areas. This resulted in a high uptake of referrals by LHWs to the BHUs:

- Matiari district demonstrated an increase of 89% in DRA referrals (an increase in persons referred by LHWs to BHUs using the DRA screening guide between 2017 and 2018)
- Lahore district demonstrated an increase of 77.7% in DRA referrals (an increase in persons referred by LHWs to BHUs using the DRA screening guide between 2017 and 2018)

This component is scalable owing to the country-wide deployment of LHWs and synergy with at least one provincial NCD programme (in Punjab).

LHW training for DRA and referral

The training of LHWs in the use of a DRA form for identifying community members at risk of diabetes and referring them to the BHU for further screening and diagnosis was one of the hallmarks of the project. This component established a referral pathway for persons with or at risk of having diabetes and raised awareness amongst LHWs about the condition. This is a sustainable and scalable component and is discussed further under sustainability.

Medical Officer at BHUs

The training of the medical officers (general physicians) in screening for DR at the BHUs was a logical step. Although the programme strategy faced limitations in the actual proportion of medical officers who were willing to perform ophthalmoscopy for DR screening in persons with diabetes, the knowledge and skill gained about the implications of diabetes on eye health improved the counselling of persons with diabetes and their referral for eye examination.

Screening Team

The use of a screening team comprising of an optometrist and an ophthalmic technician was a successful component of the project. The screening team firstly reviewed persons sent as referrals from the DRA screening process, performed blood sugar test on all persons diagnosed or at risk with diabetes, and conducted a retinal examination using ophthalmoscopy to detect DR. Persons identified with DR through this process were then referred to the respective tertiary centres for further diagnosis and treatment.

The main limitation with this component was that it was project dependent and ended with the close of the project. However, the project successfully established the principle of utilising an optometrist for primary level screening for DR. The role of the optometrist at primary health care level is discussed further under sustainability and its implications for scalability.

Tertiary Hospital – optometrist and medical retina specialist

The project successfully established a referral pathway from BHUs to tertiary eye care centres for persons with DR. This formal referral pathway did not exist before. Persons with diabetes identified with DR were referred directly to a diabetic clinic where they were received and screened by an optometrist. Patients with sight-threatening DR or those at risk were immediately referred to the medical retina specialist for confirmatory diagnosis, and treatment by either laser or intra-vitreous therapy.

Medical retina units are now available in most tertiary teaching hospitals (several of these medical and surgical retina units were established or strengthened by the Foundation in earlier projects). Posts for optometrists have either been created or are in the process of being created in tertiary teaching hospitals. This component is scalable.

To what extent did this project design enable the various groups of the target population (including women and marginalized groups) to access diabetes and DR services, compared to before the project started?

Baseline – KAP

The project conducted a baseline KAP¹¹ for people with diabetes in Lahore and Matiari districts in 2016. The survey revealed the following key findings among respondents:

- About 60% of respondents were aware that they had diabetes
- About one-third (34%) had a positive family history of diabetes
- About one-third (31%) indicated that they had been diagnosed with DR
- Only two-fifths (42%) reported sharing of information regarding DR (receiving information about DR from health personnel)
- Two-thirds (66%) indicated that they would like to obtain more information about DR
- Availability of transport and its costs (37%) and distance (35%) were reported as key barriers to their seeking treatment
- Most of the male patients decided independently to visit the health care facility for DR treatment, while less than half of women reported that they made this decision independently (86% vs. 46%)

The project improved access of persons with diabetes or at risk of developing diabetes, firstly to LHWs and thereafter to BHUs, and secondly to tertiary centres (please see section on Effectiveness for more detail). In normal circumstances, most of these persons would not have had the opportunity of DR screening at the primary health care facility level. The screening teams were able to detect DR and refer the patients to the respective tertiary centres.

Furthermore, women with diabetes or at risk of developing diabetes are less likely to make a decision to go for assessment and screening or treatment for DR especially if they are

asymptomatic. The project greatly improved identification of women with diabetes or at risk of developing diabetes, and detection of DR through screening at the BHUs. The sex-disaggregated impact of the project is discussed further under the section on Effectiveness.

The patient satisfaction study¹² demonstrated that of all patients who were referred and reached the tertiary hospital, 74% were women. Based on population data and prevalence of diabetes, the extent of access and coverage are presented below in [Table 4](#) using the original diabetes of 6.8% used in the project proposal design and [Table 5](#) using the actual diabetes prevalence of 26.3%. Table 4 indicates falsely high estimates of access and coverage.

In Lahore (Nishtar Town and Wagah Town), the project achieved a coverage of about 18.3% through DRA (total persons screened through DRA divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) and 20.8% (total persons screened at the BHUs divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) at BHUs for persons with diabetes or at risk of developing diabetes (Table 5).

In Matiari district (Hala Taluka and Matiari Taluka), the project achieved a coverage of about 33.8% through DRA (total persons screened through DRA divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) and 34.9% (total persons screened at the BHUs divided by the total population 25 years and above estimated to have diabetes using a prevalence rate of diabetes of 26%) at BHUs for persons with diabetes or at risk of developing diabetes (Table 5).

There was greater access and coverage achieved in Hala and Matiari at primary health care level compared to Nishtar Town and Wagah Town.

Table 4 Access and coverage of screening by DRA and at BHUs (diabetes prevalence 6.8%)

	Wagah Town	Nishtar Town	Hala Taluka	Matiari Taluka
Total population*	421,921	652,034	262,423	340,677
Estimated adult population 25 years and above (48% of total sample)	202,522	312,976	125,963	163,524
Estimated burden of disease (diabetes) in age group 25 years and above – weighted prevalence of diabetes 6.8%	13,771	21,282	8565	11,120
Total disease burden (diabetes) in age group 25 years and above – weighted prevalence of diabetes 6.8%	35,053		19,685	
Number of persons screened for diabetes or at risk of diabetes through DRA	24,487		25,452	
Number of persons screened for diabetes and DR at BHUs	27,929		26,334	
% access and coverage of adult population with disease burden by DRA	69.9%		129.3%	
% access and coverage of adult population with disease burden at BHU	79.7%		133.8%	

*Data obtained from the Pakistan National Census 2017, Pakistan Bureau of Statistics

Table 5 - Access and coverage of screening by DRA and at BHUs (diabetes prevalence 26.3%)

	Wagah Town	Nishtar Town	Hala Taluka	Matiari Taluka
Total population*	421,921	652,034	262,423	340,677
Estimated adult population 25 years and above (48% of total sample)	202,522	312,976	125,963	163,524
Estimated burden of disease (diabetes) in age group 25 years and above – weighted prevalence of diabetes 26%	52,655	81,373	32,750	42,516
Total disease burden (diabetes) in age group 25 years and above – weighted prevalence of diabetes 26%	134,028		75,266	
Number of persons screened for diabetes or at risk of diabetes through DRA	24,487		25,452	
Number of persons screened for diabetes and DR at BHUs	27,929		26,334	
% access and coverage of adult population with disease burden by DRA	18.3%		33.8%	
% access and coverage of adult population with disease burden at BHU	20.8%		34.9%	

*Data obtained from the Pakistan National Census 2017, Pakistan Bureau of Statistics

Since no such DR screening programme existed before the IMOC-P project, there was no baseline access and coverage data available to determine the extent of improvement as a result of the project. The IMOC-P project now provides a comprehensive baseline for future DR programmes. Further analysis by socio-economic status, disability and vulnerability was beyond the scope of this evaluation.

How did the project's collaboration with the Government and non-government partners, and the steering committees at both districts (Lahore and Hyderabad) affect the implementation of this project?

Initially, the project had planned to work with two government partners (SIOVS and LGH in collaboration with COAVS) and a private hospital called Wilcare. However, in the first year of the project in 2016, it was found that the patients could not afford the costs at Wilcare and it was too far for them. The Foundation ended the partnership with Wilcare Hospital and by mid-2017 identified another non-government partner at Gurkhi Tertiary Teaching Hospital (GTTH). The equipment donated to Wilcare was transferred to GTTH, which practically started its activities in the last quarter of 2017. Between November and December 2017, training of primary health care workers of Wagha town and of GTTH staff on HIMS and use of ophthalmic equipment was completed. Screening activities/camps were started by 1st of Jan 2018 in Wagha Town.

Project reports indicate that there was little programme activity in 2016 which was mostly used to document agreements and memoranda of understanding between the Foundation and government partners, initiate trainings for LHWs and procure equipment. The new government policy of partnership agreements with international non-governmental agencies has resulted in a time lag between conceptual clearance of a project and actual signing of agreements. This causes an unavoidable delay and such lag times of about six months or more would need to be factored in new projects and their timelines in the future. The Foundation used the intervening time to conduct a baseline KAP survey in 2016.

For all practical purposes, the project activities started in 2017 with SIOVS and LGH, while screening activities by GTTH came on line in early 2018. This implies that the three-years project had to be compressed into a two-year time frame, with GTTH only having one year for implementation. Despite these limitations, most of the project performance indicators were achieved satisfactorily and, in several cases, exceeded targets. This is discussed further under Effectiveness.

In the case of SIOVS, the provincial government of Sindh set up a 'Steering Committee' to oversee, monitor and guide the execution of the project. The Steering Committee was chaired by the Director General of Health, and included representation from SIOVS, Lady health Workers programme, People's Primary Health Initiative (who were responsible for the functioning of BHUs in the project areas), the Foundation, and others co-opted as necessary.

The Steering Committee met on a quarterly basis and approved the annual work plan. This process played a significant role in streamlining project activities and ensuring an integrated response among concerned health units and programmes. This was demonstrated in the collaboration of the following multiple stakeholders for the implementation of the IMOC-P project:

- Health Department- Government of Sindh District Health Office District Matiari
- Provincial Programme for Family Planning & Primary Health Care – Provincial Programme Implementation Unit (PPIU) Sindh
- Sindh Institute of Ophthalmology and Vision Sciences-Hyderabad
- The Fred Hollows Foundation
- Peoples Primary Health Initiative (PPHI)

A similar process of an integrated response by multiple stakeholders was followed in Lahore which also proved very effective:

- Primary and Secondary Healthcare Department- Government of Punjab District Health Office District Lahore
- Directorate of Integrated Reproductive, Maternal, Newborn and Child Health and Nutrition Programme, Government of Punjab
- College of Ophthalmology and Allied Vision Sciences-Lahore
- The Fred Hollows Foundation

This was an example of good practice as it ensured facilitation and institutionalisation of activities. The impact on the LHW programme is discussed later under Sustainability.

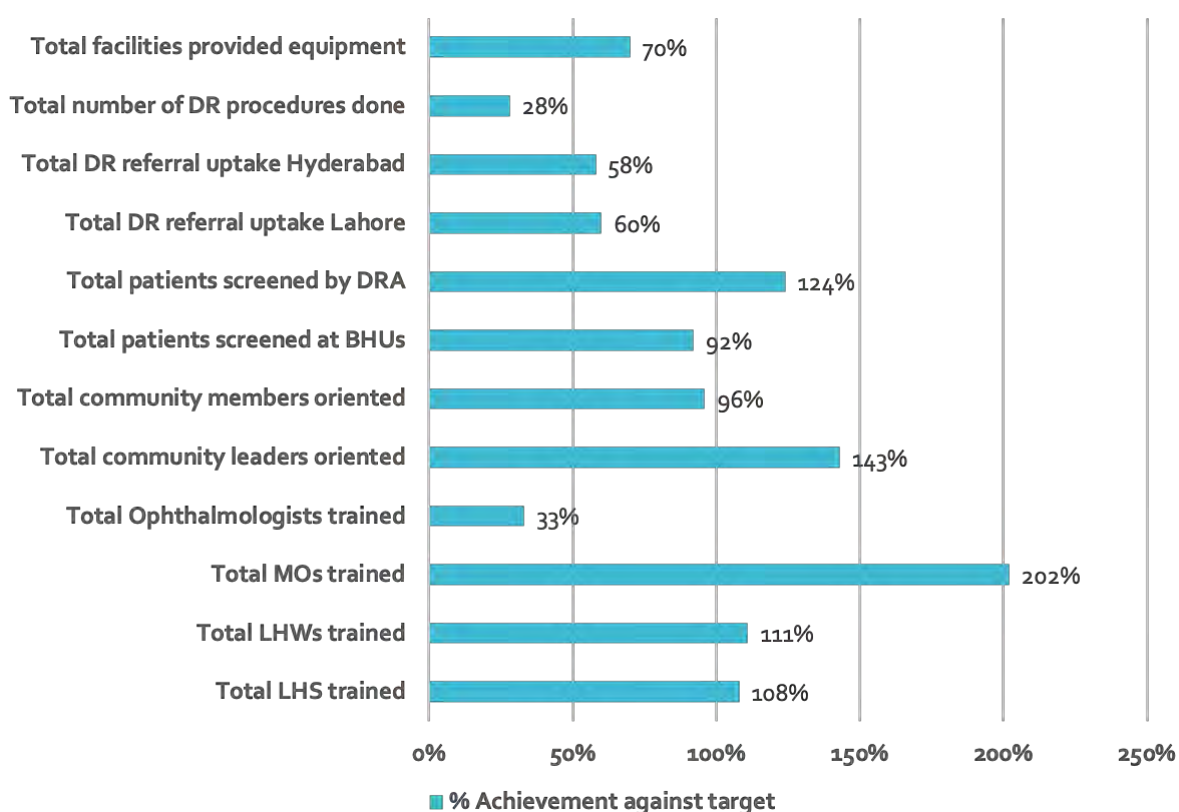
Effectiveness

To what extent did the Project achieve an increase in the proportion of people with diabetes accessing eye care services and presenting in the earlier stages of diabetic retinopathy?

The project data indicates that most key performance indicators achieved 70% or more of their respective targets (Fig 1). Some indicators demonstrated an underperformance against targets.

About 111% of LHWs were trained in diabetes and eye health and the use of the DRA form. The project exceeded its target despite the limited availability of LHWs for training activities as they were constantly involved in other programmes like family planning, immunisation and nutrition. This was made possible through the integrated response of multiple stakeholders alluded to in the prevision section. Furthermore, since GTTH came on line in 2018, the project would have been able to train more LHWs had GTTH started its activities earlier.

Figure 1 - Percentage achievement of key project indicators



*The data for number of community sessions is not presented on the chart as it showed an achievement of 615% against its target – its inclusion would have skewed the bar chart.

The referral uptake of DR referrals from BHUs to tertiary hospitals in Hyderabad and Lahore was 58% and 60% respectively (Fig 2). There were no specific targets for these as this was a new initiative with no reference data.

The IMOC-P study was successful in achieving a relatively good referral uptake rate of almost 60%. Although there were no comparable studies identified for eye care in Pakistan, referral uptake data for eye care services in other South Asian countries is summarised below:

- 21.8% uptake of referral to a tertiary facility in South India¹³
- About 50% uptake of referrals to a tertiary facility in Nepal¹⁴
- 41% uptake of referrals to a tertiary facility in South India¹⁵

The Patient Satisfaction study¹⁶ indicated that some of the main causes for low referral uptake included the following:

- Of the study sample, 34.9% patients did not go for any further consultation/treatment, 32.3% went to other government hospital/doctor and 32.8% consulted private clinic/doctor/hospital
- Those who went to other hospitals/clinics found them easy to access and closer to their place of residence, and therefore making 'distance/accessibility' as a major barrier
- 42.8% responded that the distance between their place of residence and tertiary hospital was more than 10 km
- Only 29.7% could afford hospital expenses, while 34.1% could afford travelling expenses

The IMOC-P project did not have any specific provision for patient support costs for those who were poor or non-affording. The service rates (e.g. laser for DR, or intra-vitreous injection) were available with the MOs at the BHUs. All patients being referred were informed of service related costs at the tertiary hospitals. Since the non-mydratic fundus cameras were donated by the Foundation, partners did not charge patients for use of this camera. At GTTH, the Foundation negotiated a special package for poor patients, whereby if poor patients met the government poor category of Zakat receiving (they had to have a Zakat form issued by their local Zakat Council), the hospital provided them free service. Most patients at GTTH fell in the paying category.

The referral uptake affected the number of DR procedures (28% of target) as there were fewer patients received than expected especially in 2016 (no referral) and 2017 with few referrals.

Analysis of referral patterns indicate that there is an increasing trend of referral uptake in 2018 (**Fig 2**). There are month to month variances, some of which can be explained especially for the peri-urban and rural farming communities.

Figure 2 - Trends in referral uptake at tertiary hospitals in 2018

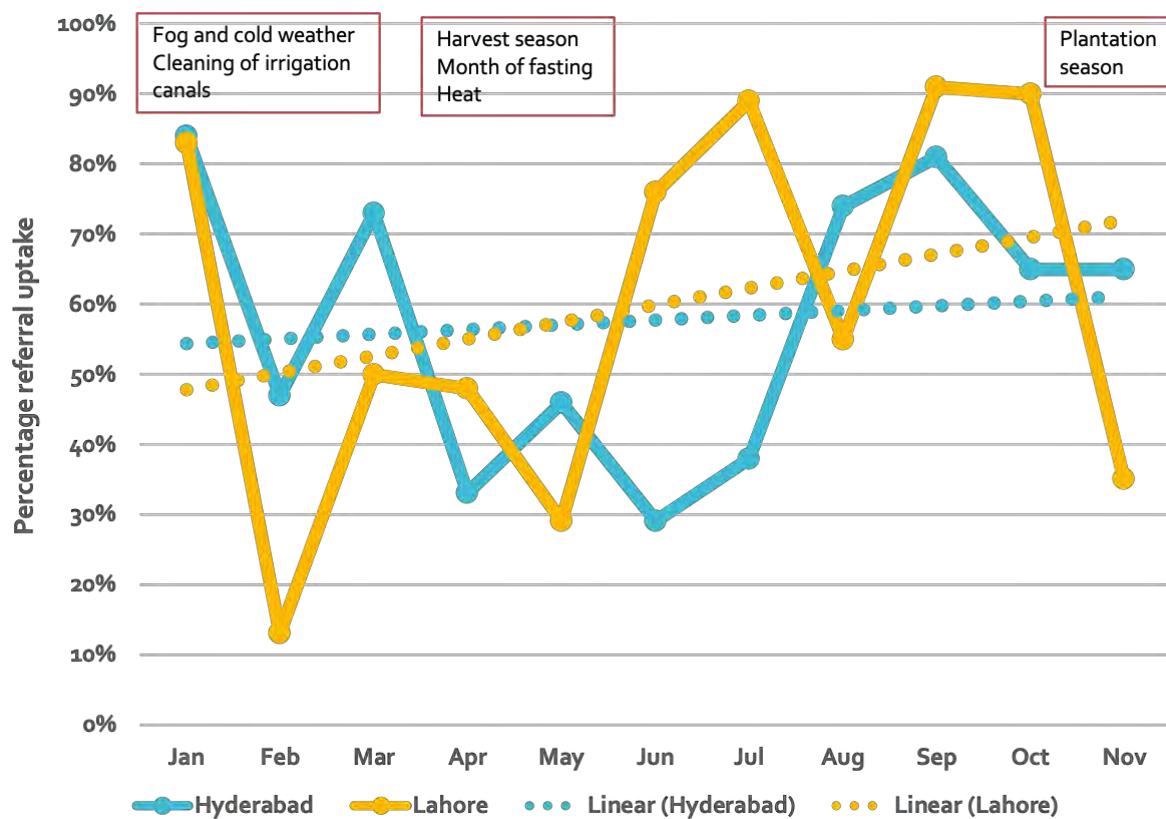
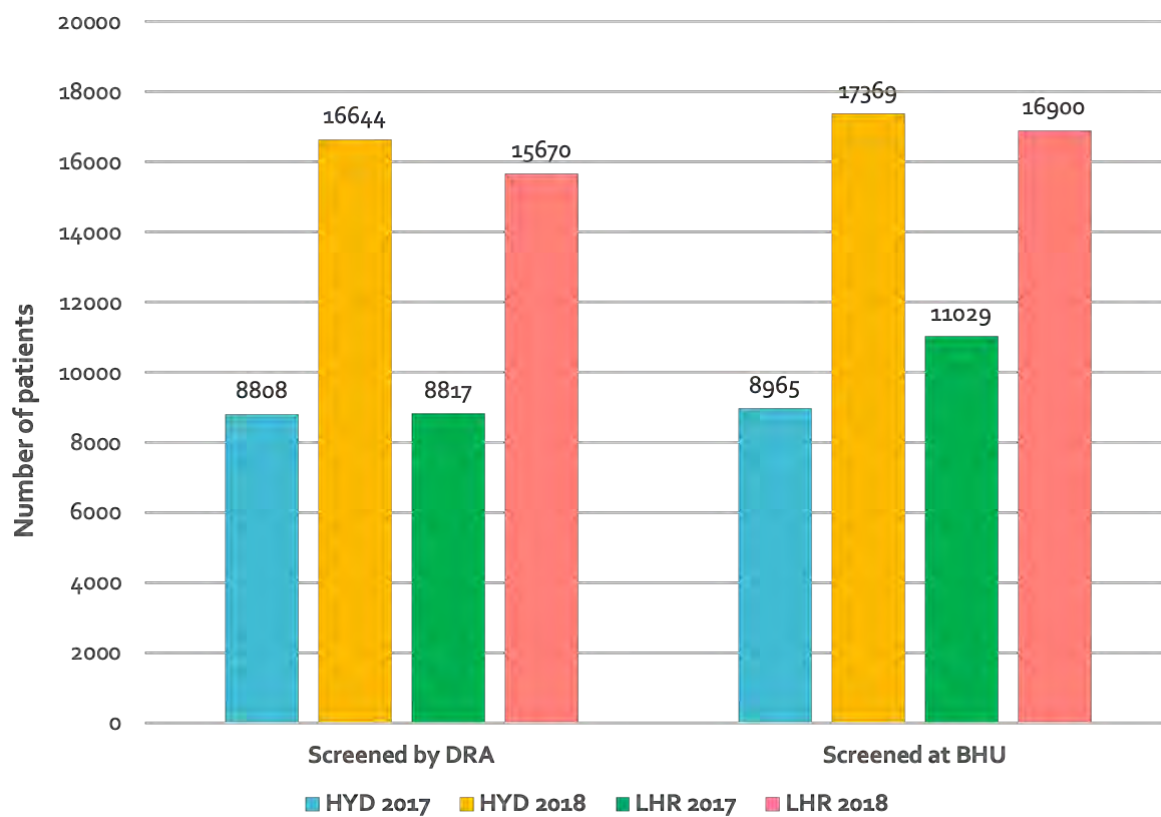


Figure 3 demonstrates the overall referral trends from LHWs to BHUs and those screened at BHUs by the screening teams. In both Matiari district (Matiari Taluka and Hala Taluka) and Lahore district (Wagah Town and Nishtar Town), there were significant increases in the number of persons referred or screened between 2017 and 2018:

- Matiari district demonstrated an increase of 89% in DRA referrals (an increase in persons referred by LHWs to BHUs using the DRA screening guide between 2017 and 2018) and 93.7% in BHU screenings (an increase in persons screened for diabetes at BHUs between 2017 and 2018)
- Lahore district demonstrated an increase of 77.7% in DRA referrals (an increase in persons referred by LHWs to BHUs using the DRA screening guide between 2017 and 2018) and 53.2% in BHU screenings (an increase in persons screened for diabetes at BHUs between 2017 and 2018)

Majority of trainings for LHWs were held in 2017 and the referral systems were established by 2018, which correlates with the increasing trend of referrals.

Figure 3 - Overall referral trends in primary health settings



Legend: HYD – Hyderabad; LHR - Lahore

To what extent did the project support the development of an equitable, comprehensive and integrated model of care for people at risk of vision loss due to diabetes?

Three main project components were identified that contributed towards an equitable, comprehensive and integrated model of care.

LHW screening and use of DRA form

Lady Health Workers form the backbone of primary health care in Pakistan. Until the launch of the IMOC-P project, LHWs were not involved in any screening or health promotion activities related to diabetes. The IMOC-P demonstrated that non-physician health workers could be trained to raise awareness about diabetes and identify persons at risk of developing diabetes. Project data indicates a rising trend of referrals by LHWs using the DRA form. This screening activity has been internalised in the Sindh LHW programme, while it has gained acceptance in at least the Lahore district component of the LHW programme in Punjab. The use of the DRA form or a similar tool is discussed further under Sustainability.

The LHWs interviewed during the FGDs admitted that it was difficult for them in the beginning of the project to take up an “extra” responsibility of raising awareness and assessing

community members at risk of diabetes. In addition to carrying out mother and child health and family planning activities, risk assessment of diabetes was a “burden”. However, when the project gained momentum and LHWs developed confidence about their DRA assessments especially when the patients they referred were found to have diabetes and referred to tertiary centres for further investigations. When people they had diagnosed/assessed would come back and enquire about consequences of diabetes or further guidance, then all of them felt comfortable and enthusiastic about the project. Some of them arranged sessions with school children in their catchment areas in Lahore and these children sent their family members for diabetes risk assessment.

When asked about the use of the DRA form in future after the closure of the project, the LHWs responded that they would continue referring patients to BHUs and keep assessing patients at risk based upon their learning from the DRA guidelines like age, family history, waist measurements etc.

LHWs shared that diabetes is becoming more prevalent among the population and the project provided awareness about diabetes through LHWs programme. This campaign proved fruitful as people realised the risks involved in diabetes and especially how it effects their eyes and other organs. This is evident from the referrals LHWs are making to BHUs and people are showing a positive response.

Medical Officers at the BHUs and referral pathway to tertiary hospital

Medical officers (general physicians) are in-charge of first level health facilities like BHUs. They normally receive a regular workload of patients every day, some of whom have diabetes. Until the implementation of IMOC-P project, the MOs at the BHUs in the project sites were not aware of any referral pathway for persons with diabetes to seek ophthalmic examination as a measure of good practice. The project not only oriented them in diabetes and DR, but through the regular visits of the screening team also raised awareness about the referral link with the respective tertiary hospitals.

Medical officers were not sure of the role of LHWs using the DRA form in the future because of their limited interaction with them but they believed LHWs can play a much more effective role if they are provided more trainings and some medicines. All medical officers appreciated role of LHWs in creating awareness in the community and especially among females.

Medical officers also did not have much interaction with the project management team because of their busy outpatient clinics and flow of patients i.e. about 100-150 patients per day. But they all agreed that if some eye medicines (drops, ointments) and glasses etc were available for patients at the BHU that would have created a much more positive impact of the project.

Although it was envisaged that MOs would undertake ophthalmoscopic examination of persons with diabetes, the response by MOs has been minimal due to a heavy workload and pressures of administration (data obtained from the Patients Satisfaction and Barriers study and through Key Informant Interviews in the evaluation).

Diabetic clinic and eye clinic cooperation

This was one of the successful initiatives by the project. In all three partners, a dedicated diabetic eye clinic/room was established in the diabetic clinic to receive referrals from the BHUs and also from the diabetic clinic itself. The diabetic eye clinic/room was equipped by the project and is run by an optometrist who has been trained in ophthalmoscopy to detect DR. The optometrist not only validates the findings of the screening team, but also refers the patients to the medical retina specialist for further treatment. This has helped establish a fast-track service for persons with diabetes and DR. The optometrists deployed at these clinics/rooms are employees of the respective tertiary hospitals, except at LGH where the optometrist was originally paid for by the project and now receives an honorarium from the eye department until the post of optometrist is formally regularised for deployment.

To what extent did the Project's M&E mechanism contribute to documenting project results?

The project developed a four-tiered M&E mechanism for the project.

First, an electronic medical record was developed which captured patient data from the DRA referrals to the BHUs, persons screened at BHUs and those referred to the tertiary hospitals, and those received at the tertiary hospital and provided further treatment. By using a process of a unique identification number for each patient along with their contact and national identity card details, referring LHWs and their contacts, referring MOs and their contacts, the project team was able to monitor in real-time the progress update and status of referrals at the BHUs and tertiary hospitals.

Second, the project established a mechanism of quarterly progress review meetings with the Executive District Officers for Health in Matiari and Lahore districts. Each planned activity was reviewed and new activities for the next quarter were planned. The District Coordinators of the LHW programmes also attended these meetings which helped streamline implementation and reporting.

Third, a governance mechanism was established both in Lahore and Hyderabad through a Steering Committee that developed an annual work plan and monitored progress every 4-6 months.

Fourth, the Foundation's team developed and submitted monthly and six-monthly progress reports to the two principal donors. This required an intensive M&E follow-up and review.

The electronic medical record provided a detailed database of patient information. Partner staff were oriented in its use and compliance was monitored by the Foundation's team. The project health information system is discussed further under Sustainability.

How effective has the project been in responding to the needs of the beneficiaries?

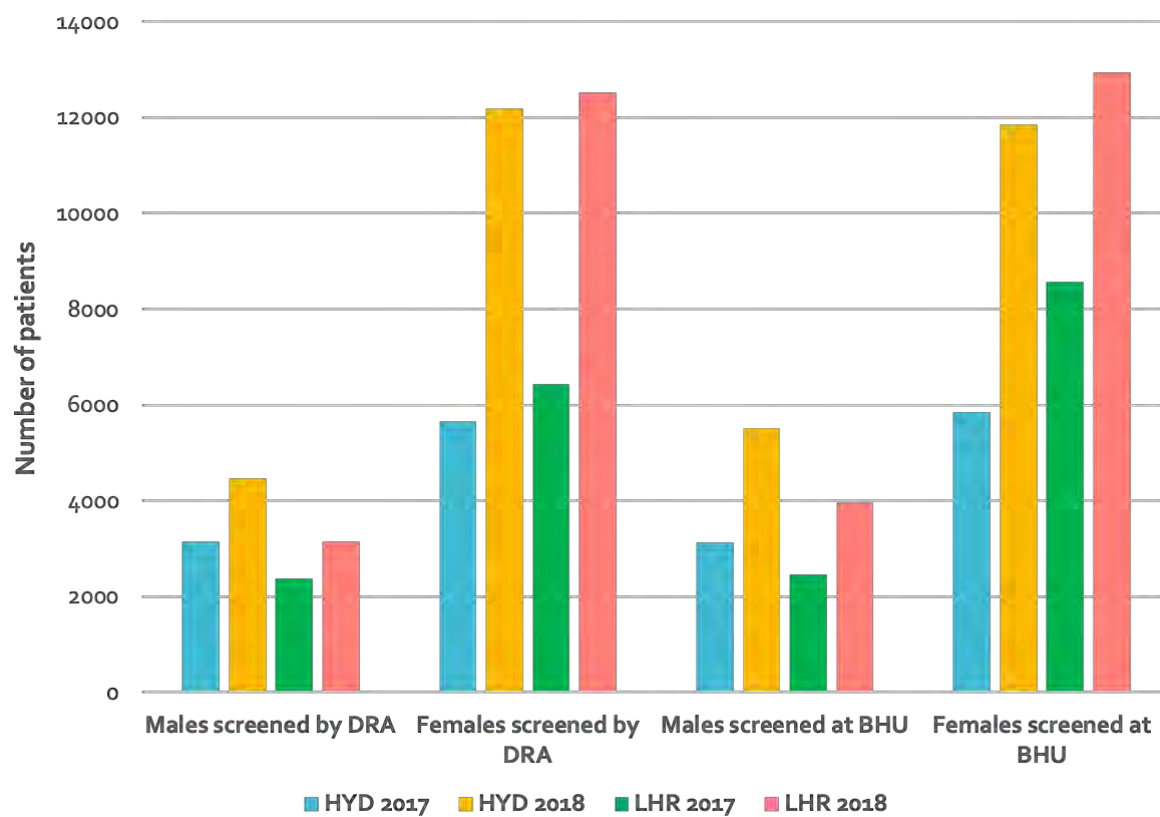
The project demonstrates improvement in access and coverage.

In both project areas, the proportion of access and coverage of the adult population with disease burden screened at BHUs achieved a coverage rate of about 20% in Lahore district and about 35% in Matiari district (**Table 5**). Furthermore, the referral uptake rate (number of patients referred from the BHUs to tertiary hospitals who actually reached the tertiary hospitals) improved from about 14% in 2017 to about 60% by the end of 2018 suggesting that the referral pathway was now functioning and achieving the intended objectives of IMOC-P.

There was a definite increase in the numbers of both males and females through the DRA screening process and further DR screening at BHUs between 2017 and 2018. The sex-disaggregated impact was more pronounced for women (**Fig 4**) (due to the interaction of LHWs mainly with women in the communities):

- In Matiari district, the number of males increased by 41.8% compared to a larger increase in women of 115.2% through the DRA screening process. Furthermore, the number of males increased by 77% compared to a larger increase in women of 102.7% through the BHU DR screening process
- In Lahore district, the number of males increased by 32.2% compared to a larger increase in women of 94.6% through the DRA screening process. Furthermore, the number of males increased by 61.2% compared to a lesser increase in women of 50.9% through the BHU DR screening process

Figure 4 – Sex-disaggregated referral trends in primary health settings



Legend: HYD – Hyderabad; LHR - Lahore

Patient satisfaction

The Patient Satisfaction study¹⁷ revealed the following patient perspectives about service utilisation:

- Overall, 74.2% of patients were satisfied with the screening process/eyes checking remained, while about four-fifths (80.9%) of patients were generally satisfied with the services they received at the tertiary hospital
- About 81.5% patients said that they were briefed about possible complications of diabetes and effects on other organs especially eyes
- About 81.5% patients expressed satisfaction with the behaviour of the doctor at the tertiary hospital, while 76.9% indicated satisfaction with other staff
- About 66.1% of patients waited for less than 1 hour in the outpatient clinic at the tertiary hospital before examination

The study also noted patient perspectives about barriers:

- The findings indicate that of those patients who did not reach the tertiary hospital after referral from the BHU, about a third (32.8%) went to a private hospital/clinic/eye specialist, a third (32.3%) went to another government hospital/eye specialist, while a third (34.9%) did not go for any medical or eye check-up
- Of those patients who preferred to go elsewhere for their examination, the main reasons cited included 1) easy to access – 57.9%; 2) advised by friends or family – 28.1%; and 3) less expensive – 14%. The alternate health facility accessed by the patients after referral was close to their residence in about half (47.2%) the patients, close to town in about two-fifths (38.2%), while 14.6% indicated that it was in another city

The findings in this section suggest that while the project made good progress in the compressed time frame of two years, there are other social determinants of health that ultimately impact on the extent of access and coverage, and uptake of referrals.

Efficiency

Was the process of achieving results cost-efficient?

Primary health care level

The project achieved a cost-efficient intervention at the primary health care level. There were two reasons for this.

First, the LHW programme is a well-established and integrated health programme that cross-cuts several health initiatives like mother and child health, nutrition, family planning, immunisation and eye health. LHWs are found in almost every community in the country and have access to household members, especially women, in those communities. By building on the health skills of the LHWs, the project was able to disseminate health messages about diabetes, create awareness about the disease and mobilise community members who were at risk of developing diabetes to seek health care and assessment at the BHUs.

Second, the foundation of health care infrastructure in the country is the BHU. The LHW programme is centred around the BHUs. About 10-15 LHWs are attached to each respective BHU. The project strengthened the referral link between LHWs and BHUs and established a new referral link for diabetes which did not exist before.

Both these processes are sustainable and scalable.

Screening team

The use of the screening team that visited the BHUs at regular intervals to review DRA referrals, diagnose previously undiagnosed persons with diabetes, and conduct DR screening and referral acted as a catalyst for the project. It helped establish a referral link between the BHU and the diabetic clinic and diabetic eye clinic at the tertiary hospitals. This link did not exist before.

However, the use of the screening team was project dependent and has now ceased to exist after the end of the project. Although the project correctly identified the role of an optometrist (who was part of the screening team) for DR screening, it would have been more cost-efficient to build in an institutional role for the optometrist so that it was sustainable in the long run. For instance, the optometrist could have been based at one of the RHCs to provide primary eye care and also support the nearby BHUs with DR screening. This aspect is discussed further under Sustainability.

Tertiary hospitals

Prior to the launch of the IMOC-P project, each of the partner hospitals had functioning diabetic/endocrine clinics and eye clinics. However, there was no formal collaborative link

between these two tertiary services, with the result that patients with diabetes were examined totally independently at the diabetic clinics, while DR was diagnosed equally independently at the eye clinics in patients who either complained of vision impairment or were diagnosed through routine examination. The project brought both services together to view needs of patients with diabetes holistically and provide a 'one-stop approach'^{18, 19, 20, 21} to the extent possible. By establishing a diabetic eye clinic in the diabetic clinic, patients with diabetes now have their eyes screened for sight-threatening DR and are promptly referred to the medical retina service in the same hospital for further treatment.

This intervention was cost-efficient and an example of good practice because:

- Enhanced synergy between existing diabetic and medical retina clinics
- Improved DR detection in patients with diabetes attending diabetic clinics through establishment of diabetic vision centres and deployment of optometrists (who were existing staff)
- Established a point of referral and counselling to patients referred from BHUs to the tertiary hospitals

Health Management Information System

One of the hallmarks of the M&E system of the IMOC-P project was the electronic medical record used for the health management information system (HMIS) both for the project and by partners. The customised software allowed data entry by screening teams when visiting BHUs and by tertiary hospitals for their DR service. The data was entered in real-time and stored in the cloud and administered and managed by a private vendor.

While the project HMIS provided a very useful tracking option for patients referred with DR and treated at the tertiary hospitals, it is dependent on annual subscription fees payable to the private vendor. During the project, the fees were paid for by the project. However, this responsibility has now been passed on to the partners who are reluctant or unable to pay the steep subscription cost of about AUD 10,000 per year.

This component of the project could have adopted a more cost-efficient approach. Other options should have been explored especially for institutionalisation within government health information systems. One of the leaders in developing management information systems is the Punjab Information Technology Board²², which is an autonomous government sponsored agency that develops customised software for various government sectors. Not only is it more cost-effective, but also cost-efficient as it can ensure pre-planned integration in existing or developing government health information systems. They can also produce stand-alone software for use by non-government hospitals so that they are also compliant with government health information pathways.

Evidence-based intervention

Three operational research studies were planned in the project.

- **KAP study**²³ – identified behaviour and practices, which helped the project develop a targeted information, education and communication (IEC) campaign – this was successful in that it raised awareness and improved health seeking behaviour and referral uptake rates
- **Patient satisfaction study**²⁴ – was conducted timely and identified several barriers to a low referral uptake in 2017 (14%). This information was utilised to modify programme strategies (like improve the screening and referral pathway between BHUs and tertiary hospitals). The combined impact of the IEC campaign and modified screening and referral strategy resulted in an increase of the referral uptake to about 60% by the end of 2018
- **Arc Light study**²⁵ – assessed the usefulness of a cheap but effective ophthalmoscope for DR screening, and the ease of use by MOs at BHUs and optometrists (in the screening teams). The study validated the decision to use optometrists for DR screening compared to MOs, and reinforced the need for a programme strategy to deploy optometrists at RHC level

These three operational research studies were a cost-efficient utilisation of project resources as they informed project design and future programme strategy.

Were the resources effectively utilised?

The utilisation of resources is assessed and presented in the matrix below. Selected parameters of resource utilisation have been used for this purpose (Table 6).

Table 6 - Assessment of utilisation of resources matrix

Resource Parameters	Project component	Highly effective	Moderately effective	Less effective	Remarks
Time	3 years project time frame		The project was implemented over 2 years		The scope of the project was vast and not suited to a 3-year implementation plan, much less a 2 year one. The project design was more suited to a 5-year plan (2 years foundation, 2 years implementation, and 1-year phased handing over or scaling up)
Human	Medical Officer			Training in ophthalmoscopy was not as productive as envisaged	MOs are not the most appropriate choice for ophthalmoscopy at primary health level owing to their workload
	Lady Health Supervisor	Appropriate training and skilling			The LHS is part of the LHW programme and her supervisory role in this case was paramount. There is continuity of this role
	Lady Health Workers	Appropriate training and skilling			The LHWs learnt new knowledge and were able to apply a non-physician skill for DRA. This knowledge and skill will continue to be applied
	Optometrist	Appropriate training and skilling			Very useful and competent resource for DR screening
	Data Entry Operator		Knowledge and skills developed for use of HMIS		The capacities developed may be unutilised if the HMIS is not implemented post-project by partners

	Screening Team		Too large geographical area for 1 team to cover in each project location		The scope of the project required at least 2 teams per location
	Diabetic Educator	Appropriate deployment by SIOVS outside of project			This is a critical resource that was not included in the project design
Material	Blood sugar testing kit	Appropriate use at BHUs			Only limitation is replacement of test strips that will need to be supplied by the health department
Technology	Ophthalmoscope to MOs			Underutilisation due to regular BHU workload	More appropriate for it to be part of a kit for optometrists
	Ophthalmic equipment and non-mydratic fundus cameras for diabetic eye clinic	Appropriate equipping of a tertiary level DR screening service run by an optometrist			This is a programme approach that can be scaled up to other tertiary hospitals with diabetic and eye clinics
	Custom designed HMIS administered and maintained by private vendor			Useful for project implementation but limited or no utilisation if no funds available for subscription	Lacks sustainable utility and has high maintenance cost
System	Health system strengthening of primary and tertiary levels of DR care	Tertiary level programme strategy appropriate for establishing diabetic eye clinics	Primary level strategy of use of LHWs appropriate for health promotion and awareness	BHUs not an appropriate referral point for screening for DR as there are no DR screening teams in the health structure. No further utilisation of screening team at end of project	The secondary level of health care was missing in the project design In Punjab, the health department developed a programme for prevention and control of NCDs at about the time the IMOC-P project was launched. There was a missed opportunity of collaboration and learning in Punjab during the life of the project

<p>Financial</p>	<p>Total approved project budget at outset was PKR 100 million</p> <p>Final actuals in country were PKR 70 million</p> <p>Approved budget for 2018 was PKR 24.93 million</p> <p>Revised 2018 forecast was PKR 16.54 million</p> <p>The 2018 actual was PKR 15.88 million</p>		<p>Cost estimation had significant variance with actuals. The Foundation addressed this by having revised annual and quarterly forecasts. This was then brought down to monthly forecasts and reimbursements to partners for activities</p>	<p>There was a missed opportunity to strengthen partner financial management capacities</p> <p>There were two principal donors for the project that required two separate reports with separate financial reporting. It would have been more useful to agree on one progress report at defined periods</p> <p>The monthly progress update reports would have been better served by having an online M&E framework with key indicators, inputs and outputs for review.</p>	<p>There appears to be a certain degree of micro-management of partners in the financial planning and disbursement process. The Foundation made a payment in advance in the first quarter of the year and afterwards reimbursement in the following quarters on monthly basis</p> <p>It is also not clear from available financial data as to how much of the project budget was being charged to the regional and head offices</p> <p>The project would have benefitted from having a critical pathway with essential activities and costing. This would have assisted the project team to exclude certain non-essential activities considering the compressed time frame for delivery</p>
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How efficient were the management and accountability structures of the project?

This section has been addressed in detail and to some extent earlier in this report and chapter.

The clustering of activities designed for a three-year project into two years placed programmatic strains both on partners and on the Foundation's team. Project activities had to be scheduled within tight timelines. This required intensive monitoring and follow-up.

The project achieved this through the Steering Committee in Lahore and Hyderabad, quarterly review visits to partners, monthly project forecasting and reporting, and six-monthly reporting. The decisions of the Steering Committee were disseminated to key stakeholders who were obliged to implement those decisions and to report progress at the next meeting. This ensured an efficient management process. Now that the project has ended, the pressure of implementation is no longer there. The status of the Steering Committee is unclear at present as to whether COAVS and SIOVS will be able to maintain enough interest among health officials for the Steering Committee to continue to function.

The accountability processes are discussed in the next section

How did the project financial management processes and procedures affect project implementation?

The financial management processes and procedures of the project, while implemented within the overall budget, presented challenges that affected the operationalisation of the project.

All the partners run a separate manual Excel based financial management system for the project. The two government partners (SIOVS and COAVS who was managing the Lahore district component) are bound by government financial rules and procedures. For instance, in Punjab, it is known as the Punjab Procurement Regulatory Authority²⁶ (PPRA). In Sindh, it is called the Sindh Public Procurement Regulatory Authority²⁷ (SPPRA). For all government related budgeting, accounting, reporting and auditing, the respective PPRA rules and software are used. However, PPRA only accounts for government funds and not international non-government organisation (INGO) funds unless they are directed through the finance department of the respective provincial government. This would be challenging as it would result in delays.

The present arrangement between the Foundation and its partners has in place project accounts into which the transfers are made. While the operation of these accounts is supported by financial documentation (vouchers, invoices and receipts) and an audit trail, the accounting and reporting is managed on Excel. This is an area where improvement can be made through use of computerised financing accounting software for Foundation and other non-government partner supported projects. Furthermore, there is need for partners to have

a financial management policy and standard operating procedures for the Foundation supported project account(s). For example, and to illustrate this point, the Foundation has a limit of PKR 16,000 for which a purchase can be made with a single quotation. Any amount above this requires three quotations. Government partners on the other hand use the PPRA guidelines which have a limit of PKR 50,000²⁸ for a single quotation. This sometimes resulted in delays in payment by the Foundation as the documentation of three quotations by the partners was not complete.

There is a pressing need to use financial software for accounting purposes like budgeting, forecasting, receipts and payments, variances, double entry, reconciliations, journal entry, income-expenditure statement, trial balance, and balance sheet. Cost-effective off the shelf accounting software options are now available and can be supported by the Foundation as part of partnership development and capacity building.

Initially, partner transfers were made on a quarterly basis. However, owing to problems in timely scheduling of activities, planned activities were sometimes not completed and there were budget underspends. In order to streamline this, the Foundation introduced an advance in the first quarter and subsequent monthly transfers as a reimbursement for activities completed or undertaken. While this helped reduce underspends, it created problems for partners who had to undertake an activity whose payment would accrue to the next month when the transfer would be made by the Foundation.

The Foundation had a requirement for financial closing on the 27th of every month. Partners could not meet this date for financial closing every month. This resulted in delays because the Foundation needed signed documents from the partners, which were not always available at the time required as the relevant signatories may not be available. The Foundation needed to report on the transfers and would not receive clearance from the regional and head offices for the next transfer until these documents were provided. The date was eventually extended to the first week of the next month.

Initial project budgeting was based on activity-based costing. However, at the time of implementation, some costs turned out to be less than originally forecasted. This resulted in some project underspends. These underspends were discussed by the Country Office with the regional and head offices of the Foundation and revised quarterly forecasts developed and approved by the approving authorities for the next quarter.

There is no mandatory requirement from the Foundation for external audit of its project accounts with partners, although partners do have their accounts audited. The Country Office requires original documents from partners for its own audits, while partners require the same original documents for their own audits. This presents a challenge for auditing.

Sustainability

To what extent will the DR model of care be continued in Lahore and Hyderabad after the completion of this project?

The project demonstrates varying trends in sustainability. These are presented below under thematic headings.

Community awareness and identification of persons with diabetes

This has a high likelihood of sustainability in both areas because

- a module on diabetes care and implications of diabetes on health has been incorporated into the new revised curriculum of LHWs in Sindh
- the Lahore district coordinator for the LHW programme has directed the LHWs to include a section on diabetes in their respective household registers in which LHWs record household information
- the Punjab programme for prevention and control of NCDs 2016-2021²⁹ ([Annex 6](#)) has plans to train LHWs in the province on NCDs including diabetes

These factors are likely to enhance public awareness about diabetes and increase identification of previously undiagnosed persons with diabetes.

The Punjab programme for prevention and control of NCDs 2016-2021 has a specific component on health awareness. The health education and health promotion tools on diabetes³⁰ do not include any mention of eye complications. This is an area for future collaboration.

When LHWs were asked about the positive and negative aspects of the project, they indicated a lack of refresher trainings, short time of the project, lack of provision of medicines, difficulties within the communities e.g. poverty, long distances, traveling costs etc made it difficult for some patients to avail services at tertiary centres. On the other hand, knowledge about diabetes has increased not only among the community but also among themselves.

Initial screening

While screening for diabetes would continue at first level health facilities (BHUs and RHCs) as part of the government health system in both areas, and through the Punjab programme for prevention and control of NCDs 2018-2021, the screening for DR is unlikely to continue at BHU level. Although the Foundation sponsored study on Arc Light³¹ demonstrated the effectiveness of the hand-held ophthalmoscope for screening of DR, its use by medical officers (general physicians) at first level health facilities is likely to be very limited. This point was also borne out in the patient satisfaction study³² which found a very low utilisation of the ophthalmoscope by medical officers at BHUs.

However, the Government of Punjab in 2018 has approved posts of optometrists at 36 RHCs and they are awaiting deployment. The Arc Light study demonstrated a high competency of optometrists in ophthalmoscopy using the Arc Light for DR screening. Once the optometrists are deployed, they can provide a sustainable DR screening service at RHCs.

Referral pathway

The IMOC-P project tested and proved the viability of the referral pathway from the LHWs to the BHUs of persons with diabetes or suspected to have diabetes. Furthermore, a formal referral link has been established between the BHUs in the project sites and the respective tertiary hospitals. This link is likely to continue and is expected to be further enhanced both in Hyderabad (by inclusion of a module of diabetes in the revised LHW curriculum) and in Lahore (through the implementation of Punjab programme for prevention and control of NCDs 2016-2021).

Cooperation between diabetic and eye care for DR

Formal collaboration was established between the medical retina service and diabetic clinic in all the three tertiary referral hospitals. An optometrist is deployed at each of the three diabetic clinics and screens patients with diabetes for DR. This collaboration is likely to continue and enhance the screening services for DR.

Furthermore, the Punjab programme for prevention and control of NCDs 2016-2021 has established NCD clinics at 130 secondary government hospitals in Punjab³³. There is need to formalise a collaborative link between the NCD clinics and eye department at the respective secondary hospitals. This will require formal collaboration between the National Eye Health programme and the Punjab programme for prevention and control of NCDs 2016-2021.

Data management

The health management information system (HMIS) developed for the IMOC-P project was a cloud-based system administered by a private vendor. The annual fee for administration and management of the software was paid by the project to the vendor. Now that the project has ended, the annual fee will need to be paid by the respective partners. The annual fee per partner is PKR 1 million (equivalent to about AUD 10,000).

LGH has indicated that it has requested the vendor to provide the software on the hospital's local server. This is still under discussion and if implemented would not have the benefit of any IT support from the vendor. Furthermore, the hospital is developing its own HMIS for all departments and aspects of the DR HMIS may be possible to incorporate into it. LGH is not planning to pay PKR 1 million as annual fees to the vendor.

GTTH has found the HMIS useful and is still discussing the cost-effectiveness of the DR HMIS and whether it is feasible to pay the high annual fees or not. The hospital administration has not yet approved this option. Furthermore, GTTH is developing its HMIS in collaboration with Shaukat Khanum Memorial Cancer Hospital and Research Centre³⁴ in Lahore. It is likely that some elements of the project HMIS are included in the hospital HMIS module for the eye department.

SIOVS is in a similar situation to GTTH and considers the annual fees excessive for its operations. However, it is still under discussion with the hospital administration.

The IMOC-P project has three feasible options for long-term sustainability of DR reporting.

First, the Punjab programme for prevention and control of NCDs 2016-2021 has established an electronic medical record system³⁵ (EMR) for the NCD clinics at the secondary hospital. There is potential to incorporate an indicator of DR in the patient database. In addition, the Punjab programme for prevention and control of NCDs 2016-2021 has planned to introduce a NCDs risk assessment tool for use by LHWs for identification and referral of persons at risk of NCDs including diabetes. Although the IMOC-P DRA form is unlikely to be used, however, several of its questions related to diabetes are likely to be similar to what the NCD programme intends to use in its NCD risk assessment form. It would be highly desirable for the Foundation and its partners in Punjab to engage with the NCD unit to build on the foundation laid by IMOC-P.

Second, the Sindh LHW programme has included a module on diabetes and is likely to start collecting data on diabetes. There is need for engagement with the Sindh LHW programme to ensure that diabetes data is being collected from the LHW programme and BHUs.

Third, the Punjab programme for prevention and control of NCDs 2016-2021 has developed an operational research strategy³⁶ and there is good scope for collaboration with COAVS and the Foundation to obtain evidence for improved integration e.g. in health information.

How were capacities strengthened at the individual and organizational level (including contributing factors and constraints)?

The project developed new capacities and strengthened existing ones in the following cadres:

- 92 LHSs were trained in the project areas and continue to provide supervisory support to LHWs
- 1302 LHWs were trained in diabetes and use of the DRA guidelines. Their awareness and screening skills have been developed and they continue to refer patients to the BHUs. The new knowledge gained will now be reinforced in Sindh through the revised curriculum

which includes a module on diabetes and eye health, and they will benefit from the roll out of the NCD programme in Punjab

- 111 MOs were oriented in DR and trained in ophthalmoscopy – they were also given Arc Light ophthalmoscope to use
- Data entry operators were trained in each partner hospital – so that they could use the HMIS
- Screening team – was trained in data entry and use of the HMIS
- Optometrists – in the screening team and those based in the diabetic eye clinics were provided refresher training in ophthalmoscopy and diagnosing DR

A few challenges were noted.

MOs often get themselves posted to BHUs to fulfil their requirement and eligibility for postgraduate training as this is based on a points system, which requires that MOs have served at BHUs in rural areas. Owing to frequent transfers, this means that MOs trained in ophthalmoscopy can be transferred e.g. to enrol in a training programme. Therefore, the DR screening capacity at a BHU would no longer be there unless the incoming MO was trained in ophthalmoscopy. Furthermore, the study conducted by the Foundation on the use of the Arc Light³⁷ indicates that optometrists are a more appropriate choice for DR screening at primary health level. In addition, there was reluctance by the MOs to perform ophthalmoscopy or undertake any DR screening owing to their existing workload. In contrast to LHWs who had direct pressure from their district coordinator to use the DRA guidelines, there was no such demand from the health department on the MOs.

The screening team faced certain challenges. First, the geographical area to be covered was too large for a single team. There should have been at least two screening teams per project area in the project design. Second, there was turn-over of the team members which resulted in delays. For instance, in Lahore, the data manager, optometrist and community mobiliser left at different times and had to be replaced.

While the optometrists were provided refresher training in ophthalmoscopy and detection of DR, there was no certification of their role as a primary or secondary grader for DR. This is a quality standard that DR screening programmes should endeavour to achieve³⁸.

Diabetic eye clinics were established at each of the three implementing partners. BHUs were provided with ophthalmoscopes, and blood sugar testing kits and strips.

How has this project influenced long-term referral patterns for diabetes and DR?

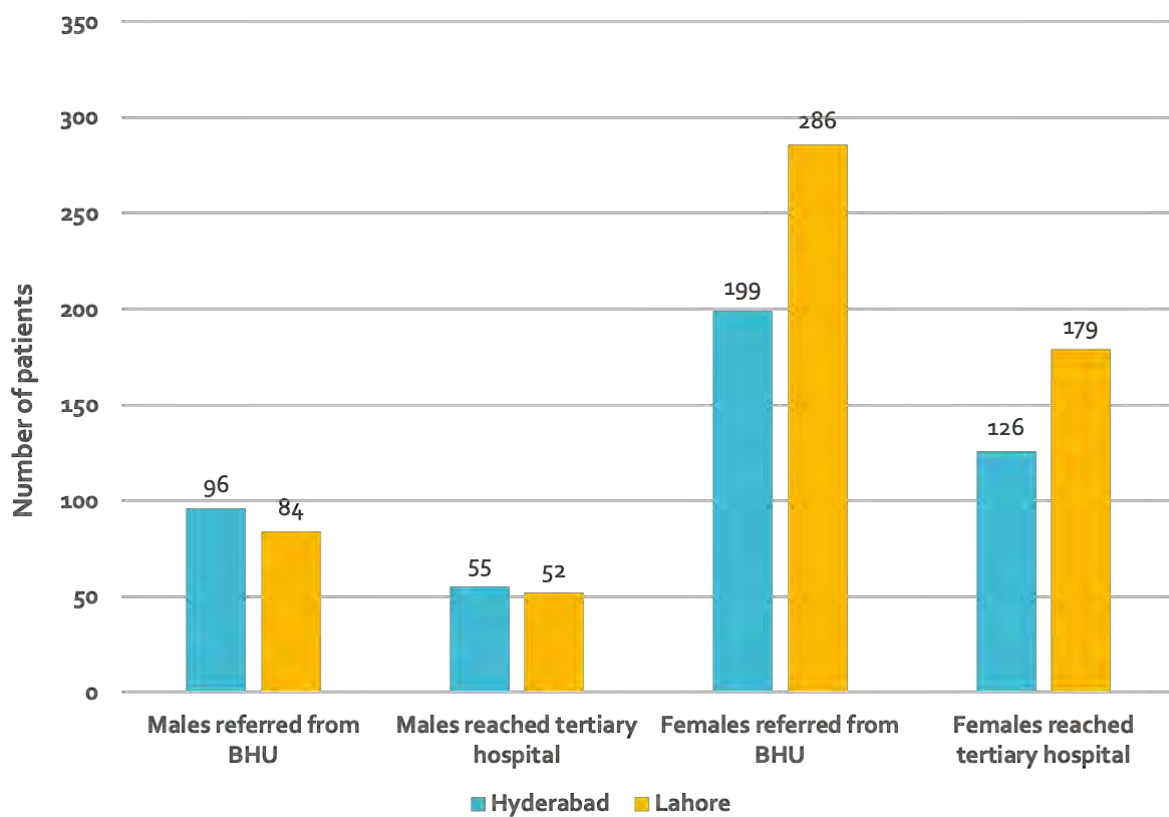
Project data indicates that the referral uptake increased steadily in both Lahore and Matiari districts between 2017 and 2018 (please see section on Effectiveness). The referral rate in

women was more than that in men (Fig 4). The sex disaggregated referral uptake data for January to November 2018 indicates the following (Fig 5):

- Hyderabad – 57% of all male referrals and 63% of all female referrals from the BHUs reached the tertiary hospital
- Lahore – 62% of all male referrals and 63% of all female referrals from the BHUs reached the tertiary hospital

Although there is a difference in the respective male and female numbers of referrals and those that reached the tertiary centres, these proportions indicate a similar trend in both project sites. This suggests that the referral pathway has been operationalised and that the programme strategy of referral after screening is showing increasing trends for both men and women. Furthermore, anecdotal data from the BHUs indicates that attendance of regular patients (not screened by project) with diabetes has increased since the project began.

Figure 5 - Sex disaggregated referral uptake trends 2018



Key Learnings

Diabetes has reached epidemic proportions in Pakistan with every fourth adult 20 years and above affected, and one in every seven persons being a pre-diabetic. This has grave implications for eye health programmes and services for diabetic retinopathy.

The use of a non-physician community health professional like the lady health worker for health promotion and awareness and to conduct diabetes risk assessment at community level was a successful programme strategy that is scalable and sustainable.

Primary health level screening for diabetic retinopathy by an optometrist was a feasible strategy and has reinforced the need for deployment of optometrists to first level health facilities like rural health centres.

Establishing a diabetic eye clinic in a tertiary setting in collaboration with diabetic clinics and ophthalmology clinics (medical retina services) was a highly feasible and sustainable intervention, which can be scaled up to other tertiary centres. This was an example of good practice.

Setting up a Steering Committee chaired by senior health officials played a significant role in facilitation and coordination of programme activities and helped maintain the momentum for the project. It is also an example of good practice.

The project demonstrated successfully that a screening service for diabetic retinopathy can be developed at the primary health level that further establishes a referral pathway to tertiary diabetic and medical retina services.

While health promotion and awareness, screening for diabetic retinopathy and presence of a referral system improve patient access to tertiary medical retina services, there are other social determinants of health that affect ultimate uptake of referrals.

Incorporation of operational research in the project design was very useful as it helped identify bottlenecks to referral uptake at tertiary medical retina services, which improved after remedial measures were taken, and informed future strategic options and programme design.

When developing DR programmes, it is desirable to develop partnerships with NCD programmes as well so that DR prevention and control strategies are synergistically aligned with NCD strategies for strategic integration and sustainable programmatic impact.

Recommendations

To the National Coordinator, National Eye Health Programme

1. **Establish** a formal collaboration between the National Eye Health programme and the Punjab programme for prevention and control of NCDs 2016-2021 to improve health awareness and health information flows, and promote identification, screening, referral and management of patients with diabetes and those at risk of developing sight-threatening diabetic retinopathy.
2. **Extend** and expand the scope of diabetic eye clinics at all tertiary teaching hospitals with diabetic and medical retina services in collaboration with the provincial health authorities and international eye care partners.

To Implementing Partners

1. **Strengthen**, reinforce and sustain the one-stop services provided through the diabetic eye clinic, which is a bridge between diabetic and medical retina services.
2. **Develop** and maintain a tracking system for patients with diabetic retinopathy referred from primary and secondary levels of health care.
3. **Induct** and deploy the services of a diabetic educator as part of the medical retina team. Where feasible, the diabetic educator should preferably be the first point of contact at the tertiary hospital for patients referred with diabetic retinopathy or diabetic eye disease.
4. **Incorporate** a mandatory diabetic retinopathy screening module in training programmes for optometry. For optometrists deployed for screening of diabetic retinopathy, ensure that they receive certification as a grader.
5. **Ensure** inclusion of a module on diabetic retinopathy in the respective hospital management information system to sustain gains made through the electronic medical record system developed in the project.

To the Foundation

1. **Strengthen** health systems by testing and piloting the screening for diabetic retinopathy by optometrists at rural health centres and establishing a referral pathway with an eye unit at a district hospital as an intermediary between the rural health centre and the tertiary centre.
2. **Support** respective eye care partners for collaboration with the Sindh Lady Health Workers programme and the Punjab programme for prevention and control of non-communicable diseases to enhance the social and health impact of integrated screening, referral and management of patients with diabetic retinopathy.

3. **Build** partner capacities in the use of computerised financial accounting software and development of financial standard operating procedures for Foundation supported projects.

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