



PROCEEDINGS OF THE ADU—POP SYMPOSIUM ON SUSTAINABILITY AND CLIMATE ACTION



Published by POP Academy
In collaboration with Abu Dhabi University

PROCEEDINGS OF

THE ADU-POP SYMPOSIUM ON SUSTAINABILITY AND CLIMATE ACTION

Edited and reviewed by Dr. Saroj Pachauri, Dr. Afsheen Raza,
Dr. Asiya Nazir, and Dr. Ash Pachauri



First published by POP Academy 2026
Copyright © 2026 by POP Academy

All rights reserved. No part of this publication may be reproduced, stored, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning, or otherwise without written permission from the publisher. It is illegal to copy this book, post it to a website, or distribute it by any other means without permission.

© Copyright POP Academy, 2026. - All rights reserved.

The content within this book may not be reproduced, duplicated or transmitted without direct written permission from the author or the publisher.

Under no circumstances will any blame or legal responsibility be held against the publisher, or author, for any damages, reparation, or monetary loss due to the information contained within this book. Either directly or indirectly. You are responsible for your own choices, actions, and results.

Legal Notice:

This book is copyright protected by POP Academy. This book is only for personal use. You cannot amend, distribute, sell, use, quote or paraphrase any part, of the content within this book, without the consent of the author or publisher.

Disclaimer Notice:

Please note the information contained within this document is for educational and entertainment purposes only. All effort has been expended to present accurate, up-to-date, and reliable, complete information. No warranties of any kind are declared or implied. Readers acknowledge that the author is not engaging in the rendering of legal, financial, medical or professional advice. The content within this book has been derived from various sources. Please consult a licensed professional before attempting any techniques outlined in this book.

By reading this document, the reader agrees that under no circumstances is the author responsible for any losses, direct or indirect, which are incurred as a result of the use of the information contained within this document, including, but not limited to, — errors, omissions, or inaccuracies.

Cover Design
Harun Ahmed

This book was professionally typeset on Reedsy.
Find out more at reedsy.com

ISBN: 978-1-964789-42-2

Table of Contents

Foreword I...xi

Foreword II...xiii

Bios of the Editors...16

Abstracts...29

Abstracts

- 1 Bio-Mimetic Liposomal Nanocarriers from *Allium Tuberosum* for Targeted Cancer Therapy
- 2 Medicinal Mushrooms as Complementary Therapeutics in Cancer Treatment
- 3 Medicinal Plants Across Altitudinal Gradients: Phytochemical Adaptations and Cancer Therapeutics
- 4 AI-Guided Small Molecule Design in Precision Oncology: From Virtual Screening to Clinical Translation
- 5 Optimization of Production and Reaction Conditions for β -Xylosidase Activity by Bacterial Isolate W8.
- 6 Climate Change and Infection-attributable Cancers: A One Health Framework for Anticipating Shifts in Oncogenic Pathogen Exposure
- 7 Antimicrobial Use Across the One Health Continuum, Gut Dysbiosis, and Colorectal Cancer Risk: A Narrative Review
- 8 Machine Learning for Spatiotemporal Estimation of Environmental Carcinogen Exposure in Cancer Epidemiology: A Scoping Review

- 9 Applications of Silica Nanoparticles for Mitigating Heavy Metal Stress and Promoting Sustainable Food Production
- 10 Climate-Driven Oxalate Burden: Characterization of Oxalotrophic *Bacillus Stercoris* with Probiotic Potential for Mitigating Oxalate Burden
- 11 A Demographic-Aware Vision-Language Framework for Equitable Diagnosis and Explanation in Skin Cancer Screening
- 12 Role of Arbuscular Mycorrhizal Fungi to Enhance Carbon Sequestration in Various Native Plant Species under UAE Conditions Aligned with SDG 13 (Climate Action)
- 13 Automation Bias and Diagnostic Deskillling in AI-Assisted Medical Education: A Scoping Review of Clinical Reasoning and Strategies to Preserve Independent Thinking
- 14 Microplastic Contamination in Commercially Available Table Salt in Saudi Arabia: Prevalence, Characterization, and Dietary Exposure Assessment
- 15 Microplastic Contamination in Packaged Edible Salt Marketed in the United Arab Emirates: Occurrence, Characterization, and Estimated Dietary Exposure
- 16 Microplastic Contamination in Edible Salt Marketed in Qatar: Occurrence, Characterization, and Estimated Dietary Exposure
- 17 Integrative Oncology Care in Cervical Adenosquamous Carcinoma: A Case Report

- 18 Occurrence of Total Aflatoxin in Monitored Foods and Population-level Childhood Growth Outcomes: An Ecological Panel Analysis Across WHO Regions
- 19 Production-Weighted Regional Climate Variability and Aflatoxin Detection in International Food Surveillance Data, 1994–2024
- 20 Global Transitions in Cardiovascular Risk-Attributable Burden Profiles Across 204 Countries, 1990–2023: a Longitudinal Unsupervised Machine-Learning Analysis
- 21 Urban and Occupational Heat–Noise Exposure Nexus in the UAE: Health Implications under the 20-Minute City
- 22 Valorization of Fallen Leaves for Climate-Conscious Synthesis of Antibacterial Metal Oxide Nanoparticles
- 23 Knowledge, risk perception, and household practices related to indoor chemical pollution in the United Arab Emirates
- 24 Cardio-Guard: Edge-AI Device Based Real-time Heart Condition Detection with Privacy Preserving Federated Learning
- 25 Gender-Inclusive Environmental Education and Youth Climate Advocacy: Evidence from Seven Secondary Schools in Cameroon
- 26 Closing the Preanalytical Gap: Impact of a Structured Behavioral and Professionalism Intervention on Phlebotomy Compliance — Observational Study
- 27 Climate Change and the Future Health of Youth: Investigating Environmental Exposures and Emerging Skin Cancer Risks in Muzaffarpur City, Bihar

- 28 Mechanisms of Anticancer Efficacy in Metal Nanostructure-Doped PDMS Composite Platforms: A Short Review
- 29 Rising Heat, Fragile Beginnings: Extreme Heat and the Risk of Preterm Birth in a Changing Climate — The Case of the United Arab Emirates
- 30 Prompting for Prevention: Can Prompt Framing Improve Generative-AI Advice on Cancer-Preventive and Sustainable Eating?
- 31 Where Health and Climate Goals Converge: Crosswalking Cancer-Prevention Dietary Guidance with Food Greenhouse-Gas Emissions
- 32 Small Changes, Dual Benefits: Modeling Ingredient Substitutions in Familiar Pakistani Meals
- 33 Beyond the Health Halo: Auditing Claim Verifiability and Cancer-Prevention Alignment in Online Health-Marketed Packaged Foods
- 34 Can Young Adults Choose for Both Health and Planet? A Digital Audit of Quick-Service Menus in Karachi
- 35 Does Sustainability Disappear from Online Cancer-Prevention Advice? A Reproducible Search-Engine Audit
- 36 Protein Foods at the Intersection of Cost, Climate Impact, and Cancer-Prevention Guidance
- 37 Building Youth Capacity for Climate-Informed Cancer Prevention: A 150-Minute Research Sprint with Novice Computer Science Students
- 38 Through Youth Eyes: A Rapid Photovoice-Inspired Study of Food Environments for Sustainable Health and Cancer Prevention

- 39 Sustainable Synthesis of Silver Nanoparticles from Pomegranate Peel Biowaste: Climate Smart Nanomedicine
- 40 Quantifying Excess Lifetime Cancer Risk from Bromate and Trihalomethane Exposure in UAE Desalinated Drinking Water
- 41 Reading the Sky: Using Interstellar to Teach Air-Quality Decision Skills in Karachi
- 42 Cracking the Polyfluoroalkyl Substances (PFAS) Mystery: Using Dark Waters to Teach Teenagers About Exposure and Health Risk
- 43 From Cinema to Climate Reality: Teaching Sea-Level Science Through the Day After Tomorrow
- 44 Building and Strengthening Community Technical Capacities for Climate Change Adaptation: A Case Study of Ecosystem-based Adaptation in Mexico
- 45 When Water Is Scarce: Exploring Heat, Hydration and Irrigation Through Dune
- 46 From Factory to Food Chain: Using Minamata to Explain Environmental Disease
- 47 Rewriting Deadpool: A Cancer Biology Challenge for Non-STEM Students
- 48 Senova: Targeting the Cellular Senescence before Cancer Risks Arise. UAE-Derived Natural Senolytic Strategy for Prevention of Colorectal Cancer
- 49 AI-Driven Neuro-immune based Cartography of Pancreatobiliary Axis: Decoding Tumor-Immune-Nerve Communication to Successfully Identify Therapeutic Vulnerabilities in Biliary and Pancreatic Cancers in the UAE

- 50 Exposome-X: An AI-Powered Map for Early-Onset Colorectal Cancer risk in Young Adults in the United Arab Emirates
- 51 Climate Change and Cancer Prevention: Environmental Exposures, Vulnerability, and Opportunities for Youth-Led Action
- 52 Beyond the Ingredient List: Using Dark Waters to Teach Chemical Information Literacy
- 53 Microclimate Disparities and Heat Vulnerability Indexing of Delhi, India
- 54 Endosome - Mitochondria “Kiss-and-Run” Iron Transfer: Potential Implications for Environmental Stress and Cancer
- 55 Population-Specific Distribution of Disease-Associated SNPs: Relevance to Skin Disease, Cancer Susceptibility, and Middle Eastern Populations
- 56 miRNAs as Biomarkers for the Diagnosis of Colorectal Cancer
- 57 Youth-Centered Climate Policy for Psychological Resilience and Sustainable Green Transition
- 58 Sustainable Algae-Based Biofuel with Circular Economy Integration: A Literature Review
- 59 Computational Kinetics Model of Micro- and Nanoplastics-Induced Cytotoxicity and Pre-Metastatic Niche Priming
- 60 Air Pollution Exposure and Cardiovascular-Cancer Risk Pathways: A Scoping Review and Youth-Led Clinical Monitoring Framework
- 61 Evaluating a Subnational Heat Action Plan through a Labor Lens

- 62 Bridging the Care Gap: Assessing Guideline Adherence in Severe Acute Malnutrition Management in Northern Ethiopia
- 63 A Forgotten Killer: Rheumatic Mitral Stenosis Mortality in Ethiopian Children
- 64 Precision Modulation of the Gut Microbiome Through Ketogenic Dietary Strategies: Implications for Sustainable Cancer Prevention
- 65 Climate Change and Global Cancer Burden
- 66 CancerGuardians: A Youth-Lead Community Ambassador Network for Cancer Prevention and Sustainable Health
- 67 Epigenetic Regulation of NY-ESO-1 as a Potential Link Between Environmental Exposures and Breast and Ovarian Cancer
- 68 Cancer-Relevant Biological Mechanisms Associated with Environmentally Weathered Microplastics: A Scoping Review
- 69 Design, Synthesis, and Antimicrobial Evaluation of New Fluoro-Formazan Derivatives
- 70 Efficient Microwave-Assisted Synthesis of Hydroxy Chalcones and In-Vitro Evaluation of Their Biological Activities
- 71 One Pot Multicomponent Synthesis Of 1,4-DHP Derivatives
- 72 "Synthesis of Dihydropyrimidinones Without Any Solvent"
- 73 Synthesis of Nickel Complex from Schiff Base
- 74 Design, Synthesis and Biological Activities of Chalcone Derivatives Containing Pyrazoline
- 75 Synthesis Of Different Metal Complex from Schiff Base

- 76 Synthesis of Manganese Complex from Schiff Base
- 77 Synthesis of Metal Complex from Schiff Base
- 78 Synthesis And Antimicrobial Investigation of Novel 1,3,5-Dithiazins Heterocycles
- 79 Preparation of 2-Acetyl-4-chlorophenyl Acetate (1-I) by Schotten–Baumann Esterification
- 80 One-pot Multi-component Synthesis of Pyrazolo [3,4-b] pyridine and Pyridodipyrimidine Ammonium Acetate
- 81 Biological Evaluation of Composite Biopolymer Films for Antimicrobial Activity and Soil Biodegradation
- 82 Effect of Some Plant Products of *Azadirachta Indica* and *Zingibare Officinale* on The Control of Adult Lesser Grain Borer “*Rhyzopertha Dominica*”
- 83 Nano-Enabled Digital Health Technologies for Early Cancer Risk Detection and Prevention: An Emerging Framework for Environmental Exposure Monitoring

Foreword I

Climate change is no longer a distant challenge or a concern for future generations. It is a defining reality of our time—one that touches our health, our communities, our economies, our natural ecosystems, and the future we are building for generations to come.

Yet, alongside the scale of this challenge, there is also a powerful source of hope: the energy, creativity, and determination of young people around the world.

This volume is more than a collection of abstracts and proceedings. It is a reflection of ideas, experiences, research, and solutions emerging from individuals who believe that meaningful climate action begins when knowledge is transformed into responsibility, collaboration, and tangible impact.

The POP Movement—Protect Our Planet—has consistently demonstrated the importance of creating spaces where young people, scientists, educators, policymakers, communities, and leaders can come together, exchange knowledge, and turn ambition into action. Such platforms are essential because climate change cannot be addressed by governments, institutions, or scientists alone. It requires a shared commitment across generations, sectors, and borders.

For us in the United Arab Emirates, sustainability is deeply connected to our vision for the future. Our nation has shown that economic development and environmental responsibility must advance together,

Foreword I

supported by innovation, science, partnerships, and the active participation of society.

As we continue this journey, empowering young people must remain at its heart.

The contributions presented in these proceedings remind us that solutions often begin with a question, an idea, or the courage to imagine a different future. When young minds are given knowledge, opportunity, and trust, they can become powerful agents of transformation.

I would like to express my sincere appreciation to everyone who contributed to this publication, and particularly to the leadership and global community of the POP Movement for their continued dedication to empowering youth and advancing climate action.

I also extend my heartfelt appreciation to Dr. Ash Pachauri and Dr. Saroj Pachauri for their commitment, leadership, and tireless efforts to inspire a new generation of climate leaders and to build bridges between knowledge and action across the world.

May these pages not simply document what has been discussed and achieved, but inspire what comes next.

Our responsibility is not merely to protect the planet we have inherited. It is to ensure that those who come after us inherit a world in which they can live, thrive, and dream.

Dr. Rashed Ahmed Mohamed Al Dhannhani
Senior Environment Specialist
Principal Ambassador of the POP Movement in the United Arab Emirates

Foreword II

On behalf of the Abu Dhabi University Cancer Research Institute (ADU-CRI), it is my distinct pleasure to present this Compendium of Abstracts for the ADU-POP Symposium on Cancer, Climate, and Youth Futures (CCYF 2026). This symposium represents a unique and timely collaboration between Abu Dhabi University Cancer Research Institute and the POP Movement, bringing together diverse voices united by a common purpose: advancing knowledge and action at the intersection of cancer, climate change, and youth wellbeing.

As Associate Provost for Research and Academic Development, I am particularly encouraged by the breadth and depth of abstracts showcased in this volume. The abstracts collected here reflect the commitment of researchers, clinicians, public health experts, educators, students, and innovators who recognize that the most pressing challenges of our era do not exist in isolation. Cancer, environmental change, population health, and social development are deeply interconnected, requiring integrated approaches that bridge traditional disciplinary boundaries.

The growing body of evidence linking environmental exposures, climate-related risks, and health outcomes underscores the urgency of collaborative research and informed action. Climate change affects not only ecosystems and economies but also the determinants of health that influence disease prevention, access to care, and long-term outcomes.

Foreword II

Understanding these relationships is critical to advancing cancer research, strengthening public health systems, and protecting vulnerable populations. In this context, young people play a particularly important role, both as those most affected by future environmental and health challenges and as emerging leaders capable of driving meaningful transformation.

The work presented in this compendium exemplifies the value of interdisciplinary inquiry and innovation. It highlights new scientific discoveries, practical interventions, and forward-thinking perspectives that contribute to our collective understanding of cancer prevention, health equity, climate resilience, and sustainable development. These contributions remind us that impactful research extends beyond the laboratory and the clinic; it informs policy, supports communities, and creates pathways toward healthier and more resilient societies.

I extend my sincere appreciation to all authors whose contributions have enriched this symposium, as well as to the Scientific and Organizing Committees whose dedication made this event possible. I also wish to acknowledge our valued partners at the POP Movement for their shared vision and commitment to fostering collaboration across disciplines, sectors, and generations.

It is my hope that this compendium will serve not only as a record of the outstanding work presented at CCYF 2026 but also as a catalyst for future partnerships, innovative research, and sustained action. The challenges associated with cancer, climate change, and youth futures demand collective solutions grounded in scientific excellence, social responsibility and

global cooperation. By working together, we can create new opportunities to improve human health, accelerate scientific discovery, and build a future that is both sustainable and equitable.

As you explore the abstracts contained within these pages, I invite you to reflect on the transformative power of curiosity, collaboration, and leadership.

Every breakthrough begins with a question, every partnership begins with a shared vision, and every meaningful change begins with the determination to act. Together, we can advance a future where science, innovation, and empowered communities work hand in hand to improve lives and safeguard the well-being of generations to come.

Prof. Montasir Qasymeh

Associate Provost for Research and Academic Development –
Abu Dhabi University
United Arab Emirates

Bios of the Editors

Dr. Saroj Pachauri, Public Health Specialist, Trustee, Center for Human Progress, New Delhi, India, and Director, POP (Protect Our Planet) Movement, New York, USA



As a public health physician, Dr. Pachauri has been extensively engaged with research on family planning, maternal and child health, sexual and reproductive health and rights, HIV and AIDS, and poverty, gender and youth. In 1996, she joined as Regional Director, South and East Asia, Population Council and established its regional office in New Delhi which she managed until 2014. In 2011, she was awarded the prestigious title of Distinguished Scholar, an honor rarely bestowed.

She worked with the Ford Foundation's New Delhi Office (1983-1994) and supported child survival, women's health, sexual and reproductive health, and HIV and AIDS programs. Before that, she worked with the International Fertility Research Program (IFRP) which was later renamed Family Health International (1971-1975) and the India Fertility Research Programme (1975-1983). She designed and monitored multi-centric clinical trials globally to assess the safety and effectiveness of fertility control technologies. During 1962-1971, as faculty of the Departments of Preventive and Social Medicine at the Lady Hardinge Medical College, New Delhi and the Institute of Med-

icine Sciences, Varanasi, she helped to develop this new discipline.

She has published twelve books of which five are on Climate Change and Health and contributed chapters to 20 books. She has over 100 publications in peer-reviewed journals and several articles in print media.

Dr. Afsheen Raza, Director, Abu Dhabi University Cancer Research Institute, Abu Dhabi University, UAE



Dr. Afsheen Raza is an Associate Professor of Molecular Biology at Abu Dhabi University, UAE, and currently serves as the Director of the Abu Dhabi University Cancer Research Institute. he is a molecular biologist and cancer cancer researcher with more than 15 years of research experience and over a decade of teaching, mentoring, and academic leadership in higher education. Her work spans molecular biology, cancer biology, genomics, immunology, and precision medicine, with a strong focus on translating laboratory discoveries into clinically relevant cancer diagnostics and therapeutics.

Dr. Raza's research interests include cancer immunotherapy, predictive and prognostic biomarkers, tumor-immune interactions, liquid biopsy technologies, hereditary cancer genetics, and mechanisms of treatment resistance in breast,

Bios of the Editors

lung, and colorectal cancers. She has led and collaborated on numerous multidisciplinary research projects and clinical studies across the UAE and the Gulf region, particularly in precision oncology and personalized medicine.

An internationally recognized scholar, Dr. Raza has authored more than 80 peer-reviewed publications, accumulated over 2,500 citations, and achieved an h-index of 24. Her key academic contributions include pioneering work on immune checkpoint biomarkers, circulating tumor DNA and exosomal biomarkers, NY-ESO-1 cancer testis antigen research, and translational cancer immunology. She has also contributed to several international clinical trials and serves on the editorial boards of leading scientific journals, including *Frontiers in Immunology* and *Heliyon Cancer Research*.

Through her research leadership, teaching excellence, and extensive scholarly output, Dr. Raza has established herself as a prominent contributor to cancer molecular biology, precision oncology, and immunotherapy research in the Middle East and internationally.

Dr. Asiya Nazir, Division Lead, Drug Discovery and Development Research, Abu Dhabi University Cancer Research Institute, Abu Dhabi University, UAE



Dr. Asiya Nazir, PhD, FHEA, is a Senior Instructor in the Department of Biomedical Sciences, College of Health Sciences, at Abu Dhabi University (ADU), and leads the Division of Drug Discovery and Development Research at the ADU Cancer Research Institute. She has over two decades of experience in teaching, research, and academic collaboration. She holds a PhD in Life Sciences from Guru Nanak Dev University and a master's degree in biotechnology.

Her research connects microbiome science, microbial metabolites, endophytic microorganisms, and natural-product drug discovery, with a focus on cancer, immune regulation, and antimicrobial resistance. Her funded projects investigate UAE Ghaf-associated microbial symbionts as sources of therapeutic compounds, alongside emerging work integrating artificial intelligence and multi-omics into precision oncology.

With an index of 15, Dr. Nazir has contributed peer-reviewed articles and book chapters and co-edited the Springer volume *Endophytes: The Silent Architects of Plant and Human Well-being*. She serves as an associate editor, guest editor, and reviewer for international journals, including editorial initiatives with Springer Nature and Frontiers. Her recognitions

Bios of the Editors

include Fellowship of the Higher Education Academy, a Sandooq Al Watan Fellowship Award, a first-place international conference oral presentation award, and the UAE Golden Visa.

Her academic leadership includes organizing the 2nd International Conference on Global Sustainable Development (ICGSD 2025) and serving as Organizing Chair of the Student Symposium: Climate, Cancer, and Youth Futures (SCCYF 2026). Through curriculum development, student research mentorship, cancer-awareness initiatives, and international partnerships, she connects education and research with public health, sustainability, and community engagement.

Dr. Ash Pachauri, Director, Center for Human Progress, New Delhi, India, and Senior Mentor, POP (Protect Our Planet) Movement, New York, USA



Dr. Ash Pachauri has a PhD in behavioral science and technology and a master's in international management. Having worked with McKinsey & Company before pursuing a career in the social development arena, Dr. Pachauri's experience in public health and sustainable development emerges from a range of initiatives. Notably, he has made significant contributions to the Bill & Melinda Gates Foundation by contributing to its public health and community agenda, the UN by focusing on youth, health, and the Sustainable Development Goals (SDGs), and the Center

for Disease Control program interventions in the US by focusing on community interventions, especially for vulnerable youth. He has also been instrumental in founding and building the POP Movement and the World Sustainable Development Forum. He is a technical adviser to the World Health Organization on Self-Care Global Guidelines to support youth, communities, and global governments.

Dr. Pachauri has been a pioneer in the use of information technology for development. His innovative approaches have been key to spearheading community—and youth-led self-care interventions, leading to global capacity building and adoption of self-care among youth. As a master trainer in behavior change communications and strategic leadership, Dr. Pachauri has led over 20,000 workshops, events, and global outreach to youth and communities to promote global health and climate action.

Widely published, winner of the prestigious Overseas Research Scholarship, awarded for advanced studies in the United Kingdom, and recognized for his academic achievements, Dr. Pachauri's awards and recognitions reflect his significant contributions to the field. The United Nations has recognized Dr. Pachauri for his dedication and leadership in their flagship publication, "Portraits of Commitment," A testament to his influence in the field. In 2021, he was awarded the GlobalMindED Inclusive Leadership Award for action in Energy and Sustainability, a recognition of his commitment to inclusive and sustainable development among young people worldwide.

Bios of the Editors

In 2025, Dr. Pachauri received multiple international honors through the POP Movement, including the Humanitarian Platinum Leadership Award for his exceptional global impact in promoting peace, sustainability, and youth leadership; the Presidential Volunteer Service Award in recognition of his sustained humanitarian service and community engagement; and the title of Top International Speaker 2025, acknowledging his global influence and thought leadership in climate action, public health, and sustainable development.

He is an Associate Fellow of the World Academy of Art and Science, a position that underscores his academic standing. Dr. Pachauri serves on the Boards and Advisory groups of several organizations and initiatives worldwide, including the global movement on bone health, the Climate Change Coalition, and the Global Union of Scientists for Peace. He demonstrates leadership and influence in the global health and climate action community.

ABSTRACTS

Abstract 1

Bio-Mimetic Liposomal Nanocarriers from *Allium Tuberosum* for Targeted Cancer Therapy

Jabir Abbas, Independent Researcher, Pakistan
[jabirali1179.s@gmail.com]

Conventional chemotherapeutics like Paclitaxel and Vincristine face major clinical limitations, including severe systemic toxicity and rapid multi-drug resistance (MDR). These challenges demand tumor-microenvironment-activated systems that minimize off-target damage and overcome resistance. This study presents a bio-mimetic framework inspired by the “two-key safety lock” defense of *Allium Tuberosum* (garlic chives). In this plant, non-toxic S-alk(en)yl Cysteine Sulphoxides (CSOs) are segregated from the enzyme alliinase. Upon tissue injury, compartment rupture triggers cytotoxic thiosulfinate synthesis. We propose translating this architecture into an antibody-targeted liposomal nanoparticle. The nanocarrier co-encapsulates alliinase and CSOs within distinct compartments inside a single liposome, conjugated with tumor-targeting antibodies (EGFR/HER2). Upon reaching the acidic tumor microenvironment (pH 6.2–6.5), compartments rupture, initiating in-situ thiosulfinate synthesis. This triggers membrane lysis, mitochondrial dysfunction, and release of tumor-associated antigens for an In-situ Vaccine effect.

The system is expected to bypass MDR through physical membrane disruption, while sparing healthy tissues via tumor-specific activation. Antigen release may prime systemic immune surveillance. This plant-inspired platform offers a shift from static chemotherapies to stimulus-responsive, multi-mechanistic oncology tools, addressing resistance, toxicity, and heterogeneity.

Keywords: Bio-mimetic, Liposomal Nanocarriers, Allium Tuberosum, Targeted Cancer Therapy, Multi-Drug Resistance, In-situ Vaccine

Abstract 2

Medicinal Mushrooms as Complementary Therapeutics in Cancer Treatment

Mandeep Kour, PhD Scholar, Department of Zoology, University of Jammu, Jammu and Kashmir, India [mandeepmandykaur988@gmail.com]

Amit Gupta, Department of Zoology, University of Jammu, Jammu and Kashmir, India [amit.gupta@jammuuniversity.ac.in]

Cancer is a dreadful disease characterized by excessive, uncontrolled, and invasive cell proliferation that has the ability to spread to the other parts of the body, destroying the normal tissues. Therefore, finding natural potent alternatives has become crucial. Mushrooms are a massive and diverse group of fungi. They are known for their use as food due to their unique taste and also as medicines because of their curative ability for centuries. To date, numerous research studies have been performed regarding the analysis of immunomodulatory, antioxidant, antibacterial, antifungal, antiviral, anti-inflammatory, and anticancer properties of distinct varieties all over the world. In vitro studies using cancer cell lines being tested upon by extracted polysaccharides have shown evidence of direct cytotoxic effects on cell lines for some of those polysaccharides.

Extract from Phellinus has shown strong evidence in the suppression of tumor proliferation in the case of digestive system cancers, e.g., gastric, duodenal, colon, and rectal; and also, liver cancer. Triterpenes are thought to be potential anticancer agents due to the biological activity they have exhibited against actively growing tumors in vitro. Though cordycepin is an actively researched nucleoside for having pro-apoptotic characteristics, Krestin, Lentinan, and Sonifilan are the anticancer polysaccharides that have already been developed from mushrooms. Some other active anticancer compounds are Calcaelin, Illudin S, Schizophyllan, Laccase, Hericium Polysaccharides A and B, Ganoderic acid, Psilocybin, Lectin, Hispolon, etc. So, overall mushrooms are a diverse and rich group that is yet to be completely explored, and there is a possibility to discover many more secondary metabolites in mushrooms that may have even better potential as anti-cancer treatments.

Keywords: Mushroom, Phellinus, Metabolites, Antioxidant, Anti-inflammatory, Anticancer

Abstract 3

Medicinal Plants Across Altitudinal Gradients: Phytochemical Adaptations and Cancer Therapeutics

Ritumbhra Rajput, PhD Scholar, Department of Zoology, University of Jammu, Jammu and Kashmir, India [ritambhra555@gmail.com]

Amit Gupta, Associate Professor, Department of Zoology, University of Jammu, Jammu and Kashmir, India [amit.gupta@jammuuniversity.ac.in]

Among the foremost significant environmental variables impacting the physiological function, development process, and phytochemical content of medicinal plants is altitude. These environmental stresses induce the development of secondary metabolites that are necessary for plant adaptation and defense. Multiple metabolites have expressed substantial anticancer abilities, notably phenolic chemicals, flavonoids, terpenoids, etc. Investigation indicates those populations residing in higher-altitude surroundings frequently possess greater levels of these therapeutic substances; however, the magnitude of change varies based on regional ecosystem variables such as season, developmental stage, and genetic history. In short, altitude influences biological processes along with phytochemical accumulation.

.Literature shows that high-altitude medicinal plant extracts have frequently demonstrated more effective antiproliferative, and cytotoxic effects versus an array of human cancer cell lines than extracts from plants harvested at lower altitudes. The quality and uniformity of plant-derived chemotherapeutic chemicals are capable of being enhanced while lessening the strain on naturally occurring populations through the discovery of the most suitable altitudinal zones during production. Developments in metabolomics, transcriptomics, and molecular pharmacology now permit investigators to more precisely associate environmental factors with metabolite profiles and treatment efficacy. The privileged high-altitude populations with greater cancer prevention potential shall be identified incorporating ecological studies with phytochemical characterization, mechanistic investigations, and clinical validation. The formulation of standardized herbal formulations and the identification of new plant-derived anticancer drugs are capable of being aided by such interdisciplinary approaches, which can lead to safer, more successful, and ecologically sound cancer prevention and treatment methods.

Keywords: Medicinal Plants, Altitudes, Secondary Metabolites, Phenolic, Flavonoids, Anticancer

Abstract 4

AI-Guided Small Molecule Design in Precision Oncology: From Virtual Screening to Clinical Translation

Amit Gupta, Associate Professor, Department of Zoology, University of Jammu, Jammu and Kashmir, India [amit.gupta@jammuuniversity.ac.in]

Rakesh Pant, Assistant Manager, Department of Water Technology Lab, Eureka Forbes Ltd., Dehradun, India [rakesh.microbiologist@gmail.com]

Ashutosh Kumar Singh, PhD scholar, Division of Environmental Biotechnology Genetics and Molecular Biology, Indian Council of Medical Research - National Institute for Research in Environmental Health, Bhopal, Madhya Pradesh, India [ashutoshkumarsingh23phd10027@vitbhopal.ac.in]

Precision oncology necessitates the need for therapeutic molecules that are not only potent against a disease-relevant target, but are also selective for the molecular state of a tumor, active in the relevant cellular context, resilient to clonal evolution, and developable as medicines. Artificial intelligence (AI) is used as a decision support layer along the entire drug discovery chain, from target prioritization to patient stratification. This review assesses the progress of small molecule design guided by AI in oncology, focusing on experimentally validated studies and translational results.

The present review highlights the combination of traditional approaches to drug design and prediction, namely, ligand- and structure-based approaches with modern AI-based approaches, including graph neural networks, diffusion models, chemical language models, and active learning techniques. There are several cases where AI technology could be effective for the purposes of enhancing virtual screening, discovering new chemical scaffolds and optimizing multi-parameter design. However, most convincing evidence exists only with regard to the application of AI in early cancer diagnosis. Many generative studies rely on docking scores or computational advances without reliable biochemical confirmation, cellular mechanistic validation or prospective comparison with conventional controls in the field of medicinal chemistry. Furthermore, although AI-driven technology is becoming a part of the drug pipeline, there has been less documentation of small molecules designed for oncology that have been tested in humans. Clinical application of AI in oncology requires closed-loop experimental validation linking molecular design, structural biology, and pharmacological translation. Future peer-review frameworks should evaluate model validation separately from translational outcomes.

Keywords: Artificial Intelligence, Machine Learning, Generative Chemistry, Virtual Screening, Precision Oncology, Kinase Inhibitors, Molecular Design

Abstract 5

Optimization of Production and Reaction Conditions for β -Xylosidase Activity by Bacterial Isolate W8.

Even Kaur, Guru Nanak Dev University, Amritsar, Punjab, India
[evendeepkaursaggal@gmail.com]

β -Xylosidase is a key hemicellulolytic enzyme involved in the hydrolysis of xylo-oligosaccharides into xylose and plays an essential role in lignocellulosic biomass conversion for various industrial applications. This study aimed to identify a promising bacterial producer of intracellular β -xylosidase and optimize its production and reaction conditions. Five bacterial isolates (B+, T1, T3, T6, and W8) were screened qualitatively and quantitatively for β -xylosidase production. The most efficient isolate was further investigated by optimizing production parameters, including carbon and nitrogen sources, and reaction parameters such as temperature, pH, buffer molarity, reaction time, substrate specificity, metal ion effects, enzyme kinetics, and thermostability using whole-cell β -xylosidase assays. Bacterial isolate W8 exhibited the highest intracellular β -xylosidase activity and was selected for detailed characterization. Corn cob xylan and tryptone were identified as the optimal carbon and nitrogen sources, respectively. Maximum enzyme activity was obtained at 50°C with a reaction time of 60 min in 50 mM sodium phosphate buffer.

The enzyme showed the highest specificity toward p-nitrophenyl- β -D-xylopyranoside (p-NPX). Kinetic analysis revealed a K_m value of 0.52 mM and a V_{max} value of 0.0386 U mg⁻¹ Dry Cell Mass (DCM). Thermostability studies demonstrated greater enzyme stability at 37°C than at 50°C. The results demonstrate that bacterial isolate W8 is a promising source of intracellular β -xylosidase with considerable potential for lignocellulosic biomass bioconversion, sustainable biorefinery processes, and other industrial biotechnological applications.

Keywords: β -Xylosidase, Bacterial Isolate W8, Intracellular Enzyme, Lignocellulosic Biomass, Enzyme Optimization, Whole-cell Biocatalysis, Enzyme Kinetics, Biotechnological Applications

Abstract 6

Climate Change and Infection-attributable Cancers: A One Health Framework for Anticipating Shifts in Oncogenic Pathogen Exposure

Hasti Khalili, Faculty of Pharmaceutical Sciences, Islamic Azad University, Tehran, Iran [hastikhalili78@gmail.com]

Alireza Eivakpour, Tarbiat Modares University, Tehran, Tehran, Iran. [eivakpour@gmail.com]

Asiya Nazir, Faculty, College of Health sciences, Abu Dhabi University, Abu Dhabi, UAE [asiya.nazir@adu.ac.ae]

Farrokhreza Kabir, Department of Clinical Sciences, Faculty of Veterinary Medicine, Science and Research Branch, Islamic Azad University, Tehran, Iran [frkabir@yahoo.com]

Mohammad Kazem Koohi, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran [mkkoohi@ut.ac.ir]

Mahjoobeh Tazari, Ferdowsi University of Mashhad, Mashhad, Iran. [mahjoobeoo@yahoo.com]

Sina Salajegheh Tazerji, Department of Clinical Sciences, Faculty of Veterinary Medicine, Science and Research Branch, Islamic Azad University, Tehran, Iran [sina.salajegheh@gmail.com]

Infectious agents caused an estimated 2.2 million cancer cases in 2018, close to 13% of the global burden. Several of the agents involved, including *Schistosoma* *Haematobium* and the food-borne liver flukes, depend on freshwater snail hosts, fish hosts and patterns of water contact that respond directly to temperature and rainfall. Climate and cancer research has

concentrated on chemical carcinogens, heat and air pollution. The infectious fraction has attracted far less attention. This conceptual paper draws on parasitology, veterinary and environmental health, and cancer epidemiology to set out a One Health framework linking climate drivers to long-latency cancer outcomes. Four pathways are examined: shifting habitat of intermediate and reservoir hosts; flood and drought effects on water, sanitation and hygiene; change in food systems and aquaculture; and displacement that interrupts vaccination and screening. Ensemble modelling projects a substantial change in the area suitable for *Bulinus Truncatus*, the snail host of Urogenital Schistosomiasis, including new habitat in southern Europe. We propose a set of indicators that link animal, environmental, and human data, and argue that the long interval between infection and malignancy leaves current climate-health surveillance, which is built around acute outcomes, unable to detect these shifts in time.

Keywords: One Health, Infection-Attributable Cancer, Climate Change, Schistosomiasis, Surveillance

Abstract 7

Antimicrobial Use Across the One Health Continuum, Gut Dysbiosis, and Colorectal Cancer Risk: A Narrative Review

Hasti Khalili, Faculty of Pharmaceutical Sciences, Islamic Azad University, Tehran, Iran [hastikhalili78@gmail.com]

Arghavan Zarafshar, Faculty of Pharmaceutical Sciences, Islamic Azad University, Tehran, Iran [arghavan.za99@gmail.com]

Asiya Nazir, Faculty, College of Health Sciences, Abu Dhabi University, Abu Dhabi, UAE [asiya.nazir@adu.ac.ae]

Alireza Eivakpour, Tarbiat Modares University, Tehran, Iran [eivakpour@gmail.com]

Sina Salajegheh Tazerji, Department of Clinical Sciences, Faculty of Veterinary Medicine, Science and Research Branch, Islamic Azad University, Tehran, Iran [sina.salajegheh@gmail.com]

Antimicrobial use in food-producing animals was estimated at 99,502 tons in 2020 and is projected to rise by about 8% by 2030, with roughly two thirds of use concentrated in Asia. Human exposure to antimicrobials and their residues therefore occurs through clinical prescribing, through food and through the wider environment. A meta-analysis covering 4.1 million individuals and more than 73,550 colorectal cancer cases reported a higher risk among people who had ever used antibiotics, and a stronger association for broad-spectrum agents than for narrow-spectrum agents. Experimental work supports a plausible mechanism, since human intestinal

organoids exposed to colibactin-producing pks+ *Escherichia Coli* developed a mutational signature that was also detected in human colorectal tumors. This narrative review brings these three bodies of evidence together and argues that antimicrobial exposure deserves attention as an environmental determinant of colorectal cancer, and not only as a driver of resistance. We examine the evidence on dysbiosis, chronic inflammation and genotoxic bacteria, set out the main gaps, and conclude that stewardship programs may carry cancer-prevention benefits that are not currently measured or claimed.

Keywords: Antimicrobial Use, Gut microbiome, Dysbiosis, Colorectal cancer, One Health

Abstract 8

Machine Learning for Spatiotemporal Estimation of Environmental Carcinogen Exposure in Cancer Epidemiology: A Scoping Review

Hasti Khalili, Faculty of Pharmaceutical Sciences, Islamic Azad University, Tehran, Iran [hastikhalili78@gmail.com]

Mahjoobeh Tazari, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad/Khorasan Razavi, Iran [mahjoobeoo@yahoo.com]

Mahnaz Esmaili, Department of Genetics, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, Academic Center for Education, Culture and Research, Tehran, Iran [mahnazesmaeli1990@gmail.com]

Asiya Nazir, Faculty, College of Health sciences, Abu Dhabi University, Abu Dhabi, UAE [asiya.nazir@adu.ac.ae]

Alireza Eivakpour, Tarbiat Modares University, Tehran, Iran [eivakpour@gmail.com]

Sina Salajegheh Tazerji, Department of Clinical Sciences, Faculty of Veterinary Medicine, Science and Research Branch, Islamic Azad University, Tehran, Iran [sina.salajegheh@gmail.com]

Outdoor air pollution and the particulate matter within it were classified as carcinogenic to humans by the International Agency for Research on Cancer in 2013, and a meta-analysis of eighteen cohort studies confirmed a higher lung cancer risk with rising particulate exposure. Estimating individual exposure to such carcinogens is still difficult, because concentrations vary sharply over short distances and change from day to day.

Land use regression has been the conventional tool, but machine learning methods are now widely used and generally perform better once a temporal component is included. Most of this work, however, is published in air quality science rather than cancer epidemiology, and the two fields apply different validation standards. This scoping review maps studies published between 2015 and 2026 that use machine learning for spatiotemporal exposure estimation and then link the estimates to cancer incidence or mortality. We follow PRISMA-ScR guidance and search four databases. We chart the algorithms, data sources, spatial and temporal resolution, validation strategy and treatment of exposure misclassification, and propose a short reporting checklist for exposure models used in cancer studies.

Keywords: Machine Learning, Exposure Assessment, Spatiotemporal Modelling, Environmental Carcinogens, Scoping Review

Abstract 9

Applications of Silica Nanoparticles for Mitigating Heavy Metal Stress and Promoting Sustainable Food Production

Abeer Alsaffar, United Arab Emirates University, Al Ain, United Arab Emirates [201814734@uaeu.ac.ae]

Fatima Alnaqbi, United Arab Emirates University, Al Ain, UAE, [202213649@uaeu.ac.ae]

Mahmoud Abdalla, Faculty of Medicine, Assiut, Egypt [akamahmoud7@gmail.com]

Zienab Ahmed, United Arab Emirates University, Al Ain, United Arab Emirates [zienab.ahmed@uaeu.ac.ae]

Climate change is intensifying water scarcity, further challenging agricultural sustainability in arid and semi-arid regions. One alternative to address this problem is to utilize water sources derived from treated wastewater facilities in agricultural sectors. However, water pollution by heavy metals (HMs) has emerged as a pressing global issue due to their persistence and accumulation in the food chain, posing serious risks to human health and ecosystems. Phytoremediation has been recognized as a cost-effective and environmentally friendly approach to mitigate HM contamination by exploiting plants' natural ability to absorb, stabilize, or degrade pollutants. This study aims to investigate the effects of incorporating Silica Nanoparticles (SiNPs) into hydroponically grown Lettuce (*Lactuca sativa* L.) exposed to HMs stress.

The experiment included four treatments: T0 (no treatment), T1 (5.5 $\mu\text{mol/L}$ CdCl_2 + 2.5 $\mu\text{mol/L}$ PbCl), T3 (5.5 $\mu\text{mol/L}$ CdCl_2 and 30 $\mu\text{mol/L}$ SiNPs). The main obtained outcome was identifying an effective nano-phytoremediation approach using SiNPs reduced HMs accumulation in plants; Cd by 50% and Pb by 80%, while enhance crop production and stimulating phytochemical synthesis. The approach supporting the environmental sustainability goals of the Abu Dhabi Emirates and the UAE, and provide innovative contributions to achieving SDGs #13 Climate Action, 1SDGs # 5 Life on Land, and SDGs #12 Responsible Consumption and Production.

Keywords: Phytoremediation, Food Safety, Lead, Cadmium, Nanotechnology, Sustainable Hydroponics

Abstract 10

Climate-Driven Oxalate Burden: Characterization of Oxalotrophic *Bacillus Stercoris* with Probiotic Potential for Mitigating Oxalate Burden

Naincy Rathee, Maharshi Dayanand University [naincyrathee@gmail.com]

NS Chauhan, Maharshi Dayanand University

Among diagnosed cases of kidney stones, calcium oxalate accounts for 70-80% cases. It is globally rising burden due to warming climates, modern diets and antibiotic exposure which lead to depletion of the native oxalate-degrading gut bacteria. This microbial loss removes a key metabolic defense against the oxalate burden there by posing a risk of hyperoxaluria driven kidney diseases. Keeping this, the study aimed to isolate and characterize a human gut-derived strain as a potential probiotic against oxalate stone disease, and subsequently to clone, express, and characterize its oxalate decarboxylase enzyme to assess its potential as a cofactor-independent therapy for intestinal oxalate degradation. A gram-positive, rod-shaped strain, identified as *Bacillus Stercoris* was isolated from human feces. Its 3.8-Mb genome (~4,900 genes; 91.7% completeness) carried probiotic-relevant traits, an oxalate decarboxylase (OxDC) gene and 111 CAZymes across 55 families. The isolate tolerated pH 5-9, up to 3% bile (w/v), 0% NaCl/KCl and heavy metals, and was non-haemolytic and non-cytotoxic, while

auto-aggregating ~67%, co-aggregating with enteric pathogens, and producing 270-300 mg/L butyrate (peak at 18 h). The recombinant 43.5-kDa OxDC showed optimal activity at pH 5.0 and 37 °C, with enhanced activity in the presence of Mn^{2+} . Though the K_m of recombinant was lower than that of wild type, it still showed higher substrate affinity ($K_m = 7.30 \mu M$; $k_{cat} = 22.8 s^{-1}$). Together, these findings suggest that host-derived *B. Stercoris* combines strong probiotic and safety characteristics with a high-affinity, cofactor-independent OxDC. This makes it a promising candidate for restoring microbial oxalate degradation and reducing oxalate accumulation.

Keywords: *Stercoris*, Probiotic, Hyperoxaluria, Depletion, Haemolytic, Pathogens

Abstract 11

A Demographic-Aware Vision-Language Framework for Equitable Diagnosis and Explanation in Skin Cancer Screening

Yohannis Adamu, Abu Dhabi University, Abu Dhabi, United Arab Emirates [yohannisadmasu05@gmail.com]

Artificial intelligence has demonstrated strong performance in skin lesion analysis, yet demographic fairness across diverse skin tones remains a critically underexplored problem. Dermatology datasets are heavily skewed toward lighter Fitzpatrick skin types, and prior work has focused almost exclusively on classification accuracy while overlooking the equitability of generated clinical explanations. Standard computer vision models trained on such distributions frequently encode demographic shortcuts, exploiting skin pigmentation as a surrogate diagnostic cue rather than isolating true disease morphology. Although Vision-Language Models (VLMs) offer richer multimodal representations by coupling visual features with free-form clinical text, they are not immune to this failure: their language decoders can inherit and amplify the very representational disparities embedded in their visual encoders. This paper addresses the central research question of how demographic fairness and diagnostic robustness in vision-language models for skin cancer screening can be improved while preserving clinically meaningful image-text alignment. We introduce a demographic-aware vision-language framework that optimizes classification, image-text

alignment. We introduce a demographic-aware vision-language framework that optimizes classification, image-text alignment, and demographic fairness simultaneously through a tri-fold loss formulation. Training is conducted on a curated multimodal dataset of image-text pairs enriched with demographic metadata. We also propose the Explanation Consistency Score (ECS), a novel metric measuring whether clinically relevant lesion features appear at consistent rates in model-generated explanations across Fitzpatrick skin-tone groups. Experiments on the Fitzpatrick17k dataset demonstrate that the proposed model substantially reduces the explanation disparity gap from 0.350 to 0.024, achieves an ECS exceeding 0.94 across all demographic groups, and maintains diagnostic accuracy comparable to unregularized baselines.

Keywords: Skin Cancer Screening, Demographic Fairness, Vision-language Models, Fitzpatrick Skin Types, Explanation Consistency, Dermatology AI, Multimodal Learning, Bias Mitigation, Clinical AI, Equitable Diagnosis

Abstract 12

Role of Arbuscular Mycorrhizal Fungi to Enhance Carbon Sequestration in Various Native Plant Species under UAE Conditions Aligned with SDG 13 (Climate Action)

Hamad Alshamsi, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates [hamad_bas@hotmail.com]

Mohammed Sheteiwy, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates [msalah@uaeu.ac.ae]

Amira Askri, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates [amira.askri@uaeu.ac.ae]

Mansoor Al Hosani, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates [mansoor-alhosani@outlook.com]

Theyab Alketbi, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates [Theyab.alketbi@outlook.com]

Mubarak Alshebli, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates [iiEmarate@gmail.com]

Arbuscular Mycorrhizal Fungi (AMF) are key components of the soil microbiome that influence plant carbon allocation and rhizosphere processes, yet their role in carbon stabilization in hyper-arid ecosystems under elevated atmospheric Carbon Dioxide CO₂ remains poorly understood. This study investigated the interactive effects of AMF symbiosis and elevated CO₂ on plant performance and soil carbon-associated properties in four native or locally adapted UAE species: *Prosopis Cineraria* (Ghaf), *Acacia Tortilis* (Samr), *Ziziphus Spina-christi* (Sidr),

and *Moringa Peregrina*. A factorial experiment combined two CO₂ regimes and two mycorrhizal treatments across four species, with three biological replicates per treatment (48 experimental units). Root dry matter, photosynthetic pigments, phenolic compounds, proline, soil organic matter, and aggregate formation were assessed. AMF responses were strongly dependent on host species and CO₂ regime. Under elevated CO₂, AMF increased root dry matter from 46.3% to 48.6% in *P. Cineraria* and from 42.7% to 53.1% in *A. Tortilis*, indicating enhanced belowground carbon allocation. *P. Cineraria* maintained stable chlorophyll (1.82–1.86 mg g⁻¹) and carotenoid (0.84–0.85 mg g⁻¹) concentrations across treatments. The strongest soil organic matter response occurred in *Z. Spina-christi*, where AMF increased organic matter from 3.99% to 10.33% under ambient CO₂ and from 3.97% to 7.78% under elevated CO₂. In *M. Peregrina*, AMF increased soil aggregate formation from 17.11% to 23.03% under ambient CO₂ and from 14.35% to 20.08% under elevated CO₂.

These findings demonstrate that AMF–CO₂ interactions regulate belowground biomass allocation, plant physiology, and rhizosphere carbon-associated properties in a species-specific manner. Selecting compatible plant–fungal associations may therefore enhance soil carbon stabilization and support ecological restoration strategies in hyper-arid UAE environments.

Abstract 12

Keywords: Arbuscular Mycorrhizal Fungi, Carbon Sequestration, Native Plant Species, Soil Organic Carbon, Mycorrhizal Symbiosis, Arid Ecosystems, Elevated Carbon Dioxide, Climate Change Mitigation, United Arab Emirates, Sustainable Development Goal 13

Abstract 13

Automation Bias and Diagnostic Deskillling in AI- Assisted Medical Education: A Scoping Review of Clinical Reasoning and Strategies to Preserve Independent Thinking

Ayesha Muneer, Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan [ayeshamuneer4@gmail.com]
Muhammad Ahmad, Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan [ahmadferid12@gmail.com]
Balnur Iskakova, Department of Health Policy and Management, Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan [balnurskak@gmail.com]

Medical trainees today learn diagnostic reasoning alongside generative artificial intelligence (AI) from their initial clinical encounters, rather than developing independent judgement before AI entered the educational system. The cognitive implications of this changing educational landscape remain poorly understood. Guided by Joanna Briggs Institute methodology, this scoping review aims to map global evidence on AI-driven cognitive offloading and its impact on diagnostic accuracy, reasoning depth and automation bias among medical students, residents and practicing clinicians, examining whether AI literacy training alone can support independent clinical reasoning. A systematic search of PubMed/MEDLINE, Scopus, Web of Science, and Education Resources Information Center (ERIC) will identify peer-reviewed studies published between 2023 and 2026 that involve medical students,

residents, or practicing clinicians and examine AI-assisted diagnostic or clinical reasoning. Records will be managed and de-duplicated in Rayyan. Study selection and data charting will follow a two-reviewer process, with inter-rater reliability assessed using Cohen's kappa. The selection process will be reported using a PRISMA-ScR flow diagram. Findings will be mapped descriptively according to study design, participant group, AI tool type, clinical reasoning task, cognitive outcomes and reported risks, including cognitive offloading, overreliance and automation bias. Proposed educational safeguards, including AI literacy training and structured clinical reasoning frameworks, will also be comparatively mapped.

Keywords: Automation Bias, Diagnostic Reasoning, Medical Education, Artificial Intelligence, Deskillling

Abstract 14

Microplastic Contamination in Commercially Available Table Salt in Saudi Arabia: Prevalence, Characterization, and Dietary Exposure Assessment

Hussein Hassan, Lebanese American University, Beirut, Lebanon [Hussein.hassan@lau.edu.lb]

Syreina Sayegh, Lebanese American University, Beirut, Lebanon [Syreina.sayegh@lau.edu.lb]

Sonel Lahdo, Lebanese American University, Byblos, Lebanon [sonel.lahdo@lau.edu.lb]

Hani Dimassi, Abu Dhabi University, Abu Dhabi, United Arab Emirates [email]

Nisreen Alwan, Abu Dhabi University, Abu Dhabi, United Arab Emirates [nisreen.alwan@adu.ac.ae]

Elias Akoury, Lebanese American University, Beirut, Lebanon [elias.akoury@lau.edu.lb]

Microplastics in food are an emerging food safety and public health concern, and edible salt, serves as a continuous source of dietary exposure. Despite this relevance, there is still limited comprehensive data on the presence and levels of microplastics (MP) contamination in commercially available table salt in the Kingdom of Saudi Arabia (KSA). A cross-sectional market survey conducted in KSA in February 2025 collected 68 unique salt SKUs from 47 brands, resulting in 99 samples after excluding flavored varieties. 31 Stock Keeping Units (SKUs) were sampled from two production batches, while 37 SKUs

were assessed from a single batch. Samples underwent dissolution, hydrogen peroxide digestion, and vacuum filtration through 0.22 µm membranes. Suspected microplastic particles were identified using optical microscopy and characterized by their morphology, color, and size, with selected particles confirmed as synthetic polymers via Attenuated Total Reflectance–Fourier Transform Infrared Spectroscopy (ATR FTIR). Statistical analyses were performed to examine associations between salt characteristics and MP contamination. Microplastics were found in most tested salt samples, with 45 Batch 1 samples (66.2%) and 16 Batch 2 samples (51.6%) showing contamination. Concentrations ranged from 0–260 particles/kg, averaging 63.5 ± 63.99 MPs/kg. Sea salt consistently exhibited significantly higher MP presence and concentrations than rock salt in both batches. Salt sourced from developed countries also showed significantly higher contamination than that from developing countries. Fibers were the dominant particle type. Blue was the most common color observed. ATR FTIR analysis confirmed polyethylene as the predominant polymer (~85%). Based on WHO's recommended salt intake (5 g/day), the estimated dietary intake was 115.8 MPs/capita/year. This study delivers the first comprehensive evaluation of microplastic contamination in commercially sold table salt in Saudi Arabia, providing essential baseline evidence for national food safety surveillance and regulatory planning.

Keywords: Microplastics, Table Salt, Saudi Arabia, Food Safety, Dietary Exposure

Abstract 15

Microplastic Contamination in Packaged Edible Salt Marketed in the United Arab Emirates: Occurrence, Characterization, and Estimated Dietary Exposure

Hussein Hassan, Lebanese American University, Beirut, Lebanon [Hussein.hassan@lau.edu.lb]

Syreina Sayegh, Lebanese American University, Beirut, Lebanon [syreina.sayegh@lau.edu.lb]

Aya Fakhr El Dine, Lebanese American University, Byblos, Lebanon

Hani Dimassi, Abu Dhabi University, Abu Dhabi, United Arab Emirates [hani.dimassi@adu.ac.ae]

Elias Akoury, Lebanese American University, Beirut, Lebanon [elias.akoury@lau.edu.lb]

Nisreen Alwan, Abu Dhabi University, Abu Dhabi, United Arab Emirates [nisreen.alwan@adu.ac.ae]

Microplastics (MPs) are identified as emerging contaminants of concern due to their entry into the human food chain through widely consumed products such as edible salt. This study examined MP occurrence and characteristics in packaged salt sold in the United Arab Emirates (UAE) and evaluated potential dietary exposure. A total of 73 Stock Keeping Units (SKUs) were identified, yielding 115 samples, with 42 collected from two production dates and 31 from a single date. After standardized digestion, filtration, and microscopic analysis, 51.3% of samples were found to contain MPs, with a mean concentration of

108.17 ± 135.17 particles/kg. Sea salt showed borderline higher contamination than rock salt, while refinement status, packaging type, and country of origin showed no significant associations. Fibers were the dominant morphology, and blue/teal and green/dark green were the most common colors. Attenuated Total Reflectance–Fourier Transform Infrared Spectroscopy (ATR FTIR) confirmed nylon, polyester, polypropylene (PP), and polyethylene (PE) as the main polymers. Based on WHO's recommended salt intake, the estimated dietary intake was 197.4 MPs/person/year, approximately 1.5 times lower than that reported for Lebanon. This study provides the first comprehensive dataset on MP contamination in UAE salt, supporting improved understanding of dietary exposure pathways and informing future risk assessment and policy development.

Keywords: Microplastics, Edible Salt, Food Safety, Dietary Exposure

Abstract 16

Microplastic Contamination in Edible Salt Marketed in Qatar: Occurrence, Characterization, and Estimated Dietary Exposure

Elias Akoury, Lebanese American University, Beirut, Lebanon
[elias.akoury@lau.edu.lb]

Hussein Hassan, Lebanese American University, Beirut, Lebanon
[Hussein.hassan@lau.edu.lb]

Syreina Sayegh, Lebanese American University, Byblos, Lebanon
[syreina.sayegh@lau.edu.lb]

Hanin Elhajj, Abu Dhabi University, Abu Dhabi, United Arab
[hanin.elhajj@adu.ac.ae]

Hani Dimassi, Abu Dhabi University, Abu Dhabi, United Arab
Emirates [hani.dimassi@adu.ac.ae]

Nisreen Alwan, Abu Dhabi University, Abu Dhabi, United Arab
Emirates [nisreen.alwan@adu.ac.ae]

Maya Bassil, Qatar University, Qatar [bassil.maya@qu.edu.qa]

Edible salt is a universally consumed food item and a potential source of continuous microplastic (MP) exposure, yet data from the Arabian Gulf, where plastic pollution and high salt intake intersect, remain limited. This study conducted a cross-sectional market survey in Qatar (April–May 2025), analyzing 94 Stock Keeping Units (SKUs) from 53 brands, yielding 129 samples across one or two production dates. After dissolution, Hydrogen Peroxide digestion, filtration, and microscopic examination, suspected MPs were characterized and confirmed

using Attenuated Total Reflectance–Fourier Transform Infrared Spectroscopy (ATR FTIR). MPs were detected in 39.4% of Batch 1 and 31.4% of Batch 2 samples, with concentrations ranging from 0–460 particles/kg and an overall mean of 47.89 ± 87.60 MPs/kg. Sea salt showed significantly higher MP occurrence than rock salt in Batch 2, and refined salt had higher concentrations than unrefined salt in Batch 1. Packaging type, country of origin, and development status showed no significant associations. Fibers dominated particle morphology, with blue/teal/cyan as the most common colors. ATR FTIR identified polyethylene as the predominant polymer (~85%), alongside polypropylene, oxidized PE/Ethyl Vinyl Acetate, and Polyester/Polyamide. No batch-to-batch differences were observed. Based on Qatar's average salt intake (13 g/day), estimated dietary exposure reached 227 MPs/year on average, with a maximum of 2,183 MPs/year.

This study provides the first comprehensive dataset on MP contamination in Qatar's edible salt market, offering baseline evidence for food safety monitoring and underscoring the need for standardized methods, ongoing surveillance, and improved production practices to reduce dietary MP exposure.

Keywords: Microplastics, Edible Salt, Food Safety, Dietary Exposure, Qatar

Abstract 17

Integrative Oncology Care in Cervical Adenosquamous Carcinoma: A Case Report

Lana Mashal, Abu Dhabi University, Abu Dhabi, United Arab Emirates [lana.khalid2003@gmail.com]

Cervical cancer is the fourth most common cancer among women globally and the fifth in the UAE, despite advances in prevention and treatment. While conventional treatment for cervical cancer is well established, case studies describing an integrative approach comprising conventional cancer treatment regimens with naturopathic care are scarce. Despite increasing global interest, naturopathic medicine is considered a new specialty in the UAE, with very few naturopathic physicians available and limited literature on its role in oncology. This report aims to present the integrative treatment plan of a 42-year-old patient diagnosed with HPV-18-positive Adenosquamous Carcinoma of the cervix. This report details an integrative approach to cancer treatment, highlighting the role of naturopathic oncology in delivering patient-centered care throughout treatment and long-term survivorship. Here, we report a Filipino woman with International Federation of Gynecology and Obstetrics (FIGO) stage IIIB/C Adenosquamous cervical cancer, diagnosed one year after delivering a healthy baby, with no previous HPV clinical examination or vaccination. The treatment regimen combined conventional therapies with naturopathic care, focusing on managing the

adverse effects of the treatment, reducing treatment-related toxicity, and controlling the cancer via metabolic and immune therapy. Therefore, a personalized treatment plan was created, emphasizing symptom assessment, dietary modifications, stress-management strategies, and other therapeutic agents, including botanical, nutritional, hormonal, and intravenous therapies. The patient achieved full remission about nine months into her treatment plan and remains disease-free two years later. This integrative approach not only supports treatment tolerance and addresses evolving symptoms but also helps the patient navigate the transition from diagnosis to active treatment and, subsequently, to survivorship care, thereby making the process more manageable.

Keywords: Cervical Adenosquamous Carcinoma, HPV-18, Integrative Oncology, Cervical Cancer Survivorship, and Supportive Care

Abstract 18

Occurrence of Total Aflatoxin in Monitored Foods and Population-level Childhood Growth Outcomes: An Ecological Panel Analysis Across WHO Regions

Waseela Ashraf, University of Europe for Applied Sciences, Dubai, United Arab Emirates [waseelaashraf@gmail.com]

Biomarker studies link aflatoxin exposure to impaired fetal and child growth, but food-surveillance occurrence is a different construct and is uneven across settings. We examined whether changes in total-aflatoxin occurrence in monitored foods were associated with regional childhood stunting and low birthweight. Directly reported total-aflatoxin records from the World Health Organization (WHO) Global Environment Monitoring System/Food Contamination Monitoring and Assessment Programme (GEMS/Food) were classified as detected or not detected and grouped into cereals, nuts and oilseeds, and herbs and spices. After exact deduplication, basket-specific detection proportions were calculated by WHO region-year. The primary exposure was the equal-weighted mean of at least two baskets with 20 or more eligible records. This measure was linked to population-weighted outcomes and socioeconomic indicators. Linear models included WHO-region fixed effects and calendar year; inference used small-sample bias-reduced cluster-robust (CR2) standard errors with Satterthwaite-adjusted degrees of freedom. Of 302,647 records, 251,294 remained after exclusions and exact

deduplication. The exposure panel contained 60 region-years from six WHO regions during 2000-2024; the inferential cohort contained 45 region-years from five repeatedly observed regions. Per 10-percentage-point higher detection, the adjusted difference was 0.110 percentage points for stunting (95% confidence interval: -0.787 to 1.007; $p = 0.713$) and -0.003 percentage points for low birthweight (-0.228 to 0.221; $p = 0.964$). Sensitivity estimates were inconsistent and imprecise. We identified no consistent regional association. Few regional clusters and non-probability food surveillance limit inference; the findings do not exclude individual-level effects.

Keywords: Aflatoxin, Childhood Stunting, Ecological Study, Food Surveillance, GEMS/Food, Low Birth Weight

Abstract 19

Production-Weighted Regional Climate Variability and Aflatoxin Detection in International Food Surveillance Data, 1994–2024

Waseela Ashraf, University of Europe for Applied Sciences,
Dubai, United Arab Emirates [waseelaashraf@gmail.com]

Aflatoxin contamination varies with environmental conditions, yet international surveillance evidence linking annual climate variability to food contamination remains limited. We conducted an ecological analysis of World Health Organization Global Environment Monitoring System (WHO GEMS)/Food records linked to Climatic Research Unit Time-Series (CRU TS4.10) climate data and Food and Agriculture Organization Corporate Statistical Database (FAOSTAT) crop-production statistics for 1994–2024. Aflatoxin B1 (AFB1) and total aflatoxin were analyzed separately in cereals and nuts/oilseeds. Eligible analyte–basket–WHO region–year cells contained at least 30 surveillance records and belonged to regional series with at least five observed years. Maximum temperature and precipitation were aggregated using basket-specific national production weights and decomposed into between-series means and within-series annual deviations. Design-adjusted beta-binomial models included WHO-region fixed effects, centered year, random-sampling proportion and as-consumed proportion. The final analysis comprised 207 region–year cells and 276,586 records. In cereals, each 100-mm within-series

increase in production-weighted precipitation was associated with higher AFB1 detection odds (Odds Ratio (OR) 3.11, 95% Confidence interval (CI) 1.45–6.71; $p=0.004$). The corresponding maximum-temperature estimate was imprecise (OR 2.03, 95% CI 0.93–4.46). Other same-year associations crossed the null. Positive AFB1–cereal precipitation estimates were also observed for previous-year and three-year mean exposures and remained significant after false-discovery-rate adjustment. However, the primary association attenuated under corrected quasi-binomial inference, disappeared with unweighted regional climate, and was not significant in leave-one-region-out analyses. Production-weighted precipitation showed a repeated association with AFB1 detection in cereals, but its magnitude depended on climate aggregation and regional influence. The findings are ecological, surveillance-dependent associations rather than causal estimates.

Keywords: Aflatoxin B1, Total Aflatoxin, Climate Variability, Precipitation, Food Surveillance, GEMS/Food, CRU TS, FAOSTAT, Cereals, Ecological Analysis

Abstract 20

Global Transitions in Cardiovascular Risk-Attributable Burden Profiles Across 204 Countries, 1990–2023: a Longitudinal Unsupervised Machine-Learning Analysis

Waseela Ashraf, University of Europe for Applied Sciences, Dubai, United Arab Emirates [waseelaashraf@gmail.com]

To identify longitudinal patterns in the relative composition of Cardiovascular Disease (CVD) risk-attributable burden across countries and to examine how these profiles changed between 1990 and 2023. Global Burden of Disease 2023 age-standardized CVD Disability-Adjusted Life-Year (DALY) rates were analyzed for 204 countries and territories, separately for females and males. Risk-attributable CVD DALY rates were expressed relative to total CVD DALY rates and summarized across seven historical periods. The primary analysis included 15 risk indicators with complete longitudinal coverage. Principal component analysis was followed by sex-stratified K-means clustering. Temporal prevalence, country-level transitions, changes in total CVD DALY rates, and two sensitivity analyses were evaluated. Seven principal components explained 82.95% of the total standardized variance. Two broad archetypes were identified in both sexes: a pollution-dominant profile and a cardiometabolic-dietary profile. The prevalence of the cardiometabolic-dietary archetype increased from 57.4% to 69.1% among female country profiles and from 59.3% to 68.6% among male profiles between 1990–1994 and

2020–2023. Most countries remained in the same archetype, with 88.2% of female and 89.7% of male profiles remaining stable. When transitions occurred, they were predominantly from the pollution-dominant to the cardiometabolic-dietary profile. The main findings remained consistent in sensitivity analyses. Global CVD risk-attributable burden was characterized by two relatively stable archetypes, accompanied by a gradual and directional increase in the cardiometabolic-dietary profile. Declining overall CVD burden can therefore coexist with an increasing relative prominence of metabolic and dietary components.

Keywords: Cardiovascular Disease, Global Burden of Disease, Disability-Adjusted Life Years, Cardiovascular Risk Factors, Machine Learning, Principal Component Analysis, K-Means Clustering, Cardiometabolic Risk, Dietary Risk, Longitudinal Analysis

Abstract 21

Urban and Occupational Heat–Noise Exposure Nexus in the UAE: Health Implications under the 20-Minute City

Jana Alabrach, Abu Dhabi University, Abu Dhabi, United Arab Emirates [jana.sohail.2014@gmail.com]

Sabeera Haris, Abu Dhabi University, Abu Dhabi, United Arab Emirates [sabeera.haris@adu.ac.ae]

Mahra Aladwan, Abu Dhabi University, Abu Dhabi, United Arab Emirates [mahra.aladwan@adu.ac.ae]

Hamad Alkaabi, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1082177@students.adu.ac.ae]

Budour Alyafei, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1085040@students.adu.ac.ae]

Mariam AlHashmi, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1090338@students.adu.ac.ae]

Mariam Alshamsi, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1089022@students.adu.ac.ae]

Mansour Alsharji, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1090947@students.adu.ac.ae]

High temperatures and environmental noise all coincide in the urban and occupational environments of the UAE, but the two stresses are considered independently despite potential combined health impacts. This cross-sectional study explored associations between the perceived heat and noise, stress, sleep disturbance, and frequency of health symptoms in the context of the 20-minute city. 154 university students and

outdoor workers responded to the questionnaire, and the data were subjected to descriptive statistics, analysis of reliability, Spearman correlation, Kruskal-Wallis tests, and an independent-samples t-test, all performed using Statistical Package for the Social Sciences software developed by International Business Machines (IBM SPSS Statistics). The proposed heat, noise, stress, and sleep scales did not achieve an acceptable level of reliability and were analyzed as separate constructs. Nevertheless, five symptom-frequency items demonstrated a satisfactory Cronbach's alpha of 0.734 and were aggregated into an overall symptom score. Heat-related fatigue was positively correlated with stress in the preceding week ($\rho = 0.284$, $p < 0.001$), whereas perceived noise disturbance was associated with noise-related sleep disturbance ($\rho = 0.330$, $p < 0.001$). In addition, exposure to heat and noise was positively correlated with the overall symptom frequency ($\rho = 0.361$, $p < 0.001$). Respondents, who perceived a higher combined exposure, also frequently reported fatigue, headaches, stress and anxiety, irritability, and sleep disturbance. No significant differences in the symptom scores were found for the access to mitigation measures or between university students and outdoor workers. The findings demonstrated that heat and noise should be considered together when designing healthy UAE cities. Shading, cooling facilities, quieter walking routes with fewer sources of noise pollution, and other measures should be taken to make 20-minute-city environments healthier.

Keywords: Perceived Heat Exposure, Environmental Noise, Symptom Frequency, Stress, Sleep Disturbance, 20-minute City,

Abstract 22

Valorization of Fallen Leaves for Climate-Conscious Synthesis of Antibacterial Metal Oxide Nanoparticles

Touseef Amna, Al-Baha University, Al-Baha, Saudi Arabia
[touseefamna@gmail.com]

Abeer Alghamdi, Al-Baha University, Al-Baha, Saudi Arabia
[ab0r11ab0r1@gmail.com]

Climate change and environmental degradation are increasing the need for sustainable approaches in healthcare and biotechnology. This study opens up an environmentally friendly approach for synthesizing copper oxide (CuO) nanoparticles using fall over leaves of *M. Avensis*. Plant-mediated nanoparticle synthesis provides a sustainable alternative to conventional chemical methods by utilizing renewable biological materials and enabling low-temperature production, thereby reducing chemical and energy demands. The synthesized CuO nanoparticles were characterized using X-ray diffraction (XRD) and scanning electron microscopy (SEM), and their antimicrobial activity was evaluated against selected pathogenic bacteria *Staphylococcus Aureus* and *Klebsiella Pneumoniae*. CuO nanoparticles demonstrated concentration-dependent antimicrobial activity, with the highest inhibition zone of 30 mm against *S. Aureus*. These findings highlight the potential of locally available plant resources for developing climate-conscious nanotechnology solutions. The approach supports environmentally responsible biotechnology by

promoting renewable resources, reducing dependence on harsh chemical synthesis, and encouraging locally-driven innovations. This work demonstrates how youth-led research can contribute to sustainable healthcare technologies while addressing broader environmental and climate challenges.

Keywords: Climate-Conscious Synthesis, Antimicrobial Activity, Nanoparticles, Pathogenic Bacteria, Plant.

Abstract 23

Knowledge, risk perception, and household practices related to indoor chemical pollution in the United Arab Emirates

Mira Qoli, Canadian University of Dubai; Massa Nakad, Canadian University of Dubai, Dubai, United Arab Emirates

Wissam Ghach, Canadian University Dubai; Rina Salhab, Canadian University of Dubai, Dubai, United Arab Emirates
[wissam.ghach@cu.dub.ac.ae]

Indoor chemical pollution is increasingly recognized as a residential exposure problem shaped not only by building materials and ventilation, but also by everyday household practices. The evidence base remains sparse in hot-arid, highly air-conditioned settings where people can spend prolonged periods indoors and where incense, gas appliances, fragranced products and mechanical cooling may interact with ventilation behavior. This cross-sectional analysis used a structured survey dataset of 485 UAE residents to quantify knowledge, risk-aware attitudes, household practices, and self-reported symptoms compatible with indoor chemical exposure. Knowledge alignment was modest (mean 4.32 of 9 items ± 2.08), and only 32.6% of respondents reached the high-knowledge threshold. Risk-aware attitudes were also limited, with 22.7% reaching the high-attitude threshold. Although protective practices such as home ventilation, kitchen-hood application and heating, ventilation, and air conditioning (HVAC) filter use were commonly reported, source-generating

behaviors including gas-stove usage, air-freshener utilization, insecticide use and indoor smoking persisted in a substantial proportion of households. Knowledge was associated with risk-aware attitudes, but attitudes showed the stronger behavioral gradient: each standard-deviation increase in risk-aware attitude was associated with nearly doubled odds of high safe practice after demographic adjustment (OR 1.97, 95% CI 1.54-2.51). Source-generating practice was associated with a higher symptom count in negative-binomial models (IRR 1.20, 95% CI 1.04-1.39). These findings identify a knowledge-practice translation gap and support targeted residential indoor-air interventions that move beyond generic awareness toward source-specific, context-sensitive behavioral guidance.

Keywords: Risk Perceptions, Demographic, Binomial Model, Attitude, Knowledge, Household, Chemical, Pollution

Abstract 24

Cardio-Guard: Edge-AI Device Based Real-time Heart Condition Detection with Privacy Preserving Federated Learning

Mirza Hussain, The Oxford College of Engineering
[mirzahussainise2027@gmail.com]

Shaik Aharima Kulsum, The Oxford College of Engineering

C A Bindyashree, The Oxford College of Engineering

Gourav Shetty, The Oxford College of Engineering

Tasfiya Nawaz, The Oxford College of Engineering

This paper presents a privacy-preserving ECG arrhythmia detection system that combines federated learning with edge inference. A one-dimensional convolutional neural network (1D CNN) is trained under a strongly non-IID, patient-partitioned setting and evaluated using FedAvg and FedProx. The completed software experiments use 38 simulated clients, 20 communication rounds, a learning rate of 0.001, and two local epochs per round. Across seeds 0, 1, and 42, FedAvg produced the strongest functional results, with a best observed test ROCAUC of 0.8730 and PR-AUC of 0.9066. FedProx degraded performance for both tested proximal strengths ($\mu = 0.1, 1.0$). A recurring seed-1 threshold collapse demonstrates substantial stochastic sensitivity and motivates multi-seed validation. The final-year system extends the validated federated training pipeline toward a Raspberry Pi edge client: inference is intended to occur locally on the device, while model weights

are synchronized approximately every 24 hours. The Raspberry Pi integration is not yet physically connected; therefore, all hardware-dependent measurements are explicitly marked TBD and are not presented as experimental results. The work therefore contributes a completed federated-learning evaluation plus a clearly defined, testable edge-deployment architecture. Index Terms-Federated learning, ECG, arrhythmia detection, edge AI, Raspberry Pi, non-IID data, FedAvg, FedProx, 1D CNN, TinyML.

Keywords: ECG arrhythmia, FedProx, Neural Network, Sensitivity, Raspberry

Abstract 25

Gender-Inclusive Environmental Education and Youth Climate Advocacy: Evidence from Seven Secondary Schools in Cameroon

Willy Endelson Dongfack, National Polytechnic Institute –
CIIEMAD, Mexico [willy@thepopmovement.org]

Climate change and environmental degradation demand greater participation of young people, while gender inclusion remains important in creating equal opportunities for environmental leadership. This study examines a gender-inclusive environmental education initiative implemented in seven secondary schools in the West Region of Cameroon. The initiative used debate and public speaking competitions, environmental clubs, and climate ambassador training to engage students in environmental protection and climate advocacy, with particular attention to the participation of female students. The study adopts a mixed-methods retrospective case-study approach, drawing on project records, participation data, gender-disaggregated information, and documented evidence from the implementation process. . The findings show that the initiative directly engaged 540 students, with female students representing approximately 70% of the student population reached. Seven environmental clubs were established, and 35 secondary-school students were trained as climate ambassadors. The debate and public-speaking activities also created opportunities for students to discuss

environmental challenges, develop communication skills, and participate in environmental advocacy. The findings suggest that combining gender-inclusive environmental education with participatory activities such as debate, public speaking, and school-based environmental clubs can provide useful opportunities for strengthening youth participation and environmental agency. The study highlights the potential of schools as important spaces for developing young environmental advocates and promoting more inclusive approaches to environmental action in Cameroon.

Keywords: Gender Inclusion, Environmental Education, Youth Advocacy, Climate Change, Environmental Citizenship, Eco-clubs, Cameroon

Abstract 26

Closing the Preanalytical Gap: Impact of a Structured Behavioral and Professionalism Intervention on Phlebotomy Compliance — Observational Study

Mazin Khursheed, Kings College London Hospital [mazin.syed@kch.sa]

Ibrahim Mansoor, Kings College London Hospital

Omer Javed, Kings College London Hospital

Fawziah Anam, Kings College London Hospital

Walaa Kattan, Kings College London Hospital

Rahaf Alshabani, Kings College London Hospital

Phlebotomy is a critical preanalytical process in which failures in patient identification, specimen labeling, infection prevention, and communication may compromise patient safety and service quality. This study evaluated whether targeted professionalism and communication training improved phlebotomy compliance. A single-center, three-phase before-and-after quality-improvement study using direct observational audits was conducted at King's College Hospital London, Jeddah, Saudi Arabia, in 2026. Phase 1 included a baseline assessment of five phlebotomy staff members. Phase 2 involved a structured training intervention targeting identified behavioral and communication gaps. Phase 3 assessed 100 phlebotomy encounters using a 41-item audit tool. Eleven comparable pre- and post-training items were analyzed using Fisher's exact test. At baseline, 60% (3/5) of staff were rated

as needing improvement, while technical competency remained >90%. Following training, compliance improved in 10 of 10 comparable items. Significant improvements occurred in professional self-introduction (20% to 75%; $p=0.020$), procedure/turnaround-time explanation (40% to 92%; $p=0.008$), eye contact and respectful tone (60% to 94%; $p=0.046$), patient privacy and dignity (80% to 100%; $p=0.048$), and professional appearance (80% to 100%; $p=0.048$). Technical practices remained highly compliant. Persistent gaps included hand hygiene (88%), two-identifier patient verification (89%). Targeted professionalism and communication training was associated with improved behavioral and patient-centered phlebotomy practices while maintaining high technical compliance. Persistent safety-related gaps warrant reinforcement and re-audit.

Keywords: Phlebotomy, Patient-centered, Audit, Behavior, Saudi Arabia, Hand Hygiene

Abstract 27

Climate Change and the Future Health of Youth: Investigating Environmental Exposures and Emerging Skin Cancer Risks in Muzaffarpur City, Bihar

Md Munib, Jauhar Academy of Research and Innovation, Bihar, India [munib.fc@gmail.com]

Climate change is emerging as an important determinant of long-term health, particularly among young populations exposed to changing environmental conditions. This study examines the potential relationship between climate-related environmental exposure and future skin cancer risk among youth in Muzaffarpur City, Bihar. It focuses on solar ultraviolet (UV) radiation, rising temperatures, outdoor activities, occupational exposure, air pollution, sun-protection practices and socioeconomic vulnerability. The study adopts a youth-centered approach to understand how changing environmental conditions may modify established skin-health risk factors. By integrating environmental assessment with behavioral and public-health perspectives, the research aims to support preventive strategies, health awareness, climate-resilient urban planning and youth-focused skin-health policies.

Keywords: Climate Change, Youth Health, Skin Cancer, UV Radiation, Environmental Exposure, Air Pollution, Climate Vulnerability, Muzaffarpur, Bihar

Abstract 28

Mechanisms of Anticancer Efficacy in Metal Nanostructure-Doped PDMS Composite Platforms: A Short Review

Harsimran Singh Bindra, Model Institute of Engineering and Technology, Jammu, India

Ranu Nayak, Amity University, Noida, Uttar Pradesh, India

Shamshi Hassan, Al-Baha University, Al-Baha, Saudi Arabia

Asiya Nazir, Abu Dhabi University, Abu Dhabi, United Arab Emirates [asiya.nazir@adu.ac.ae]

Touseef Amna, Al-Baha University, Al-Baha, Saudi Arabia [touseefamna@gmail.com]

Systemic administration of chemotherapeutics continues to face severe clinical bottlenecks, including non-specific cytotoxicity, rapid systemic clearance, and an inability to achieve high local drug concentration without systemic toxicity. To address these critical challenges, the overarching motive behind developing metal nanostructure-doped polydimethylsiloxane (PDMS) composite platforms is to establish a targeted, non-invasive, and multi-modal therapeutic strategy that prevents post-surgical tumor recurrence while enabling localized precision oncology. This review synthesizes the key mechanistic pathways through which metal nanostructure-infused PDMS platforms exert their anticancer efficacy. Structurally, embedding functional metallic nanostructures into flexible, gas-permeable PDMS matrices bridges nanoscale bio-interactions with macro-scale device mechanics. Thermally and magnetically responsive

responsive nanostructures convert external near-infrared radiation or alternating magnetic fields into precise, localized hyperthermia, directly inducing tumor cell ablation while physically deforming the elastomeric PDMS pores for “on-demand,” pulsatile drug release. Chemically, infused metallic nanostructures trigger intense intracellular reactive oxygen species (ROS) generation, which disrupts mitochondrial membrane integrity, upregulates key pro-apoptotic markers and suppresses anti-apoptotic pathways to induce programmed cell death. Furthermore, catalytic nanostructures modulate the tumor microenvironment to boost local chemodynamic activity while simultaneously providing essential antimicrobial protection against surgical site pathogens. By unifying elastomeric matrix adaptability with nanoscale photo-thermal, magnetic, oxidative, and catalytic mechanisms, metal nanostructure-doped PDMS composites offer a compelling, high-efficacy solution for local post-resection therapy and controlled cancer nanomedicine.

Keywords: Chemotherapeutics, Chemodynamic, Oncology, Cytotoxicity, Elastomeric, Hyperthermia, Permeable, Nanostructure, Mitochondria

Abstract 29

Rising Heat, Fragile Beginnings: Extreme Heat and the Risk of Preterm Birth in a Changing Climate — The Case of the United Arab Emirates

Komal Mittal, POP (Protect Our Planet) Movement, New Delhi, Delhi, India [komal@thepopmovement.org]

Climate change is driving more frequent and severe heat exposure worldwide, and the United Arab Emirates — where summer temperatures often pass 45°C — is one of the regions most at risk. Research increasingly links extreme heat during pregnancy to poor outcomes, especially preterm birth, thought to result from dehydration, oxidative stress, and stress on the placenta and hormonal systems that trigger labor. However, most of this research comes from temperate, wealthier countries, leaving a gap in understanding how these effects play out in extremely hot, arid places like the Gulf region. This study uses a qualitative approach, supported by case studies, to explore the link between extreme heat and preterm birth in the UAE. It considers the country's specific context: rapid urban growth, a large outdoor and migrant workforce, and high rates of gestational diabetes and hypertension — conditions already known to raise preterm birth risk, which may worsen further. Through case studies, the research examines how heat affects pregnancy at different stages, the risks faced by pregnant women working outdoors, and whether current national heat-safety policies adequately address pregnancy-specific risks.

The study concludes by identifying key areas for future UAE-based research — such as tracking temperature exposure against pregnancy length — and practical policy steps, including trimester-specific heat alerts and stronger workplace protections. These findings aim to protect a vulnerable population locally while offering lessons for other hot, high-income regions facing similar climate pressures.

Keywords: Climate Change, Heat, Pregnancy, Gulf, Climate Pressure, Hypertension, Migrant Workforce, Diabetes, Preterm Birth

Abstract 30

Prompting for Prevention: Can Prompt Framing Improve Generative-AI Advice on Cancer-Preventive and Sustainable Eating?

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Sarah Rajkotwala, Habib University, Karachi, Pakistan
[sr13048@st.habib.edu.pk]

Ibtihaj Hassan¹, Habib University, Karachi, Pakistan [ih12308@st.habib.edu.pk]

Bismah Asif, Habib University, Karachi, Pakistan [ba12467@st.habib.edu.pk]

Muhammad Ifham, Habib University, Karachi, Pakistan
[mi13373@st.habib.edu.pk]

Generative-AI systems are increasingly used for health information, yet prompt wording may alter how well advice balances cancer prevention, sustainability, cultural relevance, and practicality for young users. To test whether prompt framing changes the quality and balance of dietary advice generated by one AI system. Four investigators each generated one response under four fixed prompt conditions—generic health, cancer prevention, sustainability, and integrated—using the same AI model in separate chats and a standardized scenario of a budget-conscious 18-year-old university student in Karachi (16 outputs). Each output was independently scored and reconciled across five prespecified 0–2 domains: cancer-

prevention guidance, sustainability, Pakistani affordability/cultural fit, scientific caution, and actionability. Mean total scores increased from 6.75/10 for generic health to 7.25 for cancer prevention, 7.75 for sustainability, and 8.50 for the integrated prompt; median totals were 7.0, 7.5, 8.5, and 8.5. Cancer-prevention alignment was highest under the cancer-focused prompt (median 2.0), while sustainability reached 2.0 under sustainability and integrated prompts. Affordability/cultural fit fell from 2.0 under generic prompting to 1.0 under cancer-focused and integrated prompting. Prompt framing materially changed AI dietary advice. Integrated prompting improved overall balance, but local affordability and cultural fit remained important trade-offs for youth-facing digital health communication.

Keywords: Generative AI, Cancer Prevention, Sustainable Eating, Digital Health, Prompt Framing

Abstract 31

Where Health and Climate Goals Converge: Crosswalking Cancer-Prevention Dietary Guidance with Food Greenhouse-Gas Emissions

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Arish Dhanani, Habib University, Karachi, Pakistan [ad12465@st.habib.edu.pk]

Khizar Muhammad, Habib University, Karachi, Pakistan
[km12471@st.habib.edu.pk]

Ayesha Jamal, Habib University, Karachi, Pakistan [aj13421@st.habib.edu.pk]

Nibrah Faheem, Habib University Karachi, Pakistan [nf12922@st.habib.edu.pk]

Food choices connect cancer-prevention guidance with climate-related environmental impacts, yet these goals are often considered separately. To compare published global-average greenhouse-gas (GHG) values across foods classified using a simplified World Cancer Research Fund (WCRF) dietary crosswalk. A fixed sample of 24 food commodities was independently classified using locked rules as explicitly encouraged (E), explicitly limited (L), or not directly classified (N). Published global-average GHG values (kg CO₂e/kg) were taken from the Our World in Data food dataset. Category medians and ranges were compared descriptively. Twelve foods were classified E, four L, and eight N. Median GHG values

were 0.695 kg CO₂e/kg for E foods (range 0.39–2.09), 36.51 for L foods (12.31–99.48), and 4.56 for N foods (0.43–23.88). Foods explicitly encouraged in the simplified WCRF crosswalk therefore clustered at substantially lower GHG values than limited red meats, while the N category remained heterogeneous. Within this fixed dataset, cancer-prevention dietary guidance and lower food-related GHG values showed substantial convergence. The heterogeneity of unclassified foods also shows why health and environmental performance should not be collapsed into a single score. These findings support further exploration of sustainable dietary guidance that can connect cancer prevention with climate-conscious food choices.

Keywords: Cancer Prevention, Sustainable Diets, Greenhouse-gas Emissions, WCRF, Climate-health

Abstract 32

Small Changes, Dual Benefits: Modeling Ingredient Substitutions in Familiar Pakistani Meals

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Hamza Faisal, Habib University, Karachi, Pakistan [hf12307@st.habib.edu.pk]

Sabah Nasir, Habib University, Karachi, Pakistan [sn13388@st.habib.edu.pk]

Tayyaba Bano, Habib University, Karachi, Pakistan [tb12424@st.habib.edu.pk]

M. Kamil Khalid, Habib University, Karachi, Pakistan
[mk12316@st.habib.edu.pk]

Familiar meal substitutions may offer practical opportunities to align cancer-prevention dietary guidance with lower food-related greenhouse-gas (GHG) emissions without requiring entirely new eating patterns. To assess whether one standardized ingredient change can improve alignment with World Cancer Research Fund (WCRF) guidance while reducing modeled GHG emissions in familiar Pakistani meals. Eight prespecified meal scenarios were evaluated. Only the ingredient component that changed was modeled using fixed global-average GHG factors. Substitutions included reducing or replacing red meat, replacing chicken with peas, and replacing refined grains with wholegrain alternatives. . Modeled GHG change and WCRF-alignment improvement were assessed

separately using prespecified rules and independent checking. Absolute modeled GHG changes ranged from 0 to -24.69 kg CO₂e per scenario. Red-meat substitutions produced the largest absolute reductions, led by beef qeema biryani (-24.69 kg CO₂e) and aloo gosht (-22.39 kg CO₂e). Chicken-to-peas substitution reduced modeled ingredient emissions by 90.07% (-2.22 kg CO₂e). All eight substitutions improved at least one selected WCRF-alignment dimension. Wholegrain substitutions improved WCRF alignment while showing zero modeled GHG change because the fixed environmental factors did not distinguish grain processing. Small, culturally familiar ingredient substitutions showed potential dietary-guideline and environmental co-benefits. This component-level model suggests a practical pathway for exploring climate-conscious cancer-prevention guidance in familiar diets.

Keywords: Pakistani Meals, Cancer Prevention, Food Substitutions, Greenhouse-gas Emissions, Sustainable Diets

Abstract 33

Beyond the Health Halo: Auditing Claim Verifiability and Cancer-Prevention Alignment in Online Health-Marketed Packaged Foods

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Noor-ul-Huda Khurram, Habib University Karachi, Pakistan
[nk12924@st.habib.edu.pk]

Ayesha Murtaza, Habib University Karachi, Pakistan
[am12304@st.habib.edu.pk]

Amna Asif, Habib University Karachi, Pakistan [aa12383@st.habib.edu.pk]

M. Ibrahim Awan, Habib University Karachi, Pakistan
[ma12409@st.habib.edu.pk]

Health-marketed packaged foods can shape consumer perceptions online, but a verifiable claim does not necessarily indicate that the product aligns with broader cancer-prevention dietary guidance. To examine the verifiability of selected online health claims and their coexistence with cancer-prevention dietary alignment in health-marketed packaged foods. A fixed sample of 32 packaged foods sold online in Pakistan was audited using a standardized protocol. Selected claims were coded as Verifiable, Partly Verifiable, Not Verifiable, or Internally Inconsistent. Product composition was independently coded as Supportive, Mixed, Limiting, or Undetermined using a prespecified WCRF-informed cancer-prevention alignment

proxy. Planned cross-checks were reconciled before analysis. Fifteen claims (46.9%) were Verifiable, 12 (37.5%) Partly Verifiable, and five (15.6%) Not Verifiable; none were Internally Inconsistent. Composition was Mixed for 17 products (53.1%), Limiting for nine (28.1%), Supportive for five (15.6%), and Undetermined for one (3.1%). Among 15 products with fully verifiable claims, 10 were Mixed, one Limiting, and four Supportive. Claim verifiability and overall dietary alignment captured different aspects of online food marketing. Verifiable health claims frequently coexisted with Mixed or Limiting alignment, highlighting the importance of digital food literacy and careful interpretation of health-marketed products in youth-oriented cancer-prevention communication.

Keywords: Food Claims, Digital Food Environment, Cancer Prevention, Food Literacy, Health Marketing

Abstract 34

Can Young Adults Choose for Both Health and Planet? A Digital Audit of Quick-Service Menus in Karachi

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

S. Faizan Hussain, Habib University Karachi, Pakistan
[sh12419@st.habib.edu.pk]

M. Zayan Khan, Habib University Karachi, Pakistan [mk13375@
st.habib.edu.pk]

Ansharah Fatima, Habib University Karachi, Pakistan
[af13420@st.habib.edu.pk]

Kiswa Shahzad, Habib University Karachi, Pakistan [ks13099@
st.habib.edu.pk]

Young adults frequently encounter quick-service food environments where affordability, convenience, cancer-prevention dietary principles, and environmental considerations may compete. To examine joint alignment with selected cancer-prevention dietary principles and a protein-source environmental-impact proxy in a fixed sample of quick-service menu choices in Karachi. Forty-eight single-person menu items from six chains were divided among four primary coders. Each menu description was coded using two locked proxies: dietary-pattern alignment and protein-source environmental impact. The two scores generated a Green/Amber/Red/Gray traffic-light classification. Twelve items (25%) were independently cross-checked and reconciled

before analysis. Of 48 items, 26 (54%) were Red, 16 (33%) Amber, four (8%) Green, and two (4%) Gray. Nando's had 25% Green, 75% Amber, and no Red sampled items, whereas all eight sampled KFC items were Red. Green choices were limited to Nando's and Subway. Two California Pizza items were Gray because menu descriptions did not provide enough information for complete classification. Simultaneous alignment with the selected dietary and environmental criteria was uncommon in this exploratory menu sample, with substantial variation across chains. The findings highlight how food environments may constrain young adults' ability to choose for both health and climate and support further work using measured nutritional and environmental data.

Keywords: Quick-service Restaurants, Cancer Prevention, Sustainable Health, Food Environment, Young Adults

Abstract 35

Does Sustainability Disappear from Online Cancer-Prevention Advice? A Reproducible Search-Engine Audit

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Samia Sarfaraz, Habib University Karachi, Pakistan [ss10125@st.habib.edu.pk]

Zayd Mazhar, Habib University Karachi, Pakistan [zm13016@st.habib.edu.pk]

Sameer Shahid, Habib University Karachi, Pakistan [ss12484@st.habib.edu.pk]

Fasiha Faheem, Habib University Karachi, Pakistan [ff12634@st.habib.edu.pk]

Online searches are a common source of diet and cancer-prevention information for young people, but sustainability may not be routinely incorporated into the advice users encounter. To examine the evidence alignment and sustainability content of online diet-and-cancer information and whether adding sustainability language changes search results. Four fixed queries were conducted using one search engine on the same class day, creating a reproducible search snapshot. Two were standard cancer-prevention searches and two were sustainability-framed. The first six non-sponsored organic results per query were retained (24 webpages; 12 per search type). Pages were coded for evidence alignment, framing, sustainability, evidence transparency, and sensational

headlines, with assigned independent cross-checks and reconciliation. Evidence-aligned content was more common in sustainability-framed than standard searches (92% vs 58%). Single-food/superfood framing was less common (8% vs 25%), and explicit sustainability content increased from 0% to 17%. Sensational headlines occurred equally in both groups (33%). Sustainability-framed searches were associated with more evidence-aligned results and less single-food framing, but explicit sustainability remained uncommon. Search wording therefore appears to shape the digital information environment encountered by users, suggesting a simple, testable route for improving youth-facing cancer-prevention and sustainable-health communication.

Keywords: Search Engines, Cancer Prevention, Sustainability, Digital Health, Online Information

Abstract 36

Protein Foods at the Intersection of Cost, Climate Impact, and Cancer-Prevention Guidance

Humaira Jamshed, University, Karachi, Pakistan [humaira.jamshed@sse.habib.edu.pk]

M. Ayaan Asim, Habib University, Karachi, Pakistan [ma12899@st.habib.edu.pk]

M. Raasikh Hashmi, Habib University, Karachi, Pakistan [mh12412@st.habib.edu.pk]

Javairia Farhan, Habib University, Karachi, Pakistan [jf12309@st.habib.edu.pk]

Ayesha Lodhi, Habib University, Karachi, Pakistan [al12776@st.habib.edu.pk]

Protein-food choices intersect with student affordability, environmental impact, and cancer-prevention dietary guidance, creating practical trade-offs for young adults. To compare common protein foods by retail cost and modeled greenhouse-gas (GHG) emissions per 20 g protein while keeping World Cancer Research Fund (WCRF) classification separate. Eight foods were evaluated using supplied protein-density, retail-price, and global-average GHG inputs. Food quantity, cost, and modeled GHG emissions were normalized to 20 g protein. Foods were coded as WCRF Encouraged (E), Limited (L), or Not directly classified (N), and Pareto dominance was assessed without creating a combined score. Masoor dal had the lowest cost (PKR 18.62)) and modeled GHG emissions (0.146 kg

CO₂e) per 20 g protein and was the sole non-dominated option. White chana was also low-cost and low-GHG (PKR 29.17; 0.175 kg CO₂e). Beef mince had the highest modeled GHG value (11.57 kg CO₂e), while mutton had the highest cost (PKR 307.32). Chicken was cheaper than eggs, whereas eggs had lower modeled GHG emissions. Masoor, white chana, and peanuts were WCRF E; beef and mutton WCRF L; chicken, eggs, and milk WCRF N. Within this fixed sample, dry pulses aligned student affordability with lower modeled emissions and the encouraged WCRF plant-food category, illustrating a potentially useful intersection of cancer prevention, sustainable health, and student food choice.

Keywords: Protein Foods, Affordability, Greenhouse-gas Emissions, Cancer Prevention, Sustainable Health

Abstract 37

Building Youth Capacity for Climate-Informed Cancer Prevention: A 150-Minute Research Sprint with Novice Computer Science Students

Humaira Jamshed, Habib University, Karachi, Pakistan [humaira.jamshed@sse.habib.edu.pk];
Jamshed Arslan, Habib University, Karachi, Pakistan [jamshed.arlsan@gmail.com]

Climate Change and food systems jointly shape long-term health and opportunities for cancer prevention. Preparing youth to address these connected challenges requires research participation across disciplinary boundaries, including among students outside life sciences. We evaluated a highly scaffolded 150-minute authentic research sprint involving 28 first-year Computer Science students, most with no biology education beyond Grade 8. Across seven teams, students investigated original food/nutrition questions involving climate, sustainability, health, cancer prevention, technology, cost, or food environments; they sampled or coded data, calculated, compared, visualized, interpreted, and wrote abstracts. A single-cohort matched PRE–POST pilot assessed the prespecified 0–4 Systems Integration Score connecting food, human health, cancer, and climate change. Medians were 3.5 (IQR 3–4) PRE and 3.0 (IQR 3–4) POST; 4/28 improved, 18/28 were unchanged, and 6/28 decreased (Wilcoxon $p=.527$; rank-biserial $r=-.20$, 95% CI -0.78 to 0.45). Fourteen began at the

ceiling. All seven teams completed quantitative abstracts. In contrast, all four task-specific confidence ratings increased; food-sustainability confidence rose from 5 to 7, with 22/27 improving (Holm-adjusted $p=.0003$). The sprint was feasible and associated with greater confidence, but short-term systems integration measurable. Building youth capacity for climate-informed cancer prevention may require authentic participation plus more time for iteration and feedback.

Keywords: Climate Change, Youth Capacity, Cancer, Sustainability, Prevention, Life Sciences

Abstract 38

Through Youth Eyes: A Rapid Photovoice-Inspired Study of Food Environments for Sustainable Health and Cancer Prevention

Humaira Jamshed, Habib University; Jamshed Arslan, Habib University, Karachi, Pakistan [humaira.jamshed@sse.habib.edu.pk]

Diet-related cancer prevention and environmental sustainability are both shaped by everyday food environments, yet youth perspectives on what makes healthy, sustainable eating feasible are often overlooked. We examined how first-year university students perceived these influences through a rapid Photovoice-inspired participatory exercise. Twenty-seven consenting Computer Science students each submitted one photograph answering: “What in my food environment makes eating in a way that is healthy AND environmentally sustainable easier or harder?” Students identified a facilitator or barrier, added a caption, and proposed one feasible change. Inductive coding examined orientation, themes, explicit sustainability content, and locus of action. Sixteen photographs depicted facilitators, 10 barriers, and one mixed case. Home preparation was most frequent (8/27); fried foods, packaging, and habits or social influences each appeared in 4/27. Only 16/27 responses explicitly connected the image to environmental sustainability. Proposed changes more often emphasized individual, household, or peer action (15/27) than

structural action (9/27); three combined both. Even when invited to consider health and sustainability together, students commonly proposed individualized responses to food-environment challenges. These youth-generated observations connect everyday food practices with sustainable health and upstream cancer prevention, while suggesting that youth initiatives should pair personal agency with attention to structural food environments.

Keywords: Cancer, Prevention, Youth, Environment, Sustainability, Photovoice, Climate Change

Abstract 39

Sustainable Synthesis of Silver Nanoparticles from Pomegranate Peel Biowaste: Climate Smart Nanomedicine

Reham Ali Saeed, Department of Biology, Faculty of Science,
Al-Baha University, Al-Baha, Saudi Arabia [446050322@stu.
bu.edu.sa]

Touseef Amna, Al-Baha University, Al-baha, Saudi Arabia
[touseefamna@gmail.com]

Pomegranate peels are abundant agricultural by-products rich in phytochemicals that can participate in the reduction and stabilization of metal nanoparticles. Their utilization in nanotechnology offers a practical approach to converting local biowaste into valuable antimicrobial materials. In this study, silver nanoparticles (AgNPs) were synthesized using an aqueous extract of pomegranate (*Punica Granatum* L.) peel as a natural reducing agent. The development of a dark-brown color during the reaction provided the first indication of AgNP formation. The synthesized nanoparticles were subsequently characterized using X-ray diffraction (XRD) and scanning electron microscopy (SEM) to examine their crystalline structure and surface morphology. Their antibacterial activity was evaluated by the agar well diffusion method against *Escherichia Coli*, *Staphylococcus Aureus*, and *Pseudomonas Aeruginosa*. The biosynthesized AgNPs produced clear inhibition zones against the tested bacteria and demonstrated stronger antibacterial activity than the pomegranate peel

extract alone. These findings indicate that pomegranate peel can serve as an effective biological resource for producing antibacterial silver nanoparticles. Further studies will evaluate the anticancer potential of the synthesized silver nanoparticles through antiproliferative assays and molecular docking studies. Transforming this locally available waste into a functional nanomaterial supports sustainable biotechnology, reduces dependence on conventional chemical synthesis, and offers promising potential for future biomedical and antimicrobial applications, which is purely environment friendly.

Keywords: Green Synthesis, Silver Nanoparticles, Pomegranate Peel, Agricultural Biowaste, Antibacterial activity

Abstract 40

Quantifying Excess Lifetime Cancer Risk from Bromate and Trihalomethane Exposure in UAE Desalinated Drinking Water

Zairah Niaz, Al Saad Indian School, Al Ain, Abu Dhabi, United Arab Emirates [zairahniaz@gmail.com]

Increasing populations, water scarcity, and the rising demand for clean water in the United Arab Emirates are putting pressure to increase water production and find renewable resources. Driven by these factors, seawater desalination has become an important source of drinking water in the UAE. Produced through thermal and reverse-osmosis desalination is followed by chlorination or on-site electrolytic disinfection. The process can generate disinfection byproducts (DBPs) including bromate and trihalomethanes (THMs) classified by IARC as possible human carcinogens (Group 2B). Gulf desalination faces bromate formation due to the naturally high bromide content of Arabian Gulf seawater, yet localized, up-to-date exposure data for the UAE remains limited, and existing regulatory assessments typically report only pass/fail compliance against fixed concentration thresholds without quantifying the actual long-term health risk. This study proposes to collect drinking water samples from multiple UAE sources, including municipal tap water, bottled desalinated water, and supplies from different emirates—and analyze bromate and THM concentrations via ion chromatography and/or LC-MS/GC-MS, in partnership with an external laboratory. Rather than solely comparing

results against regulatory limits, measured concentrations will be used to calculate Excess Lifetime Cancer Risk (ELCR) using EPA-published cancer slope factors and standard chronic daily intake assumptions. This approach distinguishes between regulatory compliance and quantified biological risk, directly addressing whether detectable DBP levels, even if compliant with local standards, correspond to a meaningful or negligible increase in lifetime cancer risk. Findings will contribute to a localized risk quantification baseline for current Gulf water-quality literature, with implications for water treatment policy and public health communication in a region uniquely dependent on desalinated water.

Keywords: Desalination; Disinfection Byproducts (DBPs); Bromate; Trihalomethanes (THMs); Excess Lifetime Cancer Risk (ELCR); Water Quality; Carcinogenic Risk Assessment; United Arab Emirates (UAE); Public Health

Abstract 41

Reading the Sky: Using Interstellar to Teach Air-Quality Decision Skills in Karachi

Syed Abbas, Habib University, Karachi, Pakistan [sa11268@st.habib.edu.pk]

Jamshed Arslan, Habib University, Karachi, Pakistan [jamshed.arslan@sse.habib.edu.pk]

Qusai Bharmal, Habib University, Karachi, Pakistan [qb11850@st.habib.edu.pk]

Muhammad Aayan, Habib University, Karachi, Pakistan [ma12656@st.habib.edu.pk]

Humaira Jamshed, Habib University, Karachi, Pakistan [humaira.jamshed@sse.habib.edu.pk]

Interstellar (2014) makes airborne dust visible through a dramatic storm sequence, but the scene leaves the long-term health implications of particulate exposure unexplored. Outdoor air pollution and particulate matter are established causes of lung cancer, making air-quality interpretation relevant to environmental-health education in Karachi. To assess changes in students' ability to interpret the Air Quality Index (AQI) and select appropriate actions to reduce particulate exposure after a brief workshop. Developed within the Bioscience in Cinema course, this student-led, single-group pilot will recruit students in Karachi from outside the course. Participants will complete four written decision scenarios before viewing the selected dust-storm sequence. Facilitators will contrast the fictional

setting with real pollution sources, including traffic and industry, explain PM_{2.5}-related health risks, and guide participants through local AQI readings using a clearly identified index scale. A hands-on demonstration will compare masks and particulate respirators, emphasizing filtration, fit, and limitations. Participants will practice interpreting AQI information and choosing actions such as reducing outdoor exertion or using suitable respiratory protection when appropriate. The same four scenarios will be administered immediately afterward using a predefined scoring key. The primary outcome will be within-participant change in decision scores (0–4). This pilot connects youth-led science communication with an established environmental cancer hazard, while limiting conclusions to immediate learning in an uncontrolled setting.

Keywords: AQI, Bioscience, Environment, Health, Education, Particulate Matter

Abstract 42

Cracking the Polyfluoroalkyl Substances (PFAS) Mystery: Using Dark Waters to Teach Teenagers About Exposure and Health Risk

Mariam Amir, Habib University, Karachi, Pakistan [ma13398@st.habib.edu.pk]

Ishika Advani, Habib University, Karachi, Pakistan [ia13468@st.habib.edu.pk]

Naveed Ahmed, Habib University, Karachi, Pakistan [na11734@st.habib.edu.pk]

Humaira Jamshed, Habib University, Karachi, Pakistan [humaira.jamshed@sse.habib.edu.pk]

Jamshed Arslan, Habib University, Karachi, Pakistan City/State, Country [jamshed.arslan@sse.habib.edu.pk]

Per- and polyfluoroalkyl substances (PFAS) comprise a large family of manufactured chemicals, many of which break down very slowly. Dark Waters (2019) provides a starting point for discussing Perfluorooctanoic Acid (PFOA), a PFAS classified as carcinogenic to humans, while distinguishing chemical hazard from individual health risk. To assess immediate changes in teenagers' ability to identify plausible PFAS exposure pathways and evaluate health-risk claims through a film-based detective activity. Developed within the Bioscience in Cinema course, this student-led, single-group pilot will involve approximately 20–35 students aged 13–17 in a school classroom. Participants will answer four questions covering exposure pathways and

interpretation of health-risk statements. A brief introduction and selected Dark Waters scene will distinguish PFOA from the broader PFAS family and explain why exposure does not guarantee disease. In a “Chemical Detective” activity, small groups will examine prepared product and exposure cards, identify plausible pathways, and recognize when information is insufficient to establish PFAS presence. A short, fact-checked AI-generated animation will reinforce the key messages. Participants will then independently repeat the four questions, scored using a predefined answer key. The primary outcome will be within-participant change in PFAS knowledge scores (0–4), covering exposure pathways and health-risk interpretation. This pilot will explore how cinema and evidence appraisal can support youth understanding of persistent pollutants and environmental cancer hazards. Findings will describe immediate learning in an uncontrolled setting.

Keywords: PFAS, PFOA, Chemical Detective, Pollutants, Cancer, Environment, Carcinogenic, Dark Waters

Abstract 43

From Cinema to Climate Reality: Teaching Sea-Level Science Through the Day After Tomorrow

Syeda Manahil Zakir, Habib University, Karachi, Pakistan
[sz13145@st.habib.edu.pk]

Muhammad Zain Ul Abideen, Habib University, Karachi,
Pakistan [mu11733@st.habib.edu.pk]

Umar Fareed Siddiqui, Habib University, Karachi, Pakistan
[us12696@st.habib.edu.pk]

Minal Zubair Elahi, Habib University, Karachi, Pakistan
[mz13400@st.habib.edu.pk]

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Jamshed Arslan, Habib University, Karachi, Pakistan [jamshed.
arslan@sse.habib.edu.pk]

The Day After Tomorrow (2004) dramatizes rapid climate disruption, offering an opportunity to examine how melting ice actually affects sea level. Distinguishing floating sea ice from land ice is essential for understanding coastal climate risks. To assess immediate changes in secondary-school students' understanding of the different sea-level effects of melting land ice and floating sea ice. Developed within the Bioscience in Cinema course, this student-led, single-group pilot will involve Grade 9–10 students at a Karachi school. Participants will complete four true/false items targeting ice-melt and sea-level concepts before viewing a selected film scene. They will

predict, observe, and measure water-level changes in two matched containers containing equal amounts of ice, either floating in water or resting above water on a clay “continent.” Facilitated discussion will connect observations to displacement: melting land ice adds water to the ocean, whereas floating sea ice has little direct effect on sea level. Students will also learn that warming seawater expands, so ice melt is not the only contributor to sea-level rise. The model will be explicitly distinguished from the film’s broader ocean-circulation narrative. Participants will independently repeat the same four items immediately afterward, before answers are revealed. The primary outcome will be within-participant change in conceptual understanding scores (0–4). This pilot links cinema with prediction and measurement to support youth climate literacy, while limiting conclusions to immediate learning in an uncontrolled setting.

Keywords: Climate Disruption, Sea Level, Continent, Bioscience, Sea Water, Climate Literacy, Displacement

Abstract 44

Building and Strengthening Community Technical Capacities for Climate Change Adaptation: A Case Study of Ecosystem- based Adaptation in Mexico

Liliana López Ramírez, Ambiente Acuavita A.C. [liliana.lopez@acuavita.org.mx]

Víctor Alfonso Martínez Martínez, Ambiente Acuavita A.C.

Luis Enrique Bautista Lara, Ambiente Acuavita A.C.

Carlos Lugo Ramírez, Ambiente Acuavita A.C.

Climate change increases the complexity, frequency, and intensity of environmental risks faced by communities that depend on forest ecosystems. Addressing these risks requires, in addition to ecosystem interventions, local capacities to monitor, identify, and respond to changing environmental conditions. This case study examines a community-based Ecosystem-based Adaptation (EbA) process implemented in El Madroño, within the Sierra Gorda Biosphere Reserve, Mexico. Beyond the implementation of adaptation measures, the project integrated technical training, hands-on field learning, community monitoring, risk identification, and institutional coordination. An intergenerational community brigade of 20 participants—including women, men, youth, and older adults—was formed and trained to monitor ecosystem conditions, identify risks related to forest health and wildfires, document observations using digital tools—including Gaia GPS, Merlin Bird ID, and iNaturalist—and follow up on the implemented

EbA measures. The process also strengthened mechanisms for communicating identified risks and coordinating responses with local authorities and environmental institutions.

The experience suggests that building and strengthening technical capacities within communities alongside ecosystem interventions can strengthen their capacity for action and contribute to the continuity of climate change adaptation processes beyond the duration of externally funded projects.

Keywords: Ecosystem-based Adaptation, Climate Change Adaptation, Building and Strengthening Community Capacities, Community Monitoring, Local Resilience

Abstract 45

When Water Is Scarce: Exploring Heat, Hydration and Irrigation Through Dune

Bilal Ahmed Khan, Habib University, Karachi, Pakistan
[bk13392@st.habib.edu.pk]

Isra Mehboob, Habib University, Karachi, Pakistan [im12646@
st.habib.edu.pk]

Muhammad Luqman, Habib University, Karachi, Pakistan
[mj12659@st.habib.edu.pk]

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Jamshed Arslan, Habib University, Karachi, Pakistan [jamshed.
arslan@sse.habib.edu.pk]

In *Dune: Part One* (2021), irrigating sacred palm trees becomes a visible moral dilemma in a water-scarce society. This scene provides the starting point for a proposed educational pilot examining how students combine biological calculations with judgments about competing water needs during extreme heat. Developed within the Bioscience in Cinema course, the activity will connect heat-related sweating and human hydration with plant water requirements. The film's comparison between tree and human water use will be treated as a fictional prompt, not a universal biological ratio. Discussion will recognize that vegetation can provide food, shade, and cooling, with benefits and irrigation needs varying by species and setting. After viewing the scene and receiving a brief scientific explanation,

students will complete a hypothetical water-allocation challenge. Using supplied values for exposure duration, fluid-loss rates, available water and irrigation demand, participants will calculate estimated sweat-related fluid losses and construct a water budget. They will then justify their allocation through guided discussion and a short individual worksheet. The primary outcome will be the proportion producing a numerically feasible budget that meets the scenario's stated human hydration requirements. Written explanations will additionally be examined for recognition of vegetation benefits and explicit trade-offs. The pilot will characterize how students connect physiology, arithmetic, and environmental reasoning within a constrained resource decision. By making water-allocation trade-offs explicit, it offers an approach to climate-adaptation education centered on justified choices, with findings limited to performance on the classroom task.

Keywords: Bioscience, Biological, Arithmetic, Heat-related, Sweat-related, Education, Human, Hydration

Abstract 46

From Factory to Food Chain: Using Minamata to Explain Environmental Disease

Mariam Yasir Razzaq, Habib University, Karachi, Pakistan
[mr12654@st.habib.edu.pk]

Aayan Ahmed Siddiqui, Habib University, Karachi, Pakistan
[as13090@st.habib.edu.pk]

Muhammad Musaab, Habib University, Karachi, Pakistan
[mm12528@st.habib.edu.pk]

Humaira Jamshed, Habib University, Karachi, Pakistan
[humaira.jamshed@sse.habib.edu.pk]

Jamshed Arslan, Habib University, Karachi, Pakistan [jamshed.
arslan@sse.habib.edu.pk]

Pollution can reach people long after it leaves a factory. The film Minamata provides a case for examining how industrial methylmercury contamination passed through aquatic food chains and caused neurological disease. This proposed project asks whether young people can trace that pathway and identify opportunities to prevent exposure. Scientific interpretation will distinguish bioaccumulation within organisms from biomagnification across feeding relationships. It will also separate methylmercury's established neurotoxicity from its classification as possibly carcinogenic, avoiding the implication that Minamata disease was a cancer outbreak. . In a classroom pilot developed through Bioscience in Cinema, participants will view a selected film extract and reconstruct the contamination

pathway using illustrated cards. They will discuss how discharge control, seafood monitoring and public communication can reduce exposure. An individual exit task will ask participants to order the pathway, explain why predatory fish may contain higher methylmercury concentrations, and justify one preventive intervention. A predefined answer key will assess pathway accuracy as the primary outcome; written explanations will provide supporting evidence of ecological reasoning. This exploratory pilot connects cinema with environmental disease prevention and youth understanding of food systems. Findings will describe demonstrated understanding, without attributing learning gains or changes in health outcomes to the activity.

Keywords: Bioscience, Cinema, Minamata, Biomagnification, Bioaccumulation, Methylmercury, Neurotoxicity

Abstract 47

Rewriting Deadpool: A Cancer Biology Challenge for Non-STEM Students

Alishba Eijaz, Habib University, Karachi, Pakistan [ae13183@st.habib.edu.pk]

Mikail Faraz, Habib University, Karachi, Pakistan [mf13092@st.habib.edu.pk]

Muhammad Hassan, Habib University, Karachi, Pakistan [mh13210@st.habib.edu.pk]

Humaira Jamshed, Habib University, Karachi, Pakistan [humaira.jamshed@sse.habib.edu.pk]

Jamshed Arslan, Habib University, Karachi, Pakistan [jamshed.arslan@sse.habib.edu.pk]

What would remain of Deadpool's abilities if every biological mechanism had to withstand scientific scrutiny? This proposed pilot uses that question to engage non-STEM college students with cancer biology and gene regulation. Two scenes from Deadpool (2016) portray extreme stress as a means of activating dormant mutant genes in a character with advanced cancer. Discussion will distinguish stress signaling, regulated gene expression and controlled tissue repair from uncontrolled cancer growth and fictional regeneration. Stress hormones can influence gene expression; this does not substantiate the movie's proposed mechanism or establish stress as a cancer treatment. Participants will undertake a "Build Your Own Deadpool" " decision challenge, choosing among proposed

biological mechanisms and explaining which abilities could plausibly follow. An individual assessment before viewing either clip and immediately after the challenge will measure accuracy in distinguishing supported mechanisms from fictional claims. Responses will be scored using a predefined answer key, with within-participant change as the primary outcome. Short explanations will identify persistent misconceptions about cancer, regeneration, and genetic control. Developed within Bioscience in Cinema, the activity positions students as critical designers of a fictional character. The pilot will assess immediate biological judgment, providing preliminary evidence for an accessible approach to youth cancer literacy.

Keywords: Deadpool, Stress, STEM, Hormones, Cinema, Regeneration, Genetic

Abstract 48

Senova: Targeting the Cellular Senescence before Cancer Risks Arise. UAE-Derived Natural Senolytic Strategy for Prevention of Colorectal Cancer

Tuayyeb Hussain, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1091398@students.adu.ac.ae]

Asiya Nazir, Abu Dhabi University, Abu Dhabi, United Arab Emirates [asiya.nazir@adu.ac.ae]

Colorectal cancer remains a major concern in the United Arab Emirates, creating a need for preventive strategies which target the biological changes occurring even before malignant progression. Cellular senescence, a physiological mechanism can become harmful when the senescent cells persist and promote inflammation via secretion of Senescence-Associated Secretory Phenotype factors (SASP-factors). This research proposes Senova, a naturally derived senotherapeutic-based platform designed to investigate if Bioactive (Polyphenolic-Phenolic) compounds derived from UAE Dates (*Phoenix-dactylifera*) and Extra-Virgin-Olive-Oil can target harmful senescent cells selectively while preserving healthy cells. The study will further extract and characterize selected compounds and evaluate their effects on senescent and non-senescent cells. Alongside, cellular-viability, senolytic-activity, senescence-associated-markers and SASP based inflammatory signals will be analyzed to verify whether the bioactive combinations would provide enhanced activity when compared with individual

compounds. By focusing towards the elimination of dysfunctional senescent cells, Senova makes use of preventive natural product that is distinct from conventional strategies focused on established malignancy. This research could also provide a foundation for developing UAE-derived bioactive combinations as potential candidate for senotherapeutic strategies regarding early-prevention of CRC.

Keywords: Cellular Senescence, Colorectal Cancer, Senolytics, Phoenix-dactylifera, Extra-Virgin-Olive-Oil

Abstract 49

AI-Driven Neuro-immune based Cartography of Pancreatobiliary Axis: Decoding Tumor-Immune-Nerve Communication to Successfully Identify Therapeutic Vulnerabilities in Biliary and Pancreatic Cancers in the UAE

Tuayyeb Hussain, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1091398@students.adu.ac.ae]

Afsheen Raza, Abu Dhabi University, Abu Dhabi, United Arab Emirates [raza.afsheen@adu.ac.ae]

Pancreatic ductal adenocarcinoma and cholangiocarcinoma are known to exhibit aggressive behaviors and poor clinical outcomes, with neural invasion being accounted as an important component of tumor-associated progression. Emerging spatial and single cell transcriptomics studies show complex interactions among Fibroblasts, Schwann cells, immune populations and nerve cells within neural niches. Nonetheless, such interactions remain integrated incompletely across pancreatobiliary malignancies, and the previous analyses models could overlook the communication patterns. This study proposes an AI-based cartography framework to help integrate spatial transcriptomics, sc-Ribonucleic (sc-RNA) sequencing, molecular signatures and ligand-receptor interactions from Pancreatic Ductal Adenocarcinoma (PDAC). Machine-learning approaches can be used to reconstruct the tumor-immune-nerve axis network, thus identifying conserved cancer associated signaling circuits, and prioritizing neural

invasion, tumor progression and therapeutic resistance-based molecular interactions. Importance will be stressed on Schwann cell immune-interactions and Schwann cell tumor due to its emerging role in neural remodeling. The framework can also establish testable hypothesis and stress on therapeutic vulnerabilities for clinical and experimental validation, supporting precisely the field of neuro-oncology in pancreatobiliary cancers.

Keywords: Pancreatobiliary-malignancies, Schwann Cells, Tumor-Immune-NerveCommunication,AI-DrivenCartography

Abstract 50

Exposome-X: An AI-Powered Map for Early-Onset Colorectal Cancer risk in Young Adults in the United Arab Emirates

Tuayyeb Hussain, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1091398@students.adu.ac.ae]

Asmaa Abu Obaid, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Falah Theyab, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Nora Basel, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Anaam Amjirih, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Colorectal cancer represents one of the major cancer burdens in United Arab Emirates, with growing concern of occurrence at younger ages. However, lifestyle and environmental determinants contributing to the early-onset Colorectal Cancer (CRC) in the UAE remain less characterized. This study proposes an idea of AI-powered exposome framework to investigate multidimensional environmental-based patterns associated with CRC risks in young adults, specifically in the Emirates. The proposed framework will integrate occupational-exposures, air-pollution, lifestyle-factors, geographical characterizations and other environmental determinants. Data from Early Onset Colorectal Cancer-cases (EOCRC-cases) and control populations will be integrated with lifestyle and environmental

exposure datasets and will be followed by machine-learning analysis to help identify nonlinear-relations, exposure-patterns and interaction with CRC risk, while AI will help determine most potentially modifiable contributors to an individual. Geographical analysis will analyze exposure patterns across UAE. Instead of predicting the cancer diagnosis, this idea will identify several preventable exposure profiles associated with CRC. By the integration of environmental health, AI, precision prevention and epidemiology, this study aims to establish a UAE-specific-framework that could transform complex exposome-data into strategies for individuals with EOCRC.

Keywords: Artificial Intelligence, Exposome, Early-Onset-Colorectal-Cancer, Precision Prevention, United Arab Emirates

Abstract 51

Climate Change and Cancer Prevention: Environmental Exposures, Vulnerability, and Opportunities for Youth-Led Action

Maha Ahmed, Dow University of Health Sciences, Karachi, Sindh, Pakistan [mahaahmed1240@gmail.com]

Climate Change poses an emerging threat to cancer prevention by virtue of its ability to alter environmental exposures, population vulnerability, and the provision of cancer care. This review provides a summary of the existing literature regarding the association between climate change, environmental exposure, and cancer prevention, focusing on outdoor air pollution, ultraviolet (UV) radiation, wildfire smoke, extreme weather conditions, floods, occupational exposures, vulnerable populations, and healthcare system robustness. Established environmental carcinogens, especially outdoor air pollution and solar UV radiation, have significant points of intersection between environmental health and cancer prevention, whereas the existing literature about associations between other climate-related exposures, such as wildfires, extreme heat, and floods, and cancer outcomes is heterogeneous. Climate-related activities can similarly affect cancer prevention, detection, treatment, availability of medication, and service continuity, particularly with higher repercussions in lower and middle-income countries. The climate-sensitive strategy must thus enhance existing methods of cancer prevention by means of

better management of air quality, protection against ultraviolet rays, safety measures at work, monitoring of the environment, planning for emergencies, and making cancer services resilient. Youth participation can also be enhanced through education, research, digital communication, community outreach, and advocacy.

Keywords: Climate Change, Cancer Prevention, Environmental Exposure, Air Pollution, Ultraviolet Radiation, Wildfire Smoke, Occupational Health, Health System Resilience

Abstract 52

Beyond the Ingredient List: Using Dark Waters to Teach Chemical Information Literacy

Nabeeha Baig, Habib University, Karachi, Pakistan [nb13148@st.habib.edu.pk]

Abiha Asim, Habib University, Karachi, Pakistan [sa12985@st.habib.edu.pk]

Mustafa Asif, Habib University, Karachi, Pakistan [ma12907@st.habib.edu.pk]

Hamza Qureshi, Habib University, Karachi, Pakistan [hq13524@st.habib.edu.pk]

Humaira Jamshed, Habib University, Karachi, Pakistan [humaira.jamshed@sse.habib.edu.pk]

Jamshed Arslan, Habib University, Karachi, Pakistan [jamshed.arslan@sse.habib.edu.pk]

Ingredient labels disclose product components, but cannot establish whether environmental contaminants are present. Inspired by *Dark Waters* (2019), this proposal focuses on teenagers' ability to recognize the limits of consumer information when judging chemical exposure and health claims.

The film's account of industrial contamination will introduce PFOA, a persistent chemical classified as carcinogenic to humans. Scientific interpretation will distinguish PFOA from the polymer Polytetrafluoroethylene (PTFE), commonly associated with Teflon, and explain why unfamiliar ingredient

names do not establish toxicity. Discussion will connect chemical persistence with continuing exposure and the need for environmental monitoring. During a Bioscience in Cinema outreach session, participants will view a scene and inspect an everyday ingredient label, such as chewing gum packaging. They will separate statements supported by the label from questions requiring additional evidence, including chemical testing, environmental monitoring or manufacturing information. Facilitated discussion will connect these information gaps to community protection and transparent reporting. Identical questions administered before and after the activity will assess the ability to judge whether available information supports a chemical claim. The primary outcome will be paired change in correctly classified statements using a predefined key. This pilot examines immediate information literacy, linking personal curiosity with evidence needed for environmental accountability.

Keywords: PFOA, PTFE, Toxicity, Bioscience, Cinema, Literacy, Environment, Packaging

Abstract 53

Microclimate Disparities and Heat Vulnerability Indexing of Delhi, India

Prince Haristash, POP (Protect Out Planet) Movement, Delhi,
India [prince@thepopmovement.org]

Rapid urbanization and escalating global temperatures have intensified the urban heat island (UHI) effect, leading to localized microclimate extremes that threaten public health. However, thermal exposure is rarely uniform across the urban canopy; marginalized socioeconomic groups often reside in densely built, vegetation-poor neighborhoods, facing disproportionate levels of heat stress. This study investigates the intersection of physical microclimates and socioeconomic vulnerability within the hyper-dense urban matrix of the Delhi National Capital Region, an area characterized by severe seasonal heatwaves. Employing a mixed-methods spatial approach, the research utilizes high-resolution satellite thermal imagery (Landsat 8 and MODIS) to retrieve land surface temperature (LST) and land cover indices (e.g., NDVI, NDBI). These remote sensing metrics are integrated with ground-level demographic data—including income levels, housing typology, population density, and access to cooling infrastructure—using geographic information systems (GIS). By applying Principal Component Analysis (PCA) to these variables, the study constructs a high-resolution Heat Vulnerability Index (HVI). Preliminary modeling anticipates the identification of critical UHI “hotspots”

that strongly correlate with lower-income wards, highlighting a significant thermal inequity. The resulting HVI framework aims to move beyond broad city-level temperature averages to expose neighborhood-level microclimate disparities. Ultimately, the findings provide a data-driven foundation for municipal policymakers and urban planners to prioritize targeted climate adaptation strategies, such as localized Heat Action Plans (HAPs) and equitable deployment of blue-green infrastructure, in the most vulnerable communities.

Keywords: GIS, Heat Stress, HVI Framework, Hotspots, Urban Heat Island, Heat Action Plan, Microclimate, Socioeconomic, Vulnerability

Abstract 54

Endosome - Mitochondria “Kiss-and-Run” Iron Transfer: Potential Implications for Environmental Stress and Cancer

Benita Felicia, Abu Dhabi University, Abu Dhabi, United Arab Emirates, 1092507@students.adu.ac.ae

Tahura Khan, Abu Dhabi University, Abu Dhabi, United Arab Emirates, 1092712@students.adu.ac.ae

Fathima Dilfa, Abu Dhabi University, Abu Dhabi, United Arab Emirates, 1092731@students.adu.ac.ae

Zenab Aslam, Abu Dhabi University, Abu Dhabi, United Arab Emirates, 1094304@students.adu.ac.ae

Amel Hamdi*, Abu Dhabi University, Abu Dhabi, United Arab Emirates, amel.hamdi@adu.ac.ae

The disruption of iron and redox imbalance can impact cellular metabolism; hence, iron homeostasis is important for mitochondrial function and heme synthesis. These mechanisms may be disrupted by environmental stressors, characterizing a possible mechanistic connection to diseases linked to altered iron metabolism. The “kiss-and-run” hypothesis proposes that transferrin-containing endosomes transiently interact with mitochondria, allowing direct iron transfer through localized protein interactions. This mechanism enables iron delivery to the mitochondrial heme synthesis machinery without requiring diffusion through the cytosolic labile iron pool. In this study, flow cytometry, Fluorescence-Activated Cell Sorting (FACS), and Confocal microscopy with Co-localization analysis

were performed on reticulocyte lysates to investigate the kiss-and-run mechanism. Fluorescent labelling of mitochondria (MTDR) and endosomes (AGTf) enabled the identification of a double-labelled population corresponding to interacting organelles. Time-dependent co-localization was assessed, with transferrin specificity confirmed using Bovine Serum Albumin-Fluorescein Isothiocyanate (BSA-FITC) controls. Comparative analysis of Th3/+ erythrocyte cells showed altered organelle interactions compared to wild-type, indicating an association between disturbed iron handling and altered endosome-mitochondria interactions. These findings support a role for the “Kiss-and-Run” Pathway in mitochondrial iron utilization. The proposed mechanistic hypothesis is that environmental components may disrupt the endosome-mitochondria iron pathway, potentially affecting iron-dependent metabolism in cancer cells. This hypothesis requires further investigation, including possible downstream implications for ferroptosis.

Keywords: Iron metabolism, Endosome–mitochondria interaction, Environmental stress, Cancer metabolism, Ferroptosis.

Abstract 55

Population-Specific Distribution of Disease-Associated SNPs: Relevance to Skin Disease, Cancer Susceptibility, and Middle Eastern Populations

Shahd Absha, Abu Dhabi University, Abu Dhabi, United Arab Emirates [Shahdmohamed01a@gmail.com]

Meera Osama Al-Ayyash, Abu Dhabi University, Abu Dhabi, United Arab Emirates [Alayyashmeera@gmail.com]

Zubaida Ibrahim Alhamad, Abu Dhabi University, Abu Dhabi, United Arab Emirates [zubaida.alhamad@gmail.com]

Asmaa Abdulrahman, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1084851@alumni.adu.ac.ae]

Single-nucleotide Polymorphisms (SNPs), the most common form of human genetic variation, influence susceptibility to complex diseases, including cancer and skin disorders. Their distribution varies substantially among populations, affecting genetic risk interpretation and precision medicine. This study investigated population-specific distributions of SNPs associated with skin disease, pigmentation, inflammation, oxidative stress, Deoxyribonucleic acid (DNA) repair, and cancer susceptibility, emphasizing Middle Eastern populations. A comparative genomic approach used public data from the 1000 Genomes Project, Genome Aggregation Database (gnomAD), Ensembl, Database of Single Nucleotide Polymorphisms (dbSNP), ClinVar, and Genome-wide association study (GWAS) Catalog. Sixteen SNPs across fourteen genes were selected

based on published links to skin diseases and cancer-related traits. Allele frequencies and variant annotations were descriptively compared across African, European, East Asian, South Asian, and Middle Eastern populations. Marked population-specific differences occurred across all variants. Pigmentation-associated Melanocortin 1 receptor (MC1R), Tyrosinase (TYR), and Solute carrier family 24 member 5 (SLC24A5) variants differed substantially between European and non-European populations. Variants involved in inflammatory signaling (Interleukin 6 (IL6), Tumor necrosis factor (TNF)), antioxidant defense (Superoxide dismutase 2 (SOD2), Glutathione peroxidase 1 (GPX1), Catalase (CAT)), Deoxyribonucleic acid (DNA) repair (XPC, X-ray repair cross complementing 1 (XRCC1)), and skin barrier function (FLG) also showed distinct ancestry-related patterns. Middle Eastern populations frequently displayed intermediate or unique allele distributions, highlighting their genetic diversity and limitations of relying solely on European-derived reference datasets. These findings demonstrate that disease-associated SNP frequencies are strongly ancestry-dependent and require population-specific interpretation. Greater inclusion of Middle Eastern populations in genomic research is needed to improve variant classification, disease risk assessment, and equitable precision medicine. Expanding diverse genomic reference datasets will enhance the accuracy and clinical utility of genetic testing globally.

Abstract 55

Keywords: Single-nucleotide Polymorphisms, Population Genetics, Allele frequencies, Middle Eastern Populations, Skin Disease, Pigmentation, Cancer Susceptibility, Genetic Diversity, Variant Interpretation, Precision Medicine.

Abstract 56

miRNAs as Biomarkers for the Diagnosis of Colorectal Cancer

Abdalmalek Alnator, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1094487@students.adu.ac.ae]

Colorectal cancer (CRC) remains a relatively common, but fatal disease, being the third most common cancer worldwide in 2022. The survival rate of early-stage CRC is around 90.3%, which drops to 12.5% at advanced stages. Current diagnostic accuracy falls short at early stages, with stool tests such as the Fecal Immunochemical test (FIT) offering a non-invasive option though with limited sensitivity for precancerous lesions. Colonoscopy offers higher sensitivity for precancerous lesions but is invasive and has risks of complications such as perforation. MicroRNAs (miRNAs) present a novel biomarker-based diagnostic method. miRNAs are small, non-coding RNAs which are involved in gene regulation through interactions with mRNAs. Several miRNAs have been reported to be abnormally expressed in CRC, with miRNA-21-5p being heavily investigated for CRC detection. miRNAs have been shown to contribute to cancer progression or to act as tumor progressors, with some miRNAs contributing to cancer proliferation, invasion, and metastasis, while some contribute to apoptosis and inhibiting proliferation. Individual miRNAs, including miRNA-1290, miRNA-210, and miRNA-144, as well as miRNA panels which combine multiple miRNAs have shown promising sensitivity and specificity in studies on cell lines, as well as studies on

blood and stool samples. Further studies are needed to promote the integration of miRNAs in clinical settings to allow early and accurate diagnosis of CRC, promoting early intervention and better patient outcomes.

Keywords: Colorectal, Cancer, Tumor, RNA, Sensitivity, Progressors, Apoptosis, Specificity

Abstract 57

Youth-Centered Climate Policy for Psychological Resilience and Sustainable Green Transition

Ayesha Jabbar, University of Okara, Okara, Pakistan
[ayeshajabbar50@gmail.com]

Amina Muazzam, Lahore College for Women University Lahore,
Pakistan [amina.muazzam@lcwu.edu.pk]

Ali Hussain Kazim, University of Engineering and Technology,
Lahore, Pakistan [ali.h.kazim@uet.edu]

Sahar Zia, Lahore College for Women University, Lahore,
Pakistan [Sahar.zia@lcwu.edu.pk]

Climate change is becoming not only an environmental issue, but a mental health and behavioral one for youth. The current study aims to identify the relationship between climate change distress among emerging adults (aged 18-25) in Punjab, Pakistan, due to exposure to recurring smog and heatwaves events on psychological well-being, academic functioning and readiness to use sustainable green technologies, specifically electric vehicles (EVs). Drawing on a multi-phase mixed-methods PhD study, qualitative interviews first captured the lived experience of climate distress among university youth, which then followed a quantitative survey (N = 539) that investigated the effect of perceived psychological barriers and awareness of government green initiatives on the pathway from climate distress to green mobility adoption. Spatial Hotspot analysis also revealed eastern districts with high level of dis-

stress and low readiness for EV, namely Lahore and Gujranwala. Based on these insights, an Integrated Policy Framework for Youth-Centered Green Transition was created through expert consultation with the Delphi technique, involving environmental policy experts, psychologists, urban planners and automotive engineers. The framework that emerges suggests three equally interdependent pillars: psychological resilience support, behavioral transition incentives, and policy alignment with the Sustainable Development Goals and COP28 commitments. This work shows how youth mental health evidence can directly support actionable, community-driven climate policy, moving from barrier to catalyst for youth-led sustainable health and green transition solutions. The study provides a replicable framework for developing other climate-sensitive areas' green technology policy in a way that is psychologically informed and truly addresses young people's needs.

Keywords: Climate Change Distress, Youth Mental Health, Green Transition Policy, Electric Vehicle Adoption, Delphi Technique

Abstract 58

Sustainable Algae-Based Biofuel with Circular Economy Integration: A Literature Review

Emaan Danish, Earth Warriroz, Karachi, Pakistan [emaan@emaanzpeekaboo.org]

Fossil fuels are running up against their limits, and not just the geological kind. The environmental and economic costs of staying dependent on them have pushed researchers toward alternatives that can scale without repeating the same mistakes — and microalgae keep surfacing as one of the more credible candidates. They grow fast, need far less land than conventional crops, and pack enough lipid content to make biodiesel production genuinely viable. This paper works through the literature across four areas that, together, define whether algal biofuel can move from promising to practical: how microalgae are cultivated for lipid yield, how that lipid gets extracted without burning through energy budgets, how the leftover biomass fits into a circular, zero-waste system, and whether that leftover biomass actually works as aquaculture feed. Each of these four areas has its own solid research base. What's less common is a study that connects them, cultivation through to a feeding trial, in one loop. This review lays out that gap and argues it's worth closing.

Keywords: Microalgae cultivation, Lipid extraction, Circular bioeconomy, Aquaculture feed valorization, Algal biofuel

Abstract 59

Computational Kinetics Model of Micro- and Nanoplastics-Induced Cytotoxicity and Pre-Metastatic Niche Priming

Renad Abdeldaim, Abu Dhabi University, Abu Dhabi, United Arab Emirates [renad.abdeldaim@gmail.com]

Micro-and Nanoplastics (MNPs) are tiny plastic fragments (<5 mm) that can penetrate biological barriers and various tissues following inhalation or ingestion. Persistent particle stress may instead modify the host tissue environment, making a distant tissue more permissive to disseminated tumor cells through creating a pre-metastatic niche (PMN). While MNP and cancer dynamics are extensively studied, their role in altering distant tissue microenvironments to facilitate cancer metastasis remains unquantified; therefore, this study presents a nonlinear system of differential equations that models MNP-induced tissue conditioning that may contribute to a PMN-like, colonization-permissive microenvironment. The findings suggest that crossing an M2/M1 ratio of 30.82 triggers a dramatic acceleration in tissue receptivity. This transition satisfies a dual Michaelis-Menten saturation limit governed by co-dependent VEGF-driven microvascular permeability and CXCL12 chemotaxis. Three-dimensional surface mapping demonstrates that while low MNP doses of 1.0 require extended timelines to initiate colonization, a 5.0 dose acts as a temporal catalyst that can facilitate transition to a receptive niche state from 60 days down to under 15 days before reaching carrying

capacity saturation. This study mathematically highlights the tipping point where inflamed tissue transitions into a receptive PMN, providing a quantitative computational framework for exploring MNP exposure as a potential environmental modifier of metastatic susceptibility.

Keywords: Saturation, Computational, Environment, Susceptibility, Exposure, Metastasis, Permeability, Receptivity, Colonization

Abstract 60

Air Pollution Exposure and Cardiovascular-Cancer Risk Pathways: A Scoping Review and Youth-Led Clinical Monitoring Framework

Fathima Sameeha Karingkuttikal, Lovely Professional University, Punjab, India [sameehamhd@gmail.com]

Air pollutants such as PM_{2.5}, nitrogen oxides, and heavy metals are associated with vascular inflammation, oxidative stress, and endothelial dysfunction, increasing cardiovascular disease (CVD) and cancer risk. This dual risk remains understudied in youth, particularly in high-pollution regions, including the Middle East. This scoping review examines evidence linking environmental pollution with CVD and cancer, focusing on pathways linking PM_{2.5} and other pollutants to CVD and cancer, youth vulnerability, Middle East and North Africa (MENA) screening and prevention disparities, and gaps in clinical monitoring and early detection. Relevant epidemiological and biological evidence was synthesized, with emphasis on environmental exposure-related cardiovascular and cancer risks in youth and MENA populations. Long-term PM_{2.5} exposure is associated with approximately 32% higher cardiovascular mortality (Coleman et al., 2021), while cancer patients and survivors show 10-25% higher cardiopulmonary mortality risks. In the UAE, 68% of youth report concerns about local air quality (Zahra et al., 2015). Evidence also indicates increased respiratory disease burden near industrial areas.

MENA clinical practice lacks integrated protocols assessing cardiovascular and cancer risks associated with environmental exposure.

Using Cardiovascular Technology (CVT) principles, this review proposes accessible early cardiac screening for pollution exposed youth, student-led awareness, environmental risk assessment in CVT training, and stronger MENA air-quality and youth health policies. Integrating CVT with climate-health science may strengthen early prevention and protect vulnerable youth.

Keywords: Air Pollution Exposure, Environmental Health, Cardiovascular Disease, Cancer Risk Pathways, Youth Health, Cardiovascular Technology, Early Detection and Screening, Precision Prevention, Clinical Monitoring, Health Equity

Abstract 61

Evaluating a Subnational Heat Action Plan through a Labor Lens

Philo Magdalene Antony Samy, POP (Protect Our Planet) Movement, Delhi, India [philo@thepopmovement.org]

The state of Tamil Nadu has seen a steady rise in the number of heatwave days, ranking fifth in India and facing high to very high aggregated heat risk. On the frontlines of this exposure are informal workers who comprise 80-85 percent of the country's workforce. The study examines, at the state level, whether the Heat Action Plan of Tamil Nadu articulates labor arrangements and conceptualizes occupational safeguards against heat stress for its informal workforce. By doing a policy analysis of the 2026 State Heat Action Plan alongside secondary materials like labor department and public health directives and media reports, the study analyzes whether the needs of the informal workforce are featured adequately within the policy architecture and if labor arrangements and occupational protections are identified as places of interventions. The study is significant as it exposes institutional silos even within the heatwave action framework that risks marginalizing core labor concerns. By highlighting key structural gaps, the research underscores the urgent need for tailoring policy reforms that legally integrate heat adaptation strategies with existing state-level labor protection mechanisms such as the unorganized labor welfare boards. Ultimately, it seeks to provide, for policy-

makers, key worker-centric considerations that need to be foregrounded in climate resilience plans.

Keywords: Tamil Nadu, Heatwave, Climate, Resilience, Labor, India, Policy-maker, Adaptation

Abstract 62

Bridging the Care Gap: Assessing Guideline Adherence in Severe Acute Malnutrition Management in Northern Ethiopia

Ezra Girmay, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [ezra.fantahun@mu.edu.et]

Nebyat Teklehaymanot, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [nebeyattekle120@gmail.com]

Kibrom Hailu, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [kbromhailu09@gmail.com]

Hailemariam Gebrearegay, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [Hailemariam.gebrearegay@mu.edu.et]

Abraha Gebreegziabher, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [abraha.gebreegziabher@mu.edu.et]

Mengistu Hagazi, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [mengistu.hagazi@mu.edu.et]

Mohamedawel Mohamednigus, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [mohamedawel@gmail.com]

Zeray Marru, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [zeraymarru@gmail.com]

Kassahun Equar, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [equarkassahun@gmail.com]

Haftu Hailu, Mekelle University, Ayder Comprehensive Specialized Hospital Mekelle/Tigray, Ethiopia [haftu.hailu@mu.edu.et]

Severe acute malnutrition (SAM) remains a major cause of morbidity and mortality among children under five. Despite established national guidelines, evidence on their implementation in Northern Ethiopia is limited. This study assessed adherence to SAM management guidelines and treatment outcomes at a tertiary hospital. A retrospective cross-sectional study was conducted at Ayder Comprehensive Specialized Hospital, Mekelle, Ethiopia. Medical records of children aged 0–59 months admitted with SAM from September 2023 to September 2025 were reviewed. A standardized checklist adapted from the Ethiopian Hospital Clinical Audit Guide assessed adherence across clinical assessment, treatment, monitoring, rehabilitation, and discharge care. Descriptive statistics were used. Among 230 eligible records, overall adherence to recommended standards was 64.6%. Adherence was high for weight-based nutritional management (100%), complication management (99.6%), first-line antibiotic administration (98.7%), and appropriate treatment (100%). However, important gaps were identified in monitoring and rehabilitation. Appropriate clinical monitoring was documented in 48.8% of cases, while complete multi-chart follow-up occurred in only 3.5%. Iron supplementation during

phase 2 was provided in 54.1% of eligible children and deworming in 26.1%. Mean hospital stay was 10.05 days. Overall, 77.9% had good treatment outcomes, while 22.1% had poor outcomes, including death, default, or non-recovery. Guideline adherence was moderate, with strong implementation of essential initial treatment but substantial gaps in monitoring, documentation, and rehabilitation care. Targeted quality-improvement interventions, staff training, standardized documentation, and supportive supervision are needed to improve adherence and treatment outcomes.

Keywords: Severe acute malnutrition; Guideline adherence; Quality of care; Ethiopia

Abstract 63

A Forgotten Killer: Rheumatic Mitral Stenosis Mortality in Ethiopian Children

Ezra Girmay, Mekelle University, Ayder Comprehensive Specialized Hospital, Mekelle/Tigray, Ethiopia [ezra.fantahun@mu.edu.et]

Zeray Marru, Mekelle University, Ayder Comprehensive Specialized Hospital, Mekelle/Tigray, Ethiopia [zeraymarru@gmail.com]

Alemseged Birhane, Mekelle University, Ayder Comprehensive Specialized Hospital, Mekelle/Tigray, Ethiopia [nayalem10@gmail.com]

Mohammed Mustefa, Mekelle University, Ayder Comprehensive Specialized Hospital, Mekelle/Tigray, Ethiopia [mmustefa6@gmail.com]

Yonas Moges, Mekelle University, Ayder Comprehensive Specialized Hospital, Mekelle/Tigray, Ethiopia [yomaman4444@gamil.com]

Rheumatic heart disease remains a neglected cause of cardiovascular morbidity and mortality among children in sub-Saharan Africa. Rheumatic mitral stenosis (MS) may progress to advanced heart failure and fatal complications, particularly where definitive cardiac intervention is limited. We assessed the burden of complications, mortality, and predictors of death among children with rheumatic MS in northern Ethiopia. We conducted a five-year retrospective hospital-based study at

Ayder Comprehensive Specialized Hospital, Ethiopia. Medical records of 98 children with rheumatic MS were reviewed. Demographic, clinical, nutritional, echocardiographic, complication, and outcome data were collected. Logistic regression analysis was performed to identify independent predictors of mortality. The mean age at diagnosis was 13.7 ± 3.0 years, and 60.2% had severe MS. Heart failure was present in 84.7%, while 81.3% had a high probability of pulmonary hypertension. Atrial fibrillation occurred in 9.2%, left atrial thrombus in 5.1%, embolism in 4.0%, infective endocarditis in 9.2%, and cardiogenic shock in 11.2%. All patients with cardiogenic shock died. Overall mortality was 16.3%, with cardiogenic shock accounting for 68.6% of deaths. Multivariable analysis identified atrial fibrillation (adjusted odds ratio [AOR] 10.5, 95% confidence interval [CI] 1.7–63.8; $p=0.011$), peripheral edema (AOR 8.0, 95% CI 2.0–32.8; $p=0.004$), and infective endocarditis (AOR 7.6, 95% CI 1.2–46.8; $p=0.029$) as independent predictors of mortality. Pediatric rheumatic MS remains a potentially fatal but neglected cardiovascular disease. Mortality was substantial and strongly associated with advanced complications. Atrial fibrillation, peripheral edema, and infective endocarditis identify children at increased risk of death. Earlier diagnosis, prevention of complications, timely referral, and improved access to definitive valve intervention are urgently needed.

Keywords: Rheumatic heart disease; Mitral stenosis; Mortality; Ethiopia

Abstract 64

Precision Modulation of the Gut Microbiome Through Ketogenic Dietary Strategies: Implications for Sustainable Cancer Prevention

Sirisha Nuti, Department of Biotechnology, Birla Institute of Technology and Science, Pilani, Dubai Campus, Dubai International Academic City, Dubai, United Arab Emirates [p20200900@dubai.bits-pilani.ac.in]

Suresh Kumar, Department of Pharmacology, Ras Al Khaimah College of Medical Sciences, Ras Al Khaimah Medical and Health Sciences University, Ras Al Khaimah, United Arab Emirates [suresh@rakmhsu.ac.ae]

Ramachandran Subramanian, Department of Biotechnology, Birla Institute of Technology and Science, Pilani, Dubai Campus, Dubai International Academic City, Dubai, United Arab Emirates [sramachandran@dubai.bits-pilani.ac.in]

The increasing burden of cancer has encouraged interest in prevention strategies integrating nutrition, host metabolism, and the gut microbiome. The ketogenic diet (KD), high in fat, moderate in protein, and very low in carbohydrates, induces nutritional ketosis and alters cellular energy metabolism in ways that may influence tumor initiation and progression. By reducing carbohydrate intake, KD may affect glucose-dependent pathways, including those linked to the Warburg effect, while also lowering insulin and insulin-like growth factor-1, which contribute to pro-tumorigenic signaling. The

gut microbiome may be an important mediator of these effects. Carbohydrate restriction changes nutrient availability for intestinal microbes and may influence gut barrier function, inflammation, and microbial metabolite production. Some studies suggest that KD-related anticancer effects may depend partly on altered microbial activity rather than ketone bodies alone. Fecal microbiota transplantation studies in germ-free mice have shown that microbiome-related functions can contribute to anticancer effects in colorectal cancer models. Sustainability is also important for long-term prevention. Conventional ketogenic diets are often high in fat and low in fermentable fiber, which may affect adherence, microbial diversity, and function. Future research should therefore explore plant-forward, fiber-conscious ketogenic or low-carbohydrate diets that retain metabolic benefits while supporting gut health and reducing environmental concerns. Integrating microbiome science, metabolomics, and personalized nutrition may support more targeted and sustainable cancer prevention. Overall, microbiome-informed ketogenic approaches warrant further investigation, but longitudinal clinical studies are needed to establish long-term efficacy, safety, and feasibility.

Keywords: Ketogenic Diet, Cancer Prevention, Gut Microbiome, Nutritional Ketosis, Metabolic Reprogramming, Metabolomics, Personalized Nutrition

Abstract 65

Climate Change and Global Cancer Burden

Nishat Tasnim, Abu Dhabi University; Duaa Sulaiman, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1091298@students.adu.ac.ae]

Over the past few years, climate change has become one of the leading public health challenges globally, as it is associated with the risks of certain cancers. Although it does not cause cancer directly, environmental factors such as air pollution, increased Ultraviolet radiation, rising temperatures, and wildfires have all been associated with increased exposure to toxic pollutants and carcinogens, which may damage the deoxyribonucleic acid of an individual and make them more susceptible to cancer. According to reports by the World Health Organization, in the year 2022, approximately 20 million individuals were diagnosed with cancer, with around 9.7 million deaths occurring, making cancer one of the biggest global health concerns. Despite the increasing risk, there are certain preventive measures that could be taken such as wearing protective clothing, reducing air pollution, and doing frequent cancer screening to help reduce the risks of cancer.

Keywords: Climate Change, Cancer, Toxic pollutants, Carcinogens, Ultraviolet radiation, DNA damage

Abstract 66

CancerGuardians: A Youth-Lead Community Ambassador Network for Cancer Prevention and Sustainable Health

Suhaila Fares Albert Saldana, Abu Dhabi University, Abu Dhabi,
United Arab Emirates [suhailasaldana@gmail.com]

Zoya Hussain, The British School Al Khubaira

Cancer is still a major challenge for global health, with many risk factors influenced by preventable lifestyle and environmental factors. While young people have a significant potential to contribute to public health and social change, they remain underrepresented in cancer prevention and health policy initiatives. CancerGuardians proposes a youth-lead community ambassador network that transforms students and young leaders from passive recipients of health information into active participants in cancer prevention, community research, and policy advocacy. The initiative aims to establish a network of trained Youth Cancer Prevention Ambassadors across schools and universities. Through peer education, community outreach, citizen science, and evidence-based health promotion needs which encourages healthier and more sustainable lifestyles. A key component is community cancer risk mapping, in which youth volunteers collect and assess information related to tobacco exposure, dietary habits, physical activity opportunities, environmental pollution, access to preventive healthcare, and cancer awareness. These community-derived findings can then be translated into targeted recommendations

for healthcare professionals, community organization, and policymakers. CancerGuardians further introduces a Youth-to-Policy Pipeline, enabling young participants to transform community findings into policy briefs and communicate recommendations to public health stakeholders. This approach connects knowledge generation with community action and decision-making while strengthening health literacy, leadership, and civic engagement. By integrating youth leadership, citizen science, community mobilization, and policy engagement, CancerGuardians presents a scalable and sustainable approach to cancer prevention.

Keywords: Cancer, Healthcare, Preventive, Sustainable, Science, Leadership, Mobilization, Policy Engagement

Abstract 67

Epigenetic Regulation of NY-ESO-1 as a Potential Link Between Environmental Exposures and Breast and Ovarian Cancer

Suhaila Fares Albert Saldana, Abu Dhabi University, Abu Dhabi,
United Arab Emirates [suhailasaldana@gmail.com]

Afsheen Raza, Abu Dhabi University, Abu Dhabi, United Arab
Emirates

Sarah Nassor Al-Harthy, Abu Dhabi University, Abu Dhabi,
United Arab Emirates

Maha Hachem Aldahabi, Abu Dhabi University, Abu Dhabi,
United Arab Emirates

Naqaa Mohammad Nematullah, Abu Dhabi University, Abu
Dhabi, United Arab Emirates

Environmental exposures are increasingly recognized as potential contributors to cancer development, particularly through their capacity to alter cellular and epigenetic processes. Endocrine-disrupting chemicals, air pollutants, pesticides, heavy metals, and other environmental toxicants have been investigated in relation to breast and ovarian cancer, with growing evidence suggesting that some exposures can influence DNA methylation, histone modification, and chromatin regulation. These environmentally responsive epigenetic mechanisms provide a potential biological pathway through which exposures occurring across the life course may contribute to cancer susceptibility and progression.

NY-ESO-1 (CTAG1B) is a highly immunogenic cancer-testis antigen that is normally silenced in most healthy somatic tissues but becomes aberrantly expressed in several malignancies, including subsets of breast and ovarian cancers. Its expression is strongly influenced by epigenetic regulation, particularly DNA methylation, alongside histone modifications and other chromatin-regulatory mechanisms. Loss of normal epigenetic repression during tumorigenesis can therefore permit NY-ESO-1 expression, making it both a marker of epigenetic dysregulation and a potential target for cancer immunotherapy. These observations suggest an intriguing connection between environmental exposures and NY-ESO-1. Environmental factors capable of disrupting DNA methylation or histone regulation may contribute to the epigenetic conditions that permit aberrant expression of cancer-testis antigens such as NY-ESO-1. Although direct evidence demonstrating that specific environmental exposures induce NY-ESO-1 expression remains limited, findings from breast and ovarian cancer research support investigation of this potential relationship. NY-ESO-1 may therefore provide a useful molecular link for exploring how environmentally responsive epigenetic changes intersect with cancer development and tumor immunity.

Keywords: Susceptibility, Cancer, Immunity, Toxic, Epigenetic, Methylation, Environment

Abstract 68

Cancer-Relevant Biological Mechanisms Associated with Environmentally Weathered Microplastics: A Scoping Review

Dani Al Ashkar, Abu Dhabi University, Abu Dhabi, United Arab Emirates [1105857@students.adu.ac.ae]

Joe Ponnezhan, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Ayesha Alhosani, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Shahd Abousaab, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Maya Mansour, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Mahmoud Ali, Abu Dhabi University, Abu Dhabi, United Arab Emirates

Microplastics and nanoplastics are ubiquitous contaminants increasingly linked to cancer-relevant mechanisms, including oxidative stress, DNA damage, chronic inflammation, and disrupted signaling. However, most toxicological evidence derives from pristine, laboratory-manufactured particles that do not reflect microplastics as they exist in the environment. Weathering, including UV photo-oxidation, mechanical abrasion, and biological/thermal aging, alters particle surface chemistry and reactivity in ways underrepresented in cancer research. This scoping review, per the PRISMA-ScR framework, mapped existing evidence on cancer-relevant mechanisms

associated with environmentally weathered microplastics. Four databases (PubMed, Embase, Scopus, Google Scholar) were searched, yielding 187 records. After deduplication, title-abstract screening by two reviewers identified 51 records for full-text review; a second reviewer pair then assessed these, yielding 16 sources for inclusion. Across studies comparing weathered and pristine particles, weathered microplastics consistently produced greater reactive oxygen species generation, elevated DNA damage and genotoxicity, and amplified inflammatory responses (including IL-6 upregulation and inflammasome activation) relative to pristine controls, across breast, colonic, pulmonary, renal, and immune/microglial cell models. Weathered particles also showed enhanced capacity to sorb and transport co-contaminant carcinogens across membranes, consistent with a Trojan horse toxicity mechanism. Critical gaps emerged: photo-oxidation dominates the literature while mechanical and biological aging remain understudied, and most evidence comes from non-cancerous models used as proxies for cancer pathways, with few studies applying weathered particles directly to cancer cell lines. These findings support reorienting microplastic cancer toxicology toward environmentally realistic, standardized, cancer-model-specific exposure paradigms.

Keywords: Cancer, Toxicity, Pulmonary, Breast, Cell, Microplastics, DNA, PRISMA

Abstract 69

Design, Synthesis, and Antimicrobial Evaluation of New Fluoro-Formazan Derivatives

Sanjiwani Waghmare, Sanjiwani [waghmaresanjiwani2004@gmail.com]

Monika Dudhare, Digambarrao Bindu College, Bhokar District Nanded, Maharashtra, India

Gajanan Kottapalle, Digambarrao Bindu College, Bhokar District Nanded, Maharashtra, India

A series of fluoro-substituted formazan derivatives was synthesized through the coupling reaction of diazonium chloride salts with fluoro-substituted Schiff bases in pyridine medium. The structures of the newly synthesized formazan derivatives were characterized and confirmed by spectroscopic techniques, including IR, ¹H NMR, and mass spectrometry. The synthesized compounds were subsequently evaluated for their antimicrobial activity against a range of pathogenic bacterial and fungal strains. Several of the synthesized formazan derivatives exhibited significant antimicrobial activity, with some compounds showing activity comparable to or even better than that of the standard drugs against the tested bacterial and fungal pathogens. These findings indicate that the synthesized fluoro-substituted formazan derivatives may serve as promising candidates for further investigation as potential antimicrobial agents.

Proceedings for ADU Symposium

Keywords: Spectrometry, Antimicrobial, Fungal, Bacterial, Pathogens, Agents

Abstract 70

Efficient Microwave-Assisted Synthesis of Hydroxy Chalcones and In-Vitro Evaluation of Their Biological Activities

Pranali Deshmukh, Digambarrao Mahavidya Bhokar District, Nanded, Maharashtra, India [deshmukh86847@gmail.com]

Narayan Karpe, Digambarrao Bindu College, Bhokar District Nanded, Maharashtra, India

Gajanan Kottapalle, Digambarrao Bindu College, Bhokar District Nanded, Maharashtra, India

A series of novel hydroxyl chalcone derivatives (1a-1e) was synthesized via Claisen–Schmidt condensation of an aromatic hydroxy ketone with various substituted aromatic aldehydes under microwave irradiation. The structures of the synthesized compounds were elucidated and confirmed using appropriate spectroscopic techniques. The synthesized chalcone derivatives were subsequently evaluated for their in vitro antioxidant and cytotoxic activities. Most of the synthesized compounds exhibited significant antioxidant and cytotoxic activities, with several derivatives demonstrating promising potency. These findings suggest that the newly synthesized hydroxyl chalcones may serve as potential candidate for further investigation as biologically active compounds.

Keywords: Microwave, Hydroxyl, Spectroscopic, Antioxidant, Potency, Aromatic

Abstract 71

One Pot Multicomponent Synthesis Of 1,4-DHP Derivatives

Sachin Tiwade, Department of Chemistry, Digambarrao Bindu ACS College, Bhokar District Nanded, Maharashtra, India [sachintiwade7@gmail.com]

Muktai Jadhav, Digambarrao Bindu ACS College, Bhokar District Nanded, Maharashtra, India

1,4-Dihydropyridines (1,4-DHPs) are key chemical compounds that are used in medicinal and pharmaceutical research. In this simple study an eco-friendly method was used to prepare various 1,4-DHP derivatives. Those compounds were prepared by a one-pot multicomponent reaction and in which all the starting materials were added. Then those reacted together in a single step. This reaction was performed at room temperature without using any solvent. Different 1,3-dicarbonyl compounds were reacted with aldehyde compounds and mainly 5-bromothiophene-2-carboxaldehyde, and ammonium acetate. Ceric ammonium nitrate (CAN) was used as a catalyst to support the reaction. The Hantzsch reaction was completed in a short time and gave good to excellent amounts of the required products. The prepared compounds were tested for their antibacterial and antifungal activities. Nearly all of compounds showed useful biological activity. One compound among them showed excellent antifungal activity against *Candida Albicans* when it was compared with the standard drug griseofulvin. The prepared compounds were tested for their effect on breast

Abstract 71

cancer cells later. This method is easy and fast, does not require a solvent, and gives good yields. It is useful for preparing new 1,4-DHP compounds for additional biological studies.

Keywords: One-pot Synthesis, Multicomponent Reaction, 1,4-Dihydropyridines, Hantzsch Reaction, Cancer Cells.

Abstract 72

“Synthesis of Dihydropyrimidinones Without Any Solvent”

Payal Ingole, DB ACS College Bhokar, Department of Chemistry,
District Nanded, Maharashtra, India [payalingole5@gmail.
com]

Dihydropyrimidinones are an important class of nitrogen-containing heterocyclic compounds that have attracted considerable interest in organic and medicinal chemistry because of their diverse biological and pharmacological properties. The development of simple, efficient, economical, and environmentally friendly methods for their synthesis is an important area of modern organic chemistry. The present study focuses on the synthesis of dihydropyrimidinones without using any solvent. Conventional organic synthesis generally involves the use of solvents to dissolve reactants and facilitate chemical reactions. However, the use of organic solvents can lead to environmental pollution, waste generation, toxicity, and additional purification steps. Therefore, solvent-free synthesis has become an attractive approach in green chemistry. In the present work, suitable starting materials are subjected to appropriate reaction conditions in the absence of any external solvent to obtain the desired dihydropyrimidinone derivative. The reaction is carried out under suitable conditions, and the progress of the reaction is monitored by an appropriate technique. After completion, the product is isolated and purified using a suitable procedure. The synthesized compound is char-

acterized by appropriate analytical methods to confirm its formation.

The solvent-free method offers several advantages, including reduced solvent consumption, minimum waste generation, simple handling, and reduced environmental impact. It also makes the synthetic process more economical and supports the principles of green chemistry. Thus, the present study demonstrates a simple, efficient, and environmentally friendly approach for the synthesis of dihydropyrimidinones without using any solvent and highlights the importance of greener methods in modern organic synthesis.

Keywords: Organic, Economical, Toxicity, Environment, Solvent, Consumption, Synthesis

Abstract 73

Synthesis of Nickel Complex from Schiff Base

Omkar Bhandarwad, Digambarrao Bindu College, Bhokar District Nanded, Maharashtra, India [obhandarwad@gmail.com]

Arati Narwade, Digambarrao Bindu College, Bhokar District Nanded, Maharashtra, India

The present work focuses on the synthesis and characterization of nickel complexes derived from Schiff base ligands. Schiff bases containing the characteristic azomethine (C=N) group were prepared by the condensation of suitable aldehydes with primary amines under appropriate reaction conditions. The synthesized Schiff bases were subsequently treated with nickel chloride in alcoholic medium to obtain the corresponding nickel complexes. The reaction mixtures were refluxed for 6–8 hours, and the resulting precipitated complexes were filtered and dried. The synthesized Schiff bases and their nickel complexes were characterized using spectroscopic techniques, particularly IR and ^1H NMR spectroscopy. The study demonstrates the coordination ability of Schiff base ligands toward nickel ions and the formation of stable coordination complexes. The investigation provides useful information regarding the synthesis and characterization of nickel–Schiff base complexes and their significance in coordination chemistry.

Abstract 73

Keywords: Schiff Base, Nickel Complex, Nickel (II), Azomethine, Coordination Chemistry, Nickel Chloride, IR Spectroscopy, ^1H NMR

Abstract 74

Design, Synthesis and Biological Activities of Chalcone Derivatives Containing Pyrazoline

Pratiksha Jadhav, Digambarrao Bindu College, Bhokar District
Nanded, Maharashtra, India [jpratiksha392@gmail.com]

Arati Narwade, Digambarrao Bindu College, Bhokar District
Nanded, Maharashtra, India

The present work focuses on the design, synthesis and biological evaluation of chalcone derivatives containing pyrazoline moieties. Substituted pyrazolines were synthesized by the cyclization of suitable chalcones with hydrazine hydrate under reflux conditions. The reaction was carried out in alcoholic medium, followed by cooling, filtration, washing, drying and recrystallization to obtain the desired pyrazoline derivatives. The synthesized compounds were characterized by IR, ^1H NMR and mass spectroscopic techniques. The spectral data supported the formation of the pyrazoline ring and the presence of characteristic functional groups. The synthesized compounds were further evaluated for their antimicrobial and antifungal activities. The biological screening showed that the synthesized pyrazoline derivatives exhibited varying degrees of activity against the tested microorganisms. The study demonstrates the significance of chalcone-derived pyrazoline compounds as potential biologically active heterocyclic molecules.

Abstract 74

Keywords: Chalcone, Pyrazoline, Hydrazine Hydrate, Heterocyclic Compounds, Synthesis, IR Spectroscopy, ^1H NMR, Mass Spectroscopy, Antimicrobial activity, Antifungal activity

Abstract 75

Synthesis Of Different Metal Complex from Schiff Base

Pavanraje Gaikwad, Digambarrao Bindu Arts, Commerce and Science College, Bhokar District Nanded, Maharashtra, India
[pavanrajegaikwad007@gmail.com]

Arati Narwade, Digambarrao Bindu Arts, Commerce and Science College Bhokar District Nanded, Maharashtra, India

The present work focuses on the synthesis and characterization of Schiff base ligands and their metal complexes. Schiff bases containing the azomethine (C=N) group were prepared by condensation of selected aromatic aldehydes with 1-naphthylamine in alcoholic medium. The synthesized Schiff bases were subsequently reacted with selected metal salts to obtain metal complexes of cadmium (II), cobalt (II), and copper (II). The synthesized compounds were characterized by IR, ^1H NMR, mass spectral and elemental analysis techniques. The products were obtained in satisfactory yields. The study demonstrates the ability of Schiff bases to coordinate with metal ions and form stable metal complexes, highlighting their importance in coordination chemistry.

Keywords: Schiff Base, Azomethine, Metal Complexes, Coordination Chemistry, 1-Naphthylamine, Copper (II), Cobalt (II), Cadmium (II), IR, ^1H NMR

Abstract 76

Synthesis of Manganese Complex from Schiff Base

Vivek Birgale, Digambarrao Bindu College, Bhokar District
Nanded, Maharashtra, India [Vivekbirgale2@gmail.com]

Arati Narwade, Digambarrao Bindu College, Bhokar District
Nanded, Maharashtra, India

The present work focuses on the synthesis and characterization of manganese complexes derived from Schiff base ligands. Schiff bases containing the characteristic azomethine (C=N) group were prepared by the condensation of suitable aldehydes with primary amines under appropriate reaction conditions. The synthesized Schiff bases were subsequently reacted with manganese chloride tetrahydrate ($\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$) in an alcoholic medium to obtain the corresponding manganese complexes. The reaction mixtures were refluxed for 6–8 hours, and the resulting complexes were isolated by filtration and drying. The synthesized Schiff bases and manganese complexes were studied using spectroscopic techniques, particularly IR and ^1H NMR spectroscopy. The results indicate the formation of coordination complexes through suitable donor sites of the Schiff base ligands. The study highlights the importance of Schiff bases as coordinating ligands and their ability to form stable manganese complexes of potential interest in coordination chemistry.

Keywords: Schiff Base, Manganese Complex, Manganese Chloride, Azomethine, Coordination Chemistry, Mn (II), IR Spectroscopy, ^1H NMR

Abstract 77

Synthesis of Metal Complex from Schiff Base

Shivaji Shinde, Digambrrao Bindu Arts Commerce and Science College Bhokar District Nanded, Maharashtra, India
[shindeshivaji1995@gmail.com]

Arati Narwade, Digambrrao Bindu Arts Commerce and Science College Bhokar District Nanded, Maharashtra, India

The present work focuses on the synthesis and characterization of Schiff bases and their metal complexes. Schiff base ligands were prepared by the condensation of selected aldehydes with primary aromatic amines in alcoholic medium under suitable reaction conditions. The synthesized Schiff bases were subsequently reacted with metal salts to prepare their corresponding metal complexes of Co (II), Cu (II), and Fe (II). The synthesized compounds were isolated, purified and characterized using spectroscopic techniques such as IR and ^1H NMR. The study demonstrates the ability of Schiff bases to coordinate with metal ions through suitable donor sites and form stable coordination complexes. The obtained results indicate the importance of Schiff bases and their metal complexes in coordination chemistry and provide a basis for further investigation of their physicochemical and potential biological properties.

Keywords: Schiff Base, Metal Complexes, Coordination Chemistry, Co (II), Cu (II), Fe (II), Azomethine, IR Spectroscopy, ^1H NMR

Abstract 78

Synthesis And Antimicrobial Investigation of Novel 1,3,5-Dithiazins Heterocycles

Omkar Deshmukh, Digambarrao Bindu College, Bhokar District
Nanded, Maharashtra, India [omkardeshmukh2019@gmail.
com]

The present work focuses on the synthesis and antimicrobial investigation of novel 1,3,5-dithiazine heterocyclic compounds. The synthesized heterocyclic derivatives were prepared by suitable synthetic methods and purified by conventional techniques. The synthesized compounds were characterized using appropriate spectroscopic techniques to confirm their structures and functional groups. The biological potential of the synthesized compounds was investigated by evaluating their antimicrobial activity against selected microorganisms. The study indicates that 1,3,5-dithiazine derivatives possess promising biological properties and may serve as useful heterocyclic compounds for further investigation. The present work highlights the importance of 1,3,5-dithiazine heterocycles in synthetic and medicinal chemistry.

Keywords: 1,3,5-Dithiazine, Heterocyclic Compounds, Synthesis, Sulfur-containing Heterocycles, Antimicrobial activity, Biological evaluation, Spectroscopic characterization

Abstract 79

Preparation of 2-Acetyl-4-chlorophenyl Acetate (1-I) by Schotten–Baumann Esterification

Arati Narwade, Digambarrao Bindu College, Bhokar District
Nanded, Maharashtra, India [aratinarwade4697@gmail.com]

2-Acetyl-4-chlorophenyl acetate (1-I) was prepared by the Schotten–Baumann esterification of 5-chloro-2-hydroxyacetophenone with benzoyl chloride under alkaline conditions. The reaction mixture was vigorously shaken at room temperature for 30 minutes, followed by filtration, washing and recrystallization from ethanol. The synthesized compound was obtained as a white crystalline solid in 78% yield, with a melting point of 52°C. The compound was characterized by its physical properties, solubility, neutral ferric chloride test and thin-layer chromatography. The absence of coloration with neutral FeCl_3 confirmed the absence of free phenolic –OH. The molecular formula was reported as $\text{C}_{15}\text{H}_{11}\text{ClO}_3$, with elemental analysis values closely matching the calculated composition. The results demonstrate the successful preparation of the esterified product under Schotten–Baumann conditions.

Keywords: Schotten–Baumann Esterification, 2-Acetyl-4-Chlorophenyl Acetate, 5-Chloro-2-Hydroxyacetophenone, Benzoyl Chloride, Esterification, Characterization

Abstract 80

One-pot Multi-component Synthesis of Pyrazolo [3,4-b] pyridine and Pyridodipyrimidine Ammonium Acetate

Swapnali Govande, Digambarro Bindu Art, Commerce and Science College Bhokar, District Nanded, Maharashtra, India [swapnaligovande98@gmail.com]

A simple, efficient, and environmentally friendly one-pot multicomponent synthesis of Pyrazolo[3,4-b] pyridine and Pyridodipyrimidine derivatives has been developed using ammonium acetate as an inexpensive and efficient catalyst. The proposed methodology involves the convenient coupling of readily available starting materials under mild reaction conditions, providing a rapid route to structurally diverse nitrogen-containing heterocycles. Ammonium Acetate promotes the multicomponent transformation effectively, leading to good to excellent product yields with short reaction times. The one-pot protocol minimizes purification steps, solvent consumption, and waste generation, making it attractive from the perspective of green and sustainable chemistry. A range of substituted substrates was investigated to examine. The synthesized heterocyclic compounds were characterized using standard spectroscopic techniques, including infrared spectroscopy, nuclear magnetic resonance spectroscopy, and mass spectrometry. The operational simplicity, low catalyst cost, readily available reagents, high efficiency, and reduced environmental impact are the major advantages.

Proceedings for ADU Symposium

Keywords: Spectroscopy, Nuclear, Magnetic, Environment,
Sustainable, Synthesis, Substrates

Abstract 81

Biological Evaluation of Composite Biopolymer Films for Antimicrobial Activity and Soil Biodegradation

Deepak Bhusare, Digambarrao Bindu ACS College, Bhokar, District Nanded, Maharashtra, India [bhusaredu@gmail.com]

The extensive use of synthetic plastics has contributed significantly to environmental pollution and has created an urgent need for sustainable and biodegradable alternatives. In recent years, considerable research has focused on the development of biodegradable bioplastics and biopolymers derived from renewable and environmentally friendly materials. The present study aimed to develop and biologically evaluate biodegradable biopolymer films prepared using Polyhydroxybutyrate (PHB), Soy Protein, and a combination of PHB and Soy Protein. PHB and Soy Protein films were prepared separately, while a combined biopolymer film was developed by incorporating PHB and Soy protein with agar-agar as a binder and glycerol as a plasticizer. The optimized formulation of the combined biopolymer film consisted of 1% PHB/L, 0.5% soy protein/L, 1.6% agar-agar/L, and 1.2% glycerol/L, with alkaline deionized water adjusted to pH 10 ± 0.5 and a final volume of 100 mL. The prepared films were biologically characterized by antimicrobial activity and soil burial degradation studies. The antimicrobial activity assay demonstrated that the developed biopolymer films exhibited antimicrobial activity against selected bacterial and fungal

strains, indicating their potential for applications where microbial resistance is desirable. Soil burial studies were conducted for a two-month incubation period to evaluate the biodegradation behavior of the films. After the incubation period, PHB, Soy Protein, and combined biopolymer films exhibited 44%, 84%, and 77% degradation, respectively. The combined biopolymer film demonstrated substantially higher biodegradation than PHB alone while maintaining considerable degradation compared with Soy Protein. These findings indicate that the PHB and Soy Protein based composite has promising potential as an environmentally friendly and biodegradable alternative to conventional synthetic plastic materials.

Keywords: Halophilic Microorganisms, PHB, Soy Protein, Biopolymer, Glycerol, Agar-agar, Biodegradation

Abstract 82

Effect of Some Plant Products of *Azadirachta Indica* and *Zingibare Officinale* on The Control of Adult Lesser Grain Borer “*Rhyzopertha Dominica*”

Anuja Kamble, Digambarrao Bindu College Bhokar, Nanded, Maharashtra, India [anujak@dbcbhokar.edu.in]

Arvind Chavhan Digambarrao Bindu College Bhokar, Nanded, Maharashtra, India

The lesser grain borer, *Rhyzopertha Dominica* (Fabr) is an important insect pest of stored cereal in the world. The powder and extracts of *Azadirachta Indica* and *Zingibare Officinale* were bioassayed for their insecticidal potential against the lesser grain borer *Rhyzopertha Dominica*. The powders were applied at rates 1.5, 2.0, 3.0, 5.0/ 20 gram of wheat grains. The extracts of the plants were also applied at rates 1%, 2%, 3%, 4% per 20g of wheat grains. The results obtained show that adult mortality of *Rhyzopertha Dominica* increased as concentration of powders and extracts increased. The result obtained from this study justified that powders and extracts of *Azadirachta Indica* (L) and *Zingibare Officinale* (Rhizome) can be used as biopesticides against *R. Dominica*. The two plants are of medicinal values, Biodegradable, readily available and poses no danger to man and other mammals. The experiment was carried out under controlled laboratory conditions using different concentrations of plant extracts and powders for mortality assay, data was collected after 24, 48, 72

Hr of treatment with plant extracts and powders. The results revealed that both plant extracts and plant powder exhibited considerable bioactivity against *R. Dominica*. Among the treatments *A.Indica* demonstrated higher toxicity and repellency compared to *Zingiber Officinale*.

Keywords: Biopesticides, *Rhyzopertha Dominica*, *Azadirachta Indica*, *Zingibar Officinale*, Eco-friendly Pest Management, Stored Grain Pest

Abstract 83

Nano-Enabled Digital Health Technologies for Early Cancer Risk Detection and Prevention: An Emerging Framework for Environmental Exposure Monitoring

Samha Mohammed, Organization, Punjab, India [samhahmhd@gmail.com]

Air pollution, heavy metals, volatile organic compounds (VOCs) and endocrine disrupting chemicals (EDCs) are potential environmental and climate exposures that could increase cancer risk. But the majority of the environmental monitoring systems are not integrated with individual digital-health systems, which has led to a technological gap between personal exposure and individual cancer-risk assessment. The highly sensitive detection of chemical and biological targets using nanotechnology, and intelligent, continuous analysis using Artificial Intelligence (AI), Internet of Things (IoT) and digital health, opens up new possibilities. The study aims to create a Nano-IoT-AI platform for personalized environmental cancer-risk assessment, combining technologies such as nano-sensing, real-time IoT monitoring, machine learning, explainable AI, and digital-twin technologies to analyze environmental exposures, identify risk patterns, and facilitate personalized cancer-prevention. The proposed NanoHealth-Twin consists of four layers: adaptive nano-sensing, intelligent edge processing, personalized environment digital twin, and explainable risk intelligence. Various types of candidate nanomaterials, such as

graphene-based materials, MXenes, gold nanoparticles, carbon nanotubes and metal oxides, offer potential high sensitivity sensing platforms. The sensor and environmental data are fed into the IoT infrastructure and AI models to create individual exposure trends and proactive risk markers. NanoHealth-Twin transcends the one-size-fits-all cancer prevention model of population surveillance to a continuous, personalized, predictive model of cancer prevention. To validate the sensors, AI reliability, privacy, cybersecurity, regulation, cost, and accessibility will have to be covered in the future. The framework serves as a risk assessment and decision support tool but is not intended as an independent cancer diagnostic test.

Keywords: Nanotechnology, Digital Health, Environmental Exposure Monitoring, Cancer Risk Assessment, Nano-Sensors, Internet of Things (IoT), Artificial Intelligence, Machine Learning, Digital Twins, Explainable Artificial Intelligence



جامعة أبوظبي
Abu Dhabi University



No part of this publication may be reproduced or transmitted in any form or by any means without prior written permission from the publisher, except for brief quotations used in scholarly review or research.

ISBN: 978-1-964789-42-2

© 2026 POP Academy. All rights reserved.