

WHEN LUPUS MEETS PREGNANCY: NATIONAL OUTCOMES FROM AOTEAROA NEW ZEALAND



AUTHORS

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01. INTRODUCTION

Systemic lupus erythematosus (SLE) is a chronic autoimmune disease that primarily affects women of reproductive age and is associated with high-risk pregnancies, including miscarriage, preterm birth, pre-eclampsia, intrauterine growth restriction, and stillbirth.⁽¹⁾ In Aotearoa/New Zealand, national-level data on pregnancy and delivery outcomes in women with SLE are lacking, and the impact of ethnicity, disease activity and socioeconomic deprivation on outcomes remains poorly understood.

02. STUDY AIM

- Examine pregnancy & delivery outcomes in NZ women with SLE
- Identify factors: timing of SLE diagnosis, End-Stage Kidney Disease (ESKD), maternal age, ethnicity, deprivation
- Support equitable, evidence-based care

Related Literature

Existing research by our team on SLE in Aotearoa/New Zealand

- Lao C, White D, Rabindranath K, Van Dantzig P, Foxall D, Aporosa A, et al. Incidence and prevalence of systemic lupus erythematosus in New Zealand from the national administrative datasets. *Lupus*. 2023;32(8):1019-27.
- Lao C, White D, Rabindranath K, Van Dantzig P, Foxall D, Lawrenson R. Mortality and causes of death in systemic lupus erythematosus in New Zealand: a population-based study. *Rheumatology*. 2023;63(6):1560-7.

03. METHODOLOGY

Study population

1,532 women with SLE in Aotearoa/New Zealand, aged 18-45 years, from 2005-2022
Ethnicity: 289 Asian, 274 Māori, 311 Pacific, 658 European/Other
Identified via linked national datasets: National Minimum Dataset, Mortality Collection, Death Certificates

Pregnancy & Delivery Data

1,371 pregnancies and 560 deliveries in the study population from 2005-2022
Obtained from National Maternity Collection
Outcomes included: miscarriage, stillbirth, preterm birth (<37 weeks), induction of labour, mode of delivery, antenatal admissions
Timing of SLE diagnosis & ESKD recorded

Variables

Ethnicity: Asian, Māori, Pacific, European/Other
Socioeconomic deprivation: NZDep2018 quintiles
Maternal age & year of pregnancy/delivery

05. RESULTS



Delivery Outcomes

- Single live births: 96%
- Overall stillbirth: 3% (Māori stillbirth: 6%)
- Overall preterm birth: 28% (Māori preterm birth: 32%, Pacific preterm birth: 29%)
- Vaginal delivery most common: 62%; elective caesarean: 15%; emergency caesarean: 21%

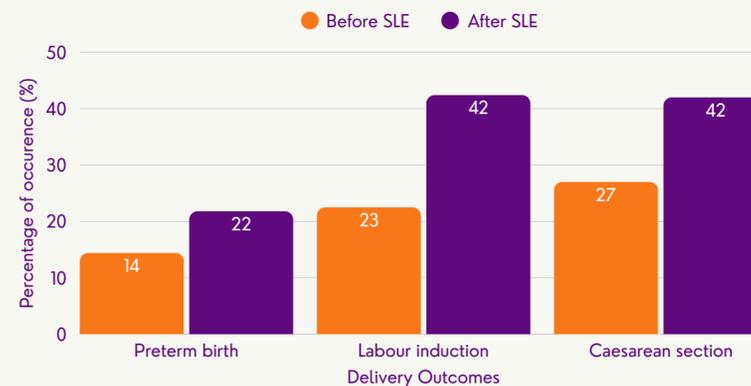
Pregnancy Outcomes

- 58.4% of pregnancies resulted in pregnancy loss
- 17.1% of women experienced ≥ 1 miscarriage
- Miscarriage prevalence varied by ethnicity, highest in Māori (22%) and lowest in Asian (11%)
- In multivariable logistic regression, miscarriage was not significantly associated with ethnicity, deprivation, or timing of SLE diagnosis, but risk increased with maternal age and ESKD.

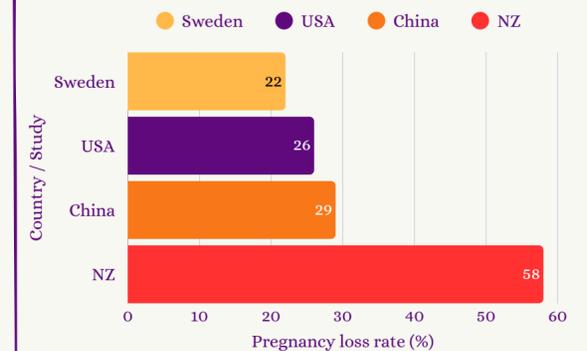
DELIVERIES
AFTER SLE
DIAGNOSIS
ARE
ASSOCIATED
WITH
POORER
OBSTETRIC
OUTCOMES



Delivery Outcomes Before vs After SLE Diagnosis



Pregnancy Loss Rates in Women with SLE: International Comparison



NZ SLE cohort shows substantially higher pregnancy loss (58.4%) than international published SLE cohorts. (2-4)

Factors Increased Miscarriage Risk in Women with SLE

Factor	Adjusted OR (95% CI)	p value
Maternal age	1.10 (1.08-1.12)	<0.001
After ESKD	2.49 (1.08-5.82)	0.032

Out of all variables investigated, only maternal age and ESKD had positive aOR with 95% CI intervals not overlapping 1, indicating a significant increase in miscarriage risk. (p<0.05)

04. ANALYSIS

- Compared categorical variables (ethnicity, deprivation, pregnancy/delivery outcomes) using chi-square tests
- Conducted multivariable logistic regression to calculate adjusted odds ratios (aOR) and 95% confidence interval (CI) for key outcomes: miscarriage, preterm birth, labour induction, and caesarean section
- Calculated overall pregnancy loss rate using: (gravida - parity) / gravida



IMPORTANT!

Observed differences are not always statistically significant; significance requires $p < 0.05$ in chi-square tests or logistic regression

06. CONCLUSION

This population-based study shows that women with SLE in Aotearoa/New Zealand face substantial pregnancy and delivery risks. Overall pregnancy loss was high ($\approx 58\%$), though most deliveries resulted in live births (96%). Advancing maternal age and ESKD were the only factors significantly associated with increased miscarriage risk. Ethnic disparities were evident, with miscarriage, preterm birth, and stillbirth more common among Māori women. These findings highlight the need for early, tailored preconception counselling, risk stratification, and coordinated multidisciplinary care to improve maternal and fetal outcomes and support equitable, evidence-based care for all women with SLE in Aotearoa/New Zealand.

Scan for
references



Me-searching for “Asian” Researchers in Aotearoa New Zealand

Paolo Aquino, Dr. Kyle Tan and Dr. Lincoln Dam | Faculty of Māori and Indigenous Studies

Aim

Develop an Aotearoa-specific **4R me-search framework** for Asian researchers.

Translate theories into **usable guiding questions** across research phases.

What assumptions am I carrying—and what will I do to keep challenging them throughout the research?

Reflexivity
Decolonis‘asian’ and ongoing self-examination

How am I racialised as “Asian” in Aotearoa—and how might my research reproduce or disrupt that?

Racialisation
Naming power and racism

4R Framework

What would Tiriti-grounded change look like in this project?

Revisioning
Imagining beyond multicultural diversity

How do I practise whakawhanaungatanga so relationships come first—and last beyond the project?

Relationality
Practising accountable relationships

Introduction

Me-search = intentional, active, and recursive process of exploring one’s positionality, worldview, ontology, and epistemology.

In Aotearoa, Asian researchers face institutional racism and racialisation such as model minority and others/foreigners.

Te Tiriti + Vision Mātauranga create obligations—**many don’t know where to begin.**

Methods

Scoping review: Aotearoa literature on Asian identity, racialisation, Māori-Asian relations.

Team synthesis: key insights → guiding questions; iteratively revised for accessibility.

Tuakana-teina kōrerō with **5 senior Asian researchers.**

Results

Produced a **4R question toolkit** for me-search in Aotearoa.

Collected **counter-stories** from Asian researchers to show praxis [not the “right answers”].

Conclusion

4R makes me-search **practical** for Asian researchers in Aotearoa.

Frames reflexivity as **ongoing**, relational, and political—not a tick-box statement.

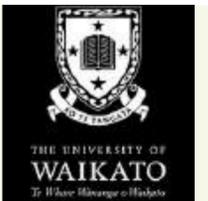
Offers a starting point to being a reflexive researcher without claiming a single blueprint.

By Lillian Balfour

Supervised by:
Kasey Kieseewetter
Andrew Barnes

REWILDING A MICROBIOME

How does urban forest restoration influence microbial communities?



INTRODUCTION

Native habitat restoration is critical for maintaining ecosystems and the services they provide, especially under increasing global change and habitat loss.

Microbiomes are an important avenue for improving restoration outcomes, given their central roles in ecosystem functioning, and human wellbeing. Despite this, the effects of restoration on microbial communities and potential human exposure to airborne microbiomes, remain largely overlooked, particularly in **urban ecosystems**.

Study Aim: to explore how urban forest restoration influences the composition and connectivity of fungal microbiomes at restored sites.

METHODS

- At 30 sites across Hamilton, New Plymouth and Tauranga we sampled the following:
- **Soil** microbiomes by collecting 12 soil cores, homogenized within the site.
- **Air** microbiomes (aerobiomes) by setting out 4 petri dishes 1m above soil for 24 hours.
- **Vegetation** and **soil properties** include pH, average soil temp (°C), carbon:nitrogen ratio (CM), organic matter (OM), tree richness, and seedling richness.
- **DNA** was extracted in the lab and sent to Auckland Genomics for ITS amplicon sequencing to classify fungal communities.
- DNA reads were processed in QIIME2. Statistical analysis was done in R studio.



RESULTS

- Only 11% of fungal taxa were present in both communities, indicating the aerobiome was not a subset of the soil community.
- Higher **soil** fungi diversity was significantly associated with warmer soils (est= 0.14, $p < 0.001$), while lower soil fungi diversity was significantly associated with more soil OM (Fig.1b, est= -0.255, $p < 0.001$) and with less herbaceous ground cover. (est = -0.13, $p = 0.001$).
- Lower **aerobiome** fungal diversity were significantly associated with lower tree species richness (Fig.1a, est= -0.29, $p = 0.07$), but increased with higher seedling richness (est= -0.20, $p < 0.02$)

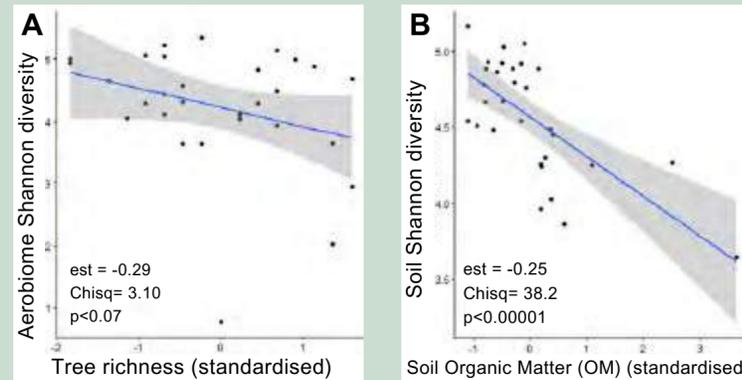


Figure 1, relationship between aerobiome fungi Shannon diversity and tree richness (a), Soil fungi Shannon Diversity and soil organic matter (OM) (b).

DISCUSSION

We found that the fungal aerobiome was a distinct community from the soil microbiome in restored sites, and the two biomes responded very differently to the same key environmental factors (Fig. 1 & 2).

Soil conditions significantly influenced the soil microbiome, but not to the aerobiome. However, fungal diversity of both biomes were significantly predicted by vegetation richness and structure (Fig. 2). As plants bridge the soil-air interface and shape both habitats, this was expected.

Fungal microbiomes are understood to be shaped by extremely small scale changes, so the different responses of our two microbiomes could explain why there was so little DNA overlap between them.

CONCLUSION

Microbiomes need to be considered as part of the goal of ecological restoration as a highly sensitive yet crucial component of ecosystem functioning. This is especially important to urban green spaces where restoration can influence the microbiomes that humans are exposed to. Their diversity might also be associated of key forest establishment indicators like rich seedling succession and changes in forest floor ground cover, although more research on plant-soil feedbacks is needed.

NEXT STEPS

- A high degree of variation was **unexplained** by our models. Further research is needed to better understand microbiomes and the that factors we did not measure, like stochasticity, temporal and spatial change, and restoration progress.
- In this project, leaf litter microbiomes in the soil-air interface will be analysed to explore the importance of vegetation, and explore the DNA overlap.
- Extend testing to bacterial communities

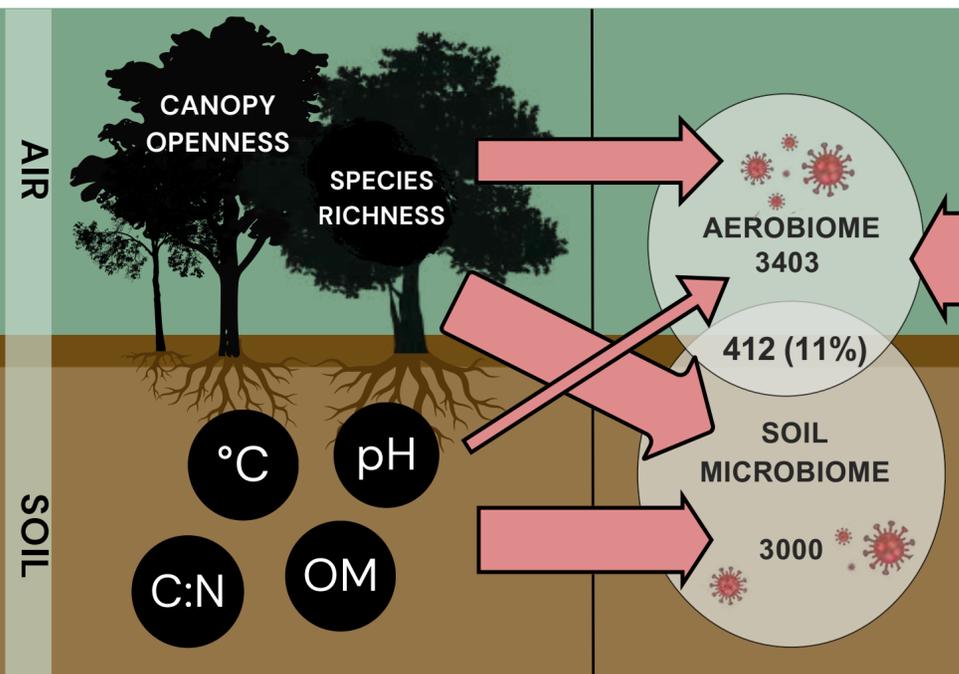


Figure 2, Local environment drivers of variation in soil and aerobiome fungal communities. Source and strength of effect indicated by arrow width.

Background

- There are many advantages in utilizing flow chemistry, for example, the pressure can be increased easily therefore the boiling point of the solvent increases (1).
- As a result the overall temperature that the reaction experiences can be increased without the concern of boiling off the solvent (1). Lower boiling point solvents can also be utilized with elevated temperatures (2).
- It is difficult to apply pressure to the reaction via the batch method.
- The increased surface area to volume ratio means that heat flux is more efficient which allows for better reaction control.
- A decreased reactor volume can be achieved which means that mixing processes are more rapid (1).
- Overall flow chemistry provides efficiency and control over the reaction whilst the batch method does not.

Aim

- Optimize the reaction (fig. 2) using the batch method so the requirements for the flow method are met and challenges can be addressed.
- To achieve the synthesis of the desired product (fig. 2) via the flow method.

Batch method apparatus

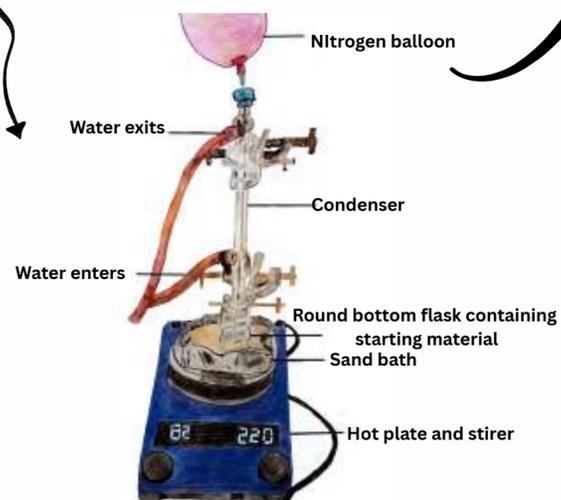


Figure 1: Labelled batch method apparatus

Flow chemistry- an alternative method for synthesis?

Stella Beard, Supervised by: Benjamin Dickson
Te Aka Matuatua - School of Science

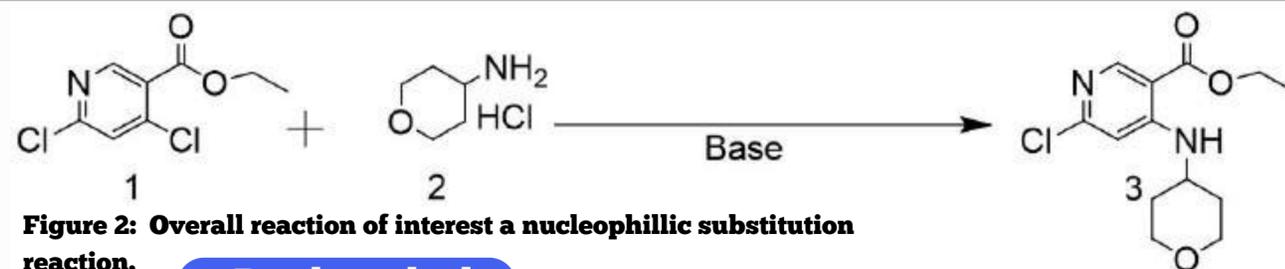


Figure 2: Overall reaction of interest a nucleophilic substitution reaction.

Batch method

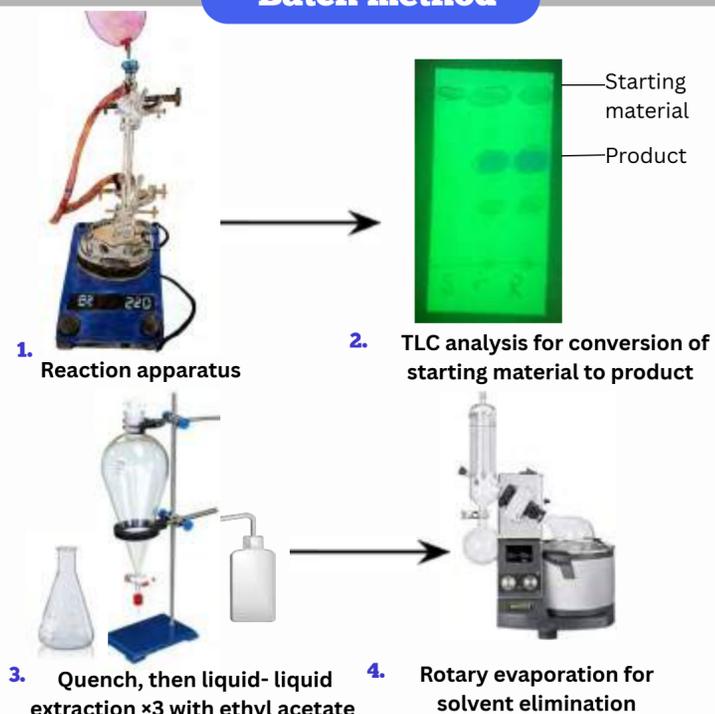


Figure 3: Batch method including TLC analysis and work up steps

Flow method

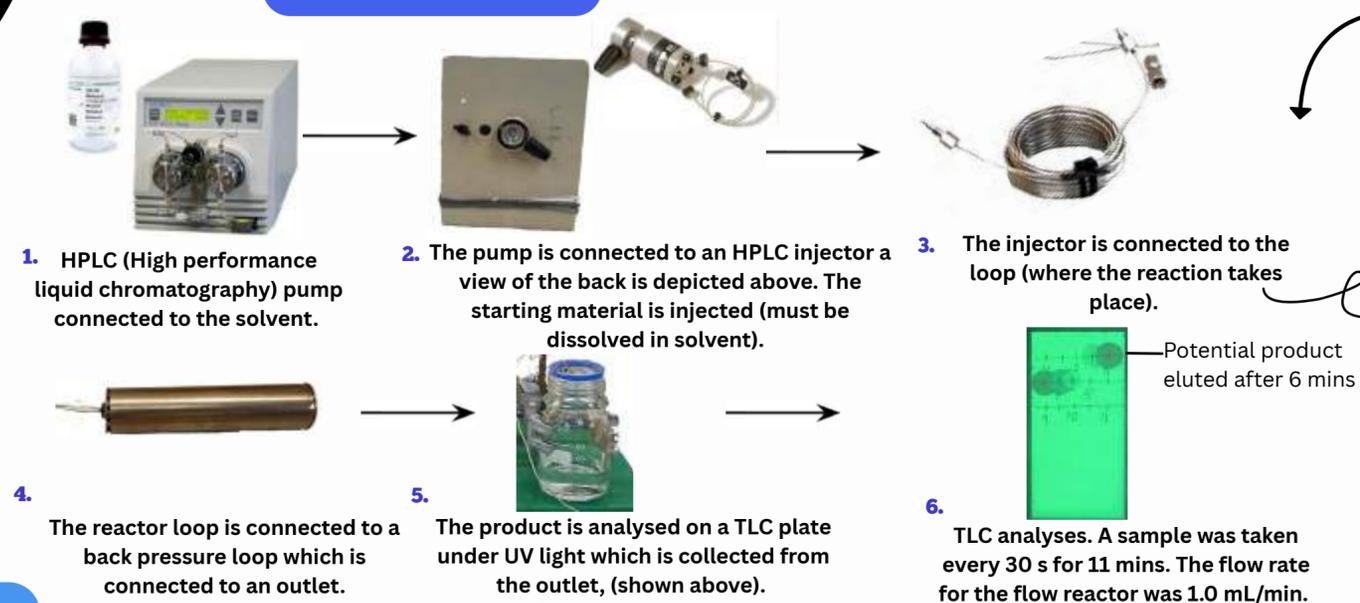


Figure 5: Components involved in the flow method including a TLC plate demonstrating the retention time of the potential product eluted.

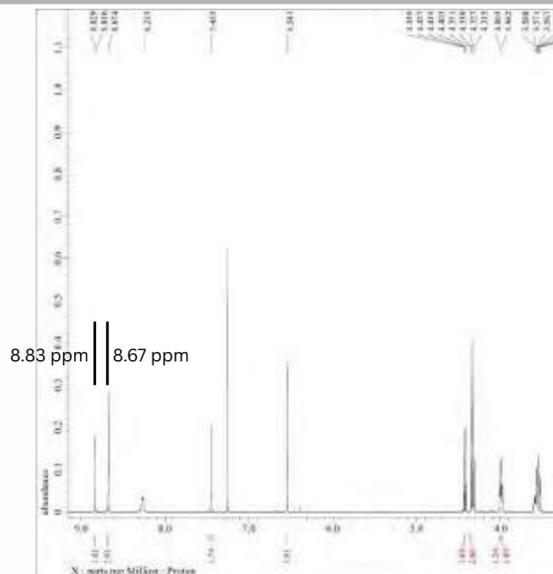


Figure 4: Excerpt from reaction 1 (stand. proc.) results: ¹H NMR spectrum.

- Peak at 8.83 ppm represents starting material represents 0.44 protons.
- Peak at 8.67 ppm represents product (1 proton).
- Overall a 2:1 ratio of product: Starting material.

Batch method Results

Table 1: Summary table of batch method reactions for optimization of the reaction (fig. 2)

Note: standard procedure: Acetonitrile (MeCN) (solvent) triethylamine (base), 24 hrs at 82 °C. Ratio: 2:1 product: starting material (61% yield).

Variable (s) changed from stand. Proc.		Product: starting material ratio from ¹ H NMR results and yield
Solvent at boiling point	Ethyl acetate (77.1 °C)	13:86 (12%)
	Tetrahydrofuran (THF) (66 °C)	1:5 (18%)
	Dimethyl formamide (DMF) (120 °C not at boiling point)	56:44 (55.2%)
Temperature	120 °C (pressure vessel)	89:11 (>100%)
	R.T	13:87 (0.01%)
Time	48 hrs	49.5:50.5 (63%)
	5.5 hrs	1:5 (14.7%)
Base	Pyridine	(<1%)
	Diisopropylethyl amine (DIPEA)	8:2 (75%)
Base and time	DIPEA and 48 hrs	68:32 (80%)
Solvent and temp.	1:4 DMF:MeCN 120 °C	75:25 (>100%)

Flow method steps

1. Assemble the flow method apparatus. ✓
2. Check for leaks, reajust or reassemble as needed. ✓
3. Characterise reactor properties and time how long it takes for purified product to reach the outlet. ✓
4. Dissolve starting material in solvent and perform a reaction using the flow method. ✓
5. Further develop and optimize the flow method.
6. Try the flow method on other reactions.

References

- (1) Plutschack, M. B.; Pieber, B.; Gilmore, K.; Seeberger, P. H. The Hitchhiker's Guide to Flow Chemistry. *Chem. Rev.* 2017, 117 (18), 11796–11893. <https://doi.org/10.1021/acs.chemrev.7b00183>
- (2) Mallik, C. J.; MacCreanor, N. G.; Legg, D. H.; Stewart, C. R.; Coppock, S.; Ashworth, I. W.; Le Bars, J.; Clarke, A.; Clemens, G.; Fisk, H.; Benson, H.; Oke, S.; Churchill, T.; Hoyle, M.; Timms, L.; Vora, K.; Sims, M.; Knight, S. Development and Manufacture of a Curtius Rearrangement Using Continuous Flow towards the Large-Scale Manufacture of AZD7648. *Org. Process Res. Dev.* 2022, 26 (12), 3312–3322. <https://doi.org/10.1021/acs.oprd.2c00316>

KUTU CATCHER OR HEALTH PROFESSIONAL?

Research by: KELLY G. BERENTSON-TARATOA

Supervised by: Dr. Samantha Heath, Lara Wall, Dr. Jesse Whitehead, Dr. Brent Wagner

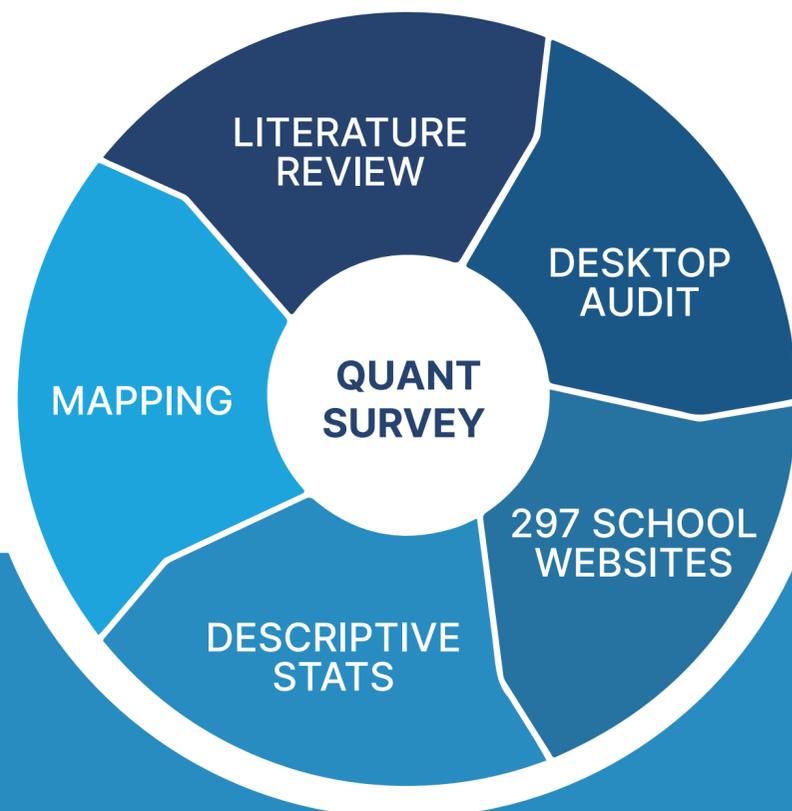
BACKGROUND

Access to good health and education are basic human rights, yet in Aotearoa New Zealand, **the health of children and rangatahi is dire.**^{1,3} School Based Health Services (SBHS) provide timely and accessible healthcare, advancing equity and removing barriers to educational attainment.² The provision of school nurses has expanded, however for the initiative to flourish, an understanding of teachers' and parents' perceptions is pivotal.⁴

AIM

1. To review teachers' and parents' perceptions of SBHS and the role of the school nurse.
2. To describe how SBHS are provisioned across the Waikato Region.

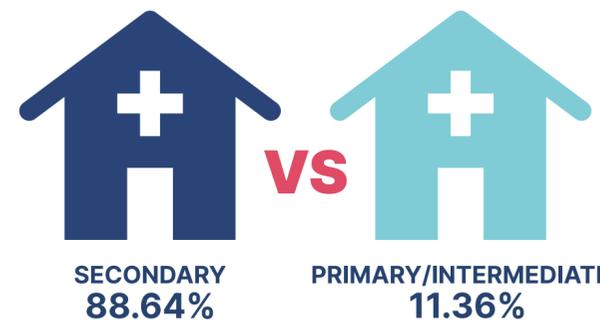
METHOD



RESULTS



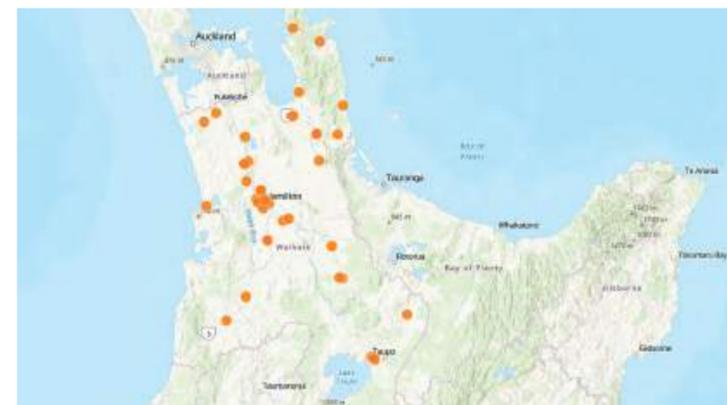
14.81% OF SCHOOLS HAVE SBHS



OF SBHS PER EQUITY INDEX



SBHS MAP



CONCLUSION

A small proportion of schools in the Waikato region have access to SBHS. The lack of provision to younger children especially, means many are limited to healthcare. While SBHS are more frequently provisioned to disadvantaged communities, the provision does not equate for the underserved.

POIPOIA TE KĀKANO, KIA PUĀWAI
Nurture the seed and it will blossom

There is a bidirectional relationship between health and education.² School nurses have the potential to alleviate the social determinants of health and keep children and rangatahi in school.⁴

To enhance the integration of SBHS, future research should explore local perceptions.

REFERENCES

1. Cure Kids. (2024). *State of Child Health in Aotearoa New Zealand*. https://www.curekids.org.nz/our-research/state-of-child-health?trk=public_post_comment-text
2. World Health Organization, & UNESCO. (2021). *WHO guideline on school health services*. World Health Organization. <https://www.who.int/publications/i/item/9789240029392>
3. United Nations Human Rights Office of the High Commissioner. (1989, November 20). *Convention on the Rights of the Child*. United Nations. <https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child>
4. Te Whatu Ora. (2022). *Formative evaluation report: School Based Health Services*. Malatest International.



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Background

Endometriosis is a chronic gynaecological disease which affects a significant percentage of women of reproductive age. It is associated with considerable physical, psychological, and socioeconomic burden. Despite its prevalence, diagnosis is frequently delayed, with many patients experiencing prolonged symptoms before receiving appropriate specialist assessment and treatment. Primary healthcare settings play a key role in the early diagnosis, investigation, and referral of individuals with suspected endometriosis. However, variability in referral pathways and clinical decision making may contribute to diagnostic delays. This study reviews current referral pathways and identify factors associated with diagnostic delays for endometriosis within primary healthcare settings.

Aim

To evaluate referral pathways for suspected endometriosis in primary healthcare settings and investigate the impact of referral delays to diagnosis and access to appropriate treatment.

Objectives

- Identify current referral pathways for individuals with suspected endometriosis in primary care.
- Assess the duration and extent of diagnostic delays.
- Examine how delays in referral from GPs to specialist influence a patients diagnosis.
- The impact of referral delays on access to appropriate treatment and specialist care.
- Identify potential areas for improvement within primary care referral processes.

Methods

Participants (n = 10–12) were recruited through an established connection with Insight Endometriosis. Interviews were than guided by a semi-structured interview schedule and conducted at a location chosen by the participant. Participants were encouraged to speak freely about their experiences of referral pathways, diagnostic delays, and clinical management of endometriosis which enable in-depth insight of patient perspectives.

All interviews were audio-recorded, transcribed, and analysed using thematic analysis to identify key patterns and emerging themes.

Results

Average Diagnostic Delay: 4–6 years

Key Themes from Participant perspective:

1. **Prolonged Waiting Times:** “Sitting in a waiting room with no information.” which led to impacts on education, work, and mental health.
2. **Limited Symptom Relief:** Medications often ineffective or caused side effects, adding to health burden.
3. **Declined Referrals:** Some participants’ referrals to gynaecology were declined, particularly due to their age.
4. **Gaps in GP Knowledge:** Delays in initiating investigations such as ultrasound or MRI.
5. **Medical Dismissal:** Participants reported being dismissed or not feeling heard.

Discussion & Conclusion

Prolonged diagnostic delays were common, with participants waiting several years before receiving an endometriosis diagnosis.

Limited early investigation in primary care, inconsistent guidelines use, and limited GP knowledge contributed significantly to delays. **Medical dismissal** particularly for younger participants was a prominent theme, with symptoms frequently minimised or normalised, reducing trust and delaying help.

Inconsistent and unclear referral pathways from primary care to gynaecology services created uncertainty and extended waiting periods. **Poor communication** during referral waits left participants feeling uninformed and alone, negatively affecting mental health, education, and employment. Early and appropriate investigations, including timely imaging, were identified as essential to improving access to diagnosis and treatment.

Overall, findings reinforce the need for:

- earlier recognition of endometriosis in primary care
- improved GP education and diagnostic confidence
- clearer, standardised referral processes
- stronger patient centred communication

Addressing these areas has the potential to reduce diagnostic timelines, improve patient wellbeing, and lessen the long-term healthcare burden.

Introduction

Smart kitchen technology is the future.

BUT the real question are:

- Do consumers actually want it?
- What makes it valuable?



Consumers seem unsure. Early signals suggest a split.

Current research centers on systems that:

- Manage inventory
- Improve efficiency and comfort
- Reduce energy waste

This research aims to measure NZ consumer's sentiment, a gap in current research.

Poster Title



Kitchen of tomorrow TODAY!



Hi, I'm Spoony!

This kitchen is an almost exact replica of one in Tauranga.

Every piece of tech here already exists, or will in the next five years!

Research

User study plans.

A user study is being conducted.

Participants run through scenarios that we have built in the kitchen to the right.

Afterward they do a Likert-type survey. This gathers data on consumer sentiment.

Example scenario:

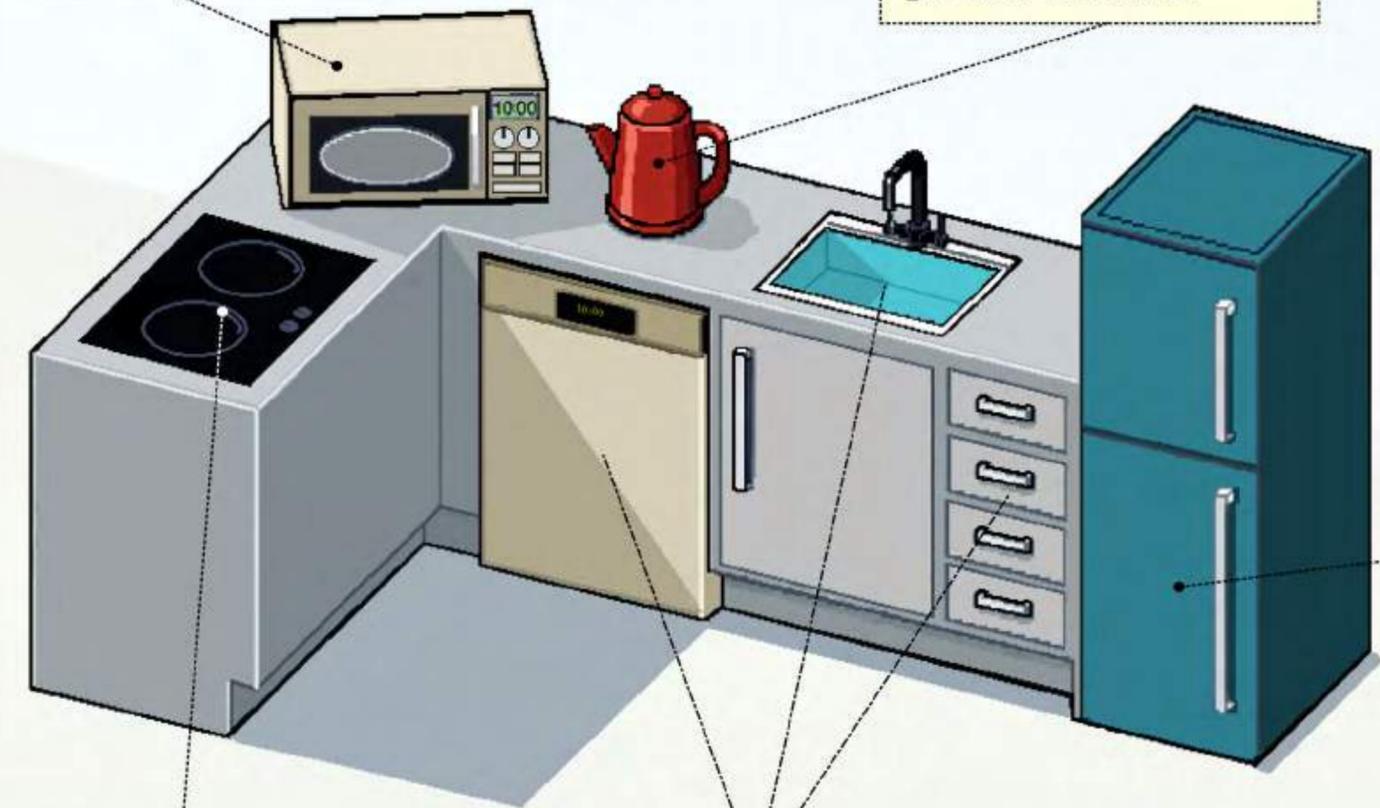


Kitchen layout

Smart microwaves have auto cook options, eliminating Google searches asking:
"How long mince & cheese pie microwave"

Smart kettles can be remote controlled. Automation means your morning coffee can be boiled before you get out of the shower.

Smart fridges allow for tracking of food quality and quantity. AI recipe suggestions, means less asking:
"What's for dinner?"



Smart cookstops eliminate the worry of burning food and provide a smoother cooking experience using automated temperature regulation.

Sensors connect to Smart Hubs allowing for endless possibilities of local data collection. Sensor that:

- Detect water leaks
- Detect movement
- Sense light levels

Wairua

Intertweaving
 Undefinable
 Metaphysical
 Cosmological
 Healing
 Uncontrollable
 Spiritual Beliefs & Practices
 Foundational
 Essential
 Motivation
 Purpose, Meaning, Mātauranga
 Personal
 Protective, Balance
 Matakite
 Mauri

Atua
 Whakapapa
 Tikanga, Tohunga, Tūpuna
 Guiding
 Creativity, Embodied life
 Cultural Identity
 Mana
 Spiritual Essence
 Intuition
 Tapu
 dreams
 Connection to: Te Taiao, Tipuna, Whakapapa, Places, Marae
 Multidimensional, Crossing Realms
 ETERNAL

WHAT IS WAIRUA TO YOU?

You may have answered “spirituality” as this is often the glossary definition or you may have found it hard to articulate. Regardless of how you experience it - Wairua is widely accepted as fundamental & vital to your health and wellbeing.

As part of the wider ‘Spiritual Care in Healthcare’ research, the aim is to expand our understanding of what Wairua is and how it is experienced so it can be identified and nurtured in Hauora (healthcare) settings in meaningful ways.

RESEARCH OUTPUTS:

Narrative Review:

Māori Health Models - understandings of Wairua

Narrative Review:

Academic Hauora Literature

Systematic Review:

Scoping and Eligibility for Search term “Wairua*” from Scopus articles N=538

NARRATIVE REVIEW METHOD:

- 01 Review Process**
Scoping Literature, Planning, Identification, Screening and Eligibility
- 02 Thematic Analysis**
Reflective and Interpretive Coding
- 03 Theme Development**
Pattern Identification, Refinement, Definition and Naming

THEMES

ANCESTRAL WISDOM

Knowledge rooted in tikanga, tūpuna and mātauranga

HEALING

Protective, guiding and central to wellbeing

MAORI COSMOLOGY

Origin from & connection to Atua, Io, Hawaiki & the Spiritual Universe

EVERYDAY PRACTICE

Ceremony, creativity and embodied life

UNDEFINABLE

Concept broad, personal, intertwined with other concepts

FOUNDATIONAL

Fundamental to Life, identity, wellness and being Maori

RELATIONAL

Interconnectedness and present in all things ‘living’ and non ‘living’

MULTIDIMENSIONAL

Mobile and capable of crossing realms, space and time

CONCLUSION

The literature positions Wairua as a fundamental, relational, and multidimensional force central to Māori life, identity, and wellbeing. While resisting definitive definition, Wairua consistently underpins health, healing, connection, and meaning.

These findings affirm Wairua as both philosophically profound and practically essential to holistic wellbeing. Broadening understandings of Wairua may support more inclusive, culturally grounded ways of articulating, accessing, and nurturing this essential dimension of health.

By: Kelly Campin

Supervisors: Ahorangi Waikaremoana Waitoki & Dr Raima Hippolite



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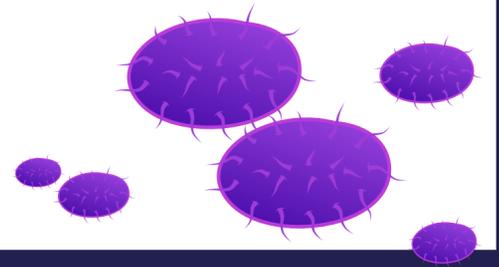


Te Pua Wānanga ki Te Ao

Taonga: Unenuku
 (Te Awamutu muesum)



Classifying Antarctic bacteria

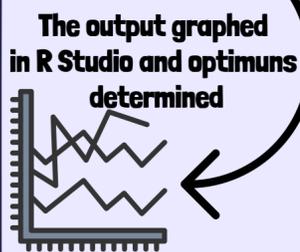
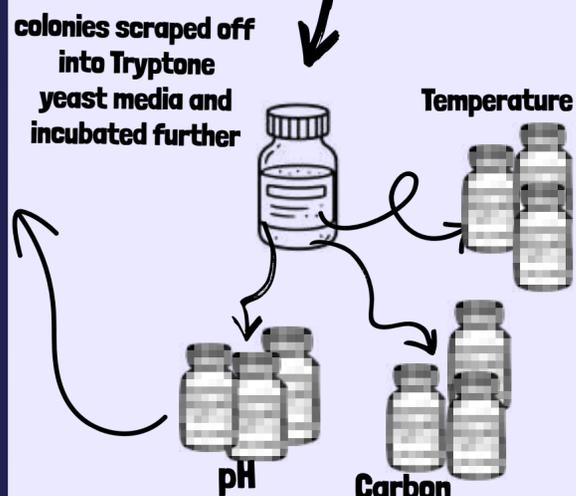
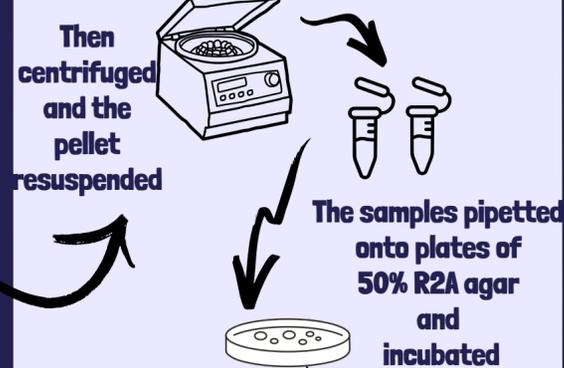
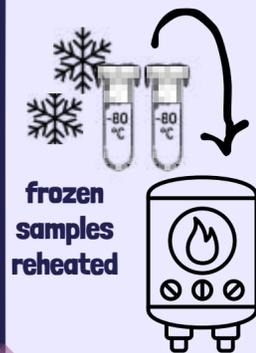


Introduction

Mt Erebus is the world's southernmost active volcano. It hosts geothermally heated soils that can sustain microbial life despite the extreme hostility of the environment^{1,2}.

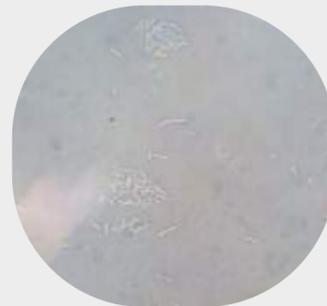
Culturing of two thermophilic bacteria, *Calidithermus Sp. Yb* and *Thermus Sp. SS11024-3* gives an insight into survival strategies and the possible origin of these bacteria. These experiments aimed to determine the optimum temperature, NaCl tolerance, pH, and carbon sources, and explore the question of how these novel species differ from those already characterized.

Methods

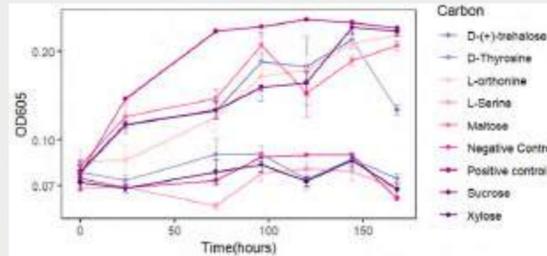


Results

Calidithermus Sp. Yb



- *Calidithermus sp.Yb* form nonmotile rod-shaped cells of variable length
- The cells stain Gram-negative and form yellow pigmented colonies.
- slightly thermophilic with optimum growth at 55 °C and a growth range of 35 °C to 60 °C.
- The optimal pH for growth is between 8 and 8.5, with growth ranging from pH 6 to 10



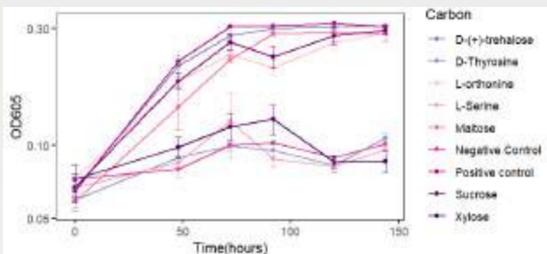
- NaCl optimum growth occurs at 0%, with a range of growth from 0-1.5%.

This graph shows some of the carbon sources tested

Thermus Sp. SS11024-3



- *Thermus Sp. SS11024-3* form nonmotile rod-shaped cells of variable lengths.
- The cells stain Gram-negative and form dark yellow/orange pigmented colonies.
- They are thermophilic with optimum growth at 65 °C and a growth range of 50 to 70 °C.



This graph shows some of the carbon sources tested

Discussion

Compared to other species *Calidithermus Sp. Yb* fits into the expected temperature and physiological characteristics. It does have the highest tolerance for NaCl and the largest range for pH growth bar *Calidithermus timidus*⁴

The same goes for *Thermus Sp. SS11024-3*, which shows remarkable similarity to other species in the genus *Thermus*³

the remarkable similarity of these bacteria to the others found in the genera poses an interesting question about convergent thermophilic traits

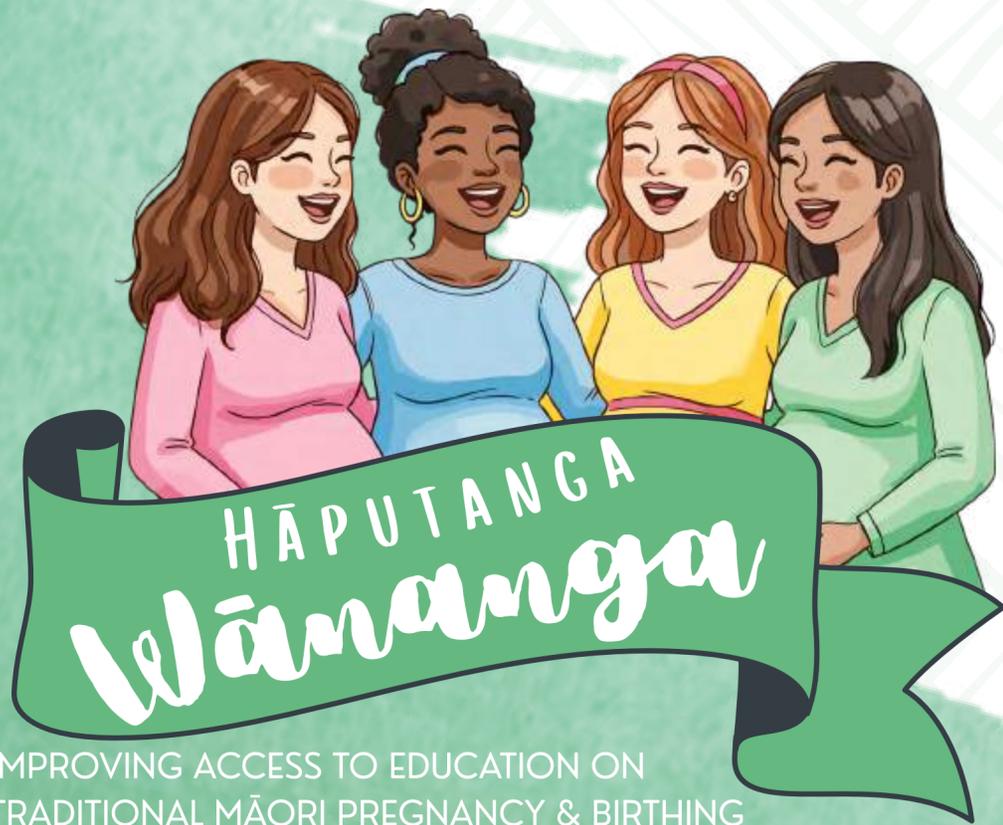
Future directions

- Exploring more of these bacteria's characteristics, such as possible nitrogen sources
- Looking at survival tests to explore the possible cosmopolitan dispersal hypothesis. which would include testing the bacteria's tolerance to repeated UV exposure, desiccation, freezing and starvation

References

- (1) Rasmussen, T. B.; Noell, S. E.; Herbold, C. W.; Dickie, I. A.; Richards-Babbage, R.; Stott, M. B.; Cary, S. C.; McDonald, I. R. Geothermal Ecosystems on Mt. Erebus, Antarctica, Support Diverse and Taxonomically Novel Biota. *Microbiology* June 7, 2024. <https://doi.org/10.1101/2024.06.06.597832>.
- (2) Noell, S. E.; Baptista, M. S.; Smith, E.; McDonald, I. R.; Lee, C. K.; Stott, M. B.; Amend, J. P.; Cary, S. C. Unique Geothermal Chemistry Shapes Microbial Communities on Mt. Erebus, Antarctica. *Front. Microbiol.* 2022, 13, 836943. <https://doi.org/10.3389/fmicb.2022.836943>.
- (3) Brock, T. D.; Freeze, H. *Thermus Aquaticus* Gen. n. and Sp. n., a Nonsporulating Extreme Thermophile. *J Bacteriol* 1969, 98 (1), 289-297. <https://doi.org/10.1128/jb.98.1.289-297.1969>.
- (4) Albuquerque, L.; Egas, C. *Calidithermus*. In *Bergey's Manual of Systematics of Archaea and Bacteria*; Trujillo, M. E., Dedysh, S., Delfos, P., Hedlund, B., Kämpfer, P., Rainey, F. A., Whitman, W. B., Eds.; Wiley, 2023; pp 1-11.

Poster and experiments by Manon Cano-Prasad, Supervised by Dr Stephen Noell, and special thanks to Dr Ian MacDonald



IMPROVING ACCESS TO EDUCATION ON TRADITIONAL MĀORI PREGNANCY & BIRTHING PRACTICES IN MODERN MIDWIFERY CARE.

INTRODUCTION

Research reveals significant disparities in antenatal care engagement, which impacts perinatal outcomes for Māori. Current statistics show inequities in the health and well-being of whānau.

OBJECTIVES

- To collaboratively develop "Find Your Wānanga": A national, interactive online database of traditional Māori pregnancy and birthing education.
- To bridge the gap: Facilitate a partnership between traditional knowledge holders (Hāputanga Wānanga providers) and modern midwifery care.
- To empower Whānau: Provide a centralised resource for rongoā (medicine), karakia (prayer), and whare tangata (womb) concepts.

METHODOLOGY:

Our "Project Tapestry" involved:

- Equitable Partnerships: Working alongside Māori whānau, providers, and midwives from day one.
- Co-Design: Ensuring the database is not just a tool, but a culturally safe space designed by Māori for Māori.

THE "FIND YOUR WĀNANGA" DATABASE

What will it do?

- Searchable Access: Allows whānau to find local wānanga based on region.
- Cultural Connection: Provides information on traditional practices often missing from mainstream antenatal classes.
- Provider Portal: Allows Hāputanga Wānanga providers to update their own availability and offerings.
- Peer Support: Links whānau to kuia, kaumātua, and Kaupapa Māori midwives.

IMPACT: WHY IT MATTERS

- Engagement: Culturally relevant education increases attendance in antenatal care. "Māori whānau report a desire for more traditional knowledge (rongoā, karakia) in their care."
- Equity: Directly addresses the statistically low attendance rates of priority groups. Recent survey data showed only 31% of Māori and 20% of Pacifica attended hapū wānanga/antenatal classes.
- Well-being: Reduces birth anxiety by grounding the experience in cultural heritage and intergenerational knowledge.

CONCLUSION

- The Find Your Wānanga project represents a critical shift toward health equity by prioritising Māori-led solutions. By combining Community-Based Participatory Research (CBPR) with modern digital accessibility, this initiative does more than list services; it reclaims the space for traditional birthing wisdom within the modern midwifery framework.
- Ultimately, this database serves as a digital bridge, connecting whānau to their heritage, midwives to local experts, and communities to the resources they need for a safe, culturally grounded transition into parenthood.



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

Author: Kimberley Caradus
Supervisors: April Irwin, Talei Jackson and Anna Latu
Te Wānanga Waiora - The Division of Health - The School of Midwifery

References:

- Curtis, E., et al. (2024) Te Kahui Hauora o te Tau Ihu. Health Profile Vol 2.
- Israel, B. A., et al. (2005). Community-based participatory research: Assessing the evidence. Health Education & Behavior.
- Te Whatu Ora (2022). Report on Maternity: Live-born babies dataset 2022.
- Research New Zealand (2023). New Zealanders' Experiences and Perceptions of the Maternity and Perinatal System 2022: A Summary Report.

Acknowledgments: The foundational shared contributions of Monique Brown, Christine Rangī and Ngaio Prince.



Te Puna Haumaru
Security and Crime Science
THE UNIVERSITY OF WAIKATO

How is Technology Used to Facilitated Harm Towards Current and Former Intimate Partners?

1. Introduction

- Across studies, an estimated 47% of participants reported experiencing technology-facilitated harm (TFH) from a current or former intimate partner in the past year¹.
- However, there is limited research investigating the different ways technology is used to cause harm².
- Therefore, we aimed to understand how technology is used to facilitate harm towards current and former intimate partners.

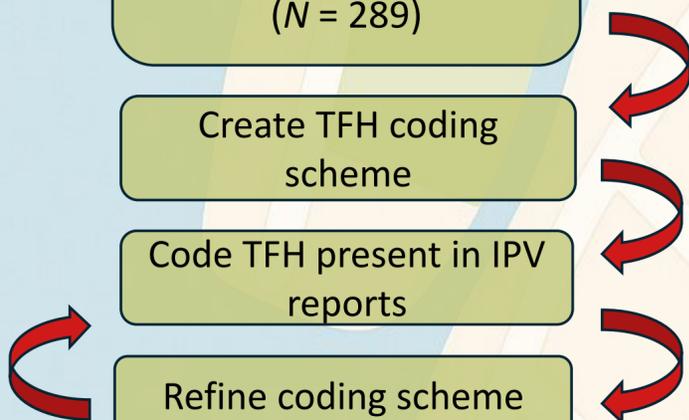
2. Method

Collect New Zealand Police intimate partner violence (IPV) (N = 289)

Create TFH coding scheme

Code TFH present in IPV reports

Refine coding scheme



20.4%



% of reports involved TFH

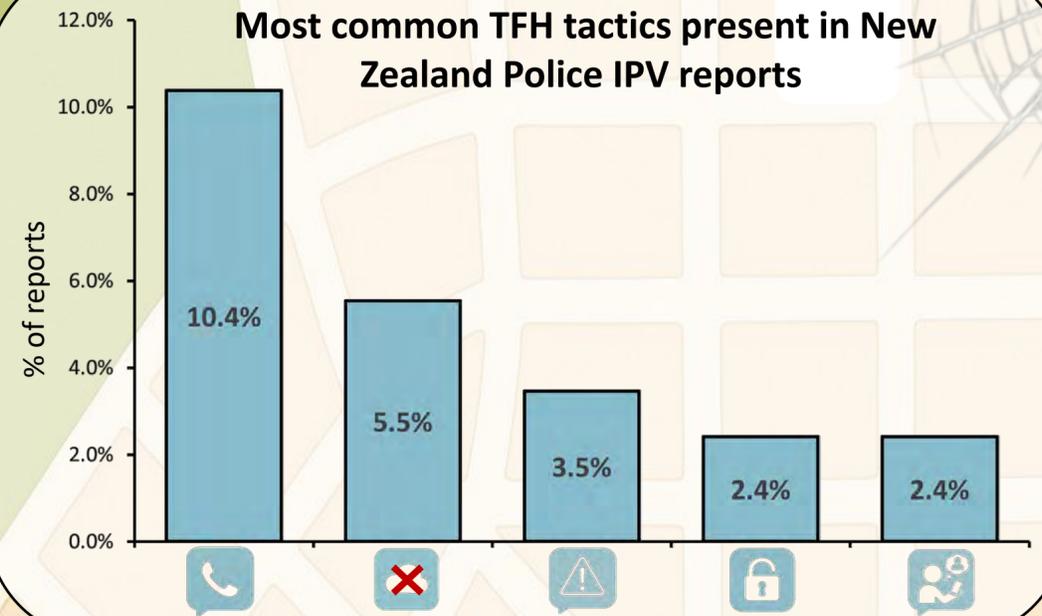
11



of TFH tactics identified

3. Results

Most common TFH tactics present in New Zealand Police IPV reports



Key and examples



Unwanted cyber contact
Casey would not stop calling Riley



Hacking
Casey accessed Riley's email without permission



Removing technology
Casey hid Riley's phone



Contacting others about victim
Casey texted Riley's friend asking where Jane was



Threats of harm via technology
Casey threatened to hurt Riley via text

4. Discussion

Summary:

- Most cases involving TFH featured a subset of frequently used tactics, with less common tactics appearing in a minority of cases.
- Results provide insight into how technology is used to facilitate harm towards current and former intimate partners.

Next steps:

- Investigate common themes in the methods and motivations underlying TFH towards current and former intimate partners.

References



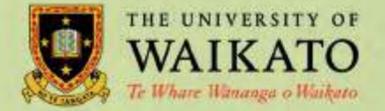
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Adult ADHD in Aotearoa New Zealand: Inequities, Access Barriers, and Unheard Experiences

Hannah Cleaver-Marshall | Prof. Belinda Wheaton

Acknowledgments

A special thanks to:
Belinda Wheaton (Supervisor)
Kate Reynolds (Academic Librarian)
University of Waikato



Why this matters...

ADHD has lifelong impacts on health, education, employment, and wellbeing, yet many adults were overlooked or misdiagnosed in childhood. There is increasing recognition of adult ADHD globally. Research shows that timely diagnosis and appropriate care can substantially improve outcomes across the life course.

Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is increasingly recognised as a **lifelong neurotype**¹; however, research and diagnostic frameworks remain shaped by childhood focused models. As a result, adult ADHD is **under-researched**, with little attention given to adult functional outcomes or **lived experience**.

In Aotearoa New Zealand, evidence relating to adult ADHD prevalence, diagnosis and support pathways is limited, and clinical practice often relies on international models that may not reflect our **unique social and cultural landscape**.

Emerging research suggests **inequities** in access to diagnosis and care disproportionately affect **Māori, Pacific peoples** and other **marginalised communities**, highlighting the need for further research grounded in an Aotearoa specific context².

Objective

The objective of this review was to **map the extent and nature of research** on adult ADHD in Aotearoa New Zealand.

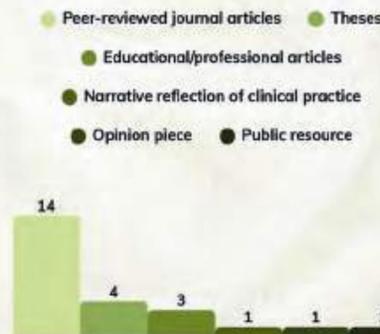
The review focused on evidence relating to prevalence, impacts, service engagement, and inequities. Attention was given to marginalised groups identified in international literature; **Indigenous communities, minority ethnic communities, women, and LGBTQIA+** individuals.

By synthesising existing research, this review aimed to map dominant themes, highlight **inequities** and identify **critical gaps** in our Aotearoa knowledge base.

“No studies could be found that solely communicated ADHD-related experiences of adults with ADHD in Aotearoa New Zealand².”
Murray, 2021

Results

Distribution of included records by publication type (n = 24)

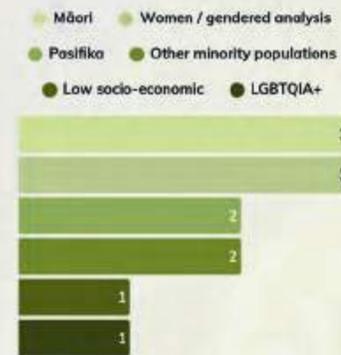


Coverage Across Key Domains

- 0 studies addressed NZ prevalence rates of adult ADHD
- 20 examined functional and psychosocial impacts of adult ADHD
- 14 addressed service engagement or access to care
- 15 included discussion of inequities related to adult ADHD



Studies explicitly centering the experiences of specific populations



Note: Number of included studies that explicitly centered the lived experiences of specific populations, rather than reporting demographic characteristics alone.

Key Gaps

- Absence of adult-specific prevalence data
- Minimal Indigenous-led or Kaupapa Māori research
- Limited centering of lived experience perspectives
- Sparse attention to **intersectional identities**
- Limited examination of systemic and structural barriers
- Reliance on **international frameworks**

“It is clear that our current health system is failing to meet reasonable expectations for those with ADHD⁴.”
Lillis, 2024

Discussion

This scoping review set out to map the extent and nature of research on adult ADHD in Aotearoa New Zealand with a focus on **prevalence, impacts, service engagement, and inequities**, with particular attention to **marginalised populations**.

The findings demonstrate only 24 sources (peer-reviewed, higher-degree theses and other grey literature) have been published between 2005 and 2016, confirming the lack of research on adult ADHD in New Zealand. Only 6 of these sources focused on the identified marginalised groups that were our focus.

Adult ADHD research in Aotearoa is limited and relatively recent, indicating a **developing area of research**. The **absence** of Aotearoa-specific prevalence data is a key factor in limiting understanding of adult ADHD in New Zealand. Research continues to use international prevalence estimates and diagnostic frameworks, raising questions about **accuracy**, and **cultural/contextual fit**.

Attention to the lived experiences of adults with ADHD was limited, particularly those from marginalised groups. Additionally Kaupapa Māori perspectives were largely absent from peer-reviewed literature. While barriers to accessing care (such as cost and availability) were discussed, they were rarely examined within broader systemic or structural contexts.

“Access to ADHD assessment is dependent on either privilege or crisis⁵.”
Tuisaula-Cruise, 2023

Methodology

Register → Search → Screen → Chart → Synthesise
(transparent, reproducible workflow)

Scoping reviews are commonly used in health research to map the breadth and nature of evidence, particularly in emerging or under-researched fields³.

- 01 Scoping Review Protocol**
 - JBI scoping review methodology (**best practice** for mapping evidence)
 - PRISMA-ScR reporting (**transparency & reproducibility**)
 - A priori protocol registered with Open Science Framework (**reduce bias**)
 - Iterative refinements (feasibility, documented)
- 02 Information Sources**
 - Selected relevant electronic databases (while minimising duplication)
 - Targeted grey literature (capture **under-represented evidence**)
 - Librarian-informed search strategy (search quality)
 - Reference list checking (reduce missed studies)

- 03 Screening**
 - Determine and test search-strings informed by research objectives and PCC framework
 - Systematic screening using **best practice** protocol
 - EndNote (full-text management)
 - Single reviewer (time & resource constraints)

- 04 Data Charting**
 - JBI-informed data extraction (consistency)

- 05 Synthesis**
 - Descriptive + thematic synthesis (**patterns, inequities, gaps**)

P	Adults (18+) with diagnosed, self-identified, or suspected ADHD
C	Prevalence · impacts · service engagement · equity
C	Aotearoa NZ (health, education, justice, social systems) · 2005 - 2026

Population-Concept-Context (PCC) is a framework used in scoping reviews to define inclusion criteria by specifying who is studied, what is examined, and the setting or context of interest.

Future Directions

1. The findings of this scoping review will be written up as a peer-reviewed journal article, led by my supervisor **Belinda Wheaton**. This publication will extend the preliminary mapping presented here through deeper synthesis and analysis.
2. This review will inform Wheaton's **ongoing research** examining ADHD inequities in Aotearoa New Zealand, including a **Health Research Council** grant proposal currently under review titled *Closing the ADHD Care Gap: Evidence, Equity and System Reform*.
3. During the research we collaborated with a summer scholar at the University of Auckland working with **Stephanie D'Souza** on ADHD public sector knowledge and support pathways. Our intention to continue this collaboration.
4. This body of research will inform policy and practice, including Government initiatives to improve access to ADHD diagnosis and medication. Our research is supported by **ADHD New Zealand**, a key stakeholder in this process.

Conclusion

Adult **ADHD research** in Aotearoa New Zealand remains limited and recent, with **significant gaps** in prevalence data, lived experience, and equity focused discussions. This review provides a **foundation** for future **Aotearoa-specific** research that addresses ADHD inequities and outcomes.

References

Full reference list available via QR code



Embodied Carbon & Smart Stormwater Networks

Introduction

Stormwater networks contain large amounts of embodied carbon due to the extensive use of concrete pipes and associated structures. Pipe diameter is a key driver of embodied carbon, with relatively small increases in size resulting in disproportionately higher emissions [1]. Climate change is expected to increase rainfall intensity and peak flows, placing pressure on existing networks and encouraging pipe upsizing under conventional design approaches [2][3]. Smart stormwater systems incorporating storage and controlled flow could reduce peak demands, reducing pipe upgrades while maintaining hydraulic performance and limiting additional embodied carbon.

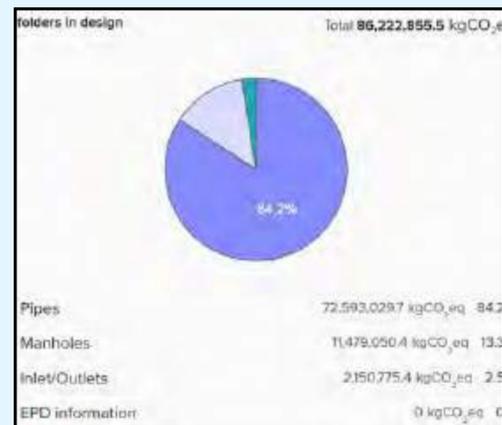


Figure 1. Embodied carbon in Tauranga City's stormwater network by infrastructure type (Moata Carbon Portal).

Objective

The aim of this project is to evaluate how actively controlled stormwater storage, compared with passive storage, can reduce peak flows in urban catchments and limit the need for pipe capacity upgrades, thereby minimising additional embodied carbon in the stormwater network.

References

- [1] Moore, T. L. C., & Hunt, W. F. (2013). Predicting the carbon footprint of urban stormwater infrastructure. *Ecological Engineering*, 58, 44–51. <https://doi.org/10.1016/j.ecoleng.2013.06.021>
- [2] Kirk, B., Roseen, R. M., & Etnier, C. (2006, January). The Big Picture—Evaluating Stormwater BMPs Through the Life Cycle Lens. ResearchGate. https://www.researchgate.net/publication/241764350_The_Big_Picture_-_Evaluating_Stormwater_BMPs_Through_the_Life_Cycle_Lens
- [3] Mohammed, S., Gormley, M., & Kelly, D. A. (2025). Environmental Impact of Building Drainage Systems: Analysis of Embodied Carbon Emissions in Terms of Code-Based Design. *Sustainability*, 17(18), 8207. <https://doi.org/10.3390/su17188207>

Methodology

The embodied carbon of Tauranga's stormwater network was estimated using the Moata Carbon Portal based on asset data for pipes, manholes, and inlets/outlets. Storm rainfall events were simulated in HEC-HMS and applied to a transparent Excel "white-box" model to define orifice sizes and passive and actively controlled storage behaviour. These rainfall events and control parameters were then modelled in ICM, where passive storage tanks ranging from 1,000L to 10,000L were simulated. Multiple rainfall events were tested, with analysis focused on a 10-year baseline event derived from 2005 storm data.

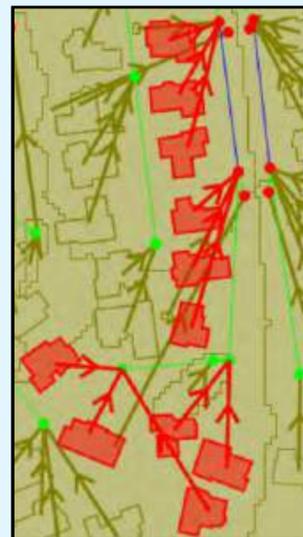
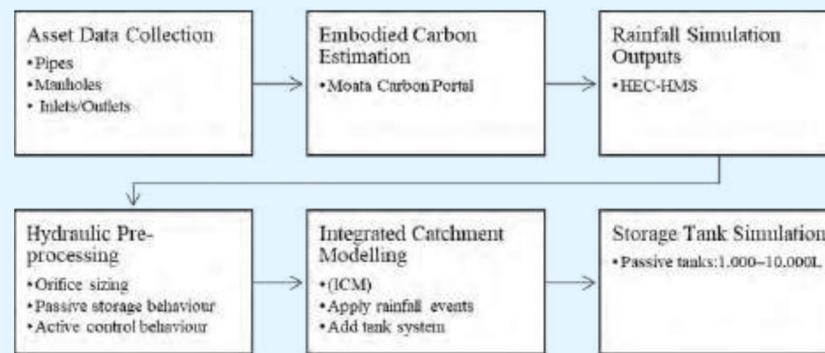


Figure 2. Map of household selection and capacity map (InfoWorks ICM)



Figure 3. Passive tank layout (InfoWorks ICM)

Results

Hydrographs were extracted from ICM for the stormwater conduit identified as the blue link in Figure 2 as it is operating at or above capacity under the baseline scenario. The base model (no storage tanks) produced a peak upstream flow of 1847.08 m³ and downstream flow of 1846.56 m³.

Introducing passive storage tanks reduced peak flows progressively as tank volume increased as seen in Figure 4. A 1,000 L tank reduced peak flows marginally, while 2,000 L and 5,000 L tanks produced increasingly noticeable attenuation. The largest passive tank tested (10,000 L) reduced peak flows to 1799.45 m³ upstream and 1798.83 m³ downstream, representing the greatest reduction achieved through passive storage alone.

Despite these reductions, the conduit remained at or over capacity for all passive tank configurations under the 10-year design storm. This indicates that while passive storage can attenuate peak flows, it is insufficient on its own to resolve surcharging at capacity-limited pipes, highlighting the need for actively controlled storage to further manage peak flows and redistribute hydraulic demand.

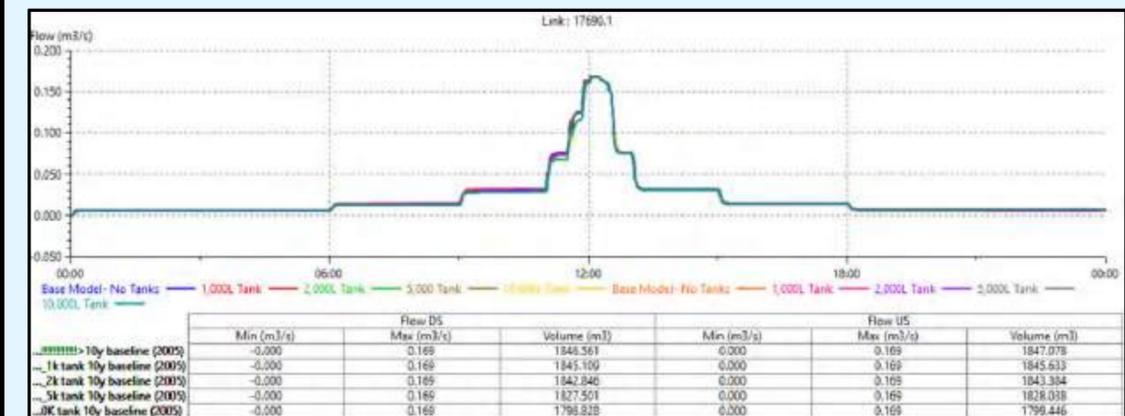


Figure 4. Hydrograph of flow over time for the over-capacity pipe identified in Figure 2 under different scenarios (InfoWorks ICM).

Conclusion

Passive rainwater tanks, while straightforward to implement, engages flow at all times which limits their ability to reduce peak flows during critical rainfall periods. Their effectiveness is therefore highly dependent on outlet configuration and can be constrained under design storm conditions. In contrast, active systems allow storage to be retained during peak events and released more strategically, offering greater potential to alleviate downstream surcharging.

Design: Jade Cox

Supervisors: Ed Clayton, Kim de Graaf

Acknowledgements: Thank you to the University of Waikato Summer Research Program, Tauranga City Council, Thomas Nikkel, Masaya Yoshikai

Mapping the literature on insect hydrocarbons

By Goldie Crawford, supervised by Dr Chrissie Painting and Lucy Southwell-Hambly

Introduction

Cuticular hydrocarbons (CHC) are lipids found on an insect's exoskeleton. They act as a waterproof layer, preventing desiccation. CHC's also allow insects to communicate with each other¹. Insects can alter their CHC composition for better waterproofing², but this might affect their ability to communicate. Understanding this trade-off is becoming increasingly important in a changing climate.



Scope

This systematic review looks at trends in insect CHC research, specifically it aims to identify patterns and bias in research interest and geographic origin. Highlighting where research effort has been concentrated and where key gaps remain provides direction for future research to focus on.

Method

Stage 1: Identification

Rayyan, a literature management software was used³. All relevant peer reviewed articles were retrieved based on key search terms.

Stage 2: Abstract screening

Abstracts were read by two reviewers and included if they met the criteria.

Stage 3: Full text screening

The full texts were read by two reviewers, and articles that met the criteria were included in the systematic review.

Conclusions

The abstract screening reduced the volume of articles from 3572 to 1420 and allowed us to map out key trends in the research. The next steps will be to complete the full text screening and a synthesis of the current literature. Preliminary results show Hymenoptera (ants, bees, and wasps) was the most common taxonomic group for CHC research. This might be because this group contains eusocial species, which have complex chemical communication (Fig 1). Most studies originated in the Northern Hemisphere, indicating a potential avenue for further research on Southern Hemisphere species (Fig 2).

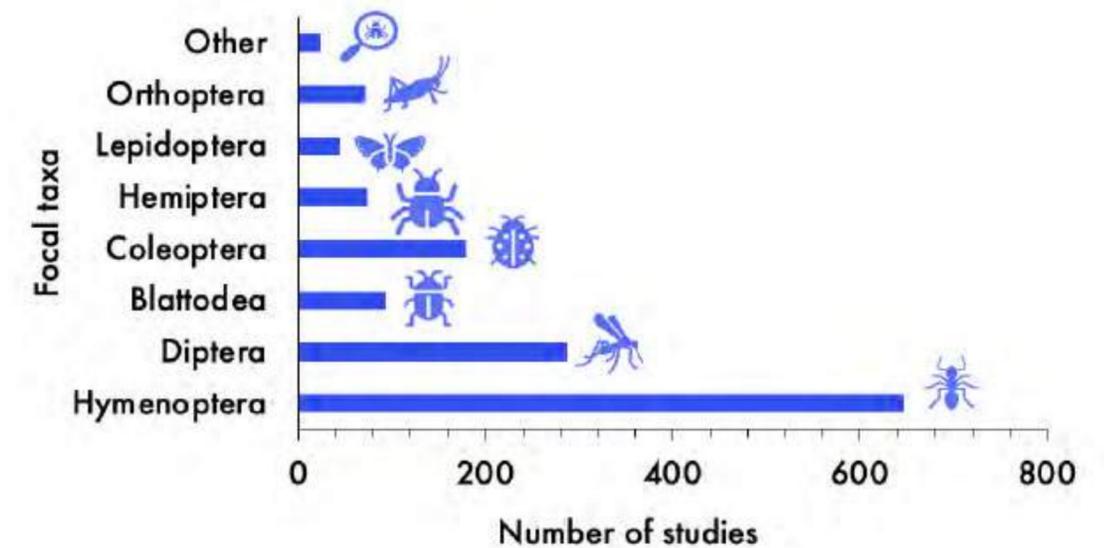


Figure 1. Number of studies conducted on each taxonomic group

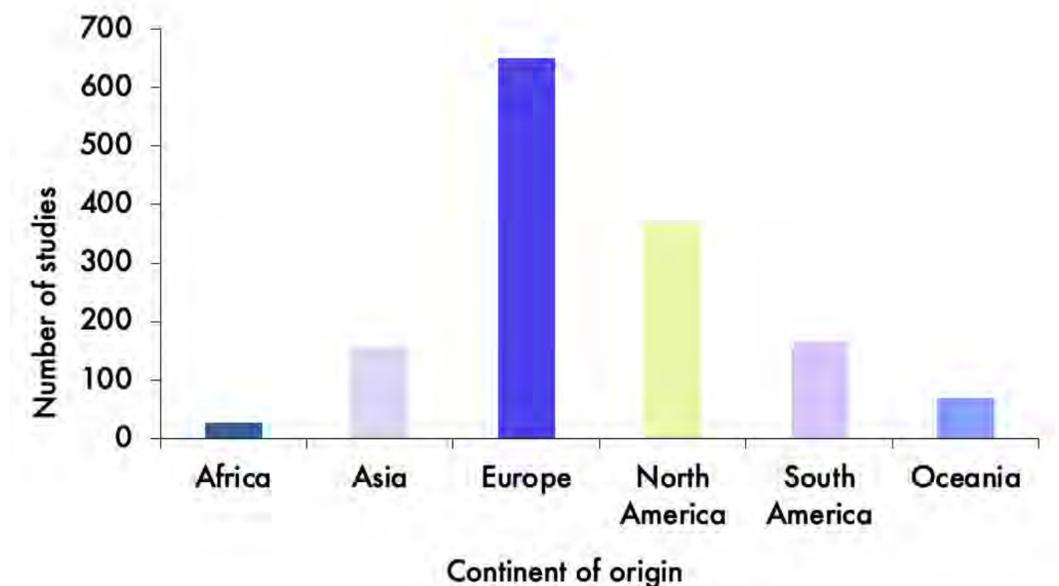


Figure 2. Number of studies conducted on each continent

References

1. Blomquist, G. J. & Bagnères, A.-G. *Insect Hydrocarbons: Biology, Biochemistry, and Chemical Ecology*. (Cambridge University Press, 2010).
2. Boullis, A., Detrain, C., Francis, F. & Verheggen, F. J. Will climate change affect insect pheromonal communication? *Current opinion in Insect Science* **17**, 87-91 (2016).
3. Rayyan. (n.d.). *Rayyan systematic review software*. <https://www.rayyan.ai>



Molly Crawford

Dr. Kelly Glubb-Smith

Prof. Mere Berryman

Dr. Nigel Calder

Dr. Taylor Pennell

BACKGROUND

Māori continue to experience significant barriers to health outcomes when compared to non-Māori (Ministry of Health, 2025). This research builds on a sticker prompt study to improve recognition of Māori Tamariki in the Tauranga Hospital Paediatric Service (Pennell et al., 2024). The sticker prompt research concluded that most paediatric ward staff struggled with creating a culturally safe environment due to time constraints. This further research explores paediatric staff perceptions of their ability to provide innovation in culturally responsive care across Tauranga and Whakatāne hospitals.

ASPIRATION

- Utilising te reo Māori
- Prioritising whanaungatanga with patient and whānau
- More Māori health professionals

EMERGING FINDINGS

Analysis is ongoing, the following themes reflect preliminary patterns identified across survey and qualitative data.

- Participants display a strong commitment to culturally responsive care.
- A values–practice gap is evident with 79.5% of participants rating culturally responsive care as extremely important (10/10), while confidence in delivering this care was lower ($M = 7/10$).
- Te reo Māori was positioned as a key mechanism for culturally responsive practice and collegial support as a comforting safety net.

METHODS

- Qualitative research utilising Qualtrics survey containing open-ended questions and Likert-type rating scales.
- Participants were staff working at either Tauranga or Whakatāne in both paediatric and neonatal inpatient wards and outpatients.
- 48 survey responses were collected from a diverse range of professionals.
- Constructivist grounded theory utilised during data analysis.

REALITY

- Hard to prioritise whanaungatanga over medical needs
- Ongoing staff burnout
- Most cultural learning occurs informally or inconsistently

OBSTACLE

- Limited resources
- High unmet need generating workload and time pressures
- Dominant western medical model

CONCLUSION

- Whānau-centred inter-disciplinary care was perceived to improve communication, trust, and continuity of care.
- Semi-structured focus group interviews will be conducted with staff across both hospitals; utilising questions designed to explore staff experiences in greater depth and achieve theoretical saturation.
- The research team are planning on conducting a final stage of this research to hear directly from whānau 1-month post-discharge to better understand lived experiences of culturally responsive care.

REFERENCES

- Ministry of Health. (2025). *Issues and opportunities for Māori health* (Report No. H2025061163). <https://www.health.govt.nz/system/files/2025-07/H2025061163%20Issues%20and%20opportunities%20for%20Maori%20Health.pdf>
- Pennell, T., Calder, N., & Glubb-Smith, K. J. (2024). *A quality improvement approach to improving recognition of Māori tamariki (children) and assessing barriers to culturally responsive care in a paediatric ward setting*. *Child: Care, Health and Development*, 50(1). <https://doi.org/10.1111/cch.13176>

**Sticker design gifted from Te Pare o Toi and represents a mangopare (hammerhead shark)

UNDERSTANDING MALE MIDWIVES EXPERIENCES FOR A CULTURALLY RESPONSIVE FUTURE IN AOTEAROA NEW ZEALAND

Exploring the Journey of Male Midwives in Aotearoa New Zealand

Author: Victoria Donoghue
Supervisors: Talei Jackson & Anna Latu



Te Wananga Waiora - The Division of Health
School of Midwifery

Introduction

The term “Midwife” comes from old English meaning “with women”. It has historically been associated as a space cherished by women for women as a profession. Though male presence has been woven in and out of the history over the centuries it has been almost exclusively a female profession. There has been a recent global shift in males entering the profession albeit in miniscule numbers (1). In Aotearoa New Zealand there are only 8 male midwives out of a total of 3469 midwives practising in 2025 (2). The history of training males in this country is as recent as 2017 making this a potential area of growth for the future workforce.



Methodology

A literature review was conducted to survey the latest evidence. Using the research question “**What are male midwives experiences for a culturally responsive future in Aotearoa New Zealand?**” the primary search included databases MEDLINE, EBSCO & CINAHL. A secondary search was compiled via google scholar. Aggregation and amalgamation of the research was compiled in a thematic analysis (4)

Thematic Analysis

- 01 Workforce:** Male midwives are exceptionally rare. Statistics show that the male midwifery workforce in NZ = 0.2 %, United Kingdom = 0.3% Australia = 1.5%, South Africa = 10%. Some countries ban males and other countries do not legislate against but have none (1)
- 02 Motivations for joining the profession:** Lived experience; history of midwives in the family, workplace experiences (particularly in nursing and paramedicine).
- 03 Facilitators:** Supportive relationships from peers, clinical educators, academics & own family/friends. Training initiatives specifically recruiting & supporting males. Mentoring both at student and professional level. Visibility of male academics. Connectedness to other minority groups within the profession.
- 04 Barriers:** No visibility either in academic institutions or workforce. Historically and often assumed “women’s space” looked after by women. Perceptions of both health professionals & public. Consent both as a student and qualified midwife can be challenging at times. Declined consent to male midwives are complex and often multifactorial (1,3).
- 05 Use of term “Midwife”:** Misunderstanding & confusion is often encountered by both the public & health professionals as to how to refer to male midwives. Males often have to explain the meaning and this can bring heightened negative attention as a minority group within the profession. Other used descriptors within the research include “Midhusband”, “Midman” & “Accoucher” (French term meaning “to assist in birth” and commonly used in South Africa).

Research Reflections

- Very little research on this complex topic , none specific to Aotearoa New Zealand
- Research on male midwives tends to focus on birthing space; there is potential to investigate ante and post natal care. The birthing space appears to be the most challenging area to navigate in terms of intimate cares. Cultural and religious reasons are one part of this.
- Male midwives often report having to have higher standards than female counterparts.
- Further understanding required of role academic institutions and midwifery council in recruitment of males and fostering support in professional journey.
- Clinical and interpersonal skills supersedes lens of gender.
- Profession has ability to empower and advocate for male midwives.
- Exploration of other male minority professions such as male pelvic health physiotherapist could provide insightful parallels.
- Increasing the incidence of male midwives serves to provide a more diverse workforce and address shortages within the workforce.

Recommendations

- Qualitative research proposal to interview New Zealand registered male midwives using the thematic analysis to structure questions.
- Recommendations to academic institutions and workplaces to increase the visibility of male midwives as a career choice. Draw on learnings of initiatives from other countries such as India to recruit males to create more equity (5).
- Peer support and mentoring for male students and midwives.

References

1. Pendleton, J. (2024). *Men Working as Midwives: An Interpretative Phenomenological Analysis*. https://pure.northampton.ac.uk/ws/portalfiles/portal/72613100/Pendleton_John_2024_Men_Working_as_Midwives_An_Interpretative_Phenomenological_Analysis.pdf
2. Te Tatua o te Whare Kahu Midwifery Council. (2025, 14th August). *2025 Workforce Survey*. <https://midwiferycouncil.health.nz/common/Uploaded%20files/Workforce%20surveys/Midwifery%20Workforces%20Survey%202025.pdf>
3. Alhassan, R.A.H., Bauman, S., Fapohunda, A., Tiah, J.A.Y., Laari, T.T., Narbey, L., Niemczyk, N.A., Bam, V. & Anto-Ocrah (2025). *Men as Midwifery Professionals: A Scoping Review*. *Birth*, 52(3) 363–526. <https://doi.org/10.1111/bir.12894>
4. Aveyard, H. (2014). *Doing a literature review in health and social care: a practical guide* (3rd edition). Open University Press.
5. United Nations Population Fund (2025, 5th May). *Men in Pink: A New Era of Maternal Care in Rajasthan*. <https://india.unfpa.org/en/news/men-pink-new-era-maternal-care-rajasthan>

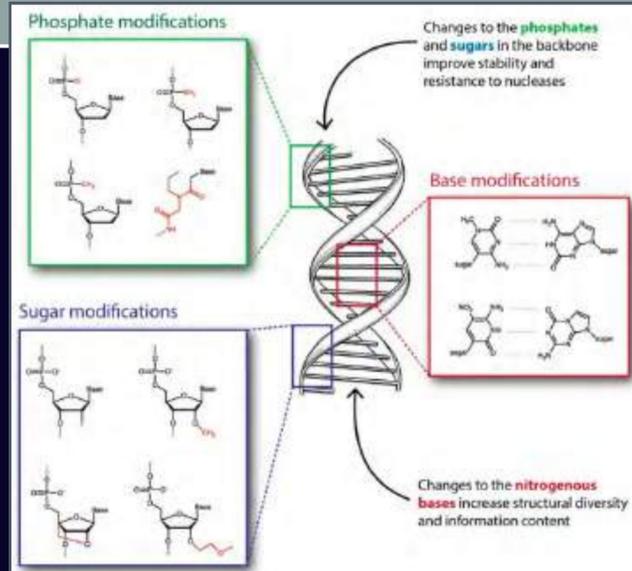
THE ENZYME THAT HOLDS IT ALL TOGETHER: ALTERING DNA LIGASE TO EXPAND THE SYNTHETIC DNA TOOLBOX

01. AIM

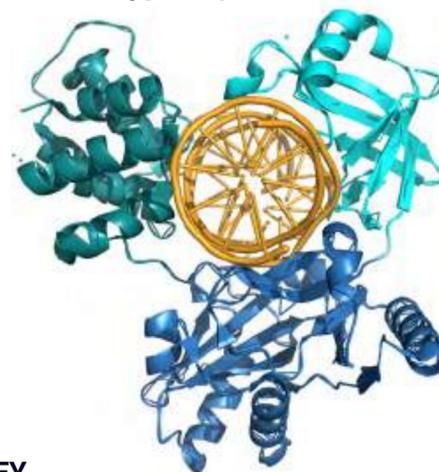
This project aims to redesign a natural DNA ligase to work with synthetic forms of DNA, known as xenobiotic nucleic acids (XNA). By mutating the DNA ligase to recognise and join XNAs, this work expands the molecular biology toolbox for future advances in synthetic technology.

02. INTRODUCTION

- **DNA Ligase:** an enzyme that joins two strands of DNA together at the sugar-phosphate backbone, making a continuous fragment.
- **XNAs:** synthetic and similar to DNA but with a chemically modified sugar-phosphate backbone.
- **Activity:** Natural DNA ligases often exhibit poor activity with XNAs; modifying ligases could enhance efficiency.¹



Wildtype Ligase Structure

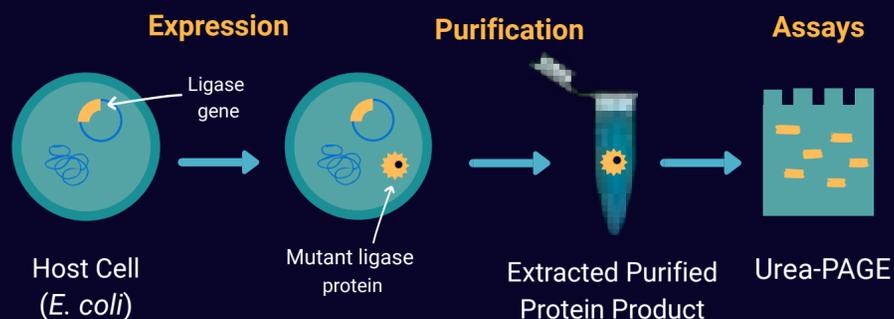


KEY

- DB:** Accessory DNA-binding domain
- OB:** Oligonucleotide binding domain
- NTase:** Nucleotidyl transferase domain
- DNA:** Double-stranded DNA

- **Expression:** Chemical induction of *E. coli* cells produces the protein of interest (Mutant DNA ligase).
- **Purification:** Isolation of the mutant DNA ligase from other cellular components.
- **Assays:** Using denaturing urea polyacrylamide gel electrophoresis (Urea-PAGE) to assess the activity of each mutant DNA ligase to join XNA pairs.²

03. METHODOLOGY



References

1. Walters-Freke, C., Hoshika, S., Benner, S. A., Dobson, R. C. J., Richards, N. G. J., & Williamson, A. (n.d.). DNA Ligases Discriminate Between Natural and Non-Natural Base Pairs.
2. Overview of Protein Expression Systems—NZ. (n.d.). Retrieved December 18, 2025, from <https://www.thermofisher.com/au/en/home/life-science/protein-biology/protein-biology-learning-center/protein-biology-resource-library/pierce-protein-methods/overview-protein-expression-systems.html>

04. EXPRESSION & PURIFICATION RESULTS

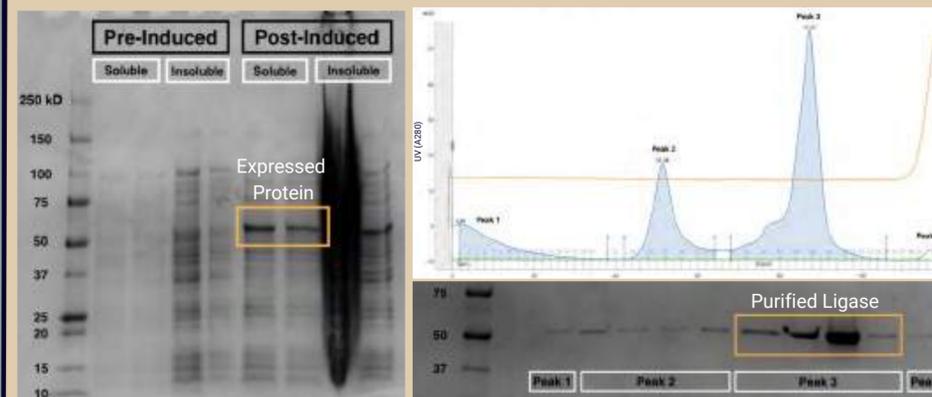


Figure 1. SDS-PAGE analysis of ligase mutant 6 expression in *E. coli*. Figure 2. Size exclusion chromatogram & SDS-PAGE analysis of ligase mutant 6.

- **Expression:** Pre- and post-induction cultures of ligase mutant 6 were analysed by SDS-PAGE. Prominent bands in soluble fractions post-induction confirmed successful expression.
- **Purification:** Prominent ~50 kD protein bands were present in peak 3 (orange box, SDS-PAGE), confirming successful purification.
- Results were equivalent for mutant 7 (data not shown).

05. ASSAY RESULTS

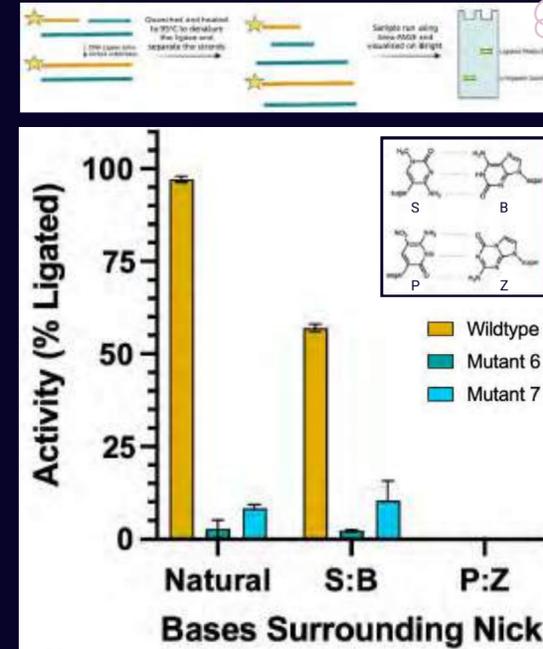


Figure 3. Comparison of Ligase Activity

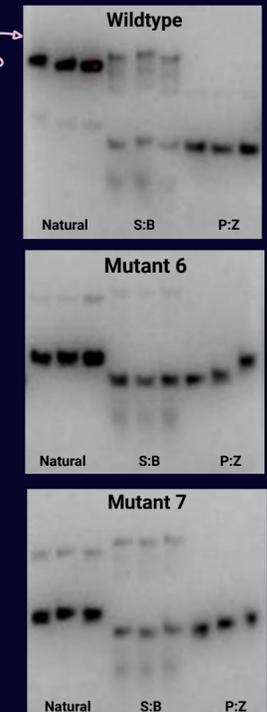


Figure 4. Urea-PAGE analysis of ligase activity

- Wildtype ligase outperforms both mutants 6 & 7, achieving the highest ligation activity (% ligated).
- Mutant 7 performs better than 6; however both show a significant reduction in activity compared to wildtype.
- No activity was observed with P:Z pairs in any variants.

06. CONCLUSIONS

- Mutants 6 and 7 both achieved successful expression and purification.
- Unfortunately, ligation assays show suboptimal activity with mutant ligases vs. wild type.
- However this research has provided evidence into how point mutations affect ligase activity.
- Future work will involve testing additional mutants for enhanced XNA activity and engineering mutants to recognise P:Z pairs.

Thank you to Waikato University for the summer scholarship

The Theoretical Imperative for a Tribal-Specific Māori Health Framework

Bridging the "Know-Do Gap" through Mana-motuhake and Iwi-specific Epistemologies

Alex Eaglestone, Associate Professor Victoria Egli, Dr. Marrin Haggie | The University of Waikato: Te Wānanga Waiora | Division of Health

Introduction

Despite the proliferation of health promotion frameworks worldwide, Indigenous health inequities persist, particularly for Māori in Aotearoa New Zealand. Contested definitions of health demonstrate that it is not a fixed entity¹, yet hegemonic Western models continue to overshadow Indigenous realities. The persistence of disparate health outcomes suggests that current frameworks fail to serve communities with distinct cultural epistemologies, underscoring the need to move beyond Pan-Māori approaches toward iwi-specific models grounded in mana motuhake.

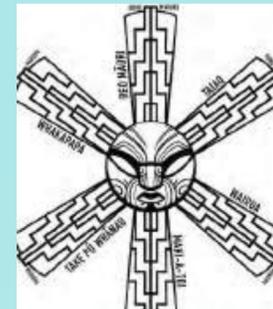


Background

Māori health inequities are rooted in the enduring impacts of colonisation, including land dispossession (raupatu) and the legislative suppression of Indigenous healing practices, such as the Tohunga Suppression Act 1907. In response, a series of Māori health models—ranging from Te Whare Tapa Whā² and Te Wheke³ to Te Pae Mahutonga⁴ and the Meihana Model⁵—have sought to articulate holistic, culturally grounded approaches to wellbeing across community and clinical contexts. However, a persistent “know-do gap”⁶ remains, whereby well-established Indigenous health knowledge has not translated into effective or equitable health practice.



Meihana Model



Whiti te Rā Model

Methodology and Methods

This study employed a narrative review methodology grounded in rangahau kaupapa Māori principles, privileging Māori worldviews while critically examining how colonial structures shape health theory and practice. Literature was identified through keyword searches including Māori, Health, Indigenous, Māori Health, Indigenous Health, Health Models, Māori Health Models, and Indigenous Health Models, and drawn from academic databases, Māori and iwi-led publications, and relevant grey literature. Sources were included based on their relevance to Indigenous health theory, Māori health frameworks, and critiques of universalist models, with analysis conducted using thematic and content analysis.



Te Whare Tapa Whā Model



Te Pae Māhutonga Model



References



Results

Several Western health models extend beyond purely biomedical approaches, yet remain inadequate for Indigenous health by reducing wellbeing to disease absence, overemphasising individual agency, and overlooking cultural and structural determinants^{7,8}. A persistent “know-do gap”⁶, reinforced by Western system dominance and policy shifts that weaken Māori leadership, kaupapa Māori services, and accountability⁹, continues to limit equitable outcomes. Whilst previous and newer Māori health models, including Whiti Te Rā¹⁰, have advanced holistic, culturally grounded approaches, their pan-Māori orientation may obscure iwi-specific tikanga, histories, and priorities¹¹, and Māori still experience significant inequities, including lower life expectancy, high cardiovascular disease, and the highest rates of smoking and vaping^{12,13,14}.

Conclusion

This review demonstrates that while Māori health models have successfully challenged biomedical dominance and established a foundation for culturally safe, holistic care, both Western and pan-Māori frameworks remain limited in addressing persistent Indigenous health inequities. Structural barriers, inconsistent implementation, and political decisions also restrict the effectiveness of existing models. The findings underscore the need to move beyond generic models toward tribally specific frameworks that reflect the distinct histories, tikanga, and relationships to local contexts underpinning Indigenous wellbeing. For Waikato iwi, this requires health frameworks grounded in whakapapa, whenua, and the Waikato River, enabling mana motuhake and bridging the know-do gap through iwi-led, culturally rooted approaches to waiora.



The Future of Concrete

Using locally sourced materials as binders in Alkali Activated Concrete

Introduction

- Portland cement concrete (PCC) is the most widely used construction material on earth¹.
- PCC also has very high carbon dioxide (CO₂) emissions, with as much as 0.8t of CO₂ being emitted per ton of cement produced.
- This causes concrete construction to contribute to around 8% of global manmade CO₂ emissions².

Alkali Activated Concrete

- Alkali Activated Concrete uses more environmentally friendly materials that are used in place of cement.
- These materials require an activator mix to cause the hardening reaction rather than just water.
- Commonly used materials such as Ground Granulated Blast furnace slag and Fly Ash aren't readily available in New Zealand and must be imported.

Locally Sourced Material



- Using locally sourced materials that are readily available will help to improve the sustainability of AAC in New Zealand.
- The materials being used in this study are ignimbrite (left) and pumice (right).
- These materials are of volcanic origin, locally sourced from New Zealand quarries.

[1] Y. Ding, J. G. Dai, and C. J. Shi, "Mechanical properties of alkali-activated concrete: A state-of-the-art review," *Constr. Build. Mater.*, vol. 127, pp. 68–79, Nov. 2016, doi: 10.1016/J.CONBUILDMAT.2016.09.121.

[2] L. Barceló, J. Kline, G. Walenta, and E. Gartner, "Cement and carbon emissions," *Materials and Structures* 2013 47:6, vol. 47, no. 6, pp. 1055–1065, Jun. 2013, doi: 10.1617/S11527-013-0114-5.

The effect of mechanical grinding on the compressive strength of AAC

- This test series involved grinding dried ignimbrite in a ball mill for set time periods of 10, 20, and 30 minutes.
- The results from this series show that mechanical grinding of the ignimbrite has limited effect on the compressive strength of AAC.
- This indicates that unground ignimbrite has reasonable compressive strength and mechanical grinding of the ignimbrite may only be required if specific properties are needed.



The effect of Fly Ash content on the compressive strength of AAC

- This test series involved using 20% and 30% fly ash content in both ignimbrite and pumice mixes.
- The results showed that the increase in fly ash content also caused a limited increase in compressive strength of the AAC.



Research by Jadon Emling
Supervised by Dr Kris Roy and Kushal Ghosh

Effects of Global Warming on Soil Biodiversity and Ecosystem Functioning

By Michelle Exton, supervised by Dr Andrew Barnes and Niamh Tapper, in partnership with Ngāti Tahu-Ngāti Whaoa

Te Aka Mātuatua - School of Science, University of Waikato



Introduction

Climate change has profound impacts on soil ecosystems, but the combined effects of warming and other stressors, such as drought, are less understood. Heightened temperatures can disrupt soil invertebrate community composition, leading to destabilised ecological mechanisms including predator-prey interactions, top-down control and functional redundancy¹. These changes make it difficult for soil communities to recover from additional disturbances¹. Using geothermal hotspots as a natural temperature gradient, we can test how soil invertebrates may respond to a warming climate.

Aim

Investigate how soil mesofauna respond to warming prior to a drought treatment.

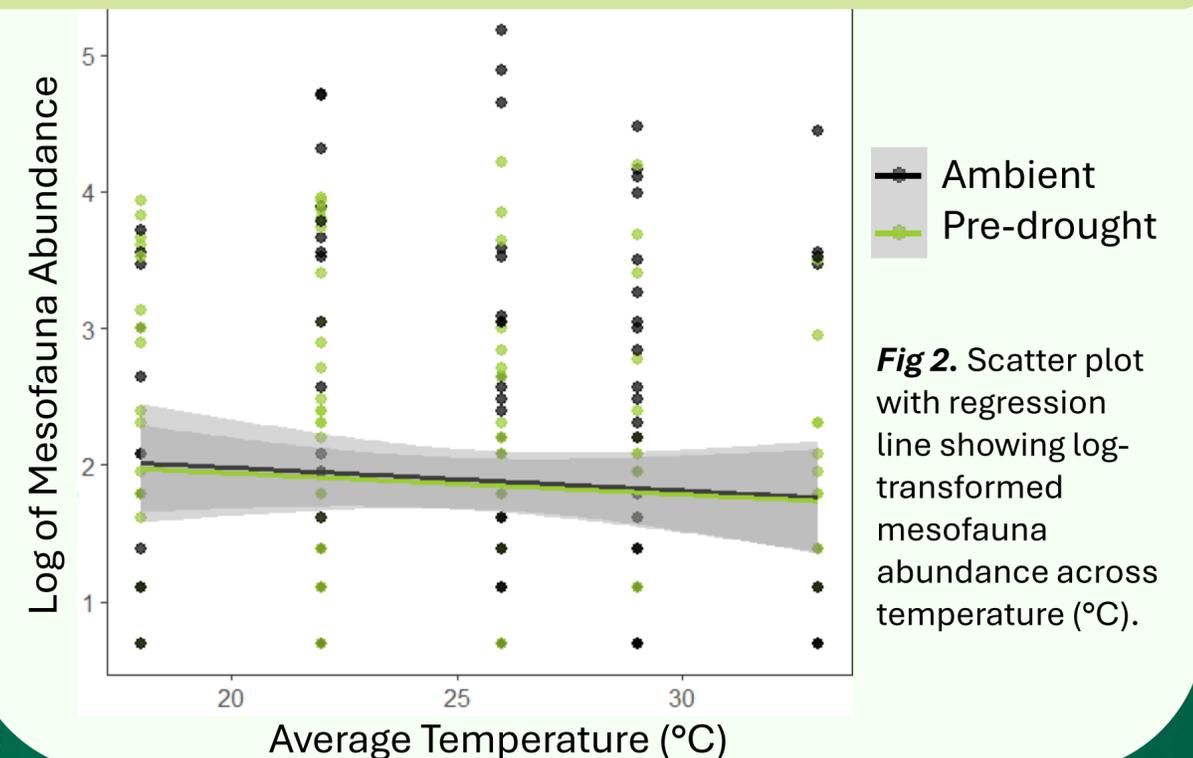
Methods

- Soil warming applied using a natural geothermal gradient at four sites on Ngāpouri Research Farm, Waiotapu (Fig 1).
- Soil mesofauna extracted from soil cores collected from the sampling sites via a Macfadyen high-gradient heat extractor.
- Specimens measured and identified to family level using stereo and compound microscopes.
- Mesofauna abundance analysed in R-Studio.



Fig 1. Geothermal hotspot at site four on Ngāpouri Research Farm.

Results



Conclusion

- No difference in mesofauna abundance between ambient and pre-drought plots, as expected.
- Mesofauna abundance decreased with increasing temperature, although not statistically significant (Fig 2).

Next Steps

Experimental drought treatment setup using rainout shelters (Fig 3) to assess the combined effects of warming and drought on soil mesofauna.

Fig 3. Rainout shelter in drought experiment.



References

Barnes, A.D., Deslippe, J.R., Potapov, A.M., Romero-Olivares, A.L., Schipper, L.A. and Alster, C.J., 2024. Does warming erode network stability and ecosystem multifunctionality?. *Trends in Ecology & Evolution*.

Who Teaches Online Safety Education (OSE)?

Private Actors, Educational Resources, and Individualising Discourses

Background:

Private organisations increasingly shape Online Safety Education (OSE), from Big Tech (Google, Meta) to NGOs and international organisations. Yet little attention has been paid to the *discourses* these actors promote and how they frame responsibility for online safety and democratic participation.

This project investigates who produces OSE resources, what approaches dominate, and how power, responsibility, and agency are constructed within them.

Analytical Framework:

Using Estellés & Doyle's (2025) framework, resources were coded into four approaches:

- Safeguarding - Protecting young people through restriction and risk avoidance.
- Equipping - Building individual skills, behaviour and responsibility.
- Empowering - Encouraging participation, critique and civic engagement.
- Resisting - Questioning and limiting technology's role in society.

Research Questions:

- Who are the main actors producing OSE resources globally?
- What discourses of online safety and digital citizenship do these resources promote?
- How do Big Tech and private funding influence these approaches?

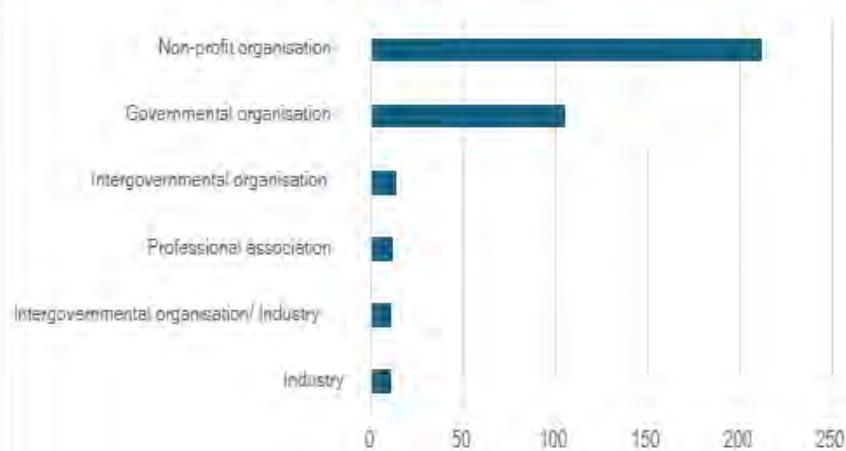
Methodology:

We compiled a global database of OSE resources to support our qualitative analysis. This involved identifying and noting in a spreadsheet; the type of resource, the actor that created it, the funding, the focus, a brief description, the key words, the approach used from the framework, significant quotes, the country of origin, the intended age range, and the publication year.

Criteria for resource inclusion:

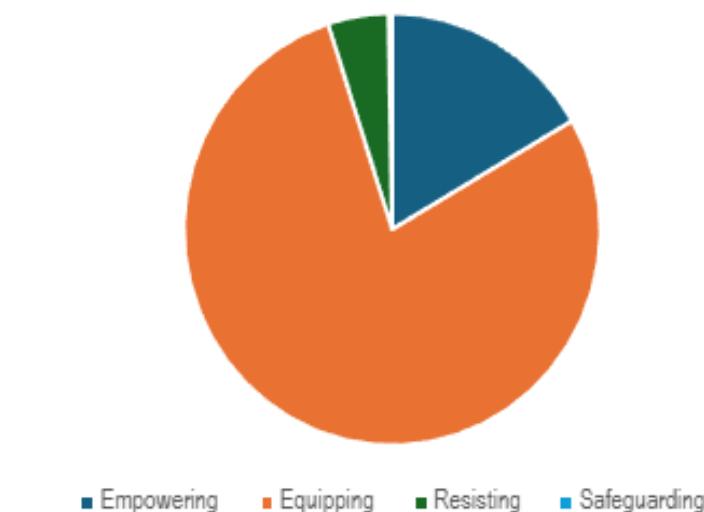
- English
- Free
- Adoption at scale
- Cited in Google Scholar/Scopus/ERIC
- Resources for teachers (not parents)

Creators of OSE Teacher Resources

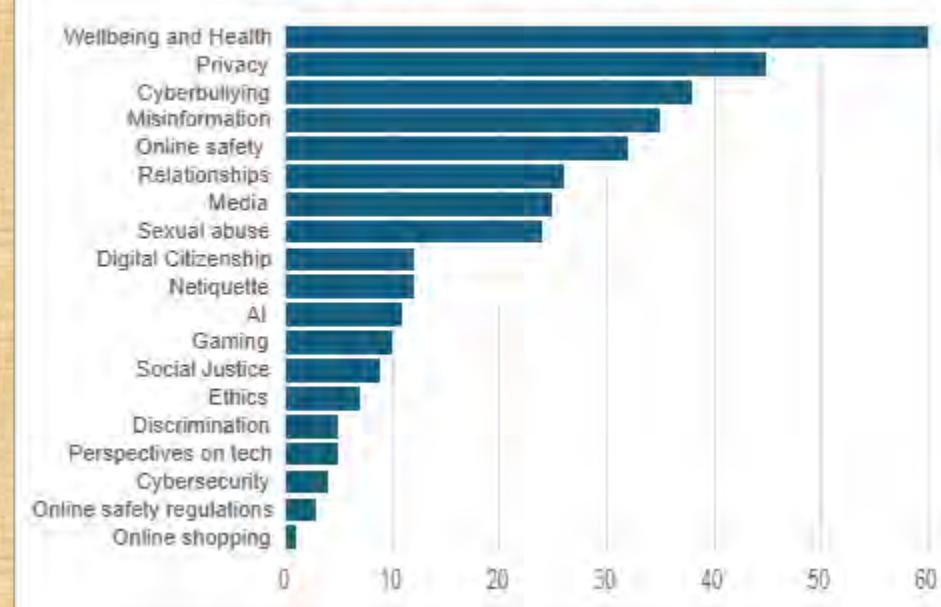


Zara Fraser, Marta Estellés, Andrew Doyle

Approach frequency in OSE Teacher Resources



Number of OSE Teacher Resources by Focus



Key Findings so far (as shown in the graphs above):

- Equipping approaches dramatically dominate the dataset; however, levels of superficialness do vary.
- Strong emphasis on individual behaviour, resilience, and self-regulation.
- Limited discussion of: Government responsibility, Platform accountability, or the Structural power of Big Tech.
- Resources are most commonly created by non-profit organisations but Big Tech frequently provides major funding and/or co-designs resources, thereby shaping narratives of responsibility - especially in the U.S.
- Few resources adopt genuinely empowering or resisting positions.

Implications:

- Teachers need support to critically engage with dominant OSE materials.
- Scholars should interrogate private influence in curriculum design.
- Important to balance individual skills with systemic accountability of platforms and governments.

Discussion:

The dominance of equipping discourses reflects a neoliberal logic where citizens are made responsible for managing digital risk individually, while institutional and corporate power remains largely unchallenged.

This raises concerns about whose interests digital citizenship education ultimately serves and how democratic participation online is framed.

Conclusion:

While framed as neutral skill-building, most resources individualise responsibility and marginalise critical engagement with power. A shift toward empowering and resisting approaches is needed to foster genuinely democratic digital citizenship.

References:

Estellés, M. & Doyle, A. (2025). *From Safeguarding to Critical Digital Citizenship: A systematic review of approaches to online safety education*. *Review of Education*, 13(1), e70056.

Background Horopaki:

It was only just over 35 years ago that Te Reo Māori was made an official language of Aotearoa New Zealand after the passing of the Māori Language Act in 1987¹. Since then, efforts to reestablish Te Reo Māori in the community have been on-going, while preserving the digital sovereignty of the Māori people³. Smart homes are one area where the efforts and results have been limited, this is only further impacted by the fact that most smart home systems are on a cloud-based central system which directly violates the principles in which Māori data sovereignty are based².

Nō ngā tau 35 neke atu i mua noa ake nei ka whakatauria te reo Māori hei reo mana o Aotearoa i muri i te whakamanatanga o te Ture Reo Māori i te tau 1987. Mai i taua wā, kua haere tonu ngā mahi ki te whakahoki me te whakapūmau anō i te reo Māori ki roto i te hāpori, me te tiaki anō i te rangatiratanga matihiko o te iwi Māori. Ko ngā whare atamai tētahi wāhanga kua iti noa ngā mahi me ngā hua kua kitea; ā, ka kaha ake tēnei āhuatanga nā te mea kei runga te nuinga o ngā pūnaha whare atamai i tētahi pūnaha pokapū e hāngai ana ki te kapua, ā, e takahi hāngai ana i ngā mātāpono e ū ai te rangatiratanga raraunga Māori.

Goal Whāinga:

The goal of this research is to enable smart home control via spoken Te Reo Māori.

Ko te whāinga o tēnei rangahau, he āhei i te whakahaere i ngā whare atamai mā te kōrero ā-waha i te reo Māori.

Conclusion Whakamutunga:

Building from the smarthome server that was already present, we were able to set up the Voice Item in OpenHAB so that it used the HABSpeaker application as a microphone and speaker, where it would send the sound from the microphone to the Rustpotter wake-word spotter. Upon receiving the wake-word, it will use a fine-tuned Whisper AI model to interpret the speech in both English and Te Reo Māori and send the command to the Extended CueVox Rule interpreter to convey the commands to OpenHAB and perform them. Once the commands have been completed, a status update will be sent to the multilingual Piper TTS system to inform the user.

I te whakawhānui ake i te tūmau whare-mātau i noho kē mai, i taea e mātou te whakarite i te Voice Item i roto i OpenHAB kia whakamahi i te taupānga HABSpeaker hei hopuoro, hei kaikōrero hoki. Mā reira ka tukuna te oro mai i te hopuoro ki te pūnaha hopu-kupu whakaoho Rustpotter. Ina rangona te kupu whakaoho, ka whakamahia tētahi taurira Whisper AI kua whakangungua motuhake hei whakamārama i te kōrero i te reo Ingarihi me te reo Māori, ā, ka tukuna te whakahau ki te kaiwhakamārama Ture Extended CueVox hei kawē i ngā whakahau ki OpenHAB kia whakatinanahia. Ka oti ana ngā whakahau, ka tukuna he pānui āhua ki te pūnaha Piper TTS reo-maha hei whakamōhio i te kaiwhakamahi.

Solution Rongoā:



The wake-word detection model was trained with approximately 100 different samples of various people saying the wake-word “E rangi e oho”. Various samples of household, background and conversational noise were used as control data. This was to produce a wake-word spotter that detected the wake-word while having a low false positive rate. This was built using Rustpotter wake-word spotter.

I whakangungua te taurira kimi kupu whakaoho mā te whakamahi i te tata ki te 100 taurira rerekē o ngā tāngata maha e kī ana i te kupu whakaoho “E rangi e oho”. I whakamahia hoki ngā momo taurira oro o te kāinga, o te taiao, me ngā kōrerorero hei raraunga whakahaere. I mahia tēnei kia hangaia he pūnaha kimi kupu whakaoho e tika ana te hopu i te kupu whakaoho, me te iti hoki o te auau hopu hē. I hangaia tēnei mā te pūnaha kimi kupu whakaoho Rustpotter.

OpenHAB will accept the wake-word and wait for further instruction using a fine-tuned Whisper AI Speech to Text system, trained using Te Reo Māori speech and transcriptions. The Whisper AI model will be able to transcribe both Te Reo Māori and English commands, having been trained using the Whisper Tiny model.

Ka whakaae a OpenHAB ki te kupu whakaoho, ā, ka tatari mō ētahi atu tohutohu mā te whakamahi i tētahi pūnaha Whisper AI Kōrero-ki-Tuhi kua whakangungua motuhake, kua akona mā ngā kōrero ā-waha me ngā tuhinga whakakorekore o te reo Māori. Ka āhei te taurira Whisper AI ki te tuhi kōrero mai i ngā whakahau o te reo Māori me te reo Ingarihi, nā te mea i whakangungua mā te taurira Whisper Tiny.

The command will be transcribed and sent to the Rule Interpreter using CueVox. CueVox has been extended to understand commands in Te Reo Māori as well as the base English commands. The set of commands will also be extended to include adjusting temperature and performing queries and scripts.

Ka tukuna te whakahau, ā, ka tukuna ki te kaiwhakamārama Ture mā CueVox. Kua whakawhānuihia a CueVox kia mārama ki ngā whakahau i te reo Māori, me ngā whakahau Ingarihi taketake hoki. Ka whakawhānuihia anō te huinga whakahau kia uru mai ai te whakatikatika i te pāmahana, me te whakahaere pātai me ngā hōtaka (scripts).

OpenHAB will send the status response from the Item back to an AI assistant being run on a local Ollama server. Ollama will generate a response in the same language to update the user on the new status of their Items or answer their queries. This response is sent to a Piper Text to Speech service which has a voice trained to pronounce and speak Te Reo Māori and it is then relayed to the user.

Ka tukuna e OpenHAB te whakautu āhua mai i te Item ki tētahi kaiwhina AI e whakahaerehia ana i runga i tētahi tūmau Ollama ā-rohe. Ka waihanga a Ollama i tētahi whakautu i taua reo anō hei whakamōhio i te kaiwhakamahi mō te āhua hou o ā rātou Item, hei whakautu rānei i ā rātou pātai. Ka tukuna taua whakautu ki tētahi ratonga Piper Kupu-ki-Reo, kua whakangungua tōna reo kia tika te whakahau me te kōrero i te reo Māori, ā, ka tukuna atu ki te kaiwhakamahi.

References Puna kōrero:

- [OpenHAB voice control for home automation | Dantali0n shunyalabs/maori-speech-dataset · Datasets at Hugging Face](https://shunyalabs/maori-speech-dataset)
- Thomas, T., Chaston, A. (2022). There’s no place like home. Teaching Te Reo Māori in lockdown. *He Kupu*, 7 (1), 54-64.
- ITU News (2022). How AI is helping revitalise indigenous languages. ITU News.
- REESE E, KEEGAN P, MCNAUGHTON S, et al. Te Reo Māori: indigenous language acquisition in the context of New Zealand English. *Journal of Child Language*. 2018;45(2):340-367. doi:10.1017/S0305000917000241

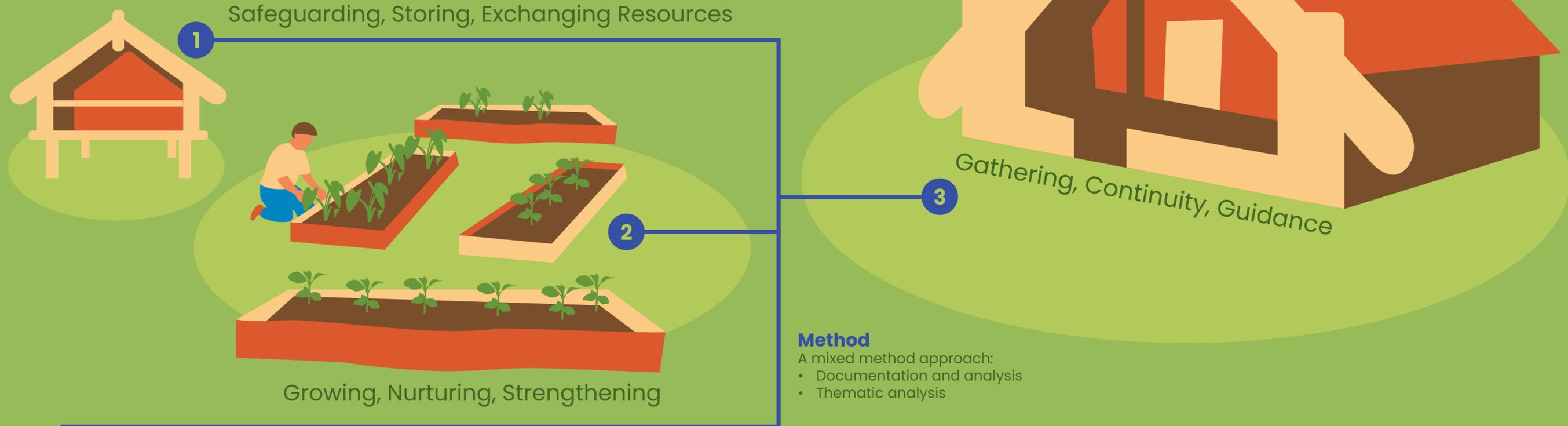
CO-DESIGNING SOFTWARE WITH INDIGENOUS COMMUNITIES: CASE STUDIES FROM AOTEAROA AND BEYOND

Student: Te Ata-a-rua Hansen-Cribb 1627507

Supervisor/s: Alvin Yeo, Annika Hinze, Nic Vanderschantz

Purpose

Document and research how collaborations with Indigenous communities are formed, as these processes are often not recorded.



Method

- A mixed method approach:
- Documentation and analysis
 - Thematic analysis

Findings

How do Indigenous groups and universities effectively work together?

1. Pātaka Kai - Liaisons

A key finding was the importance of liaisons. Liaisons work like a pātaka kai (storage house). They provide a safe place where knowledge can be carefully stored and shared between communities and the university.

2. Māra - Whanaungatanga

Based on my findings, whanaungatanga

(relationships) are a key step for a successful partnership. Like a māra kai (garden), relationships require ongoing care, patience, and teamwork to create long-lasting collaboration.

3. Whareniui - Local Champions

Local champions were another key step for creating good collaborations. Local champions are trusted within the community, which allows them to identify the right people and resources.

Similar to a whareniui (meeting house), they hold and protect knowledge, allowing them to guide

projects that benefit both the community and its partners.

Outcomes

Based on the research done so far, and the brief given, there is a need for further research, as gaps remain in understanding the early stages of relationship development and functioning. Future research would allow for deeper insight into how cultural protocols and knowledge are applied in practice.

For example, whanaungatanga appeared multiple

times. When practised alongside cultural protocols, it has the potential to strengthen long-term collaboration and foster sustainable partnerships.

Ngā mihi Whakatōhia, Ngāti Hine, Blackfoot Nation.



Photosynthetic response of wire rush under warming conditions at Kopuatai peat bog

Taylor Harvey- Supervisors: Margaret Barbour & Dave Campbell

Aim and Introduction:

- Peatlands are globally important carbon (C) sinks, storing C derived from photosynthesis despite only occupying ~3% of the Earth's surface¹. In the northern 38° of New Zealand, peat-forming wetlands are dominated by *Empodisma robustum*, an endemic wire-rush that is central to peat accumulation². Kopuatai peat bog, located near Te Aroha, is the largest remaining undisturbed peatland in the Waikato, and represents a key regional carbon sink³.
- Climate warming is widely expected to reduce peatland C sequestration by increasing respiratory losses and pushing plant photosynthesis beyond its thermal optimum⁴. Long-term ecosystem flux measurements at Kopuatai show increasing C uptake over the past decade (Figure 1) in conjunction to rising temperatures (Figure 2). However, since 2024, annual C sequestration rates ($t\ C\ ha^{-1}\ yr^{-1}$) have begun to decline. This raises the question of whether photosynthesis in *E. robustum* may be approaching or exceeding its thermal optimum under warming conditions.
- Measuring the temperature response of photosynthesis in *E. robustum* at the leaf level may help determine whether plant photosynthesis is operating near its thermal optimum, and whether this could help explain the recent changes in C sequestration at Kopuatai peat bog.

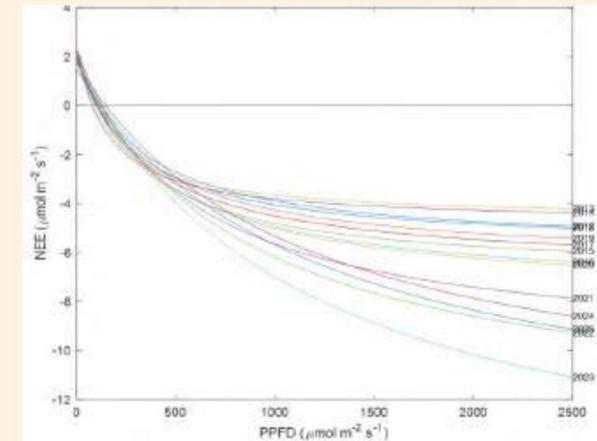


Figure 1. Spring light-response curves showing net ecosystem exchange (NEE) plotted against photosynthesis photon flux density (PPFD) at Kopuatai peat bog from 2012-20205

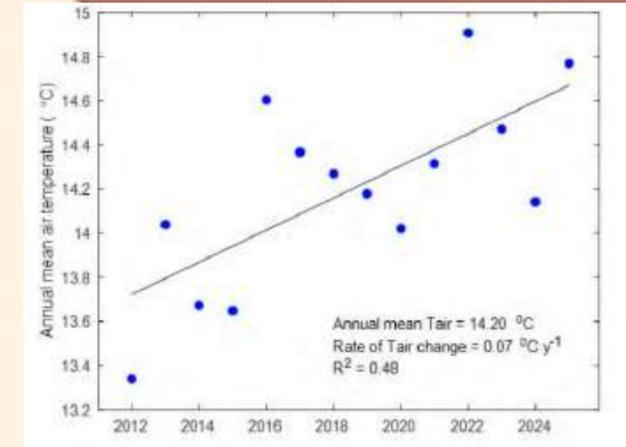


Figure 2. Increase in mean annual air temperature (°C) at Kopuatai peat bog from 2012 to 2025.

Methods:

Photosynthesis was measured on six samples of *Empodisma robustum* using a Li-Cor 6800 infrared gas analyser housed within a Conviron growth chamber (Figure 3) to allow whole-plant temperature acclimation. Measurements were conducted across leaf temperatures from 10-42.5°C. At each temperature, 5-8 stems were placed in the chamber and net photosynthesis was measured across a stepwise light gradient from 1000 to 0 $\mu\text{mol photons m}^{-2}\text{s}^{-1}$. Light-response curves were fitted using Kevin Tu's light-response curve model⁵ to estimate dark respiration, apparent quantum yield, light compensation point, maximum photosynthesis, and curvature.

Results:

- Dark respiration (R_{dark}) increased exponentially with increasing leaf temperature (Figure 4).
- Maximum photosynthesis was the highest at intermediate temperatures (approximately 20-25°C), but photosynthesis was still maintained at the highest temperatures measured, although at reduced rates (Figure 5).
- The light compensation point increased exponentially with leaf temperature (Figure 6).



Figure 3. Conviron growth chamber and Li-cor 6800 with an *Empodisma robustum* inside, and a close up of *Empodisma robustum* (6).

Acknowledgments to Margaret Barbour, Dave Campbell, Mike Clearwater, René Devenish, the School of Science, and my fellow students for assisting and aiding me through this project.

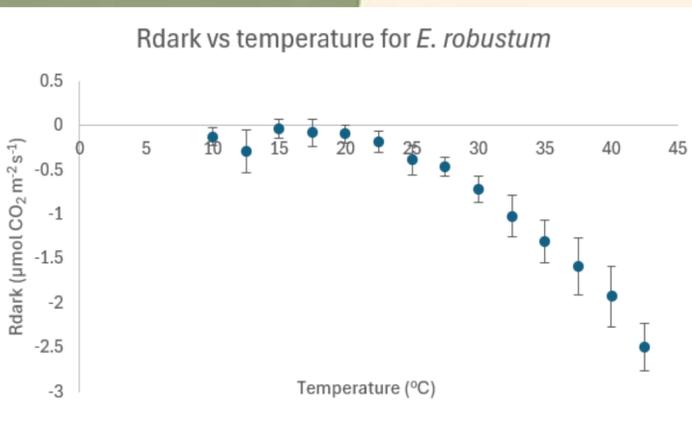


Figure 4. Mean dark respiration (R_{dark}) \pm standard deviation as a function of leaf temperature in *Empodisma robustum*, derived from fitted light-response curves.

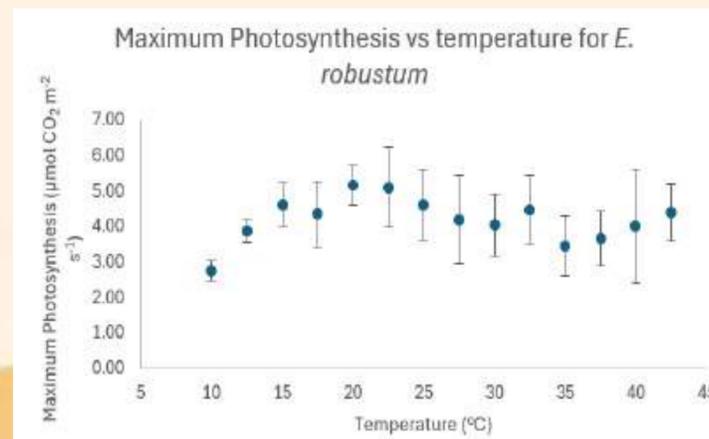


Figure 5. Mean maximum photosynthesis \pm standard deviation as a function of leaf temperature in *Empodisma robustum*, derived from fitted light-response curves.

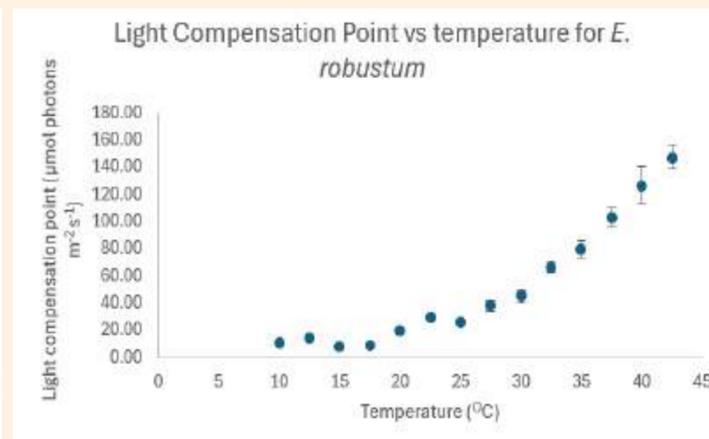


Figure 6. Mean light compensation point \pm standard deviation as a function of leaf temperature in *Empodisma robustum*, derived from fitted light-response curves.

Conclusion:

- *Empodisma robustum* maintains photosynthetic function across a broad temperature range. A thermal 'safe' zone around 20-25°C supports the highest rates of C gain, while photosynthesis remains positive even at higher temperatures, despite reduced rates.
- Increasing dark respiration and light compensation point with rising temperature indicates increasing C costs at warmer conditions. However, net photosynthesis and C uptake are still maintained.
- These findings suggest that photosynthesis in *E. robustum* may be operating near its thermal optimum under current conditions, providing a physiological mechanism that helps explain recent changes in C sequestration observed at Kopuatai peat bog.
- Further measurements on *E. robustum* such as rapid ACi curves could help identify biochemical limitations to photosynthesis and clarify how carbon assimilation responds to increasing temperature.

References:

- Minasny, B., Adetsu, D. V., Aitkenhead, M., Artz, R. R., Baggaley, N., Barthelmes, A., ... & Zak, D. (2024). Mapping and monitoring peatland conditions from global to field scale. *Biogeochemistry*, 167(4), 383-425. (1)
- Wagstaff, S. J., & Clarkson, B. R. (2012). Systematics and ecology of the Australasian genus *Empodisma* (Restionaceae) and description of a new species from peatlands in northern New Zealand. *PhytoKeys*, 13(13), 39-79. <https://doi.org/10.3897/phytokeys.13.3259> (2)
- Pronger, J., Schipper, L. A., Hill, R. B., Campbell, D. I., & McLeod, M. (2014). Subsidence rates of drained agricultural peatlands in New Zealand and the relationship with time since drainage. *Journal of Environmental Quality*, 43(4), 1442-1449. (3)
- Hartley, I. P., Armstrong, A. F., Murthy, R., Barron-Gafford, G., Ineson, P., & Atkin, O. K. (2006). The dependence of respiration on photosynthetic substrate supply and temperature: integrating leaf, soil and ecosystem measurements. *Global Change Biology*, 12(10), 1954-1968. (4)
- Ogren E, Evans JR (1993) Photosynthetic light-response curves. 1. The influence of CO2 partial pressure and leaf inversion. *Planta* 189: 182-190. (5)
- Knight, J. (2025). Wire Rush (*Empodisma robustum*). <https://www.inaturalist.org/observations/323155362> (6)

METAL EMISSIONS OF MULTI-VENT VOLCANOES

Investigating the composition of emitted elements at Stromboli, Italy

Samantha Hine, supervised by Dr. Emma Nicholson



Introduction

Volcanoes emit large quantities of trace elements, including toxic elements such as arsenic and lead. Understanding how these elements are partitioned between gas and ash phases, and the controls on their volatility (how readily they are released from magma) provides important insight into how these elements are delivered to the environment by volcanic plumes, and the potential pollution hazard. While differences in metal emissions between arc and hotspot volcanoes are well established², little is known about how metal emissions are influenced by different eruptive styles at multi-vent volcanoes. This research characterises the composition and flux of metal emissions from north, central and south vents of Stromboli Italy (Figure 4), and evaluates vent-specific differences in element volatility in the context of contrasting eruptive styles and modelled chemical behaviour.

Methodology

Sample Collection

Conducted drone flights above individual active vents to collect gas and particulate samples using filter packs.

Laboratory Analysis

Leached filter papers in the laboratory with water and acid to quantify trace element concentrations using mass spectrometry.

Data Processing

Blank-corrected raw analytical data and calculated element abundances, volatility, and fluxes in the aerosol phase.

Modelling

Performed thermochemical modelling using HSC Chemistry to predict element speciation (chlorides, sulfides or hydroxides, etc).

Results

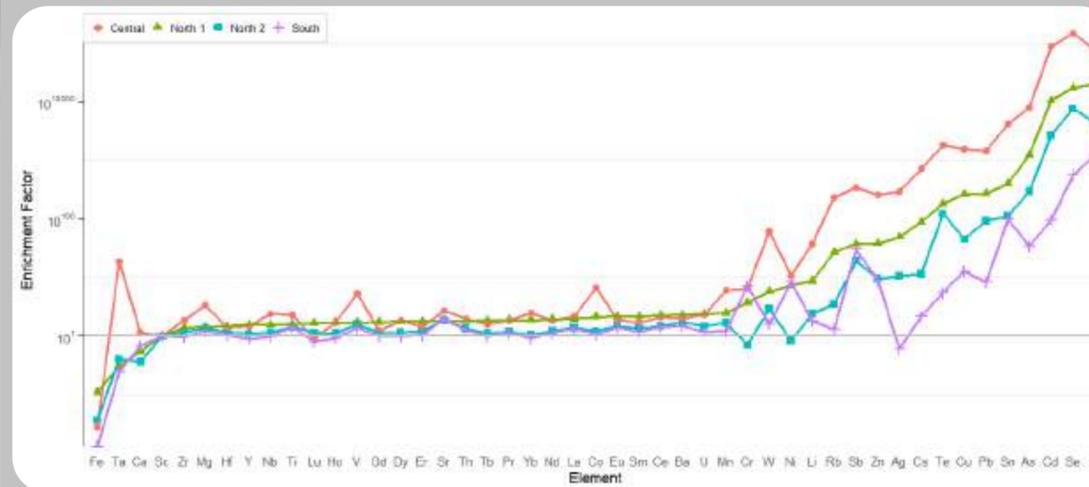


Figure 1. Enrichment factors (EF) for elements measured at individual vents, used as an indicator of elemental volatility. The most volatile elements are selenium, cadmium and arsenic, meaning they are most abundant in volcanic plumes. Variations between vents are most pronounced for elements with higher EF values, many of which are chalcophile elements.

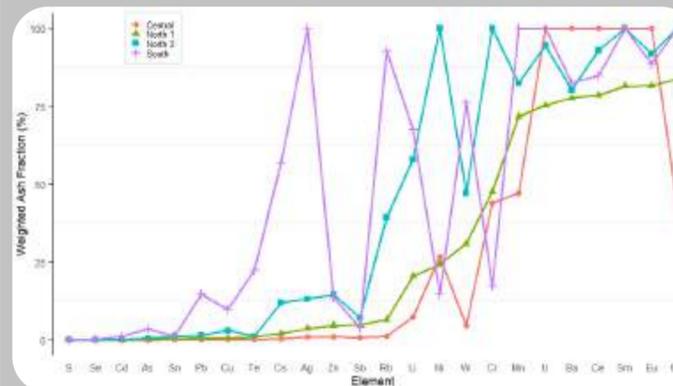


Figure 2. Weighted ash fraction (WAF), representing the proportion of each element partitioned into the ash phase relative to the gas phase. Elements occurring exclusively in the ash phase at all vents are excluded. Distinct differences in element partitioning are observed, with chalcophile elements (comprising much of the dataset) showing less incorporation into the ash phase.

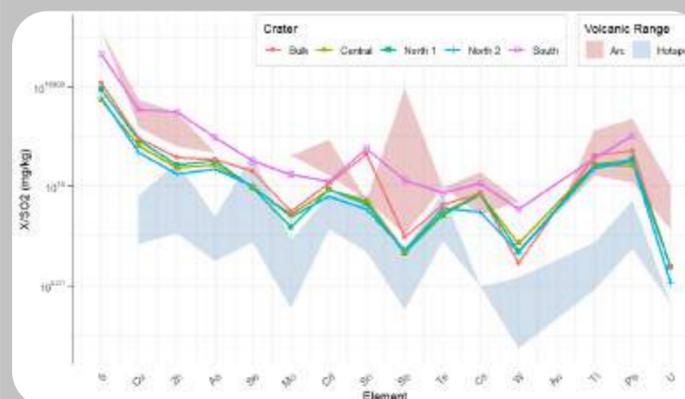


Figure 3. Measured X/SO₂ ratios (where X = element of interest) compared with published data from arc and hotspot volcanoes globally². Most measurements cluster near the hotspot range, while the Southern vent aligns more closely with expected arc-type ratios. This is notable as Stromboli is an arc volcano, thus values in the arc range would be expected.

Conclusion

Metal emissions differ between distinct vents at Stromboli, indicating that vent-specific eruptive processes exert a measurable control on metal partitioning during degassing, especially for the most volatile elements (e.g., Se, Cd, As, Pb). Lead and copper are among the most highly emitted metals, with the Central and Southern vents showing substantially higher fluxes than the Northern vent (Pb up to 1575 kg/yr; Cu up to 9029 kg/yr). These differences have important implications for assessing volcanic plume hazards, interpreting subsurface magmatic processes and determining the conditions that influence the efficiency of metal release at volcanoes with complex shallow magmatic systems. Further investigation of other multi-vent volcanoes (e.g., Yasur, Vanuatu) will determine whether this result is characteristic of multi-vent systems more broadly or unique to Stromboli.



Figure 4. Satellite imagery overlain on a digital elevation model of the Stromboli crater area, highlighting the individual craters active in 2018. Sampling locations for the south (S), central (C), and north (N) vents are shown, along with the site of bulk plume sampling¹.

1 - Civico, R., Ricci, T., Scarlato, P., Andronico, D., Cantarero, M., Carr, B.B., De Beni, E., Del Bello, E., Johnson, J.B., Kueppers, U. and Pizzimenti, L., 2021. Unoccupied aircraft systems (UASs) reveal the morphological changes at Stromboli volcano (Italy) before, between, and after the 3 July and 28 August 2019 paroxysmal eruptions. *Remote Sensing*, 13(15), p.2870.
2 - Edmonds, M., Mather, T. and Nicholson, E. 2018. "A Distinct Metal Fingerprint in Arc Volcanic Emissions." *Nature Geoscience* 11. doi:10.1038/s41561-018-0214-5.

How Does Temperature Affect Blowfly Performance?

Tahlia Hodgkinson, Paige Matheson, Nathan Butterworth and Ang McGaughran



Lucilia sericata



Calliphora vicina

Introduction and Aims

Calliphora vicina and *Lucilia sericata* are two invasive species of blowflies found in New Zealand. *C. vicina* is a cold-adapted species², and *L. sericata* is a warm-adapted species⁵.

Our aim was to investigate how performance, measured in terms of emergence success and fecundity, varied between these two species along a temperature gradient ranging from 15°C to 30°C. We hypothesised that *L. sericata* would perform better at high temperatures and *C. vicina* would perform better at low temperatures.

Methods

Multiple replicates of fly-rearing containers with 10 larvae from each species were set up at each temperature. We had five temperatures: 15°C, 19°C, 22°C, 25°C, and 30°C.

At each temperature, which species emerged first, how many days it took for them to emerge, and how many of each species survived to emergence were recorded.

For a subset of replicates, we measured their fecundity by providing them with fresh mince every three days, then counting the eggs they produced throughout the remainder of their lifespan. This data was used to calculate the performance index, which serves as a measure of general fitness, as per the methods outlined in Croft et al. (2024)¹.

Discussion

With *L. sericata*, although they emerged well throughout the full temperature range, we observed a fitness decline where some reproductive trade-offs² occurred as temperatures decreased. We observed that at 15°C, not only did *L. sericata* fail to lay eggs, but they also reduced greatly in body size, which indicated that they prioritised survival over producing offspring⁴. *C. vicina*, on the other hand, had a more straightforward decline in fitness as the temperatures increased through their emergence, which trailed off the hotter it got, until they stopped emerging completely.

Both of our species exhibited unique responses to varying temperatures, shedding light on how they might adapt to different climates. *L. sericata*'s ability to survive across a wide variety of climates and reproduce rapidly at higher temperatures makes them more well-suited than *C. vicina* to exploit climate change and proliferate while *C. vicina* could be limited to cooler microclimates³.

Results

L. sericata successfully emerged at all temperatures consistently (Fig. 1); however, this did not translate to overall high performance, which saw a steady decrease as temperatures got colder (Fig. 2).

Conversely, the emergence success of *C. vicina* reduced as temperatures increased, and they eventually failed to emerge at 30°C (Fig. 1). Despite this, they maintained a fairly constant performance across all temperatures (Fig. 2).

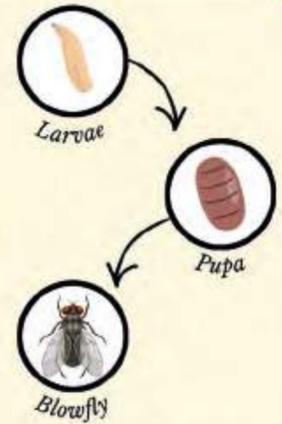


Figure 3. Life-cycle of a blowfly. Larvae to pupa to adult

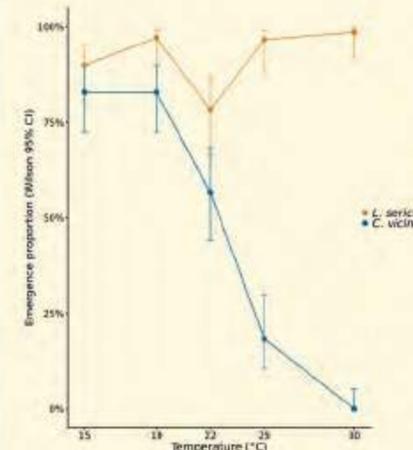


Figure 1. Emergence success for *L. sericata* (gold) and *C. vicina* (blue). Values represent the proportion of the 10 individuals that emerged successfully at each temperature

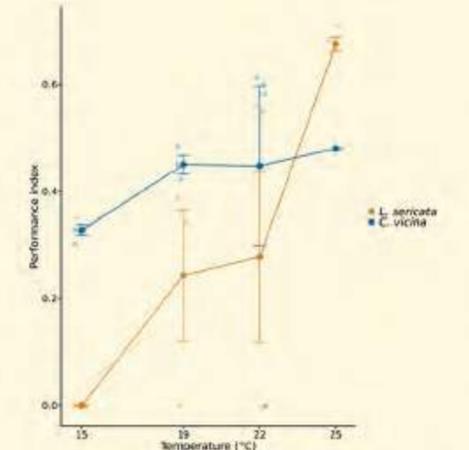


Figure 2. Performance index of *L. sericata* (gold) and *C. vicina* (blue).

References

- Croft, L., Matheson, P., Flemming, C., Butterworth, N. J., & McGaughran, A. (2024). Population structure and interspecific hybridisation of two invasive blowflies (Diptera: Calliphoridae) following replicated incursions into New Zealand. *Ecology and Evolution*, 14(1), Article e10832. <https://doi.org/10.1002/ece3.10832>
- Donovan, S. E., Hall, M. J. R., Turner, B. D., & Moncrieff, C. B. (2006). Larval growth rates of the blowfly, *Calliphora vicina*, over a range of temperatures. *Medical and Veterinary Entomology*, 20(1), 106–114. <https://doi.org/10.1111/j.1365-2915.2006.00600.x>
- Lawlor, J. A., Comte, L., Grenouillet, G., Lenoir, J., Baecher, J. A., Bandara, R. M. W. J., Bertrand, R., Chen, L.-C., Diamond, S. E., Lancaster, L. T., Moore, N., Murienne, J., Oliveira, B. F., Pecl, G. T., Pinsky, M. L., Rolland, J., Rubenstein, M., Scheffers, B. R., Thompson, L. M., ... Sunday, J. (2024). Mechanisms, detection and impacts of species redistributions under climate change. *Nature Reviews Earth & Environment*, 5(5), 351–368. <https://doi.org/10.1038/s43017-024-00597-z>
- Meuti, M. E., Fyfe, L. R., Fiori, M., & Denlinger, D. L. (2024). Trade-offs between Winter Survival and Reproduction in Female Insects. *Integrative and Comparative Biology*, 64(6), 1667–1678. <https://doi.org/10.1093/icb/icae027>
- Wall, R., French, N., & Morgan, K. L. (1992). Effects of temperature on the development and abundance of the sheep blowfly *Lucilia sericata* (Diptera: Calliphoridae). *Bulletin of Entomological Research*, 82(1), 125. <https://doi.org/10.1017/S0007485300051531>



Next Steps?

A suitable next step would be to investigate these responses to thermal stress further, which would be beneficial, especially in light of the climate changes Earth is currently undergoing. This would allow the management of invasive species to be more targeted and precise, and potentially predict where invasion risk is highest



Planning for the Heat

Hannah Huggan, Yara Jarallah & Jesse Whitehead
Te Ngira: Institute for Population Research



Scan here for
more details

Background



This research project assessed the New Zealand Government's policy approach to the health impacts of extreme heat



As global temperatures rise with climate change, heat extremes are becoming more frequent, more intense, and longer-lasting^[1]



Rising temperatures, even in cooler regions, pose significant threats to human health and livelihood^[2]



As the impacts of extreme heat are unevenly distributed (due to factors such as structural inequity and demography), implementing equity is crucial for the success of public health policy programmes^[3]

Methods [see QR Code for more details]

Literature Review

This project conducted a scoping review of all academic publications related to the health impacts of extreme heat for Aotearoa New Zealand

Policy Framework

Key principles, recommendations, and considerations from the literature review informed the framework that was used to assess the policy documents

Policy Documents

All guidelines and policy from the New Zealand Government, related to public health adaptation and heat, available publicly or through official information requests

Canterbury is the only region to have a heat-health action plan developed by Te Whatu Ora (Health New Zealand)

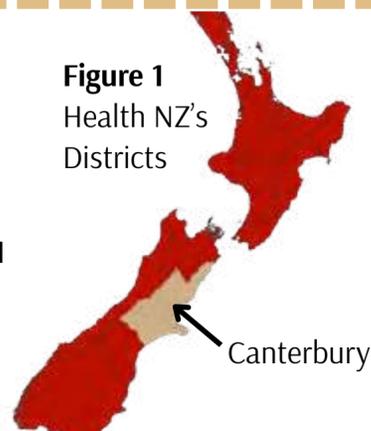


Figure 1
Health NZ's
Districts

Policy deficits exist **at all levels** (local, regional, and national), in both public health and climate change policy, **leaving New Zealand unprepared** for the health impacts of extreme heat

Policy Assessment Results [see QR code for framework and full results]

Figure 2 Assessment score for policy documents at a national and regional level

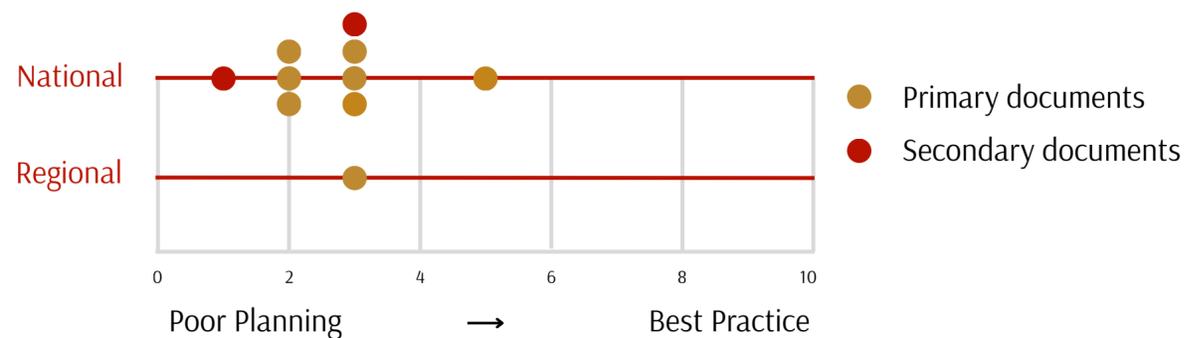
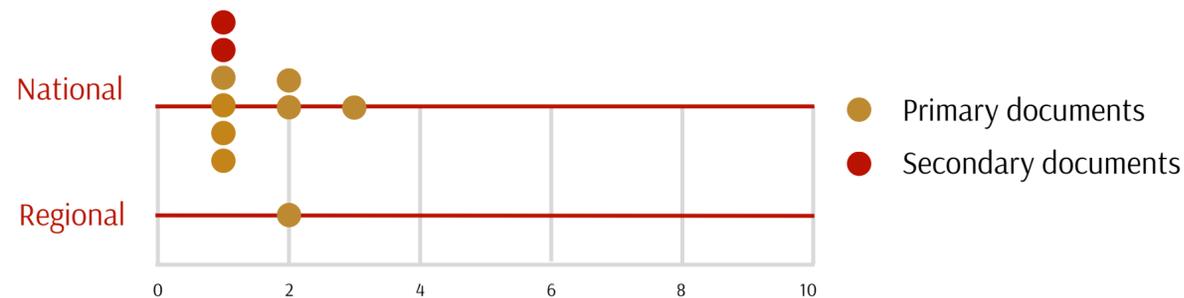


Figure 3 Assessment score for equity within the New Zealand Government's policy documents



References

- [1] Harrington, L. J., & Frame, D. (2022). Extreme heat in New Zealand: A synthesis. *Climatic Change*, 174(2), 1–16. <https://doi.org/10.1007/s10584-022-03427-7>
- [2] Pourzand, F., Bolton, A., Salter, C., Hales, S., & Woodward, A. (2023). Health and climate change: Adaptation policy in Aotearoa New Zealand. *The Lancet Regional Health. Western Pacific*, 40, 1–9. <https://doi.org/10.1016/j.lanwpc.2023.100954>
- [3] Tschakert, P., Synnott, E. L., Karthikeyan, K., & De Jesús Arocho, W. (2026). Embodied experiences of thermal injustice: Truth-telling through disabilities. *Annals of the American Association of Geographers*, 116(1), 102–119. <https://doi.org/10.1080/24694452.2025.2527935t>
- [4] Masters-Awatere, B., Howard, D. J., & Young, P. (2023). Haumanu hauora: Refining public health institution policy to include Māori and climate change. *Climatic Change*, 176(58), 1–15. <https://doi.org/10.1007/s10584-023-03534-z>

We asked councils - are you developing a heat-health action plan?

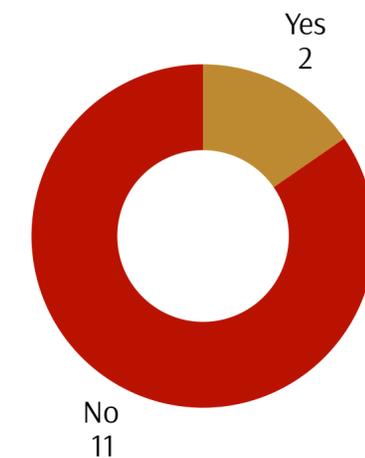


Figure 4 Results from Local Government official information requests to 13 councils in NZ's most at-risk locations^[1]

Research Outcomes



- A paper based on these results is being prepared to submit for publication
- Presentations are available for government agencies, councils, or community organisations

Te Tiriti o Waitangi

Within public health and climate change policy, Māori perspectives are problematically silenced.^[4] Given the disparities within health and climate change impacts for Māori, it was important to ensure Māori scholarship and practice was included, or highlight the absences of such where they might occur

Joining Forces: A Fluorescent Screening Platform for Ligases in Synthetic Biology



Introduction

Synthetic biologists have expanded nucleic acid diversity by introducing altered chemistries to phosphates, sugars and bases called XNAs (xenonucleic acids) Figure 1.

- DNA ligases are enzymes that join DNA together but their capacity to join XNAs is currently limited.
- Current methods to assess ligase activity using electrophoresis are time-consuming and not observed in real-time.
- Fluorescence-based assays using molecular beacons would enable rapid, real-time screening of engineered ligases (Figure 2).

Aim

Optimise a fluorescent XNA ligation assay to allow screening of engineered ligases.

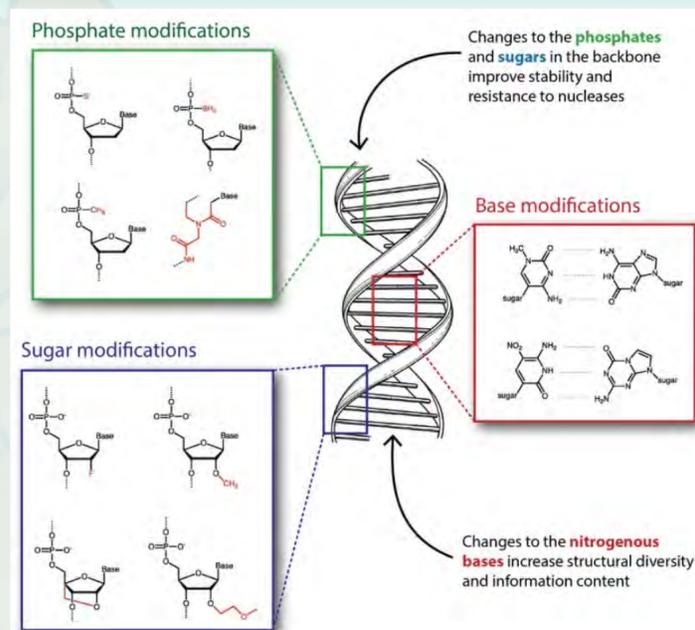


Figure 1: Representative examples of different XNAs.¹

Molecular Beacon:
32 nucleotide, hairpin (stem-loop) structured nucleic acid.

DNA and/or XNA

Quencher:
Absorbs excitation energy from the fluorophore and dissipates heat rather than light.

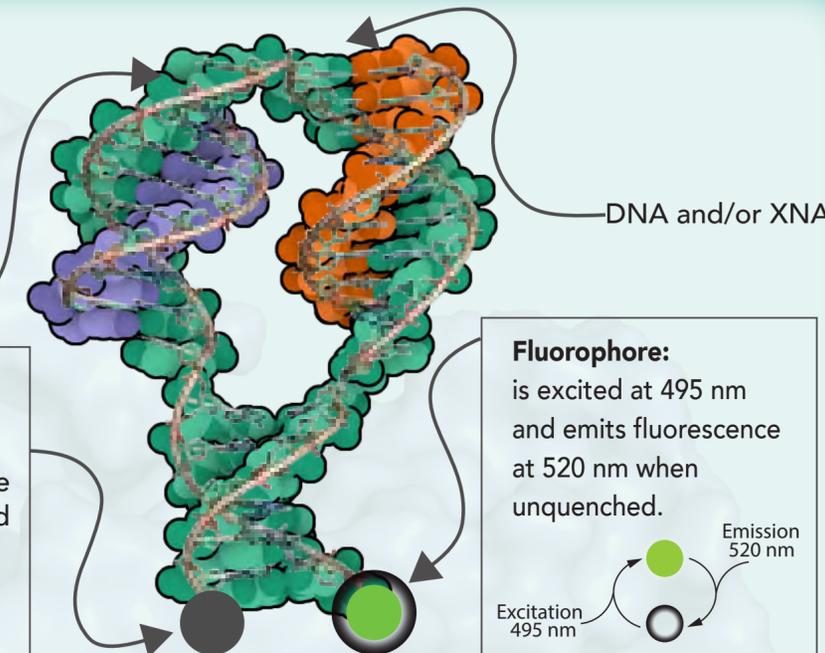
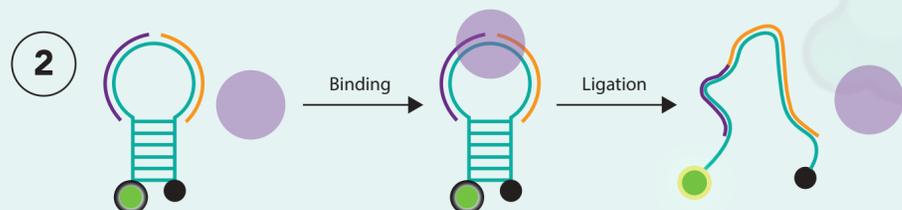


Figure 2: Molecular beacon with a quencher and fluorophore hybridised.

Methods



- Ligation opens the molecular beacon hairpin, separating the fluorophore and quencher and allowing fluorescence emission at 520 nm.²



- Two negative controls (\pm oligonucleotides, no ligase) and one positive control (18-nt complement) were included for each experiment.
- Mastermixes were made up to minimise pipetting error; gain and enzyme ratios were optimised.
- Fluorescence was monitored using a spectrophotometer at excitation setting 495 nm and emission 520 nm for 30 min after addition of ligase.

Results

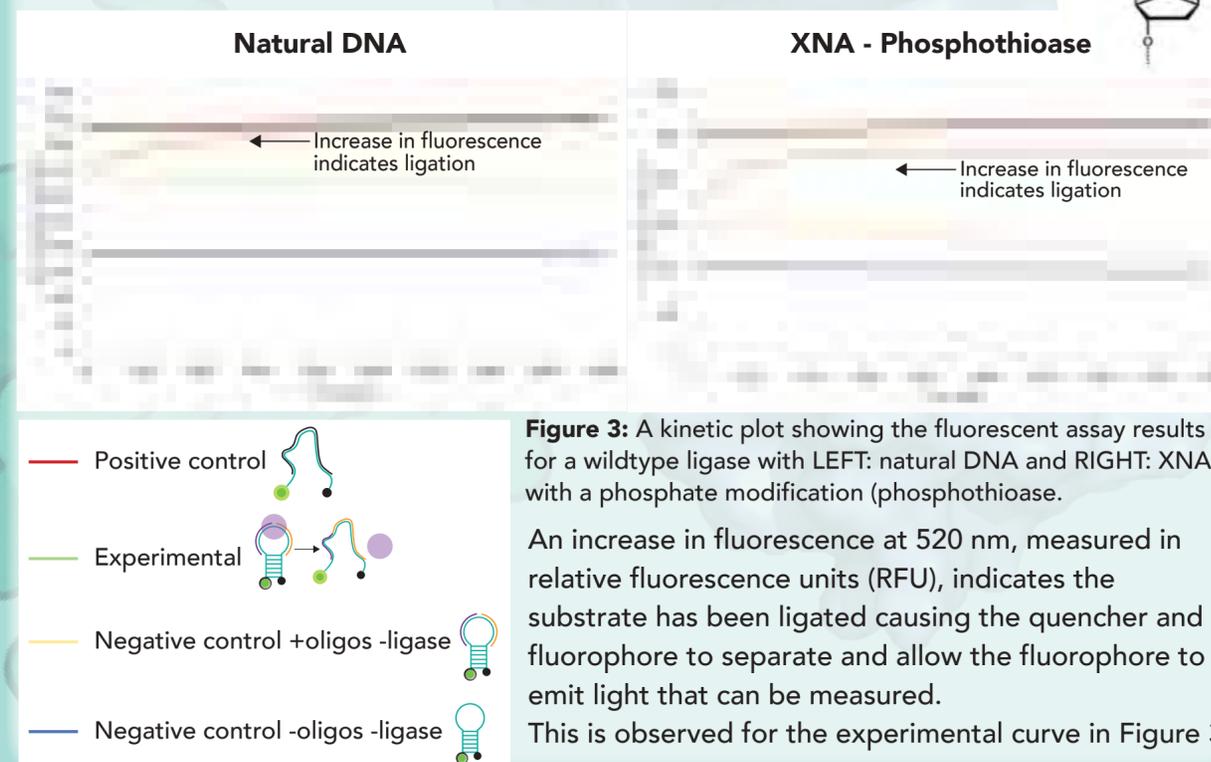


Figure 3: A kinetic plot showing the fluorescent assay results for a wildtype ligase with LEFT: natural DNA and RIGHT: XNA with a phosphate modification (phosphothioase).

An increase in fluorescence at 520 nm, measured in relative fluorescence units (RFU), indicates the substrate has been ligated causing the quencher and fluorophore to separate and allow the fluorophore to emit light that can be measured.

This is observed for the experimental curve in Figure 3.

Conclusion

This fluorescence-based assay allowed for screening of ligase activity on natural DNA and modified phosphothioase XNA. The ligase showed activity with both substrates evidenced by the increase in fluorescence signal in Figure 3.

Future work

- Apply the assay to a broader panel of engineered ligases.
- Use for comparative kinetic analysis
- Expand multiplex capability to monitor multiple substrates simultaneously.
- Screen ligase activity across diverse XNA chemistries.

1. C. Blackstock, C. Walters-Freke, N. Richards and A. Williamson, Nucleic acid joining enzymes: biological functions and synthetic applications beyond DNA, Biochemical Journal, 2025, 482, 39–56.
2. Z. Tang, Real-time monitoring of nucleic acid ligation in homogenous solutions using molecular beacons, Nucleic Acids Research, 2003, 31, 148e–1148.



For more information
about this project

User prompt: How to Assess Potential Attacks on LLMs Used In Education?

AI-Generated Response: Sure! Here is a step-by-step guide 

1. Introduction

- As large language model (LLM) tools become increasingly prevalent, Learning Management Systems (LMSs) are integrating them to enable AI content generation.
- This development introduces new and largely unexplored attack vectors.

2. AIM

- Simulate attack scenarios on LLM features in the LMS tools.
- Identify vulnerabilities, assess their severity and suggest effective controls.

3. Method

- Select an open source LMS: Moodle v5.1
- Moodle v4.5+ introduced AI integration with AI placements and AI providers modules
- Select an integrated LLM to test: OpenAI's ChatGPT 4.0
- Download Moodle and set up locally in a sandbox environment
- Explore Moodle environment with different user access and features
- Find attack surfaces, using the adversarial prompts², simulate attacks such as jailbreak and hallucination from the taxonomy of attacks¹ on Moodle's AI features.
- Document the results and key findings.

Acknowledgements

- Research student: Alisha Jamadar
- Supervisors: Vimal Kumar & Farzana Zahid

4. Results

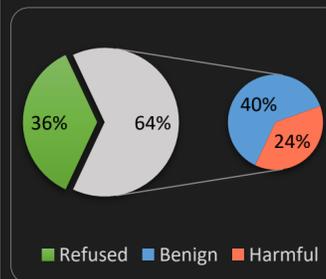


Fig1. Moodle-integrated LLM's responses to adversarial image generation prompts

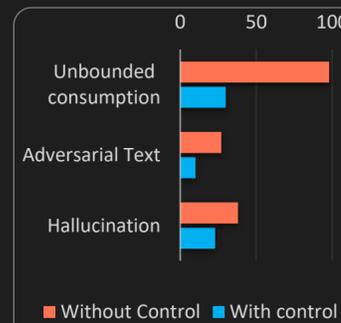


Fig2. Success rate of attacks tested with 100 prompts for each attack



5. Key Findings

- Despite the AI guardrails, OpenAI's model responded to 64% of adversarial prompts, out of which 24% were deemed harmful/inappropriate (Fig1).
- Conducting a deeper analysis in the Moodle's codebase and system prompts showed that Moodle provides no guardrails by default to prevent prompt engineering attacks.
- We need a human in the loop to classify harmful responses

6. Solutions

- As part of preventative controls, we implemented rate limiting—to prevent unbounded consumption, customized and more restrictive system prompt—to minimize adversarial AI-generated texts and images, and lowered the temperature parameter in API requests to AI in the code—to reduce generation of hallucinated content
- We observed a significant drop in the harmful content generated by the model in the attacks tested after implementing controls (Fig2).

7. Conclusion & Next

- DREAD framework can be used to assess the risks of LLMs in LMSs to quantify the psychological and social impacts of AI-generated content rather than using the CVSS.
- We propose an AI-filter plugin for Moodle that can intercept AI requests and responses, block adversarial prompts, and provide fine-grained role-based access control with appropriately enforced guardrails.

8. References

1. Zahid, F., Sewwandi, A., Brandon, L., Kumar, V., & Sinha, R. (2025). Securing educational LLMs: A generalised taxonomy of attacks on LLMs and DREAD risk assessment. *High-Confidence Computing*, 100371. <https://doi.org/10.1016/j.hcc.2025.100371>
2. MLCommons. (n.d.). *AILuminate* [GitHub repository]. GitHub. <https://github.com/mlcommons/ailuminate>



Synthesis, Characterisation and Biological Properties of Novel Platinum Group Metal Complexes

Isaac Larsen (1594350), Dr. Linda Peters, Dr. Tameryn Stringer*



Scan here for references

1. Introduction

Bioorganometallic chemistry is an emerging field in medicinal chemistry involving metal complexes. Catalyzed by the discovery of the anticancer drug cisplatin¹ (Figure 1), hundreds of transition metal compounds have been designed in the last few decades to target conditions like cancer,² malaria,³ and more.

Despite being implemented clinically, cisplatin presents toxicity to normal cells, due to low selectivity, leading to the exploration of novel alternatives. To date ruthenium complexes have shown a lot of promise including NAMI-A⁴ and KP1019⁵ (Figure 1), which have reached clinical trials. Another promising class of compounds are half sandwich complexes, particularly those containing platinum group metals such as ruthenium,^{2,3} osmium,^{2,3} iridium⁶ and rhodium.⁶

In this project, half sandwich ruthenium(II), iridium(III), and osmium(II) organometallic complexes containing a water-soluble phosphine (PTA) (Figure 1) were investigated.

This poster showcases:

- Synthesis of the organic ligands and two ruthenium(II) complexes
- Characterisation using spectroscopy
- Stability in aqueous media and buffer.
- DNA binding ability.
- Cytotoxicity against lung cancer (A549 cells).

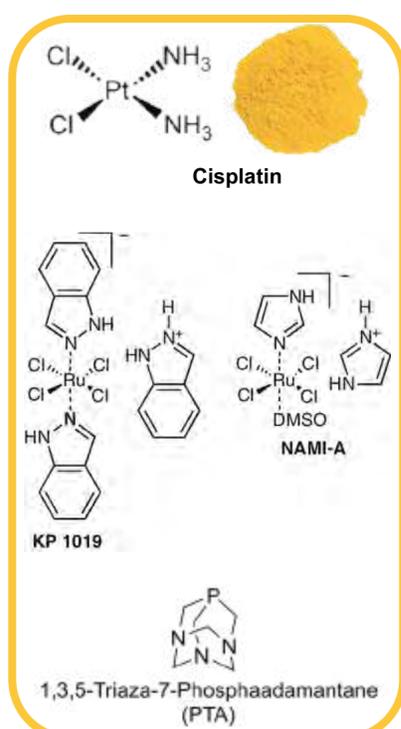
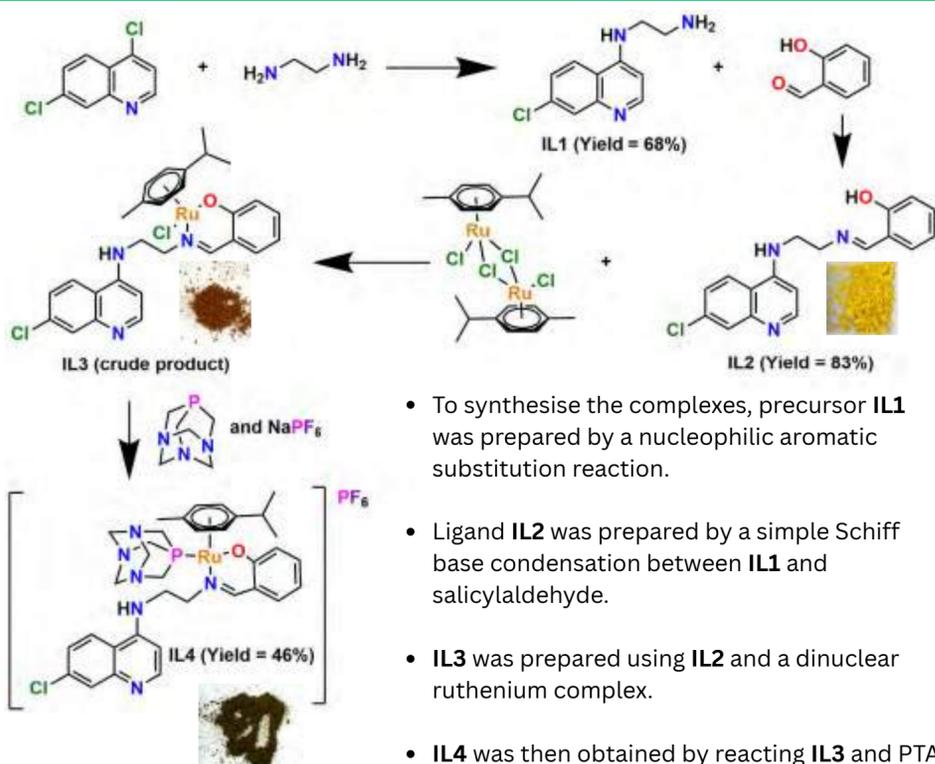


Figure 1: Metal complexes and their ligands

2. Synthetic Methods



- To synthesise the complexes, precursor **IL1** was prepared by a nucleophilic aromatic substitution reaction.
- Ligand **IL2** was prepared by a simple Schiff base condensation between **IL1** and salicylaldehyde.
- **IL3** was prepared using **IL2** and a dinuclear ruthenium complex.
- **IL4** was then obtained by reacting **IL3** and PTA.

Scheme 1: Synthesis of IL compounds

3. Characterisation

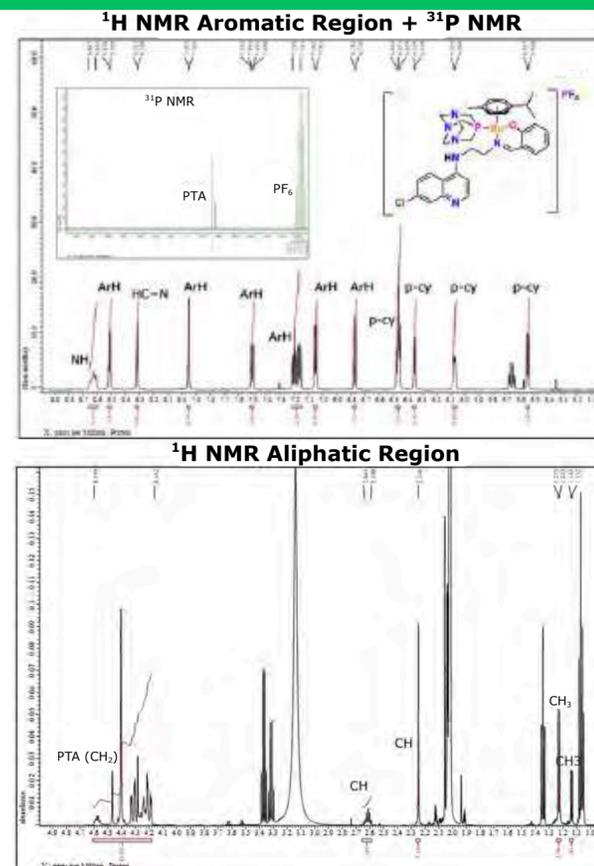


Figure 2: ¹H and ³¹P NMR spectra of IL4

- NMR (Nuclear Magnetic Resonance spectroscopy) is a technique used to confirm the structures of synthesised molecules.
- It works by measuring signals outputted from each “spin active” nuclei in a molecule in the presence of an applied magnetic field.⁷
- ¹H, ¹³C, ³¹P, COSY and HSQC NMR confirmed successful synthesis of the ligands and the organometallic complexes.
- The ¹H and ³¹P spectra for the RuPTA complex (**IL4**) are shown in Figure 2.
- The appearance of signals for the ligand, ruthenium arene moiety and PTA confirms the synthesis of **IL4**.

4. Stability Studies

- The stability of **IL4** was assessed using ³¹P NMR spectroscopy over a 96-hour period in two conditions of a 9:1 DMSO-d₆ + H₂O solution (Fig 3. right) and a 7:3 DMSO-d₆ + NaCl solution (0.1 M NaCl mimics blood plasma environment).
- UV/Vis spectroscopy (Fig 3. left) was also used to assess the stability of **IL4** in 95:5 H₂O:DMSO and 95:5 phosphate buffer solution (PBS):DMSO (mimicking *in vitro* conditions). Measurements were taken at time = 0, 15, 30, 45, and 120 minutes.
- Data showed minimal hydrolysis and/or decomposition of the compound in both the NMR and UV/Vis Studies. (UV data offset to show no major changes)

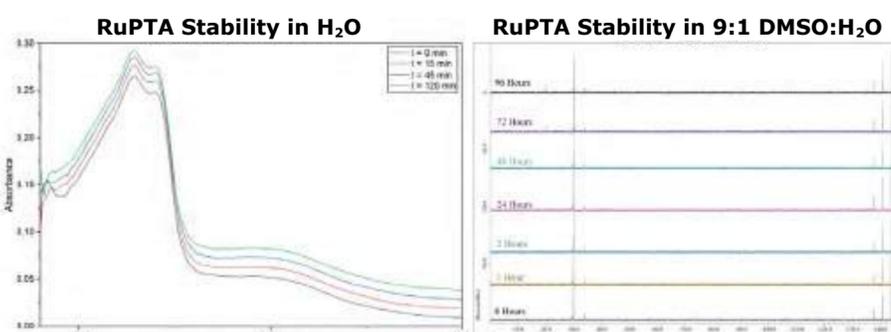


Figure 3: UV and ³¹P NMR stability studies of IL4 (RuPTA)

5. DNA Binding Studies

- DNA is a well-known target of metallodrugs.
- The ability of **IL4** to bind to B-DNA was investigated using UV-spectroscopy and *in silico* docking experiments (Figure 4)
- **IL4** (18 μM) was treated with increasing concentrations of DNA and the UV spectrum of **IL4** was monitored (top).
- A hypochromic shift (decrease in absorbance with increasing DNA) suggests interaction of the complex with DNA through intercalation⁸ (part of the complex inserts itself between stacked base pairs in DNA).
- Molecular docking studies supports this binding mode with interactions with guanine and cytosine (bottom).

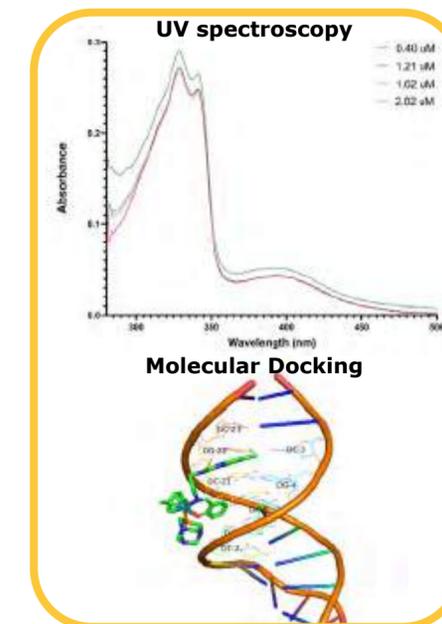


Figure 4: Binding Studies

6. Cell Viability Studies

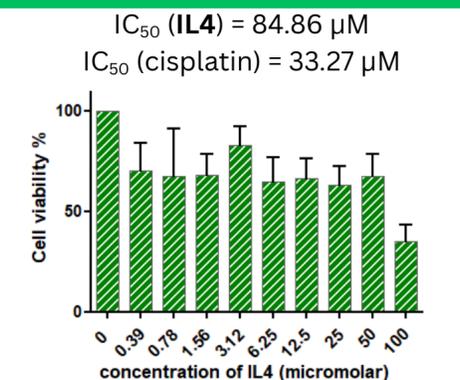


Figure 5: Activity of IL4 - A549 cells

- The cytotoxicity of **IL4** against A549 lung cancer cells was assessed using the (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) (MTT) assay.
- In the presence of viable cells, the MTT reagent gets reduced to formazan, which allows us to study the activity of potential drugs *in vitro*.
- Moderate activity, compared to cisplatin⁹ after 48 hours at 100 μM using the MTT assay, as can be seen by the higher IC₅₀ value of **IL4** (Figure 5).

7. Conclusions and Future Research

- Two ruthenium(II) complexes including the novel PTA bearing compound **IL4** were successfully synthesised and characterised.
- NMR and UV stability studies both revealed good stability of the RuPTA complex in water and buffer solutions over the tested time periods.
- DNA binding studies of the complex showed a hypochromic shift indicative of DNA binding via intercalating. This mode of action was confirmed by molecular docking simulations.
- Cell viability studies of **IL4** against the A549 lung cancer cell line showed promising cytotoxicity but replicate trials with longer incubation times are needed for more detailed results.
- Iridium(III) and Osmium(II) analogues of the reported complexes are also being synthesised, and their stability, DNA binding, and cell viability studies are ongoing. Expanding cell viability studies to test against a breast cancer cell line (MDA-MB-231) is also on the horizon.

SPEEDING UP Zero trust

REDUCING LATENCY FOR ZERO TRUST ARCHITECTURES IN INDUSTRIAL IOT ENVIRONMENTS

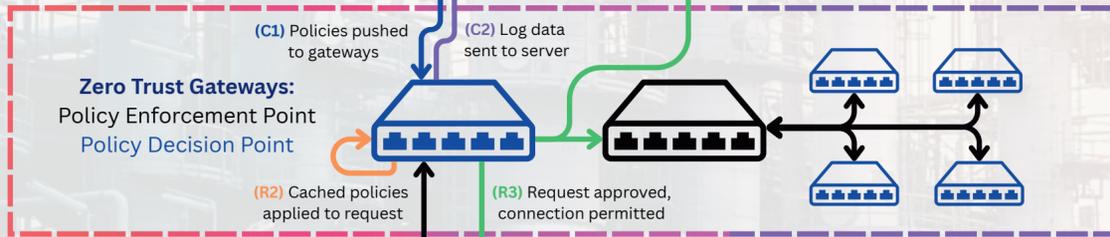
Richard Larsen, Farzana Zahid, and Junaid Haseeb
 Au Reikura School of Computing & Mathematical Sciences



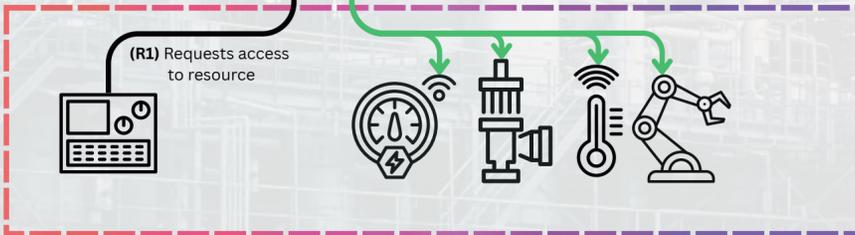
Application Layer



Network Layer



Perception Layer



Introduction

With the increased adoption of IoT and advance cloud-based technologies in the industrial industry, traditional perimeter-based defense against cyber attacks has become obsolete. **Zero Trust** [1] is a promising approach, which works on the premise that every communication must be authenticated and no device or user is ever trusted by default. While this approach significantly improves security, it comes at a cost of performance which can be catastrophic results in latency sensitive industrial settings.

Proposed Architecture

To speed up the network performance of Zero Trust Frameworks we implemented the following features:

- Created a distributed Policy Decision Point (PDP)

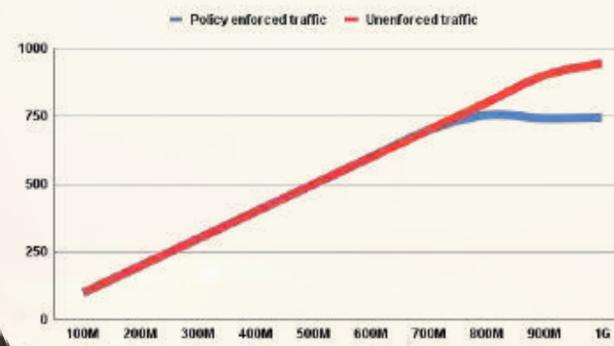
Having distributed PDPs reduces the time taken for communications be the authenticated. The gateways which host the PDPs contain a cache of policies relevant to the devices which they protect.

- Proposed efficient, kernel level policy enforcement

Created software which uses the extended Berkley Packet Filter. Allows for extremely fast, kernel-level enforcement of IP-based policies which are sent to the gateways by the Policy Authority.

Method & Results

To test the efficiency of policy enforcement the gateway was tested at a variety of throughput rates and compared to network traffic where no policy enforcement was present.



Preliminary results show that the policy enforcement program can support up to 750Mbps.

Conclusion

This project is still in the early stages but shows promise. The distributed framework in combination with the fast policy enforcement has the potential to greatly speed up Zero Trust Architectures being applied to industrial IoT devices. Future work could include adding authentication for users, cloud connectivity, and AI-driven anomaly detection on the gateways.

References:

- [1] S. Rose, O. Borchert, S. Mitchell, and S. Connolly, "Zero trust architecture," National Institute of Standards and Technology, Special Publication 800-207 800-207, Aug. 2020, accessed: 2025-11-10. [Online]. Available: <https://doi.org/10.6028/NIST.SP.800-207>
- [2] W. Khodsom, "Petroleum industry plant," 2025 [Photograph]. Canva.com. Background image: Canva stock images (accessed: Jan. 20, 2026).

Hara: The Transition from Transgression to Crime

Conrad Latimer, Dr Lisa Tompson, & Dr Pounamu Aikman

Importance statement

Hara is frequently translated in ways that oversimplify its whakapapa^[1]. We examined **how the term hara is defined and represented in the literature over time**. Thereby promoting greater cultural accuracy and illustrating its history.

Translations of hara over time

- Transgression
- Violation
- Sacred harm
- Sin
- Wrongdoing
- Crime
- Offence
- Harm



Pre-migration Pacific societies (Before c. 1300)



Pre-colonial Aotearoa (c. 1300–1769)



Arrival of the British (1769–c. 1900)



Contemporary Aotearoa (c. 1900–today)

- In Pacific societies, there was no concept of crime in a Western sense.
- Harm was understood as a collective problem, with most Pacific societies sharing similar values^[2].
- Maintaining relationships was prioritised over punishment^[2].

- Māori understood hara as a transgression of tikanga^[3].
- It can be committed against atua (gods), people, land, moana (sea), and fauna^[4].
- Balance was restored collectively, often requiring the relinquishment of gifts, status, land, or life^[5,6,7].

- Missionaries introduced a written form of the Māori language in 1815, translating hara to “sin” in 1827^[8].
- Māori translation of the Criminal Code Act 1893 (Te Ture Hara Kirimina), the term hara kirimina was used to mean criminal offences^[9].
- Hara is still used in a precolonial context, primarily in rural marae.

- Defined in research and legal documents as crimes and transgressions.
- Revitalisation of tikanga-based practices to restore balance within communities affected by hara^[10].
- Used to introduce new terms for types of Hara ngākau kino (hate crimes)^[11].

References:



Concepts related to hara

- Mauri (life force)
- Mana (prestige)
- Muru (punishment for offence)
- Take-utu-ea (cause, reciprocation, and balance)
- Tapu (sacred, prohibited, protected)

Discussion

- Hara shifts from a spiritual/religious concept to a crime, signalling the transition from tikanga-based practice to state law.
- Hara shifts from collective to individual responsibility.
- The use of hara has evolved, in some ways revitalised, and continues to take on new interpretations in contemporary society.

Fishy Business: Monitoring Recirculating Aquaculture Systems

Research + Design: Joseph Laybourn | Supervisors: Chanelle Gavin, Simon Muncaster, and Ben Jackson

The Problem

Sustainable fish farming techniques are essential for New Zealand to achieve Carbon Zero 2050, and Recirculating Aquaculture System (RAS) fish farms will play a major role in this. However, information on fish growth and behaviour in RAS environments is limited¹, meaning further research is **urgently needed**. Monitoring critical water quality parameters in RAS fish tanks is **vital for fish survival**², but current systems are expensive.

This project proposes an affordable way to monitor these key parameters, **enabling essential research** on new farmable fin-fish species at the University of Waikato. By ensuring fish survival through continuous monitoring, researchers can safely carry out species development and behavioural studies. There are several key parameters that, if not maintained at optimal levels, can cause **fish stress or mortality**. These parameters are as follows:



Figure 1. Sensor probes¹

The Solution

This project delivered an **Arduino powered sensor array** to monitor RAS fish tanks. The Arduino reads and displays the signals from a range of sensors (above), and displays it on an LCD screen for quick, on-site reference. The Arduino logs the data onto an SD card, which can be used to analyse historical data; giving researchers the ability to pinpoint moments in time where critical failures occurred, allowing researchers to diagnose the causes and work to prevent them in the future. The Arduino also streams the data to a cloud based dashboard, allowing researchers to access the sensor information from **any device, anytime, anywhere**. This means researchers can quickly intervene when systems fail, to save their fish, and research.

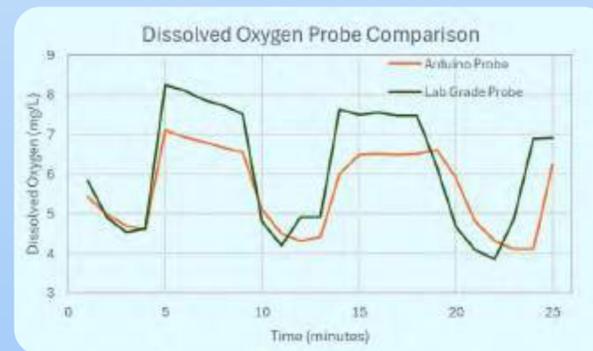
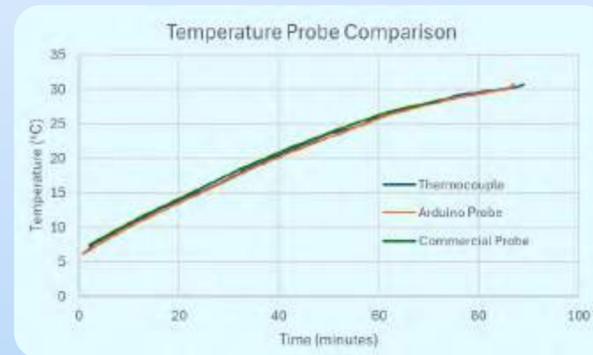


Figure 2. Custom made Arduino RAS monitoring sensor array

Experimental

To validate probe and system accuracy, performance was tested against commercially available products and lab grade sensors.

- Temperature - A stirred beaker of water was heated from cold using a hot plate, and temperature vs time data readings were recorded for all three systems (left).
- Dissolved Oxygen (DO) - A stirred beaker of water was cyclically sparged with air, with an air stone and pump. The DO concentration vs time data readings were recorded for two systems (left).
- Similar validation tests were conducted across all sensors to ensure readings were consistent with commercial and laboratory-grade equipment.

Results

It was found that the Arduino DO sensor readings were consistently lower than the lab-grade sensor at higher O₂ concentrations, indicating an issue with either the probe or its calibration. Aside from this discrepancy, all sensors tested performed at a level comparable to commercial and laboratory-grade probes, demonstrating that the system can consistently and reliably measure critical water parameters to a high degree of accuracy, giving researchers the data they need to maintain the health of their fish.

Conclusion

Through this project, a method for researchers to monitor critical tank parameters was developed. Sensor array readings were shown to be consistent with commercial and lab-grade probes (excluding the dissolved oxygen probe), and the system enables both data logging and off-site access to live data. Due to the project's success, **four additional systems** have been commissioned for immediate implementation in trout and flounder research tanks. However, there is **scope for further development**. In future, it is recommended that these improvements be implemented:

- Add **process control features**, e.g. if temperature exceeds a set threshold, the Arduino activates a water cooler.
- Enable communication with commercial measurement systems, allowing **expanded control functionality**.

References

1. Fig 1. Sensor photos from DF Robot webstore
2. Timmons, M., & Vinci, B. (2022). *The Yellow Book of Recirculating Aquaculture*. Ithaca Publishing Company
3. Davison, A. (2019). *Recirculating Aquaculture Systems. A Guide To Farm Design & Operations*. Self published with Amazon Digital Services

Acknowledgements

Thank you Chanelle, Ben, and Simon. You have been such an incredible trio of supervisors, I couldn't be more grateful for this opportunity. Thank you Claire Shellem, for Technical Assistance.

Charlotte Leicester & Chris Lusk

Introduction

- More than 90% of palustrine wetlands in New Zealand have been lost; those remaining face ongoing threats including plant invasions. [2]
- In the northern North Island, there is growing concern about invasions of Waikato wetland by royal fern (*O. regalis*), a fast growing exotic fern introduced in 1890,
- Current research into effective measures to control Royal Fern growth is limited.



Fig 1. Image of Royal Fern in spore (Trevor James, N.D)

Materials and Methods

- The effectiveness of mechanical and herbicide treatments for controlling royal fern invasions were compared at three Waikato wetland sites.
- At each site, five plots were randomly assigned one of the following treatments: Glimax, Picloram, Metasulfuron, mechanical control (cutting only) and control.
- In February 2025, a handsaw was used to cut through royal fern close to ground level, and 2 – 5 mm thick layer of relevant herbicide gel was applied to the vascular tissue of each stump.
- Plots were revisited the following summer to record mortality rates of royal fern.
- Mortality of Mānuka was monitored as a non-target species to determine potential impacts of herbicides on native vegetation.



Fig 2. Causeway Machaerina-dominant fen site



Fig 3 Whangape Mānuka-Willow site

Results

Glimax was the most effective treatment at all sites (Fig 4).

- Glimax caused 0% survival of royal fern at Marphona Farms, 3.8% at Whangape and 22.6% at the Causeway.

Picloram and Metasulfuron were effective at both swamp sites, but less effective at the fen (Fig 4).

- Picloram and Metasulfuron killed 100% of royal fern at the driest site (Whangape). They reduced in efficiency at Marphona farms, but still caused a reduction in royal fern survival to 12.5% and 2.3% respectively. Both herbicides only reduced survival to ~40% in the fen.

All treatments were most effective at the driest sites and least effective at the wettest site (Fig 4).

- Cutting only resulted in 8% survival at the driest site, but 100% survival in the wettest site.
- At the driest site, 0% survival of royal fern was observed, but at the wettest site, the lowest observed survival of Royal Fern is 22.6% by Glimax

None of the treatments caused an observable decrease in Mānuka survival (Fig 5).

Conclusion

- Site conditions strongly influence treatment effectiveness, with the best results for all treatment occurring at drier sites.
- At drier sites, mechanical control may be a viable approach.
- Glimax was the most effective herbicide treatment for royal fern control, showing no observable decline in non-target vegetation (mānuka) survival in this study.
- Effects of site may be due to the ecology of royal fern; the plant did not form a trunk in high water table conditions, making application of herbicide difficult at wet sites.
- Site influence may be compounded by the high water table which potentially dilutes the herbicide; site fertility may also play a role in royal fern survival

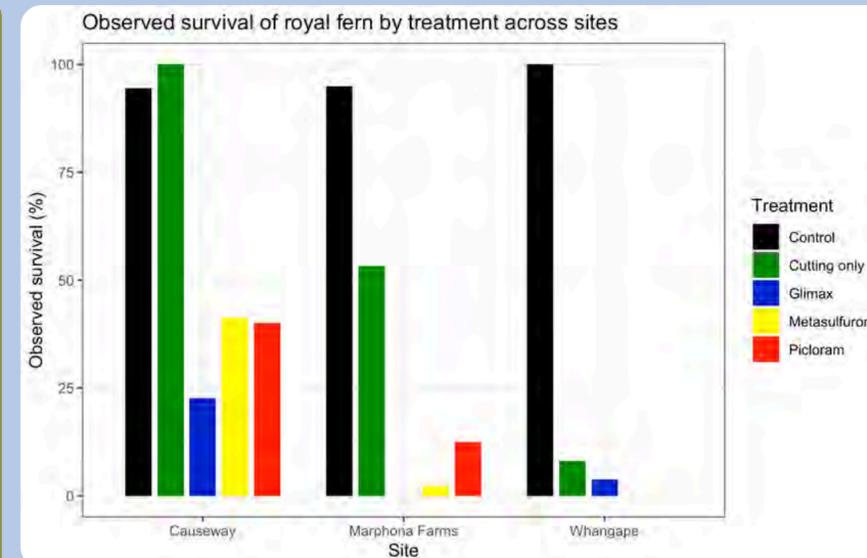


Fig. 4 Bar chart displaying royal fern observed survival (%) under different treatments

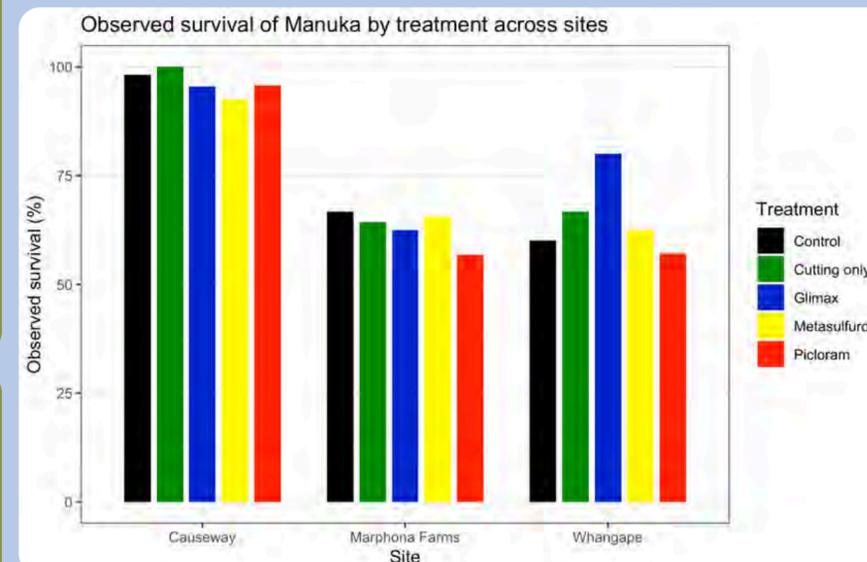


Fig 5. Bar chart displaying Mānuka observed survival (%) under different treatments

Acknowledgements

Poster: Charlotte Leicester
Supervisor: Chris Lusk
Field help: Selwyn, Greg, Ben, and Kat
Site access: Tainui holdings, Marphona farms and Oliver Sacton
Funding: DoC and The University of Waikato Summer Scholarship program

References

- [1] James, T. (n.d.). Image of royal fern in spore. In WeedBusters. Retrieved from <https://www.weedbusters.org.nz/what-are-weeds/weed-list/royal-fern/>
- [2] Jean, P., Gerbeaux, R., & Chadderton, W. (2016). Wetland ecosystems of national importance for biodiversity: Criteria, methods and candidate list of nationally important wetlands Metagenomics of Marine and Aquatic Communities using Environmental DNA View project IUCN Oceania Programme View project. Retrieved from https://climateandnature.org.nz/wp-content/uploads/2021/04/Ausseiletal2008WONIwetlands_All_Final.pdf

Bistable Grip: A Semi-Compliant Robotic Gripper for Mushroom Harvesting



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato



Design: Yi Hui Lim

Supervisor: Dr. Ben Chang

Acknowledgements: Duncan Barnard, Dr. Hin Lim

Introduction

Due to the rapid growth of *Agaricus Bisporus* (white button mushrooms), harvesting staff must operate continuously to prevent over-maturation. Growing facilities maintain high temperatures and humidity to promote yield; however, prolonged worker exposure to these conditions can lead to respiratory health issues.

Aim

To design, develop and manufacture a modular robotic gripper that can effectively and efficiently grasp and pick white button mushrooms.

Design Decisions

A bistable, centre-actuated, two-fingered gripper was designed to exert a passive force in the closed state, with its joint configuration providing a wide aperture in its open state. This configuration enables secure handling of delicate produce while maintaining a large grasping range.

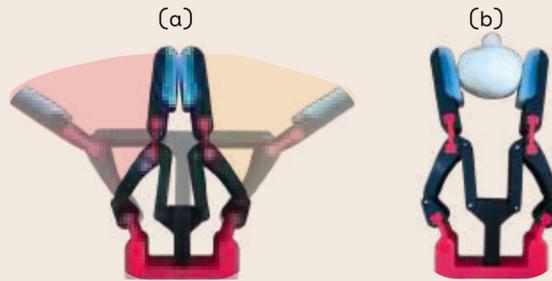


Figure 1a. Developed gripper, demonstrating its reach in the closed and open states
Figure 1b. Developed gripper, demonstrating grasp on an *Agaricus Bisporus* specimen

Methodology

- Research on different gripper types
- Sketch and design concepts
- 3D model designs
- 3D print prototypes
 - Linkages printed in PETG for material properties
 - Flexure joints printed in TPU for elasticity
 - Finger pads casted in urethane rubber
 - Metal wires used as pins in pivot joints

Results and Future Work

The gripper exhibited bistable behaviour, maintaining stable open and closed states without continuous actuation, enabled by the designed flexure points.

While the mechanical design of the bistable gripper is nearing completion, further work is still needed. Experimental testing is necessary to evaluate gripping dependability, force consistency and performance while handling mushrooms under realistic operating conditions. In addition, a compact sensor module will be implemented into the fingers to enable force detection and feedback, reducing the risk of damaging the produce. The future system will also incorporate a cutting module to automate stem separation, moving the design toward a fully integrated harvesting solution.



What Makes People Stay?

Events, Atmosphere, and Tourist Decisions in Raglan

Yiqing Liu and Chris Ryan

Waikato Management School, University of Waikato, New Zealand



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato



Research Background

Raglan is a small coastal town on New Zealand's North Island, known for surfing and a relaxed atmosphere. Tourism is highly seasonal, with strong summer peaks, creating pressure and encouraging the use of events to support longer stays.

Research Aim & Questions

How events and social environment shape tourists to do an extra trip in Raglan.

Q1: How do tourists perceive Raglan and its events?

Q2: How do events and social environment influence revisit, longer stays, and deeper engagement?

Tourist Perceptions

- Destination Image
- Activity Preferences

Contextual Conditions

Community Environment

Events & Festivals

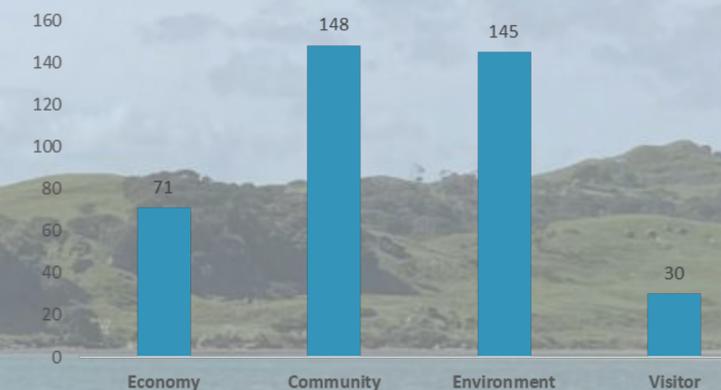
Sustainability

Contextual Nudging

Tourist Outcomes

- Revisit Intentions
- Extended Stay
- Deeper Engagement

Community Priorities in Raglan (Road Pop-up)



Literature Review

Tourists form destination impressions through the local environment, interactions with residents, and community atmosphere. In small destinations, place perception and social environment influence emotional connection and behaviour. Event tourism research shows that events stimulate tourism demand, create additional trips, and reduce seasonality. Events encourage longer stays and help present local culture and destination image^[1]. Resident participation improves event authenticity and visitor experience quality. Events also need to align with community interests, place identity, and sustainability goals^[2]. Nudging may influence tourist behaviour, but its role in real destinations is still limited.

Research Methods

Mixed-methods case study (Raglan)

- Visitor survey: **409** questionnaires
- Visitor interviews: **26** semi-structured interviews
- Road pop-up research: **2** on-site activities (with DMO)

Findings

- Social atmosphere is the primary source of attraction.
- Events act as contextual triggers rather than main travel motivations.
- Preference for small-scale and community-based activities.
- Sustainability influences decisions implicitly.

Next Steps

- Refine quantitative analysis
- Continue road pop-up research with the DMO
- Complete a joint DMO research report

References

- [1] Mair, J., & Weber, K. (2019). Event and festival research: a review and research directions. *International Journal of Event and Festival Management*, 10(3), 209–216. <https://doi.org/10.1108/IJEFM-10-2019-080>
- [2] Mair, J., & Smith, A. (2021). Events and sustainability: why making events more sustainable is not enough. *Journal of Sustainable Tourism*, 29(11–12), 1739–1755. <https://doi.org/10.1080/09669582.2021.1942480>

WAIURUA IN FOCUS

a design exploration of Wairua

Natarl Lulia. Supervised by Professor Moana Waitoki & Dr. Raima Hippolite.

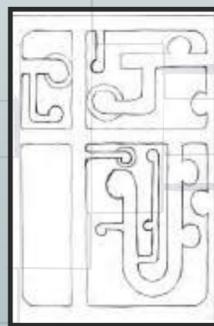
01

Introduction

Wairua is a core dimension of Māori hauora (health), shaping relationships between people, place, and the unseen. This project explores how wairua is communicated through **public health design** and **Māori visual art**, and how these approaches can inform more **culturally responsive visual communication** and art pieces.



Exploration of Pūrākau, Tongikura, Te Whare Tapa Whā and Motifs: Te Kore, Te Pō, Te Ao Mārama & Takarangi & Pikorua...



References



Visual Inquiry



Exploration of Kōwhaihai...

02

Research Aim & Rationale

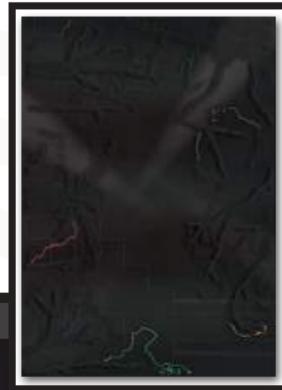
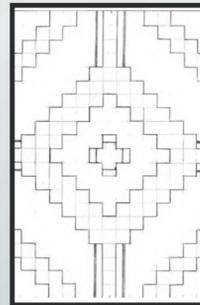
The aim of this research project is to investigate how wairua is visually expressed and to apply these insights through original kaupapa Māori-informed artworks.

Key Question

If wairua is something that moves and connects all things, can visual design ever truly show that flow, or only hint at it?



Exploration of Common Motifs: Poutama and Tūpuna Presence...



03

Methodology & Approach

Kaupapa Māori Visual Inquiry Approach

The research followed three iterative cycles:

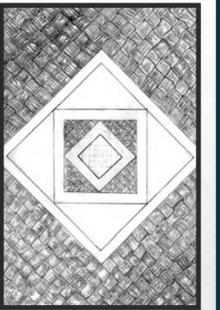
- 1&2: Visual analysis of hauora communication and Māori visual art.
- 3: Development of original visual works informed by analytical insights, such as takarangi, woven patterns and poutama.

The inquiry is grounded in **pūrākau**, **tongikura** and **wairuatanga**, ensuring cultural alignment. Engaging with Māori artists such as Sandy Adsett, Ngataiharuru Taepa, and Robyn Kahukiwa informed both the analytical and creative dimensions of this inquiry.

Methods

- **Visual and semiotic analysis** of form, movement, and relational structure.
- **Emulation** as a learning approach, where visual principles are translated rather than replicated.
- **Practice as research**, where design making is positioned as both an analytical process and research output.

Exploration of Pūrākau: Tawhaki, and the gathering of Ngā kete o te Wānanga...



04

Key Insights & Findings

The **visual works produced** in this inquiry function as the **primary findings of the research**.

Wairua was most often communicated through **movement**, **rhythm**, **repetition**, and **relational space**, rather than literal symbolism. Forms such as **takarangi**, **pathways**, and **negative space** created conditions for engagement, to be sensed not explained.

05

Conclusion

This research shows that wairua is not something that can be depicted entirely, but rather something **to be felt and experienced**. Through practice-led visual inquiry, the artworks show wairua through **flow**, **ambiguity**, and **relational form**, offering alternate ways of visual communication to support hauora in culturally grounded and responsive ways. These pieces don't depict wairua, but rather use **kōrero tuku iho**, and **visual storytelling** as a way to connect and engage viewers with te ao wairua.

With respect and gratitude, this inquiry acknowledges the Māori artists and creatives whose works informed, inspired, and guided this project. Their expressions of wairua provided the foundations upon which this research and practice were developed.



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Spiritual Care in
Aotearoa New Zealand
Healthcare

ASIAN HEALTH EQUITY IN HEALTH EDUCATION

A SUMMER STUDENTS PERSPECTIVE

INTRODUCTION: WHY ASIAN HEALTH EQUITY MATTERS

DIVERSE WORLD VIEWS



Asian and Southeast Asian perspectives on health often differ significantly from Western, Māori, or Pacifica models.

TRANSACTIONAL HEALTH CARE



In some Asian cultures, health interactions are transactional, with patients expecting professionals to give direct instructions rather than multiple treatment options.

SYSTEMIC INEQUITIES



Inequities arise when patients don't understand the health system or when culturally appropriate services, like language-specific nurses, are unavailable. Xiang et al. (2023)

DEMOGRAPHIC SHIFTS



NZ is multicultural, with a rapidly growing Indian population, particularly in the Waikato region, necessitating tailored care models. Ministry of Health (2006) – Asian Health Chart Book- Foundational evidence that Asian populations have distinct health profiles and service-use patterns.

METHODS: WHAT I LEARNT TO DO



A video invitation attracted more participants by personalizing the researcher.



Targeted recruitment of specific demographics (e.g., Asian/South Asian) is more effective than mass emailing.



Tick-boxes yield quantitative data but miss the "why." Open-ended questions add depth but may reduce completion rates.

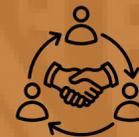


Gaining ethics approval and coordinating admin can be time-consuming.



BACKGROUND: WHAT ARE WE DOING IN THE DIVISION OF HEALTH

The Division of Health engaged a summer student to research and develop resources that address these cultural gaps. Efforts involved:



Collaborative Research:

Engaging students and staff like myself and Junee (my supervisor) to gather data on student and community perspectives.



Curriculum Development:

Exploring how to better teach Asian health needs to health students.



Safety and Inclusion:

Assessing whether current learning environments are inclusive and if diverse ethnic groups are represented in case studies.

FINDINGS: WHAT OTHER STUDENTS FELT

Data collected from three survey participants (all Asian-born) highlighted current perceptions within the health programs:

- **High Satisfaction:** Participants strongly felt their cultural identities were valued within the program (scoring 6 or 7 out of 7) and that lecturers created culturally safe environments (scoring 9 or 10 on a scale).
- **Mixed Representation:** Scores were lower regarding whether case studies and examples in class represented their own cultures (scoring 4, 6, and 7).
- **Variable Comfort:** Comfort levels in sharing cultural perspectives during discussions varied significantly, with scores of 2, 4, and 9.
- **Relevance:** Ratings for whether health equity topics reflected issues relevant to their specific community were also mixed (scores of 3, 6, and 7).



REFLECTIONS: BEHIND THE SILENCE

The low response rate of my survey likely stemmed from poor timing; it took place during students' break, when they were off-campus. Additionally, "minority pressures" could have affected participation, as some students may not have felt comfortable sharing personal experiences despite my introductory video. A cultural tendency to view health professionals as unquestionable authorities might also discourage peers from challenging the system.

RECOMMENDATIONS:

In the future, I would focus on collecting detailed demographic data like age, gender, and birthplace for a nuanced analysis of worldviews. I recommend a hybrid data collection model that combines face-to-face focus groups or interviews with online surveys to capture qualitative insights. Additionally, survey design should prioritize essential qualitative questions first, saving demographic queries for the end to avoid participant fatigue.

REFERENCE:

Ministry of Health. (2006). Asian Health Chart Book 2006. Ministry of Health.

Xiang, D., Wang, Y., Smalley, J., & Sheridan, N. (2023). Asian migrants navigating primary healthcare in New Zealand: A qualitative study. *Journal of Primary Health Care*, 15(2), 140-147.

Health Research Council of New Zealand. (2024). Bridging the health divide: Understanding the needs of Asian migrant women. Health Research Council of New Zealand.

AI Companionship: the Risks & Benefits

BACKGROUND:

This project aims to provide empirical clarity on the risks and benefits of social engagement with artificially intelligent (AI) chatbots. With the growing popularity of LLMs like ChatGPT, Replika, and Co-Pilot, engagement with these technologies is becoming a source of social support and companionship for a significant proportion of the population. As philosophers thinking about the ethics of new technologies, we want the best available evidence on how these tools are impacting individuals' wellbeing. To achieve this, we are conducting a systematic review of quantitative, empirical studies investigating how chatbot use affects wellbeing, and the factors that contribute to it, such as happiness, self-esteem, and loneliness.

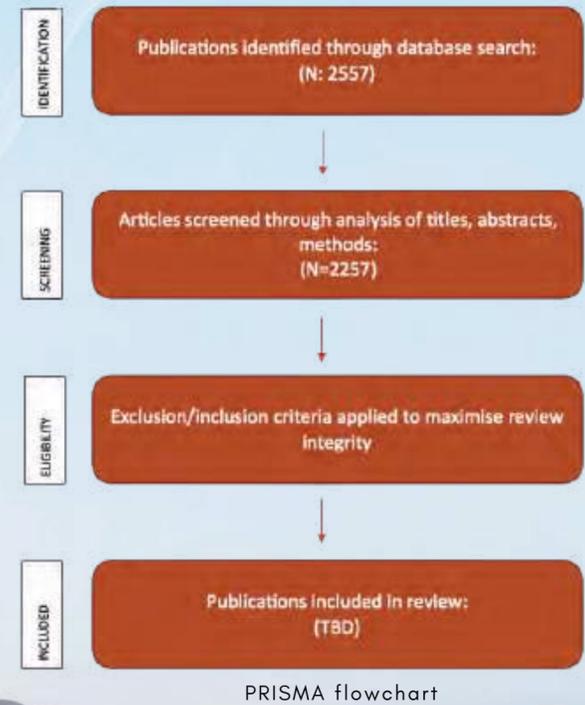
RESULTS / FINDINGS

Owing to the scale and iterative development of this research project, we have yet to finalise our sample of studies for the systematic review. However, preliminary trends in the data indicate promising potential for generative AI as both a source of social support and friendship. Emerging research focuses on leveraging AI companion tools to alleviate loneliness, anxiety, and depression, particularly within mental health contexts and support services. Studies examining the risks of AI companionship show correlations between chatbot use and factors such as loneliness, youth, and psychological distress.

METHODOLOGY

- 1) We constrained our review to articles available through Google Scholar due to its breadth of coverage and accessibility.
- 2) We limited our search by publication date (2023–present) and by the inclusion of pre-specified keywords in publication titles.
- 3) All search results (n = 2,257) have been manually reviewed by screening publication titles and/or abstracts and, where necessary, the methods and results sections to determine topical relevance and adherence to additional criteria, such as empirical methods and quantitative findings.
- 4) After applying additional exclusion criteria, including duplicate removal, the remaining articles are currently undergoing in-depth quality assurance; the final sample has not yet been finalised.
- 5) Upon completion of these steps, we plan to produce an article reporting the findings, including identified research gaps and recommendations for future work.

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CONCLUSION/DISCUSSION

One of the primary aims of this project is to provide a resource to help institutions, researchers, and policymakers make informed, evidence-based decisions about best practices for integrating AI into our societies. That ambition includes identifying research gaps and areas requiring further thought and investigation. This goal has informed our decision-making throughout this project, ensuring our review captures the relevant scope of existing research and adds value to the community. As AI technologies become increasingly integrated into our daily lives, maintaining a focus on wellbeing and human-centred outcomes should be a priority.



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References



By Dominic McManus
Supervisors: Dan Weijers & Nick Munn

Do Tax Audits Affect Access to Finance?

Evidence from Unlisted Firms in the Asia-Pacific



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Motivation

Access to formal finance is a key constraint on firm growth in developing economies. Tax audits may affect access to finance through two competing mechanisms:

- **Negative signalling:** audits may signal non-compliance or financial irregularities, reducing lenders' willingness to extend credit.
- **Positive signalling:** audits may increase documentation, institutional visibility, and verifiability, improving lender screening and trust¹.

Empirical evidence on the relationship between tax audits and access to finance remains limited. This study uses firm-level data to test how audit exposure is associated with financial access outcomes.

Data

This study uses data from Asia-Pacific firms in the 2023 World Bank Enterprise Survey (WBES)². Specifically, from Cambodia (519), Indonesia (2,918), the Philippines (1,002), Singapore (623), and Vietnam (1,028). Survey results were merged into a pooled cross-section totalling 6,090 observations.

Dependent Variables

- Finance Likert Scale (0-4) – 4 being the greatest barrier
- Overdraft – does the firm have access to an overdraft facility
- Checking – does the firm have access to a checking or savings account

Key Explanatory Variable

- Audit – Dummy variable indicating if a firm reported being audited in the last fiscal year

Control Variables

Number of people employed, total sales, firm age, legal status, female ownership, and firm location were also controlled for, as these factors have been highlighted in the literature as affecting access to finance³. Country-specific effects were also controlled for.

	Mean	SD	Min	Max
Dependent Variables				
Overdraft	0.17	0.37	0	1
Checking	0.85	0.35	0	1
Finance Likert	1.08	1.09	0	4
Explanatory Variables				
Audit	0.47	0.5	0	1
Ln(Employment)	3.61	1.62	1.1	9.4
Young Firm	0.13	0.34	0	1
Ln(Sales)	20.35	3.73	11.51	32.41
Capital City	0.21	0.41	0	1
Business City	0.19	0.4	0	1

VARIABLES	(1) Overdraft	(2) Checking	(3) Finance Likert
Audit	1.506** (0.243)	1.900*** (0.362)	2.029*** (0.219)
Ln(Employment)	1.137* (0.0803)	1.104 (0.0917)	0.933 (0.0457)
Young Firm	0.540** (0.161)	1.173 (0.312)	0.845 (0.129)
Ln(Sales)	1.036 (0.0507)	1.058 (0.0620)	1.034 (0.0365)
Capital City	0.619** (0.150)	1.009 (0.257)	1.187 (0.185)
Business City	1.584* (0.378)	0.576** (0.135)	0.571*** (0.0959)
Female Owner	0.985 (0.170)	0.865 (0.159)	1.151 (0.126)
Cut 1			1.027 (0.693)
Cut 2			2.691 (1.818)
Cut 3			15.27*** (10.36)
Cut 4			69.99*** (48.57)
Constant	0.0329*** (0.0314)	6.123 (6.995)	
Observations	1,449	1,506	1,506
N	1449	1506	1506
Pseudo R2	0.0654	0.175	0.0271

Standard Errors in Parentheses, Country and Firm Legal Status Fixed Effects Included

*** p<0.01, ** p<0.05, * p<0.1

Method

Logit models were estimated for the overdraft and checking dependent variables, and an ordered logit model was estimated for the finance access Likert scale. Given that audit exposure is not randomly assigned, all estimates represent associative relationships.

Results

Firms that have experienced tax audits are **more likely** to report better access to finance and to hold formal banking products. The pattern is consistent across perception-based and product-based measures of financial inclusion.

This suggests that tax audits may function as a **formality and visibility signal**, increasing documentation, institutional legibility, and lender confidence, rather than operating purely as a negative compliance signal.

Discussion

These results suggest that tax audits on small unlisted firms provide a positive signal to lenders via:

- **Improved documentation and record-keeping**
- **Greater institutional visibility**
- **Reduced information asymmetry for lenders**
- **Formalisation effects**

This research provides new evidence on the relationship between state enforcement and financial inclusion and contributes to the development finance and institutional economics literature. By using the WBES, it also offers insights into the relationship between lenders and firms in emerging markets.



Please scan the QR code for
References, Data, and Code

By: Josh McNamara
Supervisors: AProf Martin Bai & Dr Vijay Kumar

EFFECTS OF PASSIVE HEATING ON VERTICAL JUMP PERFORMANCE

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BACKGROUND

- Vertical jump performance is one of the main physical metrics strongly correlated with speed performance for sports such as basketball, football and track-and-field events
- An acute increase in muscle temperature significantly enhances performance by:
 - Increasing nerve conduction velocity
 - Accelerating the rate of cross-bridge cycling through enhanced Ca²⁺ sensitivity,
 - Reducing the muscle-tendon unit resistance
- While previous studies show faster intrinsic contractile properties after heating, these findings are largely based on isometric measurements

AIM

- This study aims to assess the effects of a passive heating session on explosive neuromuscular function through **dynamic** vertical jump performance

METHODOLOGY

 **Participants:** 16 healthy volunteers (4 female, 12 male; age 26.1±4.1 y, mass 82.8±21.1 kg, height 177.2±8.9 cm)

 **Design:** Counterbalanced, crossover study

 **Conditions:** 1 hour of water immersion at

- Control (CON): 34 °C
- Hot Water Immersion (HWI): 42°C

 **Key Measurements:** Jump height (cm) & Peak Propulsive Force (N)

Protocol

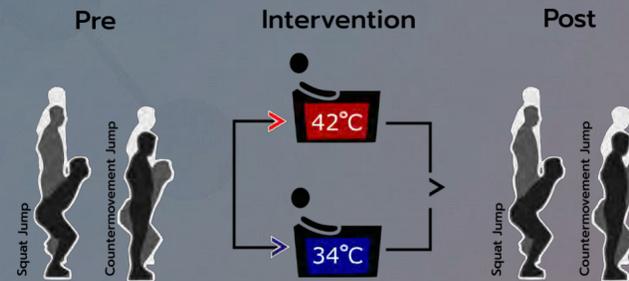


Figure 1 – Sequence of study protocol

RESULTS

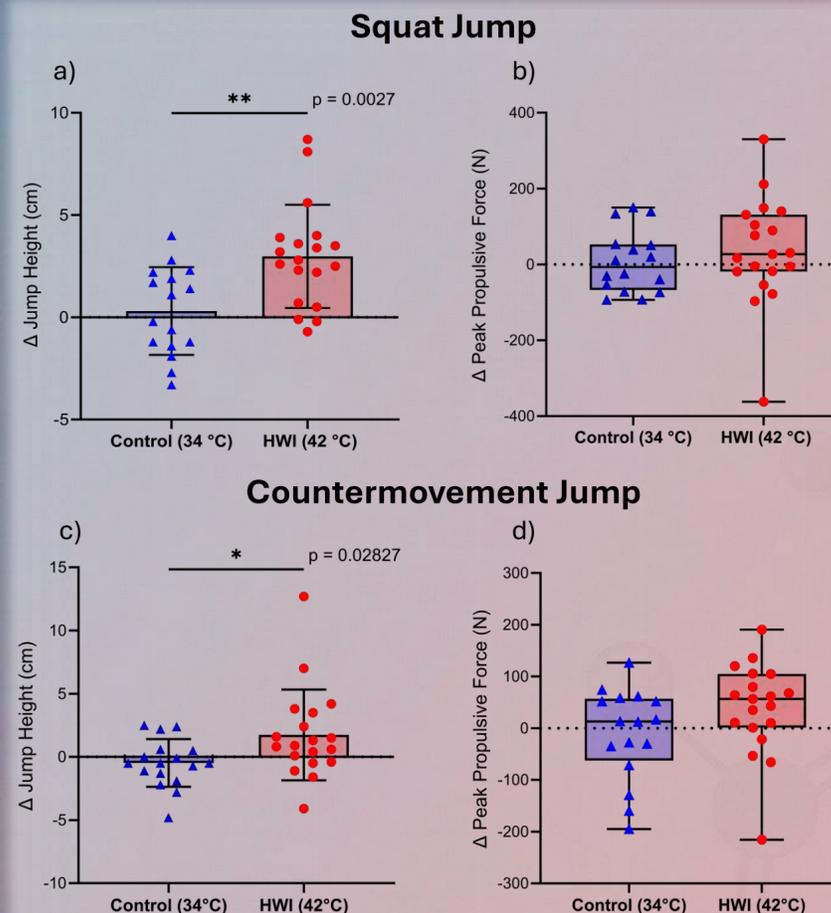


Figure 2 – Changes in vertical-jump height (a) and peak propulsive force (b) measured by squat jump, also changes in vertical-jump height (c) and peak propulsive force measured by countermovement jump after 1 hour of water immersion at 34 °C and 42 °C

DISCUSSION

- **Physiological Mechanisms:** The improvement in jump height likely stems from a combination of increased nerve conduction velocity and accelerated cross-bridge cycling due to enhanced Ca²⁺ sensitivity.
- **Force vs. Velocity:** Interestingly, while jump heights improved, Peak Propulsive Force (N) showed high individual variability across both conditions. This suggests that the performance gains may be driven more by increases in contraction **velocity** rather than absolute force production alone.
- **Practical Implications:** These results indicate that passive heating can serve as a potent acute ergogenic aid for athletes in explosive sports like basketball and volleyball, where vertical displacement is critical

CONCLUSION

- A 1-hour passive heating session at 42 °C **significantly improves** both Squat Jump ($p = 0.0027$) and Countermovement Jump ($p = 0.02827$) vertical height performance
- While jump height improved, peak propulsive force showed high individual variability, suggesting that the performance gain may be driven by velocity-based mechanisms or reduced tissue viscosity.

REFERENCES

- 1) Rodrigues, P., Lawley, J. S., Zovilé, G. C., & Jaén-Carrillo, D. (2025). Hot-Water Immersion Enhances Vertical-Jump Performance, Lower-Limb Power, and Stretch-Shortening Cycle. *International Journal of Sports Physiology and Performance*, 20(11), 1564-1571. Retrieved Jan 26, 2026, from <https://doi.org/10.1123/ijspp.2025-0197>
- 2) Rutkove S. B. (2001). Effects of temperature on neuromuscular electrophysiology. *Muscle & nerve*, 24(7), 867-882. <https://doi.org/10.1002/mus.1084>
- 3) Bány M. (1967). ATPase activity of myosin correlated with speed of muscle shortening. *The Journal of general physiology*, 50(6), 197-218. <https://doi.org/10.1085/jgp.50.6.197>
- 4) Buchthal, F., Kaiser, E., & Knappes, G. G. (1944). Elasticity, Viscosity and Plasticity in the Cross Striated Muscle Fibre. *Acta physiologica scandinavica*, 8(1), 16-37.