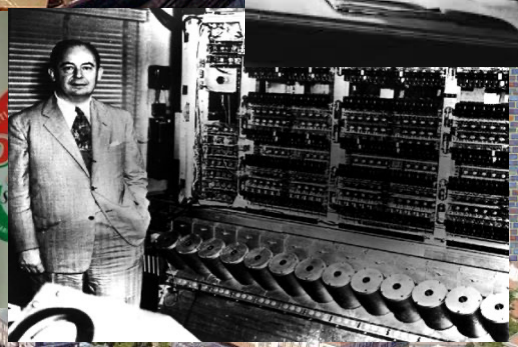
Diabetes and the eye: patient centred eye care

Professor Tünde Pető

Professor of Clinical Ophthalmology at Queen's University Belfast
Medical Retina Consultant, Clinical Lead for Diabetic Eye Screening in Northern Ireland and Clinical lead for Diabetic Eye Care in the Belfast Health and Social Care Trust

QUEEN'S UNIVERSITY BELFAST



Karikó Katalin with a statue of Albert Szent-Györgyi, a fellow Nobel Prize in Physiology or Medicine winner, at the University of Szeged

Padova

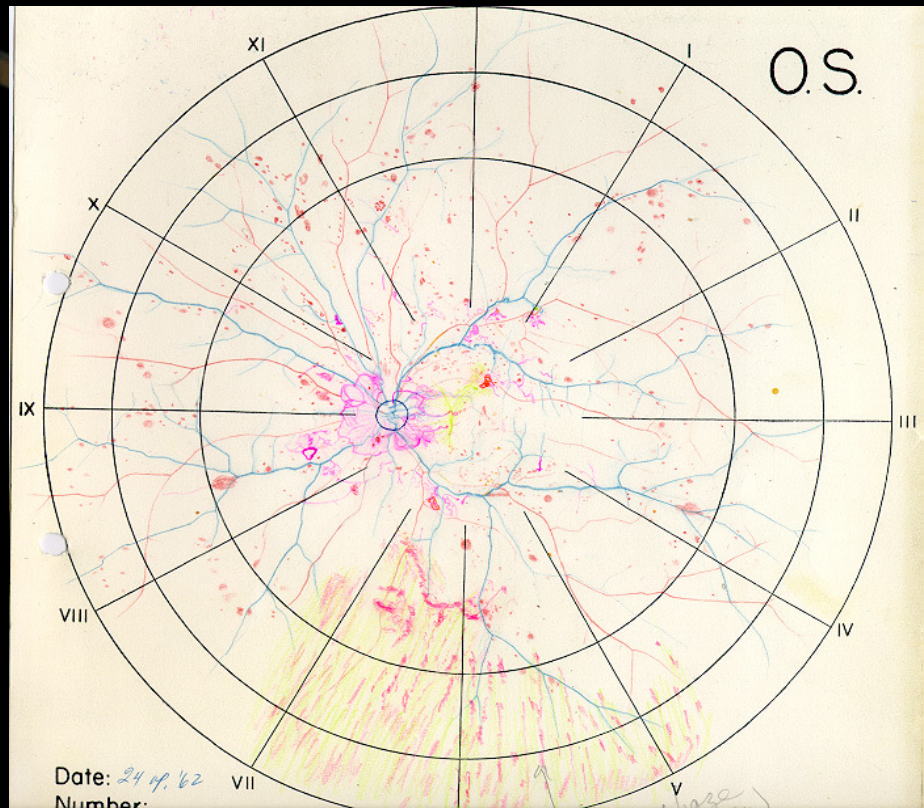
Newcastle, Australia:
PhD in Epidemiology and statistics of diabetic eye

Population based study with several follow-ups
Taught me to plan and carry out image analysis on a large scale
Taught me to deal with large number of transparency (film) images
Emphasised the need for team-work and collaboration

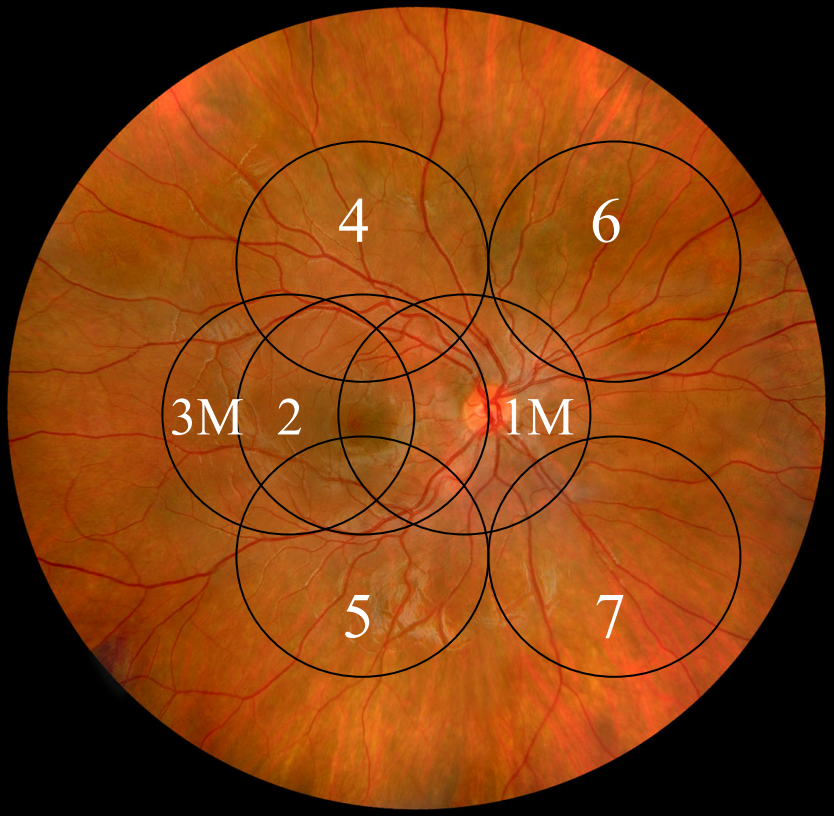
1998 – 2001: Szeged

Moorfields Eye Hospital, London 2001- 2016: Head of Reading Centre

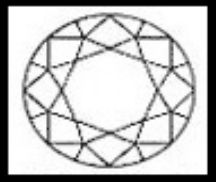
Since September 2016



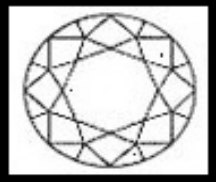
Courtesy of Wisconsin Reading Centre



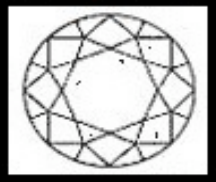
GIA Clarity Grading Scale



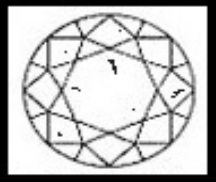
F-IF
Flawless, internally flawless. No flaws internally or externally. Extremely rare and beautiful diamonds.



VVS1-VVS2
Very, very slightly included. Very hard to see inclusions under 10X magnification. Diamonds of excellent quality.

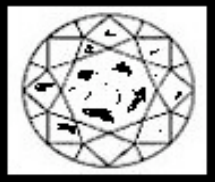


VS1-VS2
Very slightly included. Inclusions usually not visible to the naked eye. Cheaper than VVS1 or VVS2 grade loose diamonds.



SI1-SI2
Slightly included. Inclusions visible under 10X magnification and might be visible with the naked eye. Good value.

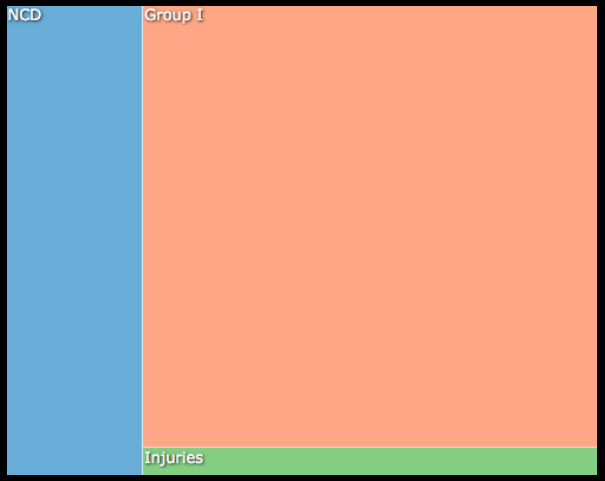
SI3-I1
Included inclusions maybe visible without magnification, but an excellent choice for earrings. An SI3-I1 grade can be an excellent value, particularly since the inclusions are hard to see.



I2-I3
Inclusions can be seen without magnification and obvious under 10X magnification. May affect transparency and brilliance.

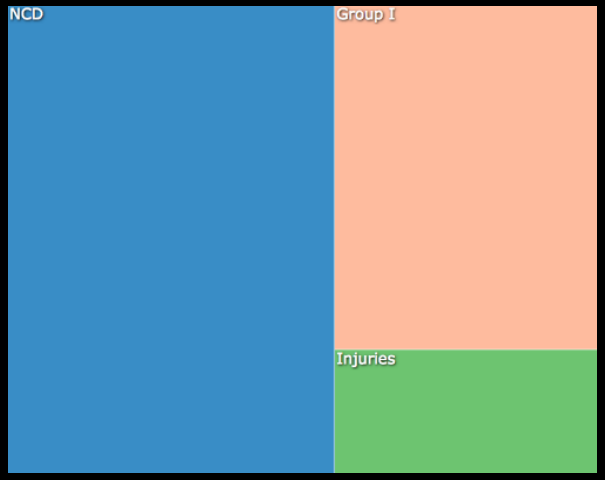
Three countries along the epidemiological transition in 2016

Nigeria



- **~70% disease burden** due to infectious, child and maternal health conditions (“Group 1”)
- **~30% disease burden** due to NCDs and injuries

India



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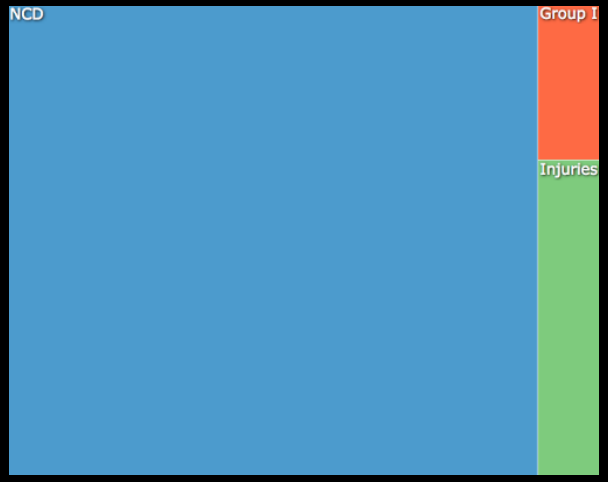
Germany



- **~5% disease burden** due to infectious, child and maternal health conditions (“Group 1”)
- **~95% disease burden** due to NCDs and injuries

gbdcompare

The global burden of vision impairment and blindness: how the cause-specific burden has changed over the past 30 years and the new initiative to make this data accessible: the Global Vision Database

Led by: Prof Rupert Bourne, BSc FRCOphth MD
Vision & Eye Research
Unit, Anglia Ruskin University, Cambridge, UK
Grant Support:
Bill & Melinda Gates Foundation
Fight for Sight
Brien Holden Vision Institute

Global estimates on the number of people blind or visually impaired by glaucoma: A meta-analysis from 2000 to 2020.

Vision Loss Expert Group of the Global Burden of Disease Study; GBD 2019 Blindness and Vision Impairment Collaborators.

Eye (Lond). 2024 Apr 2. doi: 10.1038/s41433-024-02995-5. Online ahead of print.

PMID: 38565601

Global estimates on the number of people blind or visually impaired by cataract: a meta-analysis from 2000 to 2020.

Pesudovs K, Lansingh VC, Kempen JH, Tapply I, Fernandes AG, Cicinelli MV, Arrigo A, Leveziel N, Briant PS, Vos T, Resnikoff S, Taylor HR, Sedighi T, Flaxman S, Steinmetz J, Bourne R; Vision Loss Expert Group of the Global Burden of Disease Study; GBD 2019 Blindness and Vision Impairment Collaborators.

Eye (Lond). 2024 Mar 9. doi: 10.1038/s41433-024-02961-1. Online ahead of print.

PMID: 38461217

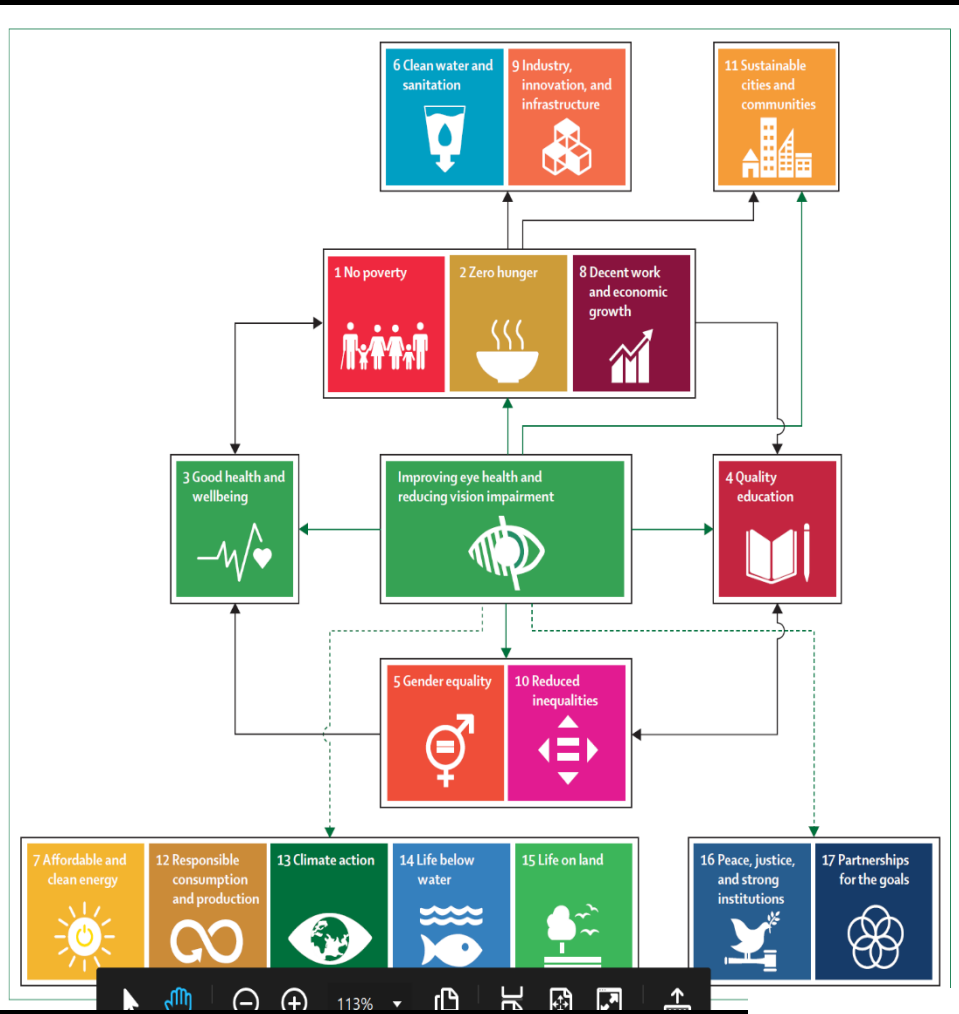
We developed prevalence estimates based on modeled distance visual impairment and blindness due to cataract, producing location-, year-, age-, and sex-specific estimates of moderate to severe vision impairment (MSVI presenting visual acuity <6/18, 3/60) and blindness (presenti ...

Effective refractive error coverage in adults aged 50 years and older: estimates from population-based surveys in 61 countries.

Bourne RRA, Cicinelli MV, Sedighi T, Tapply IH, McCormick I, Jonas JB, Congdon NG, Ramke J, Naidoo KS, Fricke TR, Burton MJ, Müller A, Bikbov MM, Furtado JM, Kyari F, He M, Wang YX, Vijaya L, Nangia V, Brian G, Emamian MH, Fotouhi A, Hashemi H, Khandekar RB, Marmamula S, Salomão S, George R, Kazakbaeva G, Braithwaite T, Casson RJ, Iwase A, Gupta N, Abdianwall MH, Varma R, Wong TY, Wang N, Taylor HR, Flaxman SR, Keel S, Resnikoff S; Vision Loss Expert Group of the Global Burden of Disease Study; RAAB International Co-Author Group.

Lancet Glob Health. 2022 Dec;10(12):e1754-e1763. doi: 10.1016/S2214-109X(22)00433-8. Epub 2022 Oct 11.

PMID: 36240807 Free article.



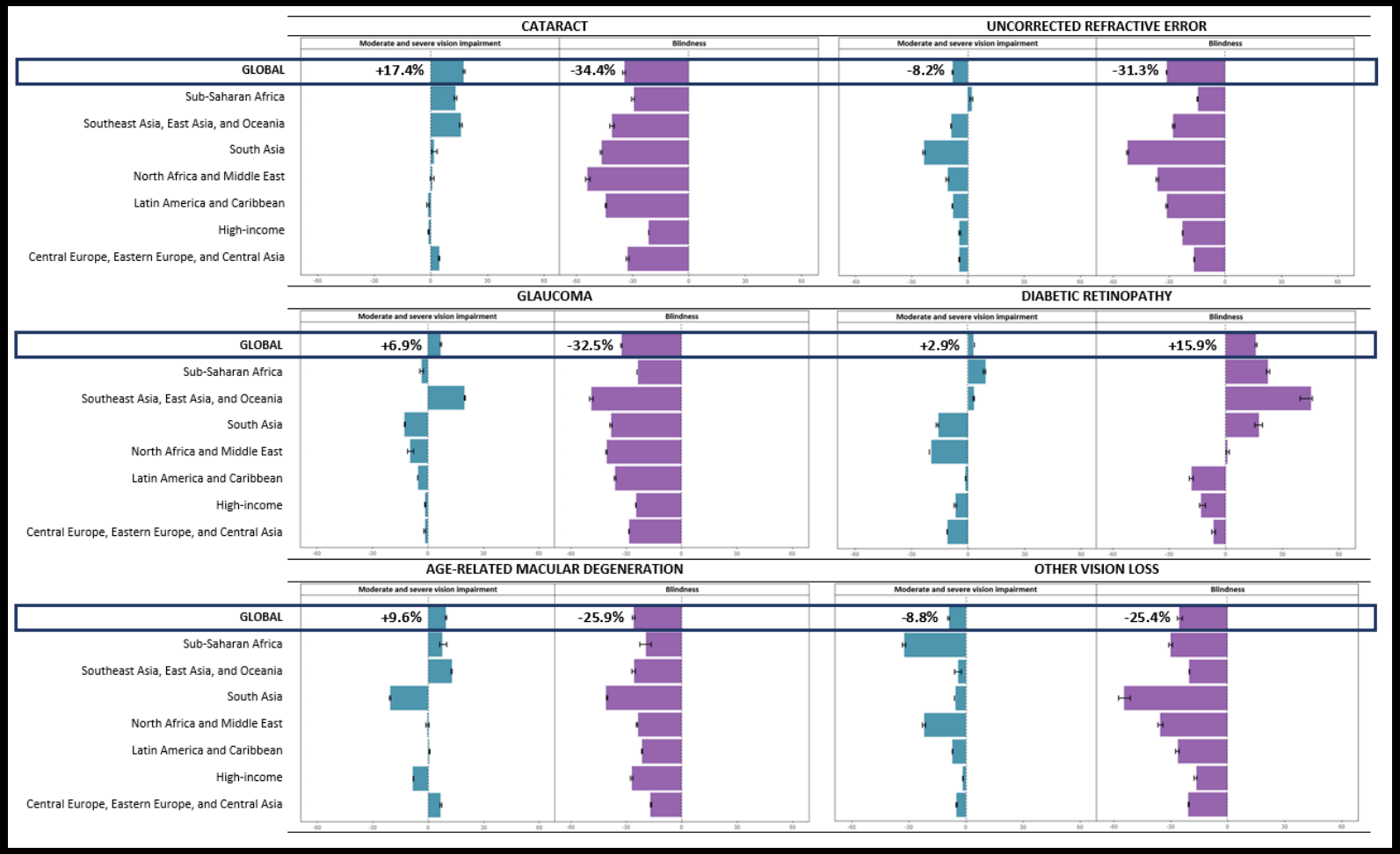
Eye-health contributes to Sustainable Development Goals

The Lancet Global Health Commission

The *Lancet Global Health* Commission on Global Eye Health: vision beyond 2020

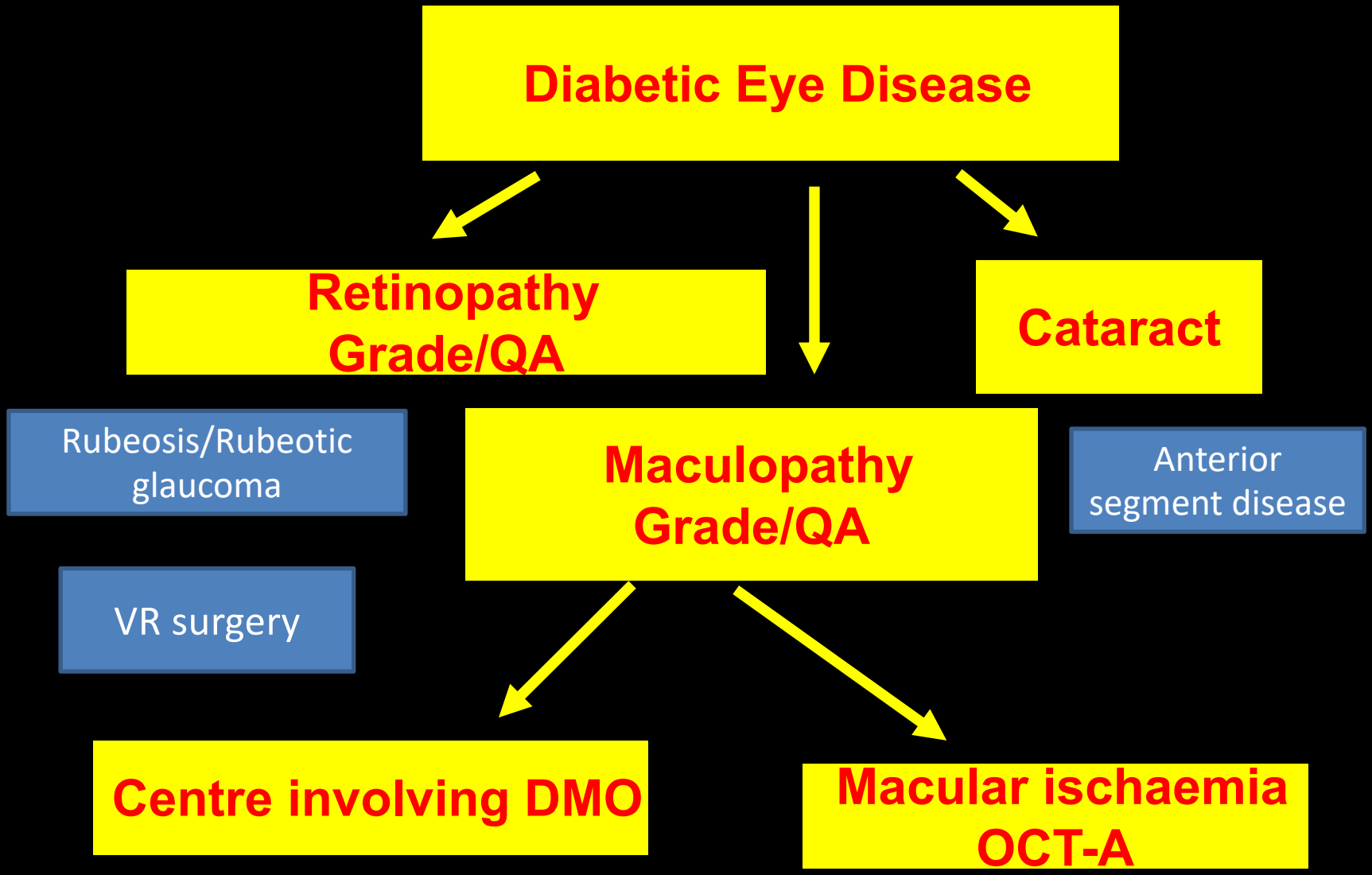
Matthew J Burton, Jacqueline Ramke, Ana Patricia Marques, Rupert R A Bourne, Nathan Congdon, Iain Jones, Brandon A M Ah Tong, Simon Arunga, Damodar Bachani, Covadonga Bascaran, Andrew Bastawrous, Karl Blanchet, Tasanee Braithwaite, John C Buchan, John Cairns, Anasaini Cama, Margarida Chagunda, Chimgee Chuluunkhuu, Andrew Cooper, Jessica Crofts-Lawrence, William H Dean, Alastair K Denniston, Joshua R Ehrlich, Paul M Emerson, Jennifer R Evans, Kevin D Frick, David S Friedman, João M Furtado, Michael M Gichangi, Stephen Gichuhi, Suzanne S Gilbert, Reeta Gurung, Esmael Habtamu, Peter Holland, Jost B Jonas, Pearse A Keane, Lisa Keay, Rohit C Khanna, Peng Tee Khaw, Hannah Kuper, Fatima Kyari, Van C Lansingh, Islay Mactaggart, Milka M Mafwiri, Wanjiku Mathenge, Ian McCormick, Priya Morjaria, Lizette Mowatt, Debbie Muirhead, Gudlavalleti V S Murthy, Nyawira Mwangi, Daksha B Patel, Tunde Peto, Babar M Qureshi, Solange R Salomão, Virginia Sarah, Bernadetha R Shilio, Anthony W Solomon, Bonnielin K Swenor, Hugh R Taylor, Ningli Wang, Aubrey Webson, Sheila K West, Tien Yin Wong, Richard Wormald, Sumrana Yasmin, Mayinuer Yusufu, Juan Carlos Silva, Serge Resnikoff, Thulasiraj Ravilla, Clare E Gilbert, Allen Foster, Hannah B Faal

Change in causal contribution to age-standardized prevalence of blindness in adults 50+ years

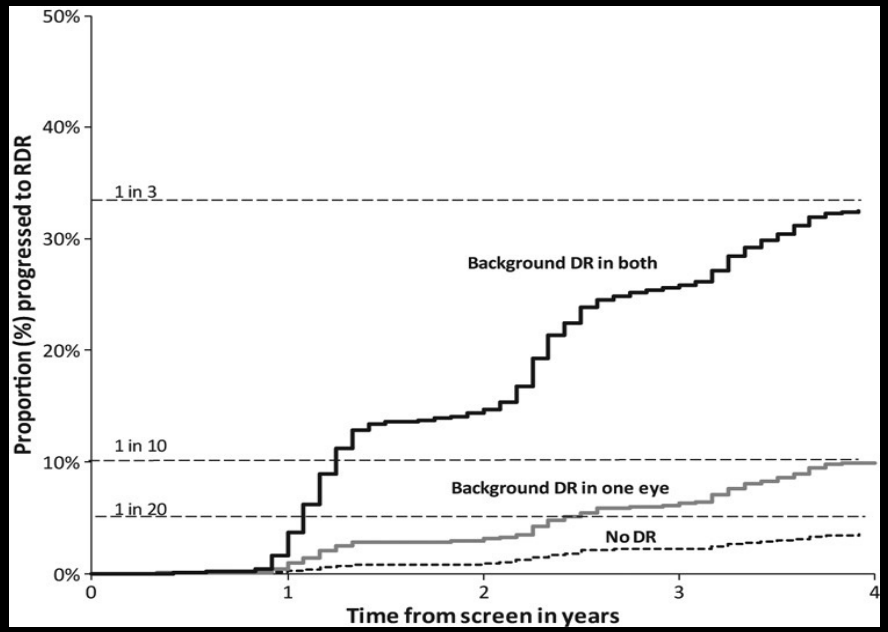


Blind <3/60 MSVI <6/18 to 3/60

… in the better eye

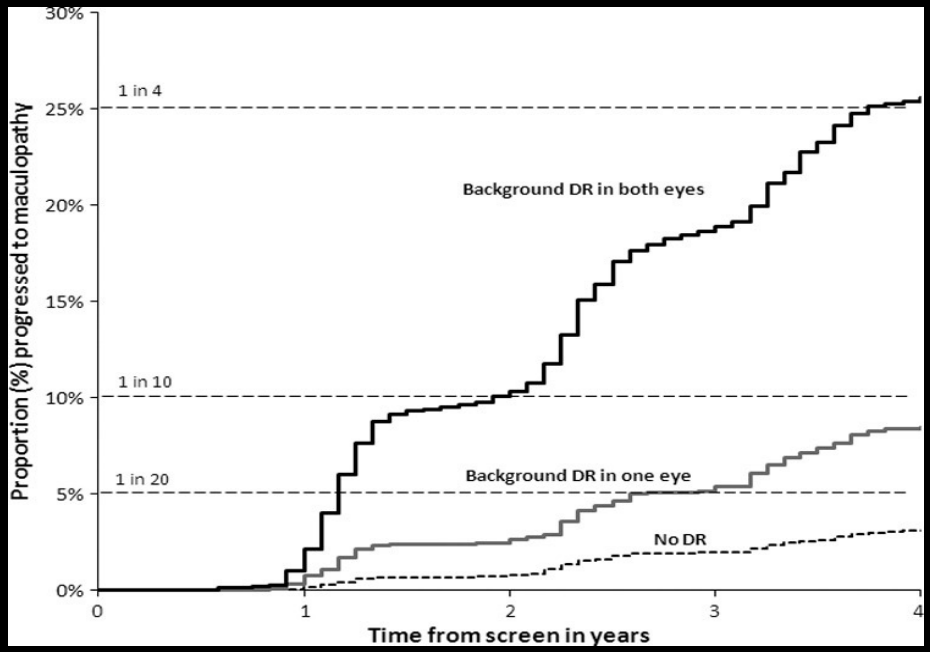

Diabetic Eye Disease
Retinopathy Grade/QA
Cataract
Rubeosis/Rubeotic glaucoma
Maculopathy Grade/QA
Anterior segment disease
VR surgery
Centre involving DMO
Macular ischaemia OCT-A

Progression to proliferative disease



In the UK, we learnt over the years that good quality image analysis allows for risk stratification of patients based on 2-fields imaging alone, but can we do better?

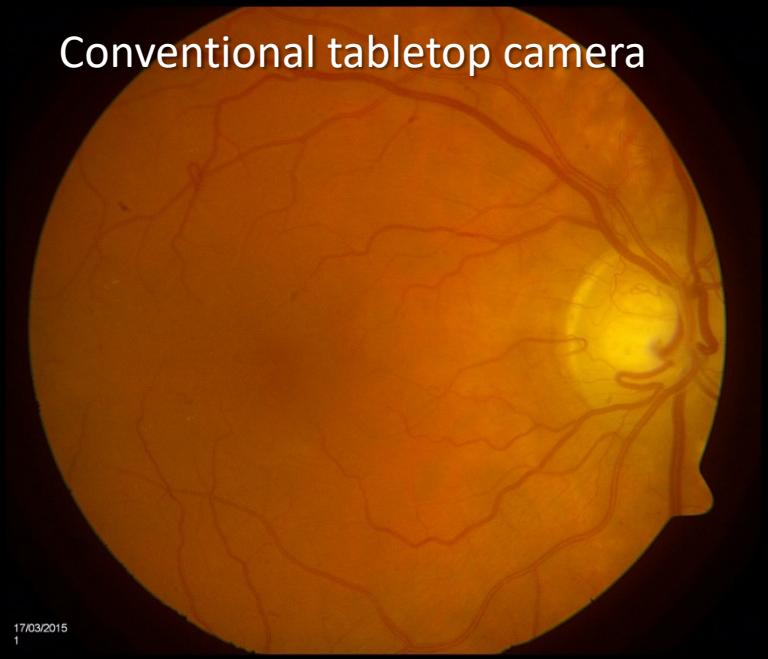
Progression to maculopathy



Area photographed in the UK programme: approx. 20% of the retina

Scanlon PH, Stratton IM, Histed M, Chave SJ, Aldington SJ. Acta Ophthalmol. 2013 Aug;91(5):e335-9.

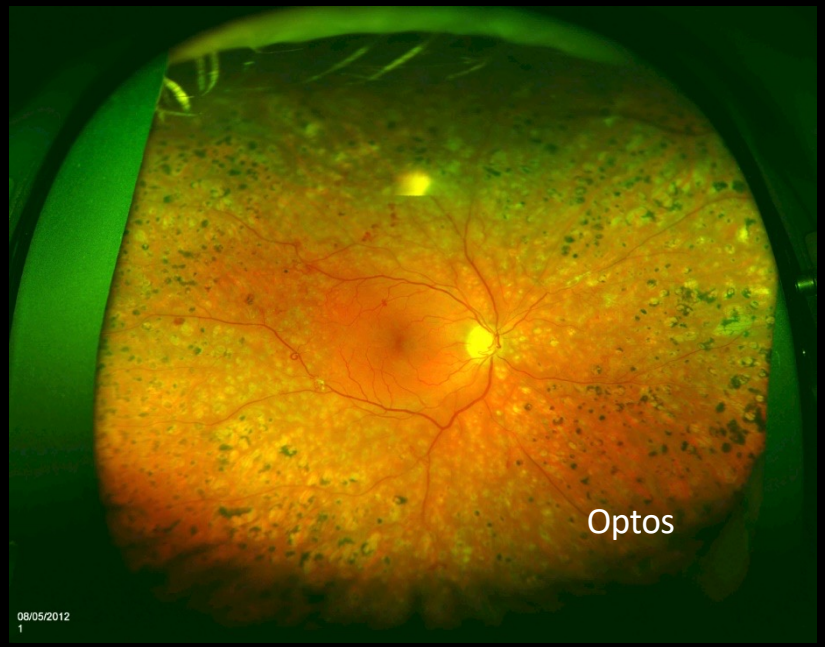
Conventional tabletop camera

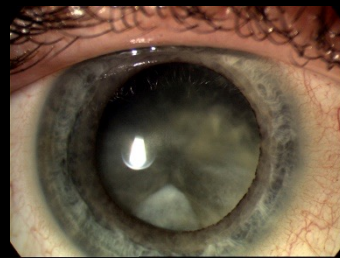


Important to know the technology and how it affects what is being imaged

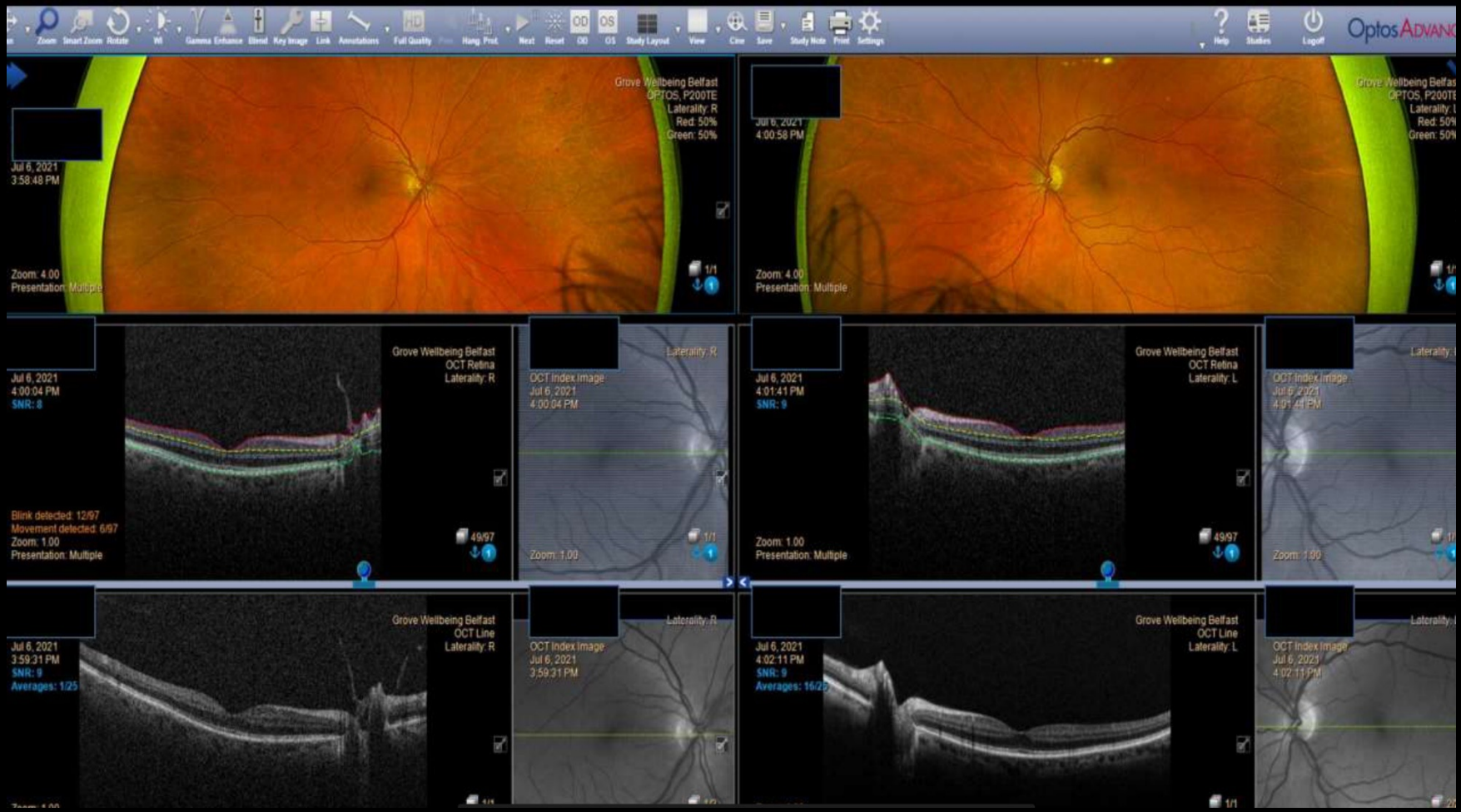
These images were taken by 3 different cameras, on the same day of the same eye! – grading and treatment decisions even by humans might be slightly different

Courtesy of David Steel, UK

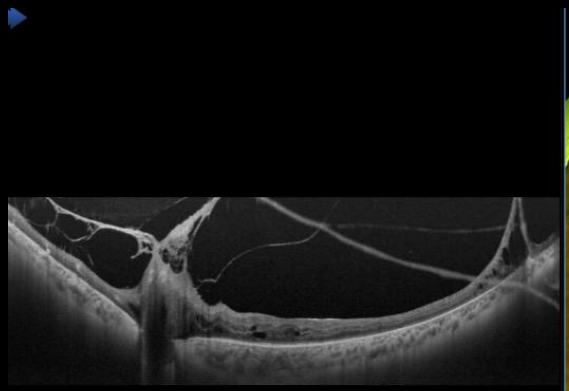


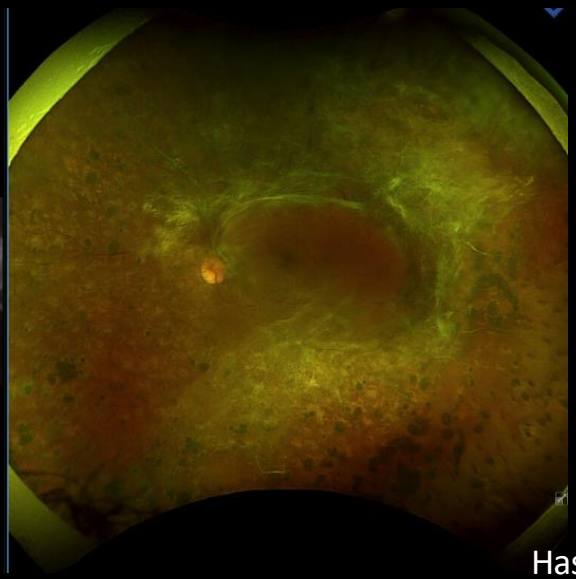


Reading images takes time and must be timetabled appropriately



Fibrovascular proliferation





Images courtesy of Dave Brown, MD Retina Consultants of Texas

Has the potential to benefit:

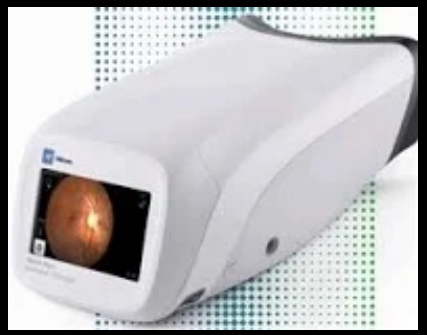
Uveitis
Ocular tumours
Peripheral pathologies /vitreoretinal surgery

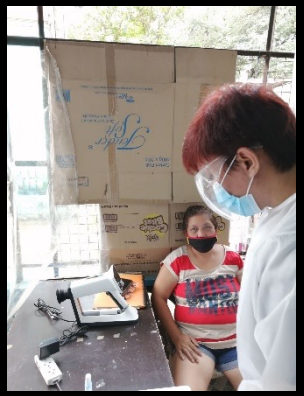
Handheld Retinal Imaging Validation Study

- Standardized diagnostic evaluation for diabetic retinopathy of multiple handheld retinal imaging devices
- Comparison with ultrawide field images, ETDRS standard and optical coherence tomography
- Images acquired by non-physician certified imager

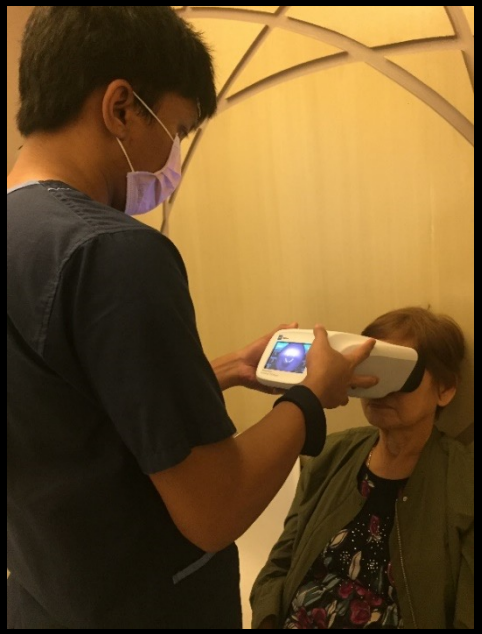
iNview Smartscope Aurora RV700





REACH-DR

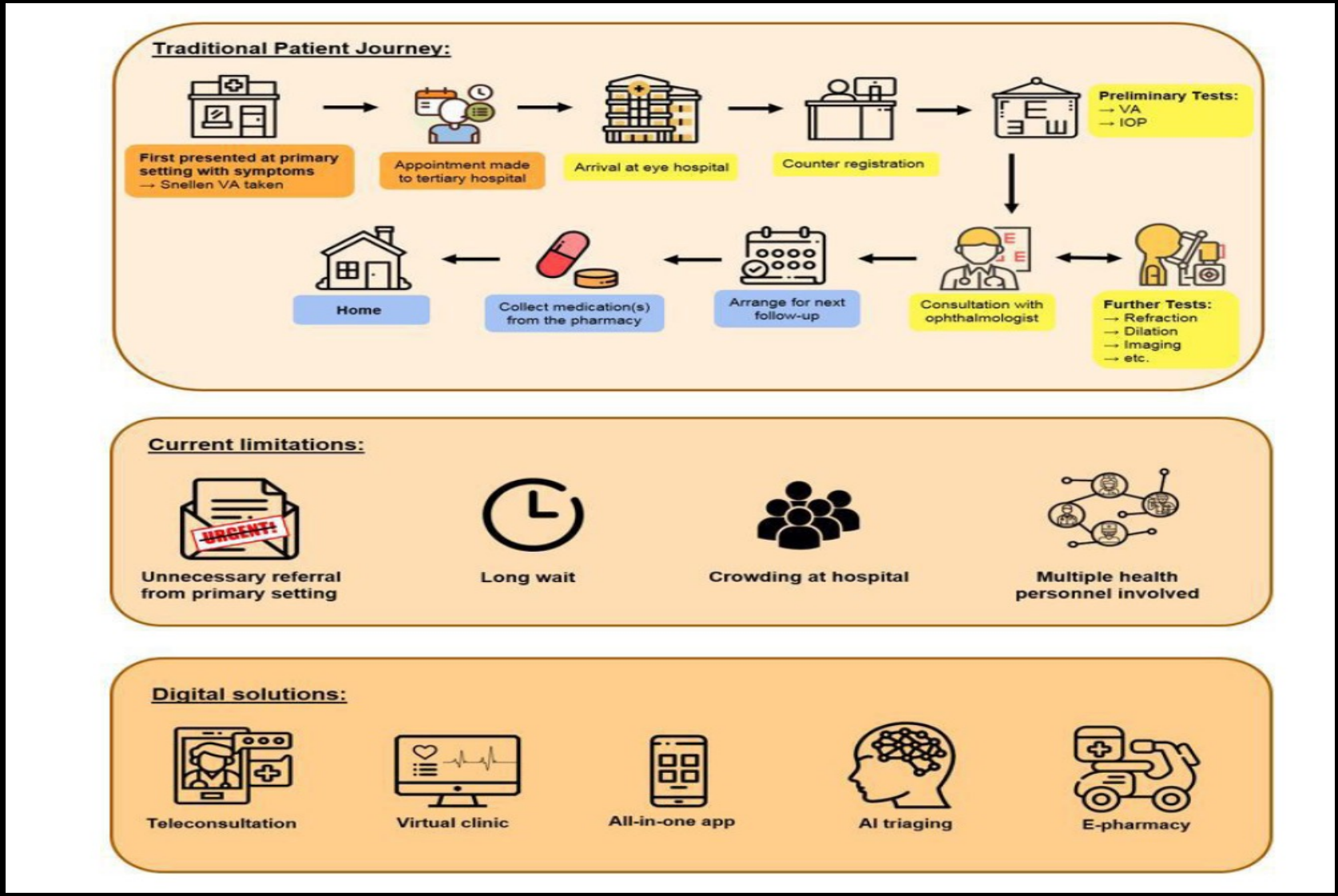


Established standard of 0.80 sensitivity and 0.95 specificity are met

Artificial intelligence in diabetic eye care

Tong et al. Eye and Vision 2020

Think about the patient journey: 76% of AMD patients and 85% of Diabetic eye clinic patients arrive with at least one accompanying person



BJO 2022: 106; 452-457

Acta Ophthalmologica

Acta Ophthalmologica 2020

Self-reported visual difficulties in Europe and related factors: a European population-based cross-sectional survey

Nicolas Leveziel,[1,2,3,4,5,#] Simon Marillet,[2] Tasanee Braithwaite,[6,7] Tunde Peto,[8] Pierre Ingrand,[2,3,9] Shahina Pardhan,[1] Alain M. Bron,[10,11] Jost B. Jonas,[12] Serge Resnikoff,[13] Julie-Anne Little[14] and Rupert R.A. Bourne[1,15,#]

Table 1. Composition of public health modules developed into the questionnaires.

European Health Status Module	European Health Determinants Module	European Health Care Module
Health status	Weight and height	Use of inpatient and day care services
Specific diseases & chronic conditions	Physical activity	Use of ambulatory and home care
Occurrence of accidents and injuries	Consumption of fruits and vegetables	Medicine use
Absence from work (health problems)	Smoking behaviour	Use of preventive services
Physical & sensory functional limitations	Alcohol consumption	Unmet needs for health care
Difficulties with personal care activities	Social support	
Difficulties with household activities	Provision of informal care or assistance	
Having pain		
Specific aspects of mental health		

European Health Interview Survey (EHIS)

- Information on 147 variables on medical, demographic and socio-economic aspects were collected from
- **311 386 people (54.2% women) in 28 EU member states and Iceland and Norway**
- We analysed vision and hearing impairment and related factors

Sensory** Problem	Total	% women	Not wearing correction UNMET NEED
Hearing	23,234	53%	12.4%
Vision problem	41,821	60%	6.3%
Both	12,202	58%	1.5%

Table 2. Crude prevalence (%) of self-reported vision problems provided by region and by country for three age groups and by sex.

		Age			Need for optical correction	
	All	15–17	18-59	60+	Met	Unmet
United Kingdom	1.11 [0.95–1.27] N = 20 127	0.58 [0.00–1.17] N = 348	0.72 [0.54–0.91] N = 10 426	2.15 [1.80–2.49] N = 9353	0.86 [0.72–0.99] N = 15 904	0.25 [0.16–0.34] N = 4223

Northern Europe 1.25%

Western Europe
2.17%

Eastern Europe
2.43%

WHO Europe
KGZ and UZB

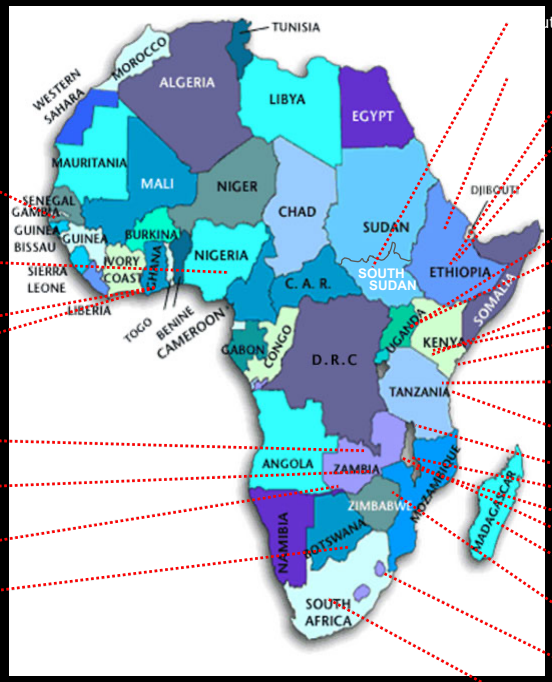
Reports are online on the WHO website

Southern Europe 2.29%

Women
Older people
Lower SE status disproportionally affected in all areas

VISION 2020Links Partners: to improve the quality and quantity of eye related training and service provision

Africa



The Gambia – SZRECC + Swansea - Singleton Hospital

Nigeria – Lagos + R Bolton
Nigeria – Kano+ Altnegalvin
Nigeria – Calabar-Wolverhampton

Ghana - Accra + Moorfields Eye Hospital

Ghana – Kumasi + Crewe – Leighton

Zambia – Kitwe + Frimley – FPH

Zambia – Lusaka + Brighton – BSUH

Zambia – Livingstone + N Staffs

Botswana – Gaborone + Cambridge – Addenbrooke's

uth Sudan – Juba + Wessex + Norwich NNUH

Ethiopia – Gondar + Leicester LRI

Ethiopia – Addis Ababa + Stoke Mandeville Bucks

Ethiopia – Hawassa + N Wales – HM Stanley Hospital

Uganda - Mbarara + Bristol Eye Hospital

Uganda – Makerere + London - Royal Free

Kenya – Nairobi COECSA + London – RCOphth

Kenya – Kenyatta National Hospital + LINK to be established

Kenya – Mombasa + Southampton

Tanzania – Moshi + Birmingham - Univ Hospitals and also a Club Jules Gonin link for VR

Tanzania - Dar es Salaam + St Thomas' Hospital
Tanzania – Mbeya + Altanagelvin NI

Tanzania – Dodoma +Belfast Trust

Malawi – Zomba + Newport Wales
Malawi – Blantyre + Glasgow - Yorkhill

Malawi – Lilongwe + Edinburgh PAEP +Fife

Madagascar + Leeds St James' Hospital

Zimbabwe – Harare + Bart's

Swaziland - Siteki + SPROG and also a Club Jules Gonin link

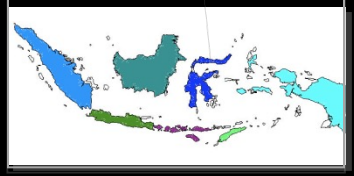
South Africa-Cape Town+ ICEH, UK

Jamaica

University of the West Indies, Jamaica + Homerton University Hospital, London

Indonesia

Makassar – Sulawesi + Ninewells - Dundee



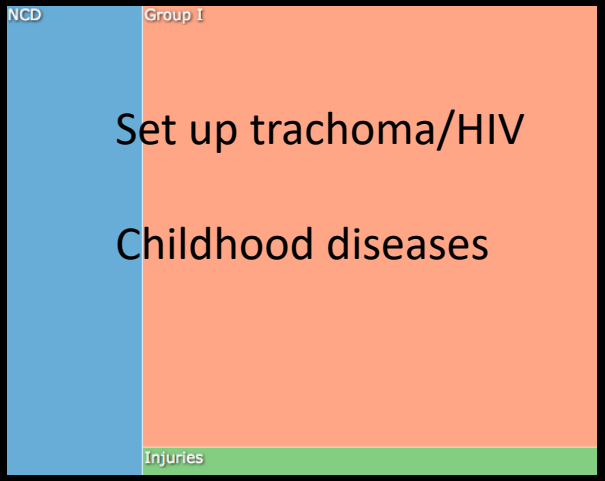
Fiji

Fiji - RANZCO

COMMONWEALTH EYE HEALTH CONSORTIUM

Three countries along the epidemiological transition in 2016

Nigeria



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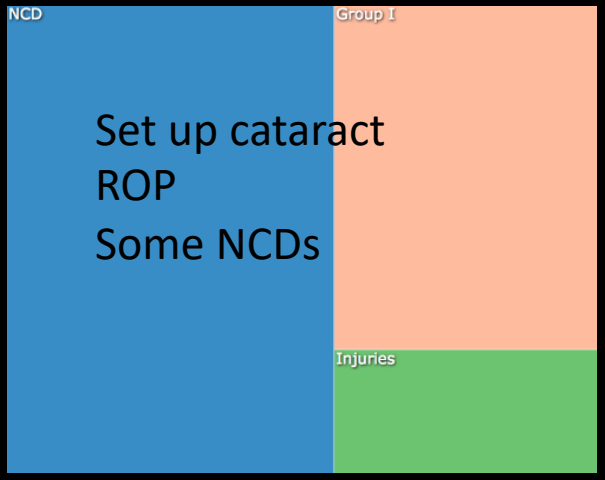

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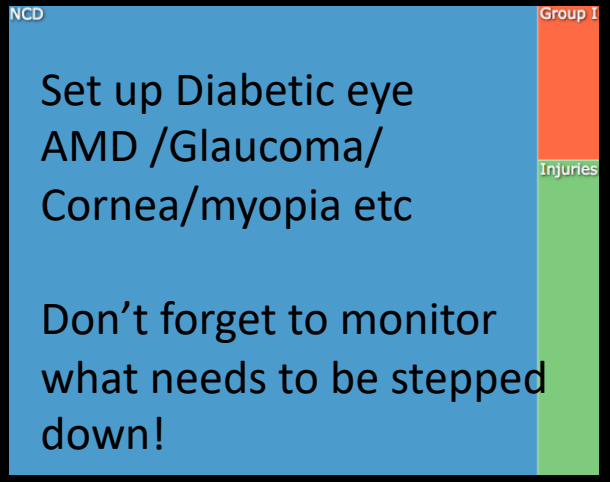


- **~5% disease burden** due to infectious, child and maternal health conditions (“Group 1”)
- **~95% disease burden** due to NCDs and injuries

gbdcompare

Queen's Diamond Jubilee Trust Project: Establishing Diabetic Eye Screening and Treatment pathways in the Commonwealth

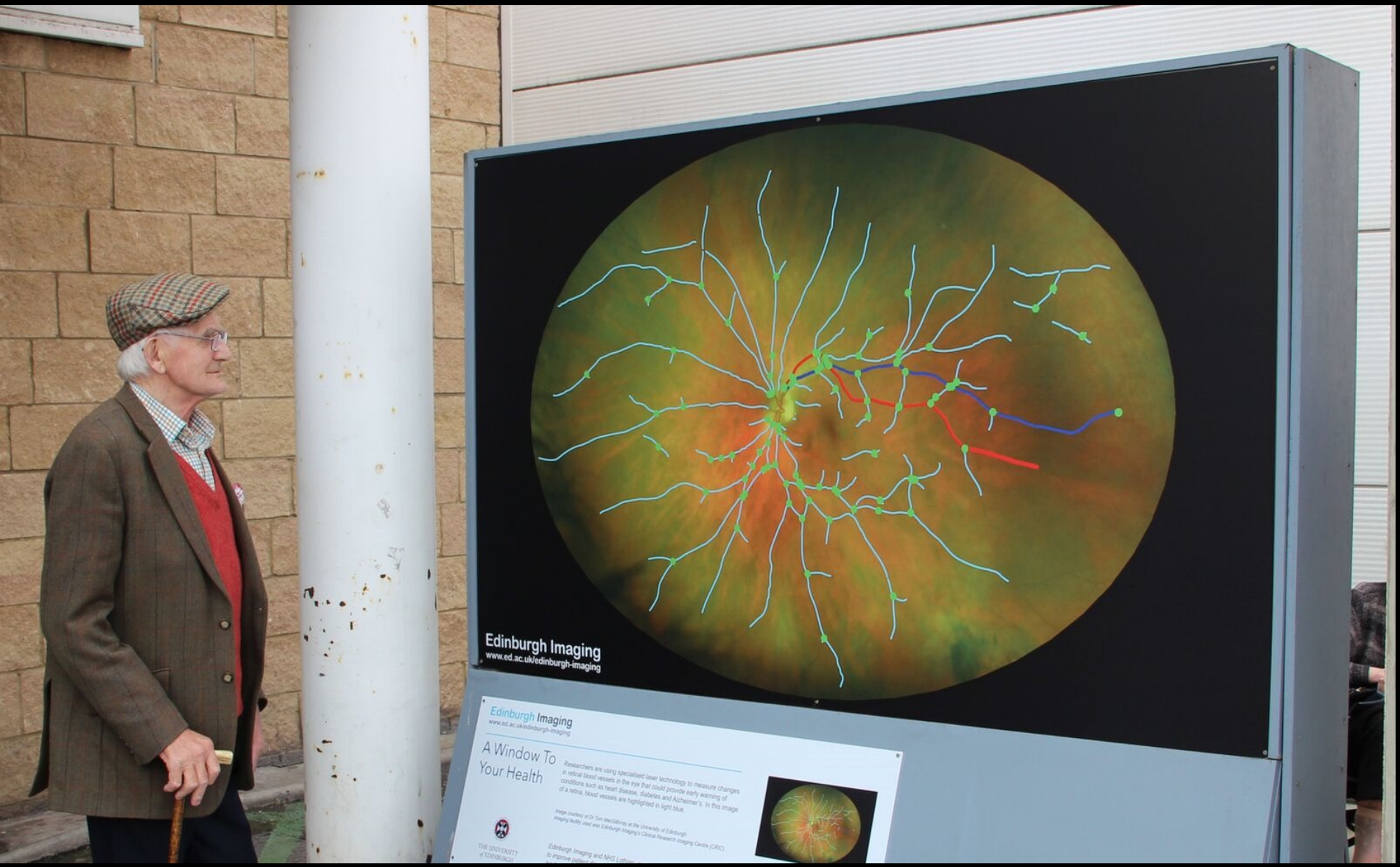
Lasting legacy: DR_net; Retinoblastoma_net etc…

2005 Liverpool declaration; invitation for the 2025 meeting!

EAsDEC, Budapest 2017

Professor Eva Kohner died on 21st September 2021, aged 92

The most cost-effective interventions in dementia are Cataract surgery and hearing aids



Working with patients to deliver what is required for better quality of life – let it be research, practical help, artwork, a cup of tea….

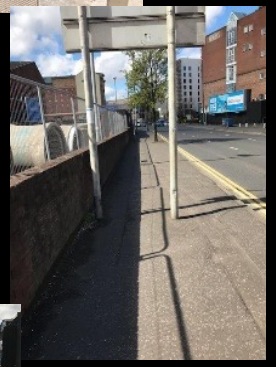
Lasting legacy: monthly podcast for patients delivered by medical students and experts

And what the patients are worried about: Trips and falls: the dangers of attending clinic appointments, going shopping …..

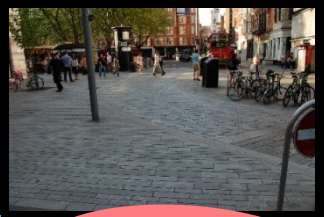
Parked Cars on Pavements

Bollards

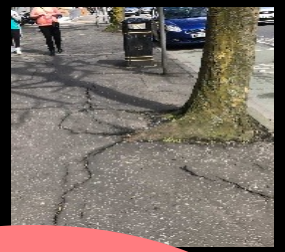
Street Clutter



A-Boards and Al Fresco Dining



Shared Space



Unfinished/Damaged paving

Tree Roots and uneven/constant paving design