



GUIDE

FOR ENVIRONMENTALLY SUSTAINABLE
PRACTICES IN THE EYE HEALTH SECTOR

Foreword



Since our workshop at the IAPB Council of Members meeting in Dar es Salaam October 2019, and the drafting of this Guide, the world has changed unrecognizably. Most countries affected by the COVID_19 pandemic have either

been through or are in lockdown as a response. Global air traffic has seen an unprecedented decline. And health systems across the world have diverted most of their resources to manage the outbreak, resulting in an almost universal suspension of crucial eye health services such as cataract surgeries and distribution of glasses.

The global pandemic has revealed how closely intertwined human and planetary health are. Though COVID-19 and climate change are not directly related, they are interconnected, share some common lessons learned.

Deforestation and mass livestock farming are two of the causes for the emergence of new zoonotic diseases in humans, and both are contributors to climate change, as is the health sector. The effects of climate change, such as extreme weather events, rising temperatures and sea levels will make land uninhabitable, intensify food insecurity, and will leave people and animals to compete for dwindling resources.

Health systems across the world risk being overwhelmed during this pandemic. Global healthcare supply chains are struggling to meet the exponentially increasing need for PPE, ventilators, and testing kits.

The importance of public health and primary care to reduce demand for secondary and tertiary health services has never been more obvious. Not only is secondary and tertiary healthcare costly, but it also often deals with failure of the system down the line, resulting in a huge environmental impact. And in the case of both, pandemics and climate change, good public health infrastructure will save lives particularly of vulnerable people and protect the health system from becoming swamped.

The current lockdown is pushing the global economy to the brink of a recession and threatening many livelihoods across the world, especially of the ones working in the informal sector in low- and middle-income countries. Many are facing an agonising dilemma: protecting their health or feeding their family, and this decision increases both poverty and health inequality. The impact of climate change on health and livelihoods is similar, though 'slower' and more localised at the beginning, but widespread and more devastating in the long-term.

The pandemic has revealed how important and interdependent our health and the health of our planet are and that we urgently need to give environmental sustainability the focus it deserves. Climate change is a health issue, not just an environmental issue. We are all connected and, just as with diseases, climate change knows no borders. The international cooperation that found a vaccine for COVID-19 is giving hope that similar international resolve to tackle climate change will result. We hope that once we emerge from the long, dark tunnel that is COVID-19, we can take this opportunity to shape a 'new normal' to not only take care of our health and economy, but also pay attention to our planet and consider environmental and social impacts.

Peter Holland

Chief Executive, International Agency for the Prevention of Blindness

Table of Contents

Executive Summary	4
10 Key Areas of Action	5
Purpose of the Guide	6
Rationale	7
Background	7
Embedding Environmental Sustainability – What does it mean?	8
Key Areas of Action	10
Lead	10
Advocate	12
Procure Sustainably	14
Reduce the Use of Fossil Fuels	17
Conserve Water	19
Reduce and Safely Dispose of Waste	20
Reduce and Green the travel	22
Follow the 4 Principles of Sustainable Clinical Practise	24
Embed Environmental Sustainability in Education	26
Focus Your Research	28
Acknowledgements	30
Abbreviations	30
References	31

Executive Summary

Environmental degradation, air pollution and climate change are having devastating impacts in all parts of the world, with the greatest effect on vulnerable and low-income communities, threatening to undo decades of progress in global health.

Eye health will be affected. Climate change is likely to increase the incidence of trachoma infections¹, vitamin A deficiency, cataracts^{2,3}, severe allergic eye diseases⁴, glaucoma⁵, age-related macular degeneration⁶ and eye injuries. It is also likely to disrupt eye health delivery through an increased frequency of extreme weather events. All countries – rich and poor – will experience the health impacts of climate change⁷ and experience shows us that those with visual impairment and disabilities are disproportionately impacted.

Conversely, healthcare is a massive consumer of resources and major emitter of greenhouse gas emissions. Worldwide healthcare is responsible for 2 billion tons of carbon dioxide equivalent (CO₂e), 4.4% of all global net greenhouse gas emissions (GHGs)⁸. Insufficient health care waste management is responsible for healthcare acquired infections.

Yet, there are significant co-benefits to the

health sector and its beneficiaries in integrating climate and environmental strategies, from better health through higher activity levels and a reduction in environmental pollution and the adverse effects of climate change to increased productivity, improved quality of services and reduced costs.

Doing nothing will seriously hamper any efforts to avoid the risk of catastrophic climate breakdown and its inevitable impact on eye health, on top of any financial and reputational risk. It is time for the healthcare sector, including the eye health community, to show leadership and accelerate efforts to mitigate its own climate impact, supporting the Sustainable Development Goals (SDGs) and the World Report on Vision's commitment to 'leaving no one behind'.

The International Agency for the Prevention of Blindness (IAPB) is at the forefront in promoting climate action within eye health through its IAPB Climate Action Working Group (IAPB CAWG) and members. This practical Guide was developed by the CAWG to support the eye health community to minimize the environmental impact of eye health services and support climate change resilience.

10 Key Areas of Action



LEAD



ADVOCATE



PROCURE SUSTAINABLY



REDUCE THE USE OF FOSSIL FUELS



CONSERVE WATER



REDUCE AND SAFELY DISPOSE OF WASTE



REDUCE AND GREEN THE TRAVEL



FOLLOW THE 4 PRINCIPLES OF SUSTAINABLE CLINICAL PRACTICE



EMBED ENVIRONMENTAL SUSTAINABILITY IN EDUCATION



FOCUS YOUR RESEARCH



Photo Credit: The Fred Hollows Foundation

Eye health organizations and institutions in their work with and through partners such as eye health service providers and eye health professionals can follow the recommended 10 key areas of action detailed within this Guide, to get started in embedding environmental sustainability into their policies, projects and operations.

Purpose of the Guide

Climate change has reached a crisis point. The impact of climate change and air pollution on health and healthcare delivery will be significant and disruptive. Moreover, healthcare is a massive consumer of resources and major emitter of greenhouse gas emissions. Yet, there are significant co-benefits to the health sector and its beneficiaries in integrating climate and environmental strategies, from better human and planetary health through a reduction in environmental pollution and the adverse effects of climate breakdown, to increased productivity, improved quality and reduced costs. Positive environmental sustainability action is vital for achieving equitable healthcare, directly supporting the Sustainable Development Goals (SDG) agenda to 2030 of 'leaving no one behind' and reframing of eye health as a development issue, as called for by the Lancet Commission on Global Eye Health and the World Report on Vision⁹. In order to achieve the important changes needed, we call for strong and informed leadership.

This guide aims to support eye health NGOs, Ministries of Health, eye health service providers and eye health professionals, to become advocates for and take actions in minimising the environmental impact of eye health delivery and developing resilience to the challenges of the climate emergency. It outlines the rationale for making environmental sustainability a priority area for eye health provision and provides guidance on how to embed environmental sustainability/climate actions internally into your organization's operations, policies and projects, and externally via the supply chain and partner eye health providers. Aligned with the World Health Organization (WHO) and SDG priorities, the document addresses the 10 key areas of action. The guide also sets out how organisations can support eye health provider communities to embed climate change actions using concrete examples.

Rationale

BACKGROUND

Environmental degradation and climate change are having devastating impacts in all parts of the world, with the greatest effect on vulnerable and low-income communities. Climate change is threatening to undo decades of progress in global health and exacerbating poverty and health inequality¹⁰, hampering the efforts of the global health community to realize universal health coverage.

Eye health will be affected. Early studies have shown that high temperature and low rainfall – both more likely because of climate change – are associated with an increase in trachoma infection¹¹. Vitamin A deficiency is predicted to rise due to a likely increase in food insecurity. Global warming may play a part in early onset and accelerated progression of cataract^{12,13}. There is an association between traffic-related air pollution and severe allergic eye diseases¹⁴ glaucoma¹⁵ and age-related macular degeneration¹⁶. Extreme weather events will lead to an increase in physical injuries, including eye injuries, and will likely affect those with visual impairment and disabilities disproportionately.

Climate change will not only affect health, it will also impact access to healthcare and continuity of service provision. Hurricanes and cyclones across the world have led to temporary closures or destruction of medical facilities, manufacturing plants and supply chains of critical medical supplies and consequently, have hampered health service delivery. Coupled with an increase in healthcare demand due to the myriad health impacts of climate change, this will put an increasing strain on scarce health service resources. Climate change

is likely to push already vulnerable populations into extreme poverty further impeding their access to health services.

While climate change will increase the challenges of global health and healthcare provision, the healthcare sector itself contributes to climate change. Worldwide healthcare is responsible for 2 billion tonnes of carbon dioxide equivalent (CO₂e), 4.4% of all global net greenhouse gas emissions (GHGs), and equivalent to the annual greenhouse gas emissions of 514 coal power stations¹⁷. Insufficient health care waste management is responsible for health-care acquired infections and "curing at the front door and poisoning at the back door."¹⁸

In the Paris agreement, countries have committed to keeping temperature rise well below 2 degrees Celsius and to pursue efforts to stay below 1.5 degrees Celsius. To achieve this, all sectors, including health, must work together to reduce GHG emissions. Time is of the essence.

Likewise, with its 17 interdependent Sustainable Development Goals (SDGs), the United Nations (UN) has provided a blueprint for the world to address, amongst other global challenges, climate change (Goal 13), environmental degradation (Goal 6, 14 and 15), sustainable production and consumption (Goal 12) and health (Goal 3). Health and well-being (Goal 3) is vital in ending poverty (Goal 1), reducing inequality (Goal 10) and ensuring quality education (Goal 4). Inter and cross-sectoral partnerships (Goal 17) between governments, NGOs, academia, the private sector and civil society are vital for realizing every SDG. The goals provide a road map for the global com-



Photo Credit: American Society of Cataract and Refractive Surgery

munity, countries and sectors to achieve an equitable and sustainable future.

More recently, the World Health Organization and Lancet Commission on Global Eye Health have positioned integrated people-centered eye care as a central component of Universal Health Coverage and the SDGs. The global recovery from the COVID-19 pandemic provides a pivotal opportunity to “build back better” by improving public health care,

promoting sustainable development, and protecting the environment.

It is time for the healthcare sector, including the eye health community, to show leadership and accelerate efforts to work towards the relevant Sustainable Development Goals and mitigate its own climate impact. Only then will the health community achieve universal health coverage and help to eradicate inequality and poverty.

EMBEDDING ENVIRONMENTAL SUSTAINABILITY – WHAT DOES IT MEAN?

A healthcare system is described as sustainable ‘if it works within its financial, environmental and social resources, improving and protecting health now and for future generations’. Until recently, the main concern when delivering health services was cost. More recently, there has been an increasing awareness of healthcare’s social impact, acknowledging, for example, the role of child labour and modern slavery in the supply chain of health services. Healthcare’s contribution to environmental degradation and climate change is already well documented. Only if we take all three costs - economic, social and environmental, the triple bottom line - into account and proactively reduce them, will our health services become truly sustainable.

As climate change is one of the biggest threats that humanity faces, this document will focus on how eye health services can take action to minimise greenhouse gas emissions.

Benefits

Embedding climate action in your organization’s operations, supply chain and service delivery will have co-benefits beyond the reduction of greenhouse gas emissions. Actions which encourage minimal and active travel, the use of renewable energy sources, energy efficien-

cy and consumption of sustainable food, will lead to improved health through a reduction in environmental pollution and the adverse effects of climate breakdown, increased physical activity and an improved diet.

Moreover, strategies that promote sustainability have the potential to improve the quality of health services, increase its productivity and reduce its costs. Re-sourcing primary and secondary prevention, empowering patients to take a role in managing their illness and cutting low value clinical interventions from clinical pathways help to reduce demand for tertiary health services, which have a greater environmental impact, and also improve the quality of health outcomes.

Risks

There are risks in doing nothing. An increase in healthcare demand due to climate change and a rise in the vulnerability of healthcare infrastructure, supply chain and staff to extreme weather events, will impact the operations of eye health organisations and the access of communities to eye care severely. The impact of the COVID-19 pandemic is a precursor to the effects of climate change on existing healthcare systems.

In the near future, there will be increas-

ing regulatory requirements for all organisations and companies related to fossil fuel consumption and reduction of carbon emissions at scale. Globally we have already seen significant shifts in investments and banking divesting from fossil fuel companies. Those who lead on this agenda will be seen as strong and forward-looking. Doing nothing carries financial and reputational risk, including with our patients. We cannot, for example, promote the need for improved environments at community level to prevent diseases such as trachoma, while ignoring our own environmental responsibilities. Organisations whose mission is to improve eye health and prevent blindness across the world need

to be at the forefront of reducing their negative impact on the environment.

Barriers

Despite the urgency of the climate crisis, the health sector’s impact on the environment and the known co-benefits of climate mitigation strategies, many organisations either lack the knowledge to embed climate action in their work or do not perceive it as a priority underpinning core business. It is assumed that mitigating global warming costs more and is inequitable.



Photo Credit: CBM

Key Areas of Action

01 LEAD



What is the issue?

It is important for the leadership team of eye health organisations and providers to recognise the urgency of climate change and their organisations' own impact on the environment, driving positive change from the top. Declaring a climate emergency and/ or issuing a position statement is the first step in acknowledging the public health threat posed by climate change and showing commitment to environmental sustainability.

The statement is a signal that the organisation is committed to changing how it operates and is focussed on climate change mitigation as a matter of urgency to be resilient in the new normal. The next step is developing a strategy that is aligned with the core business to guide implementation. For environmental sustainability to be successful, it must be fully integrated across policy, governance and organizational operations.

To achieve leadership in environmental sustainability there are four key pillars:

- **Accountability:** It is vital for the organisation's accountability to patients, local communities, governments, donors and to the planet to establish a framework for regular assessment and internal and external reporting on progress of embedding

environmental sustainability in policies, programmes and standard operational procedures.

- **Transparency:** Transparency and integrity are closely linked to increased productivity, trust, culture, and morale. It is important that employees and external stakeholders recognise how environmental sustainability is part of core business, how it has been integrated and what their own role is.

- **Compliance:** Meeting all regulatory requirements for environmental sustainability and climate action is critical, exceeding regulatory requirements demonstrates leadership.

- **Equity:** Embedding environmental sustainability within all operations needs to be inclusive with particular focus on vulnerable populations to align with the 'Leaving no one behind' agenda of the SDGs and to reduce climate injustice. There is evidence that the poor populations are most vulnerable to the adverse effects of climate change¹⁹, particularly for girls and women, in large part due to gender inequality. Building a sustainable future for all requires the full potential and participation of girls and women in environmental and climate action, and the realization of that potential depends on their health and rights²⁰. The decision to make environmental sustainability part of core business needs to be understood and endorsed

by senior management. A 'sponsor' or 'champion' at senior level can drive the development and realisation of a strategy by engaging all relevant departments. It is important that sufficient resources, including staff time, are made available to achieve this.

What can we do?

- **Acknowledge a climate emergency and commit to climate action publicly**, such as developing an environmental policy or position statement on your website to show your commitment to environmental sustainability and climate action.
- **Prioritise and resource climate change initiatives**, including behaviour change through policies, within your organisation
- **Identify a sponsor/ champion** of environmental sustainability at board/ executive level
- **Develop a policy** to set guidelines for your organisation and employees to follow to implement environmental sustainability strategies and address climate action.

- **Engage all departments in the development of an environmental sustainability strategy** and supporting actions
- **Establish a framework** for regular assessment and internal and external reporting on progress towards environmental sustainability targets, such as emissions reductions and sustainable development goals. Ensure the framework promotes equity and fairness for vulnerable populations, particularly girls and women, to avoid exacerbating inequalities from climate action strategies.
- **Clearly communicate** climate action commitment, policy and actions internally to all staff, such as induction training and on noticeboards
- **Develop or join cross-sector coalitions** working towards climate action and environmental sustainability
- **Consider how vulnerable populations**, particularly girls and women, can actively participate and benefit from environmental sustainability strategies.



Photo Credit: Sightsavers

02 ADVOCATE



What is the issue?

Advocacy and collaboration are a key part of the work of NGOs and eye health providers. Advocacy for climate action in eye health will influence partner NGOs and eye health providers to adopt policies and practices in eye health which are environmentally sustainable.

Becoming leaders and taking action ourselves, will 'allow' us to advocate for more systemic change for climate smart eye health services. Supporting and sharing research, implementation tools, case studies and training and education opportunities in this area will raise awareness and encourage adoption.

Collaboration among NGOs and eye health providers will offer peer support and accelerate implementation of environmentally sustainable eye health services which is urgently required to slow down and reverse climate breakdown.

What can we do?

- **Embed environmental sustainability into your advocacy**, so it becomes part of core business.
- **Declare a climate emergency** to raise awareness and emphasise the urgency of climate change.

- **Make every contact count:**
 - Advocate for environmental sustainability in partnership working: The more organisations recognize the urgency of climate change, the easier it will be to take action. Use the opportunity to 'create' new advocates.
 - Raise environmental sustainability at events for eye health by making the event environmentally sustainable and also lobbying for environmentally sustainable eye health practice.
- **'Use' your voice.** Eye health professionals are well respected. Use your voice to advocate for environmentally sustainable eye health practices.
- **Collaborate and include representatives from vulnerable populations in your discussions and plans.** Vulnerable populations are disproportionately affected by the adverse effects of the climate crisis and their voice needs to be heard, e.g. invite Disability People Organisations, Women and Elderly Groups, representatives from ethnic minorities.
- **Create awareness** of the links between environmental sustainability and the health/ eye health of poor communities.

SDG 17 Partnerships for the Goals

17 PARTNERSHIPS FOR THE GOALS



SDG 17 highlights the role of inclusive, interdisciplinary and multi-sectoral partnerships to realize the potential of the sustainable development agenda and ensure no-one is left behind. Strong partnerships at the local, national, regional and global level are critical to build shared values, knowledge exchange and collaboration. Coalitions of diverse partners can also mobilise resources and combine their voice to advocate for increased attention and investment in sustainability efforts.



Photo Credit: Aravind Eye Hospital

03 PROCURE SUSTAINABLY



What is the issue?

The choices an organisation makes on what products to buy and who to buy them from has substantive impacts on society and the environment. The links between surgical gloves and deforestation for rubber plantations, child labour and surgical instrument production, healthcare waste, GHG and the supply chain are well known. Healthcare Without Harm's 2019 'Health Care's Climate Footprint' report²¹ shows, 71% GHG emissions of the global health sector are associated with the supply chain, this is a total of 1.42 billion tonnes of CO₂e worldwide.

With healthcare demand increasing due to an increase in overall global population, a rise in an aging population and an increase in non-communicable diseases and new healthcare technologies entering the market, supply chain spend will increase as will GHG emissions if not counteracted.

Understanding there is a close positive connection between financial long-term viability and integration of social and environmental goals has seen in recent years the emergence of sustainable procurement as an organizational priority. Sustainable procurement considers the most positive environmental, social and economic impacts possible over the entire lifecycle of the supply chain, including raw material extraction, use of natural resources in production, working conditions of employees, transportation and logistics, to end-of-life and disposal (life cycle).

Given that most organisations spend between 40–80% of their financial resources across their supply chains, it is unsurprising that sustainable procurement is now a key element of many governments, businesses and not-for-profits' sustainability or corporate social responsibility strategies wanting to increase impact and deliver credible change.

What can we do?

Supply chain emissions can be reduced by decreasing demand in goods and services, embedding environmental sustainability into the procurement process, following the principles of the circular economy²², purchasing goods which are reusable (if suitable), designed for longevity, repairable and can readily be repurposed or recycled and which are manufactured, packaged and transported sustainably.

Actions for individual organisation

- **Engage with suppliers and manufacturers** to understand environmentally sustainable product options, global trends, emerging innovations and circular economy standards. Focussing on packaging might be a good first step. Procure items that have been made from recycled content – while the end of life of products is hard to control, we can influence the materials used in the products we buy. Therefore, emphasis should be placed on purchasing items that are made from recycled materials.
- **Develop a sustainable procurement policy** and embed environmental criteria in the purchasing process including tender specifications, supplier selection and contract management. Buy products, equipment or services that consume less and have a lower environmental impact during their in-use life and at disposal.
- **Assessing the environmental impact of products and services.** Sustainable health

SDG 12 for Responsible Consumption and Production



SDG 12 is actively promoting sustainability consciousness throughout the manufacturing (production) and use (consumption) of goods and/or services across the supply chain. However, the 2019 SDG update has warned that worldwide total and individual material consumption has expanded rapidly, seriously jeopardizing the achievement of the goal. It is asking for urgent action to prevent over extraction of resources or the degradation of environmental resources, and to include policies that improve resource efficiency, reduce waste and mainstream sustainability practices across all sectors of the economy.

product rankings are available, substitute an existing product or material with an alternative that has less impact on the environment.

- **Identify supply chain priority areas.** IAPB members collectively spend over US\$200 million on procurement per year. Collect and analyse expenditure data, identify and target the highest volume items to maximise buying power as a powerful lever for change.
- **Consider reusables vs single use.** In recent years the utilisation of single use instruments has increased massively contributing to the global plastic pollution, with medical plastic currently 2% of total plastics production by value²³. Increase the focus and value of sanitisation in operations, use reusable items where possible. Where reusables are not practical include effective waste management practices to minimise the impact on healthcare workers, the environment and the community.
- **Buy locally.** Using high quality local suppliers/distributors presents an opportunity to boost the country's economy, offering local employment opportunities. This is particularly important for low- and middle-income countries (LMICs). Using local suppliers might result in a decrease in supply chain emissions by reducing GHG emissions associated with transport and increase economic opportunity in the local community.
- **Encourage a plant-based diet.** Animal agriculture puts a lot of stress on the environment, using many natural resources and producing large amounts of methane, an extremely potent greenhouse gas. The United Nations



Photo Credit: Pranab Basak

states that “a shift toward plant-based diets” is one of the most significant ways for individuals and organizations to reduce greenhouse gases²⁴. As an organisation, you can take the opportunity to encourage plant-based diets, by ensuring meals that are provided during work events such as conferences, meetings, and training sessions, to be centred around plants.

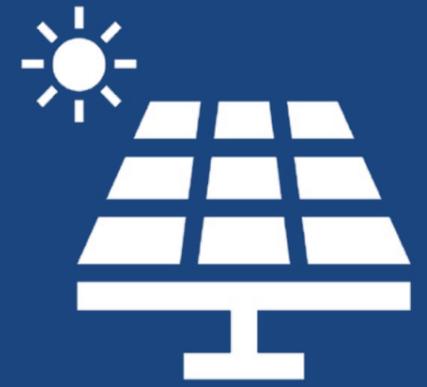
- **Manage assets.** As the manufacturing of any new item has a carbon cost, reducing the demand for new items reduces the impact on the environment. Regular preventative maintenance and repair of medical equipment extends its lifetime but is also important to ensure optimal and uninterrupted delivery of services, especially in remote areas, where the delivery of new equipment is more difficult. When equipment has reached its end of life and cannot any longer be maintained and repaired, consider if it could be repurposed or, if that is not possible, recycled.
- **Assist procurement teams in working with health staff on the ground.** There is a need to close the feed-back loop between procurement, utilisation, maintenance and disposal. Often there is very little or no communication between the procurement team and the health staff on the ground. This makes it difficult for procurers to tailor and review their procurement decisions to the needs of the health staff as procurement staff have limited clinical knowledge. Efficiency opportunities in utilisation are likely to be missed, for example, disposing of eye drops after one use when they could have been used for other patients. Lack of communication encourages unnecessary purchase or renewal of products, increased waste and hampers discussion of alternative solutions.
- **Manage waste and hazardous chemicals.** Review policies, protocols and practice to minimize the production of healthcare waste. Substitute or minimize products using

hazardous chemicals with less hazardous alternatives to reduce costs, consumption and the carbon footprint.

Actions for the Eye Health Community

- **Explore the potential for collective bargaining.** The combined purchasing power of all IAPB members is considerable. Leveraging purchasing power to understand and engage with manufacturers and suppliers, reduces costs, creates supply chain efficiencies and improves shared environmental sustainability goals and targets to support the circular economy.
- **Develop training in sustainable procurement.** Informed and capable procurers who are able to embed environmental sustainability into the procurement process are essential. Organisations who have embedded sustainability in their procurement processes could support and train other organisations in doing so.
- **Develop case studies in sustainable procurement.** Case studies offer very practical illustrations of how projects can be implemented and are an opportunity to celebrate successful achievements. The CAWG page on the IAPB website includes resources and case studies. Organisations who have got case studies to share are encouraged to get in touch with CAWG (<https://www.iapb.org/learn/work-groups/climate-action/>).
- **Develop a toolkit** for organisations, which are looking for more information on environmentally sustainable procurement practices. A toolkit in the area could offer a step by step guide in how to implement it.

REDUCE THE USE OF FOSSIL FUELS



Any facility, whether it be an office or a hospital, uses electricity and other energy sources for heating, cooling, lighting and to run their equipment. It will use water and manage their waste. Eye health organisations have a significant opportunity to reduce their environmental footprint and improve climate resilience through more sustainable facilities management. And they can support their implementing partners, from government agencies to healthcare facilities, to improve their own approaches through effective partnership and supplier coordination. Due to rapid innovation and technological improvements, many low-cost solutions now exist to improve facilities in a way that addresses climate change, benefits the environment, and reduces costs.

What is the issue?

Most energy used around the world continues to be generated from fossil fuels. The same is true for the energy used in healthcare facilities, which contributes around 25% to healthcare’s global carbon footprint.

In addition, electricity supply in LMICs can be unreliable, disrupting safe delivery of health services. Decentralised reusable energy schemes, including solar and wind, or microgrids offer a sustainable

solution to many healthcare facilities and their communities around the world. They provide clean energy while also securing continuity in the delivery of services.

Reducing the energy use of healthcare facilities starts at the building planning and design stage. It is important that healthcare buildings are planned to guarantee maximum use of natural light, natural solar shading where needed and natural ventilation to reduce the future demand in energy. Preserving and enhancing the natural environment around healthcare facilities is especially important in warmer climates with higher rainfall to provide sufficient shade and cooling but also improved rain water management.

Beyond energy efficient hospital building design and transition to renewable energy sources, energy efficiency needs to be considered at an operational level when choosing boilers, heating ventilation and air conditioning (HVAC) systems and medical and non-medical equipment. To determine the energy efficiency of equipment, the energy consumption of the equipment in standby and sleep mode and the energy that will be needed to cool the space around the equipment needs to be assessed. The energy efficiency of medical equipment also needs to be viewed in relation to the reliability of equipment.

7 AFFORDABLE AND CLEAN ENERGY



SDG 7 Affordable and Clean Energy

SDG 7 has set the global target of a substantial increase in the share of renewable energy in the global energy mix and a doubling of the rate in the improvement of energy efficiency by 2030.

The renewable energy share of total final energy consumption gradually increased from 16.6 per cent in 2010 to 17.5 per cent in 2016. However, much faster change is required to meet climate goals.

energy consumption. This could be monitored by environmental champions.

- **Procure energy from a renewable energy provider.** This can be found through an energy broker or contacting different suppliers. The cost of renewable energy tariff should not be more expensive depending on location.
- **Where appropriate generate your own energy through solar.** Solar energy could benefit eye care in most LMIC settings where the power supply is often unreliable and of poor quality. It can be used for generating electricity (solar photovoltaic system), but also for heating water (solar photothermal system). If installed at community level, decentralised solar energy not only benefits the healthcare facility, but also the local population.
- **Consider portable and self-contained solar power generation.** In circumstances where only small amounts of electricity and lighting is needed, a portable and self-contained solar power generation and lighting systems like the 'solar suitcase' offer a practical solution. They are good for emergency care in rural settings when power is required immediately.
- **Lobby government for policies** that promote the use of renewable energy like solar and wind.

What can we do?

- **Minimise energy consumption through building design.** Natural lighting and ventilation and enhancing the natural environment around facilities to provide shading and better insulation can minimise energy demand.
- **Minimise energy consumption through energy efficient heating, lighting, equipment and appliances.** Simple things like switching to LEDs (energy efficient lighting) and PIR (automatic lighting), choosing energy efficient heating systems like geothermal heating/heat pumps, selecting highly efficient heating ventilation and air conditioning (HVAC) systems, installing automatic occupancy sensors, purchasing energy efficient appliances, installing a BMS (building management system) which sets timers and eliminates the presence of a dead band can reduce energy consumption.
- **Minimise energy use through behaviour change campaigns.** Turning off lights and equipment when not in use might be viewed as not very impactful, but collectively can achieve substantial reduction in GHG emissions and costs. Implement a switch off campaign encouraging staff to be mindful of



Photo Credit: Aravind Eye Hospital

SDG 6 CONSERVE WATER



What is the issue?

Climate change is likely to lead to an increase in droughts. For example, in 2018 Cape Town was three months away from running out of water. Drought induced water shortages will exacerbate the impact of inadequate water and sanitation infrastructure at many health facilities.

Insufficient water management has a deleterious impact on health: A review from 78 low-and-middle income countries suggested that 50% of health-care facilities lack access to piped water, 33% did not have improved sanitation, 39% lack

handwashing soap and 39% lack adequate infectious waste disposal. As a consequence, it was estimated that the prevalence of healthcare acquired infections is around 16%.²⁵

Recognising the scarcity of water and the often-inadequate water and sanitation infrastructure available, it is important that healthcare facilities manage their water sustainably. Opportunities for rainwater storage, plumbing which maximises water usage and an effective sewage system, for example specifically designed wetlands, are best to be explored at the design stage of healthcare facilities, but can also be installed at a later stage.

15 LIFE ON LAND



SDG 15 Life on Land

SDG 15 promotes the conservation, restoration and sustainable use not just of terrestrial, but also inland freshwater ecosystems and their services. It also sets targets to combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strives to achieve a land degradation-neutral world.

What can we do?

- **Minimise water use.** In new builds or when refurbishing, install water saving devices such as low flow taps, toilets and fixtures. Consider taps which reduce water use through the way they are operated. For example, a study in the UK has shown that leg operated taps used at scrub sinks use less water than elbow operated taps²⁶. The use of automated taps can also save water.
- **Reuse water.** Explore the collection and use

of rainwater and grey water cycling at your healthcare facility.

- **Monitor pipes and taps.** Monitor pipes, taps, toilets and other fixtures for leakages. When leakages occur, repair them quickly.
- **Invest in effective wastewater treatment.** Specially constructed wetlands like at Aravind Eye Hospital in Pondicherry, India, might be a solution for effective wastewater treatment for LMICs.²⁷ Such actions may also be critical for protecting local communities from hospital effluent flows.

REDUCE AND SAFELY DISPOSE OF WASTE



What is the issue?

Globally, healthcare waste management is poorly implemented. Though 85% waste generated by healthcare activities is non-hazardous waste, a 2009 literature review indicates that over half the world's population is at risk from the health impacts of healthcare waste²⁸. Hazardous healthcare waste includes infectious, sharps, pharmaceutical, chemical and radioactive wastes, and hospital wastewaters.

Healthcare waste treatment and disposal can pose direct risks to health, for example, through sharps-inflicted injuries, or thermal injuries when openly burning medical waste or operating a medical waste incinerator. In addition, healthcare waste treatment and disposal have a vast environmental impact affecting health indirectly. The disposal of untreated healthcare waste in landfills can lead to the contamination of water with pathogens, pharmaceutical products and toxic pollutants, if those landfills are not properly constructed and managed. The same applies to untreated hospital wastewater. Inadequate incineration like open incineration and incineration of unsuitable materials releases pollutants like chlorine, furans and mercury, lead and cadmium into the air. Plus, incineration of medical waste produces particulate matter which contribute to air pollution.

However, there are solutions for safe disposal of hazardous waste. Modern incinerators operating at 850-1100 °C and fitted with special gas-cleaning equipment are able to reduce emissions of dioxin and furan to the level of international standards. Alternatively, autoclaving, microwaving and steam

treatment integrated with internal mixing minimize the formation and release of chemicals or hazardous emissions.

Though 85% healthcare waste is non-hazardous, its disposal nevertheless will have an impact on the environment. For example, non-contaminated healthcare plastic will add to the plastic pollution if not recycled. And the GHG emissions produced by biodegradable waste in landfill are especially high as they include methane which is 21 times more potent than carbon dioxide.

Yet, there are opportunities to reduce the environmental impact of healthcare waste. One way to reduce waste – hazardous and non-hazardous – is to reduce the use of healthcare products in the first place. For example, a hospital trust in the UK has reduced the amount of plastic waste by 21 tonnes in a year through a reduction in the use of non-sterile gloves where their use was unnecessary. This not only reduced their environmental impact, but also led to financial savings.

Waste can also be cut by reducing the disposal of unused healthcare products and pharmaceuticals. For example, Thiel et al. have shown the high wastage of cataract surgical drugs, especially eye drops, in the US leading to unnecessary greenhouse gas emissions of 23,000 to 105,000 metric tons CO₂e annually.

In case of medical instruments, there is an ongoing discussion of the environmental impact of disposable versus reusables taking into account the appropriate cleaning, sterilization, storage and the potential for repair.

And similar to municipal waste, there are opportunities for recycling of non-hazardous waste.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



SDG 12 Responsible Consumption and Production

SDG 12 is advocating for environmentally sound management of chemicals and all wastes throughout their life cycle, to significantly reduce air, water and soil pollution, minimising their adverse impacts on human health and the environment.

It is also actively promoting prevention and reduction in waste generation, encouraging waste recycling and reuse.

What can we do?

- **Where possible adopt a circular approach.** For example, see if it is possible for suppliers not only to provide your items but to also collect them for recycling, providing a closed loop solution
- **Follow the waste hierarchy 'reduce, reuse, repair, recycle':**
 - Explore if there are opportunities to reduce the use of healthcare products and/or the disposal of unused products.
 - Consider if items, e.g. medical instruments, can be reused; multi-dosed, e.g. in the case of eye drops, could they be used on other patients; or sent home with patients, e.g. in the case of medication can patients take medication prescribed during their stay at a healthcare facility home if they need to continue taking it once discharged.
 - Explore if items can be repaired when damaged - the number of skilled medical equipment technicians is increasing in many LMICs.
 - If items need to be disposed of, find out if there are reprocessing or recycling options.
- **Make waste disposal at your healthcare facility easy.** Introduce classification, waste reduction, reuse and recycling procedures for non-hazardous waste. Ensure there are enough bins for each waste stream, that the bins are labelled well, colour coordinated and are easily accessible for everyone, including people with visual and physical impairment. At every bin station there should be a separate bin for each waste stream giving the user the option to recycle
- **Consider for your local context the most appropriate option for safe disposal of hazardous medical waste** applicable to your local amenities. Can access to a modern incinerator operating at 850-1100 °C and fitted with special gas-cleaning equipment be secured? Would there be other options, e.g. autoclaving, microwaving, steam treatment integrated with internal mixing to treat medical waste? Are there sufficient resources to operate and maintain any of these solutions?
- **Use and adapt existing guidelines** to improve the management of medical and solid waste (for example "Green Hospital checklist" of the "Smart Hospital Initiative" of the Pan-American Health Organization).²⁹

REDUCE AND GREEN THE TRAVEL



What is the issue?

Generally, for NGOs, transport is a substantial programme cost and has a considerable impact on the environment. Transport – business travel, operational transport and supply chain logistics – contributes globally 7% to healthcare’s carbon footprint. Transport in general is responsible for a large proportion of urban air pollution, which causes an estimated 3.7 million premature deaths. To reduce transport’s contribution to climate change and air pollution, either the demand needs to be reduced or transport needs to be less carbon intensive.

For NGOs flying for work often feels unavoidable. Visiting projects and partners across the world and networking at conferences are important. Covid-19, closure of international borders and disruption of air travel has forced organisations worldwide to suspend routine travel, and instead utilise digital technologies for meetings and programme management. Organisations should use this time to reset their expectations and attitudes around travel. Starting to question the necessity of travel can be a first step. Some face to face visits, meetings and conferences are already being held virtually. Digital technologies like video conferencing have greatly improved over recent years. Conference talks can be uploaded or live telecasted. Internet speed and quality is increasing in most countries. Even the connectivity of free software like skype is of much better quality. Flying less will have the added benefit to increase productivity as staff will spend less time travelling and jet-lagged, will improve the health of the workforce and reduce the costs of the organisation.

It is unlikely, that organisations will be able to avoid all travel by air. In these cases, carbon offsetting or creating a travel levy green fund can be an option. However, none of these should be considered a justification for travelling. There are quality assurance schemes that are ensuring the reliability of carbon offsetting projects.

In the case of car travel, in urban areas there might be opportunities to use public transport and support active travel. Bicycles, fuel efficient and electric motor vehicles may offer a more effective way in delivering services as they can avoid traffic congestion and air pollution. It is likely that the infrastructure for fuel efficient and electric vehicles are not yet widespread in most countries but will be an option in future.

Apart from reducing the carbon intensity of transport, there are options to reduce journey frequency either by maximising the number of patients using group transport or by changing the service delivery model. For example, establishing primary care vision centres closer to the community to deal with simple eye ailments and/ or the use of telemedicine help to avoid or reduce patient and staff travel can improve access. Designing services to reduce the number of visits to complete the care cycle (investigations, diagnosis, treatment/ intervention, purchase of medicines, etc.) will also lead to a reduction in patient travel.

Generally, healthcare facilities, especially bigger, high-volume hospitals, generate a huge amount of traffic.³⁰ This needs to be considered during the planning phase when constructing a new hospital, for example, how will the hospital be connected to existing public transportation systems, are there sufficient and secure parking lots for bicycles to encourage cycling, etc.

SDG 11 Sustainable Cities and Communities

11 SUSTAINABLE CITIES AND COMMUNITIES



Though none of the SDGs mentions active travel, SDG 11 has set targets for the expansion of public transport and the improvement of air quality. However, SDG 11’s update of 2019 states that the proportion of urban residents who have convenient access to public transport remains low, particularly in developing countries. In some regions with low access to public transport, informal transport modes in many cases provide reliable transport for the majority of urban populations.

It also reports that in 2016, 9 in 10 people living in urban areas still breathed air that did not meet the World Health Organization’s air quality guidelines for particulate matter and that more than half of the world population experienced an increase in particulate matter from 2010 to 2016.

What can we do?

- **Question the necessity of journeys.** This should become part of the organisation’s culture. While some travel may be necessary, reductions can generate significant savings and reduce emissions.
- **Consider video conferencing as an alternative to face to face meetings.** Ensure that your internet connection and video conferencing facilities are of reasonable quality.
- **Consider opportunities for active travel and public transport.** If you are operating in an urban area, consider if bicycles or public transport offer a more effective way of delivering services. Encourage your employees to take active or public transit modes to commute to work.
- **Consider if the emissions of your fleet can be reduced.** Explore if there are opportunities for vehicles which use less carbon intensive fuels. Also, consider the use of motorcycles where appropriate.
- **Consider options for reducing the number of journeys by:**
 - Maximising the number of seats installed in patient transport vehicles
 - Maximising the number of patients safely transported each journey

- Designing services to reduce the number of visits to complete the care cycle where appropriate; for example, offer one stop clinics

- Train primary health staff to treat primary eye disease in the community, offering appointments at centres closer to patients’ homes

- Using technology like tele-medicine, apps to reduce the number of face to face appointments (multiple options – individual’s phones, a clinic linked to a tertiary center, etc).

The latter three options not only reduce the environmental impact, but also lessen the pressure on staff. This is an important consideration as shortages in human resource is often a problem in health service delivery in LMICs.

- **Advocate for better public transit (active transit) in urban areas.**
- **Conduct a commuter survey to ascertain how staff travel to the office.** This will highlight means of travel, distances covered, and any barriers staff may have regarding travel.
- **For unavoidable travel, consider a carbon offsetting scheme or create a travel levy green fund.** If air travel cannot be avoided, pay into a quality assured carbon offsetting scheme or create a travel levy green fund.

FOLLOW THE 4 PRINCIPLES OF SUSTAINABLE CLINICAL PRACTICE



What is the issue?

So far, the key areas – sustainable procurement, facilities management and transport – addressed how organisations can improve the environmental sustainability of their operations and healthcare infrastructure. But what can healthcare professionals do to make their clinical practice truly sustainable? Sustainable clinical practice is underpinned by four principles³¹ which maximise health outcomes while reducing healthcare demand and reducing the carbon intensity of health services.

1. Disease prevention and health promotion.

There are clear links between people's living environments and their health, including eye health. If eye health professionals can help prevent eye disease early on, demand for secondary and tertiary eye care, which tend to have a higher impact on the environment than primary care, will be reduced. For example, if we can help improve access to clean water, encourage environmental improvements and provide antibiotics when needed, eye health professionals and communities can prevent the onset and spread of Trachoma, an eye disease 157 million people across Africa, the Middle East and Asia/ Pacific are at risk of developing. Or, if we can educate or offer support to people to improve the balance of their food intake, onset of cataract, diabetic retinopathy and macular regeneration can be delayed. Likewise, public education over the need for regular sight and eye health testing in the community, particularly for high risk populations, can facilitate early case detection and prevention of major causes of sight loss including age related macular degeneration and glaucoma.

Through broader advocacy and during individual patient care, eye health professionals and those

working in community development can tackle underlying causes of disease – the social, economic and environmental determinants of health.

To be the most effective, prevention, including secondary prevention, needs to be addressed collaboratively across all medical specialties, for example, good diabetes control is needed to reduce the number of diabetic retinopathy cases. In the case of the prevention of childhood blindness, improving the immunisation rates for measles, providing vitamin A supplements and access to good nutrition are vital. Conversely, access to regular eye tests for refractive errors are important to avoid physical injuries due to traffic accidents.

2. Patient education and patient empowerment. To reduce disease progression and pre-empt complications, many patients should feel empowered to take on a greater role in the management of their own health and healthcare. Patient education and empowerment are effective ways to increase compliance with treatment and pathways management and thus preserve sight. For example, patient empowerment and education plays a vital role in diabetes treatment. Patients being able to control their blood sugar and blood pressure well will be able to delay the onset of diabetic retinopathy. Informed patients are also well placed to improve the coordination between health professionals and reduce misunderstandings or duplications, resulting in less travel from and to health care facilities.

3. Lean service delivery. Reviewing clinical pathways in eye health will help to identify and reduce low value activities, for example, unnecessary blood or diagnostic tests, and their associated environmental impacts. Eye health professionals can support this by describing the relevant patient

pathways and providing clear, evidence-based guidance. Even where clinical input is of high value, a greater use of online records, email, telephone and teleclinics can reduce travel emissions by moving information in place of patients, staff and laboratory samples. Further efficiencies can follow from better planning of services, offering, for example, one stop clinics and the integration of specialist services, such as diabetic care and

ophthalmology.

4. Preferential use of medical technologies with lower environmental impact. Inclusion of environmental sustainability criteria in the evaluation of medical technologies will allow service planners, clinicians and patients to choose clinically effective products and technologies with the best environmental profile and will encourage their

3 GOOD HEALTH AND WELL-BEING



SDG 3 Good Health and Wellbeing

Amongst others and linked to eye health, it is the target of goal 3 to end epidemics of communicable diseases by 2030, halve the number of deaths and injuries from road traffic accidents by 2020, and achieve universal coverage including access to quality essential healthcare services and access to safe, effective, quality and affordable medicines and vaccines.

However, progress is slow. Half the global population still does not have access to essential health services.

further development. This might be particularly helpful when critically reviewing innovations.

What can we do?

- **Support, promote and/or implement prevention programmes** which are vital for eye health, for example, nutrition, clean water, environmental improvement, immunisation, vitamin A supplements, diabetes support.
- **Review opportunities for engaging patients in their own treatment.** Develop guidelines how best to involve patients in their own treatment and share with your team.
- **Review your service delivery models.** Describe your clinical pathways and review its evidence base. Reduce activities which do not add any value to patient outcomes or ease of delivery. If necessary, and based on evidence, re-design the clinical pathway.
- **Review medical technologies.** Discuss with your procurement team to help identifying technologies which maximise health outcomes but minimise the environmental impact.
- **Support, promote and/or implement plant-based diets** which are important for general health. In addition, diets are the main determinant of greenhouse gas emissions, with the highest emissions found in diets high in meat and dairy, and lowest emissions for diets that are plant-based.³²

EMBED ENVIRONMENTAL SUSTAINABILITY IN EDUCATION



What is the issue?

Climate action/ environmental sustainability in healthcare is still an emerging concept, and the siloed sub-specialization of health professionals hampers a holistic approach to medical care that also considers the importance of environmental aspects in ensuring the health of patients and their communities. To accelerate the inclusion of environmental sustainability in healthcare provision it will be important to offer training for

all key areas of sustainable healthcare: sustainable procurement, facilities management, transport, service delivery models, and advocacy. It is essential to embed environmental sustainability in medical education, so that the new generation of ophthalmologists, optometrists, mid-level eye health personnel, nurses and managers across the world make environmental sustainability part and parcel of their clinical practice and activities. By doing so, the overall quality of medical care will improve.

13 CLIMATE ACTION



SDG 13 Climate Action

It is one of the targets of SDG 13 to improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning. Training and education in all key areas of sustainability in healthcare will be vital to support eye health organisations and providers to meet the public health challenge climate change poses.

What can we do?

- **Embed environmental sustainability in education training programmes.** It is the mission of international and regional bodies like the International Council of Ophthalmology (ICO), World Council of Optometry (WCO), the College of Ophthalmology of Eastern Central and Southern Africa (COECSA) and the

West African College of Surgeons to enhance ophthalmic education and education in optometry to improve eye care and contribute to the preservation and restoration of vision around the world. As part of their commitment, they develop curricula and offer initiatives to strengthen education in eye care, especially in low income countries. Their mission and global reach offer a unique opportunity to embed

environmental sustainability and climate action in their educational programmes.

- **Promote resources of environmental sustainability in eye health.** Websites of many eye health organisations, like the IAPB or its members, include resources to help their communities improve their services. Information, toolkits and guidance on environmental sustainability in eye health can be made available on the websites to reach their global community. Be sure to build understanding of the links between good eye health and the environments in which adults and children live, work and go to school.
- **Make every event count.** Conferences, summits and workshops offer opportunities and have huge global reach. These events can be used to raise awareness about climate change and eye health and share ideas how to address the issue. The events should demonstrate environmental practices.
- **Develop training programmes and e-learning.** There is a need to develop training programmes in all areas of sustainable eye health and care. This can be in the form of face to face trainings, but also online platforms. E-learning has the benefit of being more accessible for busy clinicians and hospital management as it can fit around their timetable and can be done from any location. It also has the potential to reach a wider audience.
- **Continuing professional development in eye health:** There is a need to offer a training programme to eye health professionals on how to embed environmental sustainability when working on quality improvement programmes in eye care.
- **Set up environmental or sustainability working groups within your organisation** to serve as a platform for initiating education campaigns, behaviour change and harnessing staff passion in combating climate change.



Photo Credit: Sightsavers

100 FOCUS YOUR RESEARCH



What is the issue?

Research into environmental sustainability in healthcare is still in its infancy. As a result, it is not always clear what interventions in reality reduce GHG emissions and lower the environmental impact. Within eye health, there have been a couple of studies which have looked at the carbon footprint of cataract surgery. Morris et al estimated that the carbon footprint of cataract surgery by phacoemulsification in the UK is 182 kgCO₂e³³, whereas Thiel et al found that the same surgery in India releases 6 kgCO₂e.³⁴ To get a better understanding of the global variation of the carbon footprint of cataract surgery and to reduce the GHG emissions associated with it, the Eyeefficiency tool was developed. It not only facilitates the benchmarking and improvement of the carbon footprint of cataract surgery, but also its productivity and cost. Improving productivity will help in meeting demand in global cataract surgery.

Hot topics for research in Sustainable Eye Health Services

1. Manual Small Incision Cataract Surgery (MSICS) versus Phacoemulsification (Phaco). The results of the Eyeefficiency beta testing phase at ten sites across the world and of other studies³⁵ indicate that MSICS is less expensive, less technology dependent and might be faster than phacoemulsification while clinical outcomes are similar. The Eyeefficiency tool also

suggests that MSICS has a lower carbon footprint than Phacoemulsification. However, the sample size of the beta-testing phase was very small. Considering the potential of MSICS higher productivity in low resource setting, research into the greenhouse gas emissions variation between MSICS and Phaco will help in evaluating their different environmental impacts.

2. Reusables versus single use. In recent years the use of single use medical items has increased hugely contributing to the global plastic pollution of water, soil and air, with medical plastic currently 2% of total plastics production by value.³⁶ The manufacturing and disposal of medical plastic products, which are made of fossil fuels and often incinerated as medical waste, release greenhouse gas emissions. However, single use items are very convenient, as they are disposed of after use, whereas reusables will need to be cleaned, sterilised and stored until next use. These processes also cause GHG emissions. Different regional contexts will require different choices. Research into the environmental impact of the manufacturing, use and disposal of single use versus reusable instruments in high and low resource settings would be hugely beneficial to advance the discussion if the use of single use or reusable medical items leads to less GHG emissions.

3. New service delivery modules and climate resilient infrastructure. Research into the environmental, social and financial impact of new service delivery modules, like one-stop clinics, teleclinics, or simultaneous bilateral surgeries, in low and high resource settings will help to understand the full cost and trade-offs of service provision and to choose the most appropriate,

maximising clinical outcomes while minimising costs. Evaluation and analysis of climate resilient eye health infrastructure can generate useful case studies and learnings to promote sustainable practices.

4. Existing research evidence on the extent and nature of environmental impacts of health services. While direct research into climate

change and eye health may be limited, there is a growing body of evidence on the broader impacts of climate on health and health care providers, and associated mitigation strategies. Reviewing existing resources from health and environmental bodies can address critical knowledge gaps and strengthen recommendations for environmental sustainability.



Photo Credit: Sightsavers

Acknowledgements

This Guide has been commissioned by the Fred Hollows Foundation and co-produced by the Centre for Sustainable Healthcare in partnership with the Climate Action Working Group of the International Agency for the Prevention of Blindness (IAPB CAWG). It is based on a 2-day workshop held on 5th – 6th October 2019 during IAPB Council of Members Meeting in Dar es Salaam.

We would like to thank Dr Babar Qureshi (CBM International) who supported the establishment of the IAPB Climate Action Working Group and without whom the attached document would not have been possible. A special thanks also to Richard Dallu and Nesia Mahenge for sustaining us at the CBM Tanzania office as well as participating in the workshop.

CLIMATE ACTION WORKING GROUP

Mitasha Yu (Co-chair), Imran Kham (Co-chair, SightSavers), Thulasiraj Ravilla (founding Co-Chair, Aravind Eye Hospital), David Lewis (founding Co-Chair, CBM), Hannah Faal (former Co-Chair), Tanya Harris (Secretary), Andy Cassels-Brown (founding Secretary, FHF), Elise Moo (FHF), Ingeborg Steinbach (CSH), R. Venkatesh (Aravind Eye Hospital), N Balakrishnan (Aravind Eye Hospital), Sanil Joseph (Aravind Eye Hospital), Philip Hoare, Simon Davill (IAPB), Alex Melcquir Raj (IAPB), Gerhard Schlenther (RANZCO), Cassandra Thiel (New York University), Barbara Erny (American Society of Cataract and Refractive Surgery), Irmela Erdmann (CBM), Agustina Alvarez (Light for the World), Nicola Chevis (Vision Aid Overseas), Debbie Scott (SightSavers)

WORKSHOP ATTENDEES

Richard Dallu (CBM), Nesia Mahenge (CBM), Hannah Faal, Vengadesan Natarajan (Aravind Eye Hospital), Venkatesh (Aravind Eye Hospital), Andy Cassels-Brown (FHF), Tanya Harris (FHF), Ian Wishart (FHF), Brandon Ah Tong (FHF), Richard Le Mesurier (FHF), Kelvin Storey (FHF), Manfred Mörchen (CBM), Irmela Erdmann (CBM), Philip Hoare (IAPB), Nick Parker (IAPB), Ingeborg Steinbach (CSH), Gerhard Schlenther (RANZCO), David Lewis (CBM, via Skype), Sanil, Japhet Wangwe, Goodluck Maruma, Ezekiel Joachim, Gillian Cochrane, Hugh Taylor (past President ICO/CERA)

Abbreviations

IAPB	International Agency for the Prevention of Blindness
CAWG	Climate Action Working Group
GHG emissions	Greenhouse gas emissions
SDGs	Sustainable Development Goals
CO₂eq	Carbon dioxide equivalent
MSICS	Manual Small Incision Cataract Surgery
Phaco	Phacoemulsification
FHF	Fred Hollows Foundation
CBM	Christian Blind Mission
RANZCO	Royal Australian and New Zealand College of Ophthalmologists
CSH	Centre for Sustainable Healthcare

References

- 1 Ramesh A et al. The impact of climatic risk factors on the prevalence, distribution, and severity of acute and chronic trachoma. *PLoS Negl Trop Dis*. 2013 Nov 7;7(11):e2513. doi: 0.1371/journal.pntd.0002513
- 2 Johnson GI. The environment and the eye. *Eye* 2004;18:1235-1250
- 3 Jaggernath Jyoti et al. Climate change: Impact of increased ultraviolet radiation and water changes on eye health. *Health* 2013. 05. 921-930. 10.4236/health.2013.55122
- 4 Miyazaki D et al. Air pollution significantly associated with severe ocular allergic inflammatory diseases. *Nature* (2019) 9:18205 | <https://doi.org/10.1038/s41598-019-54841-4>
- 5 Chua S et al. The Relationship Between Ambient Atmospheric Fine Particulate Matter (PM_{2.5}) and Glaucoma in a Large Community Cohort. *Investigative Ophthalmology & Visual Science*, 2019; 60 (14): 4915 DOI: 10.1167/iovs.19-28346
- 6 Chua S et al Association of ambient air pollution with age-related macular degeneration and retinal thickness in UK Biobank. *British Journal of Ophthalmology Published Online First: 25 January 2021*. doi: 10.1136/bjophthalmol-2020-316218
- 7 Watts N et al. (2019) The 2019 report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate *The Lancet*, 394(10211), 1836-1878. doi:10.1016/S0140-6736(19)32596-6
- 8 Arup. (2019) Healthcare's Climate Footprint. *Healthcare without Harm & Arup*.
- 9 Burton MJ et al. (2021). The Lancet Global Health Commission on Global Eye Health: vision beyond 2020. *The Lancet Global Health*, 9(4), e489-e551. doi:10.1016/S2214-109X(20)30488-5
- 10 Watts N et al. (2021). The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. *The Lancet*, 397(10269), 129-170. doi:10.1016/S0140-6736(20)32290-X
- 11 Ramesh, A., Kovats, S., Haslam, D., Schmidt, E., & Gilbert, C. E. (2013). The impact of climatic risk factors on the prevalence, distribution, and severity of acute and chronic trachoma *PLoS neglected tropical diseases*, 7(11), e2513. <https://doi.org/10.1371/journal.pntd.0002513>
- 12 Johnson, G. J. (2004). The environment and the eye. *Eye (Lond)*, 18(12), 1235-1250. doi:10.1038/sj.eye.6701369
- 13 Jaggernath, J., Haslam, D. and Naidoo, K. (2013) Climate change: Impact of increased ultraviolet radiation and water changes on eye health. *Health*, 5, 921-930. doi: 10.4236/health.2013.55122
- 14 Miyazaki, D., et al. (2019). Air pollution significantly associated with severe ocular allergic inflammatory diseases. *Scientific Reports*, 9.
- 15 Chua S et al. The Relationship Between Ambient Atmospheric Fine Particulate Matter (PM_{2.5}) and Glaucoma in a Large Community Cohort. *Investigative Ophthalmology & Visual Science*, 2019; 60(14), 4915-4923. doi:10.1167/iovs.19-28346
- 16 Chua S et al. Association of ambient air pollution with age-related macular degeneration and retinal thickness in UK Biobank. *British Journal of Ophthalmology Published Online First 25 January 2021* doi:10.1136/bjophthalmol-2020-316218
- 17 Arup. (2019) Healthcare's Climate Footprint. *Healthcare without Harm & Arup*.
- 18 Harhay, M. O., Halpern, S. D., Harhay, J. S., & Olliaro, P. L. (2009). Health care waste management: a neglected and growing public health problem worldwide. *Trop Med Int Health*, 14(11), 1414-1417. doi:10.1111/j.1365-3156.2009.02386.x
- 19 Yamada, S., & Galat, A. (2014). Typhoon Yolanda/Haiyan and Climate Justice. *Disaster Medicine and Public Health Preparedness*, 8(5), 432-435. doi:10.1017/dmp.2014.97
- 20 United Nations Framework Convention on Climate Change. (2019). Gender and climate change: Enhanced Lima work programme on gender and its gender action plan, FCCC/CP/2019/L.3.

- 21 Arup. (2019) Healthcare's Climate Footprint. *Healthcare without Harm & Arup*.
- 22 Haupt, M., & Hellweg, S. (2019). Measuring the environmental sustainability of a circular economy. *Environmental and Sustainability Indicators*, 1–2, 100005. <https://doi.org/10.1016/j.indic.2019.100005>
- 23 Rizan, C., Mortimer, F., Stancliffe, R., & Bhutta, M. F. (2020). Plastics in healthcare: time for a re-evaluation. *Journal of the Royal Society of Medicine*, 113(2), 49–53. <https://doi.org/10.1177/0141076819890554>
- 24 Intergovernmental Panel on Climate Change [IPCC]. (2019): Summary for Policymakers. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press
- 25 Cronk, R., & Bartram, J. (2018). Environmental conditions in health care facilities in low- and middle-income countries: Coverage and inequalities. *International journal of hygiene and environmental health*, 221(3), 409–422. <https://doi.org/10.1016/j.ijheh.2018.01.004>
- 26 Somner, J. E. A., Stone, N., Koukkoulli, A., Scott, K. M., Field, A. R., & Zygmunt, J. (2008). Surgical scrubbing: can we clean up our carbon footprints by washing our hands? *Journal of Hospital Infection*, 70(3), 212–215. doi:10.1016/j.jhin.2008.06.004
- 27 Aravind. (2020). Decentralised wastewater treatment system at Aravind Eye Hospital, Pondicherry. Centre for Science and Environment. <https://www.cseindia.org/decentralised-wastewater-treatment-system>
- 28 Harhay, M. O., Halpern, S. D., Harhay, J. S., & Olliaro, P. L. (2009). Health care waste management: a neglected and growing public health problem worldwide. *Tropical medicine & international health : TM & IH*, 14(11), 1414–1417. <https://doi.org/10.1111/j.1365-3156.2009.02386.x>
- 29 Green Hospital checklist and Smart Hospitals Toolkit, Pan-American Health Organization. (Available from <https://www.paho.org/disasters/smart-hospitals-toolkit-green-checklist>)
- 30 Ulhøi, J. P., & Ulhøi, B. P. (2009). Beyond climate focus and disciplinary myopia. The roles and responsibilities of hospitals and healthcare professionals. *International journal of environmental research and public health*, 6(3), 1204–1214. <https://doi.org/10.3390/ijerph6031204>
- 31 Mortimer F. (2010). The sustainable physician. *Clinical medicine (London, England)*, 10(2), 110–111. <https://doi.org/10.7861/clinmedicine.10-2-110>
- 32 Theurl, M. C., Lauk, C., Kalt, G., Mayer, A., Kaltenecker, K., Morais, T., . . . Haberl, H. (2020). Food systems in a zero-deforestation world: Dietary change is more important than intensification for climate targets in 2050. *Science of The Total Environment*, 735, 139353 doi:10.1016/j.scitotenv.2020.139353
- 33 Morris, D. S., Wright, T., Somner, J. E., & Connor, A. (2013). The carbon footprint of cataract surgery. *Eye (London, England)*, 27(4), 495–501. <https://doi.org/10.1038/eye.2013.9>
- 34 Thiel, C. L., Schehlein, E., Ravilla, T., Ravindran, R. D., Robin, A. L., Saedi, O. J., Schuman, J. S., & Venkatesh, R. (2017). Cataract surgery and environmental sustainability: Waste and lifecycle assessment of phacoemulsification at a private healthcare facility. *Journal of cataract and refractive surgery*, 43(11), 1391–1398. <https://doi.org/10.1016/j.jcrs.2017.08.017>
- 35 Ruit, S., Tabin, G., Chang, D., Bajracharya, L., Kline, D. C., Richheimer, W., Shrestha, M., & Paudyal, G. (2007). A prospective randomized clinical trial of phacoemulsification vs manual sutureless small-incision extracapsular cataract surgery in Nepal. *American journal of ophthalmology*, 143(1), 32–38.
- 36 Rizan, C., Mortimer, F., Stancliffe, R., & Bhutta, M. F. (2020). Plastics in healthcare: time for a re-evaluation. *Journal of the Royal Society of Medicine*, 113(2), 49–53. <https://doi.org/10.1177/0141076819890554>