Planetary Health Annual Meeting

RESEARCH, PROJECT, & LIGHTNING TALK ABSTRACTS **2022**

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Project & Research Abstracts

Air Quality, Waste, & Chemicals

A Review of PFAS Contamination of the Great Lakes Basin in the Ojibwe Nation

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Objective: This review aims to examine all accessible information on Indigenous and Ojibwe nation exposure to PFAS to assess the potential health risks of PFAS on the Ojibwe population.

Background: Per- and Polyfluoroalkyl Substances, or PFAS, are a manufactured and chemically stable group of compounds. They are extremely prevalent in consumer products and do not biodegrade in the environment. The Ojibwe Nation is located throughout the Great Lakes Basin. Cultivating so much of their sustenance on the lakes may put them at a higher risk for PFAS bioaccumulation than other Americans.

Methods: A literature review of 26 sources.

Findings: Associations exist between PFAS prevalence and disruption of thyroid homeostasis. There are suggested effects of PFAS compounds as endocrine disruptors, and PFAS contamination has been linked to hypercholesteremia, decreased fertility, ulcerative colitis, and a variety of cancers.

Interpretation: The risks of PFAS exposure to the Ojibwe nation are high, as the analyzed studies demonstrate that adverse health effects exist from PFAS exposure. However, more research needs to be conducted to gain a more comprehensive understanding of both short- and long-term impacts on culture and health, as there is a general lack of United States studies on indigenous exposure to PFAS compounds.

A systematic review of the effects of microplastics inhalation on human health

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Background: The novel entities boundary of the Planetary Boundaries framework refers to entities that are new and potentially harmful for the Planet, including microplastics (MPs). Even though the thresholds for these chemicals are not easy to determine, several experts argue that this boundary has already been crossed. Microplastics are defined as small particles less than 5 mm in size occuring in the environment as a consequence of plastic pollution. MPs have become widely distributed in the natural ecosystems and have been charged with causing several detrimental effects on both the environment and on human health. Moreover, plastics often include additives to improve their properties, which may produce additional toxic substances. Humans can be exposed to MPs through different pathways, including ingestion, inhalation and dermal contact. The aim of this systematic review is to synthesize whether inhaled microplastics and plastic additives have negative effects on human health.

Methods: MEDLINE, Scopus and Web of Science were searched starting from December 2021. The systematic literature review was conducted according to the PRISMA guidelines. Eligible studies were primary studies which reported the effects of inhaled MPs on the respiratory system. Appropriate quality assessment tools were used according to the study design of primary studies.

Findings: 32 studies met the inclusion criteria. Most of the studies were conducted in vitro, while there was a scarcity of papers that investigated the effects of MPs in population cohorts. Preliminary results show that MPs can induce pro-inflammatory or pro-carcinogenic effects by different mechanisms, depending on particles' concentration, size, type and surface charge.

Interpretation: Although plastic pollution is increasing worldwide, there is still a scarcity of primary studies investigating the effects of MPs on human health. The results of this systematic review sheds light on the possible threats of MPs inhalation and discusses whether an implementation of new public health policies is needed.

Air quality benefits and tradeoffs from vehicle electrification in the U.S. Midwest

Anastasia Montgomery (Bachelors, Northwestern University), Sara Camilleri (PhD, Northwestern University), Jordan Schnell (PhD, CIRES), Daniel Horton (PhD, Professor, Northwestern University

Background: With the recent advent of automaker production commitments, increasing consumer options, and greater affordability, the United States' vehicle fleet is fast becoming more electric. The appeal of electric vehicles (EVs) is multifaceted, and partially contingent on the assumption that an EV emits less greenhouse gas and fewer air pollutants than an internal combustion engine vehicle (ICEV). Studies have largely borne out this assumption for greenhouse gasses, but the net effect of EV adoption on air quality depends on numerous complicating factors including the source of electricity used to charge EV batteries, the type, magnitude, and proximity of other emission sources, meteorology, season, and atmospheric chemistry.

Methods: We use the two-way coupled Community Multi-Scalar Air Quality and Weather Research and Forecasting (CMAQ-WRF) modeling system to simulate changes in air quality that result from the replacement of 30% of all vehicles with EVs. We scale tailpipe, refueling infrastructure, and power plant emissions according to ICEV replacement and EV charging demands using an emissions remapping algorithm designed to emulate electric grid behavior. Our simulations are run at neighborhood-scale (1.3 km2) over a Chicago-centric U.S. Midwest domain. Air quality changes are contextualized by computing public health impacts across health endpoints using community health response functions.

Findings: Our results indicate that EV adoption results in surface-level NO2 and PM2.5 decreases, and marginal O3 increases. We find that populations collocated with major interstates are most affected by air quality changes, and demonstrate that the health impacts due to O3 increases are more than offset by benefits from NO2 and PM2.5 decreases.

Interpretation: Our 30% EV adoption scenario demonstrates a net public health benefit over our modeling domain. Census tract-level mortality data is more nuanced, however, necessitating demographic overlay to ascertain the environmental justice implications of an EV transition over our domain.

Identifying and Quantifying the Burden of Single-Use Sterile Surgical Supplies in the Operating Room

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Background: Medical waste in hospitals is a complex environmental and financial problem that challenges healthcare systems worldwide. The U.S. healthcare system produces four billion pounds of waste annually and accounts for up to 8.5% of U.S. greenhouse gas emissions, with 80% of health care industry emissions originating from supply chain-related consumables. A significant portion of this waste is produced by operating rooms where a staggering number of single-use, sterile surgical supplies (SUSSS) are opened and discarded after every surgery. Many of those items are not even used during the procedure, resulting in unnecessary waste. Despite the financial and ecological impact of this volume of preventable waste, there has been little research conducted on how to identify and reduce it.

Methods: Over the course of 44 surgeries in the pediatric operating room, sequential images were captured to create a detailed log of the movement of each single-use item used during the operation. Items were marked as unused if they were not utilized nor removed from the sterile scrub table by the conclusion of the procedure. These logs were consolidated to analyze the frequency at which each SUSSS was unnecessarily opened and discarded.

Findings: Approximately 32.12% of SUSSS identified to this point remained unused at the end of surgery. Certain SUSSS, such as towels (60.00%), sutures (30.34%), and syringes (33.33%), consistently had high rates of waste.

Interpretation: Our preliminary results demonstrate that certain items are consistently being wasted across surgeries. Identification of common culprits of waste may allow for actionable change to minimize such waste going forward. Future goals include comparison of data amongst across institutions and their associated workflows to identify best practices to promote sustainable perioperative performance. By lessening perioperative waste, the US healthcare system can invest in population health while maintaining quality of care and reducing healthcare expenditures.

Indoor air quality during the SARS-CoV-2 pandemic period in Brazil

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Background: Worldwide there is an increasing interest in indoor air quality monitoring, especially during the pandemic. The SARS-CoV-2 may have the potential to be transmitted through aerosols.

Objective: To analyze the indoor air quality according to the parameters (viable fungi, particulate matter (PM10), and carbon dioxide) established in the Resolution 09 of the National Health Regulatory Agency, ANVISA, in a previous period and referring to the SARS-COV-2 pandemic.

Methods: Were analyzed 196,569 indoor environments in 26 provinces of Brazil, between 2018 and 2021. Samples of viable fungi were collected at the respirable zone of 1.5 meters floor height, using a vacuum pump with a sample flow of 28.3 L/min, Andersen 1 stage impactor, and a petri dish with Sabouraud Dextrose Agar culture medium. The samples were immediately sent to the Microbiological Laboratory for analysis (incubation time: 7 days; 25 °C). The particulate matter (PM10) was analyzed using Light Scattering Airborne Particle Counters equipment, with a sample flow 2,83 L/min. Carbon dioxide analyses were performed using an electrochemical detector (real-time measurements). The sampling time for collection of viable fungi, and analyses of carbon dioxide and particulate matter (PM10) was 5 minutes.

Findings: Our results showed an increase of non-conforming results to viable fungi and a decrease of non-conformity to carbon dioxide concentration during the most severe period of the pandemic, when the environments were closed and with low air renewal. Interpretation: This study presents evidence about how doors and windows opening affected the indoor air quality in buildings, offices, hospitals, malls, industry, banking branches, airports, and department stores during the pandemic period in Brazil. These results can be related to low occupation of buildings during the pandemic period. Opening the windows and doors can improve the ventilation rate in indoor environments.

The air quality and health implications of transitioning 30% of the U.S. Midwest heavy-duty transport fleet from diesel to electric power

Sara F Camilleri (PhD, Postdoctoral Scholar, Northwestern University); Anastasia Montgomery (BS, PhD Candidate, Northwestern University), Maxime Visa (BS, Undergrad Researcher, Northwestern University), Jordan L Schnell (PhD, Research Associate, NOAA); Daniel E Horton (PhD, Assistant Professor)

Background: Transitioning to an electric vehicle fleet is an ongoing climate change mitigation action that will reduce tailpipe emissions but increase the energy demand for charging. The subsequent impact this would have on air quality is poorly understood. In this work we study the impact of transitioning 30% of the heavy-duty fleet in the U.S. Midwest to electric and analyze the corresponding impacts on air pollution concentrations and their associated health impacts.

Methods: We scale tailpipe, refueling, and idling emissions from heavy-duty vehicles (HDVs) by 30% and estimate the additional energy demand needed for charging. The two-way coupled Weather Research Forecast and Community Multiscale Air Quality (WRF-CMAQ) chemistry-climate model is used to simulate air pollution concentrations following these emission changes. Monthly simulations for each season were run at a 1.3 km resolution. We estimate the associated health impacts of resultant pollutant concentrations using concentrations response functions derived from epidemiological studies.

Findings: Compared to a baseline scenario, we estimate that annual NO2 and PM2.5 concentrations will decrease by up to 3.03 ppb and 0.49 ÔÅ≠g m-3, respectively across the study domain. In contrast, differences in annual daily maximum 8-hr running mean O3 (MDA8O3) concentrations are spatially heterogenous with increases along major road networks and metropolitan areas (up to 1.42 ppb) and small decreases in less populated regions. We estimate that these changes will lead to a significant number of NO2 and PM2.5-related avoided deaths and marginal increases in MDA8O3-related health effects.

Interpretation: Results highlight the overall beneficial impact of electrifying HDVs on air quality and human health despite an increase in energy demand. However, policies aimed to transition to an electric vehicle fleet should consider air quality changes with focus on areas that could result in MDA8O3 increases and lead to adverse health effects.

The COVID-19 pandemic and its impact on planetary health

Raphael Coelho (ASBAI)

A pandemia de COVID-19 deu ao mundo uma imagem clara, do que é uma crise multidimensional em escala planetária, revelando o papel central que ocupa o setor de saúde e as profundas desigualdades no acesso aos cuidados de saúde que existem entre os diferentes países e dentro de cada um deles. Melhorar os efeitos ambientais do setor e reduzir as emissões de gases de efeito estufa pode não apenas melhorar a saúde de todos, mas também reduzir os custos com os cuidados em saúde. O setor de saúde de cada país libera direta e indiretamente gases de efeito estufa ao fornecer seus serviços e ao comprar produtos, serviços e tecnologias em uma cadeia de fornecimento de carbono intensivo. Educar os profissionais de saúde mais profundamente sobre os efeitos das mudanças climáticas pode levar a práticas clínicas mais sustentáveis, melhorando os resultados para os pacientes e fornecendo um impulso substancial para aumentar os esforços para reduzir as emissões de carbono. O setor da saúde deve assumir a responsabilidade por sua pegada climática respondendo à crescente emergência climática, não apenas prestando assistência aos doentes, feridos ou moribundos como resultado da crise climática e suas causas, mas também fazendo a prevenção primária e reduzindo drasticamente suas próprias emissões.

Art and Literature

Are you listening to the world? Podcast as tool to debate a Planetary Health Agenda

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The academic literature frequently announces the need to change development routes in the face of environmental, social and economic problems. The field of Planetary Health studies makes it possible to face this scenario by providing concepts and analyses about sociological systems and human health, but its main highlights and findings have yet to be incorporated by institutions in multiple scales. Also, it is necessary to adapt them for each context. As a part of activities from the 2021 and 2022 Brazilian Planetary Health Ambassadors Program, this ongoing project relies on this gap and aims at providing subsidies for a Planetary Health Agenda (PHA) for the case of São Carlos (Brazil, SP) and building-up a net of social agents and their experience to promote local-based development alternatives. The methodological approach consisted of semi-structured interviews – with specialists, NGO and political representatives, members of organized civil society, environmental educators – combined with content analysis to capture focal topics to be incorporated into municipal agenda. The edited interviews are publicized through a streaming podcast platform, where they are available to consult. Until may, 2022, a total of eight interviews were done and the preliminary results points out themes and topics to be incorporated by the PHA such as urban waters, riparian vegetation, public green areas, environmental education, solid waste management, cultural valuation of traditional communities, urban agroecology and permaculture, urban ecosystem services, nets of solidarity and social actions, and public participation. Moreover, a map of local agents based on the interviewees answers has been prepared (Figure 1). This shows that the Planetary Health approach has made it possible to integrate environmental and human health issues, allowing that both local emergencies and practices developed by organized groups to face the overlapping contemporary crises are illuminated.

A Global South-centered initiative exploring self-study and arts-based methodologies within the Planetary Health movement: Honouring art, Indigenous knowledge Systems and loving relationships in an equitable and diverse approach.

Vanessa de Araujo Goes (Federal University of Rio de Janeiro - Brasil / ACOPPHE), Bwalya N. Lungu (Durban University of Technology - South Africa / ACOPPHE), Menzi Ka-Gudu Maseko (Ikhambi Natural Healing / Green Ankh Works - South Africa / ACOPPHE)

The complexity of contemporary global challenges concerning bio-social-political wellbeing comprises humanity's actions on many scales. Planetary Health and One Health are examples of broad fields emerging in the last decade to address these complexities. Scientific research has been

focusing mainly on the biological aspect of the problem, and the role of indigenous knowledge systems (IKS) as drivers of change in Planetary Health is poorly explored. Transdisciplinary approaches are needed, and thus, it, is essential to highlight the social-political side of this reality by integrating social sciences and humanities in these research communities. Africa Community of Planetary Partners for Health and Environment (ACOPPHE), through its Art and Indigenous action team, seeks to explore this integration by interrogating and engaging in research using self-study methodologies and arts-based research methods. In traditional scientific research, it has been a common practice that the researcher is positioned outside of their research. The results are expected to have complex scientific answers that are often not useful for communities in the need of solutions. It has also been often that the arts have not been adequately explored as a tool for research. Another pillar to this problem is that indigenous people of many places in the world have often had their knowledge of human and planet health marginalized because it was practised based and passed down through the embodiment of knowledge and not modern-day written knowledge. Self-study and arts-based methodologies have great potential here in bridging the communication between the scientific world and the lived experience of the communities through their cultural and traditional practices. They make room for intersectionality as well as making the knowledge from research findings valuable and explicit to the layman. Self-study methodologies offer the space for sharing lived experiences, critical dialogue, and possible solutions for bio-social and political issues our world faces today.

What is your part in the thread of the Anthropocene?

Larissa Medeiros (Saúde Biodiversa)

All living beings descend from a common ancestor. We inherit biological patterns and participate in biogeochemical cycles, in the weaving of life. However, the actions of some human groups have been determining extreme and irreversible environmental impacts, configuring the geological era of the Anthropocene, marked by climate changes and loss of biodiversity.
This artistic intervention was conceived for an act in an exhibition room, consisting of a string to which papers containing messages or quotes related to the Anthropocene scenario are tied. Each participant chooses a paper, a “part”, which will be linked to other papers by the same thread, emphasizing that our choices, “parts”, are linked in the same scene, in the “AnthropoScene”. A digital adaptation will be prepared for this intervention, which aims to generate reflections on the impacts of human actions and how our attitudes are connected and influence the entire thread of life.

Community Outreach, Engagement, or Organization

Educom. Planetary Health: A project to mobilize the Planetary Health Brazilian Clubs and the Lins city population for integrated actions in promotion of Planetary Health.

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An initiative of the Brazilian Planetary Health Clubs members with the support of the Africa Community of Planetary Partners for Health and Environment (ACOPPHE), the Educom.Saúde Planetária Project aims to develop educommunication and social technology practices in the promotion of Planetary Health, giving voice to the individuals and social groups interested in contributing to collective wellness. Educommunication is a field of practice and social intervention that aims to encourage dialogue, participation and sharing promoting the collaborative use of information and communication resources. Many important planetary health concepts such as sustainability, biodiversity, food and nutrition, literacy and community knowledge exchange are being covered through integrated educommunication activities described as follows: 1. promotion of dialogues and reflection about Planetary Health; 2. creation of podcasts; 3. production of printed and digital newspapers 4. production and publication of a magazine with the best articles selected by the participants and the Project team. Those activities are designed to deliver educational products as an outcome which will be diffused in the community. The main actors of this movement are 4 social educators, 135 students (between 6 and 17 years old), 14 members of three different community groups of farmers and collectors of recyclable materials. This project started in May 2022 and is scheduled to end in December 2022. Is expected that all project production will advance awareness and tools to face the challenge around the mobilization of the population in the promotion of integrated actions for Planetary Health in the city of Lins.

Creating Just and Equitable Food Systems in Tanzania

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In Sub-Saharan Africa, the importance of creating just food systems is urgent. The region has the world's fastest growing population, highest poverty rates, largest yield gap, and one of the highest rates of gender inequality. Critical ecosystems and biodiversity are threatened. The government of Tanzania created the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) to enhance food security, improve livelihoods and environmental sustainability by catalyzing inclusive agribusiness investment. A major threat to SAGCOT is that production areas suffer from water stress and land

degradation. Most land in Tanzania is communally managed and most communities do not have a Village Land Use Plan (VLUPs) – essential for sustainable management and required in the land tenure process. Tenure insecurity and the lack of VLUP lead to less sustainable management. Women producers are most vulnerable, facing challenges - economic dependence, exclusion from effective participation in governance institutions, limited access to support services. The CARE-WWF Alliance creates resilient landscapes that conserve nature, improve livelihoods and food security of local communities. In 2018, the CARE-WWF Alliance began a program in SAGCOT demonstrating a model improving livelihoods of small-scale farmers while maintaining ecosystem functions and conserving biodiversity. The Alliance coordinates with local governments and community members to support VLUPs in a watershed - participatory zoning for agriculture, forest reserves and water source protection. Since 2018, 2/3 of 21 target villages have VLUPs and are protecting water flows from 192 sources critical to livelihoods, food, and income security. The Alliance enrolled 621 farmers into 28 Farmer Field and Business Schools across 21 villages and set up 34 community-led demonstration plots in 2021. Support for over 75 Village Savings and Loan Associations promote financial inclusion for small-scale women farmers and sustainable investments in conservation agriculture and nature-based enterprises.

Be-cause health working group on Planetary Health: An interdisciplinary platform bridging diverse global voices

Davide Ziveri (Be-cause health) and Magalie Schotte (Be-cause health)

The emerging concept of planetary health needs more shared platforms, globally and locally, to develop a common language and scale-up sustainable solutions with environmental and health co-benefits among academia, health actors, policymakers, NGOs, and civil society. Be-cause health (BCH), the Belgian pluralistic platform for constructive dialogue on global health, recognized this need and calls for a diversity of stakeholders to share experiences, learn from each other, and build knowledge on planetary health. The BCH network organized an online conference on “Climate Justice and Health Equity” in November 2021, bringing together 39 speakers and 173 participants from different countries. The cross-media dissemination of the proceedings offered the rationale for the creation of the WG to explore ongoing experiences, facilitate joint initiatives, and co-develop the planetary health approach. This open-ended WG aims to facilitate learning, sharing, and influencing planetary health knowledge, policies, and practices. In line with BCH guiding principles of equitable access to quality responsive health services for all within resilient and sustainable health systems, the WG upholds inclusion, transparency, decoloniality, justice, equity, and gender as core values of planetary health. In terms of ambitions, this WG is well-positioned to be the central Belgian climate and health network, promoting meaningful participation of a diverse range of actors from low- and middle-income countries, and underrepresented and marginalized voices. This poster aims to share the ongoing work of the WG, fostering further debate and innovative collaborations. Sharing the conference outcomes and the ongoing dialogue within this new but enthusiastic WG may contribute to enlightening the planetary health frame, promoting further exchange among diverse stakeholders, and enabling transformation in knowledge production and climate and health action.

Food security and urban gardens, the case of São Paulo/Brazil

Uiara Bandineli Montedo (Polytechnic School / University of São Paulo - Assistant Professor); Bárbara Junqueira dos Santos (Institute for Energy and Nuclear Research/ University of São Paulo - Master Student)

With Covid-19 pandemic, food insecurity in Brazil has become urgent. Since 2020, there has been an increase in unemployment and the closing of schools and day care centers, demanding joint action from society, university, government and companies.

Urban and agroecological gardens were highlighted in community actions in the periphery of São Paulo, which has 106 vegetable gardens mapped by the Sampa+Rural program. These gardens are run by solidarity enterprises, which have promoted the delivery of food baskets to vulnerable families. The objective was to enhance the quality of production and ensure healthy food for about 80 families, served by 8 gardens, which contributed to generating income and thus maintaining their dynamics.

The methodology consisted of a training cycle from August/21 to April/22, with 5 meetings in each of the 8 participating gardens, covering the planning stages of planting, production, harvest and distribution/marketing. In total, more than 1000 seedlings were planted, ranging from conventional ones (lettuce, arugula, kale, parsley and chives) to seedlings of unconventional food plants, which show a high nutritional level, such as taioba and peixinho.

Participants report community gardens as spaces that promote mental health, meeting and reflection, serving as an educational tool in the promotion of significant and permanent social changes, either through the form of production, through the collaborative management process and the fight against local food insecurity.

Collective work is one of the ways to overcome food insecurity. It is necessary to take care of volunteers, increase engagement and improve their well-being. Between August and November/22 the focus will be to improve the ergonomic conditions of work in the gardens, to promote well-being and physical safety of those who work there. It is expected to reduce the turnover of participants and improve their comfort, thus contributing to the sustainability of these production systems.

Integrating Environmental and climate action for Human wellbeing and Health through an interfaith approach

Dr. Rozilla Adhiambo (ACRL-RfP), Dr. Francis Kuria, Sarah Mokaya (ACRL-RfP)

ACRL-RfP has over the years adopted an interfaith approach, with the inclusion of religious leaders, women and youth of faith in realizing human integral development, environmental protection and climate adaptation. It partners with a network of 31 affiliate National Inter-Religious Councils across Africa region, to strengthen the capacity of faith communities through trainings, conferences and dialogues.

Recognizing the interconnectedness between environmental, socio-economic issues facing the globe and Africa, ACRL-RfP notes the impact of human destruction on the health of its inhabitants. This council undertakes interventions using an interfaith approach to improve health outcomes at community, national and regional levels; outcomes expected as strengthening of food security, conservation agriculture and environmental protection. The council advocates for implementation of policies that promote low carbon emissions, climate resilient choices, renewable clean energy, food production and promotion of natural resources governance.

The council participated in UNEA5 and presented a joint statement from the faith leaders Position Paper for UNEA 5.2 Green Tent Side Event Final.pdf. As a member of Planetary Health Alliance and Partner of Planetary Health Eastern Africa Hub, the council is focused on integrating health in faith-led climate actions. Some of its members have participated in the Climate Change and Planetary Health Course supported by the German Climate Change and Health Alliance which has enhanced knowledge to transformative action. ACRL-RfP's mitigation in the Sahel Region, empowers religious women and youth networks for environment action and climate change resilience and improved livelihoods. In the long run, increasing agricultural production, improving nutritional needs of communities and provision of water through the reservoirs.

Integrating human nutrition and health into agroforestry projects in sub-Saharan Africa: a feasibility study

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Agroforestry, combining trees with agricultural crops and/or livestock, is a sustainable agroecological production method that positively contributes to numerous aspects of planetary health, including both environmental health and human well-being. While impacts of agroforestry on the environment and benefits for the economy of local communities are well studied and documented, nutrition and health aspects of agroforestry programs are less often implemented and researched.

This project aims to generate knowledge relevant for the scientific community and to create awareness among stakeholders that are involved in agroforestry programs in sub-Saharan Africa (SSA) to implement nutrition and health aspects and evaluate these outcomes in future programs. The project addresses the following key research questions: (i) what is the current extent of integration of nutrition and health aspects into past/ongoing agroforestry projects in SSA; (ii) what is needed to better integrate nutrition and health aspects into future agroforestry projects, and (iii) how could implementing organisations/institutions better measure and evaluate the impact of their activities?

Project activities, including key informant interviews and workshops, are carried out in an inter- and transdisciplinary way by cooperating with a variety of local, regional and global stakeholders representing different sectors (e.g. research, practitioners, program implementers, civil society, policymakers) as well as different disciplines (e.g. agriculture, forestry, ecology, health, nutrition, social sciences, economy). As tangible outputs, the projects will generate (i) a systematic review of both the scientific literature and the grey literature on results from past/ongoing agroforestry projects in SSA with regard to nutrition and health aspects, and (ii) a conceptual framework and roadmap for better integration and evaluation of nutrition and health aspects in future agroforestry

programs. We expect that the project outputs will sensitize key stakeholders in understanding the importance of integrating and evaluating nutrition and health aspects into their future agroforestry programs.

Future Forest reimagined, building resilience for ecological recovery and community wellbeing, Northern Appalachian-Acadian (NAPA) ecoregion of Canada and the United States

Ursula Georgeoglou (L4E, Gund Institute, The University of Vermont), Nancy Patch (Two Countries One Forest, VTANR), Christine Laporte (Wildlands Network), Conrad Reining (Two Countries One Forest, Dartmouth College), Roberta Clowater (Two Countries One Forest, New Brunswick Chapter)

In 2020, five representatives of three organizations (Wildlands Network, Two Countries One Forest and Leadership for the Ecozoic) began to plan a three-phase bioregional initiative called The Future Forest Reimagined. This initiative has three long term goals: identification and protection of old forests, acceleration of the restoration of wildland forests, increase of the amount of resilient forest through ecological management. In the first phase, the initiative hosted a series of five workshops called The Future Forest Reimagined, Building Resilience for Ecological Recovery and Community Wellbeing in the Northern Appalachians/Acadian Region, between January and March of 2022. These workshops gathered 248 participants, 157 from the United States and 89 from Canada. The participants were academic experts, key stakeholders, and rights holders from Indigenous groups. The goal was to develop a shared plan to accelerate the protection and stewardship of a resilient forested landscape across the Northern Appalachian-Acadian (NAPA) ecoregion of Canada and the United States. This phase of the initiative was a success, and it accomplished the following goals: bring together communities across nations to discuss old forest protection and ecological forestry; build relationships and inspire action towards resilient forests; identify principles and practices across borders; understand perspectives of Indigenous peoples relating to forest management, stewardship, and conservation; establish action-oriented next steps to address challenges and work towards actions; identify the bioregional dimensions in which the next phases will develop. After a survey sent to the participants and considering the five bioregional dimensions identified in phase one (partnerships, economics, policy, human wellbeing, knowledge-local, indigenous, and academic-, we are currently, launching the following phase, where we will foster and coordinate a network of working groups that will take action towards the long-term goals of the initiative.

Promoting Citizen Science in the Global South: challenges and opportunities for the Brazilian Citizen Science Network

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Citizen Science (CS) initiatives are spreading globally, with interesting intersections with achieving the Sustainable Development Goals and Planetary Health. However, several challenges still hinder CS in the Global South. In 2021, the Brazilian Citizen Science Network (RBCC, in Portuguese) was launched to provide support and visibility to CS initiatives in Brazil. Here we analyze the challenges and opportunities for the network based on the discussions performed at the I Workshop of RBCC and published as an open letter at the network website (https://bit.ly/rbccletter). Main opportunities include a) adopting a broad CS definition which embraces diverse initiatives and facilitates comprehension by institutions and funding agencies; b) willingness by institutions to promote decentralized and democratic processes regarding science and society; c) interest of funders and public institutions to support knowledge production, with society and for society, and to promote the scientific culture; d) existing supporting materials and platforms for adaptation and re-use; e) network stakeholders, experience on inter/transdisciplinary framework, governance and research. On the other hand, challenges comprised: a) misunderstanding of CS definition (often interpreted as science communication); b) lack of funding for CS initiatives in short and medium-term and for human resources acting on CS and RBCC; c) lack of training and standardized evaluation metrics in CS; d) existing platforms are not integrated and there is no policy regarding technology and infrastructure; e) dominance of stakeholders with academic background and biodiversity experts. Strong efforts are still needed to promote CS as a structured research and practice area in Brazil and RBCC plays a key role providing institutionalization and encouraging collective action towards public participation in science. Despite the current scenario of science and technology in Brazil, where there has been a dramatic decrease in funding, RBCC presents exciting opportunities to establish CS in the Global South.

Engaging student community on Planetary Health: A case study of Egerton University, Kenya

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Planetary health education holds the key to a more sustainable and healthy planet. It offers a chance to change how education on climate change is administered and provide a wider scope on the interaction between human activities and nature. It offers a more solution oriented, trans-disciplinary field and social approach in assessing the impacts of human activities on the changing environment. The Planetary Health Eastern African Hub hosted a planetary health sensitization workshop for both professors and students. The main objective was to educate both the professors and students within the department of environmental science and launch a planetary health society within the university. The hub supported the activities that included a mental health sensitization by Nyaluk foundation, a joint online sensitization training by the University of Zambia and University of Eldoret for students.

Sensitization sessions on planetary health were done in two sessions: first with the professors to understand the curriculum and another session with students to raise awareness to gauge their knowledge on planetary health. This was an opportunity to understand the current curriculum and its links to planetary health. There was great interest in getting involved in planetary health from both students and lecturers that will spur the next generation of planetary health ambassadors focused on attaining a sustainable future. The Mental health training by Nyaluk foundation sensitized students on the emerging issues on mental health and climate change. The hub in collaboration with the University of Eldoret and University of Zambia on an online series sensitizing students on topics related to Planetary health. Planetary health education presents an opportunity to carefully assess and initiate culture change.

Porto Ar Alegre: Citizen Science for Healthier Air

Enrique Falceto de Barros (UFRGS)

The World Health Organization (WHO) estimated that 4.2 million deaths worldwide were attributable to outdoor air pollution in 2016. Many cities, especially in Low-Middle Income Countries (LMIC) have poor or no air pollution monitoring on the ground. Porto Alegre, a city of 1,488,252 people in Brazil, has no official air monitoring on the ground. There is promising literature on Citizen Science (CS) to fulfill such gaps. Here we report the case of a group of concerned citizens and scientists in Porto Alegre who crowdfunded, developed and implemented a CS air pollution monitoring system called “Porto Ar Alegre” to address this problem.
Low-cost air pollution sensors were installed in 4 different public community health clinics and in a university. One CS friendly Android APP was developed to display levels of air pollution and WHO recommendations.

Data has been continuously collected since 2019. It is available to any professional or amateur scientist. Analyzed Data (unpublished) suggested a drop of 22% of air pollution in Porto Alegre during the first wave Covid-19 lockdown, making headlines in local media. Two Whatsapp groups were created with over 50 collaborators. A partnership with the municipality was initiated. A Brazilian pioneering medical environmental health NGO was created, aiding other NGOs and federal prosecutors to stop the project of the largest Latin American open coal mine in the Porto Alegre region.

This CS project has partially fulfilled a gap in air pollution monitoring in Porto Alegre. CS has potential to expand, innovate and consolidate low-cost sensors to monitor air pollution in LMIC. Many caveats emerged while implementing this project, including the need for sustained motivation and teamwork, and that community health clinics are potential allies. In the long term, such CS projects could include other environmental health indexes to integrate planetary health watch systems.

Planetary Health in Engineering: building a community

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Planetary Health (PH) is a transdisciplinary domain from the point of view of its foundations and its actions. A core principle is that everyone has a role, as the São Paulo Declaration on Planetary Health clearly states. Engineering as a professional field can considerably promote a better relationship between humankind and the planet. Engineering transforms the world based on scientific knowledge in order to improve our lives. However, in doing so, it can negatively impact the planet because of a lack of consideration of the multiple aspects involved in a project, for instance. There are many examples, good and bad, of how engineering and engineers have impacted our lives and our planet. That is why it is crucial to bring this community as an essential ally to achieve planetary health. That is the proposal of Planetary Health in Engineering, a group created within Planetary Health Brazil, to promote discussions, practice, and adoption of PH principles into engineering courses, research, and practice. We started with a core group of faculty and students, most of them from different areas of engineering from the Escola Politécnica da Universidade de São Paulo, and with seed funding from the Amigos da Poli Endowment Fund. Initially, we are developing outreach materials that explicit the connections between engineering and PH. Podcasts, texts, and

seminars that showcase examples of professionals and projects are also important to corroborate such objectives. The exercise reveals that PH already underpins many engineering actions. However professionals are unaware of the movement on the global scale. A video about PH and engineering is almost finalized. Ways to include PH into engineering curricula are also in our mission. There is room to expand the group including other engineering schools, students, and professionals all around the world.

Africa Community of Planetary Partners for Health and Environment (ACOPPHE): A grassroots initiative to celebrate diversity, bridge divides, and build equitable community partnerships which are grounded in shared values such as love, justice, and unity.

Nightingale Wakigera (University of Glasgow) and Nathaniel Uchtmann (University of California San Francisco)

Our Africa Community of Planetary Partners for Health and Environment (ACOPPHE) project was started in late 2020, following a recognition that Planetary Health values and priorities can readily serve as an impactful, unifying, and welcoming space. We came together for the common purpose of connecting and mobilizing advocates for issues like health equity, sustainable development, child rights, and climate justice. Intentionally linking these issues that are directly tied to people, place, and planet facilitates the coordination of activities, harmonization of advocacy priorities, and sharing of ideas, opportunities, and solutions. In the short time since our team coalesced, we have actively participated in and presented at multiple conferences including the 2021 Planetary Health Annual Meeting and the 2021 inVivo Planetary Health Conference. We have also hosted several online gatherings for global events such as World Environment Day and organized several Action Teams that are guided by leaders from a variety of disciplinary and geographical backgrounds.

A fundamental ACOPPHE goal is to cultivate a diverse network of leaders and advocates who connect and integrate human health with environmental sustainability. Our Planetary Partnership model for promoting international, intergenerational, and interspecies justice serves as the foundational platform for regular communication and idea exchange between academics, children and youth, and members from Indigenous communities.

We share a common vision about these 3 objectives:
1. Pursuing and prioritizing community-centered solutions, leadership, and organizational development.
2. Building dynamic partnerships with our target audience of friends, family, and allies for healthy people in loving communities and diverse environments on a healthy planet.
3. The importance of working to collaboratively link and integrate interdisciplinary and holistic approaches to health and development such as EcoHealth, One Health, Planetary Health, and Indigenous Knowledge Systems/Traditional Ecological Knowledge through cultivating individual and institutional relationships that align our activities, research, and priorities.

Education

Partnerships for Youth and Planetary Health Education

Kate Tilleczek (York University)

The planet is now home to 2 billion youth (15-24 years of age), the largest global youth cohort in history who are providing new insights and collective responses to Planetary Health challenges. Greta Thunberg's School Strike for Climate, which evolved into Fridays for Future and the Global Youth Climate Movement, is an obvious example of youth leadership and advocacy. However, there are now untold quantities and types of youth actions happening each day around the world as young people respond to planetary crises with transformative approaches. The Partnership for Youth and Planetary Wellbeing is an educative research project that harnesses, supports and foregrounds youth-centered work in Canada, Chile and Costa Rica with three aims: 1) To conduct unique research with/by/for young people that centres and analyzes their work for planetary health, 2) To share data and analyses through international connections that facilitate flow and exchange of knowledge into global and local youth-serving communities who are empowered to enact change, and 3) To co-develop with youth and their communities new educational tools to support life at the intersections of the SDGs (and not simply teach "about" them). The Partnership is built upon long standing relationships with communities to employ decolonizing and educative data collection and knowledge sharing processes including youth-made films and stories that are shared in educative ways with multiple audiences (e.g., public, youth, NGOs, policy makers). This presentation illustrates our research processes with/by/for Indigenous and non-Indigenous young people and their communities in the global North and South through inclusive, equitable and socially just participatory research methods. The intergenerational and intercultural work with youth, scholars, NGOs, educators, and communities is made visible in the presentation of the data and analysis. Implications for, and extensions to, the nascent Planetary Health Education Framework are discussed as they emerge from work.

Engineering and Planetary Health: A new paradigm of education

Paul Kadetz Institute of Global Health and Development, Queen Margaret University, UK

Although Planetary health is central to the sustainability of life on earth, the engineers who design the systems, products, and processes that are needed to transform and redesign sustainable futures, have only been peripherally involved in this movement. Involvement commences at the entry point of education, and in this paper we present a transdisciplinary approach to engineering education that attempts to redress this gap.

First, in order to address our complex challenges for achieving planetary health we consider the need to move beyond the reductionism and simple closed-system thinking of the Enlightenment in which engineering education is often located. We next consider the turn from disciplinarity to true transdisciplinarity, particularly noting Kuhn's "paradigms and paradigm shifts", Foucault's

"discourse", and Gramci's "hegemony, as well as the post-modern critical turn from simple closed systems thinking to critical complex adaptive systems thinking.

Via this framing, we discuss the development of the Masters program in Engineering for Sustainability and Health (MESH) at the University of San Diego; including the multi-disciplines that have been involved in this process and how the stakeholders involved, particularly the educators and students, are learning from one another in this co-creation process. Entirely cognizant of the "brain drain" that is facilitated when students from low-income settings study in high-income settings, the MESH program will be entirely online and project-based within the student's home setting, thereby, supporting the growth of in-country capacity for planetary health at the intersections of engineering, health, and sustainability. We conclude by mapping the ways in which the MESH program will prepare students from engineering, and other disciplinary backgrounds, with the tools and capacity to transform their consciousness and practice to one which fosters planetary health.

Planetary Health: Global Environmental Change and Emerging Infectious Disease: assessing a new online asynchronous course at Brown University

Kristina Monteiro (Brown University) and Jesse Maurier (Brown University)

Will a warmer world be a sicker world? What is it about the New England landscape that supports the proliferation of Lyme Disease? How are local wildlife trade and global species invasions contributors to emerging diseases like the 2003 outbreak of monkeypox virus in the USA? Students explored these and related questions in Planetary Health: global environmental change and emerging infectious disease, a new fully online asynchronous undergraduate course at Brown University. In this course students learn how, when, where and why infectious diseases emerge in association with anthropogenic environmental impacts, specifically climate change, land-use change, and increased human interaction with animals. This is accomplished through a range of pedagogies and assessment methods including brief micro lectures, primary literature assignments, virtual discussion with peers/instructors, reflections, and projects. Course learning objectives were written to be specific and measurable; and serve as the knowledge and skills students obtained by the end of the course. We measured achievement of objectives using direct assessments of student knowledge, including a non-graded pre- and post-course assessment and reflections graded with a standardized rubric. We used indirect assessments to evaluate student attitudes towards planetary health through sentiment-like analysis as well as student satisfaction via course evaluations. Here we showcase course learning objectives, the general curricular framework, and present results from a pre-post course assessment and student sentiment towards the topic.

Experience Report - Planetary Health Education in Botucatu Faculty of Medicine/UNESP, Brazil

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Background: The inclusion of Planetary Health (PH) in the undergraduate curriculum is recommended internationally. However, current medical curricula in Brazil present gaps in the teaching of PH. This experience report describes the implementation of an education proposal on PH in medical graduation in Botucatu Medical School UNESP, São Paulo.

Methods: All 98 third-year medical students participated in 7 classes (28 hours) with the central theme of PH through September, 2021 (one immersive week) within the Health Surveillance Module of the curriculum. Active methodologies were used with 6 small groups of 16 students each, who had lectures with 7 PH specialists from Brazil and England, interspersing with practical group activities with local professors. Students were given a clinical case and the assignment to: develop a network diagram, connecting clinical, psychosocial, and environmental aspects; propose an approach with the patient during the medical consultation called "1 minute for the planet"; and propose a community approach. Learners interacted with 14 PH Brazilian Campus Ambassadors (Brazilian Program) in order to deepen their knowledge.

Findings: The pedagogical methodologies used proved to be very adequate, the students evaluated very well. They were motivated and recognized the great importance of discussing PH in medical training, identifying applications in their personal and professional life. A significant amount suggested that the contents could be better learned if spread over more weeks of classes and with more time for reflection and study. As a negative point, they stated that the volume of material was very large. Interpretation: This proposal is one of the first integration of PH in the required medical curriculum in Brazil and was successful in providing the teaching of PH broadly and stimulating the complexity thinking of students. The collaboration of PH specialists and ambassadors was fundamental.

Natural environment and its impact on maternal and child health: what are we facing? A call to reflection and awareness

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SJD Barcelona Children's Hospital is a private non-profit institution dedicated to comprehensive care for women and children and it is one of the most referred specialized pediatric centers in Europe.

Since 2009, the Hospital conducts an Education and Health Promotion Program to raise awareness about health issues that most concern patients, families and society and we offer them tools to improve their health outcomes and quality of life. We also focus on their health literacy to empower them to gain capacity to obtain and understand health information to make appropriate health decisions.

Currently, one of our main concerns is the impact of climate change on planetary health. From this context, the Hospital has published a report with the aim of raising awareness about the effects of our relation with the environment and its impact on our health, and what consequences the climate change crisis have, and will have, for planetary health. We also offer a space for reflection and we offer guidelines so that we, as individuals and society, can take action. Our public is general population, mainly families and caregivers, as well as education and healthcare professionals.

The plan communication will consist of a press release and an official presentation for our diverse public (September 2022), reaching them out through different formats: interviews, social media, online articles, etc. All the content will be available free at our website, which receives more than 12 million annual visits, mainly from Spanish speaking countries. Expected results are more than 15,000 report downloads, about 2.000 people connected online at the event and more than 200 media hits.

Reference authors participated from our Hospital and ISGlobal. We are honored to count with the special collaboration of Dr. Neira, Director of the Public Health, Environment and Social Determinants of Health Department at WHO.

Transforming Curriculum using the Planetary Health Education Framework: A Case Study from Nursing

Kent Boyd (University of Minnesota), Kasey Bellegarde (University of Minnesota), Melissa Thone (University of Minnesota), Bianca Mueller (University of Minnesota), Kevin Ardon Casco (Universidad Nacional Autónoma de Honduras)

Details: Despite growing interest in planetary health, nursing education has major gaps in content related to the complex social and environmental crises we face and how they shape our individual and collective health and wellbeing. Over the next three years, Schools of Nursing across the United States must align their curriculum with the recent edition of the American Association of Colleges of Nursing Essentials: Core Competencies for Professional Nursing Education (2021). This is a perfect time to transform nursing curriculum to include planetary health. The University of Minnesota School of Nursing designed a process including a School of Nursing vision statement, a defined planetary health concept, and a crosswalk between the core domains of the Planetary Health Education Framework (Faerron Guzman et al., 2021) and the Nursing Essentials. The crosswalk offers a template to embed planetary health content throughout undergraduate and graduate levels of nursing education.

Target Audience: Nursing educators and faculty from other disciplines who aim to use the Planetary Health Education Framework as a foundation for their curriculum.

Goals you hope to achieve: The goal of this project was to establish an effective process for aligning the Planetary Health Education Framework with the new AACN Nursing Essentials, to prepare future nurses to practice with a planetary health lens. The process envisions future nurse leaders who are planetary health first responders, sustainability advocates, social change activists, and healers of social and environmental conditions.

Results obtained: The faculty at the School of Nursing readily adopted the planetary health vision statement and concept, and the Planetary Health Education Framework-Nursing Essentials crosswalk. This level of commitment and action contributed to the school being awarded an 'A' grade by students on the Planetary Health Report Card for Nursing.

Collaborating to Overcome the Barriers to Implementing Planetary Health Education for Medical Students, The International Medical Education Collaboration on Climate and Sustainability (IMECCS)

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Background: Medical education is lagging behind advances in planetary health knowledge due to the considerable barriers to introducing new topics into the medical curriculum. The International Medical Education Collaboration on Climate and Sustainability (IMECCS) was founded to enable healthcare students and faculty members worldwide to integrate planetary health topics into their curricula by creating ready-to-use education resources.

Methods: IMECCS consists of medical students and faculty at universities in the UK, USA andHonduras with experience in introducing planetary health topics to medical curricula. Based upon common experiences of challenges and successes the group created free planetary health education resources.

Results: The collaboration developed a website and associated resource bank with fully cited, scripted planetary health lecture slides across three broad categories: Climate and Health, Sustainability in Practice ''and Clinical Skills. The online resource bank has been accessed from 14 countries and 71 institutions.

Conclusion: Resources have been created with the intention that they can be integrated into already existing teaching sessions common to most or all medical curricula without the user needing prior knowledge or experience in planetary health education. Engagement in medium to low-income countries has been limited. Further work is required to understand the impact of the resources and to grow global reach.

Riverside's Planetary Health: discussing and building planetary health in a riverside school in the south of Amazonas (Brazil)

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Background: Basic education schools are privileged spaces for education in planetary health (PH), especially in places such as the Amazon rainforest, rich in biodiversity, natural resources, and cultural heterogeneity. In this context, this research aims to discuss the insertion of PH in rural education and produce didactic materials to teach it in the primary education of riverside students.

Methods: For data collection, we opted for a semi-structured interview with rural primary teachers in Amazonas, analyzing themes. From the interviews, a handout with lesson plans to teach PH to riverside students began to be constructed.

Findings: In the interviews, all professionals said they knew the environmental problems of the communities and the school they work, the main ones being: garbage disposal in the river, lack of basic sanitation, ore extraction, and deforestation close to the community; at school, teachers mentioned meals with ultra-processed foods, waterborne diseases and an increase in dengue cases. The teaching materials are being produced based on the reality of riverside schools, considering the appreciation of traditional local knowledge and environmental sustainability, in addition to discussing the changes that are happening in ecosystems, especially in the Amazon.

Interpretation: In general, PH education needs to be inserted at all levels of education, considering that children and adolescents can promote change and are the most affected by represent the future of the planet, being the most benefited if changes occur in the way that human beings live on planet earth and/or will be the most affected if there are no changes in the way natural ecosystems are used and exploited.

Toolkit for Patient Educational Materials about Wildfires and Health

Raj Fadadu (UCSF), Arianne Teherani (UCSF), Katherine Gundling (UCSF)

Context and Objective: Research has shown that wildfires are associated with increased asthma hospitalizations, preterm birth rates, and rates of depression, among other health effects. Given that wildfires are increasing in frequency, widespread public health education on their risks and how to minimize their health harms is needed. However, currently, many providers do not have educational materials on wildfires and health readily available. Moreover, materials available from sites such as the EPA and MyGreenDoctor are largely websites or pamphlets that are difficult to navigate or digest. Our objectives are to 1) create infographics to educate people on the health effects of wildfires and how to protect themselves and 2) compile the infographics with relevant links and an associated phone-accessible app into a Toolkit available online at the University of California Climate, Health, and Equity webpage.

Audience: Primary care providers and specialists (such as pulmonologists) can post these infographics in their clinics and direct patients with relevant pre-existing conditions to the online Toolkit.

Intervention and Impact: Two infographics have been created, one for a primary care audience and one for a pulmonology audience. To design user-friendly and inclusive infographics, we used the Agency for Healthcare Research and Quality Patient Educational Materials Assessment Tool, the FDA Human Factors and Usability Guidance Document, and the Suitability Assessment of Materials questionnaire. Each graphic includes a section about wildfire smoke, a section about the health effects, and a section with actionable steps and a QR code to access the Toolkit. Our next goal is to compile the infographics with the relevant links and associated phone app into the online Toolkit. Ultimately, we hope our infographics and Toolkit will empower providers and patients across the United States to discuss the effects of wildfires on their health and offer actionable steps for them to protect themselves.

Creating a Novel Climate Change and Health Curriculum for the University of Cincinnati College of Medicine

Mitch Singstock, University of Cincinnati College of Medicine

Education is a foundational initial step in creating future healthcare professionals that can adapt to and mitigate climate change. The health impacts of climate change are diverse and region specific; therefore, educational materials need to reflect the issues of greatest salience to learners. Currently, there is a dearth of educational materials available that emphasize the precise ways climate change and pollution will and currently are negatively impacting those in Southern Ohio and the Ohio river valley, including West Virginia, Kentucky, and Indiana. In the Spring of 2022, a flexible Climate Change and Health curriculum was created for the University of Cincinnati College of Medicine. This curriculum was designed to be incorporated into pre-existing lectures during each organ system without the need to schedule new content during the already busy preclinical curriculum, making it readily accessible to many other medical institutions in the region. Key areas of focus during the organ systems include: extreme weather, infectious disease, cardiovascular, respiratory, mental, and reproductive health. Additionally, topics related to sustainability and environmental justice include: sustainable health care practices, diet and the environment, food and water insecurity, and pollution as a key social determinant of health. This presentation includes successes and challenges in creating this curriculum, as well as, advice to other health professional students that are interested in promoting similar changes at their institutions across the Midwestern United States.

Supporting family doctors to green clinical teaching and care, and clinic operations: A scoping review of toolkits and strategies to support change

Clark Svrcek (University of Calgary), Martina Kelly (University of Calgary), Kate Nuique (University of Ottawa)

Family doctors in Canada have long-term, high trust, relationships with their patients and therefore significant opportunity to influence patient behaviour. Family doctors are skilled physicians, able to master a wide breadth of knowledge. Most recently they have been challenged to adapt practices to provide quality care during the COVID19 pandemic. They are aware of climate change and its health impacts, have eco-anxiety and want the future for their grandchildren to be bright, but they need support to make changes in their clinical care and clinical teaching. The Department of Family Medicine at the University of Calgary has supported several workshops on planetary health for medical undergraduate students and family medicine preceptors (teachers), along with quality improvement sustainability projects in academic family medicine teaching clinics. Presently, a strategy is needed to "green" our academic teaching clinics that serve over 27,000 patients, integrating planetary health and sustainable health into teaching, clinical care and clinical operations.

This educational project is designed to assist our family medicine teachers in greening their clinics and clinical practice. Several organizations have developed tools to support the greening and sustainability of primary care. This project is a scoping review of the toolkits for greening family medicine found internationally in published and grey literature. Presently there are no well-established methods for reviewing toolkits and therefore our approach is informed by seminal scoping review work by Arksey, O,ÄôMalley, Maggio, Colquhoun and Lingard.

The goal of the project will be to present the qualities of the tools and resources available to family medicine teachers so that they can assess which tools may be appropriate for use in their teaching, care and community setting. The review will form the foundation of future workshops to support change in rural and urban family medicine clinics provincially and nationally.

An approach to implementing planetary health in medical curricula to ensure competent medical practice in the climate crisis

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Project Concept: Canadian medical students are not adequately prepared to practice in a world increasingly impacted by intersecting planetary health threats including climate change, pollution, land destruction, and biodiversity loss. Though clinical education frameworks for planetary health

and sustainable healthcare exist, they are not mapped to existing accreditation standards for Canadian physicians. This presents barriers to their implementation in Canadian medical education.

Target Audience: Canadian faculties of medicine, medical educators and medical students.

Goals: To review the literature and consult with interdisciplinary experts in planetary health and medical education to develop: 1) a set of evidence-based planetary health medical education curricular competencies that are mapped onto national physician accreditation standards and recognized medical competency frameworks and 2) curricular tools that provide an approach to their implementation in Canadian medical education.

Results: The Canadian Federation of Medical Students' Health and Environment Adaptive Response Taskforce (CFMS HEART) has developed a comprehensive set of 11 planetary health medical educational competencies, distributed into three foundational domains: 1) Advancing Planetary Health Justice, 2) Managing and Preventing Health Impacts, and 3) Leading and Collaborating on Mitigation and Adaptation. To facilitate the integration of these competencies, we have also developed a series of evidence-based Climate Wise slides organized by system (e.g. cardiology) and specialty (e.g. pediatrics) in which faculty can easily integrate into existing preclinical and clinical learning materials. We are working with the Association of Faculties of Medicine of Canada (AFMC) to universally include these planetary health competencies and the Climate Wise slides into Canadian medical school curricula nationwide. We believe that our approach to implementing planetary health medical education in Canada has the potential to be scaled across diverse settings, cultures, and healthcare professional education programs worldwide.

Introducing undergraduate medical students to planetary health: evaluation of a novel flipped-classroom method introduced in Family Medicine clerkship

Clark Svrcek (University of Calgary), Martina Kelly (University of Calgary)

The concept of planetary health reflects understanding that human health and civilization depend on flourishing natural systems. Addressing planetary health issues, including climatic change, ocean acidification, land degradation, water scarcity, over-exploitation of fisheries and biodiversity loss, has been identified as an international emergency. Influential organizations such as the World Health Organization, WONCA (Global Family Doctors), the Royal Australian College of General Practitioners, and the International Federations of Medical Students have issued policy statements and calls to action for the healthcare sector and medical education.

Responding to the need of postgraduate education for Planetary Health: Development of an online Master's Degree.

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The Universitat Oberta de Catalunya (UOC), the Universitat Pompeu Fabra (UPF), and the Barcelona Institute for Global Health (ISGlobal) have developed an online and asynchronous Master in Science (MSc) in Planetary Health (PH). The aim of the programme is to train a new generation of academics and professionals who understand the challenges of PH and have tools to tackle them. The design of this MSc was based on: the alignment of the programme with the principles for PH education with a focus on human health; a multi-, inter-, and trans-disciplinary approach; the urgency to respond to the Anthropocene challenges; and the commitment to the 2030 Agenda.

The MSc is organized in twelve modules of 5 ECTS each (equivalent to 125 hours) and structured in three thematic blocks. The first block (three modules) provides the general context and the necessary methodologies for understanding and responding to the PH challenges. It also sets the bases for an effective multilevel global governance. The second block (six modules) focuses on issues identified as key challenges for PH: food systems, land use change and loss of biodiversity, water resources, global pollution, urbanisation, healthy and sustainable cities, and the climate

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5. College of Nursing, Midwifery and Healthcare, University of West London, Brentford, UK
6. Health Protection Research Unit in Healthcare Associated Infection and Antimicrobial Resistance, Imperial College London, London, UK
7. Graduate School, University of Maryland, Baltimore
8. Planetary Health Alliance, Harvard T.H. Chan School of Public Health
9. CEI International Affairs, Barcelona, Spain
10. Plants and Ecosystems, University of Antwerpen , Belgium
11. Global Ecology Unit (CREAF), Catalonia
12. Institut Barcelona d'Estudis Internacionals, Barcelona, Spain
13. Barcelona Supercomputing Center (BSC), Barcelona, Spain
14. Catalan Institution for Research and Advanced Studies (ICREA), Barcelona, Spain
15. Centre on Climate Change & Planetary Health and Centre for Mathematical Modelling of Infectious Diseases, London School of Hygiene & Tropical Medicine, London, UK
16. Estudis d'Economia i Empresa, Universitat Oberta de Catalunya, Barcelona, Spain
17. Internet Interdisciplinary Institute (IN3), Universitat Oberta de Catalunya, Barcelona, Spain
18. Unesco Chair on Food, Culture and Development, Universitat Oberta de Catalunya, Barcelona, Spain
19. UNESCO Chair in Life Cycle and Climate Change, ESCI-UPF, Barcelona, Spain
20. Department of Law, Faculty of Law, Pompeu Fabra University, Barcelona, Spain
21. Institut de Ciència i Tecnologia Ambientals (ICTA), Universitat Autònoma de Barcelona, Spain
22. Departamento de Ciencia, Tecnología y Sociedad, Insituto de Filosofía (CSIC), Barcelona, Spain
23. Departamento de Filosofía y Antropología, Universidad de Santiago de Compostela (USC), Spain
24. COVID-19 Early detection, Surveillance and Control Department, Public Health Agency of Barcelona, Spain
25. Mariana Arcaya's Research Lab, Massachusetts Institute of Technology Department of Urban Studies and Planning, Cambridge, Massachusetts, USA
26. Johns Hopkins University - Universitat Pompeu Fabra (JHU-UPF) Public Policy Center, UPF-BSM, Department of Political and Social Sciences, Universitat Pompeu Fabra, Barcelona, Spain
27. Research Group on Health Inequalities, Environment, and Employment Conditions, Department of Political and Social Sciences, Universitat Pompeu Fabra, Barcelona, Spain
28. IMIM. Hospital del Mar Medical Research Institute, Barcelona, Spain

emergency. The third block (three modules) integrates and applies the concepts from the previous blocks. It includes a module with strategies to promote transformative changes and two modules on research, including the master's thesis.

The structure of the MSc is aligned with the PH educational framework and the SDGs, and the competences and learning outcomes cover the majority of overarching principles for PH education. The MSc was recognized as an official degree by the Spanish academic system in April 2021 and launched in October 2021. There are currently more than 70 students enrolled in the program coming from a broad range of disciplines and geographic locations.

Multidisciplinary, cross-sector, and transborder approach in planetary health education at a graduate school.

Keiko Nakamura, Kaoruko Seino, Sharifullah Alemi (Tokyo Medical and Dental University)

Background: Capacity building programs for professionals and practitioners with diverse backgrounds are needed to accelerate global movement to take actions to concern planetary health. Since April 2018, a course program for planetary health has been provided to graduate school students at the Graduate School, Tokyo Medical and Dental University. Sixty students with diverse backgrounds participated in the program over the five years. This paper presents outlines of the program, evaluates satisfaction in learning objectives, and discusses useful interventions as an education program.

Methods: Program design, course materials, presentations by teams, and feedback by students were analyzed. Students came from 20 different countries and professional/ academic backgrounds included public health, environmental science, clinical medicine, dentistry, nursing, physical therapy, applied biological science, pharmaceutical science, and health industries.

Results: Four-days program was designed. The program consisted of series lectures, team projects, group presentations, and visits to a research institution. In the team projects, participants worked on a selected topic of planetary health. They explained how environmental change affects human health, described the impacts of a specific environmental condition on human health, and demonstrated applications of knowledge from the environmental and social sciences to address public health problems. Topics chosen for the team projects included air pollution, green space, yellow dust, food insecurity, heatwave, and emerging infectious diseases.

Conclusion: Interactive programs were provided to value readings of scientific literatures, synthesize knowledge into real-world measures through group discussion, and propose solutions considering multiple stakeholders. Multidisciplinary, cross-sector, and transborder approaches were applied in planetary health education programs at a graduate school.

Solutions Oriented Education: Planetary Health Intervention Proposal

Mary Richards (Brunel University London), Mandekh Hussein (Brunel University London), Edwin Routledge (Brunel University London), Nicholas Worsfold (Brunel University London)

The Bachelor of Arts and Science in Global Challenges hosted by Brunel University is a cross-disciplinary undergraduate degree with an optional pathway entirely dedicated to planetary health. Teaching activities taking place throughout the three years of the degree integrate the five foundational domains of the planetary health education framework and culminate in students developing their own planetary health intervention proposals judged during their final year.

As part of the "Core Spine" of the degree, students on all four pathways (Planetary Health, Social Cohesion, Security, Global Innovation) engage with and develop their capacity to interrogate and use scientific and quantitative methods as well as social science and humanities approaches to knowledge construction. The students also explore frames and concepts related to equity and social justice.

The Planetary Health pathway follows a progression from the first to the final third year; laying foundational knowledge in the first year (Earth Systems Science, Biosphere and Ecology, Global Health), then exploring anthropogenic impacts during the second year (Climate Change, Ecosystems Stressors) (Anthropocene and Health), before finally leading to an analysis of solutions in the final year (Ecological Public Health and/or Nature-based climate solutions). Throughout their study, students also lead individual or group projects as part of a Leadership for Sustainability module (Movement building and system change). Weekly bespoke planetary health pathway classes are designed to help students integrate and reflect on knowledge gained across pathway and core classes. Students are introduced to systems thinking and project management tools (stakeholder analysis, causal loop diagrams, theory of change/logical frameworks) which they then apply to analyse Planetary Health Case Studies. This praxis-based learning culminates in their final year when students develop their own planetary health intervention proposals. An external panel judges their initial pitch as well as a poster presentation based on the 4,000-word proposal submitted

Teaching Planetary Health: our students are the future of our planet

Dr Emma O'Neill (NHS); Dr Gemma Ashwell (University of Leeds); Dr Francesca Douglas (NHS)

Project Description: A Planetary Health course was delivered over two afternoons within the Population Health module to year two medical students at Leeds Medical School. The teaching, developed by a Planetary Health Champion (EO) supported by the module lead (GA), comprised of two virtual lectures, two e-Learning packs, and a live virtual Q&A session. The first lecture introduced Planetary Health. The two interactive e-Learning packs consisted of one on climate change and health and one on ecosystem transformation and health. These included videos; MCQs and case studies to help aid connection of this knowledge with practical clinical skills. The final lecture was on solutions for Planetary Health. The Live Q&A, a real highlight of the teaching,

included Dr Sam Myers of the Planetary Health Alliance; Dr Peter Daszak of Ecohealth Alliance; Dr Daniel O'Neill, an ecological economist; Professor Andrew Shepherd, an earth scientist and Dr Jane Goodall, a world-renowned conservationist.

Goals of the project: We aspired to raise awareness of the ecological determinants of health, the injustices that exist and the role of Doctors in addressing the health impacts of environmental decline and in advocating for the protection and restoration of the environment.

Results obtained: We conducted voluntary pre and post course questionnaires, the response rates were 33% and 21% respectively. Results showed only 10% of students received any formal prior teaching on climate change or planetary health. Students rated several statements from 1 (not at all) to 5 (very much). Responses showed positive changes in attitudes to questions including, "I feel that it is within a doctor's role to advocate for change to address the climate crisis." 91.1% felt strongly that planetary health should be part of every medical curriculum. Our experience shows the introduction of Planetary Health teaching into the medical curriculum can be both feasible and impactful.

Planetary health education for future healthcare leaders: A practice-based approach

Santosh Basapur (Rush University), Ian Hughes (Rush University), Regina Chen (Rush University), and Mallory Bejster (Rush University)

Rush University in Chicago has begun a multi-year initiative to strengthen planetary health coverage in its health professions programs. As an early first step, in the spring of 2022, we launched a new project-based interdisciplinary course for graduate students in the health professions, as a collaboration between the Health Systems Management department and the Graduate College. The course was team-taught by faculty with backgrounds in sustainability, human-centered design, and organizational psychology. Students worked in teams on projects identified by Rush's sustainability manager, and received mentorship from an interdisciplinary team of staff and faculty collaborators. Cognates for the course were designed around the five elements of the Planetary Health Education Framework, as well as human-centered design concepts to guide project development. The projects students selected to work on included reducing PVC/DEHP from the hospital supply chain, and reducing the volume of bedside waste. Course evaluations suggested that the class was very well received, with an average of 4.8 on a 5-point scale for "excellent course." One student remarked, "This should be mandatory for all students in all disciplines. This was the most useful information in regards to my future that I learned, and I wish I could've spent more semesters in the class." Students also provided many useful recommendations for how the course can be further improved, which will be shared as part of this poster.

Brazilian Campus Ambassador Program as an Educational Strategy on Planetary Health

Raquel Santiago (Planetary Health Brazil, Federal University of Goiás), Daniela Vianna (Planetary Health Brazil, University of São Paulo), Denise Alves Fungaro (Planetary Health Brazil, Institute for Energy and Nuclear Research), Nelzair Vianna (Planetary Health Brazil, FIOCRUZ), Antonio Mauro Saraiva (Planetary Health Brazil, University of São Paulo)

The Brazilian Campus Ambassadors Program (BCAP) of Planetary Health Brazil has the mission of formally recognizing the leaders of the Next Generation in Planetary Health (PH). Throughout the ten months of the program, under the mentoring of professors and researchers, the ambassadors build their PH network and develop organizational and leadership skills. Along the BCAP, the ambassadors acquire skills and tools to take a leading role in their place of action, educate their community, and facilitate collaboration among the existing fields and initiatives on human health and climate change.
The target public are undergraduate and graduate students, who acted as multipliers to involve the academic community and the civil society. This way, the BCAP, which is currently in its second edition, works as a strategy to spread the concept of PH in the Brazilian academic environment, giving it a greater capillarity to be inserted in the
different areas of education.

In 2021, the first edition of the program, we had 249 ambassadors, accompanied by 33 mentors, and 90 of them managed to finish the activities. For 2022, we opted for a smaller intake: 87 ambassadors, accompanied by 23 mentors - to provide more focused mentoring.
The result of the 2021 edition was the union of ambassadors from different areas of knowledge in the realization of lectures, online events and lives, workshops, and active participation in the organization and Poster Sessions of PHAM 2021. They learned the value of working together and communicating in an accessible language. At the same time, they learned that we all have our role in PH, broadening their initial vision on the theme. It is worth highlighting the quantity and quality of the ambassadors' activities, even with the limitations imposed COVID-19 pandemic, even generating the insertion of SP content in undergraduate and graduate courses at Brazilian universities.

One minute for the planet in the clinical consultation

Enrique Falceto de Barros (Universidade de Caxias do Sul), Diogo Onofre de Souza (Federal University of Rio Grande do Sul, ICBS / PPGECi), Tatiana Souza de Camargo (Planetary Health Alliance, Planetary Health Brazil, Federal University of Rio Grande do Sul)

The World Organization of Family Doctors (WONCA) recognizes the Climate Emergency and calls on its members for immediate Planetary Health (PH) action. WONCA represents over 500 thousand family doctors around the globe, and has been seen as a significant stakeholder by the Planetary Health Alliance due to its potential to directly reach millions of patients. It has been hypothesized that a direct message to patients from a trusted primary care provider (PCP) may create more trust in science, help dissipate fake news, improve life styles and accelerate a critical mass for the Great

Transition towards a healthier planet. However, primary care providers (PCP) have not been able to successfully convey the PH message into daily practice. One minute for the planet (OMP) in the consultation, when appropriate, may be able to pragmatically bridge this gap. Here we report the case of a primary health care consultation when a mother and a child were diagnosed, respectively, with long-covid exacerbated asthma and Dengue, both conditions associated with anthropogenic impacts on the environment. Both patients were treated in accordance with Evidence-Based Medicine. In the wrap up of the encounter the PCP took OMP. Utilizing culturally appropriate verbal and non-verbal language, the PCP discussed PH determinants behind their clinical conditions and gave pertinent healthier lifestyle suggestions for PH action - including active transport and reduction of excessive red meat. This case report was discussed in an international WONCA virtual conference sparking significant interest. It remains to be determined whether PCPs would adopt this “one minute for the planet” strategy, and whether it would effectively change patients' attitudes. Research on this topic is urgently needed. There are many potential applications for OMP such as the introduction into primary care consultations, healthcare education and other university disciplines.

Global Health Perspectives: A Collaborative Ukraine/Canada Project

Elizabeth Burgess-Pinto (MacEwan University), Tatiana Kloster (Lethbridge College), Svitlana Yastremska (Ternopil National Medical University), and Hanna Saturska (Ternopil National Medical University

For the past five years, faculty members from Ternopil National Medical University (TNMU), Ternopil, Ukraine, and the Faculty of Nursing, MacEwan University, Edmonton, Canada have collaborated to co-create a senior elective called Global Health Perspectives. The course is framed by the Planetary Health concepts of relationality, sustainability, and ways of knowing and the Sustainable Development Goals. MacEwan nursing students are partnered with TNMU students from nursing, medicine, dentistry, and public health. The partnerships have included Ukrainian students as well as students from the TNMU International school who are from Nigeria, Ghana, and India, who work together on team projects and other assignments such as transect walks and intercultural conversations. The first two years of the course were conducted as field studies in Ukraine; however, with the COVID-19 pandemic restrictions, we transitioned to a COIL (Collaborative Online International Learning) format. In each year the course focus is different. Topics to date: The SDGs and Policy Approaches, the Global Migration Issue, Comparison of approaches to the COVID-19 Pandemic, The global Health Issue of Food and Nutrition, and Neglected infectious Diseases. Over time the course is becoming more transdisciplinary with the inclusion of faculty presentations from Sociology and Business. The collaboration provides an opportunity for mutual learning by faculty and students and for TNMU faculty to harmonize their national nursing curriculum with current best practices. It has provided the opportunity for TNMU to partner with other European universities on an Erasmus Grant focused on global health. The poster will outline components of the course and provide suggestions for future directions given the current world situation.

Mobilising medical students for climate action: The Planetary Health Report Card example at a UK medical school

Stefania Tsatsari (Brighton and Sussex Medical School), Maria Barbot (Brighton and Sussex Medical School), Charlotte Spring (Brighton and Medical School), Amy Sanders (Brighton and Sussex Medical School), Dearbhla Mcilroy (Brighton and Sussex Medical School), Yasmin Tyson (Brighton and Sussex Medical School)

Background: Climate change is the greatest threat to global health in the 21st century. Despite this, there is a gap in undergraduate medical education around planetary health and sustainable healthcare. The Planetary Health Report Card (PHRC) is an international, student-driven initiative to evaluate engagement with planetary health and sustainable healthcare within medical schools. The project was undertaken for the second consecutive year by medical students at Brighton and Sussex Medical School (BSMS), UK to 1) highlight planetary health strengths and areas of improvement, 2) track progress in implementing planetary health changes, and 3) increase BSMS' accountability for educating medical students on planetary health and sustainable healthcare.

Methods: BSMS was assessed using metrics across five areas: Curriculum, Research, Community Outreach, Support for Student-led Initiatives and Campus Sustainability. Qualitative data were collected from learning materials and publicly available sources to score each metric across the five sections using a multilevel points scale.

Findings: Curriculum: 55/69 points = 80% (B+); Research: 17/17 =100% (A+), identifying BSMS as the leading UK school for planetary health research; Community Outreach: 7/14 = 50% (C); Support for Student Initiatives 12/15 = 80% (A-); Campus Sustainability: 19/31 = 61% (B-); Overall: 75% (B), placing BSMS third for overall performance out of 26 participating UK schools. Compared to last year's report, improved scores were noted across 4/5 sections, and the overall institutional grade increased from B- to B.

Interpretation: The PHRC effectively introduced student-led advocacy for planetary health within BSMS, highlighted by the increased scores achieved within 12 months. We anticipate this initiative will enable continued integration of planetary health and sustainable healthcare practices at BSMS and beyond.

Brazilian-Portuguese translation of the Planetary Health Education Framework

Saulo Barboza (Universidade de Ribeirão Preto; Instituto Federal de São Paulo), Jacob dos Santos Biziak (Instituto Federal de São Paulo; Universidade Estadual Paulista Júlio de Mesquita Filho)

The Planetary Health Education Framework (PHEF) is an important step towards the implementation and dissemination of planetary health knowledge and, consequently, towards the Great Transition. However, the accessibility and comprehension of the original PHEF may be limited for those who are not familiar with the English language. Translations of the PHEF into different languages, therefore, become crucial. Such translations can serve as catalysts of the implementation and dissemination of the framework worldwide. The objective of the present project is to translate the PHEF into Brazilian-Portuguese. The translation process will follow three phases: (1) the free translation; (2) the linguistic review; and (3) the technical review. The free translation started in order to be used as a reference for non-English speakers in a planetary health course. The course was an optional discipline of the Master Program in Health and Education at the University of Ribeirao Preto, Sao Paulo, Brazil. The five domains of the PHEF were translated by the teacher of such course and shared with students along the semester. The other components of the PHEF were translated subsequently. In phase 2, there will be an opportunity to analyze linguistic choices made and possible displacements of meanings (discursivity). Phase 3 will be conducted to verify if concepts and terms regarding the planetary health knowledge field remain adequate. The publication of the Brazilian-Portuguese version of the Planetary Health Education Framework (PHEF-PT-BR) will follow in open access format. We expect that the PHEF-PT-BR will facilitate the implementation of the framework in the Brazilian educational systems as well as in Portuguese-speaking countries. The three-phase translation process described here can also serve as a reference for further translation efforts in other languages.

Implementing a planetary health approach engaging different disciplines of the High School in Brazil

Nelzair Araujo Vianna (Fiocruz, Oswaldo Cruz Foundation, Brazil) and Quenia Lopes (Secretary of Education, Bahia, Brazil)

Educational practices on planetary health have been challenged worldwide. Planetary health education efforts around the world should allow for a shared basis of understanding across disciplines, geographical regions, and cultures teaching planetary health. There is neglect the nature care and a deficiency of public policies to mitigate climate change, especially in developing countries. The role of the School is to transmit scientific knowledge as well as to provide conditions for students to build this knowledge, integrating it into their experiences. The best way to teach them, therefore, is to make them the target of reflections and experiences. More than speeches, they are practice, example, coexistence, and reflection on the environment in real situations that will make students develop action and values. To combat the global warming and mitigate the effects of

climate change is necessary simultaneous mobilization of several sectors - health, environment, construction, industry, transport, energy, and agriculture, among others - as well as a change in habits and how we think about (and treat) planet Earth, in a perspective based on Planetary Health. Thus based on this concept was proposed an experience for students and teachers at Colégio Estadual Professor Carlos Barros, in Salvador, Brazil, where high school students were invited to participate in an interdisciplinary evaluation on climate change after each teacher has explained this topic from the point of view of their discipline. Then, teachers from different areas (Natural Sciences, Mathematics, Language, and Humanities) simultaneously developed questions that included all contents covered in the classroom and focused on climate change. Our findings revealed that 99% of the classes had a performance greater than 50% in the content studied. Therefore, as it deals with causes, effects, and solutions that affect multiple areas, working on climate change in an interdisciplinary way and with various approaches is possible, urgent, and essential.

Planetary Health Education in Medical Curricula in the Republic of Ireland

Ola Løkken Nordrum (University Hospital Galway, Ireland), Aoife Kirk (Mater Misericordiae University Hospital, Ireland), Sadhbh A. Lee (Royal College of Surgeons Ireland), Esmeralda Cecilie Pérez (National University of Ireland Galway, Ireland), Kathryn Haley (Royal College of Surgeons Ireland), Iffat Khalid (Trinity College Dublin, Ireland), Isabel Waters (Trinity College Dublin, Ireland), Sana Zulfiqar (Trinity College Dublin, Ireland), Ruth Yan (University College Cork, Ireland), David Killilea (University College Dubin, Ireland), Debbi Stanistreet (Royal College of Surgeons Ireland)

Background: The World Health Organisation considers climate change an urgent global health challenge requiring prioritised action. A recent global survey reported that only 15% of medical schools have incorporated climate change and health into the curriculum.

Objectives: This research study was carried out from November 2020 and April 2021 using the Planetary Health Report Card (PHRC) initiative to assess the current level of planetary health teaching in medical schools in the Republic of Ireland. The PHRC is a student-led international public initiative, which aims to compare medical schools using a planetary health report card. The assessment was submitted as a final report to the Irish Medical Council and to the medical schools involved.

Results: Very few learning outcomes in Irish medical curricula directly address or include the concept of planetary health. Inclusion of specific topics remains reliant on individual lecturer interest. While most universities have excellent research centres which cover specific aspects of planetary health, the links between these institutes and medical schools have not been created.

Conclusions: Overall, there are promising examples of planetary health topics being included in current Irish medical school curricula, however, these remain poorly implemented or embedded

within the curricula. Medical schools should incorporate education on planetary health to ensure graduates are equipped as to become medical leaders practising in a changing world.

Education, Community Outreach, & Policy

Advancing Environmental Justice Through the Integration of Traditional Ecological Knowledge into Environmental Policy

Jennifer Rasmussen (University of Massachusetts at Amherst)

As our planet faces more frequent and severe environmental threats due to climate change (including threats to biodiversity), environmental justice will be essential to ensure that the costs and burdens of combating these threats are shared equally, borne by all people worldwide in a fair and equitable manner. If the past is any indicator, however, environmental problems, and their solutions disproportionately affect poor communities and communities of color, including Indigenous communities. Despite these past injustices, Indigenous lands, which only make up 20 percent of the Earth's territory, contain 80 percent of the world's remaining biodiversity evidence that Indigenous peoples are among the most effective stewards of the environment. A primary reason for this remarkable statistic is the use and practice of Traditional Ecological Knowledge within Indigenous cultures, ecological wisdom which has been passed down for generations and has been shown to strengthen community resilience in response to the multiple stressors of global environmental change. While many governments have been slow to acknowledge the value of Traditional Ecological Knowledge, they have recently begun to incorporate that knowledge into environmental policy in response to the worldwide climate crisis. Continuing that integration of Traditional Ecological Knowledge into government environmental policy will ensure that such policies will be more effective at the federal, state, and local levels and more equitable in their application. Western scientists, government officials, and global leaders need to build trusting and co-equal relationships with Indigenous communities by actively listening to all cultures and respecting the many kinds of knowledge systems required to conserve the natural world and all living beings. This capstone will address how incorporating Traditional Ecological Knowledge into policy would help safeguard the environment from further biodiversity loss and other ecological destruction and advance environmental justice to ensure the fair treatment of all.

Piloting a Core Experiential Undergraduate Course to Foster Community Service for Planetary Health at Sunway University, Malaysia

Renzo R. Guinto (Sunway Centre for Planetary Health, Sunway University), Lyon Laxman (School of Arts, Sunway University), Oliver Lacey-Hall (Sunway Centre for Planetary Health, Sunway University), Maisarah Faiesall (Sunway Centre for Planetary Health, Sunway University), Khadijah Zainal (Sunway Centre for Planetary Health, Sunway University), Jemilah Mahmood (Sunway Centre for Planetary Health, Sunway University)

Located in Malaysia, Sunway University is one of the first in the world to integrate planetary health into its overall education and research agenda. One of Sunway's first educational initiatives is to redesign the mandatory Community Service course, which is part of the Malaysian government, MPU (Mata Pelajaran Umum), core requirement for all undergraduate students. During the first quarter of 2022, the Sunway Centre for Planetary Health, in collaboration with the Department of Communication, launched the pilot edition of the course "Community Service for Planetary Health," in which 37 students majoring in communication, advertising, and branding participated. During a seven-week period, the students took part in a combination of asynchronous modules and synchronous online sessions wherein they learned about the fundamentals of the planetary health approach and became exposed to tools and skills for diagnosing problems and designing solutions. They also worked closely with various host organizations in implementing projects that addressed specific planetary health-related issues (such as healthcare waste management, urban farming, raising public awareness, etc.) and harnessed their skills in communication and advertising, among others. Overall, the course helped raise students' awareness of their civic responsibility and the contributions they can make to advance planetary health at the community level. In the coming months, this experiential course will continue to be improved through repeated testing and feedback from students, host organizations, and other stakeholders, as the university's goal is to make this course available to all 3,000 undergraduate students at Sunway University regardless of their discipline by 2024.

A Heat Vulnerability Index for Salt Lake City, Utah

Megan Jones (Boston University School of Public Health)

Background: Extreme heat events (EHE) cause significant illness and mortality in the United States. Urban populations are especially at risk due to the urban heat island effect and rising global temperatures. To increase the adaptive capacity of cities and their citizens to weather these events, cooling centers and other emergency services should target the most vulnerable. The Heat Vulnerability Index (HVI) is a tool used frequently in the literature to spatially identify groups vulnerable to EHE. Here I present the development of a HVI for Salt Lake City (SLC), Utah using publicly available data in a geographic information system (GIS) to map areas for EHE intervention.

Methods: Six factors representing sensitivity, exposure, and adaptive capacity to heat-related morbidity/mortality were mapped: three sociodemographic characteristics from the U.S. Census

Bureau, diabetes prevalence from Centers for Disease Control and Prevention, cooling center access from ArcGIS Online, and majority impervious surface from satellite images. Quartiles were calculated for each factor to indicate increasing vulnerability. These values were summed to produce a HVI score for each census tract.

Findings: The HVI constructed for SLC ranged from 8 to 22 with a mean score of 14.55 and a standard deviation of 3.56. Hot spot analysis showed a statistically significant spatial cluster of high scores in the South-Central area of the city with 95% confidence and of low scores in the West-Central area of the city with 90% confidence.

Interpretation: Heat vulnerability changes over time as the population and climate change, necessitating updated HVI maps. This index and subsequent spatial analysis can be used by urban planners and political leaders to design present-day policies and programs to minimize heat hazards in SLC.

The Month-long online Advocacy for Planetary Health, knowledge level of Nigerian Students and Proposed Online Course on the concepts and Practice of Planetary Health

Awoyemi Blessing Olusoji (Federal University of Technology, Akure) and Victor Chigozie Emeka (University of Nigeria, Nsukka)

The transition from Holocene to Anthropocene is undeniable. The global systems have been exploited to advance human civilization. Unfortunately, this transition is detrimental to human health, especially that of the future generations. Hence, the need to educate and empower the next generation leaders on the tenets and practices that promote planetary health demands an urgent attention. Interestingly, every nation that seeks to achieve SDGS of the United Nations cannot alienate themselves from the above stated need, Nigeria inclusive. The university is one the higher institutions of learning in Nigeria, and the federal Government of Nigeria emphasized that it is meant to produce students that are well trained in courses that will meet national need and that will contribute to national development. The knowledge level of students in Nigerian Universities that were studied is however insufficient to promote planetary health in Nigeria. In order to bridge the knowledge gap in Nigerian students about Planetary Health, a month-long online campaign involving students from South-Eastern, Northern and Western Nigeria that employed social media handles was conducted at Obafemi Awolowo University. An endline survey was also conducted. About 24% of students who took the endline survey have accurate knowledge of what Planetary Health either as a result of the awareness or personal study or seminar attended while others have distorted views or no knowledge at all about planetary health. An online course has been proposed to hold on Google classroom in May through June to augment the meagre knowledge that Nigerian students about promote Planetary Health. Also, through observation and an appraisal of relevant articles, it was gathered that students in Universities use different innovative digitally mediated devices (Android and iOS). As a result, installable Apps and social media handles, especially Tiktok, will be employed to educate Nigerian students.

The Nursing Planetary Health Report Card: An International Student-led Initiative to Evaluate Nursing Programs' Contribution to Planetary Health

Ryne Wilson (University of Minnesota School of Nursing) and Amelia Kirby (University of Virginia School of Nursing)

Background: Nursing students are uniquely positioned to confront the challenges of the changing climate and its impact on human health. While the format and curriculum of nursing programs vary internationally, the core tenets of nursing education are consistent. Planetary health can and must be integrated throughout nursing education as a means for preparing nurses to confront the climate crises.

Project Description: A group of international nursing students came together to develop the Planetary Health Report Card [PHRC] for Nursing Programs adapted from the PHRC for Medical Schools. The PHRC operates as a needs assessment, gap analysis, and summarization of findings of Nursing Programs incorporation of planetary health curriculum and resources. It also provides students with data to encourage program faculty to incorporate planetary health into the program. Programs are scored in areas of curriculum, interdisciplinary scholarship, outreach and advocacy, student-led initiatives, and sustainability practices. The PHRC provides a cumulative grade (A - F) with supporting evidence for each section and metric. The Report is expected to be completed annual to track change and hold Programs accountable to their commitments.

Results: The project pilot has successfully produced PHRC,Äôs for four international nursing programs including programs from Virginia, USA, Minnesota, USA, the United Kingdom, and Germany. These results indicate broad applicability of the PHRC to diverse, international nursing programs.

Conclusion: The climate crisis requires health care providers in all disciplines to act. Nursing programs across the world need to prepare nurses to confront the dangers of our changing climate. The PHRC is an effective strategy for hold nursing programs accountable to their responsibility of prioritizing planetary health.

Safeguarding pollinators and pollination services through citizen science

Natalia Pirani Ghilardi-Lopes (Universidade Federal do ABC), Sheina Koffler (University of São Paulo), Tiago Maurício Francoy (University of São Paulo), Bruno de Carvalho Albertini (University of São Paulo), Celso Barbieri (University of São Paulo), Jailson Leocadio (University of São Paulo), Antonio Mauro Saraiva (University of São Paulo)

The population's knowledge about the organisms that promote the pollination ecosystem service is important for the transition to sustainable societies and planetary health. Citizen science has great potential for monitoring the indicators of the Sustainable Development Goals and, in the case of projects involving pollinators, it can contribute to SDGs 2, 8, 15 and 17. For example, many people are unaware of the importance of bees, beetles, moths, butterflies, flies, bats and birds for pollination and, consequently, for the production of seeds and fruits or even the generation of income for thousands of people on the planet. Fear or disgust can even harm the conservation of these beings in the long term. The book “Citizen Science and South American pollinators" (Ghilardi-Lopes & Zattara, 2022 - https://doi.org/10.4322/978-65-86819-20-5.100001.pt and https://doi.org/ 10.4322/978-65-86819-21-2.100001.es) was produced by 60 authors (52 scientists and 8 citizen scientists, from Brazil, Argentina, Peru, Chile, Colombia and the United Kingdom) and aimed not only to disseminate information about these different pollinator groups, but highlighting citizen science projects underway in South America so that the public can contribute to the generation of scientific knowledge about the biology and ecology of South American pollinators. The book uses coloquial language to explain how to become a citizen scientist. Also, eight citizen science projects are presented, with which the reader can collaborate (“The Guardians of Pollinators”, “Project Beekee - #cidadãoasf”, “Ecological Lists of Butterflies”, “FIT Count”, “Flower flies of Chile” , “Most-Wanted-Bee”, “Urban Bats in Lima”, “I saw a Bumble bee”).

Girawa - Planetary Health education project for Sri Lanka, Brazil and beyond

Hugh Shirley (Girawa, Harvard Medical School), Kayden Stern (King's Academy, California), Mikhail Caga-Anan (Girawa), Heshawa Abayatilaka (Girawa), Collins Kipkemoi (Girawa)

Girawa is a volunteer-led project building an open-access educational resource that puts nature at the heart of STEM education. Our goal is to provide interactive educational materials for students aged up to 18 years, and to promote international consensus and collaboration for planetary health. We cover topics from human disease to ecology through educational materials prepared by team members covering a range of expertise in STEM subjects.

Currently, Girawa is partnered with the Foundation of Goodness in Sri Lanka, Clubé Saúde Planetária Lins in Brazil, and with The King’s Academy in the US, with the goal of expanding to other parts of the world. In total, Girawa has launched five educational modules. Examples of topics explored include air pollution, COVID-19, and medicinal plants. In addition to our electronic educational material and practical activities, we publish blog articles discussing a variety of

planetary health topics, and a gallery of messages from students to COP26 leaders demanding drastic action on climate and environmental crises. Girawa is now coordinating the launch of a networking system for students across our partnered organizations with the aim of allowing students to share their local culture and challenges, and their knowledge gained on planetary health. Girawa is also initiating a recipe-sharing platform that, coupled with nutrition modules, provides a basis for sustainable, healthy eating using local ingredients.

In the future, we hope to measure outcomes of our programming through surveys and site visits. This would allow our team to focus on the most effective means of instruction and topics, while expanding our programming to include culturally and regionally relevant topics. This may include appointing local planetary health champions and hosting short videos and live webinars featuring experts in subjects related to planetary health.

The importance of education in Urban Health: the pilot experience of 15 Italian Public Health residents in a school-based project

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As stated in a recent editorial of The Lancet Public Health, the future health of the planet and the human health are inextricably linked. For this reason, citizens, practitioners and professionals, especially those involved in Public Health, must be equipped to address and understand Planetary Health (PH) issues. Strategies at incorporating PH education into high schools and academic curricula are required to build capacity for future PH leadership. One of the most relevant tools for achieving these goals is the PH Education Framework. The Italian Institute for PH applied this framework to a school-based project for education in urban health.

The PH Education Framework domains were used for the development of 4 interactive sessions on urban health, created and delivered by 15 Italian residents in Public Health, to 319 students at a high school in Rome during spring 2022. After the 4th lesson, semi-structured interviews were conducted with the residents in order to assess perceptions, acceptance, barriers and facilitators of the experience. Data was gathered anonymously and analyzed using standard qualitative methods.

All the residents answered the interview. Almost all reported the experience as highly impactful for training, team building, and increase in accountability. Most of residents felt more confident on urban health and more involved in concrete actions for tackling pollution and climate change after

delivering the lessons. Barriers mentioned were difficulties interacting with students and their compliance. The opportunity to give lessons in the high school setting facilitated direct emotional contact with students and better feedback was received.

Giving responsibility and leadership roles to Public Health residents and involving them in education could improve their self-confidence and feelings of value and helpfulness, especially for urban health and climate change issues sensed by youth. Further experiences could be valuable to notice differences related to age groups and personal involvement.

Planet.Health: an exploratory incubator for blockchain and planetary health

Rita Issa (University College London), Tony Lai (Stanford Blockchain Centre), Alix Faddoul (Red Cross Climate Centre and World Bank), Jeremy Lauer (University of Strathclyde), Srivatsan Rajagopalan (United Health Futures)

The health of people and the planet are inextricably linked and under threat. Planetary health is a solutions-oriented movement that addresses the impact of human disruptions to Earth's natural systems on human health and all life on the planet. Blockchain and distributed ledger technologies facilitate decentralisation, transparency, ownership and agency. To date, there has been little opportunity for these fields to join forces to respond to collective global challenges.

Planet.Health responded to this need by setting up an exploratory incubator to bring together people interested in how blockchain technology can be used to improve planetary health. Together, we developed an action-oriented platform to respond in practical ways to critical planetary challenges. We did this across three stages. The first stage, reflection, was a series of virtual events focused on shared learning, community building and upskilling on planetary health and blockchain. The second stage, chrysalis, is an in-person incubator event in October 2022. The third stage, emergence, focuses on building a shared platform for ongoing collaboration and action.

In this poster, we will present initial outcomes of the Planet.Health incubator. By bringing together experts and innovators from diverse backgrounds, focusing our combined expertise on a set of core planetary health problems, engaging in shared learning and dialogue, and working directly with those who are on the frontline of planetary health challenges around the world, we hope to spark creative and bold solutions.

Learning together: Growing a Planetary Health Education Community in Eastern Africa

Melvine Anyango Otieno (Planetary Health Eastern African Hub/University of Eldoret), Laura Jung (German Climate Change and Health Alliance/Leipzig University), Given Moonga and Twambo Simanga (University of Zambia), Maira Joseph Walter (Egerton University), Nyambura Muroki (University of Nairobi), Agan Leonard (University of Eldoret)

Planetary Health as a holistic perspective on human health and its interconnectedness with nature calls for interdisciplinary and transregional teaching and research around the globe. While the concept becomes increasingly popular in the Global North, it is still largely missing in the Sub-Saharan African curricula. Educational institutions play a vital role in shaping our and the world's future and are thus essential in creating change within society.

The Planetary Health Eastern Africa Hub, initiated by the Planetary Health Alliance and only founded in 2019, aims at raising awareness for planetary health across the region. It is fostering an education community involving regional lecturers, researchers and students from different disciplines including medicine, public health and environmental science. The goal is to create and establish planetary health courses that are based on globally shared values and principles, but reflect local needs, expertise, and teaching conditions. By bringing together researchers, lecturers and interested students, the Hub offers the opportunity to mutually explore how planetary health connects to the ongoing efforts on creating healthy environments in Eastern Africa and to inspire conversations around the health of our planet.

Here, we want to highlight challenges, opportunities and successes of planetary health education over the past two years in the Eastern African Region. By sharing the growth that is happening within and beyond our network, we hope to inspire others and exchange ideas for improving planetary health education initiatives for transformative action.

"Connect, learn, transform": Embedding Planetary Health into medical education across Wales

Constantinos Demetriou (University of Swansea)

Across Wales there was uncoordinated climate action in healthcare education and lack of support network. There was a recognised need amongst trainees that Planetary Health principles were embedded into medical undergraduate training, with Planetary Health and sustainable healthcare minimally featured in curriculum or educational programmes.

In June 2021 medical students along with health workers helped launch Green Health Wales1 with a national conference. Green Health Wales is a national network enabling all health workers and students in Wales to connect, learn and transform in the areas of sustainable healthcare and Planetary Health.

Students and staff involved in medical education in Wales have an appetite for change, advocating to embed Planetary Health into the medical school curricula in Welsh Universities. Two medical student sustainability societies have been set up and are providing support to its members and are able to receive wider support within the Green Health Wales network through regular meetings and updates. Other examples include recently exploring the role of One Health approaches in education, joining learning between medical and veterinary students in Wales.

Connecting, learning and transforming, as part of a national network empowers trainees to overcome empathy, knowledge and implementation challenges to Planetary Health education. The network, breaks down the artificial barriers across organisations and stages of training and helps to uncover the power of collective and compassionate leadership across the undergraduate and postgraduate training pathway. It facilitates the sharing of learning across educational establishments in Wales and beyond, this allows stronger engagement between students and staff on the development of embedding Planetary Health principles into curricula. Dysgu is Welsh for both learning and teaching, this is proving effective for embedding Planetary Health into medical education across Wales.

Applied Education for Planetary Health Concepts: One Health Field School in Rwanda

Mahlet Tadesse Admasu, Evelyn Bigini, Kirsten Beata Dodroe, Dr. Phaedra Henley, Dr. Anselme Shyaka (all from the University of Global Health Equity)

Initiative Details: One Health (OH) is a specialization within the Master of Science in Global Health Delivery (MGHD) program at the University of Global Health Equity (UGHE) in Butaro, Rwanda. The goal of the OH program is to equip global health leaders to respond to complex challenges posed by the interdependencies of human, animal, and environmental health. Through a one-week Field School (FS), OH students visited eight sites throughout Rwanda including a slaughterhouse, rice farming cooperative, national park, animal rescue shelter, milk collection center, beverage processing plant, and wildlife rehabilitation center. These site visits showcased OH issues within the social, cultural, and political context of the local communities they impact.

Target Audience: The MGHD OH track at UGHE is composed of eleven students from four countries with professional backgrounds across the medical and environmental sciences.

Goals of Project:
1. Apply principles of OH to recognize the interconnectedness and interdependence between human, animal, and environmental health in Rwanda.
2. Utilize leadership, strategic thinking, data analysis, evidence-based practice, and communication skills to identify, prioritize, design, and evaluate the impact of OH interventions

3. Identify the opportunities and challenges of applying the OH approach in real-life situations and developing innovative strategies for promoting healthy coexistence between humans and animals in sustainable local ecosystems.

Results:
Students collected quantitative and qualitative data through observations, document analyses, and interviews to produce class presentations and reports proposing OH interventions. Subsequently, four students created poster presentations for a university-wide competition. FS also provided students with professional networking opportunities.

The OH FS program is catalyzing the development of global health professionals who can critically understand the applications of OH in the development of Planetary Health interventions. This educational program serves as an example for the integration of experiential learning into Planetary Health educational programs.

UFCG Planetary Health Working Group - Experience Report

Jeyse Rani de Sales Nascimento (UFCG); Ival da Costa Filho (UFCG); Anny Carolini Dantas da Fonseca (UFCG); Francisco Gabriel Pereira (UFCG); Francisca Benedito da Silva Cardoso (UFCG); Maria Vívia Casado Marques (UFCG); Gabrielle de Lima Maniçoba (UFCG); Maria da Vitória Santos do Nascimento (UFCG); Ana Clara Julião do Carmo (UFCG); Beathriz Almeida Linhares (UFCG); Graciele de Oliveira Silva (UFCG); Flávia Maria de Medeiros Filgueiras (UFCG); Fernanda da Silva Santos (UFCG); Larissa Noca de Medeiros; Francinalva Dantas de Medeiros (UFCG)

Planetary Health addresses in a systemic, integrative and transdisciplinary way one of the most urgent issues of our time, the environmental crisis, covering the relationships between human health and terrestrial ecosystems. It is essential to think about how the health of populations has been affected by climate change and the loss of biodiversity and, furthermore, how health systems relate to the environment. Therefore, we seek to reflect on the importance of this debate in the education process of health professionals, since they are strategic agents in facing the impacts of environmental changes on the health of communities, through adaptation and mitigation actions of these impacts, whether through the formulation of public policies or the dissemination of the theme. Therefore, the discussion about the insertion of the environmental theme in the undergraduate curricula of students in the health area is of great importance. Based on these reflections, in 2020, the Research Group on Planetary Health – Lynn Margulis, from the Federal University of Campina Grande – Paraíba – Brazil (CES/UFCG) was created, in view of the observation of a region that suffers from water scarcity and, consequently, greater susceptibility to climate change and the incidence of arboviruses (such as Dengue, Chikungunya and Zika). This group carries out cycles of debates, research and extension projects, both with the general population and professionals working in primary health care, and the construction of a regular

discipline. These actions aim to sensitize students, health professionals and the community to environmental issues and so that they perceive the biodiverse and preserved environment as an ally in health actions.

Expanding access to sexual and reproductive health (SRH) services and building community resilience to climate change through multisectoral programs: Case study of an integrated Population, Health, and Environment (PHE) program in Tanzania.

Phillipo Paul Issabu (Pathfinder International), Josaphat Mshighati (Pathfinder International), Angelo Kihaga (Pathfinder International)

Background: There are a number of different threats to the health and well-being of people and the environment in the Greater Mahale Ecosystem (GME) in Western Tanzania and the Northern Tanzania Rangelands (NTR). To address these challenges, Pathfinder International, in collaboration with conservation partners and the Government of Tanzania, have been implementing an integrated Population, Health, and Environment (PHE) program in Tanzania, GME and NTR to increase communities' resilience to climate change, increase environmentally friendly practices, and improve the Sexual and Reproductive Health (SRH) services of the population.

Program: The project implemented integrated SRH services and conservation interventions in six districts across four regions of Tanzania, targeting communities living adjacent to national parks. These activities include: capacity building of health providers and community health workers; mobile family planning (FP) outreach programs; demand generation activities for SRH services; model households to promote positive PHE behaviors; and community-based income-generating activities (IGA).

Results: Since the inception of the program in 2011, a total of 163,495 community members have accessed FP methods of their choice. The project has also enrolled 20,268 households into the model household intervention, which encourages the adoption of PHE positive behaviors such as use of SRH services, construction and use of toilet facilities, treatment of drinking water, tree planting, and ensuring educational investments for both girls and boys. In addition, 4,980 community members have accessed financial resources that have been invested into various environmentally friendly IGAs.

Lessons learned: The project results show that an integrated PHE approach can be effective in increasing access to SRH services for men, women, and youth while simultaneously building community, household, and individual resilience to various shocks and stresses that are a result of climate change and environmental fragility.

Global Health International Congress: A project to change your understanding of health

Luísa Teixeira Francisco e Gontijo (Centro Universitário de Belo Horizonte), Letícia Maria Possa Vicente Sacramento Ferreira (Centro Universitário de Belo Horizonte), Andressa Nascimento Silveira (Centro Universitário de Belo Horizonte), Marconi Augusto dos Reis (Centro Universitário de Belo Horizonte)

The Global Health International Congress (GHIC) is a virtual gathering that aims to transform the understanding of health. The global political, economic and social scenario, directly influences the health of populations. For this reason, it's necessary to create spaces in which this theme is widely discussed and different views on reality are exposed. Through this event we contributed to the formation of professionals better prepared to deal with conflicts, hunger, migration, epidemics, climate change, understand the social determination of the health-disease process (SDHDP) and how international cooperation can be an important tool in overcoming public health challenges.

The goals are to encourage reflection on global challenges and on SDHDP, promote the exchange of ideas and bring quality information, under a decolonized and multilateral vision. The congress is organized by a multidisciplinary team from different nationalities, guaranteeing the sharing of worldviews and experiences to create a unique event. The project is completely free, and we expect to reach all people, without distinction/barriers.

The first edition (2020) has the thematic "Health in an interconnected world", 541 subscribers, 28 speakers, 11 countries in the organizing committee (OC). We counted with renowned speakers, such as Clare Gerada and Million Belay. The second edition (2021) has the thematic "Equity in Health: a Global Challenge", had 8 nationalities on the OC, 52 speakers and 2269 subscribers. Once again there were lectures by prestigious speakers, such as Peter Catter and Sat Khalsa.

The second edition also had the creation of the Working Groups (WG), with the purpose of deepening the debates of congress themes in monthly meetings. We had 5 different groups, coordinated by OC members, open to everyone to join, with specific thematics, such as "Conflicts and Migration". From the discussions were produced scientific articles and educational content freely accessible on social networks.

Planet&AR Project: An interface between Medical Education and Planetary Health on Ilha de Maré, Bahia, Brazil

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Introduction: The Planet&AR Project was created in 2021 with the proposal to promote the incorporation of Planetary Health into the curriculum of Brazilian medical schools through practical activities and experiences in public health on an island called Ilha de Maré, Salvador, BA, Brazil. This island is nationally recognized for the difficulties endured by the population regarding water and air pollution and social inequality in the state of Bahia and the city of Salvador.

Methods: Region's social, environmental, economics and cultural context to the students, two pillars of study were divided among students from two selected Brazilian medical schools. The first pillar consisted of tourism, the economic aspect of the island, based on natural resources and the use of beaches for leisure. The second pillar, based on culture, consisted of artisanal shellfish harvesting and local cuisine and the practice of handicrafts, both with historical and ancestral aspects. The students stayed at the site for 3 days and relied on the participation of residents and workers from the region. The students stayed at the site for 3 days and relied on the participation of residents and workers from the region.

Discussion: The reconnaissance work and insertion of planetary health in the island context began upon the group's arrival when locomotion difficulties were observed that directly impacted the population's access to health. In addition, students were able to observe the consequences of pollution on the quality of life of residents and the cultural force that raises the practices of the place.

Conclusion: The practical activity in the field proved to be an teaching tool for Planetary Health and, consequently, for the promotion and improvement of health in Brazil.

Food & Nutrition

Planetary health in context of inequalities: meat consumption case-study in Brazil

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Background: Meat consumption is a key issue when discussing planetary health, due to its impact on human's and the planet's health. Nevertheless, it is important to understand how meat is consumed in different contexts of inequality, making it crucial to consider the socioeconomic and cultural realities. Thus, we analyzed meat intake and its prices over the years according to income strata in Brazil to discuss food inequalities and challenges in planetary health.

Methods: We evaluated Brazilians individual meat intake and food price data using 2008/ 2017 National Dietary and Household Budget Surveys. Affordability was estimated based on changes in income and meat prices in 2008 and 2017. We estimated greenhouse gas emissions, land use, and eutrophication related to food production as a proxy of the environmental impact of food consumption.

Findings: The Brazilian population showed an overall increase in total meat intake by 12% from 2008 to 2017; however, this increase was differentiated according to income. Individuals of the lowest income stratum did not increase their consumption. However, in spite of beef's high prices, it was the kind of meat that was consumed the most among all strata, as it carries important cultural meanings in Brazil. Meat contributes to more than 75% of environmental impact from the Brazilians' diet and its impacts were higher among higher income people.

Interpretation: Even though meat is associated with negative impacts on planetary health, it is key to underline that in Brazil relevant factors that drive meat intake may be associated with restricted purchase power and food affordability. The high income strata consume more beef per capita and consequently have a higher environmental impact than the low income stratum, who have potentially less purchasing power. To consider contextual socio-economic inequalities and cultural meaning is crucial to build a more inclusive understanding of planetary health.

Development and usage of a sustainability index to assess university restaurant menus.

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Background: Eating out has increased over the years, but the nutritional quality of meals has not improved. University restaurants are strategic spaces for healthy and sustainable eating practices but are incipient in food and nutrition education programs focused on planetary health. Thus, we designed an index considering aspects of sustainability and nutrition. Also, we compared omnivorous and vegetarian menus of university restaurants using this index.

Methods: We designed the index from the literature review and considered environmental (n = 6) and nutritional (n = 8) indicators applicable to menus. We scored each indicator and classified 6380 vegetarian and omnivorous menus as poor, fair, good, very good, and excellent. Analyzes were performed separately for the human health and environmental dimensions.

Findings: We classified 68% of omnivorous and 84% of vegetarian menus as very good or excellent considering the human health dimension. For the environmental dimension, we classified 66% of vegetarian menus as very good or excellent, while 51% of omnivorous menus were considered poor.

Interpretations: Vegetarian menus presented better scores for the health dimension, because vegetarian dishes usually present less saturated fat and higher fiber content. Half of omnivorous menus presented poor scores for the environmental dimension, because meat, especially beef, has the greatest environmental impact. If a meal with meat was replaced by legumes, a person would stop emitting around 20 kg CO2eq and using 60 L of water. The index can be a support tool for restaurants to create more sustainable menus and can be adapted and applied at other food services.

Improving Food System Framework in Nigeria

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Background: Environmental issues have contributed to food system challenges. While there are convergences about what ideal food systems should look like and what transformations and actions are needed, a rigorous analysis of the various proposed actions or strategies is generally lacking. The findings from this review will identify gaps and highlight areas of evidence-based food improvement that puts climate adaptability and planetary health into cognizance.

Methods: This review adopts qualitative research exploring gaps and assessing transition to a sustainable food system. Current literature, and existing practices on building resilient food systems, climate adaptability and enabling policy will be categorized and analyzed for identification and modeling of progress and lapses. Key themes around new technologies and innovation, policies, will be highlighted for leveraging strategies to address food insecurity. The review will also reflect knowledge and increase synergies of collaboration that can be applied to practice for transforming food systems with policymakers, stakeholders, governments, the farmers, and citizens.

Findings: Sustainable food systems are essential components for planetary health and promoting nutrition. The impacts of environmental changes have disrupted the food system. Food systems are currently affected by climate change, declining pollinators, biodiversity loss, deforestation, heat waves and drought. Rising food prices have exacerbated hunger and poor dietary consumption. While there is emphasis on policies for transforming the cogent food system disparities, there are little practices incorporating policy structure in improving sustainable food systems in Nigeria.

Interpretations: Environmental change influences the composition, production, and supplement content of food. Research, and technology in food innovation are fundamental for improving food system creation, and developing the food framework's sustainable capacity. The ability to design feasible and quality food systems for the future requires the mix of methodology from various disciplines, development in logical and cross-sectoral analysis, leveraging synergies and collaboration for exploration of adaptability and resilience.

Dietary patterns in North and South India: a comparison with EAT-Lancet guidelines

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Background: To promote human and environmental health, in 2019, the EAT-Lancet Commission recommended a universal reference diet (EAT). Very few studies have compared Indian diets with EAT using primary dietary data. We examined this using the UDAY cohort data.

Methods: Data from 8762 adult (more than equal to 30 years) participants of the UDAY cohort from North (Sonipat) and South (Vizag) India, were collected on socio-demographic characteristics, wealth index and dietary intake (24 food group-based food frequency questionnaire) between October 2018 and February 2019. The food groups were merged according to their nutritional content as per the EAT.

Findings: The mean age of the participants was 52.4±11.7 years, half were women and half resided in rural areas. All food groups i.e., whole grains, all vegetables, fruits, and protein foods (legumes, eggs, fish, chicken, meat, etc.), except dairy, were consumed in lower quantities compared to EAT. Consumption of fruits and vegetables were noticeably low. Almost 92% of the participants consumed all fruits (sweet, Vitamin A, C rich, other fruits) below EAT recommended levels (100-300g/day) (average daily consumption was 31.7±31.1g and 46.8±41.8g in rural and urban Sonipat; 46.4±47.6g and 44.9±45.1g in rural and urban Vizag respectively). Around 88% participants from all study sites consumed all vegetables (green-leafy, other-veg) below EAT levels (200-600g/day) (the average daily consumption was 99.9±74.7g in rural Sonipat, 136.0±117.0g in urban Sonipat, 120.1±50.6g in rural Vizag and 139.3±70.4g in urban Vizag). The fruit and vegetable intakes were higher in South than North India, among urban than rural and, in those belonging to richer neighbourhoods ($p<0.001$, all) with no gender differences.

Interpretation: Compared to EAT levels, the dietary intakes were low, especially for fruits and vegetables. Considering the widespread nutrient deficiencies in India, urgent policy actions for making nutrient-rich foods available and affordable, especially for rural and disadvantaged populations are essential.

A proposed framework to guide the use of nutrient indices in environmental life cycle assessments

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Background: The use of nutrient profiling systems is becoming more wide-spread, as the need for producers and consumers to rank food items in terms of their contribution to nutrition increases. However, the application of these algorithms is often ad-hoc, leading to a lack of transparency and comparability across studies. Accordingly, we developed the 'points of differentiation' framework to guide best practices in developing these nutrient indices, particularly as they relate to environmental life cycle assessment because the use of these metrics as the functional unit (which is the measure against which environmental impacts are assessed) is also increasing. We focus on metrics related to nutrient adequacy (including nutrient quality e.g., protein quality) and nutrient diversity.

Methods: The framework was developed based on case studies and review analyses. We first identified key gaps (e.g., dietary-specific metrics) and other methodological challenges (e.g., weighting, capping) related to developing and using nutrient metrics in environmental assessments; we then tested these and identified other methodological interest areas in subsequent analyses.

Findings: In a previous regionally-explicit study, we found nutrient metrics greatly changed sustainability tradeoffs between food groups (e.g., seafood is more environmentally-sustainable when measured on a nutrient basis while meat only scores slightly better on a nutrient basis with differences between ruminants and non-ruminants). Such findings were also confirmed in other cases.

With respect to methodological choice, across all case studies, energy standardization, disqualifying nutrients, and capping played a significant role. Context- and dietary- specific metrics versus more generalized metrics also influenced results. Key gaps that remain include proper accounting for disqualifying nutrients and ultra-processed foods.

Interpretation: The massive variability in outcomes depending on which metric is chosen and how that metric is applied means that future work is needed that builds upon this framework and harmonizes efforts to improve the robustness of sustainability results.

Environmental impacts, micronutrient adequacies, protein qualities, and fatty acid profiles of plant-based beverages compared to cow's milk: a sustainability assessment

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Background: Understanding tradeoffs between environmental and nutritional sustainability domains of plant-based beverages versus cow's milk is a pertinent question, with increasing adoption of plant-based diets. Accordingly, we quantify nutrient densities (using a novel nutrient profiling system), protein quality, fatty acid profiles, and environmental impacts (e.g., deforestation, global warming potential, water use, etc.) of these drinks. We assessed cashew, soy, almond, hemp, oat, spelt, rice, and coconut drinks, as well as cow's milk produced from arable-land based, pasture-raised, and grass-fed systems.

Methods: We combined literature and database data to estimate environmental impacts from farm to packaging, and a nutritional group provided the nutrient contents of all drinks. Following the points of differentiation framework, we developed a novel metric, to rank food items, termed the Food Substitute Index (FSI20), which is reflective of national nutrient deficiencies across various dietary patterns. Environmental sensitivity and scenario analyses were also performed.

Findings: Findings indicate a high risk of introducing nutrient deficiencies into the food supply unless plant-based beverages are fortified. With respect to combined environmental-nutritional sustainability scores, cow,Äôs milk has moderate scores because its high nutrient density can partially compensate for the high environmental impacts. Of the plant-based beverages, soy drink has high combined scores when produced in France (results differ for Brazilian soy), coconut and cashew, on average, have low sustainability scores, and hemp shows promise due to its favorable fatty acid profile.

Interpretation: The nutrient density and environmental impacts of beverages varied greatly even within a single beverage type. This high variation suggests that recommendations of optimal beverages to cover nutritional deficiencies in an environmentally-friendly manner is not straightforward. Lastly, continual development of nutrient profiling systems will be needed as the health burden of nutrient deficiencies becomes more apparent.

Diet for a healthy body and healthy planet

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Background: Diets rich in animal-based foods threaten planetary and human health, but plant-rich diets have varied health and environmental effects. We characterized a healthy dietary index and three plant-based indices by their environmental impacts and associations with risk of cardiovascular disease (CVD).

Methods: Participants were categorized by quintiles of four dietary indices, including Alternative Healthy Eating Index-2010 (AHEI), Plant-based (PDI), Unhealthy Plant-based (uPDI), and Healthy Plant-based (hPDI), based on a food frequency questionnaire in the Nurses' Health Study II (n=90,849). We calculated environmental impacts, including greenhouse gas (GHG) emissions and irrigation water, nitrogenous fertilizer, and high-quality cropland needs, and relative risks (RRs) of CVD from 1991–2017, comparing quintiles.

Findings: Comparing extreme quintiles, higher AHEI was associated with decreased CVD risk (RR: 0.77; 95% CI: 0.66–0.89), lower GHG emissions (Q5: 2.6kg CO2eq vs. Q1: 3.7kg CO2eq), and lower fertilizer, cropland, and water needs (all p trends<0.001). Similarly, the highest hPDI quintile was associated with a 29% lower CVD risk (95% CI: 0.60–0.83) and lower environmental impacts (all p trends<0.001). The uPDI exhibited opposite trends, with the highest quintile experiencing a 15% higher CVD risk (95% CI: 1.00–1.33; p trend=0.02) and requiring more cropland and fertilizer (p trends<0.001).

Interpretation: Dietary patterns associated with better health (AHEI and hPDI) had lower GHG emissions and nitrogenous fertilizer, cropland, and irrigation water needs. Not all plant-based diets conferred the same health and environmental benefits. Because human health ultimately depends upon planetary health, dietary guidelines should include nuanced consideration of environmental sustainability.

Revitalising local eco-agri-food systems in the wake of climate change: A Scoping Review

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Background: Local eco-agri-food systems magnify the consequences of planetary health crises, and climate change represents a threat to communities already in environments of extreme vulnerability. The aim of this study is two-fold: first, to explore the impact of climate change on local assets within eco-agri-food systems and how these affect community capacities and capabilities related to community positive health. Second, to highlight how communities create pressure points for action to re-integrate local resources, capacities and capabilities to pursue community positive health.

Methods: The methodology relied on a six-step process: elaboration of the research questions; identification of peer-reviewed articles and gray literature documents; definition of criteria for the inclusion and analysis; charting of the information obtained; consultation in the nature of reflection with key stakeholders in India, Kenya and Peru; summarize and report the results.

Findings: The scoping review highlighted pathways through which climate change is impacting community assets such natural, human, social, and produced resources of local agri-eco-food systems. The review also showed how communities could be agents of change and cope with these challenges. We articulated the potential pressure points in the system that re-vitalise local resources and enhance community capacities and capabilities, such as agro-ecology practices and community-led initiatives.

Interpretation: The research outcomes were mapped in a conceptual framework outlining the relationship between climate change impacts on local eco-agri-food systems assets and capacities and capabilities for community positive health. Coping strategies adopted by communities were grouped in a checklist that could support communities in similar contexts to mitigate climate change impacts and prevent worse scenarios. These tools could guide the development of policies, projects and programmes that aim to sustain local agri-eco-food systems facing climate change's detrimental effects.

Urban health, decarbonisation, and local climate action planning: a comparative case study on three Brazilian cities using computer-assisted qualitative data analysis software.

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Background: Five years past the Paris Agreement, we are far from limiting the global temperature increase to 2ºC above preindustrial levels. To cope with the adverse impacts of climate change, cities have developed innovative climate policies and strategies committed to achieve carbon neutrality by at least 2050. This is also observed in Brazil, where 85% of the population lives in cities. Effective urban decarbonization demands innovative and timely governance solutions in all relevant local policy sectors. Food security promotion, in particular, provides opportunities for local climate change mitigation, while enhancing urban health and quality of life. Local organic farming and adequate food waste management can help lower GHG emissions in the transportation and waste sectors. Agroecological farming in the urban fringes can foster carbon sequestration by controlling deforestation. To fully explore the synergies between local climate action, food security and urban health promotion, cities must integrate and coordinate the implicated public policies and plans. In this context, the proposed investigation aims to verify if and how Brazilian cities coordinate their climate mitigation and food security policies and plans and what synergies and contributions to urban health and quality of life stem from this coordination.

Methods: Developed as a multiple case study covering three Brazilian cities, Florianópolis, Recife and São Paulo, all regional centralities committed to carbon neutrality, the investigation comprised the collection and qualitative analysis of public policies documents using Computer Assisted Qualitative Data Analysis Software – CAQDAS.

Findings and Interpretation: Preliminary results show that the three investigated cities have included mitigation strategies related to food security promotion in their local climate action policies and plans. However, these strategies lack appropriate integration and coordination with the correlated sectoral policies. All three investigated cities must improve intersectoral policy coordination by developing appropriate climate governance solutions.

The gaps to EAT-Lancet sustainable diet in Brazil: a study with nationally representative data

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Background: Diet is a fundamental determinant of human health, but it also has a major impact on the health of the planet. The EAT-Lancet Commission proposed a healthy diet from a sustainable food system. In Brazil, low adherence was reported both at the national level and in Brazilian regions. Our question was, "what is the gap between the current Brazilian diet and the ideal EAT Lancet diet?"

Methods: We use data from the Brazilian National Dietary Survey NDS-HBS 2017-2018, a nationwide survey carried out by household sampling. Personal food consumption was collected for all residents aged 10 years and older in 20,112 randomly selected households, totalizing information from 46,164 individuals. The individual food consumption was obtained in-person using 24-hour dietary recall. Weekdays and weekends were represented in the survey. We calculate the individual intake of all food items, grouped according to the EAT-Lancet diet (cereals, tubers, fruits, dairy, beef and lamb, pork, poultry, eggs, fish, beans, soy, peanuts, nuts, vegetable oils, animal fat, sugar). All mixed dishes and processed products identified in the individual food consumption survey were disaggregated into their ingredients. We computed the fraction of the total energy of highly processed products based on a major ingredient (e.g., products based primarily on maize starch or wheat flour). The EAT-Lancet diet assumes a 30-year-old adult consuming, on average, 2,500 kcal per day. We estimated the amount of energy for Brazil and each state accounting for the variability of the population's age, gender and lifestyle, based on the data from IBGE. Findings: Comparing with the EAT-Lancet diet, we observe overconsumption of beef and lamb, pork, poultry, eggs, beans and sugar and underconsumption of nuts, vegetables, dairy, fruits, fish, oils and animal fat. Interpretation: These results may help guide change efforts towards greater adherence to a healthy and sustainable diet.

Inequitable Rise in Cancer Prevalence due to Zinc Deficiencies from Anthropogenic CO2 Emissions

Ella Whitman (Boston College, Student)

Background: Dietary micronutrient deficiencies are responsible for causing one-third of preventable cancers. Zinc is an essential micronutrient for human health and well-being; prolonged deficiency is a risk factor for various cancer types. About 150-200 million people are likely to experience a new onset of zinc deficiency due to depleted crop nutrients resulting from elevated anthropogenic CO2 emissions.

Goal: To understand how zinc deficiency resulting from anthropogenic emissions of CO2 disproportionally affects the global distribution of cancer.

Methods: A robust body of literature that included modeling studies, statistical analyses, annual reports, and scientific journals was reviewed. Findings were summarized in a scoping literature review and presented in an academic poster.

Findings: Similar geographical regions with a high prevalence of zinc deficiency are at the highest risk for inadequate zinc intake from elevated atmospheric CO2 levels. Specifically, populations in Sub-Saharan Africa and Southeast Asia have the highest risk for zinc deficiency under elevated CO2 levels and the highest prevalence of zinc deficiency (measured as a share of the total population with intakes below physiological requirements). The correlation between currently deficient populations and at-risk populations demonstrates the contingency for an increased prevalence of zinc nutrient deficiency and cancer burden in these regions.

Interpretation: Using a global lens to investigate how nutritional deficiencies resulting from rising CO2 levels can increase the prevalence of cancer is necessary to reduce the global burden of disease and promote health equity. The mediating factors in a country may intensify or reduce associated health effects. Our actions impact the well-being of our global citizens of varying geographic locations, cultures, and generations. It's critical to foster inclusivity, empowerment, and representation of communities to ensure planetary health solutions are context-specific and address the needs of those facing the disproportionate burden of global environmental change.

Climate change and Rift Valley Fever Disease Outbreak: Implications on pastoralists food environment

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Background: Rift Valley Fever (RVF) disease affects both livestock and humans. Variations in rainfall patterns has contributed to more frequent intense floods which favour the vector mosquito and associated RVF outbreaks. Pastoralists living on poor rangelands depend on livestock for food and livelihood. RVF outbreaks control and management measures like quarantine, trade bans of livestock and associated products disrupt the food systems in pastoralist settings. This contributes to limited food availability, access, and affordability leading to poor food choice and consumption with potential negative nutrition especially in women of reproductive age (WRA) and children below five years old. Evidence is limited on the effects of RVF outbreaks on the food environment and nutrition security. This study analysed the effect of RVF outbreak on various domains of the food environment to inform future RVF outbreaks response to be comprehensive and consider nutrition.

Methods: A mixed-methods study conducted in pastoralist Isiolo County, Kenya, purposively selected due to a recent RVF outbreak in 2020. A cross-sectional household survey (N=767), focus group discussions and in-depth interviews were conducted. Data on 24-hr dietary recall, dietary practices was collected and analysed using NutriSurvey tool and NVivo software for qualitative data.

Results: Mortality in sheep, goat and cattle was 40.2%; 52.8% and 19.6% respectively; about 70%-92% households depended on income from livestock sales. Livestock sales reduced; food prices went up; flesh-meat consumption declined from 19.7% to 14.2% before and during RVF outbreak. Only 23.6% of the WRA achieved minimum dietary diversity score; about 55% of the children consumed insufficient energy, protein, and vitamin A.

Interpretation: Future RVF responses to consider nutrition as the disease and mortality, reduce livestock productivity and associated foods while RVF control measures reduce food access, income, raise food prices contributing to purchase and consumption of inadequate, cheap, less nutritious foods with potential negative nutrition outcomes.

Critical and locally constructed perspectives in planetary health: Lessons from the Brazilian School Feeding Program's cassava acquisition

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Background: In 2013, FAO identified cassava as a crop of the 21st century that responds to the challenge of healthier diets and climate change. However, the EAT-Lancet reference recommended restricting tubers or starchy vegetables, such as cassava, for more sustainable diets. In Brazil, cassava plays a fundamental historical, social, environmental, cultural, and nutritional role. We evaluated the acquisition of cassava and its products by the Brazilian School Feeding Program (PNAE).

Methods: PNAE purchases from 2019, of a random sample of 26 Brazilian cities, one of each national state, were analyzed considering quantity, frequency, cost, and type of production (by family farmers or conventional) of cassava and its products, in comparison with other tubers.

Findings: In 2019, 6684 kg of cassava was purchased, 77% produced by family farmers. Of 2862 purchases, the frequency of acquisition of cassava was 3.3% (n=102), 1.7% of cassava, and 1.6% of cassava products. About 2.5% of the program budget was invested in cassava and its products. Cassava was the most frequently purchased among the tubers, corresponding to 31% of them, followed by potatoes and sweet potatoes.The highest frequency of purchases was observed among the cities of Northeast Brazil, whereas the lowest ones were in the cities in the Southeast and South regions.

Interpretation: Cassava is native from the Amazon region, domesticated by Indigenous people. Currently it is a staple food cultivated by smallholders farmers in most of Brazil and in other countries in the global south. It is a tuber root frequently acquired in PNAE, especially in the Northeast region, and provided predominantly by family farmers. Being accessible and affordable food, grown and consumed locally, cassava is of enormous importance for food security and sustainability in Brazil. Thus, the shared challenges to achieving better planetary health must be built locally.

Cooking up changes: the act of cooking as a tool to promote planetary health

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Background: The act of cooking is a social practice that can be seen as a creative space of everyday life, encompassing cultural, environmental, social, economic and political dimensions, being a promising space for promoting dialogue, learning and transformations. Cooking makes up the practices related to food consumption, which are an important part of mitigating issues related to climate change and the food system. This act can contribute to the promotion of sustainable food standards, supporting the achievement of food and nutrition security for all, so as not to compromise the economic, social and environmental foundations. Objectives: to understand the meanings of the act of cooking for women from an urban agriculture group (GAU), in the east side of the city of São Paulo and to understand the relationship they establish between the act of cooking and their agricultural activities.

Methods: Body-map storytelling, which make use of drawing, painting and other art-based techniques, along with oral narratives, to represent aspects of people's lives and the world they live in. Findings: Cooking helps participants to develop aspects related to a more sustainable diet (moderate consumption, greater consumption of vegetables, reduced meat consumption and reduced waste), along with promoting cultural appreciation and strengthening community activities, contributing to the improvement of their health and the community where they develop their activities.

Interpretation: The act of cooking proved to be an activity that connects the field to the table, and can be an interesting tool to promote health in its broadest aspects, including those related to sustainability.

Female management in agriculture and its association with social, environmental, nutritional, and economic indicators of the Brazilian food system

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Background: Women, compared to men, often experience limited access to land, formal labor, infrastructure, credit, and extension services in agriculture worldwide. Therefore, we aimed to investigate how female management in agriculture is related to social, environmental, and nutritional aspects in the Brazilian food systems.

Methods: Based on a systematized review of the literature and using official and publicly available datasets from Brazil, we selected and calculated 46 indicators of food system sustainability for each of the 26 Brazilian states. To check the correlation between the percentage of farms headed by women and other selected indicators, spearman correlation coefficient was used, and a network was drawn to visualize strong connections (rho<-0.6 or rho>0.6).

Findings: States with higher percentage of farms headed by women also had lower food access (rho=-0.625; p=0 .001); lower food affordability (rho=-0.605; p=0.001); lower food security (rho=-0,708; p<0.001); higher prevalence of stunting among children under 5 (rho=0.661; p<0.001); higher disability-adjusted life years attributed to intestinal infections (rho=0.712; p<0.001); higher percentage of farms headed by individuals self-declared as non-white (rho=0.689; p<0.001); lower percentage of farmers participating in community supported agriculture operations (rho=-0.842; p<0.001); lower infrastructure (rho=-0.830; p<0.001); lower income in food production (rho=-0.712; p<0.001); lower access to land (rho=-0.689;p<0.001); and lower productivity (rho=-0.606 p<0.001). Female management was not associated with environmental impacts.

Interpretation: Farms headed by females in Brazil face many political and social challenges that translate into lower access to infrastructure and land, what, ultimately, lowers resilience, productivity, and income. Low income fosters higher food insecurity risk. Access to income and social rights in food production must be guaranteed for all, especially for females, to reach better sustainability in food systems.

Food in the Great Transition: Distributive Justice and Mutual Aid

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Background: Planetary Health has given much consideration to how humanity can be fed healthily without destroying the planet; the EAT-Lancet's 'planetary health diet' encourages low impact, low-red meat food systems. Less attention, however, has been given to the equitable distribution of food, and how this can be maintained during periods of disruption initiated by Anthropocene emergencies to ensure no one is left hungry. We sought to understand how mutual aid might play a role in future Anthropocene emergencies by studying its role in food provision during the pandemic. Disaster studies (e.g Rebecca Solnit), point to an outpouring of community support during crises. Peter Kropotkin argued that such cooperation is more humanity's natural state than 'survival of the fittest', corrupted from Darwin to champion competition of the strong over the weak.

Methods: We used participatory action, observation and interviews to map how mutual aid groups emerged in the early weeks of COVID-19 lockdown, who organised them, and what helped or hindered their enactment of mutual aid. We used these findings to produce a i-Doc (interactive documentary) highlighting the groups,Äô motivations and actions.

Findings: Food (in)security was a major challenge during the pandemic. Many mutual aid groups delivered food (to shielding neighbours; children left without free school meals; overworked NHS staff), or set up food banks, community fridges and kitchens. This raises serious questions around why so many people were in need of such help and how they can be best supported (at the community level) in future.

Interpretation: Many families were left in dire circumstances during pandemic lockdowns. Many of these vulnerabilities were already present: the pandemic exacerbated them and made them more immediately visible. These vulnerabilities, likely to re-emerge in future Anthropocene crises, need to be addressed now to ensure distributive and intergenerational justice in line with planetary health ethics.

Institutionalisation of integrated population, health and environmental conservation approaches into local policies and programs in East Africa

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Background: Both the importance and the complexity of pursuing integrated population, health and environment (PHE/PED) approaches have been affirmed by experts as necessary to achieve the SGDs by a wide range. Many examples have been successfully tested in a diverse range of countries and settings. However, ensuring their sustainable expansion has frequently not been a major focus of efforts to date and little practical experience/evidence has been documented about how such approaches can be institutionalised within country programs and policies. Health of People and Environment in the Lake Victoria Basin (HoPE-LVB) applied the ExpandNet/WHO approach to systematically designing and implementing interventions with future scale up. This study revisits the earlier application of a systematic approach to scale up in the project, which focused on improving reproductive health and environmental conservation outcomes in Uganda and Kenya from 2012-2018.

Methods: Key informant interviews, group discussions, policy and programmatic document review are being conducted with involvement of PHE program implementers, policy makers, district and county leadership, community members, and academia that were involved in the implementation and scale up process of PHE/PED integration in both Kenya and Uganda.

Findings: HoPE-LVB officially ended in 2018 but scaling process has continued in multiple and important ways. Preliminary findings indicate that key determinants of continued scaling-up success are being met, such as a growing perceived relevance of pursuing integrated development approaches in policy and programs. Ugandan examples include PHE becoming integrated into Climate Change Policy, Nationally Determined Contributions, PHE Strategy 2025, National Population Council Strategy.

Interpretation: Key PED policy and programmatic outcomes to date demonstrate the fact that HoPE-LVB application of a systematic approach to scaling up throughout implementation substantially facilitated later scaling-up successes. In order to achieve a SDG agenda globally, such efforts combining the two – namely integrating across population, environment and development - will need to be multiplied many times over.

Current action and utilization of novel technology for sustainable food production in Japan

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Background: Rapid growth of population and global climate change require the robust system of sustainable food production. At the same time, given the concept of “planetary health”, it is anticipated to minimize negative impact through food production against environment in order to pursue improved health and environmental benefits. However, it has been pointed out that owing to the shortage and ageing of workforce and consumers’ preference, food production system in Japan supposed to be not sustainable. For example, although there are global certification frameworks which assure sustainability via biological safety, chemical safety, the number of foods acquiring global certification is quite limited in Japan. So, we aimed to identify the bottleneck and explore the good example of sustainable food production which are utilizing novel technology in Japan.

Methods: Literature review and depth interview was adopted.

Findings: As the major bottlenecks, following factors were suggested. 1)complicated recording work to prove sustainability, 2) low perception about global certification among food producer as well as consumer, 3) high cost of obtaining the certification, 4) aging and labor shortage in agriculture and fishery. Meanwhile, pioneering food producers are producing crops and aquatic foods in a sustainable manner by utilizing digital devices for efficient sensing and recording. Also, precise climate data from satellite is now available for appropriate prediction of resource allocation and waste reduction.

Interpretation: Several bottlenecks to generalize sustainable food production were shown in the study. Facing to highly aged society, appropriate intervention such as spreading of technology to compensate the labor shortage, sustainability education targeted at food producer and consumer is needed. By doing so, the significance of sustainable food system will be enlightened and the behavioral changes of food production and purchasing are expected.

Participation in community supported agriculture operations has positive effects on social, economic, environmental and nutritional sustainability aspects in Brazil

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Background: Community supported agriculture operations (CSAO) have been associated with lower land concentration and monoculture, and higher organic, agroecological and family farming activities. We aimed to investigate how CSAO is related to social, environmental, and nutritional aspects of the Brazilian food system.

Methods: A systematized literature review was conducted to catalog indicators that measures different aspects of the Brazilian food system sustainability. Then, we calculated 46 indicators using public official data available for all 26 Brazilian states. The correlation between the percentage of farmers participating in CSAO (according to 2017 Brazilian Census of Agriculture), and social, nutritional, environmental and economic indicators were calculated using Spearman's coefficient, which then was inserted into a network graph to visualize strong connections (rho<-0.6 or rho>0.6).

Findings: States with higher percentage of farmers participating in CSAO had higher food security (rho=0.759; p<0.001), lower percentage of farms headed by women or non-whites (rho = -0.842 and -0.767; p<0.001, respectively), higher grocery store density (rho=0.659; p<0.001), higher Diet Diversity Score (rho = 0.64769; p<0.001) lower percentage of workers earning less than the poverty threshold in food production (rho = -0.874; p<0.001), lower percentage of household expenditures on food (rho = -0.677; p<0.001), lower prevalence of Stunting age (rho= -0.542; p=0.005), lower disability-adjusted life years attributed to intestinal infections (rho = -0.777; p<0.001), higher infrastructure (rho=0.915; p<0.001), and higher land access (rho=0.711; p<0.001).

Interpretation: Having a higher percentage of farmers in CSAO seems to impact positively on food security among the Brazilian states. However, this data should be interpreted with caution, as it is a cross-sectional study and it is not possible to infer causality. No effects of CSAO participation were found on FS environmental sustainability in Brazil.

Ultra-processed foods intake and lower adherence to EAT-Lancet sustainable diet in the Brazilian population

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Background: The EAT-Lancet Commission proposed a sustainable diet to improve population and planetary health, and sparked scientific discussions to highlight the benefits of this diet. However, studies associating the consumption of ultra-processed foods (UPF) with the EAT-Lancet diet are lacking. Thus, we aimed to evaluate the association between UPF intake with adherence to the EAT-Lancet diet through the Planetary Health Diet Index (PHDI).

Methods: We used data from 46,164 Brazilians aged over 10 years old who participated in the Brazilian Household Budget Survey 2017-2018. Food consumption was evaluated with a 24-hour dietary recall. The NOVA system was used to classify the UPF. The share of UPF to daily energy and grams intake was categorized into quintiles. The PHDI has 16 components and the total score can range from 0 to 150 points (higher the score, higher the adherence). Linear regression models considering the ‚Äúsurvey‚Äù command was used.

Findings: The average PHDI total score was 45.9 points (95% CI 45.6 – 46.1). Higher share of UPF to daily energy intake (5th quintile, mean (min – max): 46.4 (29.6 – 100) was associated with lower adherence to EAT-Lancet diet (–5.38 points in the PHDI score [95% CI –6.01: –4.75]) after adjustments for sex, age, per capita income (quartiles of per capita income), self-reported race (white, black or brown) and residence area (urban or rural). The results were similar with daily UPF grams intake (β –7.14; 95% CI –7.73: –6.55).

Interpretation: These results indicating that high contribution of UPF in the diet is associated with the lower adherence to a healthy and sustainable diet. Although the EAT-Lancet being a landmark in discussions on sustainable food systems, little has been discussed about the impact of UPF on current food systems and their environmental impacts. Our findings support that UPF should be considered in sustainable food systems.

Developing a Planetary Health Diet Score

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Background: In 2019, the EAT-Lancet Commission proposed a healthy dietary pattern that, along with reductions in food waste and improved agricultural practices, could feed the increasing global population sustainably. We aimed to develop a Planetary Health Diet (PHD) index to quantify adherence to the EAT-Lancet reference diet.

Methods: We conducted a literature review of dose-response relationships between intakes of food groups and risks of major chronic diseases such as diabetes, cancer and cardiovascular diseases in meta-analyses, pooled prospective cohort studies, large individual studies, and/or available feeding trials. Results from relevant food substitution analysis and distributions of recent consumption across countries based on the Food and Agriculture Organization's data were also taken into account. We then examined the distributions of PHD scores for 63,699 women in the Nurses‚Äô Health Study (NHS) cohort who completed up to seven semiquantitative food frequency questionnaires from 1986 to 2010.

Findings: The PHD index includes scores based on intakes (grams per day) for 15 food groups with ranges from 0 to 10 (or 0-5 for two groups); the total score range is 0-140. In the NHS, the mean (±SD) score increased steadily over time from 72.5±10.2 in 1986 to 88.0±11.4 in 2010. The correlations with the 1986 PHD score over time were 0.45 at 4 years, 0.40 at 8 years, 0.35 at 12 years, 0.31 at 16 years, 0.27 at 20 years, and 0.25 at 24 years.

Interpretation: We have developed a PHD score representing degree of adherence to a healthy and environmentally sustainable dietary pattern that can be used in epidemiologic studies. Over time in a large cohort of women, adherence increased, and within-person correlations decreased. These findings highlight the importance of repeated assessments of diet in studies with long term follow-up.

Rapid Qualitative Multi-Method Assessment of the Impacts of the COVID-19 Pandemic on Wet Market Biosecurity and Local Food Security in the Philippines

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Background: In the wake of the COVID-19 pandemic, wet markets were perceived as potential sources of novel zoonotic diseases due to the sale of live animals. Meanwhile, wet markets were also heavily impacted by the pandemic due to various restrictions that were hastily enforced. This study examined the impacts of the COVID-19 pandemic on wet markets in the Philippines, specifically on biosecurity reforms and the restrictions' effect on local food security.

Methods: This exploratory qualitative research study utilized a multi-method approach consisting of media analysis, policy review, key informant interviews, and rapid ethnography in an urban and rural wet market in the Philippines. Data collected from various methods were triangulated and key findings were synthesized using thematic analysis.

Findings: Pandemic restrictions were found to be partly responsible for the decrease in the sale of wildlife in markets known as "wildlife trade hubs." As part of the pandemic response, only a few additional hygiene and sanitation practices were enforced at wet markets, including the use of plastic barriers and conducting more intense market disinfection. Moreover, the restrictions initially caused a chain reaction across the supply chain that unveiled underlying food system vulnerabilities, primarily the lack of financial capacity of small-scale producers. Ultimately, food prices increased, while alternative methods of food distribution emerged such as online retailing and satellite markets.

Interpretation: Despite the additional temporary hygiene and sanitation practices enforced during the pandemic, overall wet market biosecurity needs to be further improved. The restrictions greatly affected local food supply, disproportionately impacting both small-scale producers and low income consumers. Moving forward, there is a need to apply a proactive, whole of society approach to pandemic response especially in wet markets. Different sectors must exercise greater communication and collaboration in order to mitigate the negative impacts to local food security and maximize the positive benefits to improving biosecurity.

Differences of home garden use and food consumption between main and outlying islands in Tuvalu

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Background: Home garden is an alternative to ensure sustainability and security of food in Tuvalu, where there is an increasing difficulty to obtain fresh foods under climate change. Fresh vegetables and fruit from home gardens serve as more affordable and nutritious substitutes for canned and packed foods, reducing environmental impacts of global shipping, and mitigating the burden of obesity and non-communicable diseases. However, no study examined the demographic determinants for higher home garden usage in Tuvalu.

Methods: Tuvalu government and Taiwan technical mission collaborated and conducted a nationwide nutrition survey and education campaign in 2022. We delivered education courses and developed recipes using locally sourced ingredients in both main and outlying islands. We used a structured questionnaire to collect the use of home garden, demographic, and behavioral factors with in-person interviews. We compared the characteristics between main and outlying islands and applied logistic regression for the association on home garden use.

Findings: We enrolled 838 adults in Tuvalu (637 from Funafuti, main island; 201 from outlying islands). Participants in Funafuti were younger (38.7 versus 47.5 years old), and both had similar gender and body mass index distribution (Funafuti: 35.63, outlying islands: 35.86 kg/m2). People from the outlying islands had lower average incomes, bought less imported foods, and consumed more locally produced foods (such as swamp taro and breadfruit). Meanwhile, home gardens were more prevalent among residents in outlying islands than in Funafuti (36.3% versus 25.7%) and living in outlying islands was 2.07-time more likely to have a home garden than in Funafuti (95% CI: 1.43-2.98).

Interpretation: We found Tuvalu inhabitants' farming and foods intake were affected by the environment they lived in. Possible reasons affecting their farming practices included larger living space, less access to imported foods, and lower income. This study provides important information for building an affordable food system in Tuvalu.

Pathways between fishery access and early childhood development: a longitudinal cohort study

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Background: Access to natural resources is fundamental to human well-being. We aim here to disentangle the multiple pathways through which fishery resources benefit early childhood development. While evidence links fish consumption and early childhood development, differences in nutrient content across fish species and the role of fishing income may modify or extend how fishery access shapes child development. To address these gaps, we examined how species of fish consumed affects early childhood development and disentangled the effects of fishing income and fish consumption.

Methods: In this longitudinal cohort study, we analyzed data from fishing households around Lake Victoria, Kenya, surveyed at nine time points between 2012-2015. We used a statistical approach that implements fixed-effects in structural equation models to investigate how child consumption of two predominant fish species and household fishing income affected child gross motor, personal-social, and communication development scores.

Findings: Consumption of only one of the two predominant fish species significantly benefited all three child development outcomes. Fishing income significantly increased gross motor and personal-social development. The sizes of these significant effects of fish consumption and fishing income are comparable (from 0·10 [90% CI 0·03–0·18] to 0·18 [90% CI 0·09–0·28]). Fishing income significantly increased child development scores through its effect on child growth.

Interpretation: Natural resources provide for multiple pathways linking human and ecosystem health. Disentangling these pathways is critical to fostering sustainable ecosystem management that preserves health benefits, such as the early childhood development benefits of fish access within fishing communities.Food & Nutrition

Interdisciplinary approaches to adolescent nutrition and environmental literacy and behaviours: Development of a nutrition education program and evaluation framework

Sarah Jarvis (MSc, PhD Candidate, University of Toronto), Dorsa Sohaei (MSc, University of Toronto), Vasanti Malik (ScD, Assistant Professor, University of Toronto)

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Sarah Jarvis (MSc, PhD Candidate, University of Toronto), Dorsa Sohaei (MSc, University of Toronto), Vasanti Malik (ScD, Assistant Professor, University of Toronto)

Background: Adolescence is a critical period to establish healthy sustainable eating behaviours and diets that will track into adulthood. Youth are increasingly aware of the harmful effects of climate change yet perceptibly disconnected from their natural environment in urban settings. There is limited evidence on optimal strategies to improve accessibility, acceptability, and attractiveness of healthy sustainable diets among youth. We aimed to design a nutrition education program that engages youth as stewards of their local food systems to improve the nutrition literacy and dietary behaviours in the Greater Toronto Area.

Methods: A literature review of existing interventions was conducted to identify most effective program design elements including theoretical models, outcome measures and evaluation tools. Specific priorities of the program will be set based on a local needs assessment of social, epidemiological, ecological, and political factors through stakeholder consultation.

Findings: The study protocol was reported according to SPIRIT and structured according to the PRECEDE-PROCEED Model with integration of the Health Belief and Experiential Learning models. The program design is grounded in the Theory of Reasoned Action/Planned Behaviour, Social Cognitive Theory, and Self-Determination Theory. The behaviour change objectives are concurrent with the underlying pillars of a healthy sustainable diet (i.e. healthful, environmentally sustainable, affordable, and culturally appropriate and accessible for all). These include adherence to high quality, nutrient dense plant-based dietary patterns, reduction of household food waste, increased motivation, knowledge, and skills surrounding affordable food preparation and cooking, and enhanced awareness of connectedness to the natural environment and food systems. The evaluation plan includes a pre- and post-test measurement instrument developed through an iterative process based on previously validated tools.

Interpretation: This procedure may inform future researchers, program planners, and educators to translate sustainable nutrition research into practice and engage youth as key agents of change in the Great Transition towards sustainable food systems.

Local government stakeholders' perceptions regarding food environment policy actions to simultaneously influence climate change and healthy eating

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Background: Unhealthy food systems are key drivers of diet-related burden of non-communicable diseases and account for 30 % of the global emissions. Local governments play a crucial role in improving healthiness and environmental sustainability of food systems however their current actions simultaneously addressing the two issues are unclear. Our aim was to explore the perceptions of local government stakeholders towards opportunities to adopt policy actions simultaneously addressing healthy eating and climate change.

Methods: We conducted in depth semi-structured interviews with a purposive sample of stakeholders from local government sustainability and health departments in the state of Victoria, Australia. Interview questions focused on stakeholder experiences, current council priority and future action areas targeting healthy and sustainable food systems. Data were analysed using reflexive thematic analysis using an iterative deductive approach. Multiple Streams Theory 'problem', 'politics' and 'policy' streams were used to explain how certain factors influence politics at the local government level.

Findings: Eleven semi-structured interviews were conducted from four local governments. Local government stakeholders acknowledged councils' role in undertaking actions to simultaneously influence healthy eating and climate change. Key influences on councils taking action aligned with Multiple Streams Theory's elements of 'problem' (council's existing risk and auditing reports as drivers for climate change action), 'policy' (budgetary constraints) and 'politics' (council executive agenda, existing socio-health inequities in the community and community support). Improving food security and developing external partnerships were highlighted as future action areas.

Interpretation: Policy change can be enabled by tailoring policy action areas according to community needs through councils' external partnerships and executive support. For favourable policy action we recommend increasing stakeholder perceptions of problem significance, prioritising of solution feasibility by policymakers, and maintaining political environments conducive to policy change by leveraging community and executive support.

The Interconnectivity between Lifestyle, Nutrition and Climate Change: a narrative review through Planetary Health lens

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Background: Food and nutrition are the basic requirements for human health for which climate and resilient environment are determinants. The actual food consumption and production patterns are largely contributing to environment and climate disruption, thus it is imperative to adopt a multi-dimensional planetary health approach to ensure a dietary lifestyle shift and a sustainable and equitable food system. Therefore, it is relevant to extrapolate the linkage between climate change and the food system.

Methods: A narrative review was conducted based on the keywords (‚Äò‚ÄôClimate Change" OR "Planetary Health") AND "Nutrition" to understand the linkage between theses subjects. 23 articles were initially retrieved from the PubMed database and 10 articles were considered after the full-text evaluation. Articles were selected based on the research question "How the planetary health perspective may highlight the impacts of climate change on the global food and nutrition system?”

Findings: An intrinsic interdependency between environment, climate change and the food system has been found. Land degradation, drought, global warming, water scarcity, pollution, and loss of biodiversity are interconnected affecting the quality, availability and diversity of food, which deteriorates nutrition and threatens food security. Food systems are crossing several planetary boundaries with serious environmental outcomes. Furthermore, excessive consumption of animal products and ultra-processed food is contributing to malnutrition and the burden of non communicable diseases.

Interpretation: Balanced natural systems and the access to high quality food are essential for human health. Thus, it is critical to adopt a multi-dimensional approach to promote a dietary pattern shift as well to transform the food system by a sustainable and equitable perspective, in order to achieve the 2030 Agenda. Planetary health broadness is a lens to understand the interconnectivity between food systems, human health and climate change, and should be an overarching multidisciplinary approach to address the climate change crisis.

Infectious Diseases

Climate stress and its impact on livestock health, farming livelihoods and antibiotic use in Karnataka, India

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Background (including context and aim): Recognising how climate variables may relate to livestock diseases is essential to predicting future outbreaks and planning future farming policies to safeguard global food supplies. We aim to define relationships between surface temperatures, precipitation, and vapour pressure with well-documented bacterial diseases in livestock across the Indian state of Karnataka – haemorrhagic septicaemia (HS), anthrax (AX), black quarter (BQ) and enterotoxaemia (ET).

Methods: Livestock outbreak data was collected from the NADRES v2 platform, and climate variable data collected from the CRU TS 4.05 gridded dataset. The period chosen was 1987-2020. These datasets were statistically compared using multiple correlative techniques and a principal component analysis. Risk maps were created using analytical results.

Findings: We identify that both precipitation and vapour pressure are key climate variables that positively relate to outbreaks of HS, AX, and BQ. Temperature and maximum temperature are negatively correlated with the same diseases, indicating that a cooling (but still hot) climate with wetter, humid conditions is a prime risk factor for future outbreaks. Principal component analyses have revealed the SW India monsoon and winter periods to be the most critically associated with HS, AX and BQ outbreaks. The negative relationship between temperature and these diseases, combined with the positive associations with rainfall and humidity, allow the classification of climate-associated risk maps.

Interpretation: From these risk maps, we identify that the north-western coast of Karnataka is the highest-risk area for HS, AX and BQ, irrespective of other factors outside of these climate variables that may also govern outbreaks. The western coastline and northern regions are at high risk of outbreak, while the central-eastern and south-eastern regions are the lowest risk. These risk levels are not predicted to change in the next 50 years, even with increased temperatures, and changing spatiotemporal patterns of precipitation and vapour pressures following CMIP6 modelled values.

The effect of landscape fires on child hospital visits and admissions: a time-series study in southern Mozambique

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Background: Landscape fires (LF) have negative effects on air quality, carbon cycling and soil. Research linking LF with child health remains limited. We assessed the association between LF and child hospital visits and admissions in Manhi√ßa district, Mozambique, an area affected by forest and cropland fires.

Methods: We conducted a time-series analysis (2012-2020) using daily satellite-derived fire counts (VIIRS 375m) and fire-related fine particulate matter (PM2.5) from smoke dispersion forecasts and number of hospital visits and admissions from a continuous pediatric (<15 years) morbidity surveillance system. Fires, according to land use type, were extracted from the study area and a 100km buffer. We applied quasi-Poisson regression models controlling for temperature, day of the week, season and long-term trend, and offsetting by annual population-time at risk to examine associations between fires (lags 0-4 days) and hospital visits and admissions.

Findings: We analysed 114,443 fires and a total of 507,034 child hospital visits (39.5% respiratory-linked) and 8,981 admissions (26.7% respiratory-linked). 47% of the fires were forest fires. Fire counts were moderately correlated with fire-related PM2.5 (R2= 0.47). Respiratory infection was the most frequent cause for visiting the hospital. Comparing two days with identical values in the adjustment variables but differing by 40 fires (interquartile range) resulted in an increase of all-cause (0.95%; 95%CI: 0.46, 1.44) and respiratory-linked hospital visits (1.14%; 0.57, 1.69) the following day. Significant associations were observed for other lags: lag 0-1 with all-cause (0.47%; 0.17, 0.77) and respiratory-linked visits (0.64%; 0.29, 0.99) and lag 2 with respiratory-linked visits (0.47%; 0.17, 0.77). Among land uses, the strongest effect was observed for cropland fires. We did not observe associations for hospital admissions.

Interpretation: Landscape fires, and especially cropland fires, were associated with all-cause and respiratory-linked hospital visits in children. Preventive strategies are needed to reduce the impact of human-induced fires on children's health.

Influences of social and environmental factors on dengue fever epidemiology in the city of São Paulo - Brazil

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Action plans for dengue fever prevention are always associated with vector control of Aedes aegypti, which is responsible for the transmission of the four virus serotypes circulating in Brazil. Despite efforts and investments in awareness campaigns and the broad use of insecticides, dengue fever epidemics persists for decades, alternating periods of greater and lesser endemicity. In this work, we aim to investigate spatial distribution of dengue fever in the city of SaÃÉo Paulo (Brazil) during the last eight years. We hypothesize that vegetal coverage, proximity to surface water areas, social vulnerability and population density may impact differentially in the occurrence of vectors and thus in dengue epidemics. Data from epidemiological bulletins and city public GIS database (GeoSampa) were collected and will be evaluated for associations and correlations. Preliminary data suggests that isolated, neither population density (PD, p=0,387) nor social vulnerability (favela index – FI) explain the differences observed in city districts with distinct incidence rates (IR) as Brasilandia (median IR: 579,4; PD: 12.615 hab/km2; FI: 29,6), Vila Medeiros (median IR: 334,87; PD: 16.873; FI: 3,0), Parelheiros (median IR: 42,8; PD: 855 hab/km2; FI: 10,8) and S√£o Rafael (median IR: 50,8; PD: 11.934 hab/km2; FI: 12). As a sum of environmental and social factors may leverage dengue transmission, we expect to identify those which influence the most, in order to outline specific vector control strategies for each region.

Trans-local and trans-glocal: Community responses to planetary health during COVID-19

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Background: Around the world, community-based organisations (CBOs) respond to local manifestations of interlocking planetary health crises. Local experiences of COVID-19 were exacerbated by insecure livelihoods, extractive economies, environmental destruction, and worsening inequity. CBOs are in a position to develop innovative and contextualised responses that address the interlocking crises and revitalise local systems of resources, however such responses are under-recognised and devalued because of their small scale. This study aimed to use a trans-local learning approach anchored in place-based case studies to understand how CBO responses to COVID-19 can link livelihoods, equity, health, well-being and the environment to address planetary health crises.

Methods: We conducted group discussions and interviews with five CBOs working with underserved communities in Finland, India, Kenya, Peru and the US. We then used a case study synthesis approach to collaboratively analyse similarities and divergences in experiences within and between each context. Insights were supported by the co-development of the translocal health network (www.translocalhealth.com), educational vignettes and mixed media.

Findings: Due to the proximity to the communities each organisation served, CBOs were able to signal potential system-wide consequences of COVID-19 relative to worsening existing social and health inequities and planetary health challenges. Crucially, organisations were able to develop rights-based, ecologically-minded pandemic responses to local priorities. Responses centred on systemisting and mobilising community assets including building young people,Äôs skills and livelihood opportunities to increase local ownership over decisions and safeguard diverse cultural and natural resources contributing to community and planetary health.

Interpretation: Whilst high-level, large scale responses have dominated planetary health discourse, our work has demonstrated solutions to planetary health often come from small-scale but connected-up and connected-out community initiatives. Locally-focused, globally aware actions represent untapped potential in strengthening planetary health, harnessing this power warrants greater recognition, funding and network opportunities for small to medium-scale CBOs

Spatiotemporal distribution and diversity of airborne resistant bacteria: an exploratory observational study in the urban and rural environments of Bangladesh

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Background: Antimicrobial resistance (AMR) is a widespread planetary health issue. However, there is dearth of knowledge and scientific evidences on the magnitude of resistant bacteria in air and their transmission pathway. Therefore, we conducted an exploratory observational study in Bangladesh to quantify the clinically significant drug resistant bacteria in air with spatial diversity.

Methods: We collected air samples from both urban and rural settings in four distinct environments: i) Urban live bird markets(LBM) ii) Urban residential area(URA) iii) Commercial poultry farms(CPF) and iv) Rural households(RHH). We used MacConkey agar supplemented with 3rd generation cephalosporin (3GC) and meropenem respectively to obtain 3GC resistant (3GCr) and carbapenem resistant Enterobacteriaceae (CRE). Mannitol Salt agar supplemented with oxacillin and Slanetz-Bartley medium supplemented with vancomycin were utilized to obtain

Methicillin (Oxacillin) resistant Staphylococci (MRS) and Vancomycin resistant Enterococci (VRE). The bacterial identification and susceptibility testing were conducted by VITEK 2 system.

Findings: We found the presence of 3GCr, CRE, MRS and VRE in 85%, 60%, 100% and 80% air samples respectively. 3GCr, CRE and MRS were highest in CPFs and VRE in LBMs. The abundance (>90%) of MRS, VRE and 3GCr in URA is alarming whereas the air samples from RHHs were heavily burdened with 3GCr and MRS (60-100%).The CRE in poultry environment also establishes the threat added by current farm practice. The diversity and richness of resistant organisms were measured by Shannon diversity index, which was higher in both seasons at LBMs and CPFs (H-2.17-2.21 and H-1.99-2.03 respectively). Considering the organism family, the major bacteria were Staphylococcaceae (35%), Pseudomonadaceae (20%), Enterobacteriaceae (15%), Moraxellaceae (10%), Lactobacillaceae (7%) and Enterococcaceae (6%).

Interpretation: Our study findings emphasize on the inclusion of air in the system approach and surveillance to tackle AMR due to its high potential for acting as both reservoir and medium of spread of resistance.

Digital Infection Blockers. A Planetary Health Solution to Prevent the Next Pandemic

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Background: SARS-CoV-2 is a complex planetary health problem with disastrous impact. The COVID 19 pandemic showed that there were serious deficits in the digitalization of public health services worldwide. Even the simplest processes were handled analog, e.g. with letters and fax, and some of the software was 20 years old. On the other hand, digital contact tracking tools, green code systems, artificial intelligence and various digital tools were used early in many countries. From this background, two questions arise: What is the impact of digital tools for infection control and to build resilience? What is the future role of digital tools for building the field of Planetary Health?

Methods: Based on a qualitative literature review, an initial assessment of digital NPIs was conducted. Then, data analysis was used to identify countries that are successfully and less successfully using digital tools. Based on this, the SIR model as well as the classical control strategies containment, elimination and eradication were analysed with a focus on possible digital factors.

Findings: The effectiveness and efficiency of infection control were identified as the two key performance indicators (KPIs) for the evaluation of pandemic management. States using professional digital tools combined with procedural knowledge and good governance had the highest effectiveness of infection control in terms of low fatality and infection rates. As a new phenomenon, digital infection blockers have been discovered that can reduce the transmission and spatial diffusions of viruses up to 90 %. With the digital infection blockers, a new digital SIR model was built, new digital control strategies (including AI) were developed and the first tools to

implement them in practice. Digitalisation was identified as a strong impact factor for infection disease control. Exactly how high the factor of digital infection control in the COVID 19 pandemic was, needs further investigation.

Interpretation: Digital infection blockers can help to prevent the next pandemic. They can be an important instrument in optimising NPIs and supplementing vaccines in the future. Generally, digital tools can -together with better governance - significantly increase and accelerate the effectiveness of public and planetary health operations. For healthy people, planetary health and to prevent the next pandemic, digital tools and services for cities, counties and state must be modernised worldwide.

The role of veterinarians in the One Health approach to antimicrobial resistance perspectives in Jordan

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Background: This study aims to evaluate the role of Jordanian veterinarians in terms of their knowledge, attitudes and common practices in combating antimicrobial resistance (AMR) and summarize the registered veterinary drugs between 2017 2020.

Methods: Descriptive study data were collected using a standardized questionnaire that focused on the knowledge, attitudes, and practices of Jordanian veterinarians.

Findings: The findings were analyzed descriptively; 84% of the participants agreed with the statement on the definition of AMR. The majority (95.65%) of participants agreed that AMR is a challenge for the veterinary sector in Jordan and that it should be prioritized over other zoonotic diseases. Approximately 69% of the participants believed that the misuse and overuse of antimicrobials by unqualified, fraudulent, or unauthorized practitioners is the primary reason for the rise of cases associated with AMR and the challenges that accompany these. The most common practice among the respondents in this study was to recommend clients (e.g., farmers and owners) to practice good animal husbandry (80.00%). The study also revealed that there was a significant difference ($p = 0.015$) between attendance at AMR training sessions and the professional sector (private, public, and academic) of the veterinarians.

Interpretation: This study underscores the importance of implementing a continuous education program on AMR so as to enhance the all-round knowledge of veterinarians and improve their advisory skills. In addition, laws should be enacted to ensure that veterinarians prescribe the

correct antimicrobials and to improve surveillance systems for monitoring the use of antimicrobials in veterinary medicine.

Effects of Migration and Vaccination on Spread and Control of Yellow Fever in Latin American Communities – A Mathematical Modeling Study

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Background: With the Covid19 pandemic, the stigmatization of migrants as mere vectors of diseases has worsened. Our goal is to assess how migration rates can affect yellow fever dynamics in Latin American communities, and one of those is Necoclí (Colombia), with 70,000 inhabitants and another 70,000 migrants annually waiting to access Central America.

Methods: This study brings a SEIRV-SEI model for humans and vectors and numerical simulations applied to three scenarios: (1) the migration from an endemic community to a disease-free host community; (2) migration from an endemic community located in a migratory route to a disease-free one; (3) Necoclí as a study case, evaluating the effects of vaccinating migrants upon arrival.

Findings: The type of vector and vaccination coverage in the host community are more relevant for the occurrence of outbreaks than migration rates, and effective vaccination can reduce up to 50% of cases, but not eliminate them due to the influx of exogenous cases. In Necolcí, the loss of herd immunity is 50% every year, and in case of an outbreak, there could be from 3,500 to almost 8,000 cases of yellow fever in the city.

Interpretation: Although migration brings a virus to a community, it is not responsible for the outbreak outcomes. So we should focus on vaccinating and working on vector control instead of blaming migrants. Vaccination could prevent even more cases if any proportion of migrants are already immune, but there is no way to access it or hope they have vaccination documentation in hand. With the increase in the migration of children under 5 years of age, the concern about their vaccination history is even greater. The model represents many communities in Latin America and suggests that safe migration corridors can significantly contribute to the control of vaccine preventable diseases.

A possible mechanism underlying the region-based variation in the impact of COVID-19: a past epidemic of Mycobacterium tuberculosis

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Background: The COVID-19 has created a remarkable and varying impact worldwide. In a holistic way of tackling this pandemic, a possible mechanism underlying the region-based variation in the impact should be clarified. Herein, we hypothesised that the past epidemic of Mycobacterium tuberculosis may act as a latent explanatory factor for the worldwide differences seen in COVID-19 impact on mortality and incidence.

Methods: In this ecological study, we compared the past epidemic of M. tuberculosis, incidence (159 countries in 1990) and mortality (28 countries in 1950), with the mortality and incidence of COVID-19 on 11th February 2022 according to BCG vaccination status. We also calculated the rate ratios (RR) of the cumulative COVID-19 incidence/mortality per 1 million for one unit decrease in the incidence/mortality of tuberculosis, respectively, using the generalized log-linear regression model.

Findings: An inverse relationship existed between the past epidemic indicators of M. tuberculosis and the current COVID-19 impact was observed. The RR of the COVID-19 mortality was 1.23 (95% confidence interval: 1.08-1.39) per 1 unit decrease in the incidence rate of tuberculosis (per 100,000 people). The RR of the COVID-19 incidence was 1.51 (1.36-1.69). These associations existed even after adjusting for potential confounders (elderly rate, diabetes prevalence, mortality rate from cardiovascular disease, and GDP per capita), leading to an adjusted RR of COVID-19 mortality of 1.08 (0.93-1.26) and RR of COVID-19 incidence of 1.99 (1.04-1.35). After latent infection, Mycobacterium survives in the human body and may continue to stimulate trained immunity.

Interpretation: This study suggests a possible mechanism of tuberculosis to influence on the region-based variation in the early phase of the COVID-19 impact. Both pathogens are involved with human beings at the global level. Therefore, future research is needed to determine how the natural environment affects the two diseases themselves and this relationship.

Spatial-temporal associations between forest cover change and pediatric health indicators in selected sub-Saharan African countries

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Background: The relationship between forest cover loss and infectious disease risk is in need of further investigation, particularly in impacts to vulnerable populations (children). The proposed research investigates the linkages between forest cover change and selected pediatric health outcomes. We propose various regression analyses to investigate forest cover data from NOAA and pediatric health data from USAID's Demographic and Health Survey to assess these associations. The research will use DHS ‚Äúcluster sites‚Äù along the human-wildlife interface in Senegal, Kenya, and Tanzania as appropriate geographic variables. Anticipated outcomes would demonstrate the positive or negative relationship between forest cover change and certain diagnoses, while allowing for further mechanistic investigation.

Methods: This research proposes regression analyses using land cover data from the National Ocean and Atmospheric Association (NOAA) and Global Forest Change project, and health data from USAID's Demographic and Health Survey datasets to assess associations between pediatric health land use change. To measure deforestation, a Normalized Vegetation Index and Enhanced Vegetation Index will be used to measure forest cover change/loss. To measure pediatric health, we will assign variables to dehydration, respiratory, digestive, and malaria diagnoses in our designated DHS cluster sites. We plan to run logistical, multiple, and longitudinal regression analyses plotting environmental variables (NVI, Enhanced Vegetation Index by year, Global Human Footprint) versus pediatric health variables (OC201-204) at the appropriate scales.Additionally, an assessment of the specific mechanism(s) that link forest cover and pediatric health outcomes would be useful following a successful initial data analysis.

Findings: This study is in the process of being completed, thus findings are incomplete at the present moment, but will be complete by the time of the PHA Annual Meeting. We expect to show an association between significant forest cover loss and higher child health morbidity. The expected results would provide a basis and further opportunity for research to explore the causal relationship between these data.

Interpretation: The relationship between forest cover loss and human health in areas along the human-wildlife interface is poorly understood. This research proposes an investigation into ecological determinants of health issues impacting vulnerable populations (children) along that interface. While the connection between deforestation and infectious disease is becoming more clear, additional data that expounds upon children as a vulnerable population is needed in the literature. Understanding the relationship between forest cover and pediatric morbidity and

mortality may allow for the investigation of mechanistic properties that could further the evidence for a casual relationship between certain factors.

Knowledge, attitudes and Practices of Medical Students on Covid 19 in Burundi

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Background: COVID-19 first appeared in China in late 2019 and was declared pandemic by the WHO in early 2020. The first cases in Burundi were reported in late March 2020. Our study aimed to find out the basic knowledge, attitudes and practices on Covid-19 of medical students; who've already started their hospital practices likely to encounter patients since they weren't trained before the start of their internship.

Methods: We collected data both on a pre-designed questionnaire (offline questionnaire for medical students from National Univerity of Burundi and University of Ngozi who do their internship in capital city) and an online survey via a Google form (for medical students from Hope Africa University who do internship in rural area). We analyzed socio-demographic data as well as knowledge, attitudes and practices of COVID-19. We used random sampling method. As software, we used Epi-Info for data analysis.

Findings: Out of the 3 universities with medical faculties in the whole country; we were able to collect responses from 78 students; 50% were from the University of NGOZI, 46.15% were from the University of Burundi and others from Hope Africa University. Males were represented at 69.23%. Only 34.62% of our respondents claimed to have received training on COVID-19 if not all of them claimed to have learned it from various sources: Social media (70.51%), Google (42.31%), public or electronic poster (20.51%) and online course (5.13%). In general, the majority of students (98.71%) had advanced knowledge on COVID-19 (with ,â•13 out of 25). 78.21% had full knowledge of the means of propagation; only 21.79% knew more about the risk of complications, 64.10% claimed to follow the preventive practices against Covid19 while almost 41.56% washed hands less than once an hour. In 49.35% of cases, the students stated that they throw away the masks in the garbage after use. Knowledge, attitudes and practices did not depend on the university (P=0.8719). A significative majority of students, 87.2%, indicated they were scared of being infected by COVID-19 during internship.

Interpretation: Medical students in Burundi have advanced knowledge regarding COVID-19 but still lack some necessary and useful information to counter the spread of the disease and the risk of complications. Also, self-information takes precedence over training as a source of information. It would be important to learn medical students about Covid-19 and how to prevent themselves before starting their internship, to teach them how to use the PPE (Personal Protective Equipment)

and to give them necessary tools which can help to prevent themselves to Covid-19 during the clinical studies or internship.

Mental Health

Complimentary and Integrative Health: A Systems Thinking Response to COVID-19

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Background: This critical analysis established how Complimentary and Integrative Health (CIH) practitioners and the modalities they offer can play more of a role in prevention and intervention during emergencies like the COVID-19 pandemic through the establishment of best practices.

Methods: For this critical analysis, a systematic search and review of the relevant literature was first conducted in the Cochrane Database of Systematic Reviews (CDSR) and then uploaded into Covidence from PubMed. Initially, two-hundred and thirty-one articles (n=231) were examined by two CIH experts through a title and abstract screening. From that initial pool, one-hundred and eighteen articles (n=118) were fully assessed for relevance and then sorted by topic for further analysis by the author and when necessary in consultation with key informants.

Findings: This critical analysis stems from a body of literature focused on Traditional, Complementary, and Integrative Medicine (TCIM) health practices, therapies, and medical systems that address both the health and disease of human beings, consisting of ninety-two articles (n=92) from the first two years of COVID-19 pandemic.

Interpretation: CIH can prepare populations for future challenges while playing a pivotal role in addressing the concurrent public health emergencies resulting from the COVID-19 through coordinated efforts by all stakeholders. This analysis may provide important considerations for future research and policy to ensure better public health.

Learning about planetary health issues from a qualitative study on physical activity and health during the COVID-19 pandemic.

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Background: This work addresses partial results of qualitative health research on the topic of physical activity during the Covid-19 pandemic in São Paulo-Brazil. With closed parks and gyms, people were encouraged to practice physical exercise but lacked resources (cognitive, material, and space). Listening to people in this situation opened the possibility to think about other topics related to the Planetary Health field of interest.

Methods: Semi-structured online interviews were conducted. An open question started the conversation between participant and researcher. An adaptation of the photovoice technique was used to deepen understanding and data production in some cases.

Partial Findings: Most participants spontaneously pointed to issues about physical activity. Due to the methodological design, it was possible to relate topics such as mental health, lack of nature, and urban landscape to the pursuit or absence of physical exercise.

Interpretation: Listening about issues in people's daily lives during the pandemic made it possible to understand some relationships about physical activity behavior during specific periods such as the COVID-19 Pandemic. The open-ended question allows participants to choose the starting point for their response. More contact with nature, the need for freedom (expressed by pictures of natural landscapes), and contact with other people were the elements that drove the decisions to engage in physical activity (also the absence) in the lockdown. Parks, public or private (community) green spaces that expand the contact with nature are fundamental for mental health in cities like São Paulo. Public structures for physical activity are also important, but in situations of restrictive measures, it is necessary to drive governmental actions so that people can access information and resources to practice physical activity. Physical activity in public space, green areas and mental health seems to be connected in these pandemic times.

Long-term housing and health trajectories post natural disaster events

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Background: Extreme weather disasters have profound health consequences and can result in damage to people's homes that destabilize their recovery. We assess the effect of these disasters on long-term health and housing trajectories and how health recovery differs by housing circumstances.

Methods: A population based longitudinal dataset (2009-2019) from Australia is used. We match exposure cohorts who experienced a weather-related disaster (flood, wildfire, or cyclone) with control cohorts who were unexposed based on a series of baseline covariates. The impact of disasters on people's health and housing circumstances up to eight years post disaster is assessed using linear mixed models controlling for time-invariant and time-varying confounders.

Findings: Two thousand and three respondents were exposed to natural disasters that damaged or destroyed their homes. The groups most at risk include older people, people in regional or remote locations, people residing in socioeconomically disadvantaged areas, people who identify as indigenous, low-income households, and people with long-term health conditions. Mental, social, and emotional health is significantly impacted at the disaster year, and the impact is sustained for two years post disaster before gradually recovering to the counterfactual level. Housing affordability

stress and mortgage or rent arrears peak at post year one. Residential mobility is significantly higher at the disaster year, largely driven by moves within a local area. Health trajectories vary depending on people's housing circumstances. Those displaced have five times worse mental health than those who remained in their homes at the disaster year. Those in rental properties and disadvantaged areas pre-disaster have larger decreases in mental health.

Interpretation: Natural disasters affect mental, social, and emotional well-being, and cause housing stress and insecurity. Health impact is most felt by socioeconomically vulnerable groups and those displaced. Assistance with housing following disasters can be protective of health and well-being.

Saving Snow: Climate Change Attitudes and Behaviors Among the Nordic Ski Community

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Background: Nordic (cross-country) skiing benefits human health and the economic livelihoods of communities near ski centers, but climate change is changing the landscape and availability of the sport. The purpose of this project is to understand current climate change-related attitudes and beliefs among the Nordic ski community, and to offer related policy recommendations for supporting climate-smart cross-country ski initiatives.

Methods: Our approach included an anonymous online survey of cross-country skiers in the United States aged 18 years and older (n = 785). Questions included participant's current skiing behaviors, motivations to ski, and distance traveled to ski, beliefs related to how climate change is and will impact ability to ski, general climate change awareness and attitudes, and demographics.

Findings: Our preliminary results indicate that health and fitness are the primary motivating factor for cross-country skiing (49%), followed being out in nature (25%), and improved mental health (10%). The majority of respondents report skiing at least once per week (64%), and 64% report primarily driving less than 30 minutes to reach their ski destination. Respondents are very aware of climate change (77%), believe climate change is important (70%), are worried about climate change (66%), and believe that climate change is already impacting their ability to ski (83%). Fewer respondents actively consider the climate impact of their ski travel (64%) or of their preferred ski center (43%). Importantly, most respondents say that if future conditions at their preferred ski location are poor, they will travel somewhere else to ski (83%).

Interpretation: These findings suggest that the Nordic ski community is aware of climate change, but overall does not participate in mitigation actions related to climate-friendly skiing.

The mental health impacts of human-ecosystem-animal relationships: A systematic scoping review of Eco-, Planetary, and One Health approaches.

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The threats to our living planet and biodiversity are ever-present and increasingly more severe due to climate change and environmental degradation. There is an emerging discourse exploring the mental health dimensions contained within these changes. To better understand these impacts requires novel and creative methodological approaches built on frameworks that integrate perspectives from the social and natural sciences. Three of the most influential approaches that use holistic and interdisciplinary frameworks that work within the human-animal-ecosystem interface include: One Health, EcoHealth, and Planetary Health. These frameworks report mental health as an integral component within public health-related outcomes. However, a comprehensive and up-to-date synthesis of the state of the literature that examines how mental health is explored within these frameworks does not currently exist. A systematic scoping review was therefore conducted to obtain clear understandings of patterns and gaps, identify broad themes, and highlight future research needs and considerations. Eight databases were used (PubMed; PsycINFO; Cochrane Library; GreenFILE; CINAHL Plus; Global Health; Scopus; Web of Science) to identify all empirical studies. The authors adhered to strict PRISMA guidelines, used well-defined inclusion/exclusion criteria, and used dual screening/extraction throughout the process. 1786 titles/abstracts were reviewed, with 179 articles receiving full-text review. Only 13 papers were included: six used the One Health Framework, with Planetary and EcoHealth each represented by three. The main finding of this review is the dearth in literature despite each framework recognizing the importance of understanding, enhancing, and protecting the relationship between Earth's animals, ecosystems, and mental health. Other trends include a predominate focus on companion animals as interventions, and the use of "sense of place" as a mental health outcome. Future research should empirically shine a light on the mechanisms underpinning the intersections between ecosystem, animal, and human mental-health so that data-driven policy recommendations and interventions can be proposed.

Perceptions about New York City Community Gardens in Relation to Food Security and Other (Potential) Benefits

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Background: Community gardens (CGs) provide human and ecological benefits (e.g. strengthening food systems, community development, and urban greenspace). CGs have particularly rich histories in New York City (NYC) (e.g. combating structural discrimination). Previous studies have quantified NYC CGs' benefits, but qualitative insights into key stakeholders' perceptions have not been sufficiently explored. This study sought to explore key stakeholders' perspectives about NYC CGs' benefits, costs, risks, barriers, and trade-offs, and if/how the COVID-19 pandemic shaped them.

Methods: Individual, semi-structured, virtual interviews were conducted with fourteen stakeholders (NYC residents, CG leaders and researchers, and city officials connected to CGs) during June and July 2021. Coding and thematic analysis were used to analyze the data.

Findings: Participants perceived NYC CGs as context-dependent concerning their size, plants grown, purpose, and land-sharing system. CGs were described in relation to (alternative) food systems, greenspace-gentrification relationships, environmental health (e.g., coastal resilience), and NYC inequities based on settler colonialism, racism, classism, and sexism. Participants highlighted cultural benefits like mental health "oases," youth education, and sociocultural memories, as well as "food sovereignty." CGs were seen as "more than the sum of their parts." Barriers to accessing NYC CGs included the work-intensive and hyper-urban "rhythm" of NYC life. Risks of heavy metal contamination and unpleasant intercultural/interpersonal dynamics were described. Participants identified (potential) time, labor, and monetary costs impacting CG use. Trade-offs between inclusivity (perceived as equitable) and exclusivity (perceived as peaceful), and urban spatial uses (housing versus greenspace access) were highlighted. The COVID-19 pandemic was perceived to exacerbate food insecurity and housing inequities in NYC communities and alter CG engagement.

Interpretation: Participants added nuanced perspectives not yet reflected in public documents and studies. Insights addressed CG operationalizations, social meanings surrounding cultural benefits and food sovereignty, safely and effectively using NYC spaces, and connections between the COVID-19 pandemic and historical inequities.

Effects of food and water insecurity on depression scores among women living in urban informal settlements in Makassar, Indonesia during the COVID-19 pandemic: a longitudinal cohort study

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Background: Women living in informal settlements may be particularly vulnerable to the detrimental effects of the COVID-19 pandemic due to increased economic and psychosocial stressors in already resource-strapped environments. The objective of this study was to assess the effect of food and water insecurity during the pandemic on depression among women living in urban informal settlements in Makassar, Indonesia.

Methods: We implemented surveys at three time points among women enrolled in the Revitalizing Informal Settlements and their Environments trial. Depression was measured using the CESD-10 scale in November-December 2019 and February-March 2021. Food and water insecurity were measured in August-September 2020. Food insecurity was measured using two questions from IPA,Äôs Research for Effective COVID-19 Responses survey. Water insecurity was measured using the short form of the HWISE scale. We ran three multivariate quantile linear regression models to assess the effects of these insecurities during the COVID-19 pandemic on CESD-10 score, while controlling for pre-pandemic CESD-10 score, financial satisfaction, disability, and wealth. There was data from 323 women from the last two time points and 221 women from all three time points.

Results: Food (β: 1.48, 95% CI: 0.79-2.17), joint food/water (β: 2.40, 95% CI: 1.43-3.38) and water (β: 0.13, 95% CI: -0.01-0.26) insecurity all had positive relationships with CESD-10 score. In sub-group analyses of respondents for whom we had pre-pandemic CESD-10 scores, results were similar but attenuated, with joint insecurity (β: 1.96, 95% CI: 0.78-3.15) maintaining the strongest relationship with CESD-10 score.

Conclusions: Joint insecurity predicted higher depression scores among the women in our study. Our results highlight the importance of addressing food and water insecurity together, rather than in silos as is standard practice. This cross-sectoral coordination will be especially important with the growing threat that climate change plays on both food and water insecurity in LMICs.

Investigating the contextual factors and mechanisms associated with implementing bluespace prescription programmes in health and social care settings: a systematic review using realist synthesis

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Background: Nature-based social prescribing programmes such as 'bluespace prescriptions' promote public health and health improvement of individuals with long-term conditions. However, there is limited evidence that explains the contexts and mechanisms of implementing Bluespace Prescription Programmes (BPPs) in health and social care settings that could inform policy and practice.

Methods: We conducted a realist review by searching six databases for articles (2000-2020) published in English, about health and social care professionals providing referral to or prescription of blue space activities with health-related outcomes. We thematically developed contextual factors by analysing the contexts of implementing BPPs. We used these contextual factors to develop programme theories describing the mechanisms of BPP implementation.

Findings: Fifteen studies with adequate to strong quality were included from 6,736 collected records. Service users had improvements on their physical, mental, social health, and environmental knowledge after participating in BPPs referred to or prescribed by health and social care professionals. Patient-related contextual factors were referral information, free equipment and transportation, social support, blue space environments, and skills of service providers. Programme-related contextual factors were communication, multi-stakeholder collaboration, financing, and adequate service providers.

Interpretation: Programme theories on patient enrolment, engagement, adherence, communication protocols, and long-term programme sustainability described the mechanisms of BPP implementation. BPPs could support health and social care services if contextual factors, mechanisms, and programme theories associated with patients,Äô characteristics and programme delivery are considered in planning, development, and implementation of similar nature-based social prescribing programmes in health and social care settings.

Humanizing Marine Spatial Planning: A Salutogenic Approach

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Human well-being is increasingly being recognized as an important aspect of marine spatial planning (MSP), yet research and practice continue to neglect this component. Specifically, the consequences of marine development and climate change on human health are largely absent from ocean governance processes, and need to be addressed. This study argues that human health and spatial planning frameworks may be employed in combination to address this issue. Guided by the concept of salutogenesis (health promotion), this study utilized online participatory mapping in conjunction with a questionnaire to explore study participants,Äô perceptions of the health benefits of, and barriers to, participating in coastal activities within Halifax Regional Municipality (HRM), Nova Scotia, Canada. Results from this study indicated that participating in coastal activities in HRM is perceived to be very important for human health. In support of MSP implementation, criteria for salutogenically significant areas (SSAs) were developed by drawing parallels to the CBD criteria for biologically and ecologically significant areas, which included uniqueness, diversity, productivity, importance for underserved populations, and vulnerability. Recommendations are made for gathering SSA criteria information while enabling marine managers to make more informed decisions about how to best consider human health objectives within MSP. Further application of this participatory mapping approach to gather human health data, particularly to collaborate or partner with diverse and underserved population groups, is recommended.

Exposure to nature during COVID-19 pandemic and associated impact on mental health: A systematic review with meta-analysis

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Background: The COVID-19 pandemic and the measures such as lockdowns to control its transmission generated unique impacts on psychological health and well-being. In these circumstances, access to nature and outdoor spaces became a potentially important coping strategy, but the current evidence exploring the mental health benefits of nature exposure during different stages of the pandemic is mixed and poorly understood. We systematically synthesized the evidence to examine larger trends in associations between nature exposure and mental health during the COVID-19 pandemic.

Method: We performed a comprehensive keyword search in PubMed, Web of Science, Scopus, CINAHL, and PsycInfo for articles published between January 2020 and April 2022. We followed the PRISMA guideline to synthesize and report results. Using the Navigation Guide, we determined the risk of bias in studies at the individual level and throughout the body of evidence for each outcome of interest.

Findings: A total of 2,004 relevant articles were initially identified and after screening for relevancy, 72 were ultimately included in the review. Studies found associations between green space visit frequency, green space accessibility, and type of green space (e.g., indoor vs. outdoor) with mental

health outcomes (e.g., depression, anxiety) during the pandemic. However, evidence for links between satellite image-driven measures of greenness (e.g., NDVI) and mental health was limited. Meta-analysis shows that access to gardens was associated with lower odds of depression (OR=0.71, 95% CI=0.61-0.82, I2=0%) and anxiety (OR=0.73, 95% CI=0.63-0.84, I2=0%). Similarly, higher frequency of visits to greenspace was associated with improved mental well-being (OR=0.10, 95% CI=0.07-0.14, I2=0%) and general mental health (OR=0.11, 95% CI=0.03-0.38, I2=82%).

Interpretation: Interventions that prioritize nature-based infrastructure and emphasize exposure to nearby nature (indoor plants, gardens), and visits to greenspaces such as parks, could create more psychologically resilient communities in the face of future public health crises.

Access to urban green spaces and social inequalities: A London case study using national social deprivation statistics

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Background: Rapid urbanization increased the proportion of the population living in cities and reshaped land covers in urban environments. Research has shown that communities in the most deprived neighbourhoods lack access to urban green spaces (UGS) and are unable to benefit from the health and wellbeing, social and economic benefits they can provide. The aim of this project was to gain a better understanding of the social dimensions of inequalities on access to UGSs.

Methods: We completed a literature review of European studies investigating socio-economic inequalities to the access and use of green spaces by carrying out a case study for the London Borough of Camden analysing existing national data for multiple dimensions of deprivation and access to green space (as measured by the Friends of the Earth green space rating). Analysis of Variance (ANOVA) was used to detect statistically significant differences between average deprivation scores and the green space rating categories.

Findings: The literature review found socio-economic inequalities to the access and use of green spaces depending on age, gender, and those with disability. This can also be influenced by the design of UGS. The case study revealed non-statistically negative trends between increased social deprivation (for several dimensions) and decreased access to green space. Interestingly, statistically significant differences were found between 'barrier to housing & services' and access to green space.

Interpretation: Current evidence clearly indicates that access to urban green space and its benefits are socially unequal although some dimensions are underexplored. The method employed for the case study could be further developed and applied to Greater London or other urban centres and attempt to detect interactions between social dimensions that correlate with poorer access to green space. Such investigations are crucial to support socially fairer decisions about urban planning and ensuring environmental justice.

Impact of unseasonable flooding on women's food security and mental health in rural Sylhet, Bangladesh

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Background: Climate change will lead to more frequent and intensive flooding. In April 2017, unseasonably early flooding led to inundation of low-lying cropland before rice harvest in northeastern Bangladesh. We describe coping strategies and quantify short- and medium-term impacts of this event on food security and depressive symptoms of women.

Methods: This observational study is nested within the cluster-randomized trial "Food and Agricultural Approaches to Reducing Malnutrition" (FAARM, NCT02505711), which included 2700 young women in 96 settlements in rural Sylhet, Bangladesh. Flooding exposure was defined as a woman self-reporting her household to be "greatly affected" 6 months after the flood. A remote sensing and GIS analysis will be used to detect the flood extent and affectedness of residential and cropping areas. We collected data on coping strategies, household food security and depressive symptoms before and up to 2.5 years after the flooding event. We used multilevel regression adjusting for intervention allocation and pre-flood measures to quantify the flood's effect on food security and mental health.

Findings: More than half of women reported their household being greatly affected, many losing a large part of their rice harvest. Borrowing money with interest was the most common coping strategy, with households paying back on average 1.5 times of what was borrowed. Greatly affected households had higher odds of food insecurity, with a reduced impact over time (6m, 2y, 2.5y after flooding: OR 2.4, $p<0.001$; OR 1.6, $p<0.001$; OR 1.3, $p=0.01$, respectively). Women in such households also had 1.5 times higher odds of depression ($p<0.001$) 2.5 years after the flood.

Interpretation: The 2017 flooding event negatively impacted food security and mental health of women. To reduce such negative impacts, adaptation is crucial, including financial protection.

Non-communicable Diseases

Heat Shock Alters the Proteomic Profile of Equine Mesenchymal Stem Cells

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Background: Increased periods and severity of extreme heat have become increasingly common because of climate change . Pregnant women and the unborn fetus are known to be more vulnerable to extreme heat events, because of thermoregulation changes during pregnancy. Since research supports the link between the chronic effects of fetal health and the development of chronic disease in adults, this increased climate stress may lead to the development of chronic disease over the lifespan. The objective of this research was to create an in vitro mammalian cell model to determine the impact of heat as a stressor on stem cell differentiation and protein expression. A proteomics approach was used to observe the protein profiles of the differentiating stem cells under heat stress.

Methods: Mass spectrometry was used to compare relative protein abundances among three cell types, mesenchymal stem cells (MSCs), osteoblasts, and adipocytes, cultured at two temperatures, 37°C and 42°C. The survival of the cells was validated using cell staining and observation of the cellular differentiation process, and the heat stress was validated by a Western blot method to target heat shock proteins.

Findings: Although cells in each condition survived the higher temperature, the morphology and organization of the cells was altered by the heat stress. Changes in the proteome during the process of stem-cell differentiation were observed in response to heat stress and may be a result of epigenetic effects.

Interpretation: We propose that this animal stem cell model can be considered analogous to exposure to heat stress during the process of human embryonic development. As an experimental model of external environmental heat stress, this represents a possible outcome of human development from climate change leading to chronic disease across the lifespan.

Association between neighborhood residential density and incident dementia using UK Biobank data

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Background: Residential density, a fundamental metric of urban packing in our cities, are known to configure environmental stressors. Little is however known of the potential association between neighbourhood residential density and dementia. We examined the association between neighbourhood residential density and incident dementia in the UK Biobank.

Methods: Participants who did not change their residence over the follow-up period, with data available for residential density and without dementia at baseline were included in this prospective study. Neighbourhood residential density was defined as the number of housing units within 1-kilometre street neighbourhood of participant's residence. Cox proportional hazard models were developed to examine the association between neighbourhood residential density and incident dementia after adjusting for socioeconomic, behavioural, environmental and anthropometric factors. As a sensitivity test, we reran the analyses by using the exposure measured within 2-kilometre.

Findings: During a mean follow-up period of 12·0 years (SD=1·7), 279,968 adult participants (51·9% of whom were women) met our inclusion criteria and were included for analyses. We found that every 1,000 units per Km2 increase in neighbourhood residential density within 1-kilometre of geocoded residence was associated with 10% higher risk of incident dementia (HR 1·10 [95% CI 1·07–1·14], p<0·0001). Relative to participants residing in the lowest housing density tertile (0-1 447 units/Km2), those in the middle (1,447-2,084 units/Km2) and top tertile (2,084-10,513 units/Km2) showed higher risks of incident dementia (middle vs bottom tertile: HR 1·11 [95% CI 1·01–1·21], p=0·0240; top vs bottom tertile: HR 1·23 [95% CI 1·12–1·36], p<0·0001). The results remained robust in our sensitivity analysis with the exposure measured within 2-kilometre.

Interpretation: We found that higher neighbourhood residential density was associated with higher risk of incident dementia. Optimizing residential density may be an important intervention to mitigate risk of dementia.

Heat stress and incidence of acute kidney injury among agricultural workers in Spain

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Background: Heat stress (HS) is associated with adverse health outcomes among workers, including acute kidney injury (AKI). This study aimed to estimate the incidence of AKI over the course of the work shift and the association with HS among agricultural workers in Spain, where summer temperatures are high and heat waves are expected to be more frequent.

Methods: Male agricultural workers were enrolled in two different harvesting seasons and provinces: summer in Alacant (n=43, September 2018) and winter in Tarragona (n=52, November 2018 and January 2019). For each participant we estimated exposure to HS during a work shift based on the wet bulb globe temperature (WBGT) index (ISO 7243:2017) and AKI cross-shift incidence, defined as an increase in post-shift serum creatinine by at least 0.3 mg/ dl or at least 1.5 times the pre-shift serum creatinine levels. We collected information on confounders. For a subsample of participants (n=54), we measured neutrophil gelatinase-associated lipocalin (NGAL) levels before and after the working shift. We used regression models to assess if heat stress is a risk factors for AKI and increase in NGAL levels.

Results: Mean WBGT was 24.5 ·µíC (20.2-27.1) during the summer season and 14.2 ·µíC (8.0-20.7) during the winter season. Nine percent of workers harvesting during summer were exposed to HS. Incidence of AKI was higher during the summer season (33% versus 4%). HS was associated with cross-shift incidence of AKI [Age adjusted OR (95%CI) =9.6 (1.4, 67.9)]. No differences in NGAL levels were observed between participants exposed to HS.

Interpretation: Heat stress is a risk factor for AKI among agricultural workers in Spain even when environmental temperatures are not extremely hot. Monitoring AKI incidence among agricultural workers in the Spain is important in the context of global warming, as frequent episode of AKI can lead to chronic kidney disease.

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The Effects of Endocrine Disrupting Chemicals in Plastic on Children's Health

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Background: Chemical additives, including endocrine-disrupting chemicals (EDCs), comprise up to 50% by weight of manufactured plastics. EDCs are synthetic chemicals that interfere with the synthesis, secretion, transport, metabolism, binding, or elimination of natural hormones responsible for homeostasis, reproduction, and developmental process. They are chemically heterogeneous compounds including plasticizers, pesticides, pharmaceuticals, and fungicides. EDCs can leach from plastic to cause acute and chronic health effects. These effects are most severe in children due to their rapid physiological development, higher exposure per unit of body weight, exploratory behavior, and long life expectancy.

Goal: To analyze the complex effects of EDCs in plastic on neonatal and pediatric health.

Findings: Low-dose exposure to EDCs during neonatal and pediatric windows of vulnerability in the embryonic period, infancy, and puberty can result in permanent neurobehavioral disorders, alterations in the skeletal, cardiovascular, reproductive, and immune systems that can impair fertility and cognitive function, and increase susceptibility to chronic diseases in childhood and across the life span. EDC exposures can result from maternal-child transmission through the placenta in pregnancy and during lactation. Children's developmentally-appropriate behavior such as frequent hand-to-mouth interaction and persistent contact with soil increases dermal, digestive, and respiratory exposure to EDCs. The complex biochemical properties of EDCs and diverse clinical presentation of their health effects present several challenges in scientific and epidemiological research. Latency in the physiological manifestation of health effects, untraditional dose-response relationships, and the inevitability of mixtures pose challenges in establishing causality between EDCs and neonatal and pediatric health outcomes.

Interpretation: There is urgent need for policies of primordial and primary prevention of EDCs health effects in a time of exponential increases in global plastic production. Coordinated and organized interdisciplinary efforts among toxicologists, physicians, pharmaceutical companies, chemical manufacturers, bioengineers, and policymakers are needed to protect the health, development, and future of our children.

Mapping potential population-level pesticide exposures using a modular and scalable geospatial strategy

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Background: Pesticide exposures are extensive among human populations and in ecosystems near agricultural land. Most countries lack the capacity to assess, monitor, and control pesticide contamination due to the limited availability of pesticide use information. We assessed the geographic distribution of pesticide application rates in Ecuador, a country that relies on intense pesticide use, to highlight regions of concern where the potential risk of exposure to human populations and ecosystems warrants further assessments.

Methods: We used a data-driven approach to identify regions (8 km x 8 km spatial resolution) where the highest pesticide application rates and the highest human population density (i.e., total, children under five, and females of childbearing age) overlap. We further identified areas of concern based on a pesticides environmental pollution score, the number of amphibian species as an indicator of ecosystem integrity, and the location of natural protected areas.

Findings: In 2015, between 4.3 and 4.5 million people (~28% of the total Ecuadorian population) dwelled in areas with high pesticide application rates. We identified five regions with high pesticide application rates in provinces that primarily produce export-bound bananas and cut-flowers. Approximately 32km2 in the Amazonian region presented high pesticide application rates, large human settlements, and a high number of amphibian species. We also identified hotspots of pesticide application rates and human populations that intersected natural protected areas.

Interpretation: Ecuador presents a widespread use of pesticides in areas with the potential to affect human health and the integrity of ecosystems. Global estimates of population, pesticide application rates, and environmental factors are key in prioritizing locations where further assessments are warranted. Given the modular and scalable nature of the data-driven geospatial tools developed, the analysis can be expanded and adapted to other regions of the world where data on pesticide use is limited.

Older adults' risk perceptions and cognitive biases impact their adaptive behaviors to prevent heat-related illnesses

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Background: The frequency and severity of heatwaves are projected to increase due to climate change, eventually increasing heat-related illness risks, particularly among older adults. Existing studies have predominantly focused on hazard and exposure factors as a direct cause of heat-related health impacts. However, few studies have examined how vulnerability factors among susceptible populations play a role in risk realization. Here, we analyzed the impacts of risk perception biases on heatstroke occurrence among older adults.

Methods: We conducted a survey (n = 3,300) across eleven welfare centers for older adults in Kyoto, Japan, in summer-fall 2021. We partnered with the Elderly Welfare Section of the City Government of Kyoto to design our research approach and surveys. The survey covered four primary factors: essential habits, heat stress, cognitive biases (comparative optimism and loss aversion biases), and social capital.

Findings: Older adults in Kyoto have comparative optimism biases (43% of men and 40% of women respondents). 50% more men have a higher degree of comparative optimism biases than women. There are minor differences among the respondents with comparative optimism biases between those with more social capital than others. In contrast to comparative optimism bases, the majority of the population (88% of men and 95.5% of women respondents) has fewer loss aversion biases. However, among those who have loss aversion biases, men show 2.5 times higher biases than women, while living alone seems conducive to more biases than not living alone.

Interpretation: Public agencies need to formulate early warning messages or awareness-raising programs to manage the existence of these biases. There are three approaches to eliminating optimism biases: i) increasing self-risk estimates, ii) encouraging older adults to provide feedback about the comparison groups through comprehensive information, and iii) restricting comparison groups, given that optimism bias is caused by selecting targets at higher risk than themselves.

Assessment of the adverse effect of crop residue burning on respiratory health: A case study of Patiala, India

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Background: Crop residue burning (CRB) is one of the top contributors of ambient air pollution (PM2.5) in north-western India. Despite the magnitude of the problems associated with high particulate levels, epidemiologic data on the associated health effects of CRB focusing on rural populations is limited in India. The present study was conducted to quantify the impact of PM2.5 from CRB on the respiratory health of agricultural community of Nabha block in Patiala, Punjab.

Methods: A total of 3644 participants (10-60 years) were enrolled in this cross-sectional study using purposive sampling. The study population was surveyed for self-reported health symptoms and other exposure confounders. Lung function tests (LFT) parameters- Forced Expiratory Volume in one second (FEV1), Forced Vital Capacity (FVC) and Peak Expiratory Flow (PEF) were noted during CRB and non-crop residue burning (NCRB) periods. Multiple regression models were used to quantify the association of PM2.5 from CRB on respiratory health after controlling for other exposure variables, i.e., cooking fuel, ventilation and distance from road.

Findings: The present study demonstrated significant associations between PM2.5 exposure and poor respiratory health with increased prevalence of respiratory symptoms and lung function decrement among the study population.The elderly group (>40-60 years) reported more respiratory complaints during CRB, e.g., for cough (OR 1.57; CI: 1.14-2.16); phlegm (1.69; 1.19-2.16) and itchiness of eyes (3.44; 2.54-4.66). The study found a decrease in LFT across all age groups (10-18, >18-40, >40-60 y) during CRB compared to NCRB period. The lung function declined by 10-14% in males and 15-18% in females for every 100 units (µg/m3) increase in PM2.5 across all age categories while the youngest group (10-18 years) reported highest reduction in lung capacity based on LFT parameters.

Interpretation: The study based on the adverse effects on health (increase in respiratory symptoms, and poor lung function) highlights to need to accelerate policy interventions and engage farmers in discussions on CRB elimination.

Behavioral Adaptation to Physical Activity and Healthy Dietary Choice: A proposed research agenda for Planetary Health

Nilanjan Bhor (M.A., Senior Associate, Indian Institute for Human Settlements)

Background: The two important behavior change aspects for both climate change adaptation and Non-Communicable Diseases prevention and treatment adherence are physical activity and healthy dietary choice. But these behavioral adaptations may likely be difficult for people especially living in developing countries and the global south given inequities in health, and social and environmental effects of rapid unplanned urbanization. This study brings insights from the PEAK Urban research - that attempted to understand how individuals with non-communicable chronic conditions perceive their health and care-seeking practices - with an objective to identify the determinants of behavior change towards physical activity (walking) and adherence to diet.

Methods: Total 20 in-depth interviews were conducted with individuals residing in a recognized slum in Bengaluru, India which was supplemented by the direct observations made at the slum.

Findings: Determinants of walking are: (i) Individual and social level: physical discomfort due to uncontrolled hypertension and/or diabetes, and more involvement with economic activity and household chores. (ii) Environmental level: heat from sunlight, bad odor from nearby garbage/dustbin site, exposure to smoke and dust, and inaccessible and no safe space for walking such as parks and playgrounds. Determinants of adherence to diet are: (i) Individual and social level: same food is being cooked for all family members, food inadequacy due to economic reasons, changes in oral taste due to continuous intake of medicines, and dependence on medicines. (ii) Environmental level: availability of inorganic food.

Interpretation: This study proposes the following implications: (i) there is a need for strengthening prevention approach by the health system in India (ii) behavioral adaptations to physical activity and healthy dietary choice must address the social and environmental determinants of health, and (iii) the current findings brings light in promoting research on behavioral adaptations to physical activity and healthy dietary choices through health system,Äôs prevention approach.

Population vulnerability of atmospheric parameters on acute cardiovascular diseases

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Background: The biggest health challenge in the 21st century is climate change. Unfavourable atmospheric situations caused by climate change are predicted to increase the number of acute cardiovascular diseases (ACVDs). ACVDs are already major public health issues and, in the future, adverse atmospheric parameters can further increase this problem. In light of these facts there is a great importance of the examination of atmospheric parameters CV effects. Several studies have examined the cardiovascular effects of climate change; however, few have investigated population cardiovascular vulnerability of atmospheric parameters' joint effects.

Methods: Our aim was to identify the population atmospheric sensitivity and detect vulnerable cardiovascular characteristic with a retrospective, observational, population-based study. The study population (8338) was diagnosed with acute cardiovascular diseases and treated at Semmelweis University Heart and Vascular Centre during a 6 year period.

Findings: We have successfully determined, first in the literature, a subpopulation with pronounced atmospheric vulnerability. Patients with diabetes, hyperlipidaemia, hypertension, and previous CV disease have a higher risk of developing morbidity in certain atmospheric conditions. Patients with diabetes have the highest vulnerability. In the demographic characteristics, we showed front sensitivity in men. Men showed front sensitivity to the cold front and women on the stationary front. In line with other international research results, our study also confirmed the more pronounced atmospheric sensitivity of the older generation. We detected some haemostatic and inflammatory factor levels increase in correlation with atmospheric parameters.

Interpretations: In the future unfavourable atmospheric situations are predicted to increase the number of acute cardiovascular disease, thus there is a need for better understanding vulnerable population characteristic in favor of effective cardiovascular prevention.

The direct and indirect influences of area-level sociodemographic factors on heat-related mortality in Europe: insights to guide adaptation strategies

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Background: Europe is the world region most affected by heat-attributable mortality but impact patterns are heterogenous. We aimed to assess the contributions to this heterogeneity of four area-level predictors – education, life expectancy, the ratio of older to younger people (ageing index), and relative income – to identify general adaptation strategies.

Methods: We extracted four outcomes from a heat-mortality study covering 147 areas in 16 European countries: the rate of increase in risk at (i) moderate and (ii) extreme temperatures, (iii) the minimum mortality percentile, and (iv) the underlying mortality rate. We used structural equation modelling to quantify the direct and indirect associations between the predictors and outcomes, accounting for country-level random effects.

Findings: Education was directly associated with lower heat-related mortality burdens via reduced risk at moderate and extreme temperatures, and lower underlying mortality rates. However, it had ambiguous indirect associations with the burden via positive associations with life expectancy, ageing index, and relative income. Higher life expectancy had contradictory relations with the burden, being associated with higher risk at moderate temperatures but lower underlying mortality rates. A higher ageing index was associated with higher burdens through higher risk at extreme temperatures and higher underlying mortality rates. Relative income made a relatively small and ambiguous contribution. The relative magnitudes of the county-level random effects suggested innate human physiology played a major role in risk at extreme temperatures but that addressing modifiable socio-material conditions may reduce the burden via influence on risk at moderate temperatures and the underlying mortality burden.

Interpretation: Our findings support three general adaptation strategies, showing the need for both general social transformation and focussed climate-specific interventions. Firstly, general social strategies to improve health and reduce underlying mortality; secondly, targeted social interventions to address factors instilling patterns of vulnerability at moderate temperatures; thirdly, specific actions during extreme temperatures.

Policy: Collaborations & Communication

Assessing the One Health Information Assessment Tool (OHIAT)

Daniel Otzoy- Garcia (John Snow Inc) and Romain Tohouri (John Snow Inc)

One Health is a collaborative, multisectoral, and transdisciplinary approach — working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment. Developing and encouraging collaboration between these sectors is important in achieving a holistic approach to infectious disease surveillance; this includes the development of information systems that help facilitate this collaboration. To this end, JSI's team has developed a global tool called the One Health Information Assessment Tool (OHIAT) to bolster countries' abilities to assess the ecosystem of organizations, information systems, and processes needed to support a fully functional One Health Information System from a perspective of digital transformation.

This tool draws from a comprehensive desk review and builds on existing tools such as PRISM, the ICT Infrastructure Assessment Tool, Interoperability Maturity Model, SOCI, the One Digital Health framework, and others. Consultative meetings have been held with WAHO, PAHO, and the DH&I Working Group,Äôs Maturity Model sub group to gain their inputs and to identify other potential collaborators.

The tool consists of two components:
The Rapid Assessment Tool for One Health which enables a quick evaluation of the basic requirements for a One Health Information System.
A maturity model, which provides a detailed review of the requisite domains which allows scoring from nascent to optimized.

The tool consists of 45 questions across the following domains: human health, wildlife management, human capacity, citizen engagement, environment, and infrastructure. The tool is designed to be administered as a desk review, through a consensus building workshop, or through a hybrid approach that combines elements of the desk review and the workshop.

The OHIAT has been translated into Vietnamese, Bangla, French, and Spanish and is being implemented under the USAID-funded STOP Spillover five-year program in Vietnam and Bangladesh.

The Dutch Top Sector Horticulture & Starting Materials approach to Planetary Health

Michiel Roelse (Topsector Horticulture)

Goals & Achievements: The Top Sector for Horticulture & Starting Materials is one of ten top sectors in the Netherlands. The companies, universities and research centres, government bodies and civil society organisations collaborate on research and innovation, internationalization and human capital to reach the following goals:

- Circular agriculture: by 2030, the agricultural and horticultural sectors will be using substantially fewer raw materials and consumables. As much value as possible is extracted from all residual flows and finished products.
- Climate-neutral agriculture and food production: by 2050, the sector will operate in a climate-neutral manner. The emission of greenhouse gases is compensated for by additional sequestration of CO2 in the soil and in nature. The sector will no longer be using fossil raw materials and will be a supplier of renewable energy.
- Climate-proof rural and urban areas: by 2050, both rural and urban areas in the Netherlands will have become more climate-proof and water-robust.
- Valued, healthy and safe food: by 2030, the food production system will be robust and resilient. Consumer will be more aware of the benefits of an healthy diet leading to the increased consumption of vegetables and fruits.

Execution: Ongoing; On behalf of the Dutch Government the Top Sector finances public-private-partnerships with an annual budget of 40M€.

Target Audience: Companies, Scientific Community, Government and society at large.

Multisectoral programme to strengthen NCD prevention and health promotion with increased connections to nature in the City of Lahti, Finland

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The interest and research evidence of green spaces to support, promote and address major public health issues has increased recently. Across Finland and elsewhere in Europe, preventable noncommunicable diseases (NCDs), such as mental illness, obesity, cardiovascular diseases, type 2 diabetes and asthma, are major factors affecting health and well-being and reducing the productivity of the workforce. All the diseases are connected to lifestyle factors.

Improving access to green spaces in cities also the United Nations Sustainable Development Goal 11 supports the achievement of the universal access to safe, inclusive, and accessible, green and public spaces. Several action plans for the prevention of NCDs call to create health supporting urban environments. The European Commission collects best practices focusing on prevention and management of non-communicable diseases.

To seek solutions for the interaction between nature, health and wellbeing, Lahti Regional Health and Environment Programme 2022-2032 (Nature Step to Health) addresses the health and environmental policies and goals of the City of Lahti and Päijät-Häme region. The programme brings together various collaborating stakeholders: public authorities, higher education and research institutes, local communities, and businesses.

The programme consists of multisectoral projects, actions, and events. The goals of the programme are to promote healthy and sustainable nutrition, enhance active mobility and physical activity, improve the living environment (incl., biodiversity), and encourage more connections to nature. Over thirty multisectoral projects promote the goals in different population groups, settings, and organizations. Enhanced mobility is provided for employees, unemployed and school children by subsidized city biking or offering bikes as employee benefits. Connection to nature is promoted by experimenting with microbial diversity, green structures and nature surroundings in various settings. Healthy and sustainable plant-based nutrition and meals are developed in the communal day care services while also reducing food waste.

The ultimate aim is to achieve both economic and environmental benefits by improving the wellbeing of inhabitants, and successfully change the public opinion and policies towards a more sustainable, climate-friendly and biodiversity-enhancing living.

Adapting to a changing environment: Inspirations from Eastern Africa

Melvine Anyango Otieno (Planetary Health Eastern Africa Hub/University of Eldoret),Given Moonga (University of Zambia/CIHLMU Center for International Health, LMU University Hospital Munich, Germany), Vivian Magero (University of Potsdam), Nathalie Nidens and Laura Jung (German Climate Change and Health Alliance/Leipzig University)

While it is widely known that the African Region is carrying a huge burden of the planetary crisis, solutions and innovation coming from the region are often overlooked or disregarded by the global community. However, while establishing a planetary health community in Eastern Africa as part of the activities of the Planetary Health Eastern Africa Hub, we encountered impressive examples for health adaptation and mitigation in a changing environment. We would like to present the following selection of examples as well as general notions on the capacity for change and innovation among local communities across Eastern Africa.

In one case from Zambia, residents of Lusaka Matero compound have exhibited remarkable willingness to adapt to environmentally friendly and healthier sources of energy for cooking and heating. As part of a climate research initiative, communities switched from charcoal as their main source of energy to cooking stoves heated by locally sourced pellets. Contrary to what might be

expected, these communities quickly adapted to the initiative and demonstrated an openness for change, showcasing tremendous flexibility.

In another example from Kenya, the indigenous communities of Lake Bogoria, one of the Rift Valley Lakes, have shown autonomous adaptive measures to severe flooding resulting from climate change. Their efforts include awareness and educational programs on vector-borne diseases, the initiation of natural mosquito and tsetse fly control mechanisms as well as the protection of endangered medicinal plants. Community members further shifted to increased income diversification and a more resilient food production countering increasing food insecurity.

By presenting these examples, we want to provide inspiration to health adaptation and mitigation projects across the globe, explore the openness for change in many communities and eventually, change the prevailing narrative from the African population as a climate victim towards adaptation and mitigation innovators.

Global Planetary Health Policy

Chelsea Hunnisett, Policy and Advocacy Adviser, The George Institute for Global Health, Master of Sustainability (Candidate), BA (Honours) with Second Class Division A, Journalism and Philosophy. Level 5, 1 King Street Newtown Australia 2042. chun0525@uni.sydney.edu.au. Lead Author. Corresponding author. Jeremy Pivor, Senior Program Coordinator, Planetary Health Alliance, MS Berkeley School of Public Health's Joint Medical Program. Co-investigator and planetary health expert.

Background: Since the 2015 Rockefeller Foundation–Lancet Commission on Planetary Health the term ‘Planetary Health’ has been used across academia and civil society to describe a state in which human beings live within planetary boundaries for the betterment of health outcomes. Increasingly, Planetary Health is being utilised by policy makers and governments to understand a systems approach to managing current and ongoing health impacts of global environmental change. However, Planetary Health has not had wide-scale uptake in policy implementation. To date, governments and policy makers have done little to develop ambitious, comprehensive and legislated planetary health policies. Rather, policy remains siloed and based on domestic political dynamics, lacking a long-term vision.

To ensure not only the survival of humankind, but to guarantee the wellbeing of current and future generations, a paradigm shift is required. A shift that sees humankind living in harmony with the planet, not exploiting it and where earth's life support systems are restored. This kind of shift necessitates an examination of the economic and social systems and policies that foster growth beyond planetary boundaries and working on practical and just solutions.

This project sought to generate insights on the 'state-of-play' of global Planetary Health policy via a literature review and interviews with Planetary Health stakeholders from the health, humanitarian,

environmental and development sectors. The report proposes solutions that can aid in building momentum into tangible policy outcomes.

About the project: The 'Planetary Health in Global Policy Discourse and Implementation' project is being conducted by Chelsea Hunnisett for her Master of Sustainability at the University of Sydney, Australia. This report is one part of this project and will be used by the Planetary Health Alliance's membership and planetary health advocates to garner insights into Planetary Health policy to date and where policy opportunities exist.

Challenges and Opportunities of Multi-Solving Approaches: Integrating Biodiversity and Health Objectives in Primary Pandemic Prevention

Dr. Kim Grützmacher (International Alliance against Health Risks in Wildlife Trade, GIZ; Museum für Naturkunde, Berlin; Leibniz Institute for Evolution and Biodiversity Research), Kathrin Norda (GIZ)

During the current globally destabilizing COVID-19 pandemic we are reminded how intertwined the crises of climate change, biodiversity loss, and health are – and that wildlife both is an important and integral part of biodiversity, underpinning that very health of human civilization, and harbors known and currently unknown pathogens, some of which have the potential to become pandemic in humans. Wildlife itself does not pose a risk, but rather it is human behavior and interaction with wildlife that offers both many opportunities to reduce pathogen spillover from wildlife and to protect wildlife for future generations: Ecological disruption, including deforestation, shifts in land uses, and unsustainable consumption increase human-wildlife contact which enables pathogens to spill over. In fact countering this, scientists estimate that a relatively small, but focused investment (less than 2% of the current pandemic-induced economic losses over ten years) into primary pandemic prevention (i.e., pre-spillover interventions) would reduce the risk of disease emergence with pandemic potential significantly. Together with the ancillary benefits to climate change mitigation and biodiversity conservation this would considerably contribute to planetary health.

Understanding this potential of primary pandemic prevention, the German Government launched the International Alliance against Health Risks in Wildlife Trade as a cross-cutting and synergistic, multi-solving approach: Fostering an international, interdisciplinary, and inclusive multi-stakeholder partnership, the Alliance, currently over 80 members from science, politics and non-governmental groups, strives (and at times struggles) to bridge sectors and silos to work on contemporary risks of zoonotic spillover, novel pathogen emergence, and zoonoses from wildlife, in use and trade, to identify and support adequate and context-specific interventions and regulation to mitigate health risks from this source. Co-creating and infusing this combined knowledge to narrow the gap between science and implementation, will improve global awareness, policies, intervention design, and practice.

Operationalizing Wildlife Health Surveillance for One Health

Lucy Keatts (WCS), Cristina Castillo (WCS), Kevin Brown (CWHC), Emily Denstedt (WCS), Amanda Fine (WCS), Kongsy Khammavong (WCS), Sarah Olson (WCS), Mathieu Pruvot (WCS, University of Calgary), Alice Latinne (WCS), Alice Porco (WCS), Chea Sokha (WCS), Patrick Zimmer (CWHC)

Despite the relevance of wildlife pathogens for biodiversity, livestock, and humans, wildlife health surveillance is lacking on a global scale, with just a few developed countries maintaining established, nationwide, and centralized programs, and most efforts in lower- and middle-income countries (LMICs) limited in scope and duration. National to global level One Health surveillance is highly unbalanced, with human and domestic animal health sectors receiving vast levels of attention and funding compared to environmental or wildlife sectors. A recent review of national assessments for 107 countries found 83% did not report wildlife surveillance or reported specific gaps. The few wildlife health surveillance systems that do exist provide evidence of value for conservation, food supply chains, and public health. For zoonotic-origin disease threats with pandemic potential, wildlife and wildlife interfaces with people and livestock are essential One Health surveillance targets. Partnering with local governments, WCS has been piloting the WildHeathNet initiative in Cambodia, Lao PDR and Viet Nam to operationalize wildlife health surveillance for One Health, integrating it with existing surveillance networks and platforms using a four-pronged approach: policy development (WildHealthBuild), data collection and management systems (WildHealthTech), capacity building (WildHealthSkills), and management actions (WildHealthRespond). WildHealthNet has so far supported detection of H5N1 highly pathogenic avian influenza in wild birds, African swine fever3 in wild boar, Lumpy skin disease in banteng (Bos javanicus), and other emerging high-consequence pathogens, facilitating One Health responses and implementation of mitigation measures to prevent further expansion of these outbreaks.

Build climate resilience through gender empowerment

Kelley Dennings (Center for Biological Diversity)

The effects of rising greenhouse gas emissions are more harmful to women, gender diverse people, and Black, Indigenous and other people of color, although these communities contribute less to climate change. This underscores the need to include gender frameworks and gender diverse voices from communities of color into climate action planning (CAP).

The Center for Biological Diversity sought to learn if frameworks related to gender were included in municipal CAPs. Gender empowerment initiatives include universal access to voluntary modern family planning methods (e.g. the oral contraceptive pill, long-acting reversible contraception, condoms and emergency contraception); LGBTQIA+ inclusive, culturally responsive and medically accurate comprehensive sexual education; and affordable sexual and reproductive healthcare that allows individuals to have autonomy over their bodies. Additional solutions include supporting

educational opportunities, redefining gender roles, creating equal opportunities for women, and guaranteeing safety from harassment and violence.

Twenty-one CAPs from cities across the US were analyzed, representing approximately 10% of the U.S. population. In this presentation Center staff will discuss the use of CAPs to build climate-resilient solutions specifically through gender empowerment.

Interrelations between impacts of Climate Change on inhabitants of Small Island Developing (SID) nations

Harshika Bisht (Harvard Graduate School of Design 2021-23)

With climate change linked to the increased frequency and intensity of weather-related events, we can expect a global challenge in the shape of mass migration to come. One section of the world's population and biodiversity that is perilously close to losing its habitat is the Small Island Developing States (SIDS). The aggregate population of SIDS is 65 million, slightly less than 1% of the world population, yet this group faces unique social, economic, and environmental challenges.

The paper is a collection of visual representations that dissect the interrelations between the impacts of climate change on small island developing countries and the impacts on the outbound migration networks from these nations. Utilizing a case study approach, we study these issues in-depth for Kiribati and Maldives. We observe unseen connections with residents' health and biodiversity in these regions when applying systems thinking to these migratory and developmental challenges. The results show us the different intersections and interrelationships of factors in the SIDC that will inform its adaptation strategies to different scenarios. One of these scenarios deems it necessary to understand the proper migration out-hotspots to help them integrate into systems of other new cities seamlessly, including healthcare and other infrastructures of institutional knowledge.

The project is a visual essay conducted for proseminar in Fall 2021 under the guidance of the department head. As the SIDS struggle with the looming challenge of rising sea levels, we try to develop a co-benefit framework that can assist them in a multi-targeted approach for time-sensitive issues. These frameworks result from this design-based research exploration that hopes to guide policy-makers, planners, and designers who work with developmental goals to move bottom-up when attempting to contextualize the problem with larger systems.

Environmentally informed pharmaceutical prescribing in Scotland: analysis of the current policy landscape to investigate the implementability of eco-directed pharmaceutical prescribing in the Scottish healthcare system

Julius Cesar Alejandre (MSc, Glasgow Caledonian University), Gabriele Frascaroli (MSc, Glasgow Caledonian University), Ania Escudero (PhD, Glasgow Caledonian University), Ole Pahl (PhD, Professor, Glasgow Caledonian University), Lesley Price (PhD, Professor, Glasgow Caledonian University), Sharon Pfleger (MPH, National Health Service Highland), Karin Helwig (PhD, Glasgow Caledonian University)

Background: The prescription of pharmaceuticals is the most used healthcare intervention. However, pharmaceuticals have negative effects on the environment and living organisms through carbon emissions; pharmaceutical contamination of water environments; and impacts on environmental antimicrobial resistance. In Scotland, selecting pharmaceuticals is informed by its therapeutic benefit, cost, and patient-related factors. To account for its environmental impact, eco-directed prescribing proposes reducing pharmaceutical consumption as appropriate through improved rational prescribing; and prescribing green pharmaceuticals informed by environmental criteria in medicine formulary development. However, there is a need to investigate if this change in prescribing practice is adoptable in the current health and environmental policy landscapes.

Methods: A joint analysis of policies on pharmaceutical prescribing and environmental monitoring of pharmaceutical substances in water environments was conducted to investigate whether the current policy landscape supports the adoption of eco-directed prescribing in the Scottish context. Barriers to and enablers for the policies and its implementation were identified through a series of co-development activities with key actors.

Findings: Pharmaceutical pollution and the need to address this are recognised in key healthcare and environmental policies. However, barriers to the integration of environmental criteria in medicine appraisal, environmental monitoring of pharmaceutical substances, awareness of stakeholders, and coordination between key expert groups need to be resolved.

Interpretation: A three-pronged policy framework is proposed to effectively integrate eco-directed prescribing within the processes of health and environmental agencies in Scotland. This framework includes: 1) organisation of a coordinative mechanism between key stakeholders; 2) systematic integration of environmental criteria in formulary development supported by expert evaluation of environmental risks of pharmaceuticals; and 3) improving knowledge of healthcare workers and the public on the environmental impact of medicines.

Communication as a key element for disseminating PH in Brazil: the PHAM2021 experience

Maria Daniela de Araújo Vianna (Ph.D., Postdoctoral Researcher, Institute of Advanced Studies - University of São Paulo), Antonio Mauro Saraiva (Ph.D., Full Professor and Researcher, Institute of Advanced Studies - University of São Paulo), Thaís Presa Martins (Ph.D., Researcher, Planetary Health Group)

This study aims to explore the results, impacts, and lessons learned from the communication process surrounding the 4th Planetary Health Annual Meeting (PHAM2021) held virtually and hosted by the University of São Paulo, in Brazil. The conference – the first in the Global South – took place during the Covid-19 pandemic and was organized by USP in partnership with the Planetary Health Alliance. The event represented a historic milestone, with a record of 5,020 registrants from 130 countries. Robust evidence shows that communication was key to the event, both in the dissemination of information about the PHAM2021 per se and in the ability to disseminate the Planetary Health concept in the region because of the event, mainly in Brazil. Of the total number of people registered for the event, 2,183 were registered in Brazil (43.5%).

Based on measurements collected from the Planetary Health Study Group (IEA-USP) on Twitter, Instagram, Facebook, and LinkedIn channels from January to May 2021, it is possible to establish a direct connection between the amplification of the audience and the PHAM2021. All numbers related to visitors, followers, subscribers, and engagement on the GPS social media channels grew up and reached peaks of records nearby the PHAM2021 occurrence. On the GSP Twitter profile, for example, visits rose from 775 in January 2021 to 1,793 in May 2021, shortly after the PHAM2021 (it took place between April 25th and 30th.

What were the direct and indirect impacts of carrying out PHAM2021 in the Brazilian context? How has communication helped? How do the students involve? What are the challenges that are important for the future? How has the use of social media networks contributed to the communications strategy? These are some of the questions that we intend to explore in this study. We will analyze user behavior on social networks, both on PHA and USP´s Planetary Health Group channels, to correlate publications with the behavior of registrations for the event. The detailed analysis of the feedback survey from the participants of the event will be the basis for consolidating the lessons learned.

Planetary Health challenges a hub for transdisciplinary collaborations

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Background: Planetary health as concept denotes an intersection between human health and that of natural systems, often refer to as 'health of human civilization'. It is a field of transdisciplinary inquiry frame, as such, understanding it promotes sustainable development prowess. Transdisciplinary in this context includes the concept of research, shared learning, and other forms of partnership that could divulge into health and well-being within the planetary health boundary for sustainable development. Against this background, the paper highlights planetary health challenges and significance of transdisciplinary collaboration in addressing the challenges.

Method: Systematic literature review search was conducted in five databases and Google Scholar from April 4th to 30th May 2018. Additional searched was made in Google Scholar on articles published from June 1st 2018 t0 December 31st 2021, for saturation and update. Inclusion and exclusion criteria were employed through which, 2,192,112 articles were returned, and narrowed to 87 articles; 30 relevant articles were selected for the narrative.

Findings: The review outcomes suggest transdisciplinary collaboration (TDC) as solution to planetary health challenges. TDC brings together diverse disciplines with stake in health and environment as one for collaborative actions. It shows how TDC is formed and maintain. It also reveals that TDC provides the needed knowledge that could be used in mitigating the impact of environmental changes.

Interpretation: In this regard, transdisciplinary collaboration integrate health and environmental disciplines, for innovative and resilient solutions that address planetary health challenges. Also, TDC indicate that connections between human health and environment thrives on collaborative governance, through which the collaborative disciplines initiate, design and create and implement solutions that address planetary health challenges.

Planetary, Public, & Urban Health

Cultural Ecosystem Services Provision for Mental and Cardiac Health in a Megacity

Douglas William Cirino (University of São Paulo, Institute of Biosciences), Simone Rodrigues de Freitas (Federal University of ABC - UFABC); Jean Paul Metzger (University of São Paulo - USP)

Health of dwellers in megacities - those with more than 10 million inhabitants - varies not only according to social, cultural and personal habits, but also due to the space. The relationship between space and health are linked to green areas, and those associations have been well documented in current researches. However, there are knowledge gaps in understanding how green areas can favor mental and cardiac health in cities, and one way to have a deeper comprehension on this is considering not just distance from and quantity of green areas, but putting the provision chain of ecosystem services (ES) as a central framework to understand those effects.

Using São Paulo megacity, Brazil, the biggest city of global south, with more than 12 million inhabitants - taking a sample of 3400 patients accompanied by a longitudinal study, we are going to develop supply-demand interaction networks considering different movement patterns of the city's residents to access the association between mental and cardiac health with urban green. In order to measure cultural services, a sampling of the opinion of residents on the scenic beauty and the recreation potential of the city's various urban landscapes will be collected through questionnaires. The data from these interviews will be used to qualify the different green areas in the city of São Paulo in relation to their potential to offer scenic and recreational ES. We expect that the supply of ES mediates the interaction between cardiac and mental health in the patients, and also controls the occurrence of the two types of diseases.

With those results we expect to be able to guide decision making on urban greening and urban planning, aiming landscapes that are more favorable to people to enjoy the offer of green spaces and reduce diseases, though nature-based solutions and ES provision.

Individual and contextual characteristics and walking for transportation among older Brazilians living in an urban center: a population-based study

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Background: An active lifestyle exerts a central role in maintaining health and wellness during the aging process. Within a broad range of available physical activities for this population, walking is a simple, safe, and affordable option that can be easily incorporated into everyday life for transportation or leisure. Most studies that consider individual and contextual aspects of walking behavior in an integrated way are from high-income regions. Therefore, the goal of this study was to examine the association of individual and contextual characteristics with walking for transportation among older Brazilians residing in a large urban area.

Methods: A multistage household survey was conducted in Belo Horizonte, Brazil, in 825 participants aged 60 years and over. Walking for transportation was assessed using the long version of the International Physical Activity Questionnaire (IPAQ). The contextual variables were six perception scales of the neighborhood's physical and social environment (walkability, quality of services, physical disorder, safety, social disorder, and social cohesion). Data were analyzed using Poisson regression with robust variance.

Findings: The overall prevalence of walking for transportation was 68.6% (95%CI = 65.3-71.8). The walking for transportation was significantly associated with walkability scale, lower family income (up to four minimum wages), very good/good self-rated health, and high social participation ($p<0.05$). Interpretation: Our findings suggest that promoting adequate conditions for walkability in urban areas, improving older people's general health, and expanding their opportunities for social participation are important strategies that might increase walking levels for transportation in older Brazilians.

Effects of residential economic segregation on physical activity among urban dwellers

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Background: Physical activity is one of the main risk factors for chronic non-communicable diseases and low levels of this behavior are observed in the population. Accelerated urbanization produces changes in patterns and lifestyles, in addition to social and health behaviors. Urban socio-spatial segregation is one of the most striking expressions of social inequalities, mirroring power relations and unequal access to resources, goods and services. This study aimed to investigate the relation between leisure-time physical activity (LTPA) and socioeconomic indicators among adults living in an urban center.

Methods: The Household survey performed in Belo Horizonte, Minas Gerais, Brazil (2008-2009). The outcome variable was the LTPA assessed by the International Physical Activity Questionnaire and classified according to current recommendations (≥150 minutes/week). The individual variables were age, sex, color or race, schooling, and family income. Residential segregation was based on household income data from 2010 IBGE demographic census and calculated for study-defined neighborhoods using the Getis-Ord Local Gi* statistics. The environmental variables were obtained from the Systematic Social Observation. Multilevel logistic regression models were adjusted, with the first level being represented by the individuals and the second one by the census tracts. A total of 3,815 adults participated in the research.

Findings: The prevalence of LTPA was of 30.2% (95% CI: 27.4-32.9). A higher chance of being active was observed among individuals with 12 years of schooling or more (OR = 2.04; 95%CI: 1.46-2.85), family income greater than 5 minimum wages (OR = 1.48; 95%CI: 1.05-2.06), and residents in areas of low economic residential segregation (OR = 1.97; 95%CI: 1.30-2.98).

Interpretation: Neighborhoods classified as presenting low economic residential segregation showed better attributes of walking environment, safety, and aesthetic quality. Identifying the presence of socioeconomic differences in physical activity practice and the environment attributes is essential for directing public policies, focusing on the most vulnerable groups.

A Planetary Health Policy Tool for project design and decision-making

Megan Curren (Climate Caucus), Bronwyn Dunbar (Ph.D. candidate, University of Victoria), Rik Logtenberg (Climate Caucus), Tara Ney (Ph.D., Associate Professor, University of Victoria), Jim McDavid (Ph.D., Emeritus Professor, University of Victoria)

Context: Planetary Health requires ubiquitous transformative and regenerative action. However, policymakers lack tools to support project/policy design and decision-making that accounts for both numerous and complex critical human and natural system dimensions. We need to develop approaches to meaningfully consider the interconnected and diverse dimensions of both natural and human systems in an integrated, simple and practical way.
Aim: The Planetary Health Policy Design Tool has been developed to help guide us towards regenerative futures. This presentation will present the tool, show how to use it, and explore how it can be adapted to different contexts to enhance its transferability and pertinence.

Methods: The Planetary Health Framework developed by Brousselle & McDavid (2021) was used to create the Planetary Health Policy Design Tool; it is a nine-dimension scale meant to quickly assess any project/policy and enable design improvements to positively contribute to Planetary Health. The research team collaborated with Climate Caucus, a network of 460+ local elected leaders, and developed the tool specifically for local government use. It has been tested and refined by interviewing elected officials, administrators, and Indigenous leaders.

Findings: We will present the tool and show how it relates to the Planetary Health Framework. We will show how this tool can be used to support (1) an iterative dialogical approach to the design of project/policies for Planetary Health; (2) group deliberation; (3) citizen engagement. We will also show how this tool can be easily adapted to other organizations to enhance its pertinence in different contexts.

Interpretation: The Planetary Health Policy Design Tool is easy-to-use, and it enables holistic consideration of planetary health dimensions. The tool helps to identify trade-offs and encourages design choices to improve planetary health across multiple dimensions. It will support deep and system-wide transformation in all actions, for all life to thrive for all time.

Urban health education in youth: a case study in an Italian high school

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Background: Cities both contribute to and are affected by climate change, leading to significant health issues in urban settings. Educational institutions - as indicated in the ‚ÄúPlanetary health education framework‚Äù - have a privileged position to contribute to achieving the transformations needed for a healthier future, so urban health education is an essential step to empowering health of the youth who live in urban settings. The aim of this study is to measure and to raise the awareness of urban health among high school students through an educational interactive intervention, that was conducted in a high school in Rome, Italy during spring 2022.

Methods: Four interactive sessions were delivered to 319 students from 13 to 18 years old, that completed a 12-items questionnaire before and another after the interventions. Data was gathered anonymously and analysed using descriptive and inferential statistics.

Findings: Most students (60%) successfully completed the pre/post-intervention surveys. Students increased their knowledge on urban health: 11.8% of them were aware of it before the intervention vs. 87.5% after the intervention. An improvement in the questionnaire scores was detected in 58% of respondents, while 15% of the students did not improve and 27% got worse. A worsening between pre and post intervention was mostly recorded in the first and second grades of high school (29% in first grade and 28% in second grade).

Interpretation: The results of the present study suggest that school-based interventions using interactive approaches on urban health are effective for increasing the knowledge level of scholars about it, and can be useful to promote health in an urban setting, especially for older students (17-18 years old). This kind of approach is also optimal for the high attention and interest kept constantly by most students.

Contrasting Effects of Green Coverage Between Upper and Lower Respiratory Diseases: A New Pattern for the Tropics?

Douglas William Cirino (University of São Paulo, Institute of Biosciences), Simone Rodrigues de Freitas (PhD, Associate professor, Federal University of ABC); Jean Paul Metzger (PhD, Full-professor, University of São Paulo)

Background: The association between human health and green areas is well-established, with patterns of improvement on lung health in behalf of the presence and proximity of green areas. Moreover, in northern and temperate regions, the presence of green areas still can be related with respiratory allergies occurrence, mainly associated with spring and pollen rain. In the tropical region is less common the occurrence and record of pollen allergies linked to green areas, and the effect of green in lower respiratory systems is still incipient. Aiming to understand spatially explicit patterns of green coverage and respiratory health we search for hospitalizations in São Paulo city (SP), Brazil, a tropical region.

Methods: We calculate rates of hospitalization by upper allergies (UR) and lower-lung-related (LR) respiratory diseases in SP in the public health system. Controlling population and socioeconomic data we relate the hospitalization rates with the land cover of different vegetation types per neighborhood. We ran binomial generalized linear models considering the hospitalization rates by UR and LR causes separated.

Findings: The models bring contrasting responses for total coverage in neighborhood for UR and LR. Green areas increased the hospitalization by UR and decreased by LR. The effect of increment in hospitalization rates is higher for UR in the spring, showing a possible association with pollen allergies or fungus and mites present in more humid and forested areas. On other hand lower LR hospitalizations can be related to air quality control, what can occur in more green neighborhoods.

Interpretation: Those findings should be one of the firsts spatially explicit patterns in cities for allergies to forest in tropical regions. Despite the opposing effect between UR and LR, the rates by LR are higher and need some attention, in that way, green areas should be encouraged to be implemented in the urban environment.

Appropriateness of Drinking Water Purification Technologies for Vulnerable Populations

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Background: Globally, >200000 children under the age of five, die every year due to water-borne diseases like diarrhoea. People living in remote villages, water-stressed areas, and in poor sanitation and hygienic conditions are particularly vulnerable to risks of contracting diseases from contaminated drinking water. The health outcomes of the vulnerable have not improved significantly despite intensive technology interventions. The appropriateness and sustainability of technologies could be reasons for this.

Aim: To assess the appropriateness of existing drinking water purification technologies for vulnerable populations.

Method: Hybrid multi-criteria decision analysis was used to assess the appropriateness of existing drinking water disinfection technologies. This approach integrates Analytical Hierarchy Process (AHP) and Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) methods. AHP was used to score and set the proportion of importance of the relative weights for the decision criteria-sets, and TOPSIS to obtain the final ranking. Systematic reviews on technology efficiency provided data to assess the set criteria, including safety, efficacy, cost, practicality, compliance, and environmental impact.

Findings: Fourteen technologies based on physical, chemical, and combined methods of drinking water purification, were assessed. Based on Positive Ideal Solution Value (PISV), solar disinfection technology (0.86) was identified as the most appropriate, followed by copper metal-based device (0.83) and Chlorination (0.45); while comprehensive, advanced systems like Reverse Osmosis (0.32) did not score well on appropriateness.
Interpretation: The method and findings of this research can assist developing countries in selecting technologies that are appropriate for the target audience. It emphasizes evaluation of appropriateness as a pre-requisite to ensure durability and sustainability of community interventions.

School greenness and student-level academic performance: evidence from a capital city in the Global South

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Background: Greenspace in the school environment might enhance academic performance. However, the literature –dominated by school-level studies in developed countries of the northern hemisphere–, presents mixed evidence of an association. In this study, we aim at evaluating the association between school greenness and student-level academic outcomes in a capital city of the Global South.

Methods: The sample included fourth grade students (n=271,739) enrolled in 1,398 public, charter, and private schools between 2014 and 2018. Academic performance outcomes included continuous student-level standardized test scores and binary indicators of attainment of learning standards in mathematics and reading. School greenness within a 100 m buffer was estimated for each year using Normalized Difference Vegetation Index (NDVI) derived from Landsat 8 imagery. Linear mixed effects models and generalized estimating equations were fit to evaluate associations, adjusting for individual and school level sociodemographic factors and stratifying by school type. Analyses were stratified by school type.

Findings: A 0.1 increase in school NDVI was associated with higher test scores in mathematics (3.69 points, 95%CI: 2.49;4.88) and in reading (1.84 points, 95%CI: 0.73;2.95); as well as with higher odds of attaining learning standards in mathematics (OR: 1.17, 95%CI: 1.10;1.24) and reading (OR: 1.05, 95%CI: 1.01;1.10). We found evidence of effect modification by school type, with larger effect estimates for students in public schools. No significant associations were detected for students in private schools.

Interpretation: Higher school greenness was associated with improved individual-level academic outcomes among elementary-aged students in a capital city in South America, highlighting the potential of green space to enhance academic performance and moderate educational and urban environmental inequalities.

Effects of meaning in a planetary health discourse: a qualitative study

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Background: Planetary health efforts towards the Great Transition happens in a variety of forms. In the realm of language, most efforts are via discourse. We aimed to analyze a planetary health discourse and consider potential effects of meaning that resonates from such materiality.

Methods: Epistemological breaks – a concept conceived by Gaston Bachelard and further developed by Georges Canguilhem, and Michel Foucault – are disruptive forms of knowing. The framework of the discourse analysis established by Michel Pêcheux articulates three epistemological breaks: the linguistics structured by Ferdinand Saussure; the historical materialism proposed by Karl Marx and Friedrich Engels; and the subject of the unconscious evoked by Sigmund Freud and Jacques Lacan. We have used the framework of Pêcheux to analyze the São Paulo Declaration of Planetary Health.

Findings: The discourse of and around the Declaration produces an effect of meaning on/about union and belonging. The regular usage of 'we' and 'our' gives raise to such effect. The amount of translations, consultations, and signatures from people and (inter)national institutions pave the way for the creation of a "global planetary health community" through the operation of a spokesperson. Such discursive and enunciative functioning generates effects of meaning towards the authorization to "raise an alarm" and postulate the need for "a just, global transition", a "fundamental shift in how we live on Earth".

Interpretation: Discourse analysis articulates diverse epistemologies that enable to look at the constitution of subjectivation. The enunciators of the São Paulo Declaration of Planetary Health find support in the image of (inter)national institutions and people, and (un)consciously assume and attribute positions to subjects. Connecting the knowledge fields of discourse analysis and planetary health can be an opportunity to consider positions of subjects and effects of meaning that emerge from discourses, continue building the fields and growing the movements.

Other

Catastrophic Health Expenditure and Voluntary Health Insurance: Can Community Based Health Insurance Scheme Reduce Catastrophic Health Expenditure in Rural Tanzania?: A Cross-Sectional Study

Sverre Grepperud (PhD, Professor, University of Oslo), Amani Alaeli Mlaki (PhD, MUHAS), Amani Thomas Mori (PhD, Professor, University of Bergen)

Background: Over 150 million people suffer financial catastrophe each year because of out-of-pocket (OOP) payments. Low and middle-income countries (LMICs) comprise a high proportion of the population that has no access to essential healthcare services and the global burden of disease is much higher compared to high-income countries. This paper aimed to analyze the incidence and the determinants of catastrophic health expenditure among members and non-members of the improved Community Health Fund (iCHF) in rural Tanzania.

Methods: A cross-sectional household survey was used to collect data from 722 households in Tanzania. Catastrophic health expenditure (CHE) was defined as households' health expenditure exceeding 40% of total non-food expenditure. Logistic regression was employed to assess the association between CHE and iCHF membership status after adjustment for other socioeconomic and demographic variables.

Findings: When disaggregated by socioeconomic status we found that the incidence of CHE was higher among non-members of iCHF insurance compared to the members i.e 21% versus 15%. The incidence of CHE among non-members was higher among the poorest households compared to the least poor. Being a member of insurance, reduced the probability of incurring catastrophic health expenditure in the lower quintiles but the probability increased in the upper quintiles.

Conclusion: Voluntary health insurance schemes, reduce the probability of households in the informal sector incurring CHE. Policymakers should reconsider the iCHF scheme to be a compulsory means of health financing for every individual employed in the informal sector.

Circular economy in the sugarcane agroindustry: bagasse-fly-ash-based zeolite

Denise Alves Fungaro (PhD, Researcher, Instituto de Pesquisas Energéticas e Nucleares)
Juliana de Carvalho Izidoro (PhD, Researcher, Instituto de Pesquisas Energéticas e Nucleares)

The sugarcane industry in the process of producing sugar and ethanol generates bagasse in large amounts. The burning of bagasse used for steam and electricity generation produces 3 million tonnes of bagasse fly ash (BFA) annually. Handling and improper disposal of BFA cause pollution in soils, air, and water, which results in environmental challenges and human health problems. The valorization of BFA is a convenient and sustainable means to reduce solid waste generation and decrease the environmental pollution load. The purpose of this research is to investigate the

application of BFA for the synthesis of zeolite. Because of three-dimensional structure and unique porous properties, zeolite is a value-added product with many applications such as adsorbent material and industrial catalysis.

After separation of the coarser particles containing mainly unburned carbon, fine particles of BFA were used to synthesize zeolite by alkali fusion (550 oC; 1 h; BFA: NaOH= 1:1.2 w/w) followed by hydrothermal treatment at 100 °C for 3 h. Si/Al molar ratio of 1.0 was adjusted with an external alumina source. BFA and synthesized zeolite were characterized using XFR, XRD, and MEV. The results showed that BFA may be used effectively for the synthesis of zeolite NaA with high purity comparable with the commercial product.
Zeolite NaA is employed in sugarcane mills in the dehydration processes for the removal of water from the hydrated ethanol. Thus, the application of BFA in zeolitization process strategy provides not only environmental and economic benefits for the sugarcane agroindustry but also contributes to a circular economy and towards the achievement of Sustainable Development Goal 12.

Impacts of urban growth in hydrological ecosystem services: the case of São Carlos (Brazil, SP)

Edimilson Rodrigues (University of São Paulo), Marcelo Montaño (PhD, Professor, University of São Paulo).

The conceptual framework of Planetary Health has pointed out the need to elaborate development alternatives integrating human living conditions with natural systems, which raises the need for context-specific socio-environmental baselines. Therefore, this ongoing research aims to estimate the changes in hydrological ecosystem services (hES) between the years 1985 and 2020 considering the dynamics of land use/cover (LULC) in three different watersheds in São Carlos (Brazil, SP). The Soil Conservation Service (SCS) method was adopted to determine peak flows for the entire time series analyzed. Given the unavailability of complete empirical data, theoretical conditions and equations from a review of the scientific literature were adopted. Thus, rainy events of 2-hour duration and 50-year return time were considered for the simulation of flow rates based on changes in LULC. The preliminary outcomes show an increase in surface runoff (Q), a decrease in both infiltration and evapotranspiration, related to urban growth. For Q, the increases were 4.58 m^3/s (66%), 6.18 m^3/s (52%) and 17.40 m^3/s (96%) for Mineirinho, Santa Maria do Leme and Jararaca's watersheds, respectively. For infiltration and evapotranspiration were verified a decrease of 61.56 thousand m^3 (18.7%), 86.40 thousand m^3 (12%), and 305,48 thousand m^3 (8.5%) in the same order and the urban sprawl (ha) was 264.94 ha (273%), 275.47 ha (131.48%) and 199.84 ha (166.78%). The modeled data must be interpreted as relative indices, given the uncertainties of hydrological analysis. Even so, it is an expression of the development model, with additions of pressure on environmental systems and hES due to the transfer of flow downstream and changes in LULC, contributing to flooding events in urban valleys.

Monitoring pollinators in Brazil: the challenge of adapting the FIT Count citizen science protocol to the Brazilian context

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Background: Pollination is an important service to guarantee the well functioning of Ecosystems and agroecosystems. Since about 90% of crop yields worldwide depend on pollination, monitoring the abundance of pollinators is important to ensure food security. Citizen science can be an approach to produce data on pollinators abundance, but context-based protocols are needed to ensure the production of useful information.

Methods: The 10 step FIT Count (Flower-Insect Timed Counts) citizen science protocol, developed by the UK Pollinator Monitoring Scheme (PoMS) was adapted to the Brazilian context by an interdisciplinary team following these steps: 1) choosing the habitats according to Brazilian biomes, 2) setting the pollinators and plant groups to be monitored considering the large biodiversity across the country, 3) translating the app documentation, features, and labels to Portuguese, 4) adapting the app to include other pollinators beyond insects, such as bats and hummingbirds (which are not pollinators in UK), 5) changing the nomenclature of plant inflorescences to include the diversity of types that exist in Brazil, and 6) reviewing the Terms and Privacy document for the app based on Brazilian legislation.

Findings: The Brazilian version of the FIT Count app is in testing phase and next steps include launching the supporting materials and pilot testing with citizen scientists. Despite building from a pre-existing protocol, the team faced challenges related to the inclusion of species and groups representative of the great Brazilian biodiversity while allowing non-experts to navigate the app and contribute with high-quality data.

Interpretation: Adapting an app/protocol may represent a short cut, resulting in fast delivery of the final product, expanding the use of an already tested tool, and better use of resources. However, constraints must also be considered, such as limitations related to changing Terms and Privacy or features of data collection planned for different contexts.

Qualitative analysis of diversity, equity and inclusion efforts in Planetary and One Health initiatives across academic institutions in California

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Background: Following the 2020 protests for the Black Lives Matter movement, many institutions across the US responded by creating and adapting workshops, grant opportunities, and courses on diversity, equity, and inclusion (DEI). To help ensure that these good intentions lead to systemic change, a critical evaluation of these efforts is needed in order to understand what is working, identify where further work is needed, and help develop best practices that can be disseminated and shared. Such evaluation is especially necessary as many universities have struggled to disentangle themselves from upholding and benefiting from inequitable beliefs and practices. To address this need, we are evaluating different approaches to improving DEI in Planetary and One Health through a mixed-methods approach of program leader and participant interviews. Questions we aim to answer include: the utility of topics and approaches, functionality of trainings, discrepancies between expected and actual learning outcomes, perceived gaps in knowledge, and what are participant-driven recommendations for improvements.

Methods: Leaders and attendees of DEI workshops and programs will be recruited from four California universities: UC Berkeley, UC Davis, UC San Francisco, and Stanford University. These universities were selected because of their involvement and significant influence in either One Health, Planetary Health and/or global health research. In addition to questions about participant experience and reflections on workshops, demographic information on participants will also be collected to help understand the background of individuals interested in receiving and engaging in dialogue on DEI-related issues.

Significance: Incorporating DEI into Planetary and One Health is an iterative process requiring ongoing development of DEI-related programming. Regular assessment of strengths and limitations of developed approaches is integral to ensuring progress towards systematizing diverse perspectives in research institutions. The results of the present evaluation will highlight high-impact practices that can be accessed through a repository of best practices.

Intergenerational Perceptions about Globalization among Tribes of the Biodiversity Hotspot of the Nilgiris District of Tamil Nadu, India

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Background: The Nilgiris District in India is the World's 8th Biodiversity hotspot with over 2300 endemic species. This region is inhabited by 6 particularly vulnerable tribal groups (PVTG) as designated by the Government of India. Globalization is the increasing connectedness and interdependence of world cultures and economies. Particular features of globalization such as global communication and diffusion of information, global mobility), cross cultural interaction and global environmental changes have differential impacts on generations. The elderly tribes are less influenced and therefore more traditional in their approaches to health and well-being and environment than the younger generations. Traditional tribal way of living provides us with information on bio conservation, healing and wellness practices and sustainable living, documenting these perceptions will help in revival of the tribes.

Aim: To study the intergenerational perception among the Nilgiris tribes about globalization and its consequences on the environment, health and well-being of individuals and communities.

Methodology: Using qualitative research methodology we study the intergenerational perceptions of the Nilgiri tribes, their lived experiences about globalization and its consequences. In-depth Interviews were conducted among 5 tribal heads as part of the ongoing research and over 50 more in-depth interviews are scheduled to be completed by Mid-July. Using the interpretive phenomenological approach and analysis, preliminary findings are discussed below.

Findings: Preliminary research reveals that globalization is perceived more positively among the younger generations with many seeking mainstream healthcare and more inclined towards mainstream ways of living, while the elder tribes have ambivalent perceptions particularly about loss of socio-cultural wellness and environmental wellness but positive perceptions with regards to Economic Wellness.

Interpretation: The results are preliminary in nature, interpretation will be complete after the conclusion of the remaining in-depth interviews scheduled to be completed by mid-July 2022.

The influence of different vegetation types and paved surfaces on early childhood development: a population-based birth cohort study

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Background: Growing evidence suggests that green space is associated with improved childhood health and development, but potential differences in the influence of vegetation types remains unexplored. This study investigated whether associations between early childhood development and residential exposure to vegetation differed for tree cover versus grass cover, as well as paved land.

Methods: In a large population-based birth cohort (n=27,539) in Metro Vancouver, Canada, early childhood development was assessed via kindergarten teacher-ratings on the Early Development Instrument (EDI). The residential surrounding environment was characterized using a high spatial-resolution land cover map that was linked to children's residence. Cumulative residential exposure (from birth to time of EDI assessment) was calculated as the mean of annual percentage values of different land cover types within a 250 m buffer of postal code centroids. Multilevel models were used to analyze associations between land cover types and early childhood development.

Findings: In adjusted models, higher levels of cumulative residential exposure to total vegetation were associated with increased EDI score (β-coefficient: 0.33, 95% CI: 0.21, 0.45), indicating benefits to early childhood development. Similar positive associations were observed for exposure to tree (β-coefficient: 0.26, 95% CI: 0.15, 0.37) and grass cover (β-coefficient: 0.12, 95% CI: 0.02, 0.22), while exposure to paved surfaces was associated with EDI reductions (β-coefficient: -0.35, 95% CI: -0.47, -0.23).

Interpretation: Increased residential exposure to vegetation was positively associated with early childhood developmental outcomes, with larger impacts for tree cover relative to grass cover. This study provides support for targeted urban greening initiatives and informs urban planning for promoting childhood health. In light of the findings, it is important to consider the potential health risks related to urbanization and decreasing exposure to nature and to climate change induced landscape degradation.

Behaviour change interventions employed in pharmaceutical prescribing programmes that have the potential to reduce the environmental impacts of medicines: case studies from China, The Netherlands, and Sweden

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Background: Pharmaceutical acquisition and use have negative impacts on climate and the environment. In addition to greenhouse gases emitted from the pharmaceutical supply chain, active pharmaceutical ingredients pose risks to the environment. This requires adoption of environmentally informed pharmaceutical prescribing or the integration of environmental criteria in medicine formulary development. However, eco-directed prescribing requires behavioural change amongst healthcare workers.

Methods: We analysed three case studies of pharmaceutical prescribing programmes implemented by healthcare providers and with outcomes on adherence to pharmaceutical prescribing guidelines, reducing pharmaceutical use or prescription, or reducing active pharmaceutical ingredients in water environments. We dissected specific intervention strategies from these prescribing programmes and mapped these to specific behaviour change techniques from the Behaviour Change Taxonomy (BCT) version 1, and further to nine intervention functions of the Behaviour Change Wheel (BCW). These case studies are part of a broader knowledge synthesis.

Findings: Case studies of pharmaceutical prescribing programmes from China, The Netherlands, and Sweden were implemented by general practitioners in primary care setting. The use of education, enablement, and environmental restructuring intervention strategies for the pharmaceutical prescribing programmes in China and The Netherlands helped decrease residual levels of ofloxacin in the aquatic environment and decrease prescription of diclofenac, respectively. High prescriber adherence to eco-directed pharmaceutical prescribing in Sweden using their Wise List model was associated with education, persuasion, incentivisation, and environmental restructuring intervention strategies.

Interpretation: These case studies demonstrate that pharmaceutical prescribing programmes have the potential to reduce environmental impacts of medicines used a combination of behaviour change interventions. There is a need to contextually replicate these eco-directed prescribing

programmes to understand how these can reduce environmental impact of other pharmaceutical classes in different healthcare settings.

Health in the Wellbeing Economy

Lindsay McLaren, (PhD, Professor, University of Calgary) and Michael Abrams, (MS, Adjunct Professor, McDaniel College)

Background: Although the idea is not new, there is growing interest and momentum around the idea of a well-being economy, briefly defined as an economy whose prime directive is to deliver social and ecological well being for all – rather than a narrow version of economic growth. This is a bold, broad, and cross-cutting vision that would touch all levels of government and indeed all elements of society. It is not yet clear what it would mean for particular sectors. Our aim is to consider what a well-being economy means for health.

Methods: We first define what we mean by health and how it relates to well-being. The premise of our paper is that health is well-being – they are the same. For many, health has become synonymous with health care or individual, lifestyle choices, but at the population level health is inseparable from social and ecological determinants. We provide several examples of how a well-being economy contributes to health conceptualized broadly in this way.

The Geneva Charter for Well-being is a comprehensive vision of a well-being economy that comprises equity, respect for planetary boundaries, healthy public policy, universal health coverage and the impacts of the digital transformation. Drawing on the Charter as an organizing framework, we describe a model of societal health that integrates these ideas. We conclude with practical implications, drawing from jurisdictions where elements of a well-being economy are in place.

Findings/Interpretation: Societal health is reflected fractal-like at the individual and community levels. A post-growth well-being economy would be regenerative,Äìcontrasted with our current degenerative industrial economies. While respecting the limits of the planet's life support systems, it would deliver on the promise of long, healthy and fulfilling lives.

Planetary Health Action Study Erfurt (PACE): Accelerating climate protection by behavioural insights

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Background: The Planetary Health Action Study Erfurt (PACE) investigates the gap between scientific consensus and collective action to protect our planet's and our own health. We aim to better understand social cognitive processes leading to citizens' readiness to act against climate change. This can contribute to designing and communicating climate protection policies so that they are supported by the public. For this purpose, planetary health communication needs to be better understood.

Method: In a serial cross-sectional design, we examine psychological factors influencing health and climate protection-related attitudes and behaviours. The first survey took place in July 2021 (n = 1.521; German quota sample representing the distribution of age, gender and federal state of the adult general population). Currently, the survey runs every four weeks (n ≈ 1.000). Along with demographic variables, different direct paths to "readiness to act" (operationalized, e.g., via knowledge, health risk perception, social consensus) and potential moderators (e.g., self-efficacy, informational and behavioural fatigue) are assessed.

Findings: Extreme weather events were seen as likely to seriously impact health. Health consequences such as low food quality or mental problems were deemed less relevant. Those who think that they will be exposed to health risks consider them as more serious and are more likely to agree with climate protection measures. From 80 potential measures surveyed, 17 received more than 75% approval. High approval rates were found for cheaper local transport and reducing food waste, low ones for regulations of renewable energy or reducing livestock. 11% oppose the implementation of the measures listed.

Interpretation: The study showed that the majority of participants are pro-climate protection. Risk perception differs between individuals. The links between climate change and health risks that go beyond heat and extreme weather should be communicated more effectively. Frameworks should be created that facilitate climate-friendly collective and individual action.

Floods, Conflict and Displacement: The triad of planetary health boundaries in South Sudan

PhD, Prof OP Jindal Global University, India

Background: South Sudan's coping capacity is very low as the country is prone to lots of hazards like annual floods, health emergencies like COVID-19, resulting in internal conflicts and displacement. Ayod and Fangak counties were facing floods during the year 2019-21 and flooding affected eight out of ten of the states in the country. More than 3,000 households were displaced by floods. Other than that the country is facing conflicts till 2011 prompting as many as two million refugees to return to the worlds youngest country.

Methods: The data were collected through literature review, qualitative and quantitative via household surveys (n- 462) through Kobo Software, Focus Group Discussions' (n- 6), and Key Informant Interviews (KII) (n- 19). Prior to data collection, investigators provided information on the survey and its purpose in the local language/dialect.

Findings: The population has faced lots of displacements since 2019 when flooding intensified in the Upper Nile and the Jonglei States and most shelters are left destroyed and household necessities are carried away by water. Although 67% of population sampled were the residents and hosts, 11% of the respondents were displaced for less than six months, 19% were displaced for more than six months, and 3.6% were returnees.

In 2020, security situation deteriorated further and the expansion of localised conflicts triggered 232,000 new displacements in the first half of the year. The community members have been constantly displaced due to their circumstances eg. floods, food insecurity, lack of jobs, lack of shelter and staying in their original villages or payam poses a 'burden' on the host.

Situating the consequences of displacement within wider discourse of climate injustice, we found flood-affected populations adopting maladaptive strategies. The population has faced multiple displacements since 2019 where flooding intensified in the Upper Nile and Jonglei States. Every time they are displaced, most shelters are left destroyed and household necessities are carried away by water. The qualitative data show that floods and COVID-19 both disrupted the agricultural production and availability of food in the markets and impeded accessibility. Survey results show that displaced populations have adopted multiple coping strategies to meet basic food requirements: food aid (25%); reliance on relatives (16%) and distress sale of animal products (14%). Since about 85 per cent of the land is covered by water and given the no harvest period since 2020, people in the community are running out of food. People in the community are surviving by consuming wild leaves (water lilies and grass), fruits like lalop, and fishes (especially from flood water). Localities that are away from rivers are the most inaccessible spots in the communities by most humanitarian agencies.

Interpretation: The study shows that thousands of people were displaced in the two counties due to floods and conflicts and these areas were inaccessible for humanitarian actors reaching out from Juba. Hence, communities adopted adaptive and maladaptive strategices that further added to their vulnerabilities. This study presents lessons for humanitarian responders to meet localisation agenda integrating core humanitarian standards, inclusion of displaced communities, especially women in setting programme objectives for building resilience of displaced members in remote and inaccessible regions in Ayod and Fangak.

Lightning Talk Abstracts

Day 1

Exploring the needs, barriers, and priorities to protect the mental health and improve the wellbeing of Peruvian women facing climate change impacts: a qualitative study.

Elaine C. Flores (London School of Hygiene and Tropical Medicine)

Background: Climate change is undermining the foundations of health and mental health worldwide. Women in the Global South are disproportionately affected by climate-related impacts. Peru, a megadiverse country, is responsible for only 0.1% of global CO2 emissions, but is especially susceptible to environmental threats. Peruvian data is particularly scarce and sex-disaggregated data is even less available. We aim to explore, understand, and characterise the agency, context, risks, and needs to improve and protect Peruvian women,Äôs well-being and mental health facing climate change.

Methods: We conducted 48 in-depth walking interviews with women from The Peruvian Coast, Andes, and Amazon rainforest between April and May 2022 using an iterative snowball sampling. Audio-recording, photography and geo-location data was used to better understand how environmental experiences, personal exposure profiles, mental health issues, subjective well-being and adversity vary for individuals and communities. Data was analysed using thematic analysis.

Findings: Several interviewees lacked awareness of the causes, roles, and drivers of climate change, despite clearly identifying the related environmental effects and their detrimental role in their own lives and livelihoods. Weak institutions, multilevel corruption, and incompetent authorities were mentioned as barriers to community environmental protection. Feelings of distrust, powerlessness, abandonment, suffering, invisibilisation related to extractive economies & the health sector were highlighted as embodied adversity factors. A strong machismo culture, lack of women participation in decision-making roles were mentioned widely. Existing hazards, coping responses and health inequalities varied by setting and cultural context.

Interpretation: Multiple inter-related issues are faced by environmentally threatened communities in Peru, and macrostructural barriers contribute to a lack of awareness, disempowerment, and suffering across Peruvian women. Women are key to improving environmental conditions and achieving adaptation to climate change but are chronically overlooked. A multi-layered and multi-faceted gender-sensitive approach is required to promote and protect mental health and wellbeing needs of women.

Does living near blue space modify the impact of socio-economic deprivation on mental health in urban areas? A population-based retrospective study.

Michail Georgiou (Glasgow Caledonian University), Zoë Tieges, Gordon Morison, Niamh Smith, Sebastien Chastin

Background: The incidence of mental health disorders in urban areas is increasing and there is a growing interest in using urban blue spaces as nature-based therapy to prevent and manage mental health. However, there is a dearth of longitudinal evidence of the mechanisms and impact of blue spaces on clinical markers of mental health to support and inform such interventions. Restoration of the North Glasgow branch of the Forth and Clyde Canal begun in 2000 as part of Glasgow's ''Smart Canal'' project which is the largest programme of canal regeneration in the U.K. The canal was completely closed and left to dereliction for over 40 years and the first canal lock re-opened as a space for recreation in 2006. Situated within the most deprived neighbourhoods in Europe and characterised by a clustering of environmental and socio-economic deprivation, physical and mental health challenges, significant health disparities and climate change vulnerabilities, this is a unique natural experiment that was primarily developed to increase the communities' resilience to climate change.

Methods: To investigate the mental health co-benefits deriving from the canal regeneration project, we conducted a population-based retrospective cohort study and explored whether living near blue space modifies the negative effect of socio-economic deprivation on the mental health of the population of North Glasgow Scotland, U.K, using routinely collected NHS data, over a 9-year period (2009-2018).

Findings: Our findings indicate that living near blue space modified the risk of mental health disorders deriving from socio-economic deprivation by 6% (hazard ratio 2.48, 95% confidence interval 2.39 to 2.57) for those living in the most deprived tertile (T1) and 4% (hazard ratio 1.66, 95% confidence interval 1.60 to 1.72) for those in the medium deprivation tertile (T2).

Interpretation: This supports the notion that living near blue space could play an important role in reducing the burden of mental health inequalities in urban populations.

The lost opportunity from insufficient pollinators for global food supplies and human health.

Matthew Smith (Harvard T.H. Chan School of Public Health), Nathaniel D. Mueller, Marco Springmann, Timothy B. Sulser, Lucas A. Garibaldi, James Gerber, Keith Wiebe, Samuel S. Myers

Background: Animal pollination supports agricultural production for many healthy foods like fruits, vegetables, nuts and legumes that provide key nutrients and protect against non-communicable disease. Today, most crops receive sub-optimal pollination because of limited abundance and diversity of pollinating insects.

Methods: We model the impacts on current global human health from insufficient pollination by quantifying the pollinator-related crop yield gap and lost consumption of pollination-dependent foods by country and region, after accounting for global trade, economic behaviors, and food waste. We also estimate the lost economic value of crop production for three diverse case-study countries: Honduras, Nepal, and Nigeria.

Findings: Globally, we find that we are currently losing 3–5% of fruit, vegetable, and nut production due to inadequate pollination, leading to an estimated 427,000 (86,000 – 691,000) excess deaths annually from lost healthy food consumption and associated diseases. Impacts are unevenly distributed: lost food production is concentrated in lower-income countries while impacts on food consumption and mortality attributable to insufficient pollination is greater in middle- and high-income countries with higher rates of non-communicable disease. Furthermore, in our three case-study countries, we find the economic value of crop production is 12–31% lower than if pollinators were abundant (due to crop production losses of 3-19%), mainly due to lost fruit and vegetable production.

Interpretation: Insufficient populations of pollinators are currently responsible for large burdens of disease through lost healthy food consumption. Also, low-income countries are losing significant income and crop yields from pollinator deficits. These results underscore the urgent need to promote pollinator-friendly practices for both human health and agricultural livelihoods.

Biodiversity and public policies purchases in Brazil – The case of School Feeding Program

Semíramis Martins Álvares Domene (Federal University of São Paulo), Josiane Steluti, Dirce Marchioni, Evandro Marcos Saidel Ribeiro, Alexandre Cláudio Botazzo Delbem, Rafaella Guimarães Moraes Camargo, António Mauro Saraiva, Aline Martins de Carvalho

Background: Brazil is the country with the greatest biodiversity on the planet. Despite this, adapted exotic species account for most of the fruits and vegetables consumed in the country. Purchasing regulated by public policies can contribute to strengthening local production of native species, as a strategy for maintaining resilient and sustainable food systems. This study aims to identify the native species and their products acquired by 26 Brazilian municipalities via/for the National School Feeding Program (PNAE).

Methods: All foods purchased in 2019 from those municipalities, one per state of the federation, and covering all six national biomes: Amazon, Cerrado, Caatinga, Atlantic Forest, Pampa, and Pantanal, for PNAE were studied for the identification of native species and their products, based on a list of 94 foods with economic and social value known as socio-biodiversity products.

Findings: Only 9 different foods from native species list were found in this study. Of the 2862 purchases in all municipalities, only 175 were of native products (6.11%), most of them in municipalities located in regions where the Caatinga and Atlantic Forest biomes coexist (43 items, 24.6%); in second place are the municipalities located in the Amazon, which purchased 36 items (20.6%). The most common native species products acquired were cassava (29%), cassava flour (17%), "colorau"- a condiment extracted from annatto seeds used as food coloring (18%), and guava (12%). None of the vegetables and only five types of fruits such as guava, pineapple, passion fruit, cashew and açaí from the native species list were purchased from the municipalities. Interpretation: The share of native biodiversity products is low in official purchases for school meals. Therefore, there is room to increase the purchasing of biodiversity species, which can have positive impacts on health, on the environment and on economic issues of family farmers.

Residential green space and waist circumference impact telomere attrition in childhood.

Thaïs De Ruyter (Ghent University), Dries S. Martens, Esmée M. Bijnens, Tim S. Nawrot, Stefaan De Henauw, Nathalie Michels

Background: Telomere shortening has been recognised as one of the best biomarkers of biological aging and is vulnerable to various environmental exposures and lifestyle factors, encompassed in the exposome. Research shows that telomere length is substantially determined early in life and that exposures in childhood may have important consequences in setting later life telomere length and thus lifespan. We explored in a child population the associations of 17 exposures with longitudinal telomere change.

Methods: Children (2.7-9.4y at baseline, 51.3% boys) were followed-up for five to seven years. Relative telomere length was measured at baseline and follow-up using quantitative real-time PCR. Exposures and lifestyle factors included: body mass index, waist circumference, dietary habits (sugar- and fat-rich food intake, vegetables and fruit intake), psychosocial stress (negative events, emotions, behavior), sleep duration, physical activity, and residential environmental quality (long-term black carbon and particulate matter exposure, and residential green space). Green space was estimated based on high-resolution land cover data within several buffers (50–3.000 m) around the child's residence. Cross-sectional (n=182) and longitudinal (n=150) analyses were performed using linear regression models, adjusting for age, sex and socioeconomic status.

Findings: Longitudinal analyses showed that higher residential green space at baseline was associated with less telomere attrition (β=0.261, p=0.002) while a higher baseline waist

circumference was associated with more telomere attrition (β=-0.287, p=0.001). These predictors were confirmed via LASSO variable selection and correction for multiple testing. In addition, children with more unhealthy exposures had significantly more telomere attrition over the follow-up period compared to children having more healthy baseline exposures (β=-0.200, p=0.017).

Interpretation: Residential green space and waist circumference were identified as predictors of telomere attrition in childhood. These results further support the advantage of a healthy lifestyle from early age onwards and the importance of a green environment to promote molecular longevity from childhood onwards.

Climate-poverty connections: Climate solutions can generate benefits for people and the planet

Yusuf Jameel PhD (Project Drawdown), Carissa Patrone, Kristen Patterson, Paul West

Background: Addressing climate change and improving the well-being of people experiencing extreme poverty, two key aspects of planetary health, can and must be complimentary. The objective of this research is to provide decision-makers with rigorous and concrete evidence of how climate solutions can also contribute to meeting development and human well-being (HWB) needs in low- and middle-income countries while improving planetary health.

Methods: We identified 28 solutions (from the 80 climate mitigation solutions Project Drawdown has previously analyzed) that have the potential to generate HWB co-benefits for rural and under-resourced communities in South Asia and sub-Saharan Africa. We then used Doughnut Economics to develop a rigorous and consistent framework to analyze 12 dimensions of HWB co-benefits generated by the climate solutions. Finally, we synthesized evidence of the HWB co-benefits of the 28 climate solutions.

Findings: Drawing on over 450 articles and reports, our landmark analysis shows that climate solutions generate enormous direct and indirect co-benefits to HWB, particularly around Income and Work, Health, Food, Education, Gender Equality, and Energy.

Interpretation: People experiencing extreme poverty are often most vulnerable to climate change, even though they are the least responsible for it. Investments in low-carbon development pathways that prioritize communities that are first and worst impacted by climate change, particularly in low- and middle-income countries, are key components of planetary health. In alignment with the IPCC AR6 reports, we must coordinate strategies, complement funding, and harmonize policies to simultaneously address climate change, alleviate poverty, and boost HWB while increasing resilience to current and future climate change. Our analysis reveals a tremendous opportunity for decision makers, policymakers, and funders to work alongside women, youth, Indigenous peoples,

and local communities to implement climate solutions that could make a dramatic difference for the well-being of both people and the planet.

Day 2

A critical ecosystems and intersectional approach to understanding farmer mental health: A mixed-methods study.

Fiona Doherty (The Ohio State University, College of Social Work)

Background: Sustainable farming is key to mitigating climate change, yet reports indicate increased prevalence of depression, anxiety, and suicide among U.S. farmers, and gaps in literature concerning the well-being of sustainably-oriented farmers. Few studies have focused on the unique stressors of beginning farmers, a group including more women, LGBTQ+, and Black, Indigenous, and People of Color (BIPOC) who face intersecting stressors of oppression.

Methods: In collaboration with an organization that supports sustainable farmers, we designed a critical ecosystems and intersectional mixed-methods approach to understand beginning farmers' systemic stressors and barriers to stress management. Beginning farmers in the Midwest region were recruited through our community partner's email list. Quantitative surveys (n=64) and semi-structured interviews (n=20) were administered. Data analysis included descriptive statistics and thematic analysis with member-checking by key informants.

Results: Survey data showed a higher prevalence of anxiety and depression symptoms (58.1%) among our sample compared to the general population (37.9%). Systemic stressors included insufficient time and labor (90% of respondents), COVID-19 (84%), climate change (80%), and social justice (75%). Interview themes provided more depth and included 1) the "stress of capitalism," 2) experiences of discrimination among farmers from marginalized identities, and 3) barriers to sustainability, such as acquiring land and capital. Beliefs of stigma prevented respondents from seeking care. Many respondents could not afford mental health therapy or struggled with health insurance compatibility.

Implications: Farmers are frontline workers in the face of climate change, yet this group is overburdened by stress. Training opportunities are needed for health professionals to understand the unique stressors of farmers, especially farmers from marginalized identities and in the context of our climate crisis. Advocates must push for enhanced social safety nets for agricultural workers, including health insurance coverage. Community conversations and informational campaigns are needed to decrease the stigma surrounding mental health support.

Young people's mental health in a changing climate.

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Background: The climate is changing more rapidly than anticipated, making it the greatest existential threat of our time. Evidence suggests that climate change can be a source of negative mental health among young people. A variety of mental health issues including eco-anxiety and post-traumatic stress disorder (PTSD) are related to the anticipation and consequences of climate change related events. Currently, there is a lack of evidence regarding these impacts focusing on young people who are vulnerable to the mental health impacts of climate change.

Methods: A quantitative approach was employed to explore the mental health impacts of climate change among young people aged 18–24 years. A secondary analysis of data from an Australian nation-wide survey (N=5483) on mental health impacts of climate change was conducted. The survey included demographic questions and questions related to the impact of climate change on participants. Hierarchical regression, analysis of Covariance (ANCOVA), and logistic regression were conducted to examine the relationship between age and the dependent variables (eco-anxiety, pre-trauma, PTSD). An ANCOVA was run to identify significant differences in eco-anxiety between those who have and have not had a direct experience of climate change.

Findings: Age was a significant predictor of eco-anxiety, pre-trauma, and PTSD and young people (18-24 years) reported significantly higher rates of eco-anxiety (OR=8.31, $p<0.001$, 95%CI 4.83-14.28), pre-trauma symptoms (OR=10.38, $p<0.001$, 95%CI 4.73-22.76), and PTSD symptoms (OR=2.54, $p=0.001$, 95%CI 1.46-4.41) than other age groups. Furthermore, there was a significant relationship between the effects of direct experiences of climate change events and eco-anxiety ($F=21.12, p<0.001$).

Interpretation: Climate related mental health is a significant planetary health issue, especially for young people in Australia. This research provides evidence of a significant link between climate change and young people's mental health. The health sector must orientate mental health practice to manage mental health impacts of climate change on young people.

Spatiotemporal variation and environmental sensitivity of childhood enteric pathogen infection risk: A Planetary Health approach to predictive modeling and risk mapping.

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Background: Diarrheal disease is a major cause of childhood illness caused by numerous ecologically sensitive enteropathogens. The bacterium Shigella causes 64,000 child deaths annually and thrives in warm, moist conditions. Spatiotemporally varying disease burden estimates are critical for targeting interventions like the forthcoming Shigella vaccine. NASA, JHU and UVA are collaborating to compile diagnostic data from multiple sources into a repository of unparalleled size, scope, and diversity. This study aimed to model and map pediatric Shigella infection risk across LMICs using covariates with quasi-global coverage.

Methods: Data were combined from 21 studies that used PCR to diagnose Shigella in stool samples from children aged <5 years in LMICs, resulting in a pooled database of over 66,000 samples from 22,000 subjects in 23 countries. These were matched spatiotemporally to time-varying hydrometeorological variables extracted from historical daily Earth Observation- and model-based re-analysis-derived estimates; environmental and demographic spatial covariates; and household- and subject-level data. Variable selection was carried out and a predictive projection method was implemented making predictions separately for three age groups.

Findings: Air temperature was the most important variable with infection risk peaking at temperatures close to that of the human body. The interaction of precipitation with soil moisture was also important. Accessibility to cities was an important non-hydrometeorological covariate. The model predicted wide belts of elevated Shigella risk in tropical Sub-Saharan Africa, India, and Brazil, and smaller pockets of high prevalence in New Guinea, Ethiopia, the Sahel, coastal Central America, and Colombia, among others.

Interpretation: Advances in differential pathogen diagnosis, climatological modeling, and geostatistical methods now make it possible to generate quasi-global maps of enteric pathogen transmission risk. These predictions will be made publicly available for use in decision-making, such as identifying populations in hotspots of Shigella transmission risk that can be prioritized as vaccines become available.

Integration of medical service provision and nature conservation worldwide 1980-2022: Collaborative evidence mapping of 43 projects across 22 countries.

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Background: Biodiversity protection is fundamental to human wellbeing, and, in turn, serving human health in medically underserved areas can sometimes strengthen conservation. We aimed to collaboratively map the evidence on projects worldwide that are, or have been, providing health services with intention of producing a conservation outcome in addition to health improvement.

Methods: Scoping indicated many NGO projects are never published in academic literature. To avoid missing such interventions we asked conservation staff worldwide to contribute data online or through interviews. Advertising to join the collaboration was through formal networks (International Union for Conservation of Nature, Planetary Health Alliance, etc.), professional contacts, funders, and a call in The Lancet Planetary Health. Additionally, data and literature were synthesised from libraries and datasets of collaborators at Population Reference Bureau, Sussex Sustainability Research Programme, and Ecological Levers for Health.

Findings: Forty-three projects from 22 countries fitted our inclusion criteria. Around half had not been published in the collected literature, with data only available through direct submission. Tropical wet forest was by far the most common habitat, followed by tropical dry forest, coral reefs, and tropical grasslands. The most represented region was Sub-Saharan Africa with 27 projects, followed by South-East Asia (five), South Asia (five), Oceania (two), South America (two), Central America (one), Europe (one). Projects ranged from basic health interventions bolted on to pre-existing conservation programmes to generate goodwill (eg, vaccination rounds bordering national parks) to complex schemes to jointly act on health and biodiversity driven (and funded) by concerns for human welfare as much as conservation.

Interpretation: Synergistic action on biodiversity conservation and health service provision is very often effective and the approach is more widespread than literature would indicate. However, funding was usually provided on a siloed basis for either health or conservation, and this remains a barrier to wider adoption.

Building blocks of positive community health: The contribution of Kenyan communities.

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Background: Local eco-agri-food systems magnify the consequences of planetary health crises, and climate change represents a threat to communities already in environments of extreme vulnerability. The aim of this study is two-fold: first, to explore the impact of climate change on local assets within eco-agri-food systems and how these affect community capacities and capabilities related to community positive health. Second, to highlight how communities create pressure points for action to re-integrate local resources, capacities and capabilities to pursue community positive health.

Methods: The methodology relied on a six-step process: elaboration of the research questions; identification of peer-reviewed articles and gray literature documents; definition of criteria for the inclusion and analysis; charting of the information obtained; consultation in the nature of reflection with key stakeholders in India, Kenya and Peru; summarize and report the results.

Findings: The scoping review highlighted pathways through which climate change is impacting community assets such natural, human, social, and produced resources of local agri-eco-food systems. The review also showed how communities could be agents of change and cope with these challenges. We articulated the potential pressure points in the system that re-vitalise local resources and enhance community capacities and capabilities, such as agro-ecology practices and community-led initiatives.

Interpretation: The research outcomes were mapped in a conceptual framework outlining the relationship between climate change impacts on local eco-agri-food systems assets and capacities and capabilities for community positive health. Coping strategies adopted by communities were grouped in a checklist that could support communities in similar contexts to mitigate climate change impacts and prevent worse scenarios. These tools could guide the development of policies, projects and programmes that aim to sustain local agri-eco-food systems facing climate change's detrimental effects.

HEAL: Australian research network in human health and environmental change.

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Background: The HEAL Network aims to strengthen the Australian community and health system resilience to climate change, extreme events, and other environmental change. This is achieved by building capacity and stimulating collaborative research that will improve our understanding of the interactions between climate, the natural and built environment, public health, and their inequitable impacts across communities. HEAL is embedding systematic co-design processes with First Nations people on environmental change preparedness, capacity building, and mitigation and adaptation solutions.

Methods: The HEAL Network is regionally distributed and includes multiple Communities of Practice, comprising researchers, practitioners, community organisations, and decision-makers. Based on initial gap analyses and stakeholder consultations, we have established 10 interdisciplinary research themes (Indigenous Knowledge Systems; Data and Decision Support Systems; Science Communication; Health System Resilience; Bushfires and Extreme Events; Food, Soil and Water Security; Biosecurity and Emerging Infectious Diseases; Urban Health; Rural and Remote Health; At-risk Populations and Lifecourse Solutions) and a range of capacity building activities that will support communities and nurture early career researchers.

Findings: HEAL will address capacity and capability gaps in human health and environmental change, and credibility gaps in interactions between policy-makers, practitioners, industry and communities. One crucial outcome is developing the meta-capacity needed to formulate priorities, co-design research, and translate and implement research findings into policy and practice. New interdisciplinary collaborations springing from HEAL have led to development of community-based, solution-focussed research, such as facilitating Aboriginal community-led climate adaptation plans based on traditional Knowledges and environmental health data.

Interpretation: HEAL prioritises evidence and capacity needs, and local action with community-led co-design of solutions embedded in a monitoring and evaluation framework. This will lead to more effective national, regional and local policies to protect and improve planetary health and reduce inequalities within and across communities.