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STA RESEARCH DIGEST 2025

Research Innovation for Present and Future

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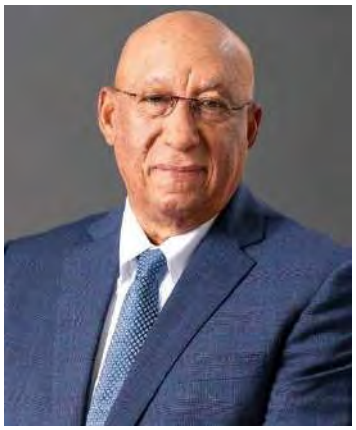

The Most Honourable Dr Dodrige D. Miller
Chancellor

I join in celebrating the St. Augustine Campus Principal's Research Awards and Festival as an important platform for acknowledging the scholarship that strengthens our University, supports Caribbean development, and positions us for global leadership. This year's theme, *Research Innovation for Present and Future*, underscores that our research is critical for shaping regional and national responses to immediate challenges while also preparing us for what lies ahead.

Campus Principal Professor Rose-Marie Belle Antoine and the wider St. Augustine Campus deserve high commendation for their consistent and proactive approach to celebrating research excellence and innovation. Through these initiatives, the Campus is connecting the work of our scholars to real societal needs and ensuring that this work is visible and accessible to all stakeholders with shared responsibility for securing a resilient Caribbean future.

For over seven decades, The UWI has played a central role in providing the knowledge and expertise that help the region respond to its most pressing concerns. Today, across our institution, researchers continue to confront issues that shape the daily lives and long-term prospects of Caribbean people. Much of this work speaks directly to the needs of Small Island Developing States: protecting our environments, supporting stable food systems, improving public health, strengthening education, advancing economic diversification, and helping governments and communities navigate emerging challenges. These efforts also align with the wider global commitment to the United Nations Sustainable Development Goals (SDGs) and inform strategic initiatives such as the first-of-its-kind UWI International School for Development Justice (ISDJ), which incorporates the SDGs into its curriculum and research programmes.

FOREWORD

Professor Rose-Marie Antoine
Pro Vice-Chancellor and Campus Principal

It is my great pleasure as the Campus Principal of The University of the West Indies, St Augustine Campus (The UWISTA), to present the STA Research Digest 2025. This iteration of the Principal's Research Awards & Festival focuses on research that is not only responsive to the realities facing us in the country and region today, but work that anticipates some of our future needs, be they in Climate Resilience, Artificial Intelligence or Health. Our theme for this year perfectly encapsulates this: Research Innovation for Present and Future. In this vein, the abstracts you will read here feature high-impact research that has already been conducted across our Campus by our scientists, researchers and students, as well as proposed or ongoing work addressing present challenges for a sustainable future.

Research, especially research grounded in community, targeting our development needs and research outputs with tangible incomes, remains a key strategic objective of this campus. It has led to the thrust toward research-centred entrepreneurship. This Digest captures the essence of our commitment toward these goals.

The Research Festival this year will feature conference-style oral and poster presentations on eight (8) thematic areas, as well as booths to exhibit the Campus's research focusing on Economic Diversification of the Country and the United Nations 2030 Sustainable Development Goals (SDGs). The latter presents a framework for achieving prosperity and sustainability by the year 2030 that is deeply connected to the development priorities of the country and region. In this regard, the Principal's Research Awards and Festival will also launch the St Augustine Research Agenda 2025–2030 for the Campus. This Agenda will feature the research areas per Faculty for the five-year period, with input from external stakeholders as the Campus seeks to continue its work, addressing significant national and regional challenges toward the advancement of national and regional development.

Whether advising governments, informing national planning, supporting community organisations, or contributing to international discourse, our researchers have ensured that Caribbean perspectives and evidence shape decision-making. Their contributions, particularly in climate science, marine studies, and other areas critical to SIDS, have earned the University strong international regard. I have noted, however, that this standing is not always fully recognised at home. The UWI's outstanding global rankings, its research output, and its impact are matters of record, but the region does not consistently celebrate or leverage these achievements.

This Research Digest is one practical tool that can help bridge that gap. By presenting the work and expertise of our researchers, the publication makes it easier for partners to better understand where the University is contributing, identify areas of shared interest, and support the continued development of research with the potential to strengthen our societies.

The research featured here represents the returns on the region's investment in its University. The success of our academics is, in many ways, the success of the Caribbean itself. Continued investment by contributing governments, the private sector, and other partners is essential if we are to sustain this work and expand its reach. Our opportunities for real, lasting change often come from graduate research, much of which remains underfunded. I encourage the private sector in particular to take a closer look at the research and innovation emerging at the St. Augustine Campus and to support the movement of promising ideas from the research stage into application.

The University cannot do this alone. Stronger connections between the institution, industry, and governments will allow research to influence practice and policy in more immediate ways. As Chancellor, I remain committed to encouraging these engagements and helping to strengthen the ties that are critical to our present progress and shared future.
Congratulations to all who have contributed to this effort; our researchers, students, administrators, and partners. Your dedicated work affirms The UWI's role as a vital regional institution and a leading voice driving global sustainable development.

Dodridge Miller
Chancellor, The University of the West Indies

The SDGs align closely with the Caribbean's own development agenda, addressing critical areas from poverty reduction to gender equality and climate action. For the region, largely comprised of Small Island Developing States, the threats of some of these issues are catastrophic; one need only look at the devastating effects of Hurricane Melissa on Jamaica. The UWI STA, apart from engaging in intellectual scholarship that can alleviate some of these issues, has also, through fora like the Principal's Research Awards and Festival, promoted the advancement of solutions. Last year, we introduced a new award at the Principal's Research Awards and Conference 2024, the HEAR (Hurricane and Earthquake Alleviation Research) Award, open to members of the public to encourage research and innovation among all members of society.

I invite all our readers to peruse the entries in this Research Awards & Festival 2025 Digest, which not only capture a diverse range of critical areas but also include a variety of information from scientists, researchers, budding researchers, and graduate students involved in those speciality areas. As I mentioned earlier, you will notice the inclusion of proposed research from some of our students, and this was by design to give some of our valuable stakeholders, such as the Government, the Private Sector and International Development Partners, the opportunity to reach out and collaborate with us as we engage in research with a purpose.

It is our hope that this Digest will also encourage and facilitate interdisciplinary and multidisciplinary research, which is key to solving some of the complex challenges we face. In this regard, abstracts were compiled from various Faculties under each theme, showcasing the breadth and depth of research on the Campus. These include: (I) Agri-Food Technology and Policy for Food and Nutrition Security; (II) Biodiversity, Climate Change and Disaster Management; (III) Health and Well-being: Issues and Advances; (IV) Engineering and Green Technologies for Sustainability; (V) Manufacturing, Trade, Tourism and Financial Well-being; (VI) ICTs for Digital Islands; (VII) AI for Multidimensional Research and Development; and (VIII) Education, Culture, Sports, Equality, Law and Governance for a Better Life and Sustainable Environment.

These areas highlight the important work to which our scientists and researchers have dedicated themselves. As such, I extend my heartfelt gratitude and appreciation to all those who answered the Call for Abstracts, allowing us to showcase the valuable work we do.

My sincere thanks to the organisations that collaborated with us in creating this Digest. Their generous support for the Principal's Research Awards and Festival 2025 is truly appreciated. Congratulations to all the researchers whose contributions have made this compendium possible. A special thank you to the Organising Committee, comprised of the Deputy Deans of Graduate Studies of all faculties, Directors & Heads of Centres and Units, my staff from the Office of the Campus Principal, the Marketing and Communications Department and the Director and staff of the School for Graduate Studies and Research for their dedication and hard work in making this Digest a reality.

I invite all of our readers to thoroughly explore our Digest to learn about the work of our current and future research.

Professor Rose-Marie Antoine
Pro Vice-Chancellor and Campus Principal

STA RESEARCH DIGEST 2025

Professor Aldrie Henry-Lee
Pro Vice-Chancellor, Graduate Studies & Research

It is with great pride that I congratulate the staff and students at the St. Augustine Campus as they celebrate the 2025 Research Festival under the compelling and timely theme, **"Research Innovation for Present and Future."** This Festival serves not only as a showcase of scholarly achievement, but also as a powerful affirmation of The UWI's role as the Caribbean's number one research university, boldly advancing knowledge to meet the evolving needs of our Caribbean people.

Research is indispensable to the Caribbean's present and future as we confront the escalating threats posed by climate change—threats that are no longer theoretical, but lived realities. The devastating impact of **Hurricane Melissa**, which displaced families, disrupted learning and research, damaged critical infrastructure across Jamaica and other parts of the region, is a stark reminder that we are on the frontlines of the climate crisis. It is through rigorous, interdisciplinary research—spanning climate science, engineering, social protection, public health, and community resilience—that we can better predict extreme weather events, understand their social and economic consequences, and design solutions that protect our most vulnerable. As we look ahead, the future of the Caribbean depends not only on our capacity to respond to disaster, but on our ability to **anticipate, innovate, and transform**—and that capacity lies squarely in the hands of our UWI researchers.

GREETINGS

Research and innovation are not abstract pursuits—they are the engines that drive national and regional development, shape public policy, inform industry, and unlock sustainable futures for the Caribbean. Whether we are addressing climate resilience, food security, economic diversification, digital transformation, or social justice, our UWI researchers are at the forefront of generating solutions that are relevant, transformative, and grounded in global standards of excellence.

The St. Augustine Campus Research Festival exemplifies the One UWI vision in action. It brings together researchers, students, industry partners, policymakers, and communities in a shared space of inquiry, creativity, and impact. This event highlights how research moves beyond publications to influence lives, industries, and institutions. The addition of the University–Industry–Government Partnerships Workshop is especially significant, as these tripartite collaborations represent the future of research translation, innovation ecosystems, and sustainable development across the region.

The theme "Research Innovation for Present and Future" also calls us to reflect on our responsibility as a regional university to act with vision. It challenges us to strengthen graduate education as a catalyst for research productivity, foster interdisciplinarity, empower early-career scholars, and ensure that innovation remains accessible and inclusive. It aligns seamlessly with our UWI's strategic priorities: educational excellence, research for impact, digital transformation, financial sustainability, and global visibility.

I congratulate the Campus Principal, Director, Graduate Studies and Research, the Festival organising team, participating Departments and Centres, and all our researchers—especially those being recognised for excellence, mentorship, and emerging scholarship. Your work reminds us that the future of the Caribbean will be shaped not by chance, but by the research we produce, the partnerships we forge, and the innovations we dare to pursue.

With every good wish for a successful Festival and continued impactful research breakthroughs in the years ahead.

Professor Aldrie Henry-Lee
Pro Vice-Chancellor, Graduate Studies & Research

STA RESEARCH DIGEST 2025

CONTENTS

THEME I

AGRI-FOOD TECHNOLOGY AND POLICY FOR FOOD AND NUTRITION SECURITY

KNOWLEDGE, ATTITUDES, PERCEPTIONS, AND PRACTICES OF NANOTECHNOLOGY IN FOOD SAFETY AMONG UNIVERSITY STUDENTS

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This study investigated university students' knowledge, attitudes, perceptions and practices (KAPP) regarding nanotechnology in food safety. A convenience sample of 411 undergraduate students at The University of the West Indies (UWI), St. Augustine Campus, completed an online survey. Findings revealed that most students demonstrated competent knowledge of nanotechnology, with 80% expressing positive attitudes, and 66% reporting high perceptions of its role in food safety. However, approximately 90% of respondents did not engage in practices related to nanotechnology in food. Correlational analyses indicated significant positive relationships between knowledge and perceptions ($r = 0.23$, $p < 0.001$) and between knowledge and attitudes ($r = 0.43$, $p < 0.001$). Interestingly, a significant negative relationship was observed between knowledge and practices ($r = -0.26$, $p < 0.001$). No significant gender-based differences were found in knowledge, attitudes, perceptions, or practices. However, Chi-square analysis revealed a significant association between gender and awareness of nanotechnology, $\chi^2(1) = 12.92$, $p < 0.001$, with males being over twice as likely to be aware of nanotechnology compared to females (OR = 2.29, 95% CI [1.43, 3.44]). Additionally, significant differences in nanotechnology-related practices and perceptions were observed across age groups. Although a positive correlation was found between perceptions and attitudes, it was not statistically significant ($r = 0.03$, $p = 0.52$), and a non-significant negative correlation was found between attitudes and practices ($r = -0.05$, $p = 0.32$). These findings highlight a strong awareness and generally positive disposition toward nanotechnology in food safety among university students, but a significant gap in its practical engagement. Targeted educational strategies and exposure to real-world applications may be necessary to enhance student involvement in this emerging field.

PRELIMINARY ASSESSMENT OF MALABAR SPINACH (*BASELLA ALBA*) AS A SUPPLEMENTAL FEEDSTUFF FOR BROILER RABBITS (*ORYCTOLAGUS CUNICULUS*) IN TRINIDAD, WEST INDIES

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This study examines malabar spinach (*Basella alba*), an underutilised local forage, on its effectiveness in rabbit diets. A feeding trial was conducted using 20 New Zealand/ Californian crossbred rabbits. Most of the carcass evaluation parameters were not statistically significant, except for kidney weight (p-value = 0.009). The crude protein analysis of the meat was similar between groups. However, animals in T1 had a lower crude fat percentage (EE: 1.64) than the animals in T0 (EE: 2.93), with a p-value of 0.004. After mortalities were experienced, a faecal flotation parasitology analysis confirmed the presence of coccidia throughout the feeding trial. Necropsy results confirmed the cause of death in T0 as resulting from coccidiosis, and heat stress in T1. Overall, this study supports the hypothesis that *B. alba* can be implemented into rabbit diets at 1% while maintaining an equivalent growth performance to traditional commercial rabbit rations. This preliminary study encourages further research into its effectiveness at higher inclusion rates and its potential health benefits as a functional feed ingredient in commercial rabbit nutrition.

PREPARATION OF A FERMENTED SARGASSUM EXTRACT, MICROBIAL DYNAMICS INVOLVED AND ITS EFFECT ON *CAPSICUM ANNUUM*

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The ongoing Sargassum inundation presents a significant ecological and socio-economic challenge for Small Island Developing States (SIDS), which often lack the resources to manage the massive influx of biomass. However, this challenge also presents an opportunity for valorisation. This study investigated the fermentation of Sargassum to produce an organic extract with biostimulant properties for sustainable agriculture. There, however, exists the prospect for valorisation of biomass in an appropriate manner. The study examined the valorisation of *Sargassum* via fermentation to generate an extract having biostimulatory properties for agricultural sustainable practices. Sargassum biomass was dried and grounded, then fermented using the endogenous microbes already present in the biomass. Samples were taken periodically from the ferment for 16s and ITS amplicon metataxonomics. From this, 16s and ITS metataxonomics profiling demonstrated distinct shifts in microbes throughout the 35-day fermentation period as Firmicutes, Nectriaceae, and Bacteroidota, being the microbiome core of the extract. Network analysis of the microbiome showed dominant families of bacteria of Clostridiaceae, Pirellulaceae, and Sporolactobacillaceae and dominant fungal genera having *Aspergillus* and *Gibberella* at the fermentation ending stage. Fermented extract, when examined against plant pathogens *(Alternaria solani* and *Xanthomonas campestris* pv. *vesicatoria*), yielded no antimicrobial activities at up to concentrations 1% (v/v). Sweet pepper (*Capsicum annuum*) was used for plant growth trials at greenhouse conditions with foliar application sprays at 0.5-1% v/v concentrations. Parameters measured (weight of shoot and root, length of shoot and root) showed chlorophyll content to have far greater values than controls. Chlorophyll content, root length, shoot length,

root weight, and shoot weight all increased by up to 28.82%, 60.13%, 15.95%, 67.95%, and 53.90%, respectively. This study demonstrated that Sargassum-fermented extracts were an organic biostimulant for plant productivity. The study also aligned with sustainable agricultural practices by developing a product from the abundantly available *Sargassum* seaweed biomass.

NUTRITIONAL COMPOSITION AND CONSUMER ACCEPTABILITY OF BUFFALYPSO GHEE FROM THE WATER BUFFALO (*BUBALUS BUBALIS*) IN THE CARIBBEAN

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Background: In Trinidad and Tobago, the Buffalypso, a locally developed breed of water buffalo (*Bubalus bubalis*), represents a unique genetic resource with the capacity to enhance regional dairy production and sustainability. Despite the Buffalypso's adaptability to tropical conditions and its potential to diversify dairy outputs, research on value-added buffalo dairy products remains limited within the Latin America and Caribbean (LAC) region. Notably, there has been no prior documentation of the compositional or sensory characteristics of ghee derived from Buffalypso milk.
Objective: This study provides the first report on the nutritional composition and consumer acceptability of Buffalypso ghee in Trinidad and Tobago, thereby contributing to the advancement of agri-food technologies that support regional food and nutrition security.
Methods: Traditionally prepared Buffalypso ghee samples were analysed for proximate composition and micronutrient content using standard AOAC methods. Additionally, a consumer survey (n = 100) assessed willingness to purchase, acceptable price ranges, and overall product acceptability. Associations between demographic variables and consumer responses were evaluated using chi-square analyses.
Results: Analytical findings revealed elevated levels of vitamin D and comparatively lower cholesterol content than previously reported for bovine-derived ghee. The consumer survey identified significant associations between (i) participant age and willingness to purchase ghee [p=0.040]; (ii) age and acceptable price range [p = 0.191]; (iii) religion and overall acceptability [p = 0.030]; and (iv) place of residence and acceptability [p = 0.019].
Conclusion: Buffalypso ghee demonstrates promising nutritional value and market potential in Trinidad and Tobago and the wider LAC region. Promotion of Buffalypso-based dairy products could enhance sustainable dairy development and support regional food and nutrition security through diversification of nutrient-rich dairy alternatives.

PHYSICOCHEMICAL AND MICROBIOLOGICAL COMPARISON OF BREAD AND BUTTER AND SPONTANEOUS FERMENTATION PICKLING METHODS FOR TROPICAL VEGETABLES

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Bitter melon (*Momordica charantia* L.), christophene (*Sechium edule*), and white radish (*Raphanus sativus*) are highly perishable tropical vegetables that lose their quality very rapidly after

harvest. Pickling is an efficient method of preservation to extend their shelf life without impairing their sensory and nutritional qualities. The present study compared and evaluated the physicochemical, microbiological, and sensory qualities of pickled tropical vegetables that were processed by two methods: the bread and butter technique and spontaneous fermentation.

In the bread-and-butter process, vegetables were initially brined in an ice water bath and onion, then washed, and processed in a mixture of sugar, salt, spices, and herbs before bottling and refrigeration for one month. In spontaneous fermentation, vegetables were blanched in a spiced brine, bottled, and set under ambient temperature and allowed to ferment for two weeks prior to analysis. Analyses were conducted at 0, 2, and 4 weeks, for sensory acceptability (9-point hedonic scale), microbial load (PCA, MRS, and PDA media), pH, titratable acidity (TTA), total soluble solids (TSS), water activity (a_w), and colour. Microbiological analysis revealed no detectable microbial growth in both treatments, demonstrating effective preservation and product safety. Both treatments provided microbiologically stable products with acceptable sensory attributes upon storage.

FROM WHEAT TO WELLNESS: DEVELOPING A SWEET POTATO–SPINACH FLATBREAD FOR ENHANCED NUTRITION AND REGIONAL FOOD RESILIENCE

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The global shift toward healthier, nutrient-enhanced food products has created opportunities to reformulate traditional staples using biofortified and locally sourced ingredients. Flatbread, commonly made from refined wheat flour (RWF), serves as an appropriate vehicle for enhancing dietary quality while promoting regional agricultural sustainability. This study examined the potential of developing a value-added flatbread fortified with orange-fleshed sweet potato (*Ipomoea batatas* L.) flour (OFSP) and spinach (*Amaranthus dubius*), two locally cultivated crops rich in β-carotene, fibre, minerals, and phytonutrients. The research objective was to determine the effect of including OFSP flour and spinach on the physicochemical composition, sensory acceptance, and microbial safety of composite flatbreads. Six formulations were produced by varying the proportions of OFSP flour, WF and spinach, and evaluated using a randomised 3 × 2 factorial design with four replications (n = 24). Sensory evaluation using a 9-point hedonic scale revealed positive consumer acceptance for colour, aroma, texture, and overall liking. Nutritional analysis confirmed that OFSP-based flatbreads displayed favourable levels of protein, ash, fat, and moisture, as well as inherent micronutrients, when compared to the WF control. All samples met established microbial safety limits, indicating suitability for human consumption. This work contributes to the advancement of several United Nations Sustainable Development Goals (SDGs), including: SDG 2 (Zero Hunger), through increased access to nutritious, lower-cost foods; SDG 3 (Good Health and Well-Being), by offering alternatives rich in pro-vitamin A and functional plant compounds; SDG 8 (Decent Work and Economic Growth), through opportunities for agro-processing, rural employment and value-chain expansion; and SDG 12 (Responsible Consumption and Production), by promoting the utilisation of locally produced crops and reducing dependence on imported wheat flour. For the Caribbean region, where food import dependency, diet-related non-communicable diseases, and underutilisation of indigenous crops remain critical issues, these findings demonstrate a scalable pathway for enhancing food and nutrition security. The development of OFSP-spinach biofortified flatbread presents a culturally acceptable, nutritionally enhanced

food product that can support regional public health and agricultural resilience.

PRODUCT, PROCESS AND MARKET INNOVATIONS TO SUPPORT SUSTAINABLE COCOA SECTOR DEVELOPMENT FOR ECONOMIC DIVERSIFICATION

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Trinidad and Tobago's long-standing heritage in fine or flavour cocoa presents a strong yet underexploited opportunity for economic diversification. Although recognised globally as one of only seven exclusive producers of fine-flavour cocoa, national output has declined to about 400 metric tons annually due to ageing farms and farmers, low yield, inconsistent post-harvest practices and weak market linkages. This project built a quality management, certification and traceability system to support more profitable tree-to-bar investments along the cocoa value chain. Firstly, the study developed three versions of flexible-capacity fermentation and drying systems tailored to small and medium holders to enhance post-harvest control, improve consistency and validated them under experimental and on-farm trials, aiming to unlock the full flavour potential of Trinidad and Tobago's fine flavour cocoa genotypes. Secondly, a tree-bar certification system and a digital traceability platform towards improving market trust were developed. Thirdly, to provide greater exposure to the tree-to-bar producers, a dedicated E-marketing browsing platform was developed to allow the tree-to-bar and farm-based microlot producers greater exposure to the global marketplace. This comprehensive ecosystem approach provides for a supply chain-based quality assurance system along with a digital traceability system that provides enhanced brand visibility to local small and medium enterprises in Trinidad and Tobago, thus incentivising investment in the local cocoa sector.

ASSESSING THE POTENTIAL IMPACT OF THE IMO's MID-TERM GHG MITIGATION MEASURES ON FOOD SECURITY IN CARIBBEAN NATIONS

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This study investigated the potential impacts of the International Maritime Organization (IMO) mid-term greenhouse gas (GHG) mitigation measures on food security in the Caribbean. With a heavy reliance on food imports and vulnerabilities to external shocks, the region faces significant challenges in achieving food security. The study's primary objectives are to assess the critical commodities influencing food security in the Caribbean, evaluate the welfare impact of policy scenarios, and examine the revenue distribution from carbon levies in mitigating food security risks. Using a Global Dynamic Model (GDL), the study forecasts food import volumes and expenditure from 2024 to 2050. The Linear Approximate Almost Ideal Demand System (LA-AIDS) model is employed to derive expenditure and price elasticities, while

Compensating Variation (CV) is applied to assess the welfare impacts of the IMO's mid-term measures. Three key policy scenarios, no carbon levy, high carbon levy, and low carbon levy, are modelled with varying revenue distribution mechanisms to gauge their effect on food security. The results highlight that, in the short term, carbon levies may lead to food price increases, which could exacerbate food insecurity in vulnerable populations. Over the long term, the Caribbean faces challenges in maintaining affordable and stable food supplies. Scenario 26 (high carbon levy) emerged as the most effective in generating revenue to compensate for welfare losses, particularly in Small Island Developing States (SIDS) and Least Developed Countries (LDCs), thereby mitigating the impact on food security. The results suggested that a well-structured carbon levy, designed with targeted revenue distribution mechanisms, could play a critical role in mitigating the adverse impacts of the IMO's mid-term measures on food security. To enhance food security resilience, policy efforts should focus on diversified agricultural strategies, improved food affordability mechanisms, and regional cooperation.

UNDERSTANDING THE DETERMINANTS OF DOMESTIC FOOD AVAILABILITY: EVIDENCE FROM A CARIBBEAN SMALL ISLAND DEVELOPING STATE

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This study examined the key determinants of domestic food availability in a Caribbean Small Island Developing State, Trinidad and Tobago, focusing on the roles of inflation, globalisation, population growth and financial development. Given the nation's heavy reliance on food imports and vulnerability to inflationary pressures, understanding these macroeconomic drivers is essential for ensuring long-term food security and economic resilience. Using an Autoregressive Distributed Lag (ARDL) model with an Error-correction Mechanism (ECM) and annual data spanning 1983 to 2022, this study investigated both short- and long-run dynamics. Additionally, Toda-Yamamoto causality analysis was employed to examine the direction of causal relationships between the variables. The findings revealed that inflation had a negative and statistically significant effect on food availability, emphasising the need for price stabilisation policies to mitigate rising food production costs. Globalisation negatively affects food availability in the long run, suggesting that excessive dependence on food imports can weaken domestic food production. Conversely, population growth and financial development positively impact food availability, reinforcing the idea that a growing population stimulates food production when supported by proper infrastructure and policies. Further, financial development can enhance domestic food availability by improving credit access and investment in agricultural modernisation. The error-correction term of − 0.977 suggests a high speed of adjustment, indicating that short-term deviations from equilibrium are quickly corrected. These findings have important implications, highlighting the need for inflation control to

counter its negative impact on food availability, trade policies that reduce over-reliance on food imports due to the adverse effects of globalisation, strategic investments in agricultural expansion to harness the positive impact of population growth, and financial sector development to support increased access to credit and agricultural modernisation.

UNDERSTANDING FOOD IMPORT DEMAND IN THE CARIBBEAN: A PANEL APPROACH

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Caribbean Small Island Developing States face a mounting food security challenge, marked by rising food import dependency, structural limitations in domestic production, and increased vulnerability to global supply shocks. Despite persistent efforts to promote regional self-sufficiency, food imports have continued to increase significantly over the past four decades, exposing these nations to external price volatility and trade imbalances. This study empirically investigates the determinants of aggregate food import demand in the Caribbean using annual panel data from 1979 to 2020 for fifteen (15) countries. Applying a panel fixed-effects model with Driscoll-Kraay standard errors, the analysis accounted for key econometric issues such as heteroskedasticity, autocorrelation, and cross-sectional dependence. The model incorporates five explanatory variables: relative prices, per capita income, trade openness, tourist arrivals, and domestic food production. Results indicated that relative prices exert a statistically significant negative effect on food import demand, while per capita income and trade openness were strong positive drivers. Tourism also contributed positively, though its effect varied by country size. Interestingly, domestic food production showed a mixed relationship, positively correlated in small islands but negatively in larger states, suggesting heterogeneity in substitution effects. These findings highlighted the importance of tailoring food security policies to country-specific structural realities, with emphasis on strengthening domestic agricultural capacity, promoting linkages between local production and the tourism sector, leveraging trade policy to mitigate external shocks, and adopting targeted price-based interventions to manage import demand without compromising food affordability. The study contributes valuable empirical insights to inform regional policymaking and offers a timely analytical framework for addressing food system vulnerabilities in the Caribbean.

WHEN HEALTHY DIETS ARE UNAFFORDABLE: EVIDENCE FROM PANEL DATA ON FOOD INSECURITY IN CARIBBEAN SIDS

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Food insecurity remains a pressing challenge for Caribbean Small Island Developing States (SIDS), where import dependence, volatile world food prices and limited domestic agricultural output constrain progress toward Sustainable Development Goal 2 (Zero Hunger). While previous research has examined income and domestic food availability as key determinants of food insecurity, few studies have considered the cost of a healthy diet, a direct measure of dietary affordability, as an important factor shaping food security outcomes, particularly in Caribbean SIDS. This study investigated the determinants of food insecurity in nine (9) Caribbean SIDS from 2017–2021, incorporating the cost of a healthy diet. Using a panel data method, the prevalence of undernourishment, a measure of food insecurity, was modelled against per capita income, the cost of a healthy diet and agricultural production. Based on the Hausman test, a fixed model with Driscoll–Kraay standard errors was estimated to address heteroskedasticity and serial correlation. Diagnostic tests confirmed no cross-sectional dependence, validating the specification. Results showed that a 1% increase in per capita income significantly reduces undernourishment by 0.39% ($p < 0.01$), highlighting the importance of income in food access. Conversely, a 1% increase in the cost of a healthy diet raised undernourishment by 0.21% ($p < 0.02$), highlighting affordability as a constraint. Agricultural production reduced undernourishment by 0.42% ($p < 0.04$), demonstrating the role of local supply in enhancing food security. By integrating the cost of a healthy diet into a panel econometric framework, this study demonstrated that affordability and availability, alongside income growth, are critical to reducing food insecurity in the Caribbean.

AGRO BY-PRODUCT FEEDSTUFF AS A SUBSTITUTE FOR CONVENTIONAL FEED FOR RABBITS IN TRINIDAD, WEST INDIES

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This paper reports the findings of research that aimed to compare the digestibility of conventional pelleted feed (Diet 1) and an agricultural by-product feed (Diet 2) made from local agricultural by-products (cocoa husk shells, coconut seed meal, Moruga hill rice hulls, Moruga hill rice bran and rejected powdered beans) in 12 cross-bred New Zealand rabbits. The rabbits were reared in a humid tropical environment. Significant differences ($p<0.05$) were found in nutritive components between the two diets in terms of organic matter (Diet 1: 915.9 g/kg vs Diet 2: 910.8 g/kg) and ether extract (Diet 1: 2.04 g/kg vs Diet 2: 1.05 g/kg). Additionally, there were significant differences ($p<0.05$) in digestibility of crude protein (Diet 1:767.4g/kg vs Diet 2: 813.1 g/kg), organic matter (Diet 1: 818.9g/kg vs Diet 2: 843.6g/kg), and dry matter (Diet 1: 865.9 g/kg vs Diet 2: 793.3 g/kg). Overall, these findings suggest that Diet 2 would be a more digestible alternative to conventional pelleted feeds for rabbits with respect to crude protein. Besides, the by-product feed can be a valuable alternative to conventional pelleted feed in rabbit production, providing cost savings and potential environmental benefits. Further research is needed to explore its potential as a viable feed source for rabbits.

IMPLICATIONS OF UNREGULATED ARSENIC USE IN POULTRY PRODUCTION ON FOOD SAFETY AND PUBLIC HEALTH IN TRINIDAD AND TOBAGO

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Arsenic-based feed additives and environmental contamination have historically contributed to arsenic accumulation in poultry, raising urgent concerns for food safety and human health. Chronic exposure to arsenic, especially inorganic forms, is linked to cardiovascular disease, diabetes, hypertension, infertility, developmental delays in children and various cancers, making its regulation a global public health priority. Despite the established carcinogenicity of arsenic, many regions, including the Caribbean, lack clear standards governing its presence in poultry products. This study quantified arsenic (As) species in commercial chicken and turkey, sourced locally and internationally, using solvent extraction with selective reduction coupled to hydride generation atomic absorption spectrometry. Results revealed that As(III) ranged from 0.00–201.24 µg/kg and As(V) from 0.00–298.13 µg/kg. Total arsenic (tAs) levels were as high as 1267.39 µg/kg, with several samples exceeding the U.S. FDA regulatory limit of 500 µg/kg. Importantly, the more toxic As(III) species were detected at significant concentrations, highlighting their significant contribution to health risks relative to As(V). Risk assessments demonstrated Hazard Quotients (HQ) > 1 in some products, mainly local, indicating the potential for non-carcinogenic health effects. Whereas Incremental Lifetime Cancer Risk (ILCR) values up to 1.1×10^{-3} reflected a moderate cancer risk from long-term dietary exposure in adults. These findings highlight substantial variability across poultry brands and origins, emphasising the consequences of unregulated arsenic in the food supply chain. This research showcases the urgent need for regulatory enforcement, consumer protection policies, and elimination of arsenical practices in agriculture. By bridging analytical chemistry with food policy, the study contributes directly to SDG2 (Zero Hunger) by ensuring that poultry remains a safe and sustainable source and to SDG3 (Good Health & Well-being) by reducing toxic arsenic exposures.

NEEM AND BAY LEAF EXTRACTS AS SUSTAINABLE ECO-FRIENDLY ALTERNATIVES FOR THE MANAGEMENT OF PESTS AND DISEASES AFFECTING SOURSOP IN TRINIDAD

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Annona muricata L., commonly known as soursop, is a tree that is important to the region for its nutritional value, culinary uses, medicinal properties and its local, regional and international export market potential. Soursop, however, is plagued by numerous pests and diseases. The fungus, *Colletotrichum,* which causes the disease anthracnose, along with scale insects, is considered the most important. The economic losses suffered by local farmers are not yet determined, although examination of infected fruits shows complete loss, and in affected fields, losses can surpass 80% anthracnose and scales, respectively. Conventional control strategies for this pest and disease include the use of synthetic fungicides and insecticides, which are known to negatively impact the environment and human

health. Moreover, due to these concerns, countries have established MRLs for pesticides and, in some cases, have completely banned some pesticides used on agricultural commodities. For these reasons, sustainable, eco-friendly alternatives need to be explored to meet the regional and international market standards. One such approach that is currently being explored is the use of botanicals, particularly neem and bay leaf extracts. Neem (*Azadirachta indica)* is an effective biological insecticide, and according to literature, the oil it produces, called azadirachtin, is linked to high mortality and deterrent capabilities of unwanted pests (Adusei and Azupio 2022; Dhakad et al. 2025). In addition to being a powerful insecticide, neem extract also has a role to play in microbial disease management, as various studies have shown its ability to control fungal and bacterial disease agents (Dhakad et al. 2025; Siame et al. 2016). In addition, research on essential oils from bay leaf (*Pimenta racemosa*) has demonstrated the suppression of bacteria and fungi pathogens (Lawal et al. 2024; Gimenez et al. 2019). Similar to neem, bay leaf extract has also been shown to possess insecticidal capabilities. These include deterring and toxicity through contact and ingestion. These botanical extracts will be explored as alternatives to chemical pesticides for managing scales and anthracnose in soursop.

IN VITRO RUMINAL FERMENTATION KINETICS OF ALTERNATIVE SUPPLEMENTAL FEEDS FORMULATED WITH BY-PRODUCTS FROM FOOD CROPS

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This study evaluated the *in vitro* ruminal fermentation kinetics and fermentative profile of three feed treatments: a commercial feed and two supplemental feeds formulated from agricultural by-products available in Trinidad and Tobago. Two iso-nitrogenous and iso-caloric alternative supplemental feeds were formulated with available agricultural by-products (cocoa hulls and shells, coconut meal, powdered bean, rice bran, hulls and corn stover). One was formulated without coconut meal (Supp.-CM) and the other without corn stover (Supp.-CS). All three feed treatments were incubated with buffered rumen inoculum. and their *in vitro* ruminal gas production was measured at 2, 4, 6, 8, 10, 12,18, 24, 36, 48 and 72 hours post-incubation. Gas production rate peaked 6 hours post-incubation in the commercial feed and around 12–18 hours post-incubation in the alternative supplemental feeds. Gas produced from the immediately soluble fraction *(a)* and potential degradability was highest in the commercial feed. However, gas production from the insoluble fraction *(b)* was similar to the commercial feed and Supp.-CS (246 – 262 g/kg^{-1}). Gas production rate constant for insoluble fraction *(c)*, the lag phase, ruminal pH and partitioning factor did not differ between feed types. The estimated amount of methane produced from the commercial concentrate feed (49.1 ml/g DM^{-1}) was significantly higher when compared to the Supp.-CM, which had 40.5 ml/g DM^{-1} and Supp.-CS with 41.5 ml/g DM^{-1}. Organic Matter Digestibility was highest in the commercial feed at 586 g/kg. Supplemental feeds from available agricultural by-products have the potential to be used as alternatives to commercial concentrate feeds for ruminants in Trinidad and Tobago due to comparable fermentation efficiency, fermentation of insoluble fraction and reduced estimated methane production. However, the potential deleterious effects of Supp.-CM and Supp.-CS at the onset of ruminal fermentation are concerning and may require further investigation.

ASSESSING THE EFFICACY OF *BACILLUS AMYLOLIQUEFACIENS* CHAG1D BIOFORMULATIONS IN PROMOTING GROWTH AND SUPPRESSION OF COLLAR ROT DISEASE IN SWEET PEPPER

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Bacillus amyloliquefaciens strain CHAG1D was tested as an effective biocontrol agent in the suppression of *Phytophthora* rot affecting vegetable crops. In addition, the growth-promoting potential of this was also studied in crops. However, there was a lack of information on the development of a bioformulation and the optimum rate of application for the suppression of disease in vegetable crops. In this context, the present study was carried out to develop and determine the effective dose of liquid, solid and slow-release formulations of the *B. amyloliquefaciens* CHAG 1D in enhancing growth and suppression of *Phytophthora capsici* in sweet pepper as a model test vegetable crop. Different dosages of liquid (75, 100, 150 ml L^{-1}), solid (5, 10, 15 g L^{-1}), and the slow-release (100, 250, 500 mg $plant^{-1}$) bioformulations of *B. amyloliquefaciens* CHAG1D were applied to sweet pepper and compared with the untreated control. The results showed that differing dosages of each bioformulation have significantly induced the number of leaves, number of branches, leaf length, leaf width, plant height, collar diameter, number of open flowers, root weight and length, total chlorophyll and marketable yield. Sweet pepper plants treated with the solid formulation at a rate of 5 g L^{-1} and slow-release formulation at 250 mg $plant^{-1}$ every two weeks produced almost six times more fruit than the untreated control. Overall, the results showed that the solid formulation at 5 g L^{-1} had greater growth promotion in sweet peppers. When it comes to disease suppression, application of slow-release bioformulation at 500 mg $plant^{-1}$ had greater reduction of *Phytophthora* rot incidence.

STANDARDISATION AND DEVELOPMENT OF BIOCONTROL FORMULATIONS

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Indiscriminate application of synthetic pesticides can affect human and environmental health, besides triggering the development of resistance in target pathogens. This study aimed to develop and evaluate liquid, solid and slow-release bioformulations using *Bacillus amyloliquefaciens* PRIN1, a native soil bacterium with proven antifungal activity. Each formulation type was prepared using different carriers, media and chemical amendments and tested over 365 days for shelf life and efficacy against *Colletotrichum gloeosporioides* and *Cercospora lactucae-sativae*. Among liquid formulations, Liquid Formulation 1 (LF1) demonstrated the highest shelf life (4.34×10^{11} CFU ml^{-1}, $p < 0.001$). Solid Formulations (SF) using the inorganic carrier showed superior viability compared to the organic carrier. Of the six slow-release treatments tested, dry beads exhibited the best performance, with high mean shelf life, low biodegradation and efficacy. Furthermore, seed treatment experiments showed that it is best to coat tomato seeds in SF slurry for 16 hrs and okra in LF1 for the same time period. In addition, the usage of LF1 at 75 ml L^{-1} and SF at 5 g L^{-1} achieved the best growth in lettuce and sweet pepper, respectively. The low-cost formulations applied at 150 ml L^{-1} and the slow-release formulation

applied at 500 mg plant^{-1} effectively suppressed *C. lactucae-sativae* and *Phytophthora capsici,* respectively.

STUDY ON THE STANDARDISATION AND EFFICACY OF LIQUID, SOLID AND SLOW-RELEASE FORMULATIONS POSSESSING *BACILLUS AMYLOLIQUEFACIENS* PRIN1 IN VEGETABLE SEEDS

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The application of plant growth-associated microbes to seeds is an epitome method of delivery as it is able to introduce the microorganism to the rhizosphere. The objectives of this experiment were (i) to assess the potential of seed colonisation of the *Bacillus amyloliquefaciens* PRIN1 when treated with liquid, solid and slow release formulations at 0, 15, 30, 60 and 90 days of storage (DOS) (ii) to measure the influence of *B. amyloliquefaciens* PRIN1 on seed germination, growth parameters and potential of root colonisation in tomato and okra. A total of eight seed treatment types and the untreated control were included in the experiments with tomato and okra seeds. At 0, 30, 60 and 90 DOS, the treated seeds were sown, and their germination and growth parameters and root colonisation were measured on the 30th day after sowing. All seed treatments with different types of bioformulations performed significantly better than the untreated control. For tomatoes, seeds treated in a solid formulation for 16 hours recorded the highest mean seed and root colonisation, total number of leaves, leaf area, total plant height, shoot length, root length, total fresh weight, germination percentage, vigour index and shortest mean germination time. For okra, seeds treated in the liquid formulation for 16 hours recorded the highest mean seed and root colonisation, total number of leaves, total plant height, shoot length, root length, collar diameter, total fresh weight, root length, germination percentage, vigour index and the shortest mean germination time. Significant differences were seen in seed and root colonisation and growth and germination parameters at each storage interval. In conclusion, it is recommended to use the solid formulation for 16 hours to coat tomato seeds and the liquid formulation for 16 hours to coat okra seeds.

ASSESSING THE LANDSCAPE OF NUTRITION RESEARCH IN CARIBBEAN SMALL ISLAND DEVELOPING STATES: A SYSTEMATIC SCOPING REVIEW

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Access to reliable food and nutrition security data is critical for understanding the challenges faced by Caribbean Small Island Developing States (SIDS). Yet, such data remain scarce, fragmented, and often siloed across disciplines. Guided by PRISMA-ScR protocols, this study

conducted a regional-level systematic review of food and nutrition research in 29 Caribbean SIDS, with findings further examined through Social Network Analysis. Results indicated that nutrition research in middle-income Caribbean countries is growing, though unevenly distributed. Most studies emphasise dietary intake, while biochemical measures and assessments of dietary knowledge, attitudes, and preferences receive limited attention. Authorship is disproportionately skewed toward foreign researchers, with only 17.5% of studies drawing on openly accessible data. Funding and methodological approaches are similarly uneven, with most publications originating from Puerto Rico, Haiti, Jamaica, and the Dominican Republic, supported largely by U.S. and European sources. Despite the application of 126 nutritional tools and indices, collaboration across regional governments, academic institutions, and NGOs remains weak, and data-sharing practices are limited. Strengthening dietary surveillance systems, fostering greater regional collaboration, and increasing investment are essential for enhancing data accessibility and representativeness. Such efforts are pivotal for advancing Caribbean food and nutrition research, supporting evidence-based policymaking, and improving public health outcomes.

CHRONIC FOOD INSECURITY IN CARIBBEAN SIDS: THE ROLE OF INCOME, GLOBALISATION, AND FINANCIAL INSTITUTION ACCESS

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Chronic food insecurity remains a persistent challenge in Caribbean Small Island Developing States (SIDS), driven by structural vulnerabilities, food import dependence and exposure to global shocks. This study investigated the determinants of chronic food insecurity in ten Caribbean SIDS over the period 2001–2021, using the prevalence of undernourishment as a proxy for chronic food insecurity. A panel dataset was constructed incorporating key variables such as GDP per capita, domestic food production, inflation, food imports, globalisation and access to financial institutions. Employing panel data techniques, the analysis began with fixed and random effects estimation, with model diagnostics including the Hausman and Breusch-Pagan tests guiding model selection. To address first-order autocorrelation detected via the Wooldridge test, the final model was estimated utilising random effects Generalised Least Squares (RE-GLS) with AR(1) correction. Results revealed that income, food production, globalisation, and financial institution access have the potential to significantly reduce food insecurity in Caribbean SIDS, while inflation and food imports had a positive but statistically insignificant effect. Policy recommendations include promoting inclusive income growth, revitalising domestic agriculture, expanding financial inclusion, and strengthening food systems' resilience to external shocks. Addressing chronic food insecurity in Caribbean SIDS requires a coordinated, multisectoral strategy that strengthens economic and institutional resilience while strengthening local food systems.

HOUSEHOLD DIETARY DIVERSITY AND ASSOCIATED SOCIOECONOMIC FACTORS: THE CASE OF THREE RURAL COMMUNITIES IN SOUTHEAST TRINIDAD DURING COVID-19

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The COVID-19 pandemic has significantly impacted food security and nutrition globally, with rural households in Caribbean Small Island Developing States (SIDS) being particularly vulnerable. This study assesses household dietary diversity (HDD) and its associated socioeconomic factors in three rural communities—Biche, Plum Mitan, and Ortoire—in Southeast Trinidad during the pandemic. Using the Household Dietary Diversity Score (HDDS) as a measure, the study identifies key determinants of HDD and evaluates variations across communities. Findings revealed that dietary diversity was moderate across the three regions. Plum Mitan exhibited the highest HDD (6.6) due to its mixed agricultural and fishing economy. Biche, a primarily agricultural region, had a score of 5.6, while Ortoire, mainly a fishing-based community, had the lowest (5.3). Economic stability was a significant determinant of HDD, as households receiving government assistance or possessing secondary income sources reported higher dietary diversity. ANOVA and chi-square tests confirmed regional disparities in dietary patterns, while ordinal logistic regression showed that region was the strongest predictor of HDD. Additionally, the pandemic caused shifts in food purchasing behaviour, with many households opting for cheaper, less preferred foods and experiencing disruptions in agri-food production. The study underscored the need for policy interventions to enhance food security and dietary diversity in these communities. Recommendations include promoting agricultural diversification, improving rural infrastructure and market access, expanding food assistance programs, and strengthening food supply chain resilience. Public health campaigns should advocate balanced diets while reducing dependency on imported cereals and processed foods.

EXPLORING COCOA (*THEOBROMA CACAO* L.) FLAVOUR DIVERSITY IN TRINIDAD: A STUDY WITH CARIBBEAN RELEVANCE

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Trinidad and Tobago, Grenada and Jamaica are regarded as exclusive (100%) fine flavour cocoa producers. Across the Caribbean, cocoa production and cocoa-based value addition provide employment and generate foreign exchange. The fermentation step in cocoa postharvest processing plays a crucial role in flavour development, and is influenced by the interplay of environmental conditions, microbiota and pulp and bean quality. Although past studies have shown flavour diversity across different locations, the drivers of diversity have not been explored. Therefore, a study was conducted on 6 farms across 2 fermentation cycles, in 6 diverse agro-ecologies in Trinidad. Freshly harvested cocoa beans were subjected to box fermentation on each farm and fermentation kinetics profiled, viz., mass temperature, testa and cotyledon pH, bean colour, physical cut tests and microbial monitoring. Bean samples were collected at days 4, 5 and 6, sun-dried using a standard method, prepared into cocoa paste samples and subjected to quantitative and qualitative sensory profiling. There were differences in the fermentation dynamics across locations, indicated by time to maximum temperature, maximum temperature achieved, time to cotyledon and testa pH intersection and differences in microbial communities. These standard proxies for assessing cocoa fermentation progression indicated that the optimal endpoints differed among the farms. The presentation explores the drivers of these differences and the implications for exploiting cocoa flavour diversity for niche marketing. The suite of analyses used comprises a toolkit, which can be applied across the Caribbean with the aim of elevating fine-flavour cocoa quality.

SYNTHESIS OF NOVEL NANOPARTICLES WITH PHYTOACTIVE AND PLANT-PROTECTIVE POTENTIAL

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Pesticides remain one of the most widely used strategies for crop protection among farmers. While they are effective in controlling pests and safeguarding yields, their extensive use has led to numerous adverse effects, including contamination of water sources, damage to non-target beneficial organisms, and serious risks to human health. Considering these limitations, nanoparticle-based biopesticides have emerged as promising and more sustainable alternatives. Chitosan, a natural polysaccharide derived from chitin, has been successfully incorporated into several biopesticide formulations due to its biocompatibility and antimicrobial properties. Likewise, essential trace metals such as copper, iron, and zinc are known to exhibit strong antimicrobial effects and have long been utilised as active ingredients in commercial pesticides. This research aimed to develop a novel nanoparticle-based pesticide by integrating three distinct metal nanoparticles (tin oxide, copper, and magnetite) with chitosan and evaluating their combined efficacy against the tomato bacterial spot pathogen Xanthomonas campestris pv. vesicatoria. The nanoparticles were synthesised using bottom-up microwave and green synthesis methods, as reducing metals to the nanoscale enhances their surface area and chemical reactivity. Particle morphology was confirmed using scanning electron microscopy (SEM), and chemical characterisation was performed via Fourier-transform infrared spectroscopy (FTIR). Each nanoparticle formulation was successfully combined with chitosan and tested against Xcv both in vitro and in infected plants. The formulations effectively inhibited Xcv growth and significantly reduced infection severity following foliar application. Furthermore, treated plants

exhibited altered expressions of key tomato defence marker genes, ethylene receptor 1, proteinase inhibitor II, and pathogenesis-related protein 1A, suggesting that nanoparticle treatment can enhance plant immune responses through modulation of defence-related gene pathways. Overall, the integration of metal-based nanoparticles with chitosan demonstrated strong potential as an eco-friendly and effective biopesticide.

SEAWEED EXTRACTS BOOST HYDROPONIC LETTUCE GROWTH AND BACTERIOME HEALTH

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Seaweed extracts are increasingly recognised as efficient plant biostimulants, and their extensive use in hydroponically cultivated crops is yet to be explored. Furthermore, research gaps remain regarding the intricate effects of seaweed extracts on hydroponically-cultivated crops, and particularly on the plant-associated microbiome. The current study addressed this gap through the evaluation of two seaweed extracts (SWE) derived from (*Ascophyllum nodosum* and *Sargassum* spp.) on the growth and bacterial dynamics (rhizoplane, phylloplane, and endosphere) of lettuce (*Lactuca sativa* L.). The *A. nodosum* extract was provided by a commercial supplier, and a *Sargassum* laboratory formulation (OJA1) was prepared. The experiment was conducted using a nutrient film technique hydroponic system, and SWE were applied to *L. sativa* L. (var. Bronze) as a 0.5%v/v foliar spray every 10 days up to harvest (35 days). Subsequently, plant growth parameters were measured and DNA were extracted for 16S rRNA amplicon sequencing. Results showed that SWE-treated plants had significantly higher yields and chlorophyll content compared to the Control plants. The metataxonomic analysis revealed that SWE-treated plants were dominated by Rhizobiaceae in the rhizoplane, and Burkholderiaceae, Sphingomonadaceae and Pseudomonadaceae in the phylloplane. Furthermore, Pseudomonadaceae dominated the root endosphere, while Rhodanobacteraceae and Comamonadaceae dominated the leaf endosphere of SWE-treated plants. Species richness was significantly elevated, and the bacterial community structure exhibited distinct beta-diversity clustering in SWE-treated plants. The study demonstrates that SWE treatments induced significant plant growth and alterations in the plant-associated bacteriome and provides novel insights into plant–microbe interactions within hydroponic cultivation systems.

STEM CANKER: A THREAT TO A DEVELOPING DRAGON-FRUIT INDUSTRY

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Dragon fruit has seen a significant increase in demand over the last decade, prompting the establishment of farms throughout Trinidad and Tobago. The fruits are now retailed at roadside markets and supermarkets. It is a nutrient-rich commodity that has contributed to agricultural diversity. However, within the last 4 years, a fungal disease characterised by brown canker surrounded by yellowing and maceration of infected tissue as the disease progresses on the stems (cladodes) and fruits has contributed to as much as 70% yield losses. The causative agent of

the disease is a fungal pathogen *Neoscytalidium* sp., causing significant losses both pre- and post-harvest. While the fruits are still edible after initial disease symptoms develop, their unsightly appearance renders them unmarketable. As the disease progresses, the cankers lead to rot and complete fruit loss. In addition to impacting the crop, the pathogen also has the potential to affect human health, prompting concerns about the ingestion of affected fruits. Chemical pesticides have been used in an attempt to control the disease, but they have had little to no effect on disease management. The disease severity is worsened by the ideal conditions of high humidity during the warm, wet periods of the year. When the disease becomes too severe, farmers remove and destroy infected plants. However, due to the improper disposal of infected plant materials, spores quickly spread to healthy plants, repeating the cycle of infection. To manage the disease, an integrated management strategy is the most likely sustainable approach. The literature has indicated the potential of several biologicals to suppress disease development. The researchers intend to explore the use of an integrated approach, which includes the use of resistant varieties along with biological and botanical formulations for sustainable disease management.

TRANSFORMING CARIBBEAN AGRICULTURE THROUGH A LEAN CIRCULAR FRAMEWORK: MODELLING RO-CROPS AGROTEC AS A SYSTEM THINKING PRACTITIONER-RESEARCHER INNOVATION

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This study presents the Lean Circular Framework (LCF) as an innovative model for transforming smallholder agriculture in the Caribbean. It addresses the limitations of the current linear food production system, which relies on extracted inputs and produces polluting waste. Developed over four decades of iterative experimentation at Ro-Crops Agrotec (1985 to 2025), a globally recognised living laboratory of nature-based solutions, the LCF redefines smallholder farming as a regenerative enterprise that utilises waste and increases resilience through deliberate, systems-based practices. Based on systems thinking, the framework views agriculture as a dynamic resource flow network involving waste reduction, value creation, and environmental stewardship. It incorporates concepts from industrial ecology, agricultural systems theory, and operational excellence to ensure smallholder farming makes a meaningful contribution to societal and economic development. The LCF is built around three core pillars: Biocircular Economy, which emphasises waste valorisation, resource cycling and industrial ecology; Lean Management, which focuses on waste elimination, process efficiency and continuous improvement; and Agroecology, rooted in nature-based solutions, climate resilience, and regenerative practices. These pillars converge to establish three integrative domains: Operational Excellence (combining Biocircular and Lean), Environmental Stewardship (combining Biocircular and Agroecology), and Designed Resilience (combining Lean and Agroecology). At their centre lies the LCF Core, a regenerative engine of waste-to-value transformation driven by ecologically grounded, systemic practices. By reducing dependence on virgin materials, restoring natural systems, and converting biological waste into bioenergy or bioproducts,

the LCF offers a pathway to replace fossil-based inputs and foster circularity. Using a qualitative, practitioner-researcher approach, this study demonstrates how smallholder farms, guided by the LCF, can act as catalysts for cleaner production, climate adaptation, and agroecological innovation. Ro-Crops Agrotec exemplifies regenerative agriculture and stands as a beacon of Caribbean resilience.

PRODUCTION AND EVALUATION OF INNOVATIVE BUTTERMILK BISCUITS FROM ORANGE-FLESH SWEET POTATO FLOUR INFUSED WITH COCONUT FOR FOOD AND NUTRITION SECURITY

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This study evaluated an innovative buttermilk biscuit incorporating orange-fleshed sweet potato (OFSP) flour with or without shredded coconut, as a partial substitute for wheat flour. The study addressed diversified flour use to bolster food and nutrition security under supply-chain volatility. It examined how OFSP substitution levels (0, 30, 50%) and coconut inclusion (0 or 5%) affect physical, nutritional, microbiological, and sensory properties of biscuits. The null hypothesis posited no treatment effects at $\alpha = 0.05$**;** the alternative posited significant effects. OFSP flour was produced and blended with wheat to yield six formulations: 100% wheat + 5% coconut (control 1)**,** 100% wheat (control 2)**,** 70:30 wheat: OFSP ± 5% coconut and 50:50 wheat: OFSP ± 5% coconut. A randomised 3 × 2 factorial design with four replicates per treatment (total 24 experimental units) was implemented. Standard protocols quantified colour (L*), geometry (diameter, thickness, spread ratio), proximate composition (protein, fat, fibre, moisture, ash), shelf-life attributes, aerobic plate counts, yeasts/moulds, and consumer acceptance with a 9-point hedonic scale. Biscuits with 30% OFSP achieved the highest ($p < 0.05$) liking for most sensory attributes, whereas 100% wheat scored lowest. Coconut addition (5%) did not enhance sensory performance. OFSP formulations contained measurable protein, fat, fibre, moisture and ash, but 100% wheat products exhibited significantly higher protein and moisture**.** Colour L***** was lower in OFSP biscuits, reflecting their characteristic orange hue. Across storage, geometry characteristics remained statistically unchanged and no growth of bacteria, yeasts, or moulds was detected, indicating microbiological stability**.** Partial replacement of wheat with OFSP, particularly at 30% produced sensory-acceptable, microbiologically safe buttermilk biscuits while reducing reliance on wheat. Although protein content declined relative to 100% wheat controls, values remained acceptable for this product category. OFSP-enriched biscuits delivered quality and safety with less reliance on wheat, an incremental but meaningful step toward diversified, resilient food systems.

THE DEVELOPMENT OF A BIOPESTICIDE FROM EDIBLE PLANTS: AN INVESTIGATION OF THE ANTIMICROBIAL EFFECTS AND THEIR INTERACTION WITH ENDOPHYTIC COMMUNITIES

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The global trend toward sustainable agriculture has accelerated research and adoption of plant-based biopesticides, driven by regulatory pressure, consumer demand for residue-free produce and resistance management concerns. Commercialisation of biopesticides is expanding rapidly, with botanical formulations entering mainstream markets through patented technologies, scalable extraction methods and integration into certified organic supply chains. The goal of this study is to formulate and evaluate the efficacy of a biopesticide from two edible ethnobotanical plant extracts (AI and CE). Additionally, the impact of the plant extract on the endophytic microbial communities in tomato plants that were sprayed with the plant extract was investigated using 16S and ITS next-generation sequencing. This work was conducted under the AgroServ project at The University of the West Indies, St. Augustine, in collaboration with The Roscoff Biological Station, France and The Mediterranean Agronomic Institute of Bari, Italy. Two plant extracts were made by maceration of AI and CE in ethanol and ethyl acetate, respectively. The biopesticide formulations were prepared using 8% aqueous solutions of the solid plant extracts with a natural emulsifying plant extract to replace traditional detergents. The crude extracts and formulation were tested against bacteria and fungi cultures using the amended agar and broth microdilution methods. Analysis of Rhizosphere communities was done on a control group of tomato plants, and groups treated with a synthetic pesticide and a biopesticide, respectively.

Bioassays on *Colletotrichum*, *Xanthomonas*, *Colocasia pectobacterium*, and *Ralstonia* revealed MICs ranging from 4–16 mg/mL, and the mix of CE and AI extracts had a synergistic amplification effect when compared to the individual extracts. Bioinformatics analyses and a life cycle analysis are ongoing to evaluate the environmental impact. The dual-action formulation offers a sustainable alternative to synthetic pesticides. Further work is warranted to determine the mechanism of action and efficacy in *in vivo* field trials against different crops.

IMPACT OF A *SARGASSUM*-BASED COMPOST ON THE GROWTH AND RHIZOBACTERIAL DYNAMICS OF LETTUCE AND SWEET PEPPER PLANTS

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Massive *Sargassum* influxes have been observed across the Caribbean coasts, western Africa, and America, raising serious concerns for health, the economy and the environment, therefore necessitating the need for multiple solutions to valorise into useful products. *Sargassum* is an underutilised resource with potential for sustainable agricultural solutions, such as a natural stimulant and soil amendment. This study evaluated a Sargassum-derived compost on lettuce (*Lactuca sativa* L.) and sweet pepper (*Capsicum annuum* L.) growth and its associated bacteriome. Parameters such as shoot and root weights, and rhizosphere microbiome analysis were used to evaluate lettuce and sweet pepper performance. The results showed that the addition of the organic compost amendment significantly improved growth and yield in both lettuce and sweet pepper plants. It also demonstrated that the application of the *Sargassum* compost amendments supported the proliferation of diverse and functionally important putative beneficial plant growth-promoting bacteria, which have also been shown to contribute to overall soil fertility. The results of this study highlighted the potential of the *Sargassum*-based compost as an effective organic amendment that not only enhanced plant growth and yield in lettuce and sweet pepper but

also enriched the rhizosphere with putative beneficial bacterial communities, thereby promoting soil health and supporting sustainable agricultural practices.

COMPARATIVE ASSESSMENT OF BLACK SOLDIER FLY LARVA (*HERMETIA ILLUCENS*) MEAL INCLUSION ON GROWTH PERFORMANCE AND FEED EFFICIENCY IN NILE TILAPIA (*OREOCHROMIS NILOTICUS*) FINGERLINGS

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Food security is a critical issue for all countries in the Caribbean region, which share vulnerabilities such as climate-change risk, environmental challenges, and economic constraints. Recent acute climate shocks such as Hurricane Melissa and emerging geopolitical tensions have underscored the urgency of developing both short- and long-term strategies for food self-sufficiency. One promising approach is the creation of small, self-sustaining agricultural models that can be managed by individuals or households and thereby reduce dependency on external food sources. The insect *Hermetia illucens* (black soldier fly) plays a key role in the circular economy by converting organic waste into high-value protein products usable in poultry, aquaculture, and other forms of animal production. The local relevance is supported by the fact that feed cost remains a major constraint for Caribbean aquaculture operations. This study proposes a series of controlled feeding trials to evaluate the potential of black soldier fly larvae meal (BSFLM) as a sustainable alternative protein source in diets for *Oreochromis niloticus* fingerlings. The primary objective is to assess the effects of BSFLM inclusion on fish growth performance, feed utilisation and overall health. The experimental design comprises three feeding trials involving one-week-old tilapia fry over a four-week period. Three experimental diets will include BSFLM at inclusion levels of 50%, 60% and 80% (replacing conventional protein sources, following recommendations from the Food and Agriculture Organization of the United Nations). A fourth group will receive a commercially available tilapia starter feed (Zeigler; 45%–55% protein) as an industry-standard control. Each treatment will be conducted with four replicates to ensure statistical robustness. It is expected that results will demonstrate that BSFLM can replace a significant portion of fishmeal in tilapia fingerling diets without compromising growth performance or feed conversion efficiency, thereby offering a viable pathway for more sustainable aquaculture in the Caribbean context.

WHOLE GENOME SEQUENCING AND GENOMIC ANALYSIS OF MORUGA HILL RICE (*ORYZA GLABERRIMA*) REVEALS ITS CLOSEST AFRICAN ORIGINS AND PUTATIVE EVIDENCE FOR PLANT BIOTIC AND ABIOTIC STRESS TOLERANCE TRAITS

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Moruga Hill Rice (MHR) is an African rice (*Oryza glaberrima* Steud.) introduced to Trinidad by *formerly enslaved African-Americans* and being grown for many generations in Trinidad at subsistence and commercial scale. There are no publications yet on the MHR genomic resources. The current study presents the first contiguous *de novo* assembly of the MHR genome through a hybrid sequencing approach using the Oxford Nanopore GridION® X5 (long-reads) and the Illumina Novaseq X Plus platforms (short-reads). The MHR genome size was found to be ~ 372.9 Mb with 56,073 genes identified. Genomic variant analysis revealed a total of 3,574,951 biallelic variants, of which 2,978,645 were SNPs and 617,143 were InDels. Several genes encoding proteins and transcription factors homologous to known biotic resistance and abiotic tolerance genes in rice were detected. Nine NLR genes showed high homology to *Pi-ta*, *Pi36, Pia-C_2, Piz(t), Pid3, Pi37* and *RGA1* blast resistance genes, with one NLR being homologous to the *RPM1* gene known to confer rice sheath blight resistance. Gene ontologies suggest that the MHR may hold drought and salt stress tolerance potential based on homology to multiple abiotic stress-responsive gene families. Phylogenomic analysis against *O. glaberrima* landraces revealed that the MHR was most related to IRGC-104904 Nigerian landrace, aligning with the historical records, but remains genetically divergent. The genomic resources of the MHR may be valuable for future research on molecular marker development and molecular breeding of superior disease-resistant and climate-resilient rice varieties.

ENHANCING PROBIOTIC YOGURT QUALITY WITH GREEN PAPAYA NECTAR: A FUNCTIONAL FOOD INNOVATION FOR SUSTAINABLE DIETS

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The incorporation of underutilised fruits and probiotic cultures into dairy products presents an opportunity to enhance nutritional value while supporting sustainable food systems. This study investigated the development of probiotic yogurt formulated with locally sourced milk from The University of the West Indies Field Station, a mixed culture of *Lactobacillus bulgaricus*, *Lactobacillus acidophilus*, and *Streptococcus thermophilus*, and varying concentrations of green papaya nectar at 0% (T0), 5% (T5), 10% (T10), and 15% (T15). A 4 × 3 completely randomised design was employed, resulting in 12 treatments. The primary objectives were to develop yogurt enriched with green papaya nectar and probiotic LAB and to evaluate the physicochemical and sensory attributes. LAB counts remained within 6.34–6.36 $\log_{10}$ CFU/mL, demonstrating viable probiotic populations throughout storage. The pH values increased significantly ($p < 0.05$) over time, while °Brix levels increased with higher papaya concentrations, reflecting the greater soluble solids contributed by the nectar. Lightness (L*) values also increased significantly ($p < 0.05$), indicating a lighter product as storage progressed. Sensory evaluation revealed significantly ($p < 0.05$) higher overall acceptability scores for yogurts containing papaya nectar compared to the control. Consistency was notably improved at day 7 in T10 and T15, with flow rates increasing from 4.33 cm/s to 7.67 cm/s and from 5.00 cm/s to 9.83 cm/s, respectively. These findings highlight green papaya nectar as a natural functional ingredient that enhances both sensory quality and consumer appeal of probiotic yogurt. Its use supports product innovation strategies aligned with sustainable and health-promoting food systems.

THEME II

BIODIVERSITY, CLIMATE CHANGE AND DISASTER MANAGEMENT

THE HYDROCARBON GENOMIC TOOLKIT: WHAT'S IN AND WHAT'S OUT?

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Whole genome and metagenomic analyses reveal targeted gene enrichment of specific metabolic processes that are necessary for the community's dynamic responsiveness to oil pollution. This work investigates how bacteria restructure their genomic toolkit to survive in oil-polluted environments. There was an increased abundance of genes associated with specific COG categories for metagenomes, which indicates that microbial communities in oil-contaminated environments may possess enhanced capabilities for functions such as cell wall biogenesis, DNA replication and repair, nucleotide transport, transcription and intracellular trafficking. These adaptations are not additive, nor are they uniformly distributed; they display strong taxonomic and ecological specificity that serve to shape succession dynamics, promote niche partitioning and advance cooperative community interactions. Genomes that facilitate high hydrocarbon degradation also showed enrichment of these genes as well as those for lipid transport, secondary metabolite biosynthesis, energy conversion, and translation and ribosome biosynthesis. A concurrent reduction in genetic investment in other metabolic functions suggests metabolic streamlining for optimised resilience and reallocation of energy expenditure. These findings identified key corresponding metabolic processes that can be used to inform bioremediation strategies and predictive models of ecosystem recovery.

IMPROVING ACCESS TO CARIBBEAN BIODIVERSITY DATA

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Given the increasing threats facing the biodiversity hotspot of the Caribbean, there is an urgent need to access, share and generate biodiversity data in the region. Well-functioning natural history collections and citizen science can play key roles in documenting, monitoring and managing biodiversity. I showcase three recent projects we have undertaken at The University of the West Indies, St. Augustine, to improve access to biodiversity data in Trinidad and Tobago, with applicability to other Caribbean countries. Firstly, we have established initiatives to generate new data

through citizen science – including employing iNaturalist at our annual 'Bioblitz' event to engage more people in data collection. This was especially successful during the pandemic when we ran virtual 'backyard bioblitzes'. Secondly, we have recently completed a project that digitised nationally important collections from our UWI Zoology Museum, the national Herbarium of Trinidad and Tobago (T&T) and the natural history collection of the National Museum of T&T and published them on a global open access database – The Global Biodiversity Information Facility. This has resulted in more than 60,000 natural history specimen records that were previously 'hidden' being accessible to anyone in the world. Thirdly, we have used these data in research, for example, in a project on fish functional diversity, where morphological measurements of museum specimens added great value to a study of temporal changes in freshwater fish assemblages. Alongside taxon-targeted scientific surveys, these approaches can help improve access to Caribbean biodiversity data, allowing more effective conservation and management.

MECHANICAL PROPERTIES ALTERATION DUE TO CO_2 INJECTION: AN EXPERIMENTAL STUDY ON RESERVOIR AND CAPROCK FROM FORMATIONS IN THE SOUTHERN AND COLUMBUS BASIN, TRINIDAD, WEST INDIES

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Growing greenhouse gas concentrations, especially carbon dioxide (CO_2), act as a key contributor for initiating global warming, and by extension, climate change. Carbon Capture and Storage is essential for climate change mitigation strategies, given the rising consumption of fossil fuels and the continued prominence of carbon-intensive industries. CO_2 is an inert gas, but when mixed with brine, it forms carbonic acid and partial dissociation that leads to a reduced pH of the fluid. The injection of CO_2 into depleted hydrocarbon reservoirs (which is generally replaced by brine) will inevitably alter the in-situ stress state and the geochemical conditions of the reservoir and caprock or seals. The impact of CO_2 injection on the physical properties of the reservoir and caprock is not well understood. This study aims to comprehend how the chemical reaction affects the rock's failure envelope and petrophysical properties. This study conducts a batch reaction experiment for 28 days under in-situ reservoir conditions (15,000 ppm salinity, 49°C, and 1410 PSI) using reservoir and caprocks from the Forest, Mayaro, Lower Cruse, and Herrera Formations in the Southern Basin, Trinidad. Strength measurements (Tensile strength, unconfined compressive strength, and confined compressive strength) will be determined to establish the rock's failure envelopes before and after CO_2-rich brine fluid rock reaction. Initial results of the classification of the reservoir and caprock lithofacies within each Formation and their failure envelopes will be presented, and possible alteration to the rocks due to the reactions will be discussed. The interaction of acidic CO_2-rich brine fluid with the reservoir and caprock may cause the rock's strength to reduce, which changes the angle of internal friction and cohesion of the failure envelope. A reduction in the rock's strength may ultimately cause the reservoir and caprock to fail, causing the CO_2 to escape from the intended storage domain.

MORPHOLOGICAL, NUTRITIONAL AND YIELD CHARACTERIZATION OF SIX SWEET POTATO [*IPOMOEA BATATAS* (L.) LAM.] CULTIVARS IN NEW ZEALAND

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Sweet potato [*Ipomoea batatas* (L.) Lam.] is an important tropical staple root tuber crop recognised for its significant potential to contribute to food and nutrition security. The species is morphologically and genetically diverse, with different varieties being adapted to varying agro-ecological conditions and often selected based on agronomic, marketing and cultural preferences. However, there have only been limited characterisation studies, which negatively impact the production and utilisation in New Zealand. The objective of this study was to characterise six sweet potato cultivars found in New Zealand by examining 23 morphological and 11 nutritional characteristics. Some characteristics were found to be highly diverse, with three (3) or more polymorphic states, such as outline of leaf, lobe number, twining, plant type, secondary colour of main vine, skin colour and flesh colour. These characteristics were also some of the main contributors that determined the level of dissimilarity among cultivars. Length of the main vine and the length of leaves showed significant differences ($p<0.05$) among the cultivars. Yield characteristics, including average number of tubers and average weight of tubers, also showed significant differences ($p<0.05$) among the cultivars. 'Purple Dawn' and 'Beauregard' showed similar proximate composition, but differed in total phenolic content, anthocyanin and chlorogenic acid, Vitamin C, and β-carotene contents. This study contributes to sweet potato characterisation, germplasm evaluation and crop improvement in New Zealand and other countries where sweet potato is produced.

DATA-DRIVEN WEIGHTING FOR COASTAL VULNERABILITY ASSESSMENT IN SMALL ISLAND DEVELOPING STATES

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Coastal regions of Small Island Developing States (SIDS) face mounting risks from sea-level rise, storm surge, wave action and socio-economic pressures. Traditional vulnerability indices typically employ fixed, expert-defined weights for hazard and exposure layers, which may not adequately reflect local conditions, especially in SIDS, where data scarcity and environmental variability are prevalent. This can lead to a misrepresentation of the effectiveness of solutions for reducing vulnerability, particularly nature-based ones that play a crucial role in these contexts. We propose a data-driven framework that leverages feature importance values derived from an XGBoost model to assign objective weights to geological

and ecological features. The model was trained to predict significant wave height, and the resulting feature importance values illustrate a data-driven weighting approach that can enhance the design and refinement of coastal vulnerability indices. In addition, Shapley Additive Explanations (SHAP) values were also computed to gain deeper insights into the marginal contribution of each predictor and to validate the robustness of the feature importance results. This framework provides a way to capture the relative influence of key factors, improve the representation of nature-based solutions and support more informed adaptation planning in many countries, especially SIDS.

AN INVESTIGATION INTO THE BIODIVERSITY OF DEEP-SEA WOOD FALLS IN MONTSERRAT

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The deep-sea ecosystem is primarily dependent on food from surface waters in the form of organic carbon. Terrestrial plant materials, such as logs and fallen trees, are transported to the ocean via rivers and streams, where they become saturated and eventually sink to the sea floor. Commonly known as wood falls, they provide a source of food, substrate and habitat to the already deprived deep-sea floor, ultimately creating unique and highly productive habitats. During the decomposition of wood falls, a succession of specialists, opportunistic and chemosynthetic organisms are found present. However, due to a lack of financial and research capacity within the Caribbean region, knowledge of deep-sea habitats such as wood falls is limited. Montserrat is a wooded island within the Caribbean that is subject to volcanic eruptions and large storms that impact both shallow-water and deepwater ecosystems. It is thus likely that wood falls exist and support deep-sea communities. In this research, we assessed remotely operated vehicle imagery of natural wood falls that were found in Montserrat. Additionally, we performed taxonomic and community analyses of fauna that were collected from these wood falls. This research revealed a diverse community of species, including rare and undiscovered fauna that can contribute to new scientific knowledge of Caribbean deep-sea ecosystems.

NATIONAL STRONG MONTION NETWORK OF TRINIDAD AND TOBAGO MEASUREMENTS (MAM)

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Although Trinidad and Tobago is considered to be in an area of moderate seismicity, the risk posed by seismic threat should not be underestimated. With a history of devastating earthquakes, the importance of making informed decisions with respect to planning

and development, disaster mitigation and risk cannot be overstated. The Trinidad and Tobago Microzonation Project was established as a method to drive research-based decisions. As a subsidiary of this project, the National Strong Motion Network (NSMN) was created. The NSMN is made up of 22 strong-motion stations in urban areas across the country. The main objective of the NSMN is to calculate fast and accurately the seismic excitation in urban areas, and produce empirical transfer functions. While the NSMN is extended all over the twin island nation, the pilot area for the production of transfer functions is Port of Spain. The research demonstrates the transfer functions calculated for the Port of Spain area via the standard spectral ratio (SSR) method, and the ground motion intensity calculated for the June 26th 2024, Mw 6.0 event. These results highlight the capabilities of the NSMN to monitor the urban areas, provide fast results that can guide first responders to aid the communities, as well as provide engineers with results useful to help them develop seismic resilient infrastructure.

SEISMIC CHARACTERIZATION OF THE DIEGO MARTIN BASIN, TRINIDAD USING COMBINED MULTICHANNEL ANALYSIS OF SURFACE WAVES (MASW) AND MICROTREMOR ARRAY MEASUREMENTS (MAM)

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Seismic site characterisation is critical in regions such as Diego Martin, Trinidad, which are prone to earthquakes. It involves the assessment of subsurface conditions to determine how a site will respond to seismic activity. Benchmark geotechnical analysis to acquire shear wave velocities using Standard Penetration Test (SPT) and Cone Penetration Test (CPT) techniques is invasive, costly to conduct and extensive to operationalise. With the advent of modern geophysical techniques such as Multichannel analysis of Surface Waves (MASW) and Microtremor Array Measurements (MAM), seismic site characterisation can be accomplished through a non-invasive, easy and fast data acquisition process. The MASW technique, which measures the dispersion of surface waves, is coupled with MAM, which uses ambient seismic noise to estimate the shear wave velocity of the subsurface. This poster presents an integrated geophysical approach utilising Multi-Channel Analysis of Surface Waves (MASW) and Microtremor Array Measurements (MAM) to conduct seismic characterisation according to the National Earthquake Hazards Reduction Program (NEHRP).

SEISMIC VULNERABILITY DISTRIBUTION AND GEOMORPHOLOGY OF THE SEISMIC INTERFACE OF THE DIEGO MARTIN VALLEY

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The Diego Martin Valley is densely populated, with 2,790 people per km^2, and is one of the largest residential districts in Trinidad and Tobago. For a given earthquake, the seismic intensity reports from the Diego Martin Valley are generally anomalously high. With Diego Martin reporting the highest intensities experienced (throughout Trinidad and Tobago) in 39% of the earthquakes in The University of the West Indies (UWI), Seismic Research Centre's (SRC's) felt report database. This suggests anomalously high local vulnerability to the seismic hazard. Constraining the vulnerability distribution via Nakamura's (1997) Kg–index involved recording the ambient ground motion within the Diego Martin Valley to

acquire the Fundamental Frequency (f0) Distribution and associated Amplitude (A0) via Nakamura's (1989) Horizontal–Vertical Spectral Ratio (HVSR) method. The HVSR provides an opportunity to further investigate the geomorphology responsible for the vulnerability distribution when combined with the shear wave velocities within the valley. These are captured using microtremor array recordings that are processed using the High-Resolution Frequency-Wave Number (HRF-K) method after Capon (1969). Oubaiche et al. (2012) have shown that the HVSR peak amplitude is proportional to the shear-wave velocity contrast, given uniformly horizontally stratified layering. However, much of the valley is characterised by significant 2D effects that confound the ability to use the traditional orthogonal mean of horizontal motion to vertical spectral ratio as an approximation of impedance contrast. This work suggests a solution to this industry-wide problem by polarising the HVSRs to the azimuth of minimum amplitude. The resulting contrast ratio (Ap) approximates to actual contrast ratio minus the confounding additional amplification caused by the geomorphology. The resulting polarised frequency peak (fp) and amplitude Ap allow for a better constrained modelling of the valley's seismic interface and the sediment to engineering bedrock interface. The seismic interface model also provides an opportunity to infer the microtectonics responsible for the formation of the valley.

DISCUSSING THE 2025 AND 2018 LANDSLIDES AT LOS IROS, SOUTHERN TRINIDAD: THE HOW, THE WHY AND THE TECHNIQUES USED TO ASSESS

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On 21 August 2018, at 5:31 p.m., the southern, eastern Caribbean experienced a magnitude 6.9 earthquake. The earthquake was located at a depth of 130 km below the Paria Peninsula in Western Venezuela. In the south of Trinidad, in the coastal village of Los Iros, the earthquake triggered a massive landslide with significant structural deformation of the agricultural village reported. Situated in the vicinity of the Southern Anticline, the village is situated above a massive mud diapiric complex characterised by a multitude of mud volcanoes. This intrusive feature cuts through the lower Cruse Formation of sand, silts, and clays. The landslide can be separated into two distinct sections with differing characteristics: 1) a rotational landslide near the coast, which triggered 2) a lateral spread event which occurred further upslope. An intensive geological survey, calculating vectors of displacement from deformation fractures and fissures of the area, reveals the flow and deformation distribution.

On 06 July 2025, the landslide was retriggered 2 weeks after unusually intense rainfall, demonstrating that the phenomenon was not uniquely earthquake-triggered. This latest event exhibits rather similar resultant features to the 2018 earthquake-induced event, in which the same faults were reactivated at a higher intensity, resulting in approximately 3 times the displacement as in the 2018 event. This suggests an ongoing process that should result in future events. Further work incorporating the use of geophysical survey results from 2018 and an experimental, rapid single-site microtremor survey, performed post-2025 event, reveals that the vulnerability distribution, along with potential flow vectors, align well with observed deformation vectors from 2018 and observations made in 2025, demonstrating the efficacy of the rapid survey for future deformation studies.

A MULTIDISCIPLINARY APPROACH INTO THE TEMPORAL EVOLUTION OF NEAR-SURFACE STRUCTURES AND MORPHOLOGY OF THE PIPARO MUD VOLCANO

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The Piparo Mud Volcano represents a major natural hazard in Trinidad and Tobago, underscored by its violent 1997 eruption, which displaced families, killed livestock, and severely damaged water and electrical infrastructure. Despite these risks, monitoring systems, hazard assessments, and disaster management strategies remain limited. To address these gaps, the study aims to: (1) map and monitor the near-surface structures using pseudo-3D electrical resistivity tomography (ERT); (2) constrain these structures with borehole sample analyses; and (3) monitor the pressure and ambient temperature of the pressurised mud fluid reservoir. This study is the first globally to directly monitor pressure within an active mud fluid reservoir, yielding new insights into mud volcano dynamics. The results reveal three near-surface structures with resistivity values ranging from 1.2 to 6.6 Ωm: a pressurised mud fluid reservoir (< 2.5 Ωm), silty claystones (> 3.2 Ωm), and clayey siltstones (2.5 to 3.2 Ωm). The pressurised mud fluid reservoir, with a volume of 315,574 m^3, has migrated northwest of the main crater and is enclosed by clayey siltstones, with silty claystones along its periphery. Silty claystones are dominated by quartz (38%), kaolinite (18%) and interstratified illite-smectite (14%) minerals, while the carbonate content is minimal (9%). Clayey siltstones are dominated by quartz (32%), kaolinite (21%), illite/muscovite (17%), interstratified illite-smectite (13%) and chlorite (5%), with minimal carbonate content (2%) and trace pyrite (1%). Pressure and ambient temperature data, collected from five strategically placed monitoring wells within the pressurised zones, reveal a direct relationship between pressure and temperature, with pressure rising steadily and cyclic thermal trends observed. The results reveal active lateral movement and heightened pressurisation within the Piparo Mud Volcano, emphasising the need for systematic monitoring and understanding of its structure. These insights will support the creation of hazard zonation maps and early warning systems to predict future eruptions.

MONITORING TERRESTRIAL GAMMA RADIATION TO CHARACTERIZE MUD VOLCANIC ACTIVITY: EVIDENCE FROM THE PIPARO MUD VOLCANO, TRINIDAD AND TOBAGO

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The Piparo Mud Volcano represents a major natural hazard in Trinidad and Tobago. Such destructive events result from overpressurised subsurface conditions that force fluidised mud and gas to the Earth's surface or seafloor. These emissions may occur abruptly, as in 1997, or

more gradually, as observed in the recent 2019 and 2024 events. Yet, despite the ongoing risks posed by sporadic eruptions, current monitoring frameworks remain predominantly surface-based and event-driven, offering limited insight into deeper structural and geophysical precursors that may signal impending activity. To address this gap, this study pioneers a novel approach that utilises gamma radiation monitoring to: (1) explore the correlation between spatial gamma radiation patterns and geomorphological features, (2) examine temporal variations in gamma radiation, and (3) evaluate the use of gamma radiation to predict volcanic activity. Gamma radiation data were collected at 40 locations over 29 months at six intervals (0, 4, 11, 17, 23 and 29), using a Geiger-Muller counter, both 1 meter above-ground level (GL) and 0.5 meters below-GL. Gamma radiation exhibited distinct patterns across three phases: pre-activity (months 0-11), active (months 11-17), and recovery (months 17-29). Above-GL radiation was highest in the southern and eastern areas of the main crater, while below-GL levels were highest in the northern and western sectors, reflecting the distribution of syngenetic fractures and smaller subsidiary craters. During the pre-activity phase, above-GL radiation increased while below-GL declined. In the active phase, radiation signals converged, coinciding with an eruption in month 13. During recovery, above-GL increased again, while below-GL declined. These phase-specific patterns indicate a clear link between gamma radiation fluctuations and volcanic activity, highlighting a promising method for early detection, improving mud volcano monitoring and supporting risk management.

MACHINE LEARNING FOR CLIMATE PERCEPTION INSIGHTS IN THE CARIBBEAN: A FRAMEWORK FOR ACTION

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This research presents a machine learning (ML)–driven framework for enhancing the understanding of climate perceptions in Caribbean Small Island Developing States (SIDS). Given the region's acute vulnerability to climate-related hazards, the framework introduces a dynamic feedback model for analysing public attitudes using data drawn from surveys, social media, and public discourse. Techniques such as sentiment analysis, topic modelling, and large language models are applied to extract localised concerns, behavioural trends and communication gaps. Traditional perception research methods are contrasted with ML-enhanced approaches, emphasising the potential for greater responsiveness, scalability, and cultural relevance. Key focus areas include climate education, early warning systems, digital engagement and participatory governance. The framework also addresses ethical considerations in AI and the importance of inclusive, multilingual analysis. By translating public perceptions into actionable insights, this research supports the design of more adaptive, community-informed climate strategies for vulnerable island contexts.

DOES CLIMATE AFFECT DENGUE INCIDENCE? A REVIEW OF RAINFALL, TEMPERATURE AND HUMIDITY AND DENGUE INCIDENCE IN TRINIDAD AND TOBAGO FROM 2019 TO 2023

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Objective: To determine whether there is an association between the climate variables temperature, rainfall and humidity with dengue cases notified to the Ministry of Health from 2019–2023 in Trinidad and Tobago.
Method: A retrospective study was undertaken to review dengue notifications reported to the Epidemiology Unit, Ministry of Health, Trinidad and Tobago and weather data obtained from the Trinidad and Tobago Meteorological Service for the period January 1, 2019, to December 31, 2023. Data were analysed using Spearman's rank correlation coefficient to explore associations between the climate variables and dengue cases.
Results: Higher rainfall is associated with an increase in dengue cases ($\rho = 0.327$, $p = 0.010$). The positive ρ indicates a moderate positive monotonic relationship between dengue cases and rainfall total and this relationship is statistically significant**.** There was a weak positive monotonic relationship between dengue cases and average humidity; as humidity increases, there is a tendency for dengue cases to increase ($\rho = 0.245$, $p = 0.056$). For temperature ($\rho = -0.108$, $p = 0.402$), the negative ρ suggests a very weak negative monotonic relationship, where higher temperatures are slightly associated with fewer dengue cases. However, the correlation is extremely weak without statistical significance.
Conclusion: This study reveals varying degrees of association between dengue cases and the weather variables. It supports the theory that rainfall facilitates an increase in dengue cases, with the relationship with humidity less clear. The role of humidity in dengue transmission is not supported by the evidence from this study. As the study was conducted during the height of the COVID-19 pandemic, under notification of infectious diseases, a phenomenon reported globally, may have occurred. Further research is therefore recommended to explore the findings from this study.

AN EVALUATION OF THE KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDS CLIMATE CHANGE AND HEALTH AMONGST THE GENERAL POPULATION OF TRINIDAD

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Objective: To evaluate the knowledge, attitudes and practices among the public in Trinidad on health and climate change.
Methods: A cross-sectional study design with interviewer-assisted questionnaires was used to collect data from the general public in Trinidad. The sample size was 425, and convenience sampling was used. Descriptive statistics were used to summarise survey responses. Statistical Package for the Social Sciences Statistics (SPSS) software was used for analysis.

Results: Data from 431 participants were analysed, with 37.8% moderately familiar with the term "climate change", 94.9% equating it to global warming and 89.6% identifying human activity as the major cause. Most (74.9%) were aware of the health impacts, linking respiratory illnesses (86%), heat-related conditions (84.5%) and vector-borne diseases (49%) to climate change. Most participants (84.9%) believed that climate change would have long-term impacts on health, while 67.8% were either moderately or extremely concerned about the health impacts of climate change. Less than a quarter of participants were aware of the government's efforts to address the health impacts of climate change (20.6%), while 68.9% believed that a large-scale government effort was required, prioritising educational campaigns (91.4%) and renewable energy (78.9%). Participant actions taken to protect themselves against the health impacts of climate change included increasing water intake during heatwaves (91.7%) and installing air conditioning units (67.5%).
Conclusions: Although the Trinidadian general public had low familiarity with climate change, many were at least moderately concerned about the impact of climate change on health. Most participants were unaware of government initiatives, which may suggest a disconnect between policy efforts and public communication. These findings suggest the need for enhanced public engagement, improved educational efforts, and more visible policy-driven interventions to promote climate-health resilience.

"BASED ON SCIENTIFIC ADVICE": THE ROLE OF THE ACADEMIC IN CARIBBEAN DISASTER RISK MANAGEMENT

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The small island developing states (SIDS) of the Eastern Caribbean are home to 21 potentially active volcanoes. SIDS typically have very narrow economic bases that can be severely impacted by hazard events. Shocks to these small economies usually have very dire consequences for island populations and governments that manage perennially scarce resources. Also, small populations often mean relatively few experts available to guide public preparedness and response to natural hazard events. This shortage of expert capacity is even more acute for low-frequency events like volcanic crises. In these circumstances, scientists invariably work very closely with risk managers who may face significant political pressure. These conditions increase the managerial risks faced by scientists as they can lose credibility and could be legally liable for the negative outcomes. Juvenile disaster risk governance frameworks that have not yet legislated binding crisis management protocols also present several other challenges. This work discussed some of the challenges faced and solutions devised by volcanologists working to understand volcanic hazard and advise multiple governments in the English-speaking Eastern Caribbean. The opportunity was taken to share some of the lessons learnt from experiences leading up to and during the 2020–2021 eruption of the La Soufrière Volcano, St. Vincent. Finally, the research discussed the value of effective communication between risk management stakeholders during inter-eruptive periods in facilitating sustainable economic development, particularly in SIDS.

EFFECT OF ALGAL-BASED PLANT BIOSTIMULANTS ON HONEYBEES (*APIS MELLIFERA*)

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The decline of honeybee populations in Trinidad threatens the productivity and sustainability of the nation's cash crops. In response to these challenges, the use of plant biostimulants, particularly algal-based formulations, has gained popularity in the Caribbean as a sustainable alternative to conventional pesticides. However, the effects of the biostimulants on the activity of bees remain unclear. The current study investigated the effects of three algal-based biostimulants (OJA1, Omex, and Algas) derived from *Sargassum* spp. on the *in vitro* toxicity and the relative gene expression levels of four important functional genes (vitellogenin, HSP70, SOD and CAT) in honeybees. *Aphis melifera* drone bees were exposed to a solution of sugar syrup (40%) containing individual biostimulants at the concentrations, 1%, 0.8%, 0.5% 0.3%,0.1%, 0.05% v/v for 24h in closed containers. The observed effects, including mortality (LC50) and motionlessness, were monitored for a period of 24 hours. Total RNAs were extracted from bees from each treatment at 12-hour and 24-hour exposure, and subsequently, relative gene expression levels were analysed. The definitive toxicity test (LC50%) indicated that Omex and Algas resulted in mortality (75% and 33% respectively) of bees at the recommended concentration of 0.5% over 24 hours. In contrast, (OJA1) displayed no observed effect (NOEL) at 0.5% over 24h at 0.5%. Relative expression of vitellogenin was highest in Omex-treated samples, whereas HSP70 and SOD were downregulated under OJA1 and Algas treatments. Notably, catalase expression was elevated in OJA1 up to 12 hours compared to the other biostimulants. In conclusion, the biostimulant OJA1 was found to be non-hazardous to *A. melifera* at the recommended concentration of 0.5% as opposed to commercial Omex and Algas, which imposed moderate toxicity. This understanding will help apiary and agricultural farmers to regulate the use of biostimulants in crops.

RESILIENCE IN THE CLIMATE CRISIS: A COMPARATIVE ANALYSIS OF PRE-ARRANGED DISASTER FINANCING STRATEGIES IN THE CARIBBEAN

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This paper offers a comparative analysis of Pre-Arranged Disaster Financing (PAF) strategies across ten Caribbean nations: Antigua & Barbuda, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St. Kitts & Nevis, St. Lucia, and St. Vincent & the Grenadines. As Small Island Developing States (SIDS) confront escalating climate-related risks, these countries have developed sophisticated, multi-layered financial mechanisms to bolster resilience. The study evaluates the region's PAF approaches, including sovereign reserves, contingent credit lines, and innovative tools like Climate-Resilient Debt Clauses. It highlights distinct strategies among OECS members, larger economies, and continental states, while addressing systemic challenges such as fiscal constraints, rising risk transfer costs, and data and capacity gaps. The analysis also underscores the importance of private sector involvement and the integration of gender and social inclusion for equitable resilience. Ultimately, the paper proposes actionable policy recommendations to strengthen the

financial architecture for a climate-resilient Caribbean future.

CLIMATE-SMART TECHNOLOGIES FOR BIODIVERSITY CONSERVATION, FOOD SECURITY & DISASTER MANAGEMENT: OPTIMIZING AQUACULTURE, HYDROPONICS, AQUAPONICS, AND BLACK SOLDIER FLY TECHNOLOGY THROUGH CIRCULAR BIOECONOMY PRINCIPLES

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Climate change and environmental degradation pose unprecedented threats to biodiversity and food security. This research develops and optimizes four climate-smart, sustainable technologies such as aquaculture, hydroponics, aquaponics, and black soldier fly (BSF) technology to enhance agricultural resilience while promoting biodiversity conservation and disaster management readiness. The study identifies and evaluates optimal system types and designs for each technology using rigorous criteria aligned with circular bioeconomy principles, including resource efficiency, waste reduction, ecosystem benefits, and scalability. Through comparative analysis, the research demonstrates how these integrated systems minimise environmental impact while maximising productivity and nutritional output. Key findings highlight context-specific applications: aquaponics and hydroponics for both water-scarce and flooded areas, aquaculture for coastal and inland communities, and BSF technology for organic waste valorisation and sustainable protein production. Each system addresses critical challenges, including water scarcity, land degradation, food insecurity, and climate vulnerability, while generating co-benefits for local biodiversity and ecosystem services. The research presents comprehensive assessments tailored to Trinidad and wider Caribbean contexts and demonstrates that climate-smart agricultural technologies, when optimised through circular bioeconomy frameworks, serve as effective nature-based solutions that simultaneously address climate adaptation, disaster resilience, food production, and biodiversity conservation—essential priorities for Caribbean sustainable development.

EVALUATING THE EFFECTIVENESS OF PASSIVE ACOUSTIC MONITORING AT DETECTING ANURANS IN CARIBBEAN TROPICAL FORESTS

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Passive acoustic monitoring (PAM) has emerged as an innovative technique that can be used to monitor biodiversity. Yet, the global distribution of its application is uneven, and few studies have evaluated its effectiveness for amphibians. Given the pressing need to improve conservation actions for this taxon, recommending efficient ways to monitor species is urgently needed. We aimed to evaluate the effectiveness of PAM by comparing the number of species, community composition, and species accumulation detected with those detected using the traditional method of visual encounter surveys (VES) in Caribbean tropical forests. The study sought to utilise findings to develop much-needed recommendations to guide monitoring and inform management for amphibians in the region. From five fixed tropical forest sites sampled across Trinidad and Tobago, it was

discovered that PAM detected 16 species, more than twice as many species as VES at six species. Using the Chao2 species richness estimator, PAM (16.4, SE 0.95) was also more comprehensive than VES (9.2, SE 4.31). Using a pattern matching algorithm, no new species were detected from PAM after the first week of sampling in July within our fixed sample sites, which suggests this could be a key survey period to focus monitoring efforts. The effort in terms of time collecting data was similar between the two methods, totalling 1,500 minutes evaluated across all five sites; PAM involved more analysis time in processing the sound files, yet required fewer field visits and resulted in greater community completeness. Where resources permit, it is recommended that PAM be used to survey amphibians in Caribbean forests, with sampling concentrated during the first two months of the rainy season to monitor communities optimally.

BALLAST WATER MANAGEMENT IN SMALL ISLAND DEVELOPING STATES (SIDS) OF THE CARIBBEAN

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The Caribbean Large Marine Ecosystem is a highly biodiverse region in the Western Tropical Atlantic Ocean and provides important habitats for resident and migratory organisms. Caribbean Small Island Developing States (SIDS) are heavily dependent on shipping. Ballast water operations increase the risk of biological invasions and the establishment of marine invasive alien species. This study assessed the status of ballast water management in Caribbean SIDS. The specific objectives were to assess (i) the policy, legal and institutional governance framework for ballast water management in Caribbean SIDS, and (ii) the status of ballast water research in the Caribbean. Many Caribbean SIDS have acceded to the International Ballast Water Management Convention, but a minority have enabled domestic legislation to implement Convention provisions. Caribbean SIDS have not enabled a robust policy and institutional framework, but have adopted a piecemeal approach, such as publishing technical notices for instructing local vessels. Challenges include lack of legislation, enforcement difficulties, shortage of legal drafters, political expediency, insufficient staffing/budgetary allocations and lack of technical capacity. Ballast water and marine invasive research in the Caribbean remains sparse and regionally fragmented, with gaps in sampling and analysis, port biological baselines, risk assessments and species potentially transported by ballast water. Caribbean SIDS must improve policy and governance frameworks to address marine bioinvasions and protect marine ecosystems. This must be complemented by scientific research, baseline monitoring and risk assessments to support evidence-based decision-making to promote marine surveillance and early detection. These findings can inform national, regional and international policy discussions to strengthen implementation.

THE DIVERSITY OF BRYOPHYTES IN THE NORTHERN RANGE, TRINIDAD, AND MAIN RIDGE, TOBAGO

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This study presents a comprehensive assessment of the bryophyte flora in the forests of the Northern Range, Trinidad, and the Main Ridge, Tobago — regions critical to the Caribbean biodiversity hotspot. Through systematic collections from 2016 to 2017, a high diversity of bryophytes across numerous localities was documented, with over 600 specimens identified. The findings revealed a rich community dominated by mosses from the families Sematophyllaceae, Calymperaceae, and Leucobryaceae, and liverworts from the Lejeuneaceae and Plagiochiliaceae. The data indicate that these forest reserves are significant reservoirs of bryophyte diversity, hosting a wide range of genera including *Taxithelium*, *Sematophyllum*, *Octoblepharum*, *Fissidens*, and *Plagiochila*. This research established a vital baseline for the understudied bryoflora of Trinidad and Tobago, highlighting the importance of these habitats for conservation and future biogeographical studies of tropical bryophytes.

CO_2-BRINE-ROCK INTERACTIONS IN DEPLETED OIL RESERVOIRS: EFFECTS ON CARBONATIC AND OIL-STAINED SILICATIC SANDSTONE PROPERTIES

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The depleted Forest Reserve Field in the Southern Basin, Trinidad, is being evaluated for CO_2 storage. However, interactions between CO_2 and the reservoir rocks may alter the rock matrix, potentially affecting the long-term storage. This study conducted batch experiments under three fluid conditions: (1) brine and rock, (2) supercritical CO_2 (sc-CO_2) and rock and (3) sc-CO_2–brine and rock. The reactions were conducted for 28 days under in-situ reservoir conditions (15,000 ppm salinity, 49°C and 1410 PSI) using reservoir rocks (consolidated carbonatic sandstone and semi-consolidated oil-stained siliciclastic sandstone) from the Forest Formation. Rock samples were analysed for petrophysical (porosity and permeability), mechanical (Unconfined Compressive Strength (UCS) and tensile strength), and seismic (P- and S-wave velocities) properties before and after each reaction. Results showed an increase in porosity and permeability for the oil-stained sandstone after reaction with sc-CO_2. In contrast, the permeability of the carbonatic sandstone decreased after brine reaction but increased after reaction with sc-CO_2–brine. P-wave velocity decreased for the carbonatic sandstone but increased for the oil-stained sandstone after reaction with sc-CO_2. Mechanical tests revealed significant UCS increases for the carbonatic sandstone and decreases for the oil-stained sandstone under all reaction conditions. The tensile strength of the clean sandstone decreased significantly after reaction to all fluids, while the oil-stained sandstone showed increased tensile strength after brine and sc-CO_2–brine reactions. X-Ray Diffraction, X-Ray Fluorescence, Atomic Absorption Spectroscopy, and thin section analyses showed that the mechanisms causing the changes in the rock matrix were precipitation, dissolution, mineral alteration and fracturing. Extended reactions beyond 28 days may result in more substantial alterations to the rock matrix, which could either benefit or deter the long-term storage of CO_2.

METATRANSCRIPTOMIC ANALYSIS OF MOSQUITO VIROMES REVEALS HIDDEN ARBOVIRAL DIVERSITY AND FIRST REPORTS OF *CAAINGUA* AND *PACORA* VIRUSES FROM *CULEX* SP. MOSQUITOES IN TRINIDAD

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Emerging and emergent arboviruses are constant threats to public health. Climate change and urbanisation are some major driving forces influencing arbovirus spread through effects on insect vector populations. There is limited pathogen-agnostic surveillance of mosquito-borne arboviruses in Trinidad and Tobago. This study is part of a longitudinal passive surveillance effort employing metatranscriptomics to detect and characterise mosquito-borne arboviruses in an unbiased manner. A forested site with shifting land use towards residences and agriculture, representing a frontier for human and mosquito interface in a changing environment, was selected. A total of 575 mosquitoes were collected in June (*Culex* spp. (n=325), *Haemagogus janthinomys* (n=8), *Psorophora albipes* (n=41), *Sabethes* sp. (12), Total=386) and September (*Culex* spp. (n=129), *Ochlerotatus* sp. (n=24), *Psorophora* sp. (n=36), Total=189). Most viruses were insect-specific and from the following families: Mesoniviridae, the Riboviria group, Orthomyoxoviridae, Flaviviridae, Peribunyaviridae, Phenuviridae and Rhabdoviridae. Three viruses of interest were identified from Culex sp. mosquitoes. Of these, *Caaingua virus* (Alphavirus) and *Pacora virus* (Orthobunyavirus) were detected for the first time in Trinidad. *Caaingua virus* is most closely related to *Venezuelan* and *Eastern equine encephalitis viruses* and can infect human mononuclear cells. *Pacora virus* is related to the Guama virus group, which includes human and animal-infecting orthobunyaviruses, and *Oropouche virus*. The third, a novel *Phlebovirus* sp., is closely related to *Itaporanga virus* (Phlebovirus) originally reported in *Culex* sp. mosquitoes in Trinidad in the 1960s. It is also similar to other human-infecting phleboviruses (57% RdRp similarity) and has demonstrated potential to infect animals. While there is currently no evidence of human infections by these three viruses in Trinidad, their detection highlights gaps in our knowledge about circulating viruses, the importance of arboviral surveillance and the utility of metatranscriptomic sequencing to identify known and potentially novel viruses.

ACTUARIAL APPROACHES TO ENERGY STABILITY IN TRINIDAD AND TOBAGO

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This report outlines a strategic framework for accelerating the adoption of renewable energy in Trinidad and Tobago through household-level solar solutions. Faced with low electricity prices, high national debt, and rising climate impacts, the report evaluates the financial and environmental merits of transitioning to solar water heaters, solar-powered air conditioners, and photovoltaic (PV) systems. Utilising linear regression, scenario modelling, and natural gas equivalency analysis, the study estimates that large-scale adoption could reduce electricity demand by over 3 billion kWh annually, conserve up to 660 million cubic metres of natural gas, and reduce carbon emissions by

1.27 million tonnes per year. These savings could generate up to $92 million USD in foreign exchange revenue through natural gas exports. The report found that investment in solar technologies is cost-effective even under conservative assumptions, and it recommended electricity rate reform, government-backed financing, and the implementation of net metering and feed-in-tariff policies to support adoption. The proposed interventions can enhance national energy security, reduce fiscal pressure and align consumer behaviour with sustainable development goals.

GENOME WIDE ASSOCIATION STUDIES FOR FLOWERING TIME, POD DEVELOPMENT PERIOD AND SELECTED YIELD COMPONENTS IN *THEOBROMA CACAO* L.

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Cocoa (*Theobroma cacao* L.) is an understory tree crop of neotropical origin, with primary populations of cocoa dispersed across various parts of Central and South America. Genetic diversity studies have shown that the populations of cocoa can be grouped into ten phylogenetic groups, corresponding to the geographic locations from where they evolved under various environmental pressures. The diversity of cocoa has been collected and conserved in two international collections. The International Cocoa Genebank, Trinidad (ICGT), is considered the largest and most diverse collection of cocoa in the public domain. Among the challenges facing the cocoa industry, the adverse impacts of climate change on the global cocoa industry are considered among the most important. Flowering time and pod development period are two important traits that govern the adaptation of cocoa cultivars to specific environments. To understand the genetic diversity for flowering time, pod development period and pod and bean characteristics within the ICGT, a subset of genotypes representing the various genetic groups (a minimum of ten accessions per genetic group/ hybrid population) were studied over five years (2016–2021). From each accession, 20 flowers were tagged, and successful pod sets were followed to maturity with pod length and width measurements taken at fortnightly intervals. At pod maturity, the pod dimensions, the number of beans and bean size, bean weight (10 beans-fresh and dry) were determined. The study showed considerable genetic diversity for the traits investigated. To further understand the genetic basis of these traits, genome-wide association studies were conducted on 291 accessions that have been studied for 5 years (2016–2021) for selected traits like pod development period, pod length, pod width, bean number per pod, bean length, bean breadth, bean width and bean mass. Significant markers have been identified for phenotypic traits, viz. pod development period, pod width, bean number, bean width and bean breadth. Once validated, these molecular markers will allow for genomic selection towards improving climate resilience and yield in cocoa.

ASSESSING THE RELIABILITY OF SATELLITE OBSERVATIONS IN ATLANTIC SARGASSUM MONITORING PROGRAMS

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The Caribbean spends an estimated US$120 million to US$210 million annually on *Sargassum* cleanup, resources that could be better directed towards other priorities (Davis

et al. 2021; Milledge and Harvey 2016). For over a decade, the Caribbean has been seeking sustainable solutions to this crisis. Given the devastating effects, the region requires effective monitoring, advisory and valorisation initiatives to mitigate the impact of influxes. One strategy has been the implementation of remote sensing systems. However, the effectiveness of satellite-based systems requires verification using localised data, which are not currently present. Without such integration, their reliability remains questionable, emphasising the need for a more rigorous validation process. This study evaluated specific systems based on data availability, accuracy, resolutions, operational capacity and model flexibility. Findings indicate that the accuracy of each is lessened by resolutions and optical barriers caused by environmental, atmospheric and oceanic conditions. Improving these limitations aims to develop a reliable, sustainable, iterative and replicable approach for understanding the region's *Sargassum* monitoring needs. As such, this research proposes a new methodology that incorporates two phases: Phase One involves drone flights and analyses using open-source software to detect *Sargassum* in coastal environments and develop a localised data source. Comparing the data from drone flights to existing satellite systems' advisory systems will ascertain the most reliable and accurate advisory approach. Phase Two focuses on valorisation by conducting interviews with entrepreneurs surrounding *Sargassum* extraction, utilisation and limitations for a better understanding of existing solutions and sustainability. By combining these two phases, the study aims to develop a scientifically informed, cost-effective and sustainable approach to monitoring and management of *Sargassum* influxes in the Caribbean.

SWARNETT – A COMMUNITY NEWS NETWORK

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The Caribbean is a region that is prone to natural disasters. As Small Island Developing States (SIDS) sitting in the direct path of Tropical Cyclones resulting from the annual Atlantic Hurricane Season, the islands are extremely vulnerable and have seen the full effects of natural disasters. Other than natural disasters, these developing nations are also vulnerable to the effects of manufactured disasters like war, crime and cybersecurity attacks. After such events, the most critical activity is Post-Disaster Management, and restoring a sense of calm and order to the citizens of the region. Having timely and accurate communication is a paramount aspect of the Post-Disaster Management activity. Persons should be able to communicate with each other to ascertain whether they are safe or in peril, what the needs of their loved ones are and where they can seek aid if needed. Given these needs, the Severe Weather and Resilient Network (SwarNeTT) is proposed. SwarNeTT is a community news network that allows persons within close vicinity to communicate with each other in the presence of and the absence of Network Infrastructure. Built as a Mobile AdHoc Network (MANET), SwarNeTT uses Wi-Fi Direct to connect nearby devices and create a communication network "on-the-fly". This network allows community members to converse with each other after a disaster has occurred and ascertain verified information that can save their lives. To ensure that the messages posted as valid, the SwarNeTT application engages a fake news detection architecture to stem the spread of fake news. SwarNeTT has been deployed thus far in the

Couva-Tabaquite-Talparo region for testing and acceptance. These tests have produced satisfactory results showing that the network can communicate over 191m and using 1Mb of bandwidth over a five (5) minute period. As such, the SwarNeTT application performs well and can create a communication link for those in need.

THEME III

HEALTH AND WELL-BEING: ISSUES AND ADVANCES

HEALTH DISPARITIES IN WOMEN WITH ULTRASOUND-CONFIRMED POLYCYSTIC OVARY SYNDROME IN TRINIDAD: A CROSS-SECTIONAL STUDY

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Objective: To assess clinical, reproductive, dermatologic and psychological differences between women with and without Polycystic Ovary Syndrome (PCOS) in Trinidad.
Methods: A survey of 308 women aged 18–45 was recruited online using convenience sampling. Data were collected via Zoom/WhatsApp interviews, using a 54-item structured questionnaire covering demographics, menstrual and reproductive history, dermatologic features and mental health. PCOS status (CONFIRMED-PCOS, PROBABLE-PCOS or No-PCOS) was classified by self-reported ultrasound diagnosis using the National Institutes of Health (NIH) 1990/2023 International Guidelines. Group differences used ANOVA or Kruskal–Wallis and Pearson χ^2 for categorical variables
Results: Of 308 respondents, 43 (14%) had CONFIRMED-PCOS, 13 (4%) PROBABLE-PCOS, and 252 (81%) No-PCOS. Mean age was 28.9±8.7 years and mean BMI 26.4±7.5 kg/m^2, with PCOS women significantly younger (24.2 vs. 29.8 years, p=0.006). No group differences in BMI, education, lifestyle habits (alcohol, smoking, exercise) or ethnicity. PCOS was associated with longer cycle length (p=0.009) and more irregular bleeding (67% vs. 21%, p<0.001). Compared with No-PCOS, those with CONFIRMED-PCOS had higher prevalence of dermatologic features (acne (~4 times), alopecia (~7 times) and acanthosis (~3 times)), fewer live births (p=0.002) and greater contraceptive use (~9 times, p<0.001). Depression severity strongly tracked with PCOS, with odds of PCOS rising nearly tenfold for mild and over twentyfold for severe cases of depression (all p<0.001). Probable-PCOS (4%) showed pronounced clinical features despite

similar BMI/lifestyle: highest hirsutism burden (FG median 10) and greater odds of alopecia (~7×) and acanthosis (~3×) vs No-PCOS. Metformin use was enriched (OR 5.16, p=0.007) while contraception and cycle length resembled No-PCOS; the depression signal was driven by severe symptoms (OR 28.1, p=0.002).

Conclusions: Ultrasound-confirmed PCOS in Trinidad was associated with significant menstrual, reproductive, dermatologic and mental health burdens despite similar BMI, lifestyle and sociodemographic profiles. Findings highlight the need for earlier diagnosis and integrated multidisciplinary care in under-resourced, ethnically diverse populations.

KNOWN RISK FACTORS OF CANCER, LIFESTYLE AND DIET AMONG A POPULATION OF CARIBBEAN IMMIGRANTS

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The aim was to investigate modifiable known risk factors of cancer: socio-demographics, lifestyle and diet among a population of Caribbean immigrants in the US. The data were processed and analysed using the SPSS software and Microsoft Excel. Descriptive statistics included mean, median, mode and standard deviation. The frequency and percentages of the different variables in the study were calculated using SPSS. Crosstabulations were done. The Chi-square test was used to evaluate the hypothesis. Statistical significance was defined as $p<0.05$. Out of 388 participants, 229 (59%) were female, and 159 participants were male (41%). Only 5.4% lived in less clean neighbourhoods. Approximately 27.3% of the participants found it very easy to balance work and their personal lives. At least 90.5% of the immigrants completed high school. More than 50% of the participants indicated that they did not have any dietary restrictions. Vegetarians accounted for 20.1%. Half were more likely to be in the healthy or very healthy categories. About 7.5% drank alcohol, and 4.6% smoked every day. Additionally, one-third of the immigrants were vaccinated against the Papillomavirus vaccine (31.7%). Further, 5.4% of the sample was treated for gastritis caused by H. pylori. Only 18.3% considered themselves to be overweight or obese, with eating mostly fruits and vegetables cited as widespread among the participants. Physical activity was engaged in every day or a few times a week for the participants (67%). This study showed that among 388 Caribbean immigrants in the United States of America (USA), most were educated (among respondents: 28.4%, 44.8% and 16.2% attended High School, College/University, and completed post-graduate studies, respectively). Although the unemployment rate was a bit high (19.6%) and the extreme poverty rate was 10%, at least one-third of the immigrants benefited from the screening programmes provided by health institutions. The results also showed that 17.3% of participants performed PSA, 34.8% screened for HBV and HCV, 26% took an HIV test, and 14.9% did a faecal occult blood test. Other screening procedures performed by the immigrants were pap-smear (62.4%), mammogram (45.4%), colonoscopy (21.4%), and gastro-duodenoscopy (9.3%). These facts suggest that a number of immigrants in the USA present risk factors for cancer, and whether these develop into malignancies would ultimately depend on the interaction of environmental, lifestyle and genetic factors.

WHAT CAN TRINIDAD'S BATS TELL US ABOUT CORONAVIRUSES IN THE CARIBBEAN?

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Coronaviruses (CoVs) circulating in animals, particularly among bats, are recognised as having significant potential for zoonotic spillover into humans. Both α- and β-CoVs have demonstrated a historical capacity to cross species barriers, but it is the β-CoVs—such as SARS-CoV, MERS-CoV and SARS-CoV-2, which are most associated with major outbreaks in humans. Bat surveillance studies in the Americas have overwhelmingly revealed α-CoVs, with few β-CoVs detections. To date, only α-CoVs have been reported in the Caribbean. In this study, the researchers screened oral and rectal swabs from 91 bats belonging to 14 different species collected in Trinidad and Tobago using a pan-CoV RT-PCR. Eight positives were detected, and amplicons were sequenced using a nanopore platform. Sequences recovered from three individual Carollia perspicillata bats were most closely related to a Trinidad bat α-CoV first identified in 2007, which has since been shown to be widely distributed throughout the Caribbean and Latin America. Additionally, 39 bat serum and tissue samples from an archived library collected across Trinidad, Suriname, and Guyana were screened using a metagenomic sequencing approach. No CoV sequences were recovered; however, a consensus sequence was assembled from Bat Pegivirus I, which reads as obtained from another C. perspicillata individual. This extends the known host and geographic range of this virus in the Americas. Screening of remaining samples using both RT-PCR and metagenomic techniques is currently underway. Surveillance for bat CoVs in the Americas is limited, particularly so within Caribbean islands. The close ecological interfaces between bats, humans, and domestic animals in the region elevate the potential for zoonotic spillover events, whose early detection is essential for public health preparedness. Without enhanced monitoring, the true diversity and epidemic risk posed by coronaviruses within Caribbean bat reservoirs will remain unknown, limiting our ability to anticipate and mitigate emerging viral threats.

HERBAL MEDICINES AND BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE INDIVIDUALS ACROSS TWO OF TRINIDAD'S REGIONAL HEALTH FACILITIES

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Background: Self-medication with herbal medicine (HM) to manage hypertension is an expanding trend worldwide. There is very little evidence to substantiate the motives for use in the control of blood pressure (BP). This study aims to ascertain the relationship between HM and antihypertensive treatment to manage hypertension across two regional health facilities in Trinidad.
Methods: This cross-sectional investigation surveyed hypertensive patients aged 35–64 from the North-Central and Eastern Regional Health facilities across Trinidad. Consent was obtained from 139 participants through convenience sampling. Data collection was obtained using a questionnaire designed and developed by the research team, including self-reporting questions and patient medical

records sections. Data were analysed using Chi-square and Mann-Whitney U tests for non-normally distributed variables, with statistical significance set at a 95% confidence interval.

Results: HM-users were either hypertensive stage 1 or 2 with no significant correlation between BMI and hypertensive stage (*p*-value = -0.053, *p*-value = 0.537). Garlic (*Allium sativum L)* (57%), most used as a tea, was taken daily 'to control BP'. The current systolic and diastolic blood pressures were not significantly different between HM-users and non-users. Among herbal medicine users, 15.7% achieved blood pressure control compared to 30.4% for non-users. Patients using herbal medicine (84.3%) were more likely to have uncontrolled blood pressure (p-value <0.05), supported by a negative correlation (phi = -0.175) and an odds ratio (95% CI) of 0.426 (0.187-0.969). Patient non-concordance to conventional medication was found to be higher among HM-users identified by the negative association among patients with uncontrolled BP. However, there was no statistically significant difference in non-concordance between HM users (40%) and non-users (29.6%). Antihypertensives prescribed included calcium channel blockers (70.1%), ACE inhibitors (46.3%), and angiotensin-II receptor blockers (40.6%). The most used herb, *A. sativum,* was preferred for BP control; however, this study showed no significant changes in BP compared to non-users.

Conclusion: Patient medication concordance is imperative. Herb-drug interactions may be associated with the higher prevalence of patients at hypertensive stages 1 and 2 that are uncontrolled in this study.

METAL-DIRECTED COORDINATION COMPOUNDS: FROM MOLECULAR DESIGN TO FUNCTIONAL APPLICATIONS

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Metal-directed coordination chemistry represents a cornerstone of modern inorganic and materials research, offering a powerful platform for constructing complex molecular architectures with tunable structural and functional properties. This presentation highlights the synthesis, structural diversity, and multifunctional applications of coordination compounds, emphasizing how metal ions act as organizing centers that control ligand orientation, geometry, and reactivity. Particular attention is given to Schiff bases, hydrazones, and terpyridines, which remain among the most widely used ligands due to their ease of synthesis, electronic adaptability, and strong metal-binding ability. These ligands facilitate the formation of mono- and multinuclear metal complexes, enabling fine modulation of electronic communication and cooperative reactivity between metal centers. Notable examples include dioxovanadium complexes, where complex (**1**) mimics haloperoxidase enzyme activity, while complex (**2**) exhibits strong binding with bovine serum albumin (BSA) and mimics catechol oxidase activity. A copper–nickel heterobimetallic complex (**3**) demonstrated efficient and green oxidation of primary and benzylic alcohols to aldehydes using hydrogen peroxide, yielding valuable intermediates for pharmaceutical synthesis. Additionally, tetranuclear (**4**) and octanuclear (**5**) rhenium supramolecular assemblies were synthesized, displaying exceptional chemical sensing capabilities toward various biomolecules and aromatic hydrocarbons (AHCs) such as nitrobenzene, anilines, and nitroanilines. Incorporation of ruthenium metal into heteroleptic bipyridine–terpyridine (**6**) frameworks further yielded complexes with solar light-harvesting properties, underscoring their potential in photovoltaic and energy conversion systems.

HEALTHCARE EXPERIENCES AMONG PERSONS WITH LOWER-LIMB AMPUTATIONS AND THEIR RELATIVES IN TRINIDAD AND TOBAGO

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Accessible and cost-effective healthcare plays an essential role in prevention and rehabilitation for persons at risk for and experiencing amputations. In Trinidad and Tobago, amputations continue to rise, despite the national healthcare system's attention to prevention, making the country a relevant case for providing insights into experiences of amputations within a healthcare system. The study employed a basic interpretive, qualitative design, using interviews with 17 persons with lower-limb amputations and 17 relatives across Trinidad and Tobago. Thematic analysis revealed five themes related to the experiences of persons with amputations and their relatives within the healthcare system: a) missed opportunities for prevention prior to amputation; b) hospital circumstances compounding participants' experiences; c) post-amputation services limiting rehabilitation and straining family caregiving; d) the potential of integrated services to promote wellbeing of persons with amputations and their relatives; and e) the complex but necessary role of advocacy. Findings suggested that holistic, multidisciplinary care would not only enhance health outcomes and quality of life for persons with amputations and their relatives, but also reduce the burden on the healthcare system. Recommendations for public health and rehabilitation emphasise the importance of culturally competent, patient-centred care.

PREVALENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER AND SYMPTOMATOLOGY AMONG UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF THE WEST INDIES, ST. AUGUSTINE: A CROSS-SECTIONAL DESCRIPTIVE STUDY

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Background: Attention Deficit Hyperactivity Disorder (ADHD) is a chronic neurodevelopmental condition marked by persistent inattention, hyperactivity, and impulsivity, often persisting into adulthood and impacting academic performance and well-being. Despite increasing awareness, data on ADHD prevalence and symptom patterns in Caribbean university populations remain limited.

Objectives: To determine the proportion of undergraduates with a formal ADHD diagnosis and those screening positive for possible undiagnosed ADHD using the WHO Adult ADHD Self-Report Scale (ASRS-v1.1); to analyse ADHD symptomatology across faculties at The University of the West Indies, St. Augustine (UWI); and to assess ADHD medication use among students with and without diagnoses.

Methods: A cross-sectional study was conducted among 374 undergraduates across The Campus's faculties. Participants completed an anonymous online questionnaire capturing demographics, diagnosis status, medication use, and ASRS-v1.1 responses. Inattention (Q1–9) and hyperactivity/impulsivity (Q10–18) symptoms were analysed, with "Often" or "Always" indicating symptom presence. Descriptive and inferential statistics assessed symptom burden and medication use across faculties.

Results: Of 374 students, 8.6% (n=32) reported a formal ADHD diagnosis, while 57.8% (n=216) screened positive for clinically significant symptoms, suggesting many may be undiagnosed. Symptom burden varied by faculty: Social Sciences (FSS) showed the highest average score (9.46) and the largest proportion above threshold (54.35%). Law (FOL) (42.86%) and Science and Technology (FST) (32.86%) also showed high symptom rates. The Faculty of Medical Sciences (FMS) recorded the lowest average score (5.45), although 18.85% met the threshold. Inattention predominated in the Faculty of Social Sciences (FSS) and Faculty of Science and Technology (FST), while hyperactivity/impulsivity was most marked in the Faculties of Law and Food and Agriculture.

Conclusions: A substantial proportion of UWI undergraduates experience undiagnosed ADHD symptoms. The variation in symptom expression across faculties highlights the need for faculty-specific screening and support strategies. Expanding accessible ADHD identification and intervention services is essential to improve student outcomes and well-being within Caribbean tertiary institutions.

ADVANCING SPORT SOCIAL WORK IN SECONDARY SCHOOLS IN TRINIDAD AND TOBAGO: BUILDING AN ECOSYSTEM TO ADDRESS STUDENT-ATHLETES' WELL-BEING

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High school sports have increasingly been recognised as an avenue for promoting youth development, psychosocial support, and social inclusion, but can also be a site for the possibility of harm. In Trinidad and Tobago, the integration of psychosocial services within school sport systems remains limited. This study explored the potential of Sport Social Work in advancing well-being among secondary school student-athletes, focusing on their needs, opportunities for intervention, and the challenges that hinder support. The research was guided by a general qualitative design, using semi-structured interviews with 20 stakeholders in sport. It is situated within a larger project examining the needs, opportunities, and challenges of integrating Sport Social Work in Trinidad and Tobago. Data were analysed through thematic analysis. Findings revealed five interconnected themes: student-athletes' low help-seeking behaviours, reliance on informal external support systems, student-athletes' stigma and perceptions of vulnerability, institutional gaps and policy limitations and opportunities for Sport Social Work integration to support student-athletes' wellbeing.

This study underscores the urgent need for creating a sport social work ecosystem within secondary schools in Trinidad and Tobago and to embed psychosocial support within sport in schools. By leveraging the principles of Sport Social Work, secondary schools in Trinidad and Tobago can move toward an integrated model of student development that addresses mental health and enhances the overall performance and well-being of student athletes. The findings contribute to the growing international body of knowledge on Sport Social Work while offering localised insights for policymakers, practitioners, and educators in the Caribbean.

BUILDING GENOMIC CAPACITY FOR CARIBBEAN ONE HEALTH

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The UWI, St. Augustine, is poised to launch the One Health Molecular Epidemiology and

Genomics (EDGe) Centre that will serve as a hub for infectious disease and genomics research, training and innovation across One Health sectors. The UWI's proven expertise in molecular epidemiology and genomics—critical for tracking infectious disease threats—has already supported Caribbean public health responses through sequencing, training, and data sharing via local and international networks.

The EDGe Centre extends this foundation and, in direct alignment with the World Health Organization (WHO) Global Genomic Surveillance Strategy for Pathogens with Pandemic and Epidemic Potential 2022–2032, aims to address regional disparities in genomic capabilities by establishing state-of-the-art laboratory infrastructure, building technical workforce capacity, and delivering research and training relevant to national and regional surveillance priorities.

By bridging human, animal and environmental sectors, the Centre also embodies the One Health vision championed in WHO frameworks. Importantly, the benefits of the infrastructural and technical capacity developed will extend far beyond infectious diseases, supporting research into plant health, food security, non-communicable diseases, antimicrobial resistance monitoring, and environmental resilience—further elevating the Centre's impact.

LIVING WELL OVER 65: EXPLORING ISSUES AROUND AGEING IN PLACE AND TYPICAL RESIDENTIAL PATTERNS OF OLDER INDIVIDUALS IN TRINIDAD & TOBAGO

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Well-being among people of advanced age has emerged as a very significant focal point of developmental concern globally due to major demographic implications of lowering birth rates occurring simultaneously with longer life expectancies. The population of older individuals in Latin America and the Caribbean is expected to almost triple by 2050 (OECD, 2023). Such projections have led states to begin devising strategies to combat the socioeconomic effects of an ageing populace. In Trinidad and Tobago (T&T) in the southern Caribbean, the government recently introduced a National Policy on Ageing, which, like many countries in the Global North, promotes 'ageing in place'. Ageing in place refers to the ability of an older person to live at home for as long as possible without needing to go into a care facility (Grimmer, 2015). In the United Kingdom (UK), this proposition transfers the burden of the eldercare crisis from the state onto families, especially women (Dowling, 2021; Sixsmith & Sixsmith, 2008). Yet, what happens when relatives cannot afford to provide formal or informal care in a country where there is limited social support and increasing austerity measures?. While there is a great deal of research assessing ageing in place in developed countries, there remains a gap in knowledge of how remaining in one's home amid declining cognitive/ physical capacity works – or does not work – in less developed nations. As much as ageing in place might be a cultural preference in T&T, is it the most effective infrastructure for its ageing population (caregivers and care recipients included)? Drawing on literature across the social sciences and a mixture of quantitative and qualitative data, this paper explores the residential patterns among older adults in T&T and takes a closer look at ageing in place within a local context in order to make recommendations for future development and policies.

QUANTITY VERSUS QUALITY – NUTRITION ADEQUACY OF DAILY MEALS SERVED AT TRINIDADIAN HOSPITALS

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Background: Approximately 20 to 50% of persons hospitalised are malnourished on admission to hospital. This study sought to determine the energy and nutrition density of meals served at local hospitals
Methods: Twenty food samples of daily meals from two hospitals were analysed for total, macronutrient, fibre and selected micronutrients using standardised protocols using Bomb calorimetry and other analytical tests. Each sample consisted of all meals and beverages provided on the respective day. The measured amounts were compared with those generated from Nutrium dietary intake software. T-tests were used to compare these means, and the results were presented using simple descriptive statistics. Nutrient density was based on a 2000kcal/day requirement. Data were presented as means with respective standard errors (SE). The University's Ethics and participating Regional Health Authority Ethics committees approved all protocols. Funding received from the Department of Agricultural Economics and Extension and the Campus Research and Publication Fund was used to analyse the meals.
Results: Mean energy content of meals was 1052.9 ± 33.52 kcal/day. Energy density calculations based on a 2000kcal/day energy requirement suggested meals met the required nutrient intakes (RNI)dx or average intakes (AI) for carbohydrates, protein, fats, calcium, Iron and potassium. They met approximately 14.6% of fibre, 41% of magnesium, 55.8% potassium, 66% Iron and 128% of sodium (RNI/AI). Comparative nutrient analyses suggest similar levels of total calories with significantly higher levels of macronutrients, magnesium, calcium, iron and lower levels of sodium and potassium between chemical analyses and dietary software analyses of foods.
Conclusion: The findings revealed that the daily composite meals were nutrient-dense but insufficient to meet RNI/AI nutrient requirements. Caution must be taken when using dietary software to estimate nutrient availability in hospital diets.

AN INDIGENOUS CARIBBEAN PLANT EXTRACT INHIBITS GROWTH OF PC-3 ANDROGEN INDEPENDENT PROSTATE CANCER CELLS

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Prostate cancer mortality rates among populations of African descent remain disproportionately high, with the highest rates reported in the Caribbean. Despite the availability of standard anticancer therapies, long-term cures for malignancies such as prostate cancer are still lacking. Tropical plants from the Caribbean, an area characterised by high biodiversity and species richness, are considered promising sources of novel therapeutic agents. Phytochemical screening of these plants, combined with innovative approaches to anticancer research, may lead to the identification of new treatments for prostate cancer.
Methods: The aerial parts of a tropical plant (Plant-S) were pulverised and extracted using ethanol or commercially available rum to produce two total extracts: T-EtOH and T-EtOR. Thin Layer Chromatography (TLC) was employed to identify potential anticancer constituents within the extracts. The anticancer activity of T-EtOH and T-EtOR against PC-3 androgen-independent prostate cancer cells was assessed using (i) MTT assays to measure

cell viability and (ii) morphological studies to observe cellular changes.
Results: TLC analysis confirmed the presence of alkaloids, polyphenols, steroids, and tannins in both T-EtOH and T-EtOR extracts. MTT assay results demonstrated that both extracts inhibited approximately 90% of PC-3 cell proliferation. Morphological evaluation further supported these findings, revealing notable changes in PC-3 cells, including irregular shapes and cellular shrinkage following treatment with the extracts
Conclusion: These findings suggest that the plant-derived preparations exhibit significant potential as therapeutic agents for prostate cancer. Further investigations using animal models are warranted to determine whether these effects can be replicated *in vivo* and to evaluate their toxicity profiles. Such studies will be critical in advancing these extracts toward clinical applications.

HIV TREATMENT KNOWLEDGE AND ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG PERSONS LIVING WITH HIV IN TRINIDAD AND TOBAGO

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Background: Optimal adherence to antiretroviral therapy (ART) is essential for viral suppression and improved health outcomes in people living with HIV (PLWH). This study investigated the association among HIV treatment knowledge, adherence self-efficacy, and ART adherence in a Caribbean context.
Methods: A cross-sectional study was conducted among 396 adults receiving ART for at least three months prior to the start date of the study. Data were collected via face-to-face interviews using a 32-item questionnaire. Adherence levels were based on WHO standards. Self-efficacy was measured using the HIV Adherence Self-Efficacy Scale (HIV-ASES), and knowledge was defined as giving the correct answers to HIV-related questions. Descriptive and inferential statistics were used.
Results: Most participants (84.3%) reported adherence; over ninety per cent (90%) said they took their medicines themselves. Higher self-efficacy scores were associated with consistent ART use. While awareness of viral load and CD4 count was high, at 87% and 77.3% respectively, only 17.5% could accurately define CD4 count. Pill identification rates were low, with only 30.5% correctly identifying Atripla. Self-efficacy scores out of 24 were high (Mean: 21.2 (SD = 1.32).
Conclusion: Adherence self-efficacy is a strong predictor of ART adherence, while knowledge plays a supportive role. Interventions that enhance both domains, through education and psychosocial support, may improve treatment outcomes among PLWH in Trinidad and Tobago.

NUTRITION CARE MODELLING FOR CANCER SURVIVORS IN TRINIDAD

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Cancer continues to be a global burden, and nutrition care is integral to managing cancer survivors' nutritional status from diagnosis to follow-up care. Despite improved cancer nutrition care in Trinidad, and nutrition being fundamental at each phase within the care continuum, cancer survivors are still challenged with accessing dietary services and management to treatment outcomes. There were noticeable gaps in the literature about

which phases of care nutrition were delivered, requiring further investigation into cancer survivors' nutrition care protocol, and their experiences to gain insight to frame a nutrition care model for care improvement. The sample comprised (n= 237) adults: cancer survivors (n=177), healthcare professionals (n=34), and caregivers (n=26). Quantitative data were obtained from questionnaires and a nutrition intervention, analysed using descriptive statistics and multiple linear regression. Significance was considered at $p < .05$. Regression analysis was significant for quality of life, diet changes and management of treatment symptoms. The qualitative study utilised phenomenology with data attained from in-depth interviews analysed for themes. The mixed methods approach component coalesced quantitative and qualitative data utilising meta-inferences. Most survivors (72%) were diagnosed with cancers of reproductive organs, managed nutrition-related side effects of treatment with plant-based diets and received nutrition care prior to and after initial treatment. Significant correlations ($p < .001$) were determined, with the cancer survivors' ethnicity, physical activity, education level, health insurance and advice from dietitians ($p < .05$), associated with their age, gender, nutrition advice from non-formal sources and nutrition care support needed for survivorship. Cancer survivors' nutritional perception, knowledge, and practices behavioural scores changed post-intervention. Integration of data sets highlighted the need for nutrition care, nutrition education and information support throughout care, existing barriers to nutrition care and institutional challenges delivering dietary services. In Trinidad, cancer survivors received nutrition care at treatment, but nutrition care should be provided throughout the survivorship care continuum.

A BIOCHEMICAL TEST AS A RATIONAL BASIS TO SELECT POTENTIAL AMINO ACIDS AND/OR NATURAL PRODUCTS TO REDUCE THE EXTENT OF PROTEIN GLYCATION PROCESSES

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According to the World Health Organization (WHO), diabetes mellitus is prevalent in approximately 830 million people globally. The International Diabetes Federation records more than 151,000 adult cases in Trinidad and Tobago. Diabetes mellitus is a chronic disease caused by the pancreas's inability to utilise and/or to produce sufficient insulin (the hormone responsible for regulating blood sugar/glucose in carbohydrate metabolism). Unregulated blood glucose levels cause numerous health complications arising from undesired chemical reactions in the human body. High levels of blood glucose in diabetic patients lead to protein glycation through a process that takes place through non-enzymatic reactions between reducing sugars and proteins. The consequence of these reactions is particularly important in the pathology and sequelae of diabetes.

The goal of this study is to propose simple biochemical procedures as a rational basis to select an amino acid or a group of amino acids and/or natural products having the strongest ability to block the protein glycation process induced by glucose. This procedure will then be used to select the highest potential natural amino acid(s) and/or natural products capable of minimising the sequelae of diabetes due to the glycation of proteins. Selected experimental parameters, based on the literature, were varied during the optimisation of the proposed method. Test reaction mixtures were prepared in a pH 7.4 saline phosphate

buffer and incubated at 37°C. Aliquots of these mixtures were removed at different time intervals and analysed using fluorescence and NMR spectroscopy. Thus far, the initial results have prompted the re-examination and modification of the current methodology and inclusion of new parameters which were not previously considered in the optimisation of the initial proposed method.

A GAMMA-WEIBULL (G-W) REGRESSION MODEL ANALYSIS OF CATARACT SURGICAL DATA

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Cataract is one of the leading causes of vision loss in Trinidad and Tobago, and surgery remains the only effective treatment. More than 50% of cataract surgeries performed in Trinidad and Tobago are done in the public hospitals. Considering that resources such as operating rooms (ORs) are shared between different specialities, effective and efficient management of the ORs is important. Determining the factors that may affect cataract surgery duration can yield information and data that could help in the decision-making of how and when surgeries are scheduled. In survival analysis, frailty models are used to identify unobserved heterogeneity in individual risks to disease and death. In this study, the presence of unobserved heterogeneity and factors that impact cataract surgery duration are investigated using a univariate gamma-Weibull (G-W) frailty model. The parameters of the model are estimated using a Bayesian approach via the Markov Chain Monte Carlo (MCMC) technique. This model is then applied to cataract surgical data obtained from a tertiary care public hospital in Trinidad, and a comparative analysis with different regression and Cox proportional hazards (PH) conducted to identify the best model. Unobserved heterogeneity was found to be present in the duration of cataract surgery, and frailty was significant (s=1.2811). A significant association ($p<0.05$) between the factors age, technique, and hypertension, and cataract surgery duration, was identified. Longer cataract surgeries were seen in older patients who underwent surgery with extracapsular extraction (ECCE).

PSYCHOLOGICAL INSULIN RESISTANCE AMONG PERSONS WITH TYPE 2 DIABETES IN TRINIDAD

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Background: Although initial treatment emphasises lifestyle changes and oral medications for type 2 Diabetes, these strategies often lose effectiveness over time due to progressive beta-cell dysfunction, making insulin therapy necessary (Suglo et al. 2022 and Haw et al. 2017). Despite insulin's proven efficacy, initiation and adherence remain low, largely due to psychological insulin resistance, a set of negative beliefs, emotions, and attitudes toward insulin use (Jang et al. 2021 and Polonsky et al. 2019), including fear of injections, perceived loss of autonomy, stigma and feelings of personal failure (Holloway et al. 2021 and Ellis et al. 2018). Understanding psychological insulin resistance within the Trinidadian context is essential to improving type 2 diabetes management outcomes through culturally responsive care.
Objective: This study examined the prevalence and dominant attitudes contributing to

psychological insulin resistance, explored the differences between insulin-dependent and insulin-naïve persons with type 2 diabetes and assessed gender and ethnic group differences to guide more personalised interventions for improving insulin use among persons with type 2 diabetes in Trinidad.

Design and Methods: A total of 278 persons with type 2 diabetes attending outpatient clinics across four major hospitals were surveyed using the Insulin Treatment Appraisal Scale (Snoek, Skovlund & Pouwe, 2007). Data on demographics, disease duration, and medication type were analysed using descriptive statistics, one-way ANOVA and independent sample *t*-test.

Results: Psychological insulin resistance prevalence was exceptionally high (96%). Negative attitudes included increased concern by family and friends (75%), belief that insulin indicated disease worsening (58%), feelings of personal failure (55%) and fear of hypoglycemia (51%). Oral medication users had higher levels of psychological insulin resistance than those using insulin alone or in combination with oral medication, explaining 9% of the variance. Gender and ethnicity differences were nonsignificant.

Conclusions: This study identified an unusually high prevalence of psychological insulin resistance among persons with type 2 diabetes in Trinidad. This elevated resistance is primarily attributed to the widespread endorsement of negative beliefs about insulin use. Targeted educational interventions addressing emotional and cultural barriers, fostering self-efficacy, and reframing insulin as a facilitator of health are critical for improving timely insulin uptake and self-management.

FROM RAINFOREST TO LABORATORY: ANTIMICROBIAL PEPTIDES FROM TRINIDADIAN FROG SKIN SECRETIONS AS LEADS AGAINST MULTIDRUG-RESISTANT BACTERIA

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Antimicrobial resistance is a growing global health crisis that compromises the efficacy of conventional antibiotics, leading to prolonged illness, increased healthcare costs and elevated mortality. The urgent need for new antimicrobial agents with a unique mechanism of action has renewed interest in frog skin antimicrobial peptides (AMPs) - key components of innate defence systems with broad-spectrum activity and low propensity for resistance development. Trinidad and Tobago possesses a rich anuran biodiversity, offering a largely untapped source of bioactive peptides with potential pharmacological value.

Field expeditions in Trinidad resulted in the collection of norepinephrine-stimulated skin secretions from *Leptodactylus insularum* and *L. nesiotus* (Leptodactylidae), as well as *Lithobates palmipes* (Ranidae). Peptidomic profiling, combining reversed-phase HPLC with MALDI-TOF mass spectrometry, and Edman degradation, enabled purification, molecular mass determination and structural characterisation of nineteen (19) distinct peptides. Sequence analyses identified members of the ocellatin family (from *Leptodactylus* spp.) and the ranatuerin-2, brevinin-1, and temporin families (from *L. palmipes*). Synthetic replicates were evaluated for antimicrobial activity (MIC) against a range of Gram-positive and Gram-negative reference bacteria, including multidrug-resistant strains and for hemolytic activity (LC_{50}) using mouse erythrocytes. Ocellatin-3N (*L. nesiotus*) exhibited broad-spectrum activity (MIC = 31.25 – 62.5 µM) against resistant strains but showed moderate hemolysis (LC_{50} = 98 µM). Brevinin-1PMa (*L. palmipes*) was highly potent against Gram-positive bacteria (MIC = 3.13–6.25 µM) but strongly hemolytic (LC_{50} = 4 µM). Notably,

the naturally truncated analogue des(8–14)brevinin-1PMa retained partial antimicrobial activity (>10-fold reduction) while displaying a >50-fold decrease in hemolytic toxicity. These findings highlight ocellatin-3N and des(8–14)brevinin-1PMa as promising structural templates for the design of long-acting, non-toxic, broad-spectrum antimicrobial agents targeting multidrug-resistant bacteria. This work not only supports the exploration of Caribbean amphibian biodiversity as a source of bioactive peptides but also contributes to advancing Sustainable Development Goal 3: Good Health and Well-being.

MANAGING NON-COMMUNICABLE DISEASES IN THE WORKPLACE IN TRINIDAD AND TOBAGO: EMPLOYER'S PERSPECTIVES

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This research examined the knowledge, attitudes and practices of employers in Trinidad and Tobago toward managing employees living with non-communicable diseases. Using a cross-sectional survey of 176 employers across various industries, regression results were used to identify the associations between employers' characteristics and NCD-related knowledge, attitudes and practices, including policy presence, as knowledge, attitudes and practices surveys are used widely in health research, given that they provide a structured approach to assessing human behaviour by understanding how awareness translates into actions. The analysis revealed that most employer demographics and organisational variables were not significant predictors of NCD knowledge or supportive attitudes and practices. The presence of formal NCD-related workplace policies did not appear to be influenced by employer characteristics, suggesting that policy adoption may rely more on governmental and international interventions and mandates and sector-specific regulations rather than internal factors. The findings obtained through regression models highlight the gap between policy intent and actual practice, emphasising the need for targeted interventions for operational staff and senior management. National policies and strategies may be essential to promote consistent and inclusive workplace health initiatives that support employees living with NCDs.

THE MUTATIONAL SPECTRUM OF PDX-1 ACROSS A DIABETIC COHORT IN TRINIDAD AND TOBAGO

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Diabetes mellitus is a complex metabolic disorder with both environmental and genetic components, including monogenic forms such as Maturity Onset Diabetes of the Young (MODY). The *PDX-1* gene, which encodes a transcription factor essential for pancreatic development and insulin regulation, has been implicated in monogenic diabetes and β-cell dysfunction. Mutations in this gene have been shown to be associated with diabetes in Trinidad. Notably, the E224K missense mutation, first described by Cockburn et al., has been linked to MODY4 and is known to impair β-cell function by altering the transactivation ability of the *PDX-1* protein, contributing to defective insulin regulation. This study investigates the mutational spectrum of *PDX-1* in a cohort of 337 diabetic individuals in Trinidad and Tobago, a population with limited existing genetic research.

Whole exome sequencing (WES) data from a cohort of 337 diabetic patients from Trinidad

and Tobago were analysed to identify variants within the *PDX-1* gene, with PCR amplification and Sanger sequencing of exons 1 and 2 performed to validate rare mutations. Bioinformatic analysis identified a total of 16 variants, with three classified as common and thirteen as rare. Most variants were intronic or synonymous, though several missense mutations and one in-frame insertion (p.Pro243dup, rs193922357) were noted. While most were classified as benign or likely benign, one variant (rs137852787, E224K) appeared in nine individuals, two of whom were related, suggesting a possible founder effect within specific ethnic subgroups. A novel intronic variant lacking a dbSNP ID was also identified. Comparison of WES and Sanger sequencing results demonstrated partial concordance, highlighting both the utility and limitations of exome sequencing for detecting rare *PDX-1* mutations in this cohort.

These findings reveal both conserved and population-specific *PDX-1* variants, suggesting that while pathogenic mutations are uncommon, certain rare alleles may act as modifiers of diabetic risk. This study provides a foundational analysis of *PDX-1* variation in the Caribbean and highlights the value of integrating genomic tools to contribute towards region-specific diabetes research and precision medicine approaches.

IMPLEMENTATION OF 3D-PRINTED BOLUS TECHNIQUE USING STRUCTURE FROM MOTION IN RADIOTHERAPY

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The implementation of 3D-printed bolus techniques enhances the treatment of superficial tumours. By utilising optical imaging tools, such as a phone camera or a 3D scanner, combined with processing aids, the photogrammetry method (e.g., Structure from Motion (SfM)) can be employed to create surface models of body parts and generate 3D volumes. These volumes can then be simulated and customised for use as boluses, reducing reliance on CT scans and enabling CT simulation to be conducted with pre-made boluses. Traditional flat commercial boluses often fail to maintain perfect contact with irregular surfaces, resulting in air gaps. In contrast, customised 3D-printed boluses improve Radiotherapy parameters like dose-volume histogram, dose distribution maps, and skin dose assessment. This work compares the 3D structures derived from phone cameras using the SfM method, 3D scanning, and CT images. Using patient-specific 3D-printed boluses instead of flat commercial options ensures more precise dose delivery during treatment. This approach, not previously documented in the regional literature, also discusses challenges in 3D printing, including material selection and characterization. Specifically, the properties and potential applications of ABS and PLA printing filaments in Radiotherapy are examined.

DEVELOPMENT OF 6-AZAINDOLE COMPOUNDS AS ANTIBIOTIC ADJUVANTS FOR COMBATTING RESISTANT PATHOGENS

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The overuse and misuse of antibiotics have led to a high prevalence of antimicrobial resistance

(AMR) among pathogenic microorganisms. AMR is considered a global health threat to humans, and it is imperative to find viable solutions to overcome this challenge. Efforts for overcoming AMR have focused on finding novel antibiotics with unique targets, but these strategies have mainly failed since most bioprospecting studies have only found compounds within known antibiotic classes. However, one alternate approach is the development of potentiators that can enhance and restore the efficacy of existing antibiotics to effectively control resistant pathogens. These potentiators can be used as adjuvants to extend the life of current antibiotics. Recently, 6-azaindole compounds were discovered at The University of the West Indies, St. Augustine, as having strong potentiating properties against resistant Gram-positive pathogens. The current study aims to further advance the development of these 6-azaindoles as adjuvants for antibiotics in combination treatment.

The study proposes to investigate the mechanism of action of the 6-azaindole compounds. Rescue concentration screening of a pre-existing library will first be done to determine any hit compounds, which would then be subjected to both spontaneous and serial mutation analysis experiments in combination with whole genome sequencing. *In vitro* characterisation of the 6-azaindoles would also be performed to identify any potential lead compounds. This would entail the use of checkerboard assays encompassing several antibiotic classes against both Gram-positive and Gram-negative pathogens, followed by time kill assays and testing of the post-antibiotic/residual effect. Potential leads would further be assessed using a mouse infection model at both sub-lethal and lethal doses. Finally, a detailed pharmacokinetic analysis will be done using the Eurofins Tier 1 ADME in vitro model and the *in vivo* rat model, while additional safety assays will be done using the Eurofins Safety47 Panel Dose Response assay.

THE PSYCHOSOCIAL EXPERIENCES OF WOMEN DIAGNOSED WITH POLYCYSTIC OVARY SYNDROME IN TRINIDAD AND TOBAGO

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Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder in reproductive-aged women, marked by menstrual irregularity, hyperandrogenism, polycystic ovarian morphology, and metabolic disturbances. PCOS carries significant long-term risks, including infertility, type 2 diabetes, cardiovascular disease and endometrial cancer. Studies have highlighted subsequent psychosocial impacts, such as heightened anxiety, depression and body image concerns, with social stigma around infertility, hirsutism and acne further deepening psychological distress. Within the Caribbean context, however, there is a lack of research on the socially produced psychological impacts of PCOS. Thus, this study sought to explore the psychosocial experiences of women in Trinidad and Tobago diagnosed with polycystic ovary syndrome (PCOS). A qualitative study was undertaken, and 24 semi-structured interviews were conducted with women aged 18–45 years who had received a physician-confirmed

diagnosis of PCOS. Participants were recruited through purposive and snowball sampling across public and private healthcare settings. Interviews were conducted online or in person, transcribed verbatim and analysed using thematic analysis.

Results showed that women with PCOS experience considerable psychosocial impacts. All participants reported forms of emotional distress, including features of anxiety, depression and social withdrawal, indicating considerable effects on mental well-being. Concerns about the aesthetic presentation of their bodies were frequently cited, particularly around experiences with acne, hair loss and hirsutism. Body surveillance issues due to weight changes were also prevalent among participants, with many expressing frustrations about weight gain and weight loss challenges. These impacts were further exacerbated by experiences of social judgment described by participants, who felt invalidated or criticised through their social interactions about their diagnosis or symptoms. The study, therefore, highlighted the ways in which PCOS significantly affects women's mental, emotional and social well-being in Trinidad and Tobago. The findings underscored the need for a multidisciplinary and culturally sensitive approach to care that includes mental health support and wider public education and sensitisation efforts.

A SELF-CONTAINED SPATIO-TEMPORAL ANOMALY DETECTION APPLICATION FOR TRAVEL SAFETY

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We describe a mobile application designed to enhance safety when using public transportation. During the training phase, the application learns typical travel patterns and times by analysing historical route data stored locally on the user's device. During operation, it identifies spatio-temporal anomalies in real-time by comparing a user's current location against their historical profile. If a significant deviation is detected, an alert is sent via SMS to the user's emergency contacts. All data and processing occur strictly on the device itself, and nothing is shared with the Cloud. It does not require an Internet connection (except for when it has to be installed, in which case public WiFi can be used), making it useful for those who cannot afford cellular data plans. This paper provides a Proof of Concept of this application and includes typical use cases to illustrate efficacy.

UNPAID CARE WORK FOR CHILDREN WITH INTELLECTUAL DISABILITIES IN TRINIDAD AND TOBAGO: A PHENOMENOLOGICAL STUDY

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Children with Intellectual Disabilities depend on their caregivers to assist them with activities of daily living as well as to assist with their attainment of their human rights as enshrined in the Republican Constitution of Trinidad and Tobago and international and regional human rights treaties to which Trinidad and Tobago have committed.

This study sought to understand the experiences of mothers who provide unpaid care work for their children diagnosed with Intellectual Disabilities. Specifically, it sought to understand the various aspects of social support featured in the lived experience of persons involved in unpaid care work for these

children; the ways in which aspects of social support impacts the caregivers' capacity to cope with their daily duties of care and how caring for a child with an Intellectual Disability in Trinidad and Tobago impacts the life roles of the caregiver.

Phenomenology was employed as the methodology. Nine mothers of children with Intellectual Disabilities were interviewed using a semi-structured interview guide. These in-depth interviews were transcribed verbatim. Data analysis was conducted according to the guidelines of Reflexive Thematic Analysis. Caregiver Stress Theory (Tsai 2003) was used as the theoretical framework.

A key finding of this study pointed to a gap in the conceptualisation of social support as presented in the Caregiver Stress Theory. While the theory recognises the role of social support as informal support (friends and family) in mediating caregiver stress, the role of formal or state support as a part of this social support network is not considered. This study highlighted the expectations of caregivers with regard to the role of formal social support and the missed opportunities of the state toward safeguarding the human rights and overall well-being of both care recipients and caregivers.

AN INVESTIGATION OF THE FREQUENCY OF ANGIOTENSINOGEN SINGLE NUCLEOTIDE POLYMORPHISMS RS699 AND RS4762, AND THEIR ASSOCIATION WITH HYPERTENSION AMONGST DIABETIC PATIENTS IN TRINIDAD AND TOBAGO

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Objective: The rs4762 and rs699 single-nucleotide polymorphisms (SNPs) of angiotensinogen have been reported as associated with cardiovascular diseases in various ethnic populations. The objectives were to assess the association of the SNPs with hypertension by determining the variant allele frequency of the SNPs and to develop a low-cost method of SNP genotyping using multiplex Amplification Refractory Mutation System (ARMS) PCR.

Methods: A case-control genetic association study of 317 diabetic patients (217 hypertensive and 100 non-hypertensive) was conducted using whole-exome sequencing data. Chi-square test and odds ratios were determined under the dominant and recessive models. The ARMS PCR method was tested using a subset of 42 samples and validated using Sanger sequencing.

Results: The cohort consisted of 41% male (n=134) and 59% female (n=196) patients. Approximately 91% were of East Indian descent. The allelic frequencies amongst the hypertensive group were computed from genotype counts as 0.09 (((2×2) +37) ÷(2×217(Total)); low frequency) for rs4762 and 0.65 (((2×42) +41) ÷ (2×217(Total)); high frequency) for rs699 variant alleles. Increased odds were noted for rs4762 under the recessive model (OR 2.33, 95% CI 0.11 to 49.02, P=0.58) and for rs699 under the dominant model (OR=1.65, 95% CI 0.84 to 3.22, P=0.14). The multiplex ARMS PCR method tested showed 100% concordance (r^2=1) with whole exome sequencing and Sanger sequencing results.

Conclusion: The variant allele frequency for the rs4762 SNP and the rs699 SNP reflects frequencies reported globally for populations comprising Indian and South Asian ethnicities. A positive association of the rs4762 and rs699 SNPs with hypertension, however, was not replicated in this Trinidad sample population. The multiplex ARMS PCR method for SNP genotyping was effectively used as a low-cost method of SNP genotyping.

KNOWLEDGE AND AWARENESS OF OCULAR ALLERGY AMONG UNDERGRADUATE STUDENTS IN TRINIDAD AND TOBAGO

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Objective: To assess the knowledge and awareness of ocular allergies (OA) among undergraduate students in Trinidad and Tobago.
Methods: A cross-sectional descriptive survey design was employed among participants at The University of the West Indies, St. Augustine. A convenience sampling technique was used to recruit participants with an estimated sample size of 408. Knowledge and awareness level was classified as poor (<51%), moderate (51-70%) and good (>70%). Data were collected using an online questionnaire developed in Google Forms and distributed primarily through a social media platform (WhatsApp).
Results: A total of 613 participants (mean age: 22 years) took part in the study. The majority were female (62.2%) and of East Indian descent (49.6%), with most (52.0%) residing in urban areas. The average correct response on OA awareness was 61.0% and knowledge was 58.2%. Most (67.0%) correctly defined OA, and 67.7% identified allergen avoidance as the best preventive measure. However, 25.1% mistakenly believed OA to be contagious. While 64.9% recognised a genetic link, nearly a quarter were uncertain. Redness (91.2%), itching (89.2%) and blurred vision (75.5%) were the most recognised symptoms, though uncertainty remained about photophobia and nausea. Misconceptions were common, with many incorrectly identifying bacterial (41.8%) and viral conjunctivitis (41.6%) as OA types. Only 43.4% correctly identified OA prevalence in Trinidad and Tobago, and awareness of potential visual loss was mixed (Yes (37.4%), No (32.0%) and uncertain (30.7%)). The Internet was the main information source (55.3%), except among medical students, who relied more on specialists (82.1%) and training (73.8%).
Conclusion: The findings reveal moderate overall knowledge and awareness of ocular allergies (OA) among university students, with gaps in understanding specific forms, symptoms, and transmission. There is a need for targeted educational interventions to address misconceptions about ocular allergies, particularly their forms and transmission. Integrating ocular health topics into non-medical curricula and promoting evidence-based resources across faculties could enhance awareness, improve knowledge and promote early recognition and prevention of ocular allergies.

OCULAR RESPONSE TO ENERGY DRINK CONSUMPTION: A PRE-POST ANALYSIS OF VISUAL FATIGUE IN YOUNG ADULTS IN TRINIDAD AND TOBAGO

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Objective: To determine the effects of caffeinated energy drinks on near visual acuity (VA), pupil size, and amplitude of accommodation (AOA) among a sample of university students.
Methods: A prospective clinical experiment was conducted at The University of the West

Indies, St. Augustine, Optometry Clinic, among regular consumers of caffeinated products. Participants underwent baseline assessments of near VA, AOA, pupil size and Body Mass Index (BMI). VA, AOA and pupil size measures were repeated thirty minutes and one hour after consumption of an energy drink containing 125 mg of caffeine. Data were analysed with SPSS version 29.0 using paired t-tests, Pearson correlations and effect size calculations

Results: Fifty-seven participants (56.1% female) were assessed. No significant sex differences were found between BMI and any visual outcome at any point ($p > 0.05$). Paired samples t-tests revealed a significant increase in pupil size at 30 minutes (mean increase = 0.29 mm) and one hour (mean increase = 0.60 mm) post-consumption ($p < 0.001$). AOA increased significantly at 30 minutes (mean increase = 0.77D, $p = 0.024$) but declined significantly between 30 and 60 minutes (mean decrease = 0.68D, $p = 0.015$). Near VA showed a minor but statistically significant decrease at 30 minutes ($p = 0.020$), and not at one hour post consumption. There was a strong correlation between pupil size and near VA ($r = 0.844–0.928$).

Conclusion: Caffeinated energy drinks momentarily increased pupil size and accommodation, with minimal impact on near VA. These transient changes may offer short-term visual benefits but are unlikely to sustain visual performance during prolonged near tasks. The lack of sustained benefits suggests a risk of visual fatigue with prolonged use.

THE EFFECT OF AMBIENT ILLUMINATION AND TEXT COLOUR ON VISUAL FATIGUE UNDER DISPLAY POLARITY AMONGST SAMPLED HEALTH-RELATED STUDENTS IN TRINIDAD AND TOBAGO

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Objective: To determine the effect of ambient illumination and text colour on visual fatigue under display polarity among sampled health-related students.

Method: A combined observational and experimental approach was done with purposive sampling among full-time students from the Faculty of Medical Sciences of the University of the West Indies, St. Augustine. Students' blink rate per minute and words per minute (w.p.m) were measured while reading stimuli with varying text colours on both positive and negative display polarity. Afterwards, participants completed a visual fatigue survey to rate comfort and indicate preferred text and background combinations.

Results: The study involved 86 participants aged 18–25 years, with 92% of them regularly using digital devices for reading. Under positive polarity, the average blink rate was 8.6 blinks per minute with a reading speed of 158 w.p.m. The average blink rate under negative polarity was 9.2 blinks per minute, and the reading speed was 172.4 w.p.m. When asked to choose a preferred text colour despite the display polarity, white text was most preferred (34.1%), followed by black text (25%), blue text (15.9%), red text (5.7 %) and yellow text (4.5 %). Additionally, the combination of black text under positive polarity was the most comfortable. Common symptoms of visual fatigue were sore, tired, burning or itching eyes (56.8%), followed by watery or dry eyes (51.1%) and difficulty focusing (47.7%). There was a statistically significant difference ($F(2,27) = 1583.64$, $p < 0.05$) in blink rates, reading speeds, and comfort level based on text colour and display polarity using analysis of variance (ANOVA).

Conclusion: Black text on white was most comfortable, and negative polarity improved reading efficiency. Text colour and display polarity affected blink rate, reading speed, and comfort, highlighting their role in visual fatigue and the importance of ergonomic screen design for student eye health in Trinidad and Tobago.

ANTIDIABETIC AND ANTIOXIDANT EFFECTS OF QUAIL EGG YOLK OIL IN A DROSOPHILA MODEL OF DIET-INDUCED METABOLIC DYSFUNCTION

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Objective: This study evaluated the antidiabetic and antioxidant potential of quail egg yolk oil (QEYO) in a *Drosophila melanogaster* model of high-sugar-diet (HSD)-induced metabolic dysfunction, with the aim of identifying its functional food value in mitigating type 2 diabetes and oxidative stress.
Methods: Adult male *Drosophila* were divided into five groups: control, HSD, HSD + QEYO (62.5 mg/10 mL or 125 mg/10 mL), and HSD + metformin (16 mg/10 mL). After 21 days of feeding, physiological, biochemical, and molecular analyses were performed. Parameters included body weight, glucose, trehalose, glycogen, triglycerides, antioxidant enzyme activities and gene expression (PEPCK, ACC, DILP2, IRS, GLUT1, SOD, CAT). Data were analysed using one-way ANOVA with $p < 0.05$ as the significance threshold.
Results: HSD-fed flies exhibited hallmark features of metabolic syndrome: increased body weight, hyperglycemia, dyslipidemia, oxidative stress, and altered metabolic gene expression. QEYO supplementation significantly reduced glucose, triglycerides and malondialdehyde levels ($p < 0.05$) while enhancing superoxide dismutase, catalase, and total antioxidant capacity. The 62.5 mg dose normalised glucose and lipid levels, whereas 125 mg further improved antioxidant enzyme activity. Gene expression analyses showed down-regulation of *PEPCK* and *ACC* (gluconeogenesis and lipogenesis) and up-regulation of *DILP2*, *IRS*, *GLUT1*, *SOD*, and *CAT*, reflecting restored insulin signalling and redox balance comparable to metformin treatment.
Conclusion: Quail egg yolk oil ameliorated diet-induced metabolic dysregulation in *Drosophila* by improving glucose homeostasis, lipid metabolism, and oxidative defence. These findings highlight its potential as a natural, functional food-based therapeutic for managing type 2 diabetes and related oxidative complications.

COSMECEUTICAL POTENTIAL OF *FICUS BENJAMINA* SEED EXTRACTS FROM TRINIDAD: BIOCHEMICAL, MINERAL, AND ANTIOXIDANT PROFILING

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Objective: This study assessed the cosmeceutical potential of *Ficus benjamina* L. seed extracts from Trinidad by evaluating their phytochemical composition, mineral profile, and antioxidant activity. The objective was to identify bioactive and mineral constituents supporting antioxidant, anti-inflammatory and skin-repairing functions for topical formulation development.
Methods: Methanolic and ethanolic extracts were prepared and analysed using Fourier Transform Infrared Spectroscopy (FTIR) and Gas Chromatography–Mass Spectrometry

(GC–MS). Total phenolic content (TPC), flavonoid content (TFC) and total antioxidant capacity (TAC) were quantified, and mineral elements were assessed by Atomic Absorption Spectroscopy (AAS). All assays were performed in triplicate, and data were analysed using one-way ANOVA ($p < 0.05$).

Results: FTIR confirmed the presence of hydroxyl, aliphatic, carbonyl, and aromatic functional groups associated with polyphenols, flavonoids, and terpenoids. GC–MS identified over 40 compounds, including catechol, guaiacol, hydroquinone, loliolide and methyl salicylate—known antioxidants and skin-protective agents. The methanolic extract demonstrated significantly higher antioxidant values (TPC: 178.34 ± 3.21 mg GAE/g; TFC: 98.74 ± 1.84 mg RE/g; TAC: 62.11 ± 2.05 mg AAE/g; $p < 0.05$). Mineral analysis revealed high levels of magnesium (11,060 mg/kg), potassium (159,665 mg/kg) and zinc (29.9 mg/kg), vital for collagen synthesis, cellular repair, and epidermal hydration.

Conclusion: The biochemical and mineral composition of *F. benjamina* seeds highlighted their strong antioxidant and skin-beneficial properties. The methanolic extract, in particular, showed promise as a natural ingredient for anti-ageing, skin-brightening and protective cosmeceutical formulations. Further in vivo and formulation studies are warranted to validate their clinical and commercial potential.

EVALUATION OF FOOT CARE EDUCATION AND SELF-EFFICACY PRACTICES AMONG DIABETIC PATIENTS IN TRINIDAD AND TOBAGO

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Diabetic foot ulcer (DFU) is a major contributor to the increased rate of hospital admissions and amputations of lower extremities of diabetes patients in the Caribbean region. This study, which is a part of a six-country international research collaboration, aimed to assess patients' knowledge and practice of the key elements of diabetes foot care at the primary healthcare settings in Trinidad. Thus, a cross-sectional questionnaire survey of 265 diabetes patients on routine doctors' appointments at primary healthcare clinics in Trinidad was conducted between January and April 2025. The questionnaire tool was adapted from a published Diabetes Knowledge Questionnaire-24 and other validated published data. The questionnaire covered general diabetes and foot care knowledge, self-efficacy and foot care behaviours. Binary and Likert scales were used to assess the patients' responses, while the Statistical Package for the Social Sciences (SPSS) was employed for analysis. The results showed that most of the patients were knowledgeable about general diabetes education and had high self-confidence mean scores on many self-efficacy assessments. However, the patients had relatively low self-confidence mean scores on important areas like trimming toenails or calling a doctor about problems with their feet. Additionally, about 66% of the patients were unaware of their HbA1c levels in the preceding two months to the study, and 18% rarely or never tested their blood glucose levels. About 56% of all the patients have never received any specialised training in diabetes foot care, and about 30% of all the patients have experienced a diabetes foot ulcer at least once. It is concluded that diabetes patients from Trinidad demonstrate satisfactory knowledge of diabetes general education, but have sub-optimal exposure to specialised diabetes foot care education. It is recommended that strengthening patient education, targeting diabetes foot care as part

of self-management programs, may reduce the risk of preventable lower limb amputation.

EXPLORING THE ASSOCIATION OF FAMILY HISTORY, DEMOGRAPHIC DIVERSITY AND SOCIAL DETERMINANTS WITH HYPERTENSION AMONG TRINIDADIAN ADULTS

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Objective: To explore the association of family history, demographic diversity and social determinants with hypertension among Trinidadian adults.
Method: A cross-sectional study of 360 adults was conducted using a convenience sample from public areas, workplaces and universities across Trinidad. Data were collected using a 28-item self-administered questionnaire capturing demographics, lifestyle habits, socioeconomic status and family history of hypertension. Chi-square test was used to identify associations between hypertension and selected variables.
Results: The results indicated a higher prevalence of hypertension in males compared to females ($\chi^2 = 9.593$, $p = 0.002$), with a small to moderate effect size (Cramér's V = 0.15). A strong association was found between age and hypertension ($\chi^2 = 138.528$, $p < 0.001$), with a large effect size (Cramér's V = 0.38). Employment status was significant ($\chi^2 = 16.451$, $p = 0.006$), with a small to moderate effect size (Cramér's V = 0.19), whereas household income was insignificant ($\chi^2 = 5.288$, $p = 0.625$). Ethnicity was also not significant ($\chi^2 = 2.528$, $p = 0.772$). Family history markedly increased the risk of hypertension ($\chi^2 = 9.329$, $p = 0.002$). Findings related to occupation and age may lack reliability given the small sample sizes.
Conclusion: There were significant associations between the development of hypertension and demographics, as well as socioeconomic status, with family history being a primary risk factor. However, ethnicity and income showed no notable relationship, highlighting demographic and lifestyle variables influencing risk.

THE UTILITY OF GENOTYPE-GUIDED THERAPY IN REDUCING THE PREVALENCE OF POLYPHARMACY IN DIABETIC PATIENTS

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The Caribbean is currently undergoing an epidemiological transition, leading to an increase in the prevalence of non-communicable diseases, such as diabetes and cardiovascular disease. This rise has resulted in many patients being prescribed multiple medications, a phenomenon known as polypharmacy. While these medications help manage chronic conditions, they can also cause drug-drug interactions (DDI), adverse side effects, and increased healthcare costs, potentially leading to non-adherence to treatment.
This study was conducted on a cohort of diabetic patients to assess the prevalence of polypharmacy and to investigate whether or not genotype-guided prescribing practices can impact polypharmacy. Whole blood samples and clinical data were collected from patients attending diabetic clinics in health centres across Trinidad over a year-long period. The clinical metadata was mined to determine the

prevalence of polypharmacy and the frequency of common drug combinations. The most common drug combinations included ACE inhibitors with NSAIDs (21%, n = 401), and ACE inhibitors with statins (20%, n = 401), with 48 patients on all three medications. In terms of diabetic drugs, metformin (prescribed to 283 patients, 71%) and gliclazide (149 patients, 37%) were most frequently used; 117 patients (29%) used both. Polypharmacy, which is defined as the use of five or more medications, affected 26.2% of the cohort (105 out of 401 participants).

Fifteen prescribed medications had known associations with genetic factors influencing drug response or safety. Of the eight pharmacogenes examined, five exhibited varying allelic frequencies in African and South Asian populations, but these frequencies remain unestablished in the Caribbean context. The whole exome sequencing data generated for this cohort will be analysed to determine the allelic frequencies of pharmacogenetic variants in this population. Ultimately, this study highlights the role of genetics in drug responses and advocates for personalised medicine to improve patient outcomes and reduce polypharmacy.

RISK OF MALNUTRITION AND ITS CORRELATES AMONG PERSONS DIAGNOSED WITH PARKINSON'S DISEASE

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Aim: The neurodegenerative impairment associated with Parkinson's Disease (PD) negatively impacts appetite and nutrient availability increasing the risk for malnutrition. The purpose of this study was to investigate the correlates of malnutrition among persons with PD in Trinidad and Tobago.

Methods: Participants were enrolled in this case-control study following written and oral consent during recruitment. The cases were clients with PD and their caregivers, while controls consisted of persons without Parkinson's Disease attending non-communicable disease treatment centres. Participants completed the Mini Nutritional Assessment (MNA) and Parkinson's Disease Questionnaire, as well as food security and quality of life questionnaire items during face-to-face interviews. Anthropometry was measured and/or gleaned from clinic records. The study was approved by the UWI Ethics committee and those of participating clinics.

Results: Seventy-five persons (PD = 25; non-PD = 50) participated in the study. Persons with PD were older and lighter than their non-PD counterparts. They were also more likely than their non-PD counterparts to report reduced appetite (92 vs. 24%; p <0.001), being constipated (60 vs. 20%; p <0.001), experiencing recent weight loss (56 vs. 30%; p = 0.03), engaging in poor self-care (40 vs. 4%; p <0.001), having mobility problems (40 vs. 4%; p <0.001), a high risk of food insecurity (100 vs. 66%; p <0.001), feeling depressed and anxious (60 vs. 20%; p <0.001) and at a high risk for malnutrition (48 vs. 4%; p <0.001).

Conclusion: The neurological derangements associated with PD increase the risk of malnutrition through a myriad of factors associated with meal consumption.

ANTIBIOTIC PROPHYLAXIS IN SURGICAL PATIENTS: A RETROSPECTIVE ANALYSIS AT A SECONDARY HOSPITAL IN TRINIDAD AND TOBAGO

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Background: Antibiotic prophylaxis is a critical intervention in reducing postoperative infections, yet inappropriate prescribing remains a global contributor to antimicrobial resistance (AMR). Trinidad and Tobago lacks localised data on perioperative antibiotic practices, hindering effective antimicrobial stewardship.
Objective: To assess the prescribing patterns, appropriateness, and outcomes of prophylactic antibiotic use across various surgical departments at the Sangre Grande Hospital Campus (SGHC), under the Eastern Regional Health Authority (ERHA).
Methods: A retrospective observational study was conducted, randomly selecting 235 patient records, over a 14-month period from January 2024 to April 2025. Data included demographics, surgical category, type and route of antibiotics administered, duration of hospital stay and use of microbiological testing. Antibiotics were classified using the World Health Organization (WHO) 'AWaRe' framework.
Results: Among the 235 patients, 52.8% were female and 47.2% were male. General surgery accounted for the majority of procedures (74.5%). Patients aged ≥60 years comprised the largest demographic (42.1%). Antibiotic prophylaxis was administered in 85.1% of cases, totalling 225 prescriptions—62.2% from the WHO 'Access' category and 37.8% from the 'Watch' category. Augmentin (44.4%), Ceftriaxone (25.3%), and Metronidazole (17.3%) were the most frequently used antibiotics. Most antibiotics were delivered intravenously (66%), with minimal use of oral or subcutaneous routes. Only four patients (1.7%) had microbiological cultures sent, despite the availability of susceptibility testing. The surgical site infection (SSI) rate was low (0.43%), and 45.5% of patients were discharged within one day post-surgery. All postoperative monitoring was performed by nursing staff.
Conclusion: This study revealed widespread empirical antibiotic use with low reliance on culture-based prescribing. Despite a low SSI rate, the underutilisation of microbiological testing and the reliance on 'Watch' category antibiotics presented concerns. The findings highlighted the need for improved surveillance systems to improve the stewardship of antibiotics in surgical prophylaxis.

ONE HEATH DISEASE SURVEILLANCE AND IMPLICATIONS FOR MANAGING INFECTIOUS DISEASES IN HUMANS AND ANIMALS

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The lack of proper animal waste management threatens soil, water, air, and human health by harbouring pathogens contributing to zoonoses and antimicrobial resistance (AMR). The One Health framework links human, animal, environmental and agricultural health, urging integrated surveillance amid climate change and globalisation. In Trinidad and Tobago, gaps exist in One Health genetic research using 'omics' for pathogen tracking and pathway analysis in waste, manure, agriculture, and human samples. This proposal employs multiple methods, including metagenomics, whole genome (WGS) and amplicon-based sequencing, microbial culturing, for assessing the microbial risks, and quantification of nitrates, phosphates, and heavy metals to trace the chemical risks and propose sustainable solutions. This will be conducted in a randomly selected watershed, as part of a larger project with the Environmental Management Agency (EMA). A baseline Knowledge, Attitudes and Practices (KAP) survey will be done to assess community vulnerabilities. Targeted sampling will be conducted based on sample type,

season, and location. Samples from wastes, environments (soil), crops (plant samples and run-off), and human sources will undergo DNA and RNA extraction followed by metagenomic sequencing and downstream bioinformatics analyses for pathogen detection and determination of phylogenetic relationships. The top five pathogens will be cultured and confirmed (16S rRNA/ITS). Screening will be done for individual pathogens via Polymerase Chain Reaction (PCR) for virulence/AMR genes. WGS with downstream bioinformatics will be used. The quantification of ions and minerals will also be done. Interventions such as organic composting will be implemented. Monitoring and evaluation of waste management will be done. The KAP will reveal vulnerabilities important to the study. Prevalent pathogens (e.g., *E. coli* and *Salmonella*) and AMR genes in specimens from pathway analysis will be elucidated. WGS can uncover cross-continuum relatedness of microbiomes. Optimal organic manure composition and the effects of pollutants in a One Health continuum will be explored.

"I AM IGNORED AND EXCLUDED! - WHERE IS THE SUPPORT?" AN INVESTIGATION INTO THE EFFECTS OF WORKPLACE OSTRACISM ON EMPLOYEE WELL-BEING AND ORGANIZATIONAL DEVIANCE: THE MODERATING ROLE OF PERCEIVED ORGANIZATIONAL SUPPORT

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This study builds on the conservation of resources and social exchange theories and takes a unique perspective on workplace ostracism by assessing its impact on a mix of individual and organisational outcomes, and the potential buffering effects of organisational support. More specifically, the study examines the effects of workplace ostracism on three dimensions of employee well-being, as well as the impact on organisational deviance. Finally, the moderating role of perceived organisational support on the relationships between workplace ostracism, employee well-being and organisational deviance is evaluated.

Data were collected from 183 public sector employees in Trinidad. Regression analysis was used to analyse the data. The data provided support for the hypotheses that workplace ostracism relates positively to employee well-being and organisational deviance. However, perceived organisational support did not moderate the relationships between workplace ostracism and the dimensions of employee well-being or organisational deviance, respectively. Implications and future research directions are discussed.

AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN EMPLOYEE ANXIETY AND DEPRESSION AS PREDICTORS OF ENGAGEMENT IN THE OIL AND GAS SECTOR: THE MODERATING ROLE OF JOB DEMAND

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Purpose: Employee mental health remains an international priority with significant implications for the workplace. This study investigates the relationship between two dimensions of mental health, namely anxiety and depression, and their relationship to employee engagement within the oil and gas sectors of Trinidad, Guyana and Suriname. The moderating role of job demand in the relationship between these dimensions of

mental health and engagement is also investigated.
Design/methodology/approach: Quantitative data via an online web-based survey were collected from a sample of 210 employees within the oil and gas sectors, across the countries of Trinidad, Guyana and Suriname. Multiple hierarchical regression analysis was performed to test the research relationships.
Findings: The findings provided support for the propositions that employee anxiety and depression negatively impact work engagement. However, job demand did not moderate the relationship between anxiety and work engagement or depression and work engagement.
Originality: This study addressed clear gaps, as limited research has examined the relationships of anxiety and depression with work engagement, and even fewer studies have investigated the moderating role of job demand in these relationships. Therefore, this study contributed to understanding relatively under-explored relationships between employee mental health, work engagement and job demand.

A SURVEY OF *TRYPANOSOMA CRUZI* IN THE BLACK-EARED OPOSSUM (*DIDELPHYS MARSUPIALIS*), RED-RUMPED AGOUTI (*DASYPROCTA LEPORINA*) AND NINE-BANDED ARMADILLO (*DASYPUS NOVEMCINCTUS*) IN TRINIDAD, WEST INDIES

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Background: *Trypanosoma cruzi* (Chagas disease) circulates in Trinidad but has been documented only in its arthropod vector and in one rat. Opossums, armadillos and agouti are present in Trinidad and are known *T. cruzi* hosts.
Objective: To demonstrate *T. cruzi* infection in opossum, armadillo and agouti in Trinidad.
Methods: Tissues from 75 opossums, 20 armadillos, and 23 agouti collected throughout Trinidad between 2014 and 2020 were analyzed for *T. cruzi* infection. Diagnostic methods included PCR on the heart and spleen (all species), blood smear examination (opossum and armadillo), immunofluorescence (opossums) and histopathology (all 3 species).
Results: For the opossum: 81% (51/63) of spleen samples and 79% (42/53) of heart samples were *T. cruzi*-positive via PCR, immunofluorescence revealed a 39% (22/57) seropositivity, and all blood smears were negative (0/72). Overall, 68% (51/75) of the opossums were positive on at least one test (PCR or IFA). For armadillos: 37% (7/19) of splenic samples and 53% (10/19) of heart samples were *T. cruzi*-positive via PCR, and trypanosomes were observed in the blood of one animal (1/15). Overall, 60% (12/20) of the armadillos were positive on at least one test. In agouti: 83% (15/18) of spleen samples and 75% (12/16) of heart samples were PCR positive for *T. cruzi*. Seventy-eight per cent (12/23) of agouti were positive on at least one test. Although no amastigotes were apparent

on histopathologic evaluation, lymphohistiocytic myocarditis, a common *T. cruzi*-associated lesion, was seen in 15% (9/61) opossums and 25% (4/16) of armadillos. **Conclusion:** This is the first report of *Trypanosoma cruzi* in wild reservoirs in Trinidad. The hunting and consumption of these animals pose a possible risk of Chagas disease transmission.

A PREVENTABLE EPIDEMIC: ASSESSING KNOWLEDGE, ATTITUDE AND PRACTICE TOWARD OCCUPATIONAL NOISE EXPOSURE AND HEARING LOSS IN TRINIDAD AND TOBAGO

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Occupational Noise-Induced Hearing Loss (ONIHL) is a persistent, preventable workplace disease, recognised globally as the second most common form of sensorineural hearing loss. However, the availability of data for developing regions, particularly the Caribbean, is scarce. This study aimed to assess the Knowledge, Attitude and Practice (KAP) of workers in Trinidad and Tobago towards occupational noise exposure, ONIHL and the use of Hearing Protection Devices (HPDs), and was supported by the UWI-Research and Development Impact (RDI) fund.

This study employed a cross-sectional design to gather data from a wide range of occupational sectors, such as manufacturing, oil and gas support, protective services, steelpan orchestras and various non-industrial settings. A modified validated questionnaire, designed to evaluate KAP domains, was administered in person by the researcher and online to collect data. The response rate for organisations sampled in person was 95.6% (N=282) while the response rate for online participation was unknown (N=62). Workplace noise exposures, which exceeded the recommended Permissible Exposure Level (PEL) of 90 dBA for an 8-hour TWA were also documented.

The study revealed significant disparities in the KAP domains. The result for attitude was good (76% average score); workers acknowledged the importance of reducing noise exposure and wearing HPDs. However, it was notable that steelpan manufacturing and steelpan orchestras documented poor attitude scores (<75%). The knowledge scores (63% average score) were poor, with key gaps including a lack of awareness of the recommended PEL, the preventability of ONIHL and other health impacts of noise. However, practice was the weakest domain (35 % average score), illustrating a lack of knowledge and training contributing to low HPD usage.

In conclusion, this KAP study provides local evidence that some workers are at risk of developing ONIHL. Interventions focused on education and hearing conservation are crucial to close knowledge barriers and poor practices. Additionally, improved enforcement of noise regulations will help safeguard our workforce against this preventable workplace disease.

THE SOCIAL CONSTRUCTION OF FEMININE AND MASCULINE BEAUTY IDEALS

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Due to growing concerns about unrealistic body ideals promoted by social media, extensive research has examined its impact on body

image, beauty standards and overall well-being, primarily in the Global North. However, there is a significant gap in understanding how these beauty standards are constructed and adopted, particularly regarding preferences for different body types and body dissatisfaction in the southern Caribbean, especially in Trinidad and Tobago. To explore these dynamics, a phenomenological design was used, with twelve semi-structured interviews conducted with six males and six females in Trinidad and Tobago. By applying post-structuralist, social comparison and objectification theory, the relationship between social media platforms, gender-specific behaviours, peer validation and body satisfaction or dissatisfaction was examined. The research revealed complex dynamics in which social media served as a catalyst for upward social comparisons, leading to decreased body satisfaction among participants of both genders. Participants reported feelings of dissatisfaction and negative emotions regarding their bodies, often wishing to change their appearance to align with the idealised images they encountered on social media. Key findings indicated that these feelings of dissatisfaction are linked to ideals surrounding the 'perfect' body, which can result in adverse outcomes such as (i) adopting a false persona, (ii) body dissatisfaction, (iii) engaging in obsessive self-improvement behaviours, (iv) preoccupation with achieving thinness, (v) fixation on exercise and diet, (vi) upward social comparison and (vii) anxiety and low self-esteem. The study emphasises the importance of gendered experiences and the influence of peer interactions in shaping body image perceptions. It highlights the need for a more nuanced understanding of how global beauty ideals are negotiated in local contexts. Additionally, this analysis contributed to the broader discussion about promoting media literacy, body positivity and mental well-being.

PLANT-EXTRACT-ATTENUATED *SALMONELLA* VACCINE COMBINED WITH EGG YOLK ANTIBODIES (IGY) FOR POULTRY PROTECTION

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Salmonella infections in poultry represent a significant threat to public health and contribute to substantial economic losses within the agricultural sector. In response to these challenges, this study explores an innovative dual control strategy integrating the use of indigenous plant-based bacterial attenuation with targeted immunotherapy using egg yolk-derived immunoglobulin Y (IgY) antibodies. Garlic (Allium sativum) and onion (Allium cepa) extracts were employed to attenuate virulent strains of Salmonella enterica, resulting in a notable reduction in bacterial viability during in vitro assays. In the absence of extracts, Salmonella formed colonies approximately 4 mm in diameter with characteristic black centres on HE agar (due to hydrogen sulfide production). Treatment with garlic extract at 1.5% resulted in significantly smaller colonies (~1 mm; $p < 0.01$ vs. control), often lacking black centres, which suggested reduced H2S production. Following oral vaccination with the attenuated strains, chickens demonstrated a robust immune response, characterised by the production of high titers of anti-Salmonella IgY antibodies, as measured by ELISA. At 1:500, the antigen–antibody ratio was optimal, leading to stronger binding and an increased OD. At dilutions of 1:125 and 1:250, OD readings were 0.64 and 0.96, respectively, demonstrating a strong dose-dependent response. Replicates confirmed this finding. Post-vaccination cloacal swabs were collected daily during the first week; thereafter, they were collected weekly and cultured on XLD agar, which confirmed a decrease in Salmonella colonisation. Functional assays demonstrated that specific antibodies possessed strong agglutination activity against homologous Salmonella strains, highlighting their utility in passive immunisation protocols. Safety assessments

confirmed the vaccine's non-pathogenic profile, while immunogenicity trials showed consistent antibody production across vaccinated flocks. This dual modality—combining natural antimicrobial agents with specific IgY-based immunotherapy—offers a sustainable, low-cost alternative to antibiotics, with the potential to reduce zoonotic transmission, enhance poultry welfare, and support antimicrobial stewardship in animal husbandry.

PREPARING TOMORROW'S DOCTORS FOR CLIMATE CHANGE: INSIGHTS FROM CARIBBEAN MEDICAL STUDENT PERCEPTIONS

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Objective: This study explores medical students' perceptions and attitudes toward climate change, focusing on their awareness, concern levels and preferred information sources. Given their future roles as healthcare professionals, understanding how medical students conceptualise climate change is critical to informing curriculum development and advancing health-centred climate education.

Methods: A cross-sectional online survey was distributed to students across five universities and medical institutions. The questionnaire included Likert-scale and multiple-choice questions addressing beliefs about climate change, level of concern, sources of information, and perceptions of institutional support. Descriptive statistics, correlation analyses (Spearman and Pearson) and regression models were applied. Based on a population of about 1,000 students, a minimum of 285 was required for representativeness. In total, 113 valid responses were obtained (40% of the target), sufficient for correlation and regression but limiting generalisability.

Results: Of the 113 respondents, 65% were female and 35% male. The mean age was 25 years, with 87% undergraduate and 13% postgraduate. Nearly all participants agreed climate change is occurring (99.2%), with 70.4% attributing it mainly or entirely to human activity. Concern was high, with 50.4% 'very' or 'extremely worried'. Social media (25.0%) and television (19.2%) were the most common sources, while university-based channels accounted for less than one-third. Students strongly desired more education on mitigation, adaptation and SDG 13. A weak but statistically significant positive correlation was found between awareness and concern (Spearman's $\rho = 0.263$, $p < 0.005$; Pearson's $r = 0.274$, $p < 0.003$). No significant differences were observed across gender, age, or level of study.

Conclusion: Medical students are highly aware and concerned about climate change, but rely mainly on non-academic sources. These findings underscore the importance of integrating climate change into medical curricula and strengthening institutional initiatives to prepare future healthcare professionals for climate-related health challenges.

DIET DIVERSITY AND ITS CORRELATES AMONG YOUNG ADULTS ATTENDING THE UNIVERSITY OF THE WEST INDIES ST. AUGUSTINE

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Background: Poor diet remains an important factor in the development of non-communicable diseases (NCDs). University students often experience levels of stress that may negatively impact healthy lifestyle behaviours.
Purpose: This study investigated diet diversity, dietary patterns and associated factors in a sample of university students.
Methodology: The study was cross-sectional in nature. Following informed consent and enrollment in the study, participants completed a questionnaire consisting of the diet diversity questionnaire (DQQ), physical activity behaviours, anthropometric and socio-demographic items. The DQQ data were categorised into four domain scores as follows: Food Group Diversity (FGD), NCP-Protect, NCD-Risk, and Global Recommended Dietary (GRD) scores. Participation was voluntary. Principal component analysis (PCA) was used to identify dietary patterns based on food items consumed. The study was approved by the University's Ethics Committee.
Findings: PCA analysis identified six dietary patterns that accounted for 53.5% of foods consumed as follows: 'Foods High in Salt, Sugar and Fats (HSSF)' (12.5%); 'Traditional' (10.8%); 'Pescatarian' (8.3%); 'Meat-based' (7.5%); 'Typical' (7.5%); 'Pollotarian' (7.1%). Dietary patterns were highly significantly associated with diet diversity scores ($p < 0.01$) and time spent time spent in moderate-to-vigorous physical activity ($p < 0.01$)
Conclusion: The significant associations between diet diversity scores and dietary patterns and physical activity suggest that diet diversity scores may be useful low-burden proxies for rapidly assessing the risk of adverse lifestyle behaviours linked to NCDs in this population.

EVALUATING METAGENOMIC SEQUENCING FOR VIRAL DIAGNOSTICS AND SURVEILLANCE IN TRINIDAD AND TOBAGO

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Molecular epidemiological approaches based on next-generation sequencing (NGS) and bioinformatic tools (Gardy et al. 2018) have proven invaluable for pathogen surveillance, providing critical insights into outbreak dynamics and informing public health interventions. However, significant global disparities in capacity remain a challenge, including in the Caribbean (Sahadeo 2023 and Britto 2022). Since many viral infections first present as clinically indistinguishable acute undifferentiated febrile illnesses (AUFI), diagnosis may require a series of time-consuming pathogen-specific tests to confirm or rule out individual viruses. Often, causative agents remain unidentified due to a lack of a specific test or a missed detection window. In addition to hampering surveillance and control, this delays patient access to disease-specific treatment, prolonging health risks.
To address this, "pathogen-agnostic" diagnostic testing based on metagenomic sequencing has been proposed (Chiu et al.

2019). Unlike traditional pathogen-specific approaches, metagenomics analyses the entire microbial community in clinical samples, leveraging NGS platforms (e.g., Illumina, Nanopore (Claro et al. 2023)) to capture and sequence genetic material, enabling simultaneous detection and characterisation of multiple microorganisms in a single test, including novel or previously uncharacterised pathogens. The methodology further employs bioinformatics pipelines for taxonomic classification, sequence annotation and various assembly algorithms to reconstruct viral genomes from fragmented sequence reads. The aim would be to design and validate an efficient metagenomic workflow for clinical diagnostic and outbreak response in resource-limited Caribbean settings, where we will compare the performance of Nanopore and Illumina-based metagenomic workflows to gold-standard amplicon-based pathogen detection methods, including determining limits of detection (LoD) in different matrices (viral transport medium, serum, urine). Specificity and sensitivity will also be determined against diagnostic tests routinely used for suspected viral illnesses in Trinidad and Tobago clinical settings. For this, sera/nasal swabs/urine samples were collected from adults with a recent history (within 14 days of onset) of AUFI or influenza-like illnesses (ILI). This systematic comparison between different sequencing protocols/platforms across sample types represents the first local comprehensive evaluation of metagenomic diagnostics. This will provide evidence-based recommendations for platform selection based on test performance, cost-effectiveness, and turnaround time. Data generated will also facilitate characterisation of AUFI and ILI viromes, potentially revealing region-specific viral variants or previously unknown viruses with pandemic potential.

BRIDGING BUSH MEDICINE TRADITION AND SCIENTIFIC EVIDENCE: EXPLORING THE ANTICANCER POTENTIAL OF SELECTED PLANTS IN TRINIDAD

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Cancer remains a leading cause of death in Trinidad and Tobago, with prostate, breast, and lung malignancies accounting for the highest incidence and mortality. ‘Bush medicine’, as colloquially known, refers to traditional plant remedies used for treating a range of ailments. This study investigated the cytotoxic potential of extracts from understudied plants used by bush medicine practitioners (BMPs) for cancer treatment.

Ethical approval was granted to interview thirty (30) consenting BMPs across Trinidad using unstructured questionnaires. Over seventy (70) plant species with perceived anticancer activity were documented. Guided by the literature review, five (5) understudied species were selected, collected, identified and vouchered at the National Herbarium. Plant parts were macerated in 95% ethanol to yield eight crude extracts: BB, CH, MaR, MB-MS, JBB, JBF, JBL and JBS. Cytotoxicity screening against prostate (PC-3), lung (A549 and H1299) and breast (MDA-MB-231 and MDA-MB-468) cancer cells was carried out using an MTT assay. The concentrations inhibiting 50% of cell growth (IC_{50}) were derived from dose-response curves generated in GraphPad Prism, and selectivity indices (SI) were calculated relative to non-tumourigenic keratinocytes (HaCaT). Flow cytometry with propidium iodide staining was used to evaluate effects on cell cycle progression via FlowJo analysis.

Among the tested extracts, MaR exhibited broad-spectrum cytotoxicity across all cell lines (IC_{50} = 5–65 µg/mL), showing pronounced

activity against MDA-MB-468 cells (IC_{50} = 5.84 ± 1.44 µg/mL; SI = 6.53). Treatment with MaR (40 µg/mL) induced G1 arrest, S-phase suppression, and near-complete G2 depletion. BB also showed strong activity, notably against H1299 lung cancer cells (IC_{50} = 4.58 ± 1.46 µg/mL; SI = 25), and moderate inhibition of MDA-MB-468 (IC_{50} < 45 µg/mL).
These findings highlight MaR and BB as promising candidates for further bioassay-guided fractionation and mechanistic studies. The scientific evaluation of local bush medicine plants aligns with SDG 3, good health and well-being.

PREVALENCE OF PCOS IN A MULTIETHNIC CARIBBEAN POPULATION: A COMMUNITY-BASED ASSESSMENT

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Objective: Polycystic Ovary Syndrome (PCOS) remains significantly underreported, with estimates indicating that up to 70% of affected individuals remain undiagnosed—particularly in low-resource and ethnically diverse regions. This is the first community-based study in Trinidad to estimate the prevalence of probable PCOS using clinical and biochemical parameters aligned with the 1990 National Institutes of Health (NIH) criteria and the 2023 International Evidence-Based Guideline for the Assessment and Management of PCOS.
Methods: The researchers conducted a community-based, prospective cross-sectional study involving females aged 18–45 years, randomly selected from communities across Trinidad (using a traditional method of placing all villages in the selected zones and then randomly selecting a village from the zone) to reflect the nation's ethnic diversity. Participants completed a standardised questionnaire and underwent a brief physical examination. Clinical hyperandrogenism was assessed using the modified Ferriman-Gallwey (mFG) scale, and population-specific cutoffs were identified via cluster analysis. Menstrual dysfunction (MD) was defined as a cycle length <21 or >35 days or less than 8 cycles per year. Hyperandrogenemia was defined using serum total testosterone (T) levels determined by liquid chromatographytandem mass spectrometry and free T, determined by equilibrium dialysis. Anti-Müllerian hormone (AMH) was evaluated to assess ovarian status, but pelvic ultrasonography was not performed. TSH, prolactin, and 17-hydroxyprogesterone

(results pending) were obtained. PCOS was defined by the NIH 1990 criteria to assess for PCOS phenotypes A and B, which require the presence of both oligo/anovulation and hyperandrogenism. To operationalise this, we defined three diagnostic groups: menstrual dysfunction (MD) plus a hirsutism score (HIR_score) greater than 6 (Group 1), MD plus either HIR_score >6 or abnormal total testosterone (TTST) (Group 2), and either abnormal AMH or MD, in combination with either HIR_score >6 or abnormal TTST (Group 3). Prevalence estimates and corresponding 95% confidence intervals (CIs) were calculated for each group.

Results: The cut-off values were defined at the 75th percentile for each biomarker and included: TSH (2.42 mIU/L), prolactin (16.25 ng/mL), 17-hydroxyprogesterone (114.5 ng/dL), total testosterone (34 ng/dL) and free testosterone (4.23 ng/dL). A total of 245 participants were evaluated; 9.8% met the criteria for Group 1 (24/245; 95% CI: 6.1%–13.5%), 10.0% (24/241; 95% CI: 6.2%–13.7%) met Group 2 criteria and 14.7% (35/238; 95% CI: 10.2%–19.2%) met Group 3 criteria. Overall, 10% of the participants were affected by phenotype A PCOS and 14.7% by phenotype B.

Conclusion: Using NIH-based definitions for PCOS (Phenotypes A and B), findings suggest that up to **14.7%**—approximately **1 in 7**—reproductive-aged women in Trinidad may have PCOS. These results underscore a pressing public health concern in the region and highlight the need for culturally tailored screening strategies and increased awareness within primary care settings.

ENDOPHYTIC FUNGI FROM *TILLANDSIA* SPECIES IN TRINIDAD AND TOBAGO: A PROMISING SOURCE OF ANTIOXIDANT METABOLITES

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Endophytic fungi are recognised as prolific sources of bioactive natural compounds with potential pharmaceutical applications. However, the endophytic fungal communities of the *Tillandsia* genus remain largely unexplored, especially in the Caribbean. Previous studies on *Tillandsia* species in other regions have revealed endophytes that produce compounds with antimicrobial and anticancer properties, yet no investigations have been conducted on species found in Trinidad and Tobago.

This study examined the biological activity of fungal endophytes isolated from two local *Tillandsia* species, *T. utriculata* and *T. flexuosa*. Twelve fungal isolates were obtained and fermented on rice media to produce crude extracts. These extracts were evaluated for antioxidant activity using the DPPH radical scavenging and CUPRAC assays and for total phenolic content using the Folin-Ciocalteu method. The antioxidant activity of the rice-media extracts ranged from 2.6–24.3% inhibition (DPPH) and 7.8–112.5 mg/g Trolox equivalents (TE) (CUPRAC) at 0.5 mg/mL, while the total phenolic content ranged from 13.2–50.7 mg/g gallic acid equivalents (GAE) at 1 mg/mL.

To assess the influence of culture media on metabolite production, the endophytes were subsequently grown on Cassava Dextrose Broth (CDB). Extracts from CDB cultures exhibited enhanced bioactivity, with antioxidant activity ranging from 6.1–29.1% inhibition (DPPH) and 9.8–133.5 mg/g TE (CUPRAC) and total phenolic content ranging from 12.5–86.5 mg/g GAE. These findings confirm the presence of biologically active metabolites in the fungal endophytes associated with *Tillandsia* species in Trinidad and Tobago and demonstrate that culture conditions significantly influence metabolite production. The results highlight the potential of these endophytes as novel sources

of antioxidant compounds with possible pharmaceutical applications.

NUMERICAL ANALYSIS OF BLOOD FLOW WITH GOLD NANOPARTICLES IN DISEASED ARTERIES

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This study investigates magnetohydrodynamic blood flow through a tapered diseased arterial segment exhibiting both stenosis and post-stenotic dilation, modelled as a nanofluid with suspended gold nanoparticles. Using a Buongiorno-based formulation, the governing equations for momentum, energy and nanoparticle transport were derived under the mild stenosis assumption and solved numerically. The analysis focuses on how geometric irregularities and magnetic field strength influence key haemodynamic and thermal characteristics, including axial velocity, temperature distribution and nanoparticle concentration. Numerical simulation shows that the constricted region significantly accelerates blood flow, while the dilated segment creates recirculation zones that alter wall shear stress on the arterial wall. The effects of an external magnetic field on the flow behaviour are also explored. This additional external force on the blood-nanoparticle mixture resulted in the slowing of the fluid, producing more uniform temperature profiles. Additionally, the extent of stenosis and dilation was found to strongly influence nanoparticle distribution, with tighter constrictions limiting radial dispersion and larger dilations promoting uneven accumulation. The findings here provide insight into the interplay between magnetic effects, viscous dissipation and arterial geometry, offering a foundation for future multi-dimensional studies and biomedical applications. Development of these models also has implications for nanoparticle-based drug delivery and magnetic hyperthermia treatments.

THE OPTIC BOTTLENECK: MODELLING THE EFFECTS OF ELEVATED INTRAOCULAR PRESSURE ON THE CENTRAL RETINAL VEIN

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Elevated intraocular pressure (IOP) is one of the most common risk factors for glaucoma, a leading cause of irreversible blindness. These high pressures are believed to cause damage to the optic nerve head at the lamina cribrosa, a thin elastic tissue through which the central retinal artery and vein pass. A time-dependent Carreau fluid model was used to simulate the blood phase, whilst a linear elastic homogeneous model was used for the vein walls and surrounding lamina cribrosa tissue. The fluid velocity and solid displacement fields were solved via a fluid-structure interaction with respect to a moving mesh using a finite element method. Results indicated very little throttling of the blood across the lamina cribrosa at typical IOP levels. However, at increased IOP (up to 40mmHg), this effect was more pronounced, predicting lower fluid velocity upstream from the lamina cribrosa. Displacement fields indicated that increasing the IOP pushes the lamina cribrosa further into the optic nerve canal. Therefore, this study supports the hypothesis that significant stresses passed onto the optic nerve cells by additional bending of the lamina cribrosa are one of the primary reasons for damage to the optic nerve head. Studies in the literature have demonstrated a link between the pulsation amplitude of the central retinal vein and

relationships between the intraocular and intracranial pressures. Consequently, accurate models of the central retinal vein may contribute to the development of non-invasive techniques for estimating intracranial pressures, particularly in patients with glaucoma.

VICARIOUS TRAUMATIZATION OF QUALITATIVE RESEARCHERS IN HIGHER EDUCATION IN TRINIDAD AND TOBAGO

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Purpose: The distance between qualitative researchers and study participants is extremely close, as qualitative research is usually conducted face-to-face. Despite this closeness, conspicuously absent from research in the Caribbean is scholarship on vicarious traumatisation (VT) suffered by qualitative researchers in higher education. This article aimed to determine the existence of vicarious trauma in qualitative researchers in higher education in Trinidad and Tobago and to proffer solutions to mitigate similar challenges in the future.
Design/methodology/approach: Consensual qualitative research using semi-structured interviews was utilised to collect data from ten qualitative researchers employed at institutes of higher education in Trinidad and Tobago.
Findings: The findings indicated the presence of VT and a range of vicarious trauma symptoms among the participants, including: anger, anxiety, dejection, disgust, helplessness, frustration, resignation, irritability, numbness, obsessive thoughts and difficulty concentrating. Three themes emanated from the narratives of the qualitative researchers. The findings suggested similarities in VT among the qualitative researchers.
Practical implications: Implementing policies at institutes of higher education might assist in managing VT among qualitative researchers in Trinidad and Tobago.
Originality/value: Scholarship on the risk of vicarious trauma to qualitative researchers has existed for many years. However, much of this research does not focus on the Caribbean. Further, the limited scholarship on VT in the Caribbean fails to acknowledge and develop supportive processes to assist qualitative researchers. The conduct of empirical issue on the phenomenon from a diverse range of disciplines highlights issues facing qualitative researchers.

THEME IV

ENGINEERING AND GREEN TECHNOLOGIES FOR SUSTAINABILITY

VISIBLE LIGHT UPGRADING OF FURFURAL TO FUEL ADDITIVES

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The growing global population has led to increased demand for energy and essential chemicals, exacerbating pollution and the effects of global warming. The primary sources of energy and carbon for chemical production are derived from fossil fuels, which are finite and environmentally detrimental. Therefore, finding renewable sources of energy and carbon is crucial for mitigating global warming. Utilising waste biomass as a renewable carbon and energy source offers a sustainable alternative, reducing reliance on fossil fuels. This approach supports the principles of a circular economy by minimising waste and promoting the reuse and recycling of materials. This research focuses on the photocatalytic upgrading of furfural, a platform molecule derived from waste biomass such as corn stover, to high-value chemicals. Photocatalysis was chosen due to its use of sunlight, an abundant and renewable energy source, thereby avoiding the environmental impacts associated with fossil fuel-powered electricity. The process is energy-efficient, as photons from the sunlight are directly utilised by the catalyst without conversion to other forms of energy. The use of a novel catalyst synthesis method called chemical vapour impregnation, which is a solventless method, to deposit metal nanoparticles (<5nm) on the surface of a well-known photocatalyst, Titania (TiO_2).

We investigated the conversion of Furfural to the primary product, which is gamma-velerolactone (GVL), utilising TiO_2-based photocatalysts, with noble and non-noble metal nanoparticles deposited on the surfaces as monometallic and bimetallic catalysts, under visible light irradiation. Our findings demonstrate that these TiO_2-based catalysts can achieve high yields (>75%) and selectivity (>99%) for GVL. This study highlights the potential of photocatalytic methods for the sustainable production of value-added chemicals from biomass-derived feedstocks, which, in turn, meet the objectives of many UN SDGs. These include Affordable and Clean Energy (SDG 7) by using visible light photocatalysis, Responsible Consumption and Production (SDG 12) through waste biomass as a feedstock and Climate Action (SDG 13) that sees using light as an energy source and will reduce dependence on the fossil fuel-powered electrical grid, which will contribute to the development of greener chemical processes.

TOWARDS VALORIZATION OF *SARGASSUM* TO CALCIUM ALGINATE BIOPLASTIC COMPOSITES AS AN ALTERNATIVE TO CONVENTIONAL PLASTICS

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Plastic pollution represents a critical threat to environmental and human health, driving the urgent need for bio-based alternatives that align with circular economy principles and reduce reliance on fossil-based plastics. *Sargassum natans*, a brown seaweed inundating Caribbean and Latin American coastlines for over a decade, has emerged as a promising feedstock for alginate, a biopolymer with valuable film-forming properties. This study developed a multistage extraction and precipitation process to improve alginate recovery compared to single-stage methods, enhancing yield from 17% at 71% purity to 28% at 92% purity. Process optimisation using Response Surface Methodology (RSM) validated these conditions. Bioplastic films fabricated from pure *Sargassum* alginate exhibited poor mechanical, barrier and thermal performance, limiting application. To overcome this, composite technology was employed to formulate an optimised biodegradable alginate-based bioplastic. The resulting composition (6 wt% alginate, 0.263 wt% starch, 0.35 wt% CMC, 0.065 g/g sorbitol, and 0.025 g/g PEG-200) achieved exceptional functionality, including ultra-high oxygen barrier (OP = 0.2 $cm^3 \cdot \mu m \cdot m^{-2} \cdot d^{-1} \cdot kPa^{-1}$), strong water vapor barrier (WVP = 2.18 × 10^{-12} $g \cdot m/m^2 \cdot s \cdot Pa$) and high tensile modulus (E = 3.93 GPa). Importantly, no additive migration occurred in simulated aqueous food systems over 10 days, and full biodegradation was observed within 14 days. The alginate bioplastic outperforms in providing ultra-low oxygen barrier packaging properties, with a required mass of plastic material producing a total carbon footprint (kg $CO2_{eq}$) 64–978 times lower than PLA and PET, respectively, and overall packaging costs 280 times less than current synthetic plastic. Techno-economics illustrate that a total annualised cost (TAC) for alginate bioplastic of $US 4.56 per kg is possible, ensuring high economic feasibility, comparable to current commercial bio-based alternatives. This work demonstrates the dual benefits of mitigating invasive *Sargassum* blooms and producing a cost-effective, high-performance alginate bioplastic. The results emphasise the potential of engineering innovation and green technologies to deliver sustainable packaging solutions while advancing low-carbon operations in the Caribbean plastics sector.

MINIMIZING ENERGY DISSIPATION IN CYLINDRICAL SYSTEMS: THE ROLE OF INDEPENDENT OSCILLATIONS AND SLIP BOUNDARY CONDITIONS FOR GREEN DESIGN

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The unsteady motion of an incompressible viscous fluid in an infinitely long cylinder undergoing longitudinal and torsional oscillations of independent amplitudes, with slip occurring where the Newtonian fluid meets the cylinder, is examined. The proposed governing equations are solved, and analytical expressions for the velocity field, shear stresses, drag force on the cylinder, work done and drag coefficient are obtained. The behaviour of the velocity components, drag and work done is illustrated graphically, and conclusions were drawn. These results of understanding the drag, energy dissipation (work done), and improving efficiency are fundamental to sustainable engineering. This study provided the predictive tools necessary to engineer systems that are more efficient, durable and consume less energy, which aligns with sustainability goals.

EXPLORING *THEOBROMA CACAO* (COCOA) POD HUSK AS A CORROSION INHIBITOR

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Metals are an integral part of our lives. Their degradation over time as a result of their surroundings endangers human life and the environment (Jones 1996, Ahmad 2006 and Wilson 2017), but the synthetic inhibitors used to mitigate metallic corrosion are often expensive and hazardous to natural life. *Theobroma cacao* falls under the category of green corrosion inhibitors and has been proven to aid in the corrosion retardation of carbon steels in acidic solution (Paz Astudillo et al. 2017, Yetri and Sukatik 2017 and Jeffers and Wilson 2021), making it an eco-friendly, bio-degradable and renewable alternative. Time and temperature studies were conducted on mild steel coupons in 0.2 M H2SO4(aq) in the absence and presence of *Theobroma cacao* methanol extract using *in situ* Electrochemical Impedance Spectroscopy (EIS) to investigate how *Theobroma cacao* provides protection against metallic corrosion. Readings were taken periodically for eighty-four (84) days and at different temperatures. Results indicated that *Theobroma cacao* absorbs onto the metal surface via physisorption, with underlying traits of chemisorption that offer partial protection to the metal surface even when thermally stressed.

THE EXTRACTION OF CELLULOSE FROM *BAMBUSA VULGARIS* (BAMBOO) BIOWASTE FOR THE SYNTHESIS OF USEFUL PRODUCTS FOR ENVIRONMENTAL PURPOSES

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Cellulose is a naturally occurring polymer, commonly found in lignocellulosic biomass, and has no adverse effects on health or the environment. The degradability, sustainability and ability to form self-supporting structures makes cellulose an ideal compound to be explored, as a possible solution to satisfy the increasing demand for biodegradable and environmentally safe solutions to existing, and growing issues such as environmental pollution. This research aims to investigate extracting cellulose from waste *Bambusa vulgaris* (bamboo) biomass by using the physical extraction techniques: autoclave, pressure vessel, and supercritical fluid extraction (SFE). The recovery of cellulose from waste bamboo biomass at reduced reagent concentrations was also explored. The autoclave operates at 121°C and 15 psi which can aid extraction of cellulose by disrupting the lignocellulosic structure. A pressure vessel was used to securely contain pressures higher than atmospheric pressure. As such the biowaste was exposed to pressures ranging from 30 psi to 90 psi and temperatures between 70°C and 90°C. SFE uses supercritical fluids (a fluid which exhibits both gaseous and liquid properties at temperatures and pressures beyond the critical point) to extract the compound of interest. SFE was used to subject the sample to the changes in temperature and pressure, enough to fracture the biomass structure and was carried out using the conditions 300 bar and 60°C for 2 hours. The effects of the autoclave, pressure vessel and SFE on the biowaste was explored over a

sodium hydroxide concentration ranging from 1.5% to 20%. It was determined that the pressure vessel method of extraction was the most appropriate of all the methods explored. The optimized extraction conditions for the maximum yield, determined using the Design Expert software, utilizing the pressure vessel, resulted in a pressure of 90 psi, temperature of 70°C and a sodium hydroxide concentration of 1.5 %.

A TRANSDISCIPLINARY APPROACH TO THE ENGINEERED DESIGN OF NATURE-BASED SOLUTIONS ON THE COAST

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Climate change would have far-reaching impacts on coastal regions of Small Island Developing States (SIDS), including those in the Caribbean. While there have been efforts to mitigate potential adverse impacts, many Caribbean nations are still required to make decisions using limited human and financial resources. Caribbean coasts are susceptible to multiple coastal hazards, and yet nations rely on these regions for economic stability. These challenges appear to be insurmountable as stakeholders sometimes work in isolation and lack a coordinated approach, which delays tangible progress. Engineers have a critical role in the transition to more resilient communities as they engage in the design and construction of coastal structures and infrastructure. To do this, a transdisciplinary approach is required, which is not easily achieved at the national level and, extremely ambitious at a regional level. Regardless, Caribbean engineers must quickly adapt and learn to be effective in this transdisciplinary space and to fully understand the social, economic and environmental issues that affect coastal resilience in at-risk communities. Nature-based solutions are just one approach that engineers can use to embrace more sustainable designs.

THE ROLE OF CATALYSIS IN VALORIZATION OF BIOMASS AND WASTE FEEDSTOCKS: LEVULINIC ACID HYDROGENATION

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Levulinic acid (LA), which can be derived from a variety of waste agricultural materials, can be catalytically upgraded to fuel blender and fine chemicals supporting carbon neutrality. Specifically, the production of gamma valerolactone (GVL) by selective LA hydrogenation is of major interest due to the higher economic value of GVL and its potential in the industrial and fine chemicals sectors, even though the reaction normally proceeds at relatively high temperatures using high overpressure of (fossil fuel-derived) hydrogen over catalysts with high metal loading. This work examined the thermocatalytic LA to GVL transformation while applying multiple green chemistry principles and the UN Sustainable Development Goals 7,9,12, and 13.

Nano-catalysts with low metal loading (<1wt%), prepared by a green solvent-free method, afforded high yields of GVL under conditions of moderate temperature and low overpressure of hydrogen. These materials were shown to have high dispersion of mostly metallic supported nanoparticles (generally less than 3nm) and are re-useable.

Furthermore, these catalysts were found to produce hydrogen *in situ* from green hydrogen sources such as 2-propanol, ethanol and glycerol. Interestingly, these hydrogen donors were all found to be effective hydrogen sources for LA hydrogenation under mild reaction

conditions. Notably, glycerol afforded near quantitative GVL production under optimised conditions, thus illustrating waste co-valorisation and increasing the sustainability index of the reaction. The findings of the green hydrogen donor study illustrate the bifunctional nature of the prepared catalysts.

Photocatalytic protocols were applied to the LA hydrogenation reaction with the catalysts used in the thermocatalytic system. The use of visible light LEDs yielded low amounts of GVL using external H_2, while the use of U.V. LEDs (365 nm) and in-situ H_2 yielded alpha angelicalactone (α-AL). These findings demonstrate the potential to further improve the energy economics of the reaction while using a multifunctional catalyst.

CO_2 TREATMENT FOR THE CARBON CURING OF FRESH CONCRETE: DEVELOPING A PROTOTYPE SYSTEM

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Cement production is responsible for approximately 8% of global anthropogenic CO_2 emissions, underscoring the urgent need for sustainable construction technologies aligned with UN Sustainable Development Goals (SDGs) 9, 11, 12, and 13. The overarching objective of this study is to establish scalable design parameters and implementation guidelines that can be integrated into standard concrete manufacturing. In this regard, carbon curing is examined as part of a circular economy approach to concrete production, employing carbon capture and utilisation (CCU) to reduce the embodied emissions of cement-based materials. The process involves injecting CO_2 into fresh concrete where it reacts with calcium silicate hydrate (C–S–H) to form stable calcium carbonate ($CaCO_3$) and silica gels, effectively storing carbon while improving material performance.

A prototype CO_2 curing chamber is being designed and tested to determine optimal treatment conditions through controlled variation of exposure time, air pressure, and CO_2 concentration. Key performance indicators—such as compressive strength, durability and microstructural integrity—are assessed to quantify the benefits and trade-offs of CO_2 treatment. Preliminary observations suggest that carbon curing enhances early strength, surface density and durability, although the precise limits of CO_2 uptake and its long-term effects remain areas for further investigation.

Importantly, this research contributes to carbon capture initiatives within Small Island Developing States, such as Trinidad and Tobago, offering a localised and practical pathway toward construction-sector decarbonisation, material innovation and enhanced climate resilience.

VISCOELASTIC RHEOLOGY AND SLIP: A FRAMEWORK FOR MINIMUM ENERGY DISSIPATION IN OSCILLATING FLUID MACHINERY

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The induced unsteady flow due to an infinitely long solid cylindrical rod, oscillating longitudinally and torsionally, submerged in an Upper-Convected Maxwell (UCM) fluid with slip at the boundary, is examined. Analytical expressions are obtained for the velocity field, tangential drag and the work done. The effects of slip are investigated, and some comparisons are made with its Newtonian counterpart. The results show that the oscillations' amplitude without slip is greater than that for slip. For UCM fluids, the oscillating rod has less influence on

the fluid's velocity components as slip increases. For the times studied, the velocity of a UCM fluid is larger than a Newtonian fluid. For UCM fluids, at certain times, the Drag was less than that of a Newtonian fluid, and as the slip decreases, it appears that the Drag stabilises. With the change from purely longitudinal oscillations to torsional oscillations, the work done changes as slip lessens; however, that for UCM fluids seems less varied compared to its Newtonian counterpart. These results establish a foundational analytical model essential for the sustainable design and optimisation of oscillating fluid machinery, including drilling components, subsea cables and micro-scale mixers used in green chemical processing and oceanic engineering problems.

IDENTIFICATION OF OPTIMAL MXENE-DOPED MATERIAL FOR ENHANCED EFFICIENCY IN PEROVSKITE SOLAR CELLS

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The application of MXenes for the optimisation of solar cells has garnered much attention in recent years. This is due to their optical transparency, tunable work function and high metallic electrical conductivity. Consequently, MXenes have been studied as additives in the absorber and charge transport layers of perovskite solar cells to enhance their power conversion efficiency (PCE). However, there is still considerable effort to be invested in identifying the optimal MXene-doped material, which will further enhance the solar cell's PCE. As a result, using the Finite Element Method (FEM), this work presents numerical analysis of a double-layered $MAPbI_3$/ $MASnI_3$ perovskite solar cell paired with six experimentally derived MXene materials. The results show that the addition of TiO_2 – Ti_3C_2 in the electron transport layer (ETL) improved energy band alignment, which boosted exciton transport and extraction within the solar cell. The combined effect enhanced the PCE by 1.17% to reach 28.6%. As a result, the addition of TiO_2–Ti_3C_2 boosted the overall performance of the solar cell, resulting in a higher PCE. Therefore, although the use of MXene in perovskite solar cells is in its infancy, such studies can be used to provide insight and guide future research in the design of solar cells using these novel materials.

TUNING STRUCTURE AND FUNCTION: METAL-ION INDUCED PHASE TRANSFORMATION IN COPPER ANTIMONY SULPHIDE NANOSTRUCTURES

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The strategic doping of transition metal ions into copper antimony sulphide (CAS) semiconducting nanostructures can significantly influence their optical and pseudocapacitive properties, for which there are few reports and therefore is the focus of this study. Accordingly, highly crystalline metal ions (Mn^{2+}, Fe^{2+}, Co^{2+}, Ni^{2+} and Zn^{2+}) doped off-stoichiometric copper-rich/poor, antimony-rich/poor and sulphur-poor CAS nanosheets (10–23 nm) were grown via colloidal (hot-injection) synthesis using metal

diethyldithiocarbamate precursors. Importantly, metal ion doping significantly influences the structure and composition of the off-stoichiometric CAS nanosheets. Data from powder X-ray diffraction, Raman spectroscopy, high-resolution scanning/transmission electron microscopy and energy dispersive X-ray spectroscopy confirm that the heavier metal ion dopants induce a novel phase transformation from famatinite (*f*CAS) to chalcostibite (*c*CAS) nanostructures. The influence of the metal ion dopants is also observed in the photophysical properties of as-synthesised nanostructures. This involves blue-shifted ultraviolet-visible absorption, reduced Urbach tailing and tunable band gaps between 2.17 and 2.38 eV. Also, the doped nanostructures display broad visible-near infrared photoluminescence via a triple radiative pathway with relatively short decay lifetimes between 5.3 and 11.3 ns. This is mediated by electronic transitions involving intrinsic (copper/antimony/sulphur interstitials) and extrinsic (metal ion interstitials) defect states. Additionally, electrodes prepared from Mn^{2+}-doped *f*CAS nanostructures show enhanced pseudocapacitance via Na^+ surface adsorption and intercalation relative to undoped *f*CAS electrodes, while Zn^{2+}-doped *c*CAS electrodes exhibit pseudocapacitance via a combination of Na^+ surface adsorption, intercalation, and redox reactions. These electrodes exhibit reduced charge transfer resistance, improved electronic conductivity and notably enhanced specific capacitance (~222 F g^{-1}) and charge transport, as measured in 1 M Na_2SO_4 electrolyte via cyclic voltammetry and electrochemical impedance spectroscopy. To this end, the discovery of the metal ion-induced phase transformation presents a new avenue for optimising the functional properties of *f*/*c*CAS nanostructures, highlighting the critical role of metal ion-related defects in controlling the optical and electrochemical properties, toward potential solar absorption and energy storage applications.

NOVEL CATHODE STRATEGIES FOR ENHANCED POWER GENERATION IN ACTIVATED SLUDGE-BASED MICROBIAL FUEL CELL

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The wastewater flowing through our drains holds a significant, yet largely untapped, reservoir of chemical energy. Traditional wastewater treatment processes are energy-intensive, but microbial fuel cells (MFCs) offer a paradigm shift, presenting a transformative pathway to reclaim both energy and valuable resources from these effluent streams. This study delves into the performance of innovatively constructed, locally fabricated, lab-scale MFC systems, which were designed with a focus on cost-effectiveness and easy scalability. We systematically investigated the electrochemical performance of these MFCs by feeding them with real municipal wastewater, a crucial step for demonstrating their practical viability. The research specifically focuses on getting the current and power densities while rigorously comparing aerated and non-aerated cathode configurations. The findings underscore the critical role of aerated cathodes in significantly enhancing electricity generation, revealing a key strategy for maximising energy recovery. This research not only provides a powerful, empirical demonstration of MFC technology, but also bridges critical gaps between sustainable engineering design and environmental science. By showcasing a low-cost and scalable solution for energy production, our work paves the way for a more sustainable and resource-efficient future in wastewater treatment.

SUSTAINABLE PATHWAYS TO NET-ZERO CONSTRUCTION: GEOPOLYMER-BASED GREEN CONCRETE FROM AGRICULTURAL AND MARINE WASTES

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The construction sector is a major contributor to global carbon emissions, with conventional Portland cement producing nearly 1 ton of CO_2 per ton of cement produced, consuming up to 5 GJ of energy, and degrading ecosystems through extensive limestone extraction. Achieving net-zero construction requires sustainable alternatives that minimise environmental impact while maintaining the structural integrity of civil engineering infrastructure.

This research investigates the conversion of Caribbean agricultural, plant-based and marine wastes into geopolymer concrete. Ashes-source materials, derived from giant African snail shells, elephant grass, plantain leaves, bamboo stems, rice husks, pistachio shells, groundnut shells, coconut shells, coconut coir and sargassum seaweed are being characterized using X-ray fluorescence (XRF) and X-ray diffraction (XRD) to determine their aluminosilicate content, mineralogy and pozzolanic reactivity—critical factors for effective geopolymerisation.

Two activators are under evaluation: traditional alkali-based solutions (sodium and potassium) and phosphoric acid, each assessed independently to compare their reactivity with the source materials. Response Surface Methodology (RSM) will optimise key mix parameters, including activator concentration, precursor-to-activator ratio, curing duration, and temperature. Statistical modelling will be employed to predict mechanical strength and short-term durability, while microstructural analyses of optimised mixtures will link internal morphology to performance.

By valorising local residues, this study promotes circular economy principles, reduces dependence on conventional Portland cement, and advances green engineering practices. The anticipated outcomes aim to facilitate net-zero construction, climate-resilient infrastructure, and alignment with SDGs 9, 11, 12, and 13. This work lays the foundation for eco-friendly, high-performance geopolymer concretes tailored for tropical, resource-constrained Caribbean communities.

SOLVENT AND SPIN COATING EFFECTS ON THE MORPHOLOGY AND OPTICAL PROPERTIES OF CURCUMIN THIN FILMS

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The significance of thin films has grown in the past decade owing to their usefulness in various fields, including optoelectronics and healthcare. Curcumin is a major polyphenol found in Turmeric. Curcumin is non-toxic, inexpensive and abundant; it is an antimicrobial and photoactive compound. The curcumin thin films were prepared via spin coating using ethanol, chloroform, dichloromethane (DCM) and dimethylformamide (DMF) as solvents, at spin speeds ranging from 1000 to 10000 rpm. The film morphology was determined by using AFM (Atomic Force Microscope) and SEM (Scanning Electron Microscope), while the optical properties were analysed by using UV-Vis spectroscopy. Surface analysis by SEM and AFM revealed a strong solvent dependence, showing most films exhibited smooth, rounded features, while DCM produced unique rod-like structures. AFM measurements indicated notable variations in surface roughness, suggesting different application potentials, with

smoother films being more suitable for optical coatings and rougher ones offering higher surface area for sensing or catalytic uses. The scrutiny of UV–Vis spectroscopy data revealed that optical band gaps were closely linked to morphology and molecular packing. The band gap of spin-coated curcumin thin films decreases with increasing spin speed up to 6,000 rpm, then increases at higher speeds. These findings demonstrate that both solvent choice and spin rate provide effective means of tuning the properties of curcumin thin films, enabling targeted design for optoelectronic and biological applications.

TUNING OPTICAL PROPERTIES OF 1-(2-FLUORO-4-NITROPHENYL) PIPERAZINE THIN FILMS VIA SPIN COATING FOR SOLAR CELL APPLICATIONS

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Abstract: Organic semiconductors have garnered significant attention due to their processability, mechanical flexibility, and potential for cost-effective optoelectronic devices. Building on this foundation, the present study explores the tunability of optoelectronic and morphological properties of 1-(2-fluoro-4-nitrophenyl) piperazine thin films fabricated via spin coating, targeting applications in solar cells and related devices. 1-(2-fluoro-4-nitrophenyl) piperazine thin films were deposited on glass substrates using 20 µL of solution at varying spin speeds (500, 1000, and 1500 rpm) and heating temperatures (50 °C, 60 °C, and 70 °C). UV-Vis spectroscopy and scanning electron microscopy (SEM) analyses demonstrated that increased spin speed correlates with an increased optical band gap, indicating morphology-driven modulation of electronic properties. Heating at variable temperatures produced negligible changes in band gap but enhanced the absorption coefficient and refractive index, suggesting improved optical response without compromising electronic structure. These results underscore the ability to tailor these thin film properties through processing parameters, reinforcing its suitability for integration into organic photovoltaic devices. This work advances the design of solution-processed organic semiconductors with tunable properties for scalable and efficient optoelectronic applications.

INFLUENCE OF ALKALINE MOLARITY AND BINDER RATIOS ON THE FRESH AND HARDENED PROPERTIES OF SLAG-BASED GEOPOLYMERS

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Ordinary Portland Cement (OPC) production is an energy-intensive process that consumes natural resources and emits approximately 0.9 tonnes of CO_2 per tonne of cement, accounting for 5-8% of global emissions and exacerbating climate change. Geopolymer technology offers a sustainable, cement-free alternative by combining industrial by-products with alkaline activators, lowering CO_2 emissions. This study examines the rheological and mechanical properties of geopolymer pastes with varying proportions of ground granulated blast furnace slag (GGBFS) and class F fly ash (FA) (100:0%, 75:25%, 50:50%, 25:75%, and 0:100%). Each mix was activated using sodium hydroxide solutions of 12 M, 14 M, and 16 M (molarity), combined with sodium silicate. The experimental tests included consistency, setting times, compressive strength, and hardened density. Fourier Transform Infrared

Spectroscopy (FTIR) was employed to assess chemical bonding, while multiple regression analysis correlated mix design variables with strength development. Results showed that alkaline molarity had minimal effect on consistency across all mixes. Setting times increased with higher FA content and exhibited a non-linear relationship with molarity, increasing from 12 M to 14 M before decreasing at 16 M. Compressive strength was highest at 14 M for all GGBFS-FA combinations, with optimum performance observed at 75% GGBFS:25% FA, achieving 45.83 MPa, approximately 24% higher than OPC paste (34.97 MPa). Hardened density generally decreased with increasing FA content but peaked at 14 M, ranging between 2151.20 kg/m^3 (100% GGBFS) to 1934.70 kg/m^3 (100% FA). The FTIR analysis confirmed the formation of alumino-silicate networks typical of geopolymer gels. Regression analysis yielded an R^2 value of 0.80, indicating a strong correlation between mix proportions, molarity and strength. The findings demonstrate that geopolymer pastes activated at 14 M with optimal GGBFS-FA proportions deliver superior mechanical performance, while substantially reducing carbon emissions, supporting the UN Sustainable Development Goals 9, 11, and 13, and circular economy practices.

MICROPOLAR SLIP FLOW BETWEEN COAXIAL CYLINDERS WITH A TETRAD OF INDEPENDENT LONGITUDINAL AND TORSIONAL OSCILLATIONS (MSC)

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The unsteady flow of an incompressible creeping Micropolar fluid generated by the motion of coaxial cylinders, C_I and C_{II}, undergoing a tetrad of independent oscillations, is investigated. C_I is a solid circular rod of radius R_1 , and C_{II} is a straight hollow circular cylinder of radius R_2, where $R_2 > R_1$. The Micropolar fluid occupies the annular region between the two cylinders, and slip is assumed at both solid–fluid interfaces. Employing the Basset slip condition, exact solutions for the fluid macro-velocity and micro-velocity fields, as well as the drag on both cylinders, are derived. Parametric studies for varying Micropolar and slip parameters are presented graphically, illustrating transitions from near-perfect slip to no-slip conditions.
This study lies within the broader field of Micropolar fluid dynamics, which has considerable potential in energy-efficient flow systems and sustainable engineering technologies. The results provide insight into drag reduction and energy dissipation mechanisms relevant to rotating machinery, advanced lubrication systems, and microfluidic device design. Such understanding supports the development of low-energy, high-efficiency, and environmentally conscious fluid systems in applications ranging from precision mechanical engineering to biomedical and environmental micro-pumping technologies. Consequently, the findings contribute to the overarching goal of green and sustainable engineering innovation through optimised fluid-structure interactions.

BIOPROSPECTING EXTREMOPHILE MICROBES FOR APPLICATIONS IN THE HYDROCARBON INDUSTRY

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Trinidad is replete with biodiversity from the South American mainland on a macro scale. The island's tropical location, geology and isolation have created a niche for unique flora and fauna. In this study, Bioprospecting was used to examine the diversity of microscopic life found in the niche environment of hydrocarbon seeps. Three locations were selected where hydrocarbons of varying composition emerge naturally from the ground in Trinidad. The Pitch Lake was one of the sample locations, an area of viscous bituminous hydrocarbons, which varies in consistency depending on the exact sampling location. Marac is a miniature pitch lake, although darkly stained hydrocarbon mixed with mud is seen emerging from small-coned mud volcanoes. The third location was Siparia Forest Reserve, where thick crude oil saturates the mud on the surface with no volcano cones. Using a sterile spade and sample bag, 1 kg soil samples were extracted at a depth of 15 cm and stored at freezing (°C) temperature for further analysis. Bioprospecting was carried out using a Challenge Growth process as described by Premuzic et al. 1996. Microbes, from each soil inoculum, were cultivated in a pressure chamber up to 1500 psi. High pressure was used as a selective stage to simulate the adaptation of microbes to the high pressure found at the depths of oil reservoirs or subsea mud volcanoes. The microbes were also subjected to high temperatures of 45 °C, which also presents a challenge for some mesophilic organisms. The findings of the study showed the growth of diverse bacteria as well as archaea, which were able to thrive under the extreme conditions. Organisms of this type are classified as extremophiles. These extremophiles showed promising potential for Microbial Enhanced Oil Recovery, Bioremediation, Carbon Capture and Semiconductor manufacturing.

PHOTOCATALYTIC OXIDATION OF HMF USING MOLECULAR OXYGEN

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The usage of plastics has become ingrained in modern society due to their versatility and multi-functionality for many different applications. However, the production and irresponsible end-of-life management of plastics have profound system-wide environmental impacts. Additionally, over 98% of all plastics are derived from finite oil and gas resources. One of these plastics is polyethylene terephthalate (PET), which is used in the manufacture of textiles and packaging materials. It is derived from terephthalic acid and ethylene glycol, both of which are from the petrochemical industry.

The selective partial oxidation of hydroxymethyl furfural (HMF), derived from waste biomass resources, produces furandicarboxcylic acid (FDCA) that can be utilised as a monomer for the creation of bio-based plastics with superior properties to PET. FDCA, being bio-derived, has been shown to lower CO2 emissions associated with the production of polyethylene furanoate (PEF), an alternative to PET. Sustainable production of FDCA remains a bottleneck in the adoption of PEF as a replacement for PET. Thus, the aim of this research project is to synthesise FDCA using green heterogeneous catalysis protocols.

THEME V

MANUFACTURING, TRADE, TOURISM AND FINANCIAL WELL-BEING

AN EMPIRICAL ASSESSMENT OF CARICOM'S INTRA-INDUSTRY TRADE

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Intra-Industry Trade (IIT), most popularly defined as "trade in differentiated products which are close substitutes," has become increasingly prevalent in today's globalised world. For Caribbean countries which share many similar characteristics, IIT offers a valuable lens through which they can better navigate the regional and global trade landscape. Utilising the popular Grubel-Lloyd (1975) index and the modified Holistic Intra-Industry Trade (HoIIT) Index by Baptiste, Hosein and Saridakis (2025), this paper empirically assesses the factors that affect CARICOM's IIT. An examination of the Pooled Ordinary Least Squares, General Method of Moments, Poisson Pseudo-Maximum Likelihood (PPML) and Fractional Probit estimators with panel data is conducted. The PPML estimator is then extended based on the HoIIT index to investigate the factors that affect CARICOM's top ten IIT sub-sectors. Results show that factors such as Absolute GDP per capita Differential, Trade Cost and Average Market size significantly affect CARICOM's IIT levels. On a sector-specific basis, the findings suggest that the Average Market Size, Absolute GDP Differential, Distance and Preferential Tariffs significantly impact CARICOM's IIT in the agricultural and non-energy manufacturing sectors. Moreover, by linking TradeCAN's Rising Star calculations to the HoIIT index, it was found that at the STIC 3-digit level, Eggs, Maize corn un-milled, Tobacco manufactures, dyeing and tanning extracts, synthetics, pigments, paints, varnishes, materials of rubber, manufactures of metal, n.e.s. and Printed matter, all exhibit significant IIT relationships within CARICOM. These sectors present opportunities that can be exploited to generate further revenue gains for the region. The findings of this paper thus provide a framework for policymakers in planning initiatives to deepen the levels of CARICOM IIT, and by extension, its regional integration efforts, guided by industry-specific investigations.

RETURN SPILLOVERS AMONG STOCK MARKETS

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This study investigates cross-market return spillovers among multiple international equity indices. A standard Vector Autoregressive (VAR) was employed to assess both static spillovers across three distinct regimes: pre-COVID, COVID, and post-COVID. The results revealed that total system connectedness intensifies sharply during global stress episodes, peaking in the COVID-19 period and showing renewed surges surrounding additional turbulent intervals. Additionally, spillover leadership is concentrated in major equity markets, whereas minor exchanges occupy peripheral positions as net receivers with minimal outward transmission. These findings offer valuable insights for portfolio diversification and risk management, especially in smaller open economies. Robustness checks across lag choices, forecast horizons, and sub-sample windows confirm the stability of the main conclusions.

LONG-RUN DUTCH DISEASE IMPLICATIONS UNDER SHORT-RUN CAPITAL SPECIFICITY

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This paper extends the analysis of the theoretical implications of the Dutch Disease within the short-run capital specificity constraint, primarily using Edgeworth-Bowley box analysis. Under the assumption of short-run capital specificity, a Hick's neutral expansion of productivity within the energy sector unambiguously increases the real wage rate in the economy. Under a fixed sectoral capital constraint and marginal rate of technical substitution, there is an inevitable reduction in the labour allocation within the manufacturing sector and a corresponding output contraction. Accordingly, there is an accumulation of spare capital capacity within the manufacturing sector in the short run until the intersectoral capital mobility constraint is relaxed in the depletion phase. As the energy resource depletes in the medium run, capital and labour are liberated and redistributed to the manufacturing and services in a form analogous to an exogenous factor increase within a Heckscher-Ohlin economy. The depletion phase implication in terms of absolute and relative output under varying relative factor intensity permutations is explored.

WEIGHTED ELIGIBILITY-BASED PRODUCT RECOMMENDATION SYSTEM

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In the finance and banking industry, product recommendation systems play an important role in enhancing customer engagement and driving cross-sell and upsell opportunities. However, traditional recommendation models often fail to account for product eligibility constraints and customer-specific suitability, leading to irrelevant suggestions. This paper introduces a novel hybrid framework that combines rule-based eligibility filtering, customer segmentation and machine learning to generate personalised, actionable product recommendations. The goal of this paper is to predict the most suitable financial product for a customer by mimicking human reasoning. To achieve this, the research employs a hybrid approach that combines fuzzy logic rule-based eligibility filtering with a supervised machine learning model to estimate adoption probabilities and recommend the next best

product for the customer. Key features such as income, risk, credit score and employment status are used together with other engineered features such as customer segment, balance to income ratio and eligibility scores to rank products for each customer. A weighting mechanism is introduced to prioritise recommendations that align with both customer needs and business constraints. Evaluation of synthetic data generated to mimic real-world data shows that the incorporation of eligibility and behavioural characteristics significantly improves the relevance of the recommendation and predictive performance. This system presents a scalable and interpretable solution for financial institutions that aims to optimise customer targeting while maintaining operational feasibility. Ideally, recommending the right product to the right customer.

AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN ECONOMIC DEVELOPMENT AND MACROECONOMIC STABILITY

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The purpose of this research is to examine the influence of macroeconomic stability on economic development in a panel of countries. We calculate the macroeconomic stability index using the Macroeconomic Stability Pentagon (MSP). The MSP equally weighs the 5 key economic indicators (economic growth, inflation, fiscal balance, unemployment and the current account balance) and compares them with the best year over the time period. Using panel data over the period 1990–2023 for 32 Latin American and Caribbean economies, we explore the dynamics of macroeconomic stability.

We supplement the analysis by comparing the economies in each region against themselves and highlighting the best-performing economy over the period 2014–2023. Initial findings reveal that St. Kitts and Nevis for the Caribbean and Argentina for Latin America are the best-performing economies over the time period, according to their respective MSP scores. Additionally, using the data from 32 economies over the period 1990–2023, the effect of an economy's MSP score on economic development, measured using HDI, was examined.

BORDER CARBON ADJUSTMENTS: THE POTENTIAL IMPACT ON TRINIDAD AND TOBAGO'S GROWTH AND TRADE

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Countries have implemented carbon pricing instruments to achieve net-zero emissions by 2050. While carbon pricing is regarded as an efficient policy for reducing greenhouse gas emissions, it has also raised concerns about carbon leakage, where domestic climate policies may lead to production and emissions shifting to countries with less stringent regulations. To mitigate this risk, the EU has introduced its Carbon Border Adjustment Mechanism (CBAM). Energy producers, such as Trinidad and Tobago, are anticipated to be most affected given the potential impact on global demand and international commodity prices. Consequently, this paper aims to quantify the effect of the EU's CBAM on Trinidad and Tobago's economic growth and trade. Through the employment of the Global Trade and Analysis Project Environment Power (GTAP-E-Power) model, the results indicate modest declines in domestic output, reductions in both exports and imports, and a marginal decline in carbon dioxide emissions. Overall, the impact of the EU CBAM on the domestic economy is

tempered by trade diversion. The design of policies geared towards strengthening the measurement and collection of emissions data, bolstering the diversification strategy to reduce dependence on the EU market, introducing a domestic carbon tax, and reforming fuel subsidies should be considered to ensure the resilience of the domestic economy to climate change mitigation policies.

TARIFF SHOCKS, PREFERENCE EROSION AND EXPORT COMPETITIVENESS IN SMALL SOUTHERN ECONOMIES: A SIMULATION OF THE TRUMP TARIFF IMPACT

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This paper develops a methodological basis for analysing the impact of tariff shocks and preference erosion on the export competitiveness of small countries. Our econometric methodology combines nonlinear binary response models with a two-channel analytical approach to capture both the direct erosion of preferential access and tariff shocks, along with the indirect effect of tariff-induced input cost increases. This framework was employed to assess two groups of small Southern economies that benefitted from preferential access to the United States of America (USA): the Caribbean Community (CARICOM) under the Caribbean Basin Economic Recovery Act (CBERA) and small Sub-Saharan countries under the African Growth and Opportunity Act (AGOA), within the current environment of US protectionism. Results illustrate that both CBERA and AGOA promoted the development of eligible industries and shaped Southern export patterns to both the USA and international markets. We find that the imposition of Trump tariffs directly reduces the likelihood of Southern exports to the USA. Moreover, higher costs of industry inputs sourced from the USA, brought on by President Trump's broad use of tariffs on major trading partners, are likely to further compromise Southern exports to both the USA and international markets. Thus, though the direct reaction by small Southern exporters to the President's blanket tariffs is a diversion of exports to international markets, increasing input costs limits the extent of this adjustment.

EXPORT MANUFACTURING IN SMALL ISLAND DEVELOPING STATES

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The literature has long suggested that small island developing states (SIDS) are at a disadvantage in comparison to their larger counterparts and that while larger countries pursued manufacturing for exports, the focus of SIDS was narrower, typically comprising commodities, financial services, or tourism. Given the significant benefits of export manufacturing according to the literature, this paper explores selected macroeconomic factors and their influence on export manufacturing in SIDS. Using a Panel autoregressive distributed lag (ARDL) framework and categorising SIDS according to their regional geography and natural resource wealth, we found empirical support for the

hypothesis that GDP positively influences manufacturing exports in the Asia-Pacific region only. The results suggest that trade openness is important to resource-rich SIDS and for the Caribbean subgroup of SIDS. This paper also finds evidence in support of the Dutch Disease among the Caribbean and resource-rich SIDS, given the significant negative relationship between the Real Effective Exchange Rate (REER) and export manufacturing.

A COMPARATIVE ASSESSMENT OF THE WELFARE IMPACT OF DIFFERENT PARTIAL SCOPE TRADE AGREEMENTS FOR TRINIDAD AND TOBAGO

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This paper investigates several partial scope trade agreements (PSTA) that Trinidad and Tobago (TTO) have either signed or negotiated using the natural trading partner hypothesis and a partial equilibrium methodology. The simulated results for TTO forming a partial scope trade agreement with Panama, Guatemala, Chile, Curacao, Colombia and China (CHN) indicate that the majority of the trade that is diverted to each partner country comes from the Non-Partner Country-Rest of the World, with only a minor proportion being diverted from CARICOM states. Additionally, the simulated results also indicate that the tariff revenue loss, which occurs due to the removal of tariffs for each partner country, outweighs the gains to welfare. The results of this study indicate that forming an integration arrangement with a larger partner country, such as China, yields the most significant response as the trade, revenue and welfare effects associated with a TTO-CHN PSTA are larger than PSTAs with other smaller partner countries.

THE INTERMEDIARY ROLE OF BIOFUELS IN THE TRANSMISSION OF SYSTEMIC RISK IN FOOD AND ENERGY MARKETS

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This paper examines the volatility spillovers between energy, biofuel and staple grain commodities, focusing on the intermediary role of biofuel crops and the effects of geopolitical and policy shocks. Quantile autoregressions and Diebold-Yilmaz connectedness measures are applied on volume-weighted indices of nine highly traded futures contracts to capture the dynamic spillovers across quantiles. The results show that in commodity markets, connectedness is concentrated at the tails of the return distribution and modest at the median. Biofuels amplify volatility by transmitting shocks from energy to food, and post-Ukraine invasion and spillovers increase asymmetrically. Causality tests confirming bi-directional relationships between energy and biofuel crops demonstrate the role of policy mandates and substitution. The findings also highlight quantile methods as an early warning tool for managing food and energy security risks.

THEME VI & VII

ICTS FOR DIGITAL ISLANDS & AI FOR MULTIDIMENSIONAL RESEARCH AND DEVELOPMENT

THE SPATIAL STORYWORLDING OF CARIBBEAN LITERARY TEXTS FOR VIRTUAL REALITY NARRATIVES

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Virtual Reality (VR) technologies present an opportunity for storytelling within an immersive and interactive environment that orients participants (Slater and Sanches-Vives 2) on the scene of the narrative (Koski 8-11; Google News Lab). While this digital storytelling practice is widely deployed internationally, reflecting a wide range of social, cultural and historical issues, the Caribbean is yet to create content reflecting our culture and heritage. To aid in the region's ongoing negotiation of the digital divide and its attempt to bridge the temporal divisiveness inherent within this concept, this paper suggests that existing Caribbean literary texts that mimetically represent historical and contemporary Caribbean lived realities be adapted into VR narratives. Due to the audiovisual and interactive characteristics of VR as a medium, one of the key aspects of the transmedial storyworlding becomes the spatial environment and its physical and semiotic elements. To demonstrate the process, selected spatial elements of Marlon James' The Book of Night Women will be used. This text was engaged due to the novel's exophoric references to real-world, historically preserved spaces across the Jamaican landscape and its depiction of the Caribbean colonial experience. While VR is considered to be emerging technology, this poster seeks to examine the use of existing cultural artefacts, archival maps, digital photography and generative AI to transpose narratives from page to holodeck, demonstrating that the inclusion of new media does not imply the replacement of more traditional methodologies of enshrining culture but also explores how existing cultural and spatial data can be merged into digital cultural praxis, transforming the medium into architecture of innovation. Additionally, in an attempt to demonstrate the necessity of interdisciplinary approaches to capacity building for cultural praxis, the data collected and literary analysis to support spatial storyworlding were utilised by a group of Level 2 Electrical and Computer Engineering Students enrolled in ECNG 2007: Computer Systems students during Semester 1 of the 2025/2026 academic year. As a result, this poster will include hyperlinked audiovisual content demonstrating in-progress models intended for inclusion in a VR narrative of the novel developed by six students (Jacob Camacho, Kereena Jaggernauth, Danveer Kalliecharan, Elizabeth Mahadeo, Ansarah Mohammed and Mahailia Persad).

ARTIFICIAL APPROACHES TO NATURAL ISSUES: ENVIRONMENTAL EDUCATION THROUGH AI-MEDIATED ECO-CULTURAL STORYTELLING

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This research focuses on a digital project undertaken by the Dream Lab, a digital humanities lab within the Artificial Intelligence Innovation Centre (AIIC) at The University of the West Indies, St. Augustine, which involves an AI-generated character personality for a storytelling figure from the Mahabharata, Narada Munni. The AI model depicted was created and leveraged for both eco-cultural and environmental education through storytelling praxes and live engagement between the audience and the character. Narada Munni was selected for the personality due to his existence as an archetypal storytelling figure within Hindu narratives. As such, this interdisciplinary project resides at the nexus of culture, storytelling, education and emerging technology. Using the selected cultural narrative, the 'Samudra Manthan' or 'The Churning of the Ocean', allows the model to straddle both cultural education and environmental concerns through digital mediation. Within this narrative, as part of extracting a nectar of immortality, gods and demons from Hindu mythology unite to churn the ocean, during which objects of value and of danger are extracted. Resultingly, this narrative enables allegorical parallels to contemporary environmental issues, such as the incursions of destructive oil spills in the extraction of the resource from the ocean. From these parallels, the AI-generated character is able to introduce commentary and pose questions to the audience about oceanic preservation and conservation practices. This project examines the development of such a model through STREAM praxis. It provides insight into the process of developing the 3D AI-character, creating and fine-tuning its Language Learning Models (LLMs) ability to interact with a live audience, and highlights potential use cases. Through its content, the project illustratively interrogates the potential of deploying this technology across a wider cross-section of use cases and highlights the potential synergetic relationship between AI technology and the humanities. In its exploration of AI-storytelling praxis, this paper engages adaptation studies, fidelity to the source material (cultural sensitivity), interactivity and subjective representation.

INVESTIGATING THE PREVALENCE, ATTITUDES, KNOWLEDGE, AND IMPACT OF AI TOOLS AMONG PHYSICIANS IN TRINIDAD AND TOBAGO: A PILOT STUDY OF PHYSICIANS' PERSPECTIVES

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Objective: To identify AI tools currently used by physicians, assess attitudes, knowledge and the impact of AI on clinical practice, and identify factors that influence their willingness to adopt AI tools in clinical practice across Trinidad and Tobago.
Methods: A cross-sectional design in this pilot study was conducted over a six-week period. Quantitative data were collected through an online survey using purposive sampling. Distribution was restricted to professional networks and medical associations, inviting the target size of 905 physicians practising in private and public sectors across Trinidad and Tobago to participate. Fifty-seven responses were uploaded to SPSS (v.30.0.0.0) and

analysed using descriptive statistics, cross-tabulations, logistic regression analyses and chi-squared tests. All responses were securely stored with password protection.

Results: 33.3% of physicians reported using AI tools in clinical practice, of which ChatGPT accounted for 89.5% and Gemini 10.5%. Most were hesitant mainly due to fear of misdiagnosis, dependence, data privacy and bias. Education and addressing these concerns will be pivotal in implementation. Younger doctors showed higher adoption, with 100% of those aged 28–30 using AI compared to 0% over 60, reinforcing the importance of education, especially to physicians over 50. In the public sector, only 5.3% with over 20 years' experience used AI, compared to 52.7% with under 10 years. In private practice, 57.1% reported use, the highest among those with under 10 years' experience. Regarding attitude, 89.5% believed AI would revolutionise medicine, and 52.6% of non-users were in favour. One hundred per cent of current users were in favour, while 53.8% viewed AI as useful and believed it should be implemented in healthcare.

Conclusion: AI use among physicians remains limited. Future studies should aim to raise awareness, ensure safe clinical integration, and evaluate long-term effects on patient care.

MULTI-AGENT COOPERATIVE TRANSPORTATION CONTROL OF A QUADROTOR LIFTING SYSTEM

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Multicopter cooperative systems, involving multiple drones working together, have garnered significant attention for their ability to overcome range and mass limitations inherent to single quadrotor systems. These systems offer promising applications in commercial and industrial aerial transport, leveraging enhanced payload capacity, agility and access to unreachable areas. Geometric controllers are widely used to stabilise such multibody robotic systems, as they operate on the system's nonlinear manifold, allowing full payload range of motion. Multi-robot autonomous aerial systems, however, risk inter-robot collisions. Despite these challenges, safety-constrained geometric multicopter frameworks that preserve the stability and tracking performance of a nominal control law remain underexplored. Such frameworks can preserve the stability and agile payload tracking capabilities of the nominal control law, while enforcing forward invariance of a safe set of inter-robot distances. This work therefore develops a safety-critical Control Barrier Function (CBF) framework for collision avoidance in tethered multicopter transportation systems. Its core contribution is a methodology for embedding formally guaranteed safety into nominal control laws, via minimal modification, preserving their stability. Safety is formalised as forward invariance of prescribed time-varying closed sets, for which rigorous set-invariance proofs are provided. The cable-force allocation of an n-multicopter transportation system was reformulated as a CBF-constrained optimisation. The solution space of the underdetermined system was effectively restricted to a safe subspace via model-based CBF inequality constraints. This preserved the payload wrench commanded by the nominal control, and by extension, the stability of the closed-loop dynamics. Numerical simulations implemented in MATLAB Simulink showed that the approach achieved simultaneous payload trajectory tracking of agile references and adherence to defined time-varying safe sets of inter-robot distances.

ALGORITHMIC AND HUMAN PERSPECTIVES ON SYNTHETIC MEDIA VERIFICATION

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This study presented a comprehensive comparison between AI detection systems and human performance in identifying deepfake media. Leading AI architectures were evaluated, including XceptionNet, EfficientNet variants and Vision Transformers on benchmark datasets, such as FaceForensics++ and Deepfake Detection Challenge Dataset (DFDC).

For human assessment, questionnaires were used, asking participants to classify image samples as real or fake and demographic data were collected, including age and education level. This method identified a direct comparison with AI performance on identical content while identifying factors that influence human detection ability. The study examined the complementary strengths of various methods, comparing the contextual reasoning and adaptability of humans to new deepfake techniques with the pixel-level artefact detecting capabilities of AI systems. The best practices for human-AI collaboration and the impact of demographic variables on detection accuracy were examined.

The researchers proposed a practical framework in which AI performs large-scale initial screening and flags situations that are unclear for human expert assessment, potentially creating hybrid detection systems that leverage both computational efficiency and human intuition. The study contributes actionable insights for developing robust deepfake detection systems and establishes a methodology for evaluating human factors in media authentication. Our findings provide a clear roadmap for creating more resilient defenses against evolving deepfake threats.

CULTURALLY BESPOKE ARTIFICIAL INTELLIGENCE SYSTEMS FOR THE WEST INDIES. CASE STUDIES IN MEDIA RESTORATION, ART STYLE CLASSIFICATION AND SPEECH RECOGNITION

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At the core of most deep learning and artificial intelligence applications is data. The data used to train systems influence their performance. In this suite of works, it is demonstrated that deep learning systems have a 'cultural blind spot' and can benefit from fine-tuning with regional context. By retraining existing state-of-the-art deep learning systems, an increased performance on regional data is evident. This work highlights this with applications in image colourisation, image upscaling, automatic speech recognition and art style classification. Regional datasets were curated and used to retrain the Whisper-Lite (Automatic Speech Recognition), ECCV (Colourisation), Real-ESRGAN (Spatial Resolution Scaling) and VGG-16 (Art style classification) systems. For each application, a portion of the region-specific corpora was used to test the baseline 'off-the-shelf' system and the 'fine-tuned' systems. Subjective testing on restored (colourised and resolution-enhanced) images showed that 95% of participants preferred the results of the fine-tuned systems over the 'off-the-shelf' baselines. The word error rate for Trinidadian-accented speech decreased from 16% to 7% with the fine-tuned Whisper-lite. It is also demonstrated that West Indian art styles correlate with some modern art genres, such as Cubism, Fauvism and Abstract Expressionism, but should generally be considered its own style, as AI systems identify a cluster of features unique to our art.

This work would greatly benefit from more labelled data. Preliminary work has shown improvements in a wide array of culturally relevant applications, as measured by both subjective and objective metrics. It is essential to note that the fine-tuned model does not outperform the existing models entirely, but only surpasses them for footage that shares the same context as the fine-tuning. This approach is highly transferable to other regions with unique cultural aesthetics and heritage, as well as to other applications where the 'default' training data does not align well with the West Indian context.

FROM CODE TO CULTURE: AI AND THE HUMAN-IN-THE-LOOP IN CARIBBEAN MEDIA ANALYSIS

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This study explored how artificial intelligence (AI) can serve as a multidimensional research instrument, aiming to combine computational precision and interpretive depth to advance both cultural analysis and technological development. Drawing on work that combines machine learning, natural language processing (NLP) and digital ethnography, the study situated AI as a methodological partner rather than a replacement for human insight. Using Trinidadian point-of-view (POV) videos and their comment cultures as a case study, it demonstrated how NLP and discourse analysis can identify patterns of humour, belonging and intergenerational dialogue that structure Caribbean digital identity. This hybrid approach exemplified a human-in-the-loop model in which algorithms surface large-scale patterns while researchers contextualise meaning through cultural interpretation.

This model was extended to other modalities to show how communicative behaviour across text, sound and gesture could be studied within a unified analytical framework. These methods may have implications for education, creative industries and public communication, especially in Global South contexts where participatory traditions intersect with algorithmic marginalisation. By embedding participatory and decolonial values within AI-driven methodologies, the study argued for redefining research and development as inherently multidimensional to advance technical innovation, cultural understanding and ethical reflection. Ultimately, AI is positioned as both a tool and a terrain for inquiry to create new forms of cross-disciplinary collaboration while revealing the sociotechnical dynamics that shape visibility, creativity, and identity in a platform-mediated world.

REPRESENTATION LEARNING OVER SIGNED NETWORKS

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Recently, there has been significant interest in low-dimensional representations of graphs that can then be exploited by machine learning and data mining techniques. The geometric relationships within these learned representations should reflect those between nodes in the original graph. Most work has concentrated on unsigned graphs, which only model positive relationships. However, such techniques can be inadequate for signed graphs, which model both positive and negative

relationships. In this paper, the researchers present a method –StEM (Signed neTwork Embedding Model) – for learning representations of signed networks that achieve improved performance on tasks such as visualisation, node classification and signed link prediction.

CLASSIFYING LOW-RESOURCE ACCENTS: CROSS LINGUAL LEARNING FOR TRINIDADIAN AND JAMAICAN ENGLISH

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The rapid improvement of Automatic Speech Recognition (ASR) has advanced speech technologies for major English accents, but Caribbean varieties such as Trinidadian (TT) and Jamaican (JM) remain underrepresented. The researchers address this gap by building an accent classification pipeline for TT and JM English and testing its generalisation to unseen speakers' accented speech.

The research involved finetuning the Common Accent cross-lingual speech representation (XLSR) transformer on a curated dataset combining Common Voice and locally sourced TT/JM recordings (N ≈ 14,700 utterances; 26.5 hours), using data augmentation and transfer learning to mitigate low-resource imbalance. Models were evaluated with stratified holdout splits (not speaker-disjoint) and measured using accuracy and F1.

Experiments contrasted training from scratch for six accents with XLSR finetuning targeted at TT and JM. Training from scratch was constrained by GPU memory, but XLSR finetuning consistently improved classification performance, achieving an average accuracy of 67%. By providing validated models and a reproducible training pipeline, this work advances accent-aware speech processing for Caribbean English and lays the groundwork for improved ASR and accent-adaptive applications in the region. Future work will reevaluate using speaker-disjoint cross-validation and an expanded JM dataset.

COPYRIGHT LAW AND AI: AUTOMATIC SPEECH RECOGNITION A CASE STUDY

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The development and use of artificial intelligence (AI) is not new. However, AI systems are rapidly being made available to end users. Therefore, the use of AI across a range of industries is more prevalent, and inevitable legal issues are arising. Consequently, the purpose of this paper is twofold: (1) to explain how AI technology works in the context of automated speech recognition (ASR) systems in order to identify the key points at which copyright issues arise; and (2) to assess what copyright laws are required to address AI using ASR as a case study.

This article will recommend the key considerations that countries must contemplate and implement in order to ensure that their copyright laws are capable of accommodating the legitimate development and use of AI systems. The training and use of AI systems requires access to copyright works especially in the context of ASR that necessarily requires audio and audiovisual works. Failure to legitimise the development and use of AI systems will result in copyright infringements and bias towards minority groups, which may cause countries to be left behind in the next technological revolution (again). As a result, the best response is for countries to empower

themselves by reshaping their copyright laws to legitimately accommodate AI systems in a way that allows for efficient and ethical development accompanied by legal certainty.

OFFICE SCHEDULING OF A HYBRID WORKFORCE WITH FAIRNESS AND GROUP COLLABORATION CONSTRAINTS

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Public-sector agencies are accelerating hybrid work adoption while seeking to preserve collaboration, equity, and operational efficiency. The researchers present a collaboration-aware scheduling pipeline that combines project associations and reporting-line proximity constraints. This is achieved by clustering employees based on these associations and then mapping clusters to shared in-office days via a fairness-constrained cyclic scheduler. The research introduces the Collaboration Ensurance Score (CES) to evaluate whether teams with shared dependencies are co-scheduled on the same days. Experiments on organisations of size 10, 100 and 1000 employees were run to demonstrate the effect of problem size on performance. The Mean-Shift algorithm achieves 47% higher CES than the K-Means++ algorithm at medium scale. The proposed approach provides deployment guidance while ensuring equitable schedules and collaboration.

OPTICAL LENS INVENTORY OPTIMISATION MODEL

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This study develops and evaluates a machine learning (ML) framework to optimise inventory management for small optical chains, addressing the trade-off between maintaining sufficient stock of common prescription lenses and minimising costly middleman reliance. By moving beyond intuition-based procurement, we introduce a data-driven approach integrating demand forecasting (using Prophet and ARIMA models) with linear programming (LP) optimisation. The model predicts quarterly demand for the top 30 lens combinations (covering 72.5% of sales) and incorporates a novel Prescription Weighting System to translate aggregate forecasts into Rx-specific order quantities based on refractive error distributions. Our optimisation model balances bulk pre-ordering against third-party procurement costs, accounting for prediction errors: excess inventory incurs holding costs, while under-ordering triggers expensive third-party fees ($321,145 at $10k budget vs. $0 at $40k budget). Historical data validation shows significant improvements; middleman orders drop from 430 (Very Low budget) to 37 (High budget), while profits rise from $303,654 to $35,617 at the optimal $40k quarterly investment. ARIMA-based optimisation outperforms Prophet, yielding $34,475 profit at $30k versus -$33,309. This framework provides small optical chains with a scalable, practical solution to enhance profitability, improve

service levels, and reduce dependency on costly intermediaries.

ON THE ACCELERATION OF THE VECTOR QUANTIZATION ALGORITHM

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Historically, the Vector Quantization (VQ) image compression algorithm was designed for single-core processors. Despite its simplicity, impressive bit rates, and good reconstructed image quality, the VQ algorithm is limited by a runtime complexity of O(N), where *N* is the size of the main codebook. As each input pixel block can be processed independently, the traditional VQ algorithm does not fully exploit modern multi-core architectures. The research proposes a novel GPU-accelerated implementation for both the VQ encoder and decoder that exploits multi-core architectures. Further, it presents the design of CUDA kernels for distributing the computations across multiple GPU threads. Although these kernels do not fundamentally change the theoretical runtime complexity of the encoder and decoder, it does reduce their respective constant factors, which yields significantly lower execution times. Specifically, the VQ encoder is improved by 61x, 44x, 34x and 29x for main codebook sizes $N = 128, 256, 512$, and 1024, while the GPU-accelerated VQ decoder is at least 200x faster across all codebook sizes. These improvements make VQ algorithms more practical for real-time applications such as multimedia streaming and reversible data hiding.

ETHICAL GOVERNANCE AND ARTIFICIAL INTELLIGENCE FOR CLIMATE RESILIENCE IN SMALL ISLAND DEVELOPING STATES

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This study investigates how AI can ethically and effectively support climate resilience in Small Island Developing States (SIDS). Recognising the unique vulnerabilities and resource constraints in these regions, the research explores the use and incorporation of ethical AI governance into climate adaptation strategies. Using Braun and Clarke's six-phase thematic analysis, a curated set of documents, including academic literature, United Nations reports, and technical evaluations, was examined. Natural language processing tools, such as keyword and bigram analysis, were used to validate key themes. Four core findings emerged: (1) the need for open-access, interoperable data platforms to support regional coordination; (2) the integration of ethical governance principles into AI development and deployment; (3) the importance of community-centred adaptation and decision-making; and (4) ongoing barriers to equitable access to climate finance. It offers practical recommendations for policymakers and regional institutions, including the establishment of inclusive data ecosystems, capacity-building efforts, and the reform of climate finance mechanisms, providing a foundation for future participatory research.

DESIGNING AI-DRIVEN EARLY WARNING SYSTEMS FOR FLOOD RESILIENCE IN SMALL ISLAND DEVELOPING STATES

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AI systems for disaster risk reduction in Small Island Developing States (SIDS) must operate under complex constraints, including limited data availability, fragmented infrastructure, and diverse governance environments. The development of an effective early warning system in such contexts requires more than predictive accuracy; it demands an integrated design approach that is ethical, scalable, and policy aware. This work introduces a modular architecture for an AI-driven flood forecasting and anticipatory action system that combines real-time data fusion, geospatial risk zoning, and Agentic AI for autonomous decision support. The design incorporates explainable AI, forecast-based financing protocols, and alignment with Sustainable Development Goals to ensure both technical performance and societal relevance. Emphasis is placed on the architectural challenges, system trade-offs, and contextual factors that shape how AI can transition from experimental capability to actionable, governance-ready solutions for disaster resilience in SIDS.

APPLICATION OF GPT ARCHITECTURES FOR RENEWABLE ENERGY FORECASTING AND STOCHASTIC POWER GENERATION SCHEDULING

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Accurate short-term forecasting of electrical load, solar irradiance, and wind generation is critical for optimizing power system operations under uncertainty. Recent advancements in Generative Pre-trained Transformer (GPT) algorithms have opened new frontiers in time-series prediction by leveraging their ability to model complex temporal dependencies and nonlinear relationships across multiple correlated variables. Unlike traditional autoregressive models or shallow learning methods, GPT-based architectures capture both long-range temporal correlations and contextual information from auxiliary data sources such as weather patterns, social behaviour, and grid conditions.

This study explores the application of GPT algorithms for short-term forecasting in integrated energy systems, focusing on three key domains: electrical load, solar photovoltaic (PV) output, and wind power generation. The GPT models are fine-tuned on multi-modal datasets combining meteorological data, historical grid measurements, and exogenous signals such as calendar and event indicators. By employing attention mechanisms, the models dynamically weight the relevance of past data to forecast near-future intervals, typically within 1–24 hours ahead.

The forecast outputs are subsequently used to inform stochastic optimization models for power generation scheduling. The integration of GPT-based forecasts enhances the formulation of uncertainty sets and scenario generation

processes within stochastic unit commitment and economic dispatch frameworks.

GENERATIVE AI FOR BUSINESS SUSTAINABILITY: EXAMINING USABILITY, USEFULNESS, AND TRIPLE BOTTOM LINE IMPACTS IN SMALL AND MEDIUM ENTERPRISES

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Generative AI has emerged as a game-changing technology with great potential to enhance business sustainability. This study explores the adoption and application of generative AI among small and medium-sized enterprises (SMEs) in a small island developing state (SIDS). The study utilises the Technology Acceptance Model (TAM) and the Triple Bottom Line (TBL) framework. It integrates quantitative and qualitative methods to comprehensively understand generative AI's role in fostering sustainable business practices. Quantitative findings reveal that perceived ease of use and usefulness significantly influence SMEs' intentions to adopt generative AI, ultimately predicting its actual usage. Qualitative insights complement these findings by identifying four key applications: operational efficiency, data-driven decision-making, sustainable product and service innovation, and building a sustainable brand identity. Despite its potential, the study acknowledges limitations, including focusing on a single SIDS and relying on self-reported data, which constrain generalisability. However, these limitations do not diminish the study's importance, as it highlights practical pathways for SMEs to overcome resource constraints and achieve sustainability goals. The findings highlight the transformative role of generative AI in equipping SMEs with innovative tools to balance profitability with environmental and social responsibility. Policymakers are urged to support this transition through education and outreach, making generative AI accessible and practical for SMEs.

ARTIFICIAL INTELLIGENCE ADOPTION IN LATIN AMERICA AND THE CARIBBEAN (LAC): POLICY INSIGHTS FROM TRINIDAD AND TOBAGO

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This study investigated the current state of AI Adoption in Trinidad and Tobago to inform regional AI policies across Latin America and the Caribbean. It addresses the questions: What is the current level of AI Adoption? What barriers and opportunities exist for accelerating AI Implementation? Using an explanatory sequential Mixed Methods Design, a structured survey was administered to key stakeholders. Preliminary findings from 75 survey responses reveal that 48% of participants consider AI adoption in their organisations to be in early exploratory or pilot phases. The most cited challenges were the high cost of implementation, while 66% reported the absence of an institutional AI policy or strategy. Productivity enhancement emerged as the

primary use case, and education and training were the most recommended enablers of adoption. Twenty-eight participants consented to follow-up interviews, which will be stratified into case studies of adopters and non-adopters to provide comparative insights. These findings highlighted the need for targeted investments in digital capacity and policy frameworks to support inclusive adoption in the region.

A DOMAIN-AGNOSTIC FEDERATED GRAPH-BASED DIGITAL TWIN FRAMEWORK FOR PERSONALISED INTELLIGENCE AND ANOMALY DETECTION

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Digital Twins provide transformative potential for real-time and predictive analytics when used in complex systems. Existing implementations are domain-specific, centralised and vulnerable to privacy breaches. This research introduces a novel domain-agnostic framework that integrates federated learning (FL) with federated graph neural networks (Fed-GNNs) to preserve privacy, personalised intelligence and anomaly detection across distributed environments. Leveraging modular ontologies, the framework facilitates seamless adaptation to diverse domains, such as healthcare, automotive systems and smart infrastructure. This allows heterogeneous digital twins to coexist within a unified system.

The core idea relies on ontology-driven graph modelling, where systems are represented as multi-scale, dynamic graphs with nodes, edges and attributes mapped to interchangeable schemas stored in Neo4j graph databases. Fed-GNNs enable collaborative training on local subgraphs without sharing raw data, as well as using non-independent and identically distributed heterogeneity and adaptive aggregation of data. Data privacy is strengthened through differential privacy and semantic-aware secure aggregation, and this mitigates risks like subgraph leakage for sensitive applications. Advanced anomaly detection algorithms will detect semantic, structural and behavioural irregularities in temporal graph evolutions, to support real-time diagnostics and preserve privacy during federated updates. The framework will be evaluated across multiple domains, and there will be an evaluation of the performance, accuracy, efficiency and transferability compared to baselines like FedAvg, GraphSAGE and FedPerGNN. Future ablation studies will assess the impact of key components in low-resource simulations, expected to validate usability in Caribbean clinics or the Internet of Things (IoT) Networks.

This proposed open-source paradigm will advance distributed algorithms, graph data management and privacy-preserving machine learning, and foster a more secure, intelligent digital twin infrastructure for the next generation of applications. Stakeholders will be empowered with collaborative insights from the chosen domains, which maintain data sovereignty and ethical standards.

A MACHINE LEARNING APPROACH TO MULTI-CROP DISEASE IDENTIFICATION USING XGBOOST

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Vegetable and fruit crops are highly susceptible to a variety of diseases that significantly reduce yield and compromise produce quality. This research introduces a novel digital tool for the detection and assessment of emerging diseases across multiple crops, including tomato, sweet pepper, potato, apple, corn and grape, to support improved crop health monitoring. The proposed tool is designed to classify plant diseases independent of crop type. To enhance detection accuracy, input images were resized and segmented using the GrabCut method to isolate leaf regions. The segmented images were then converted into HSV colour space and grayscale formats for feature extraction. A total of 96 features were derived, including colour histograms, Local Binary Patterns (LBP), and Gray-Level Co-occurrence Matrix (GLCM) descriptors. Disease classification was performed using the Extreme Gradient Boosting (XGBoost) algorithm. The study employed 27,691 images from the Plant Village dataset, and the model achieved classification accuracies of 97.20%, 100.0%, 97.68%, 97.01%, 87.94% and 97.91% for tomato, sweet pepper, potato, apple, corn and grape, respectively. These results demonstrated the effectiveness of the proposed approach in delivering high-accuracy, multi-crop disease detection to support crop health management.

THEME VIII

EDUCATION, CULTURE, SPORTS, EQUALITY, LAW AND GOVERNANCE FOR A BETTER LIFE AND SUSTAINABLE ENVIRONMENT

THE LEGAL AND REGULATORY FRAMEWORKS GOVERNING GEOTHERMAL ENERGY AND SUSTAINABLE DEVELOPMENT IN MONTSERRAT AND SELECTED COMMONWEALTH CARIBBEAN JURISDICTIONS

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The researcher belongs to a multidisciplinary team, which forms part of the University of Oxford's interdisciplinary research project ReSET: Rethinking Natural Resources (See https://reset.web.ox.ac.uk/). In July 2025, a presentation was delivered at a Workshop on Geothermal Resource Governance and Sustainable Development in Montserrat. This research highlights certain aspects of a broader study in that area. The Caribbean has significant geothermal potential, especially in volcanic islands, for instance, in Dominica, St. Vincent and the Grenadines, St. Kitts and Nevis, and Montserrat.

The focus is on challenges and opportunities in geothermal energy development and critical raw materials (including, but not limited to, lithium) from geothermal fluids, and the combined benefits of co-producing geothermal energy and critical minerals from the same system/project offer some very exciting opportunities. It also demonstrates the role of renewables, technology, policy, laws and community, as well as the importance of sustainable development. The research is important for several reasons, including its potential impact on socio-economic growth, long-term energy security, climate change mitigation and sustainable development.

The research further highlights the existing legal and regulatory frameworks governing geothermal energy in Montserrat and selected Commonwealth Caribbean jurisdictions. It will depict the extent to which these frameworks support sustainable development, environmental protection and energy security. The poster will identify gaps and inconsistencies in legislation (via a table) that may hinder effective geothermal governance. Drawing on international best practices, multilateral environmental agreements and legal commitments, the poster will propose legal and policy reforms to promote equitable, transparent, and sustainable use of geothermal resources. The aim of the poster is to support the region's transition to renewable energy in a manner that equitably balances economic growth and environmental stewardship.

THE IMPACT OF COVID-19 ON THE VALUE-ADDED PERFORMANCE OF SECONDARY SCHOOLS IN TRINIDAD AND TOBAGO

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This study examined the effect of the COVID-19 pandemic on the value-added (VA) performance of secondary schools in Trinidad and Tobago. Using matched student-level data linking Secondary Entrance Assessment (SEA) scores to Caribbean Secondary Education Certificate (CSEC) attainment for four cohorts (SEA 2013–CSEC 2018, SEA 2014–CSEC 2019, SEA 2015–CSEC 2020 and SEA 2016–CSEC 2021), VA scores were calculated for each school before and during the pandemic. A multilevel logistic regression model was used to control for prior attainment and student background characteristics. Pre-pandemic VA scores were compared with pandemic-era scores to assess changes in school effectiveness. Results indicated a significant decline in the mean VA across schools during COVID-19, with increased variability in VA estimates and notable shifts in school rankings. Several schools demonstrated resilience, maintaining or improving VA despite pandemic disruptions, while others experienced sharp declines. Findings highlighted the need for adaptive accountability systems and targeted support to maintain educational equity in times of crisis.

EDUCATION EXPERIENCES OF STUDENTS WITH DISABILITIES IN REGULAR PRIMARY AND SECONDARY SCHOOLS IN TRINIDAD

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Children with disabilities continue to face barriers to equal and quality education. This study explored their education experiences in regular primary and secondary schools in Trinidad, considering the online and physical settings. Data were collected from twenty students with disabilities and twenty-two parents/guardians via interviews across all education districts in Trinidad. The findings highlight three major challenges: ableist perceptions of differences leading to marginalisation, inadequate school systems causing students to be left behind and limited provision of services beyond school systems, creating additional strain for students and parents. Achieving inclusive education requires the transformation of ableist ideas through sustained public discourse and systemic education reform, including increased collaboration with parents/guardians and the adoption of strategies to facilitate dialogue between students and teachers.

EXPLORING THE LEVEL OF KNOWLEDGE OF VISITORS TOWARDS GEOCONSERVATION AND GEOLOGY IN TRINIDAD – THE GASPAR GRANDE CAVE

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The Gaspar Grande Cave located 12km west of Port of Spain is safely adapted to host visitors, making it a unique natural phenomenon to the country. The cave is known for its aesthetic, scientific and historical value amongst local and international visitors, as guided tours are used to highlight its geological features.
The Gaspar Grande Cave is composed of Lower Cretaceous limestone and is currently undergoing degradation due to saltwater intrusion and dissolution of the cave roof via precipitation. There are skylights and several sinkholes in close proximity to the cave that highlight the delicate balance due to infrastructure construction, unsupervised human activity and climate change. The cave contains a variety of geological formations,

notably, speleothems, skylights and cave pools. These geological features not only represent invaluable geological heritage but also serve as crucial records of the region's climatic and environmental history. At present, these geological formations face serious conservation challenges due to factors such as vandalism, natural erosion, anthropogenic pressure and climate change.

To address some of these challenges, the cave managed by the Chaguaramas Development Authority (CDA) has introduced several conservation actions. Additionally, to improve on emphasising the importance of geoconservation and geology to locals and tourists, the paper proposes conducting a validated questionnaire with CDA tour visitors over the age of 18. This study will investigate knowledge towards geoconservation and geology at the Gaspar Grande Cave. Outcomes of which are well positioned to make significant contributions to UNESCO's sustainable development goals (SDG 1, 4, 8, 11 and 15).

Together, these actions aim to promote a sustainable visitor model that values geoconservation and geoeducation of the Gaspar Grande Cave.

BOOKS, BABIES OR BOTH?: EXPLORING THE CONSTRUCTION OF CHILD-BEARING AMONG WOMEN IN TERTIARY EDUCATION

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Within recent decades, the Caribbean has experienced simultaneous heightened socio-economic development, educational access and declines in population growth and fertility rates, the latter falling below replacement levels in 2015. The increased involvement of citizens, particularly women, in tertiary education – and their place within this system – have been posited as reasons for this decline. Against this background, this qualitative study explores the construction of childbearing among women of reproductive age who are involved at different levels within tertiary education. Using interviews and quota sampling, the experiences and perceptions of twelve (12) postgraduate students, early career academics and later stage academics at one regional university were explored. Thematic analysis revealed concerns around juggling multiple roles, positionality within the academy, and balancing biological and academic trajectories as central to women's decision-making as it relates to having children. Additionally, navigating reproductive health within the academic space emerged as a major factor influencing the possibility of childbearing among teaching staff. In addition, participants shared their views on tertiary education as a source of both freedom and constraint on their potential plans for procreation. The findings of this study highlight the need for academic spaces to be made more conducive to both staff and students to make unrestrained child-bearing decisions, and the role of the university as a sphere for reproductive health and justice. Thus, this study interrogates the connection between education and reproduction as extensions of Caribbean development processes.

ASSESSING CHANGES IN ACADEMIC ATTAINMENT IN STUDENT OUTCOMES DURING THE COVID-19 PANDEMIC IN TRINIDAD AND TOBAGO

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This study investigates how the COVID-19 pandemic affected secondary attainment

outcomes and gender disparities of primary-level performance measures in Trinidad and Tobago. Using four matched Secondary Entrance Assessment (SEA) and Caribbean Secondary Education Certificate (CSEC) cohorts (2013–2018, 2014–2019, 2015–2020 and 2016–2021), the researchers employed logistic regression and correlation analyses to examine changes in the probability of attaining a full CSEC qualification (five or more subjects including Mathematics and English) across performance levels, gender groups, and time periods. Results revealed substantial increases in overall attainment probabilities during the pandemic, particularly among students with lower SEA scores, suggesting that pandemic-era assessment adjustments such as increased reliance on school-based assessments and modified examination formats may have contributed to improved outcomes. Additionally, the gender gap in attainment is presented, with females outperforming males across all SEA levels. Together, the results point to a complex trade-off between advancing educational equity and maintaining consistent assessment standards during periods of crisis-driven reform. Policy implications included the need for targeted post-pandemic support, gender-sensitive interventions and the design of resilient assessment frameworks that uphold both equity and credibility in times of crisis.

MAKING DATA MORE ACCESSIBLE TO RESEARCHERS – AN EXPLORATORY ASSESSMENT OF STATISTICAL DISCLOSURE (SDC) TECHNIQUES WITH APPLICATION TO HOUSEHOLD SURVEY DATA

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Governments often hesitate to share microdata with researchers due to the moral and legal obligation to protect confidentiality. This study proposed a solution to this data-sharing problem by illustrating the use of various statistical disclosure control (SDC) techniques. These methods are employed to mask microdata sets, ensuring that individual records cannot be linked to a person, household, or other entity upon dissemination. The study reviewed common SDC methods that Caribbean Community (CARICOM) National Statistical Offices (NSOs) might undertake when beginning to apply these techniques. It also includes an exploratory analysis of a few specific SDC techniques: microaggregation, noise addition, and rank swapping. The evaluation of these methods focused on measuring disclosure risk and information loss. The results confirmed the expected statistical properties of the applied methods. Specifically, rank swapping and the Maximum Distance to Average Vector (MDAV) approach to microaggregation were identified as techniques that minimise information loss while maintaining an acceptable level of disclosure risk.

BARRIERS AND FACILITATORS AMONG SPECIAL OLYMPIC COACHES IN THE CARIBBEAN

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Drawing on the Social Ecological Model (SEM), this study examined the factors that have either constrained or facilitated the work of Special Olympic coaches in the Caribbean country of Trinidad and Tobago. It was based on a sequential, mixed-methods case study that involved the use of an online survey (n = 33) and three focus group interviews with 14 Special Olympic coaches. It was found that there were

more systemic barriers than facilitators and that intrapersonal (self- motivation, training, experience, attitudes), interpersonal (family, friends, teachers, co-workers), community (facilities, relations between organisations), organisational (staffing, funding, business), and policy factors (state policy practices) combined to influence the work of these coaches. The implications of the findings for the development of coaches and Special Olympics on the island, as well as further theorising on the subjects, are discussed.

ARGUING MERIT, DESERT AND JUSTICE IN 11+ TESTING

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11+ testing for early selection and tracking has been a part of the Caribbean education landscape since independence. Under colonial administration, selection to secondary school was required because it was a valued but limited outcome. But with universal secondary education in 2001, why has the 11+ persisted? The core argument supporting continued use is best captured by the claims of the 1998 Task Force appointed to remove the 11+. The Task Force proposed instead that the examination be retained to ensure that different students are placed in the type of secondary schools that they are best suited for. This understanding includes arguments by Aristotle and Plato. It is a desert-based conception of justice, arguing for people receiving what they deserve, whether good or bad. So, then, is the current 11+ system fair? The answer depends on the specific justice perspectives. Three core concepts are justice, desert and merit. Justice is a system that ensures people receive their deserts or are judged on their merits. Desert refers to the concept of receiving what one is due based on one's actions, qualities, or circumstances. Merit is a specific type of desert, usually involving deserving rewards or treatment resulting from positive characteristics, effort, or skill. These definitions raise questions for debate: What is merit in the context of secondary schooling? Can merit really be measured by an 11+ achievement test? Do different opportunities to learn within the primary school system of Trinidad and Tobago constrain arguments for 11+ testing? Using the Narrative Policy Framework (NPF), the researcher considers policy beliefs and narrative strategies and explores the heroes, villains, victims, beneficiaries, and those called to act for 11+ testing in Trinidad and Tobago. The research also examines the claims, warrants, and grounds of justice theories across time, from Plato to Amartya Sen.

CAN THE 11+ BE REMOVED? INSIGHTS FROM SYSTEMS THEORY

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The 11+, either in its original or modified and rebranded ‘assessment’ form, remains a high-stakes public examination in the region. Its primary purpose is to facilitate early selection and tracking into the secondary school sector in Caribbean nation-states. Neither adding profiles nor performance tasks changes this purpose. The processes and outcomes of the examination maintain the stratified schooling system. To be sure, there are a few high-performing systems which have retained test-based early tracking, but several countries in Europe continue to experiment with delayed tracking. In the last two decades in the Caribbean, the OECS has called for harmonisation or standardising approaches to transition, CXC implemented the Caribbean proficiency exit assessment (CPEA), and Trinidad and Tobago and Barbados were

forthright in calling for the removal of the 11+. In the 1989 chapter on validity in the third edition of Educational Measurement, Samuel Messick advised that the entire selection system should be studied. This approach calls for the use of systems theory when considering removal. The elements of the 11+ include mechanisms of selection, choice and placement rules, legal arrangements for direct entry, the format and nature of the test, and differentiation or stratification in the secondary school sector. The researcher advances the work of the 2022 SEA/Concordat Committee report by applying systems thinking to explain the policy reform trajectory of 11+ in Trinidad and Tobago. Additionally, the paper documents the progress, regressions and missteps from 1962 to the present. This convoluted circular pathway is explained focusing on five areas: people, power, beliefs, agency, structure and culture. In crafting future sustainable solutions for removal, the research employs leverage theory, power transition theory, the iceberg model, and morphogenetic and decolonisation theories to show how a just system can be created through iterative progressive change.

IMPROVING ACADEMIC ADVISING BY PREDICTING A STUDENT'S GPA GIVEN THEIR CHOSEN COURSES

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The academic advising process is very beneficial since many students are unaware of the difficulties they may face when taking certain courses or combinations of courses in the upcoming semester. Unfortunately, it is difficult for academic staff to take into account the various factors that may affect the student's performance, given their choice of courses. It is believed that historical student data can assist with this task. One can use tools, such as collaborative filtering, to predict the performance of a student on a set of courses given the past performances of similar students as well as the past performance of the individual. An academic advisor can then use this information to provide better advice to the student to avoid course overloading or even course underloading. The paper presents one such approach in which, given a set of courses for the coming semester, we predict the semester GPA of the student if they were to take these courses. Through this advice, the student may then decide to reduce their course load in order to maintain a high-grade point average or increase their course load to complete their degree earlier. The research proposes to use data from a Computer Science department at a university and demonstrates that, using the available demographic and course grade data, one can make reasonably accurate predictions to assist the advisor.

ENHANCING STATISTICAL LITERACY: TRANSFORMATIVE LEARNING FOR NON-STEM TERTIARY STUDENTS

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Statistical literacy is an essential competency in today's data-driven world, yet many non-STEM tertiary students face barriers such as statistical anxiety, low confidence and limited

ability to apply concepts in real-world contexts. This pilot mixed-methods study investigates how guided research projects—grounded in Transformative Learning Theory (TLT) and the Knowledge–Attitudes–Perceptions (KAP) framework can enhance statistical literacy among 20 non-STEM students at a Caribbean university. A 54-item KAP instrument assessed students' statistical knowledge, attitudes, and perceptions.

Results indicated a generally positive valuation of statistics (M = 5.49), but persistent challenges with inferential reasoning (M = 5.42 out of 10) and ongoing statistical anxiety. A strong correlation between affect and cognitive competence (r = 0.67) highlights the importance of emotional engagement in learning. Thematic analysis of student reflections revealed transformative shifts in self-efficacy, perceived relevance, and ability to apply statistical tools. Findings support the value of student-centred, reflective pedagogies in statistics education, especially for curriculum reform targeting non-STEM learners.

STRATEGIC RESILIENCE FOR SUSTAINABILITY IN A CARIBBEAN HIGHER EDUCATION INSTITUTION: A QUALITATIVE CASE STUDY

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This study explores how a Caribbean higher education institution (HEI), The University of the West Indies (UWI), has demonstrated strategic resilience while advancing its sustainability agenda in response to economic, health, and technological disruptions. It aims to offer regionally grounded insights on embedding resilience and sustainability principles into institutional planning and governance. A qualitative case study design was employed, using thematic analysis of seven Annual Reports (2017–2024) from The UWI, St. Augustine Campus, one of five campuses.

The analysis focused on institutional responses to macroeconomic shifts, the COVID-19 pandemic, and the post-pandemic transformation period. Key themes included strategic resilience, SDG 4 alignment, and SDG monitoring and reporting. The institution implemented phased strategic planning to navigate crises while preserving educational continuity and operational functionality. Leadership actions included rapid digital transformation, diversification of revenue streams, and strategic collaborations at the national and regional levels.

While sustainability-related projects were documented, opportunities remain to enhance institutional reporting, assess partnership impacts, and align sustainability efforts more systematically across the university's planning frameworks. This research offers an empirical contribution from a Caribbean Small Island Developing State (SIDS) context, where HEIs face distinct vulnerabilities and regional responsibilities. It provides practical guidance for academic leaders, planners, and policymakers aiming to integrate resilience and sustainability into higher education governance and institutional transformation strategies.

DECOLONISING SYSTEMIC POLICING ENTANGLEMENTS: THE "FRAME CASE" AS A COUNTER-NARRATIVE IN 21ST CENTURY TRINIDAD AND TOBAGO

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This study trans-historically explores how narratives of the Frame Case exemplify and resist colonial entanglements in contemporary Trinidad and Tobago. Central to this study is the concept of the Frame Case, a culturally specific term used by typically African, Indian and Mixed residents in criminally labelled communities in Trinidad and Tobago to describe how and why they are falsely accused, targeted and arrested for crimes they did not commit. Emerging from working-class communities, this emic (insider) term signals the underlying dynamics of criminalisation, stigmatisation and dehumanisation that are rooted in racialised, classist, militarised and spatial systems of colonial power. Grounded in decolonial theory, the Frame Case is situated within multiple state apparatuses, including the Judiciary, Executive, Legislative, Media, Penal and Police Service and serves to dismantle and deconstruct these institutions that uphold systemic policing practices. To investigate this, the researcher utilises narrative inquiry, integrating qualitative approaches with culturally relevant methods, which include examining archival data and conducting Caribbean-centric 'online' sessions. These virtual sessions, which incorporate fifteen semi-structured interviews and one chat-based focus group, serve as a safe space during the coronavirus pandemic where participants felt comfortable to share their experiences. Following data triangulation, the findings reveal that the post-colonial present is, in fact, a neo-colonial reality as demonstrated through the intertwining of colonial epistemes and material conditions that persist in the form of criminalisation, dehumanisation and stigmatisation as articulated in the experiences of the Frame Case. These patterns continue despite the formal end of political colonisation and through the leadership of neo-colonial elites. To address this problem, the research crafts a study with a participatory approach, proposing recommendations that offer practical insights into confronting systemic policing entanglements in the neo-colonial present.

TOWARDS MORE EFFICIENT POLICING – AN APPLICATION OF A NOVEL CRIME HOTSPOT DETECTION METHOD

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The prevention and reduction of criminal activity remain significant challenges for law enforcement agencies. Empirical evidence consistently indicates that the spatial distribution of crime is neither uniform nor random. Rather, criminal incidents tend to concentrate in specific geographic areas, commonly referred to as *crime hotspots*. This study proposes a novel yet intuitive methodological framework for determining both the optimal number and spatial configuration of such crime hotspots, conceptualised here as spatial clusters. The approach represents a refinement of conventional clustering algorithms.

Traditionally, the selection of the optimal number of clusters in such algorithms is guided by the minimisation of the Within-Cluster Sum of Squares (WCSS) criterion. However, reliance on WCSS alone may yield clusters that are excessively large and therefore unsuitable for effective deployment of police resources. To address this limitation, a heuristic, cost-based evaluation metric is introduced that incorporates both *allocation costs* and *patrol costs* associated with each cluster. This alternative metric is designed to produce clusters that are not only statistically coherent but also operationally feasible from a policing perspective. The proposed method is applied to spatial crime data from Trinidad to evaluate its practical utility.

AN EXAMINATION OF HIGH ACADEMIC PERFORMANCE: AN INTERSECTIONAL AND MULTI-SITE CASE STUDY WITHIN ONE EDUCATION DISTRICT IN TRINIDAD AND TOBAGO

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This qualitative, multi-site case study identified and explored factors contributing to high academic performance at three primary schools across school types in Trinidad and Tobago: one government (GPS), one denominational (DPS) and one private (PPS). All schools were located in one geo-educational district—St. George East District. The study primarily aimed to gain insights into and determine the factors that contribute to high academic performance at these schools, noting the impact of COVID-19. A secondary aim was to consider the compounding effects of the identified factors. Respondents included students, administrators and teachers. Data analysis combined thematic and cross-case analysis to identify within-case and cross-case themes. Intersectionality theory was used as the guiding theoretical framework to examine how various factors intersect to either enhance privilege or contribute to disadvantage. Findings revealed that both in-school and out-of-school factors significantly affected academic performance. Key influences included socio-economic status (SES), gender, ethnicity, school leadership, stakeholder involvement, school culture, religiosity, educational stability, self-determination, and COVID-19 responsiveness. These intersecting factors shaped the academic experiences and outcomes of students across the three schools. Since resources were not distributed equally or equitably across the students or schools in this study, those with lower performance levels may be disadvantaged and at risk of marginalisation. Importantly, the study found that resources were not equally or equitably distributed across students or school types. As a result, students with lower performance levels may face increased risk of marginalisation. The study underscores the critical role of responsive school leadership in building a community of learners and cultivating an inclusive and equitable school culture for high academic performance.

AN ANALYTICAL STUDY ON THE INFLUENCE OF THE LEARNING ENVIRONMENT ON STUDENT ACADEMIC MOTIVATION IN THE FACULTY OF MEDICAL SCIENCES AT THE UNIVERSITY OF THE WEST INDIES, TRINIDAD AND TOBAGO

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Background: The learning environment plays a critical role in shaping students' academic motivation, particularly in health sciences education. This study aimed to (1) describe the demographic characteristics of undergraduate health sciences students, (2) explore relationships between the perceived learning environment and academic motivation, and (3) examine the influence of the learning

environment and demographic factors on motivation.

Methods: A cross-sectional study was conducted among Year 1 and Year 2 students (n = 350) enrolled in the Faculty of Medical Sciences at The University of the West Indies, Trinidad and Tobago, during the 2024–25 academic year. Participants were drawn from five schools: Medicine, Nursing, Pharmacy, Dentistry and Optometry. Data were collected using a three-part questionnaire: demographics, the Dundee Ready Education Environment Measure (DREEM), and the Academic Motivation Scale (AMS-28). Descriptive statistics, Pearson's correlations and stepwise multiple regression analyses were performed using SPSS v30.

Results: Most participants were female (73%), aged 18–21 years (69%), and Trinbagonian nationals (94%). The DREEM scores indicated a generally positive learning environment, with the highest ratings for perception of teachers (64.3%). AMS-28 results revealed high external motivation (79.5%), moderate intrinsic motivation (65.6%), and low amotivation (29.6%). DREEM scores correlated positively with intrinsic motivation ($r = .15$, $p = .006$) and negatively with amotivation ($r = –.15$, $p = .006$). Regression analyses identified DREEM scores, programme of study, gender and ethnicity as predictors. A positive learning environment predicted higher intrinsic motivation and lower amotivation, while female and pharmacy students reported greater external motivation.

Conclusion: The perceived learning environment significantly influences academic motivation among health sciences students. Enhancing the educational climate can foster intrinsic motivation, reduce amotivation and strengthen commitment to learning, thereby improving academic performance and professional preparedness.

TEACHERS' PERSPECTIVE OF COMPREHENSIVE SEXUALITY EDUCATION (CSE) IN THE SECONDARY SCHOOLS' CURRICULUM

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Sex education is arguably one of the most debatable 'taboo' topics within the Caribbean region. Since the discovery of HIV/AIDS in the 1980s, Koop (1986) recommended that young people be made aware of heterosexual and homosexual relationships to curb the spread of this deadly disease. Consequently, CARICOM was forced to develop and implement policies with the thrust of reshaping values and promoting positive behaviours in youths, for arresting the alarming and rapid spread of HIV/AIDS in the region. In 1994, a CARICOM Standing Committee implemented Health and Family Life Education (HFLE) in schools throughout the region. Subsequently, an evaluation of the HFLE curriculum highlighted several gaps in both the content and delivery of the sexuality component (UNFPA 2022). As such, the objectives of this research were to determine if there is a need for CSE at the secondary school level, what age-appropriate and relevant content is and what the anticipated benefits and challenges are.

Teachers, as one of the most important stakeholders in education, are held in high esteem by students, as they are viewed as knowledgeable, reliable, credible, and trustworthy (Harrison & Dempsey 1998). It is through this lens that this research was conducted, using a case study approach, with a qualitative method, that interrogated the perspective of 6 teachers, of varied characteristics, on the inclusion of CSE programs in the secondary schools' curriculum. The findings revealed that teachers agreed with the deficiencies in HFLE, identifying that age-appropriate and relevant topics on STIs, LGBTQI+, and relationships are critical aspects of any sexuality education program. Teachers indicated that they are willing and will be comfortable teaching CSE, once provided with the necessary training and resources. However, they anticipate resistance from the Ministry of Education, parents and religious institutions

and suggest the need for collaboration and advocacy on the issue of CSE.

SPORT DEVELOPMENT AND SPORT FOR DEVELOPMENT IN THE CARIBBEAN: A SOCIOLOGY OF EMERGING TRENDS

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The emergence of sport for development as a developmental strategy led by the United Nations and the use of sport by companies around the world as part of their Corporate Social Responsibility strategies have brought to the fore its developmental utility. Within this broader global context, *Sport Development and Sport for Development in the Caribbean* offers a unique focus on the Caribbean context to examine issues related to sport development and sport for development across a range of Caribbean countries that include Cuba, the Dominican Republic, Haiti, Jamaica, Martinique and Trinidad and Tobago.

Building on a relatively small, emerging body of work on the Caribbean context, the chapters showcase how this region has been an important part of the processes of globalisation, commercialisation and professionalisation that have expressed themselves in and through sport. Touching on a range of sports, which have formed part of Caribbean sport history and culture, including cricket, athletics, baseball and soccer, authors examine a broad array of issues in Caribbean sport that have come to define the contemporary scope of sport sociology. Topics covered are globalisation, commercialisation, professionalisation, nationalism, gender, race, national identity, nationalism, athletic migration and disability.

THE BRITISH, SOCCER AND IDENTITY IN THE CARIBBEAN: CLASS, RACE AND NATION, 1908–1973

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This book examines the role of the British in the diffusion and development of soccer on the Caribbean islands of Trinidad and Tobago, in the light of issues of race, ethnicity, colour, class and national identity, in the period 1908–1973. This role was expressed in the activities of understudied organisations like the English Football Association and the British Council, as well as oil companies like Shell and British Petroleum, through the recruitment of coaches such as Jimmy Hill and Michael Laing; the staging of tours involving teams such as Chelsea, Coventry City, Wolverhampton Wanderers and Arsenal in the 1960s; the formation of clubs, leagues and the construction of sporting facilities. Relatedly, it examines the role of the local middle classes in facilitating the commercialisation of the game through professionalisation and the operations of betting pools. The volume will help to give readers a better understanding of how the game served as a "double agent" of British hegemony and segregation, as well as integration and socio-political change in colonial and post-colonial society.

FROM A TRICKLE TO A THRONG: TRANSATLANTIC SOCCER MIGRATION FROM TRINIDAD AND TOBAGO, 1933-2019

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The exponential increase in sport migration over the last 30 years, particularly in soccer, has witnessed a commensurate increase in its scholarly study. This study seeks to add to the Literature based on an explanatory case study of the changing size and destination of transatlantic soccer migration from the Caribbean island of Trinidad and Tobago in the period 1933-2019. It is explanatory in nature since it draws on several major theoretical perspectives that have been employed to examine soccer migration and sport migration in general, which have included: world systems, dependency, figurational, network and globalisation theories. It was found that soccer migration from the island fluctuated significantly in the period examined and was dominated by migration flows notably, to the USA and Europe in the post-independence period (from 1962); increased substantially from the 1990s, by 2,100%, which was reflected in a notable increase in the number of destinations from 2 to 26, as well as the diversity of destinations from 3 to 20 consistent with a global pattern. However, there was also a marked shift in destinations away from the UK to within Europe, as well as to Asia and Central America, owing largely to stricter requirements to enter the UK soccer market. The study is seen as merely a tip of the transatlantic soccer migration iceberg from the island and the Caribbean as a whole, for there is a need to examine a much wider range of issues that include secondary migration, female migration, foreign League and team status, the mixed impact of migration on senders and receivers, as well as the role of agents, players and friends as part of this migration process.

A RE-DIMENSIONED THEORY OF PLANNED BEHAVIOUR ON ENERGY SAVING INTENTION IN THE WORKPLACE: THE MEDIATING EFFECT OF ENVIRONMENTAL KNOWLEDGE AND ORGANISATIONAL CULTURE

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This research expands the Theory of Planned Behaviour (TPB) framework to investigate factors influencing employees' intentions to save energy in the workplace (INSER), integrating organisational culture (ORGCULT) and environmental knowledge (ENVKNOW) as mediators. Structural equation modelling (SEM) applied to survey data from employees confirms that attitudes toward energy saving (ATES) and perceived behavioural control (PERBCON) play significant roles in predicting INSER. At the same time, subjective norms (SUBNORM) do not exhibit a direct effect. ORGCULT proved a potent mediator, emphasising its capacity to convert pro-environmental attitudes into concrete actions. In contrast, ENVKNOW did not mediate the relationship, questioning the assumption that knowledge alone can drive energy-saving behaviours. These findings underscore that organisational commitment and leadership engagement have a more significant impact than peer norms or awareness initiatives, reshaping how TPB is applied in workplace sustainability contexts. From a managerial perspective, organisations should focus on fostering a sustainability-oriented culture, implementing structural strategies, and leveraging behavioural nudges rather than

relying solely on informational campaigns. Theoretically, this study refines TPB by demonstrating that institutional influences precede SUBNORMS in professional environments. These insights contribute to corporate sustainability discourse, highlighting the need for leadership-led engagement, workplace-driven behavioural strategies, and policy-based interventions to sustain long-term energy efficiency.

ENGINEERED FOR BUSINESS: A COMPARATIVE ANALYSIS OF ENTREPRENEURIAL INTENTIONS AMONG MANAGEMENT AND ENGINEERING STUDENTS

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Entrepreneurship is increasingly recognised as a catalyst for economic growth and youth employment, particularly in developing countries. This study examines the influence of entrepreneurial education (EE) and entrepreneurial motivation (EM) on the formation of entrepreneurial intentions (EI) among management and engineering students. Using an explanatory research design, survey data were collected from 176 undergraduate students (66 engineering, 110 management). Factor analysis and linear regression were employed to assess the relationships among key variables. The results indicate that both EE and EM significantly predict EI; however, EE emerged as the stronger influence, particularly among engineering students ($\beta \approx 0.84$) compared to management students ($\beta \approx 0.77$). EM demonstrated a consistent effect across both groups (~0.43). Contrary to expectations, EM did not have a significantly greater impact on management students. These findings highlight the need for discipline-specific approaches to entrepreneurship development. While engineering students respond strongly to structured educational interventions, management students may benefit more from motivational strategies. This study contributes to the entrepreneurial intentions literature by extending the Theory of Planned Behaviour to incorporate disciplinary variation and offering practical insights for curriculum development in developing country contexts.

THE SHAMANISTIC AND QUANTUM WOMB OF NATURE: WILSON HARRIS'S DEPICTION OF NON-NORMATIVE CONCEPTS OF GENDER IN THE LANGUAGE OF CARNIVAL

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Wilson Harris's deliberate use of Caribbean shamanistic vestiges in his theoretical writings and fiction created an occasion that fissured the strict, binding, formulaic conventions that dominated the Anglophone Caribbean. One can argue that Harris's shamanistic perspectives of

gender punctured the traditional male/female binary within the Anglophone Caribbean. This research argues that Harris's depiction of non-normative concepts of gender, in the language of his novel Carnival, is influenced by his fusion of the pre-Columbian shamanistic womb of nature with his personal experience of quantum immediacy. In terms of theoretical undergirding, this study is guided by Manuel Aguilar-Moreno's anthropological research of pre-Columbian notions of gender, postcolonial criticism of Harris's work, and Harris's notion of quantum immediacy. The findings of this research will reveal that the pre-Columbian shamanistic womb of nature, infused with quantum immediacy, results in an original language of fiction in Carnival and serves as a formidable counter-discourse to the consolidated cisheteronormative perception of gender within the Anglophone Caribbean literary canon.

INFERENTIAL STATISTICAL ANALYSIS OF THE BIVARIATE HAJORTH MODEL AND ITS CHARACTERISTICS

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In this study, a comprehensive analysis of bivariate continuous variables is introduced, employing the bivariate Hajorth model. A novel approach is proposed that combines the Farlie-Gumbel-Morgenstern (FGM) copula with the Hajorth model. The model addresses the variation in data by using the fluctuating nature of the FGM copula along with the versatility of the Hajorth model. This aims to provide a robust solution for modelling bivariate lifespan phenomena. The contribution encompasses theoretical innovations and practical implementations. The researchers present key model functions, such as the cumulative distribution function F(z1 ,z2), the probability density function f(z1 ,z2), reliability properties and several measures of dependence. Parameters of the model are also estimated by the method of maximum likelihood and a Bayesian framework, while applying the Markov Chain Monte Carlo strategy. The classical methods utilise asymptotic and bootstrap confidence intervals, while Bayesian approaches employ the highest posterior density for interval estimation. The research further evaluates the model through model comparison and uses the Burr dataset to illustrate research findings, thereby emphasising the importance of the proposed model. This analysis will provide valuable insights into bivariate modelling and its applications in real-life data analysis.

AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN THE SOCIAL ISSUES OF CRIME, CHRONIC DISEASES AND MENTAL DEVELOPMENT OF CHILDREN AS IT RELATES TO POTABLE WATER QUALITY IN DIFFERENT GEOGRAPHIC LOCATIONS IN TRINIDAD AND TOBAGO

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This research explores the relationship between the social issues of crime, chronic

diseases and mental development of children as it relates to potable water quality in different geographic locations in Trinidad and Tobago. Recent observations indicate that key socioeconomic factors such as crime, low productivity, impaired cognitive intelligence and aggression are on the rise in Trinidad and Tobago, more so the degree of violence observed in criminal activity. Although there may be several contributors to these observations, pollution in one form or another has never been considered in the local or regional context.

In this study, the effects of water quality on socioeconomic behaviour and chronic diseases were examined. The presence of key contaminants in drinking water due to either pollution or natural sources has been found to have profound influences on health, development and by extension crime. Pollutants such as lead are well established to influence Poor IQ development, violent crimes and unwed pregnancies, and Cadmium is associated with diabetes and kidney disease. This project aims to evaluate the levels of Lead, Cadmium, Chromium, Nickel, Zinc, Arsenic and Mercury in potable water from the national distribution system, compare findings against WHO/PAHO regulations, compare metal levels with data obtained from Socioeconomic, Crime and Medical surveys and evaluate (if any), relationships between individual heavy metal content of the water samples with Socioeconomic, Crime and Medical surveys.

This research will identify possible sources of social and medical issues throughout Trinidad and present probable solutions to deal with them. Also, shortcomings of the municipal water treatment system could be identified and improvements made. Primary and secondary socioeconomic, medical and educational issues may be identified and treated.

LEVERAGING ACTUARIAL TECHNIQUES FOR SUSTAINABLE TERTIARY EDUCATION FUNDING

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This report presents a comprehensive and multidimensional strategy to achieve sustainable tertiary education funding in Trinidad and Tobago. The current Government Assistance for Tuition Expenses (GATE) programme, once a cornerstone of accessible higher education, faces mounting fiscal pressure and declining reliability due to volatile oil revenues, administrative challenges, and shifting eligibility rules. To address these concerns, the report introduces a three-pronged funding approach: (1) excise taxes on tobacco and cannabis (upon legalisation), (2) a Registered Education Savings Plan (RESP), and (3) an Income Contingent Loan (ICL) scheme. Sin taxes are modelled using robust forecasting and Monte Carlo simulations, revealing that a 30% cannabis excise tax alone could fully fund GATE and more, even under conservative assumptions. The RESP component promotes long-term savings with tax-free growth and government matching contributions, ensuring comprehensive financial support beyond tuition. The ICL dimension, based on Australia's HECS model, ties repayment to income levels, mitigating default risks and improving fiscal sustainability. Together, these innovations offer a resilient, equitable, and forward-looking financing model that balances public health, fiscal responsibility, and universal access to higher education. The strategy aligns with national goals for human capital development, economic diversification, and long-term social inclusion.

THE SMART TABLES® TRINIDAD AND TOBAGO

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The Smart Tables® is an actuarial framework for loss of earnings due to personal injury or death, for common-law jurisdictions in the developing world. This framework is expected to provide significant improvement in the calculation and assessment of damages for cases involving bodily injury and death. In several developed countries, it is common for payments on disability or death to be determined by reference to actuarially based tables, such as the Ogden Tables in the UK. The Smart Tables® are based on the principles behind the UK Ogden Tables but use indigenous demographic and economic assumptions. In most developing countries, this is not the case. Awards are often arbitrary and are not based on factors such as actuarial expectations of life. Therefore, the STT is embarking on an exercise which will require each developing jurisdiction to have its own Smart Tables.

The main outputs of The Smart Tables® include an Interest Rate Methodology which produces a "net" rate of interest to be used in determining the lump sum investment that would replace lost future. Secondly, a breakdown of the relevant Demographic Assumptions was created which details the necessity of population-specific tables, highlights the demographic differences between CARICOM and developed countries and discusses the difference between their economic systems and health systems. Finally, a Case Companion was produced wherein the calculation of loss of future earnings was illustrated, using The Smart Tables® compared to the traditionally awarded amounts.

The first jurisdiction in which The Smart Tables® will be rolled out is that of Trinidad & Tobago, for the 2025/26 Law Term. The Smart Tables Trinidad & Tobago® methodology will use the employed person mortality table as its mortality assumption.

COMPLETE POPULATION MORTALITY TABLES FOR THE EMPLOYED POPULATION OF TRINIDAD AND TOBAGO

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Reliable mortality measurement is fundamental to actuarial practice, informing insurance pricing, pension valuations, and the design of social security systems. Yet, in many developing regions, including the Caribbean Community (CARICOM), Complete Population Mortality Tables (CPMTs) remain unavailable. This limitation is particularly significant given the heterogeneity of CARICOM populations and the growing demand for evidence-based actuarial assumptions tailored to local conditions. To address this gap, we constructed the first CPMTs for Trinidad and Tobago and

Jamaica. The recently published CPMTs for Trinidad and Tobago will provide the foundation for the development of the first mortality tables for employed persons in the Caribbean, derived from administrative empirical records of the National Insurance Board of Trinidad and Tobago.

Methodologically, the study undertook a comparative evaluation of experience study frameworks, including the Society of Actuaries (SOA) experience study tool, other industry-standard platforms, and a bespoke implementation in R. This assessment provided insight into the relative advantages and limitations of each framework in data environments characterised by incompleteness and heterogeneity. Complete employed persons' mortality tables were then constructed following a detailed comparison of graduation techniques. The Whittaker-Henderson method was found to yield stable and credible estimates for males aged 25–90 and females aged 35–90, with validity supported by consistency checks against international reference tables and population-level mortality patterns for Trinidad and Tobago.

CREATING COMPLETE MORTALITY LIFE TABLES FOR CARICOM: THE CASES OF TRINIDAD & TOBAGO AND JAMAICA

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Reliable mortality measurement is fundamental to actuarial practice, informing insurance pricing, pension valuations and the design of social security systems. Yet, in many developing regions, including the Caribbean Community (CARICOM), Complete Population Mortality Tables (CPMTs) remain unavailable, with countries instead relying on abridged life tables that constrain precision and applicability. This limitation is particularly significant given the heterogeneity of CARICOM populations and the growing demand for evidence-based actuarial assumptions tailored to local conditions. To address this gap, we constructed the first CPMTs for Trinidad and Tobago and Jamaica.

Complete population mortality tables (CPMTs) provide mortality rates and life expectancies at successive integer ages starting at age 0 and ending at a sufficiently high age (e.g., age 100 years). CPMTs are important because they enable evidence-based analysis and decision-making across various government sectors. CPMTs are also important for actuaries in developing countries where credible mortality data on insured lives may be scarce.

As Trinidad and Tobago and Jamaica are two of the largest economies in CARICOM, our goal is to use their most recent existing APMTs and convert them to CPMTs. The mortality plots produced by Trinidad and Tobago and Jamaica APMTs show "accident humps" for both male and female mortality rates, which make them suitable for the Heligman–Pollard (H&P) method of expanding APMTs.

Although CARICOM countries are diverse in many ways, they are sufficiently similar that mortality tables produced for Trinidad and Tobago and for Jamaica will be more relevant to CARICOM countries than tables based on the mortality experience of developed countries such as the United States, Canada, the United Kingdom, or members of the European Union. Hence we anticipate that these tables will benefit Trinidad and Tobago and Jamaica and will be used by other CARICOM countries with minimum modifications to aid their governments' planning.

A FIT-FOR-PURPOSE LAND ADMINISTRATION MODEL TO SUPPORT INDIGENOUS LAND RIGHTS: THE CASE OF MAYA COMMUNAL LANDS IN BELIZE

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Indigenous lands are often subjected to disputes with formal State entities, which undermines both environmental governance and the human rights of indigenous peoples. The Maya people of southern Belize practice a customary system of land tenure that is rooted in the traditional practices of their ancestors and based on collective ownership, with influences from their colonial past. The boundaries of their territory have been routinely encroached upon by the State, forcing a legal battle that reached the highest appellate court – the CCJ. A landmark ruling in 2015 affirmed the Maya communal land as constitutionally protected; however, the Government of Belize has yet to operationalise this ruling. The lack of a framework for land demarcation, governance, or title registration prevents the Maya people from receiving the full benefits of the legitimisation of their land rights.

This study utilises a pilot survey done in the Toledo District of southern Belize to assess the level of tenure security experienced by occupants, their satisfaction with current governance mechanisms -particularly the alcaldes and village councils, as well as document their governance practices and willingness to support a State-driven titling and registration process. It then proposes a model to bridge the gap between the customary rights and the formal titling regime that includes a three-phase implementation roadmap featuring participatory demarcation, legislative drafting, and capacity building. The framework is adapted to the Land Administration Domain Model (LADM) ISO standard 19152 to streamline the data infrastructure.

The research concludes that the Maya lands offer more than just a governance solution; it presents an adaptable framework for how plural legal systems can coexist within a rights-based and climate-resilient land administration framework. The combination of customary land governance with global land tools can help Belize meet its legal obligations, strengthen Indigenous rights, and establish a development approach that is both inclusive and sustainable.

FROM EARTHBODY TO EARTHBABY: THE POTENTIALITIES OF ECOMAS AS A MODALITY FOR CLIMATE CHANGE ACTION IN CARIBBEAN CARNIVAL PERFORMANCE

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This practice-based exploration of climate change utilises a traditional Trinidad masquerade character, the Baby Doll, to illuminate the challenges of this global trend on the small, island developing states of the Caribbean. Using an autoethnographic approach, I examine the possibility of what I term ecoMas as a viable mitigation strategy against one of the most virile forms of environmental degradation in our region, the use of plastic bottles to distribute and sell water. By embodying the character of the Babydoll, I highlight the long trajectory of environmental abuse in this region, linking it to the capitalist colonial expansionist project beginning in the 15th century, which continues in the contemporary period. Using the theories of ecoscenography and making, I perform Babydoll on the plantation estate of Lopinot. In keeping with Jolie's (2019) assertion, I show how these embodied knowledges can work in tandem with new scientific and developmental

insights to create multiple ways of knowing and sensing that can save the environment. During my performance, I 'speak back' to the forces that benefit from the untethered use of natural resources. In reflection, I posit that the ecology of masquerade-making and performance can challenge our ingrained beliefs about progress and how we use natural resources because of its capacity to present alternative visions of a sustainable future.

BUILDING PATHWAYS FOR INTERSECTIONAL SOLIDARITY: A CRITICAL REFLECTION

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Using intersectional lenses, the research critically reflects on the processes and challenges of building intersectional scholarship and solidarity within higher education. A dialogic interview within a collaborative auto-ethnography process is used to reflect on journeys into intersectional research and the insights that are gained through this process. The researcher shares through the presentation some of the key acumen and rigidities of doing intersectional research within the region, but with specific reflections on areas related to domestic violence, educational performance, as well as academic and body identity. The research communicates through this dialogue, the possibilities for theoretical integration and contextualisation, the importance of mentoring for emerging scholars, and the implications for building pathways for solidarity within that process.

TOO AFRAID: HOW STATUS SILENCES VENEZUELAN MIGRANTS IN TRINIDAD AND TOBAGO

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This paper examines the role the status of Venezuelan migrants (asylum seekers and refugees) in Trinidad and Tobago (T&T) plays in the willingness of these migrants to share their lived experiences. The non-compliance by T&T with international obligations toward the protection of asylum seekers and refugees places Venezuelan migrants in a precarious situation due to their legal status in T&T. The consequence of the legal status results in migrants being arrested by officials for irregularly entering T&T. Socio-economic status impacts the ability of Venezuelan migrants to access safe and just employment, housing, education and healthcare. The historical sociocultural status creates attitudes of xenophobia by T&T nationals toward Venezuelan migrants. Racial and ethnic markers of status reinforce challenges of integration in T&T society. Layered over these categories of status is the intersectionality of characteristics of gender and age in the official complicity of trafficking. The totality of these consequences of status on the reality for the Venezuelan migrant in T&T undergirds the reluctance they have in sharing their stories. They are forced to hide their accent, their language, and their culture to facilitate their acceptance in T&T society. Their voice is, therefore, silenced, but their stories are told through the advocates who work with them in T&T. These advocates use their status as T&T nationals to create a safe space for the Venezuelan migrants to live in a very hostile environment.

COLONIAL CONSTITUTIONALISM IN THE ANGLOPHONE COMMONWEALTH CARIBBEAN

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The Anglophone Commonwealth Caribbean region has had quite a homogeneous colonial history. To this end, the breaking of the symbolic bonds of servitude as a people from the coloniser, through independence, reaffirmed what was to become a true, lasting legacy of colonialism. This can be seen in the very instruments that have been used to usher in an ironic separation from the past while also perpetuating a legacy of colonialism in independent nations: regional constitutions. These constitutions continue to trap nations in a time warp and serve only to demonstrate the dangerous and pervasive effects of colonialism. Moreover, it reinforces the continued presence of the British in the region well beyond the legal end of their administrative and economic ties to the region. It is the aim of this paper to explain the motivations which operated to keep colonialism alive in the constitutions of the Anglophone Commonwealth Caribbean. In engaging in this analysis, themes of metacolonialism, acculturation, nationalism, and republicanism will be used to explain the process of constitutional drafting that gives an overt deference by the once colonised nations, and eventual independent nations, to the former coloniser.

UNDERMINING THE INTERNATIONAL LEGAL ORDER: THE IMPACT OF INSTITUTIONAL WEAKNESS AND EXCLUSIONARY FOREIGN POLICY

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The creation of the new international world order was ushered in after the Second World War, which saw the allied powers defeat Germany in its attempt to achieve the Final Solution. The effect of World War II was that the pre-existing international legal system, the League of Nations, was abandoned, in large part due to its failure to prevent the global conflict. In other words, the evaluation of the success of the international legal system was predicated on the ability of the institutions and systems of that framework to create international peace and prevent war. It was envisioned that the new international legal system was to achieve the objective of global peace in a way that the League of Nations was not able to do. As such, the successor institution, the United Nations, had the goal of realising the unattained goal of the League. Consequently, if the United Nations were to be unable to secure global peace and if conflict were allowed to arise and escalate to war, then the swift action taken on the League should be meted out to the United Nations. This article will explore the impact of the foreign policy on the institutional strength of the United Nations and its impact on global peace and security. In so doing, the war on Terror, the facilitation of the Russia/Ukraine War, and the inaction in the Israel/Palestine conflict and the use of international diplomacy to achieve individual state goals will be explored. The impact will be examined with a view to determining whether the United Nations system is currently in its failed state. This is not solely due to the UN's failure to prevent conflict, but the fact that its systems are actually facilitating it. In such a situation, the utility of the United Nations in contemporary times must be evaluated in much the same way as the League of Nations' relevance and success were assessed by its failure to stop the Second World War.

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