Multi-sectoral science communication partnerships:

Theoretical frameworks underpinning initiation and continuation of dialogue with communities

Case study: LENScience

Jacquie Bay
Liggins Institute, University of Auckland
j.bay@auckland.ac.nz

Partnerships enabling science communication & translation: What, Why and How?

Session Aims

- To reflect on current ideas about science communication and translation
- To identify the capabilities required to enable people to participate as critical, informed and responsible citizens who can and do use scientific evidence in decision making.
- To explore the potential of school-science-community partnerships to:
  - develop scientific literacy capabilities during adolescence;
  - facilitate science-community communication enabling the potential for translation of scientific evidence within communities

Who are we and how does that impact our understanding of and approach to science communication?

Field of Professional Expertise

- Education
- Science
- Health
- Social Science

Life Experience

- Culture
- Age
- Community
- Experiences

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

LIGGINS INSTITUTE

LENScience facilitates connections between schools and science organisations;

supporting science education;
enabling science communication & translation

What opinions do we hold about science communication?

Scientists have information that the community needs to hear.

Scientists should decide how scientific knowledge is used in the community.

Being given information makes people change.

If you know something you can communicate it to other people.

STRONLGY AGREE | AGREE | DISAGREE | STRONLGY DISAGREE

I DO NOT KNOW ENOUGH ABOUT THIS TO EXPRESS AN INFORMED OPINION

The process of science is not complete until the community for whom the scientific knowledge has relevance are **able to connect with** this knowledge and **decide for themselves** how to use it within their social context. Sir Peter Gluckman 2011

The Science and Society Challenge

Science Goal: To ensure the science capacities and literacy of New Zealand society so as to promote engagement between Science & Technology and New Zealand society, in turn enhancing the role played by science in advancing the national interest

Societal Goal: To allow New Zealand society to make best use of its human and technological capacities to address the risks and challenges ahead. This requires the better use of scientific knowledge in policy formation at all levels of national and local government, in the private sector and in society as a whole

National Science Challenges Panel (2013) *Report of National Science Challenges Panel,* Wellington, New Zealand

The Science and Society Challenge

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The Panel see this "…*as the most important and of the highest priority, and implementation of this Challenge should be regarded as critical"*

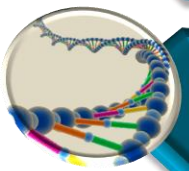
(NSCP 2013, p33).

whole

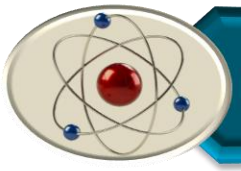
National Science Challenges Panel (2013) *Report of National Science Challenges Panel,* Wellington, New Zealand

21ST CENTURY SOCIETY

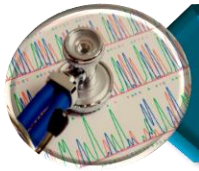
Climate Change



Genetic Modification

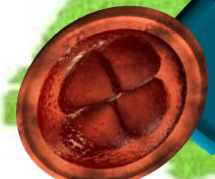


Energy Sources



Personalised Medicine

Noncommunicable Disease Epidemic



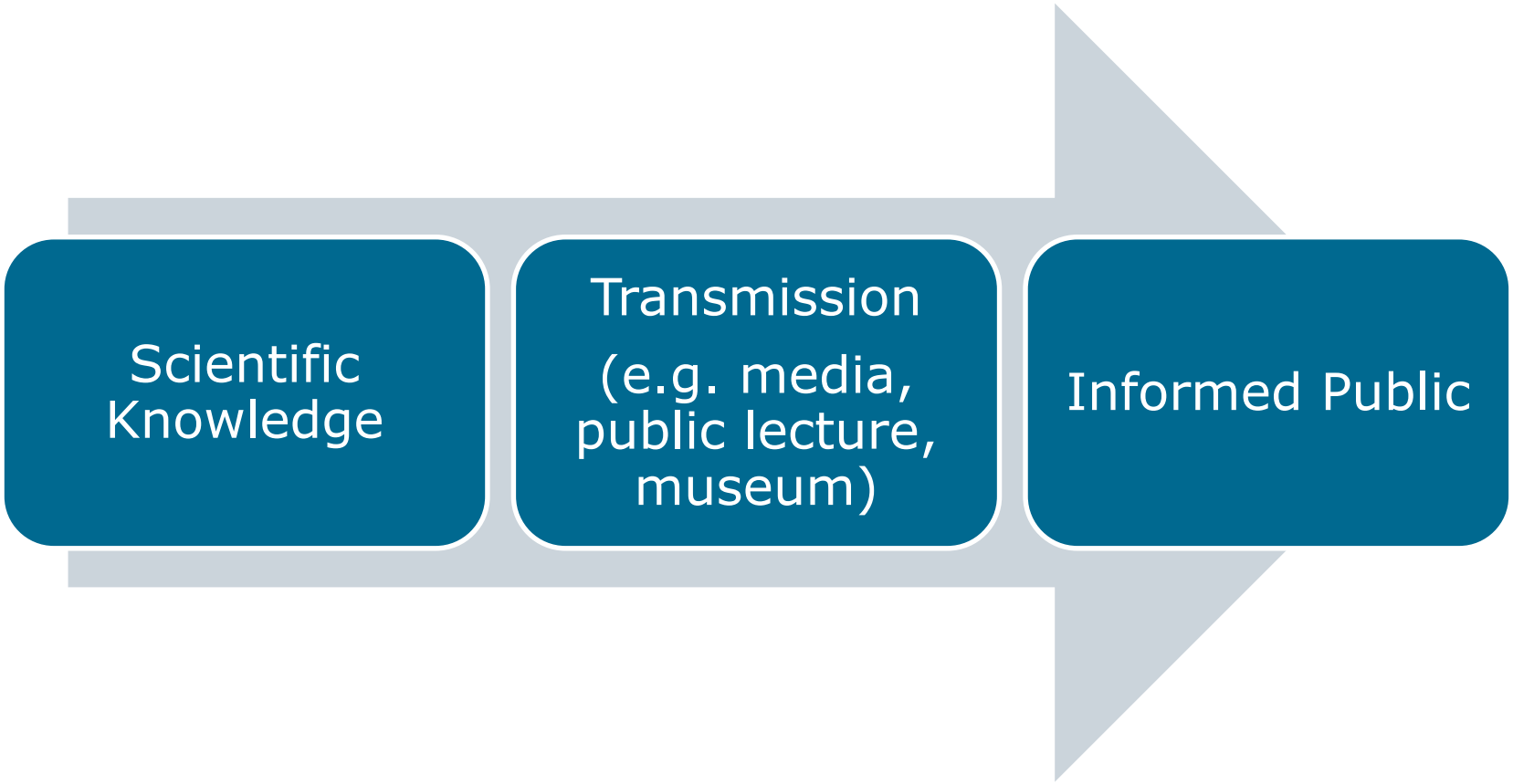
Biomedical Technologies

Access to scientific knowledge: A human right

The Universal Declaration of Human Rights, Article 27(1)

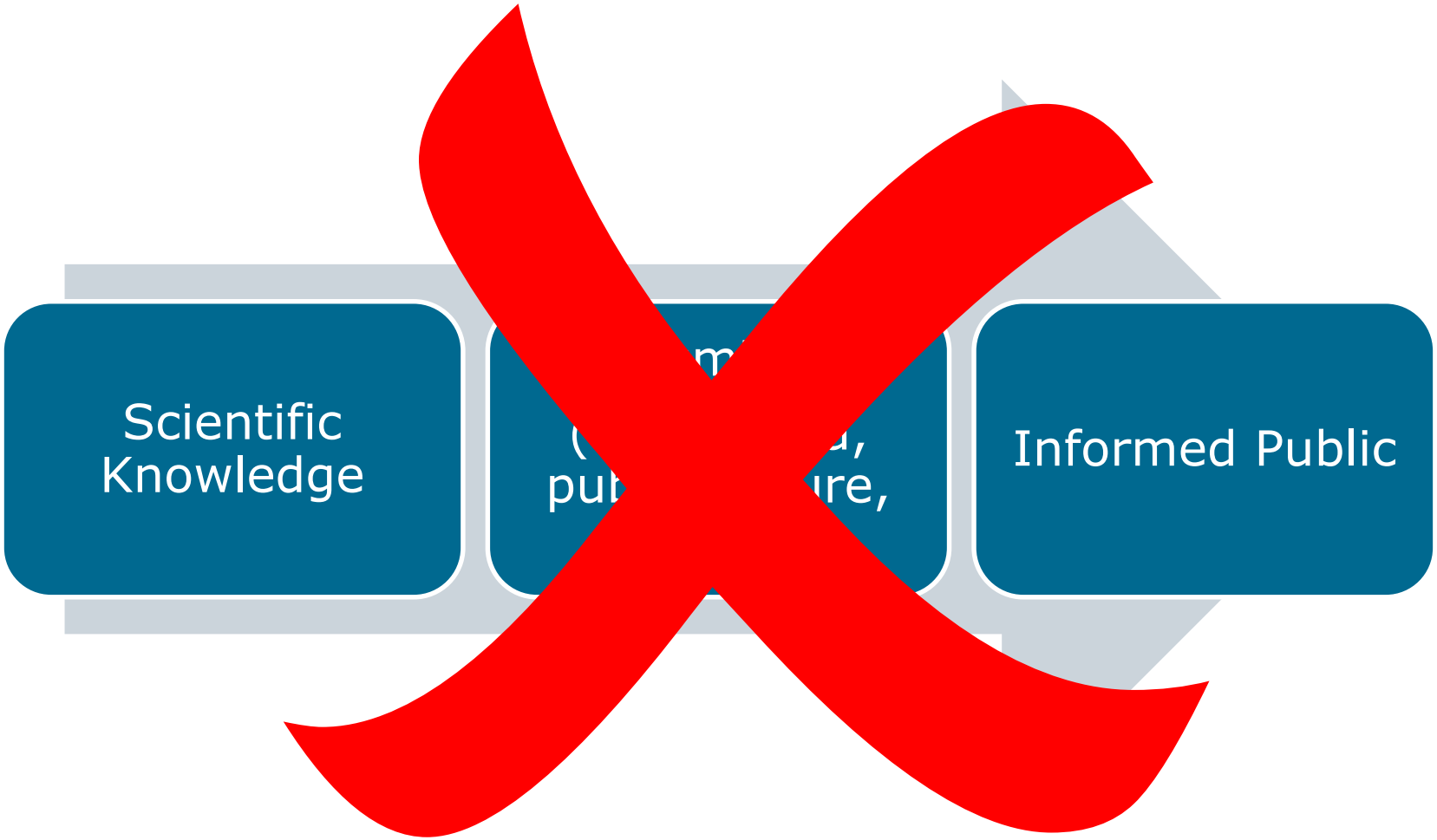
"Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits".

UN General Assembly. Universal declaration of human rights: United Nations 1948 Contract No.: 12.



Flawed 1980's Public Understanding of Science Model

Wynne, B. **(1991): Knowledge in Context,** Science, Technology and Human Values **16(4), 1-19.**



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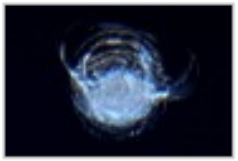
When a window breaks in space

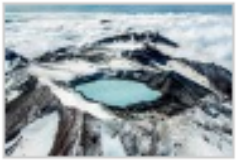


A bit of debris chipped the International Space Station. That's just one piece of a much bigger problem.

Students show off their mussels

Nelson biology students have been investigating aquaculture with the help of Cawthron Institute scientists.

Volcano neighbours told to "be ready"



Volcanologists raised Ruapehu's alert rating to Level two.

Mt Ruapehu 'safe'

Mt Ruapehu's volcanic alert level has been raised but it doesn't mean people can't visit Tongariro National Park.

The Antarctic is shrinking

There are several lines of latitude which define the edge of the Antarctic, but one is on the move.

Effective science communication: Ensuring the right of communities to access, assess, and consider appropriate and contextual use of scientific evidence.

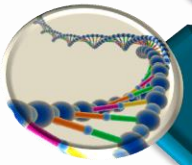
The process of science is not complete until the community for whom the scientific knowledge has relevance are able to connect with this knowledge and decide for themselves how to use it within their social context. Sir Peter Gluckman, RNZ, 2011

"Scientific advice and policy formation now increasingly… [utilizes] a 'co-production' model of policy making, in which ***policy makers, expert advisors and society negotiate*** *to set policy goals and regulatory decisions that are agreed to be scientifically justifiable …as well as socially & politically acceptable".*

Gluckman, P.D. (2011) *Towards better use of evidence in policy formation: a discussion paper.* Office of the Prime Minister's Science Advisory Committee, Auckland, New Zealand

Effective science communication: Ensuring the right of communities to engage in decision making about socio-scientific issues or wicked problems

Climate Change



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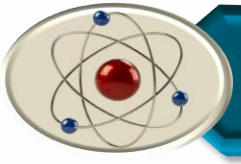

Energy Sources

Food Security

Noncommunicable Disease Epidemic

Biomedical Technologies

Science Communication

TRANSACTIONAL

Relational and committed to long-term partnership

All partners are learners

Listening is as important as speaking

Making (constructing) meaning in context, together

Acknowledging different perspectives that contribute to decision making

Not just about science – social, economic, cultural…

Non-linear: Complex, messy, challenging…

Effective science communication: Ensuring the right of communities to engage in decision making about socio-scientific issues or wicked problems

Require multi-sectoral commitment and cooperation

Multi-sectoral engagement

Multi-sectoral partnerships are recommended where complexity determines that no single sector has the required expertise or resources to bring about change [Bailey 2010].

Known to be challenging, time consuming, and often fail, when successful, multi-sectoral partnerships achieve more collectively than partners achieve alone [Wildridge et al 2004].

Coursey Bailey, S.B. Focusing on solid partnerships across multiple sectors for population health improvement. *Preventing Chronic Disease* 2010, *7*, A115.
Wildridge, V.; Childs, S.; Cawthra, L.; Madge, B. How to create successful partnerships—a review of the literature. *Health Information & Libraries Journal* 2004, *21*, 3-19.

Effective science communication: Ensuring the right of communities to engage in decision making about socio-scientific issues or wicked problems

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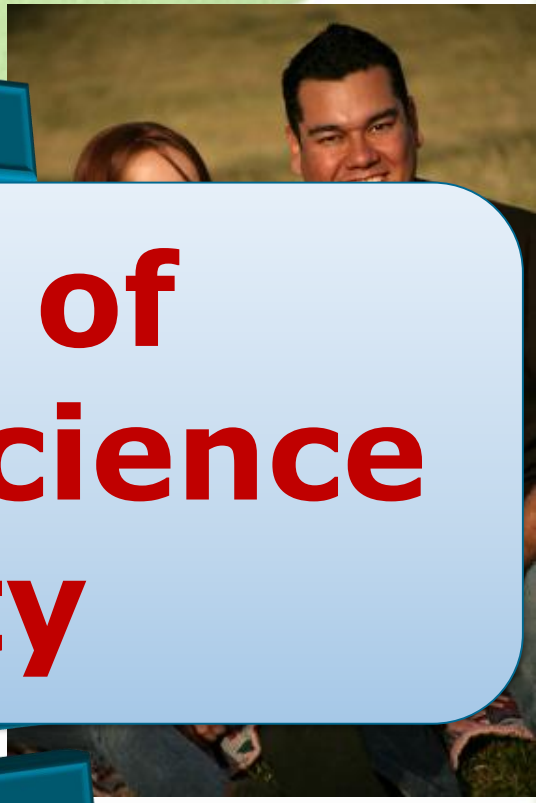


The challenge of complexity – of science and of society

Noncommunicable

Biomedical Technologies

Complex Adaptive Systems

Dynamic, involving multiple elements (agents) interacting non-linearly with each other and the environment.

Elements evolve in response to interactions, influenced by historical and current settings.

Small changes within the system may produce disproportionately significant consequences.
[Snowden 2007; Plesk et al 2001].

Snowden, D.J.; Boone, M.E. A leader's framework for decision making. Harv Bus Rev 2007, 85, 68-76.
Plsek, P.E.; Greenhalgh, T. Complexity science: The challenge of complexity in health care. BMJ 2001, 323, 625-628

Complex Adaptive Systems

Examples of Complex Adaptive Systems

- The Non-communicable Disease Epidemic
- Climate Change
- Many biological systems –
  - The human immune system
  - A flock of birds….
- Many social systems….
  - Schools
  - The health care system

Effective science communication: Ensuring the right of communities to engage in decision making about socio-scientific issues or wicked problems

Case Study:

Science communication in the context of a complex socio-scientific issue

The Non-communicable Disease Epidemic

Cardiovascular Diseases

Such as heart disease, stroke and High Blood Pressure.

Cancers

Such as lung cancer, breast cancer, prostate cancer, bowel cancer.

Diabetes

Including type 1 diabetes, type 2 diabetes, gestational diabetes.

Chronic Respiratory Diseases

Such as asthma and chronic obstructive pulmonary disease (COPD).

Mental Health Conditions and Neurological (brain) Diseases

Such as depression, Alzheimer's disease, dementia.

- The world's biggest killer
- 36 million deaths per year
- 63% of deaths globally

Recognition: ***The need for multisectoral approaches***

2011 UN High-level Meeting on NCDs: Political declaration

Clause 21: *Recognised social and environmental determinants of NCD risk*
Clause 26: *Recognised the contribution of developmental processes*
Clause 43: *Recognised the need for multisectoral population wide interventions*
Clause 43b: *Recognised the role of education in & out of schools in furthering prevention & control of NCDs*

2013 WHO Global Action Plan for Prevention & Control of NCDs

Develop, strengthen and implement, as appropriate, multisectoral public policies and action plans to promote health education and health literacy, including through evidence-based education and information strategies and programmes in and out of schools……

The Non-communicable Disease Epidemic

Cardiovascular Diseases

Such as heart disease, stroke and High Blood Pressure.

Cancers

dementia.

NCDs:

Why partner with schools? Evidence-based decisions for partnerships

- 36 million deaths per year
- 63% of deaths globally

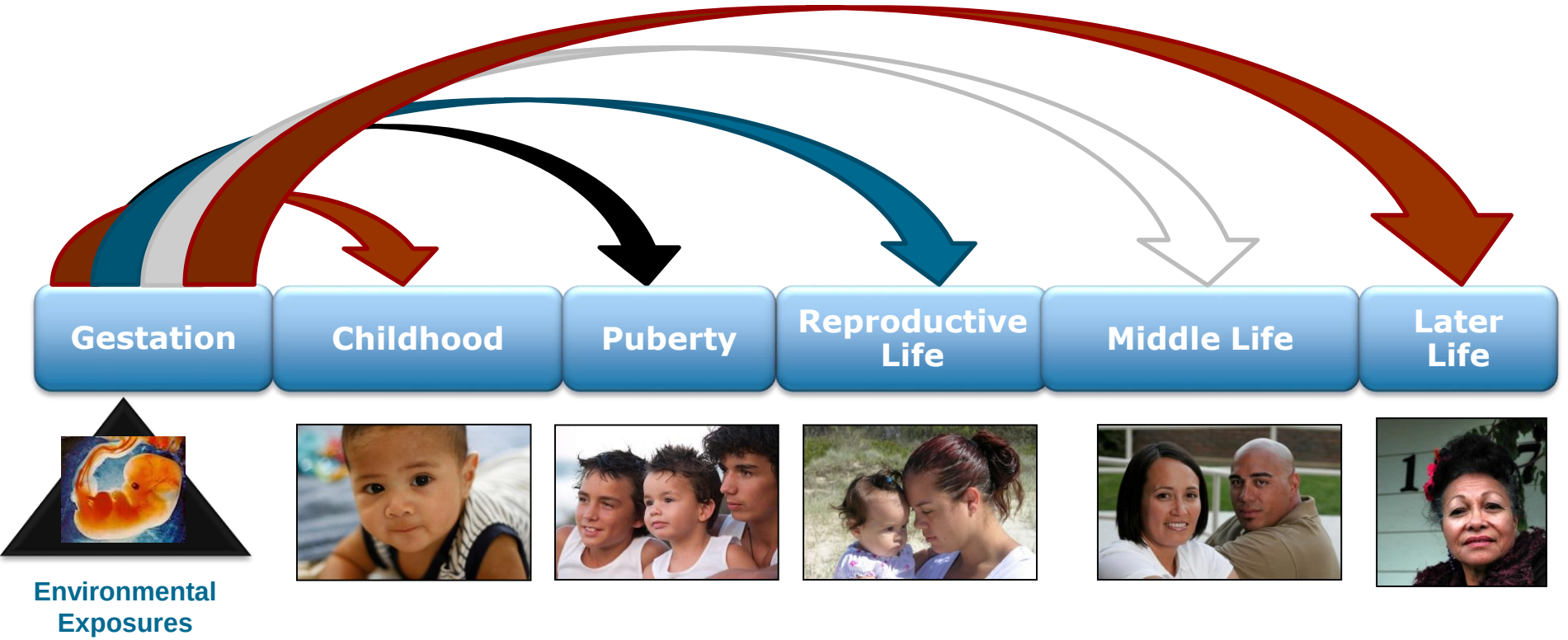
Exploring, and Making Decisions about NCD Risk

Requires scientific and health literacies

Exploring, and Making Decisions about NCD Risk

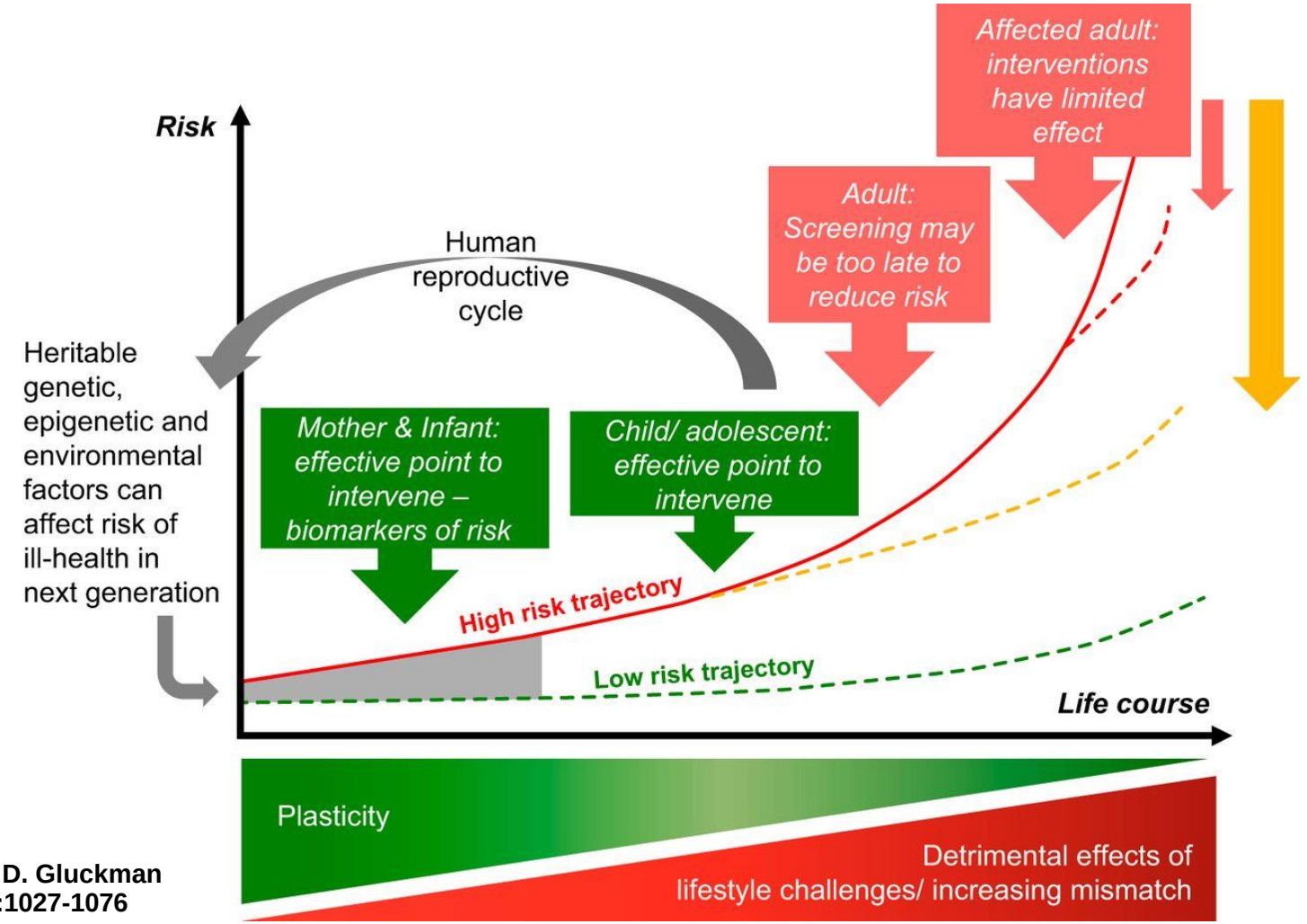
Requires scientific and health literacies

Developmental Origins of Health & Disease: Developmental Exposures Impact Disease Risk Throughout Life



Case Study: *Communication and translation of DOHaD evidence to support transgenerational NCD risk reduction*

Life-course view of noncommunicable disease (NCD) risk.



M. A. Hanson, and P. D. Gluckman
Physiol Rev 2014;94:1027-1076

Transgenerational Opportunity:
Adolescence – before the horse has bolted!

- Adolescence is a determining point for nutritional, physical activity and cognitive behaviors that persist into adulthood and influence future health.
- Consequently these behaviors will influence periconceptual environmental exposures, as well as health prior to conception.
- Even if pregnancy is a considerable distance from adolescence, behaviors that develop during adolescence contribute towards later-life NCD vulnerability in offspring.
- Thus, adolescence is a life-stage offering significant potential for transgenerational primary prevention of obesity and NCD risk.

Recognition: ***The need for multisectoral approaches***

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Recognition: ***The need for multisectoral approaches***

2011 UN High-level Meeting on NCDs: Political declaration

Case Study:
Challenging the status quo –
- lack of SHARED VISION

Control of NCDs

Develop, strengthen and implement, as appropriate, multisectoral public policies and action plans to promote health education and health literacy, including through evidence-based education and information strategies and programmes in and out of schools……

Sense-Making in Complex Adaptive Systems

The NCD epidemic and schools are both complex adaptive systems

Sense-making is a social processes involving exploration and interpretation of divergent perspectives to make sense of and respond to current and future issues [Snowden 2005].

The Cynefin model, describing knowledge in relation to cause and effect as known, knowable, complex (or emergent) and chaotic [Kurtz & Snowden 2003] supports this process.

While developed for organizational management, it is applicable to health [Van Beurden et al 2011] and education [Rosebery et al 1998], and useful within multi-sectoral planning and resultant interventions.

Multisectoral partnerships: ***Critical factors***

Shared vision if the most significant critical success factor (Wildridge et.al 2004)

Lack of connection to the core mission of the school is the most common reason for FAILURE of school-based health-promoting programs
(Waters et.al 2011)

Lack of connection to the core mission indicates lack of shared vision.

Differing goals lead to devaluing of others' strategies, limiting success.

(Fawcett et.al 2010)

Wildridge, V.; Childs, S.; Cawthra, L.; Madge, B. How to create successful partnerships—a review of the literature. Health Information & Libraries Journal 2004, 21, 3-19.
Waters, E.; de Silva-Sanigorski, A.; Hall, B.J.; Brown, T.; Campbell, K.J.; Gao, Y.; Armstrong, R.; Prosser, L.; Summerbell, C.D. Interventions for preventing obesity in children. Cochrane Database Syst Rev 2011, 12, CD001781.
Fawcett, S.; Schultz, J.; Watson-Thompson, J.; Fox, M.; Bremby, R. Building multisectoral partnerships for population health and health equity. Preventing Chronic Disease 2010, 7, A118

Multisectoral partnerships: ***Critical factors***

Shared vision if the most significant critical success factor (Wildridge et.al 2004)

What happens when you introduce sense-making into the planning of science communication and translation programmes?

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Listening to partner perspectives…

World Health Organization

Health topics | Data | Media centre | Publications | Countries | Programmes | Governance | About WHO | Search

Commission on Ending Childhood Obesity

- Commission on Ending Childhood Obesity (ECHO)
- About the work of the Commission
- Working Groups
- Information resources

Commissioners hear from young people about preventing childhood obesity

WHO/C. Dewan

28 July 2015 - Auckland, New Zealand. The Commissioners visited Tamaki College secondary school in Auckland, to hear from young people, as part of the regional consultation with Pacific Island Countries and Territories. The students, many from Pacific Island communities, told the Commissioners that overweight, obesity and type-2 diabetes are very common in their community and serious health concerns for many of their families. They discussed what actions they felt need to be taken to tackle this issue.

Read the full story

Highlights

Draft Final Report of the Commission open for comment

Commissioners hear from young people about preventing childhood obesity

Commission consults with the Eastern Mediterranean

Shared Vision: ***Must include respect for sector-specific vision***

A world free of the avoidable burden of NCDs

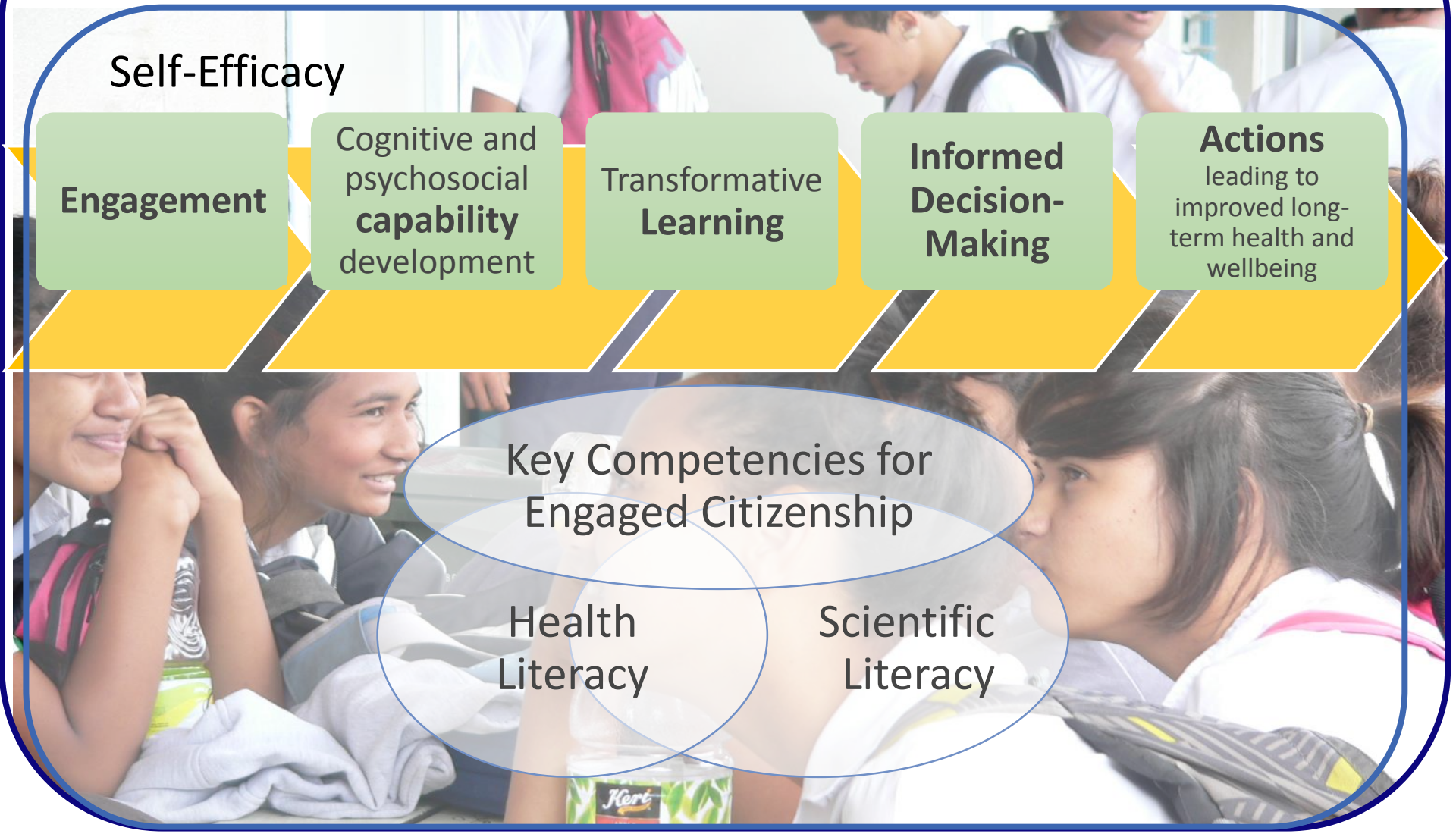
Improving nutrition and associated factors in childhood and adolescence, supporting transgenerational NCD risk reduction.

Empowering adolescents as life-long learners capable of engaging in current and future issues; negotiating ethical dilemmas, conflicting evidence, and application of evidence within the frame of social and cultural values.

Development of capabilities empowering adolescents to participate as critically engaged citizens, using evidence-based health-promoting actions to facilitate reduction in NCD risk for themselves, their potential future offspring, and their families, and contribute towards reducing negative social and economic impacts of NCDs in their communities.

World Health Organization. Global action plan for the prevention and control of noncommunicable diseases 2013-2020. 2013.
World Health Organization. Draft final report of the commission on ending childhood obesity; World Health Organization: Geneva, Switzerland, 2015.
United Nations General Assembly. Political declaration of the high-level meeting of the general assembly on the prevention and control of non-communicable diseases. United Nations: New York, 2011.
Hipkins, R.; Bolstad, R.; Boyd, S.; McDowall, S. Key competencies for the future. NZCER Press: New Zealand, 2014.

Context: Personal, Social and Environmental



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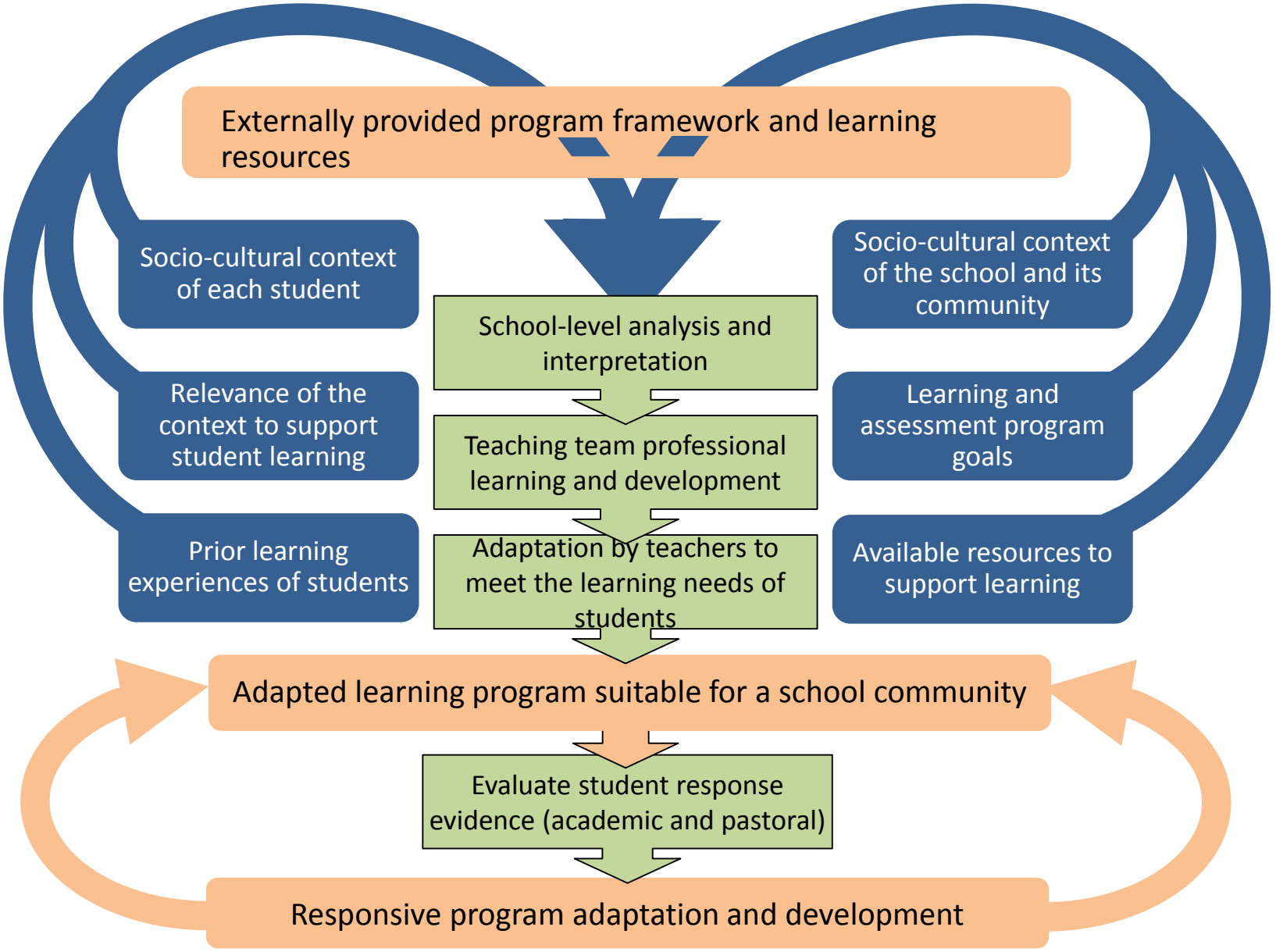

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Recognition of the NEED for SHARED VISION

2015: Commission on Ending Childhood Obesity: Final Report

Implement comprehensive programs that promote healthy schools and health and nutrition literacy among young people.

As teenagers are the next generation of parents, the importance of health and nutrition literacy in the teenage years cannot be overestimated – indeed the school years and the mainstream curricula offer important opportunities for progress.

Life course education in schools should be co-constructed with teachers, according to educational criteria and embedded in core curricula subjects.

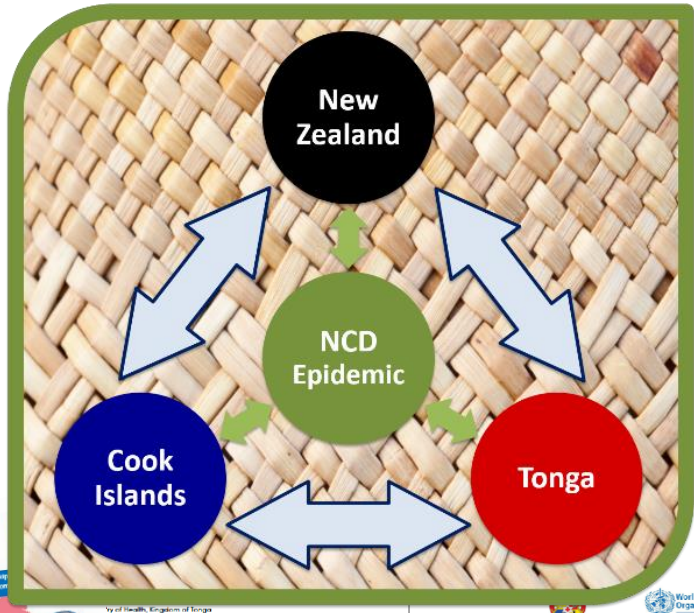
Recognition of the NEED for SHARED VISION

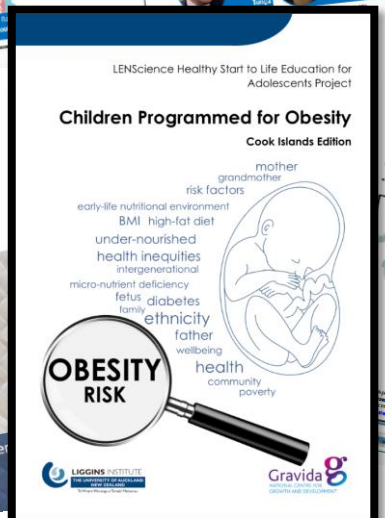
2015: Commission on Ending Childhood Obesity:

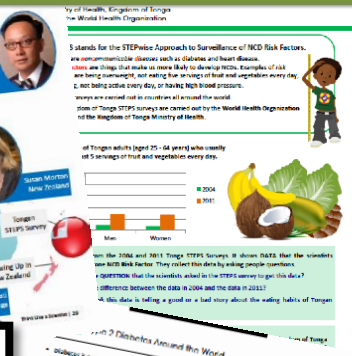
The evidence: The impact of introduce multi-sectoral perspectives and sense-making into the planning of science communication and translation programmes?

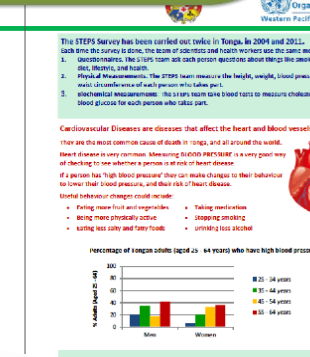
Healthy Start to Life Education for Adolescents Project:

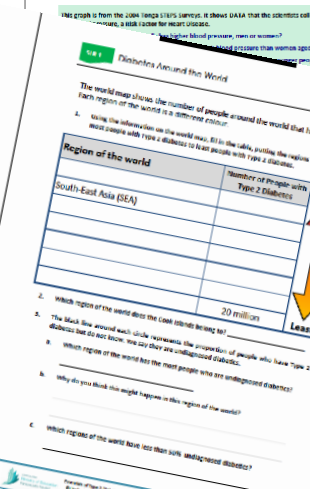
- *New Zealand*
- *Tonga*
- *Cook Islands*
- *United Kingdom*





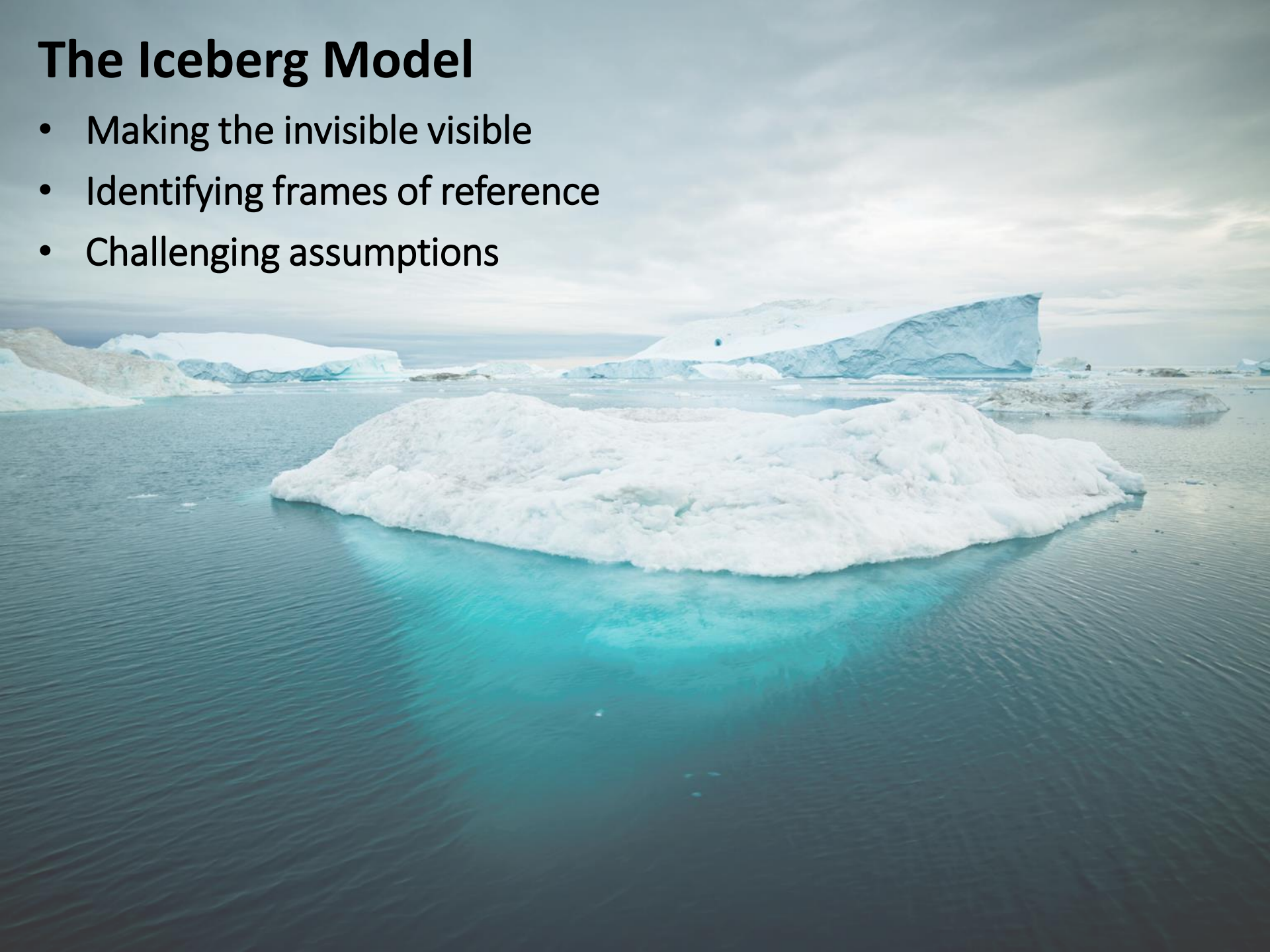






The Iceberg Model

- Making the invisible visible
- Identifying frames of reference
- Challenging assumptions



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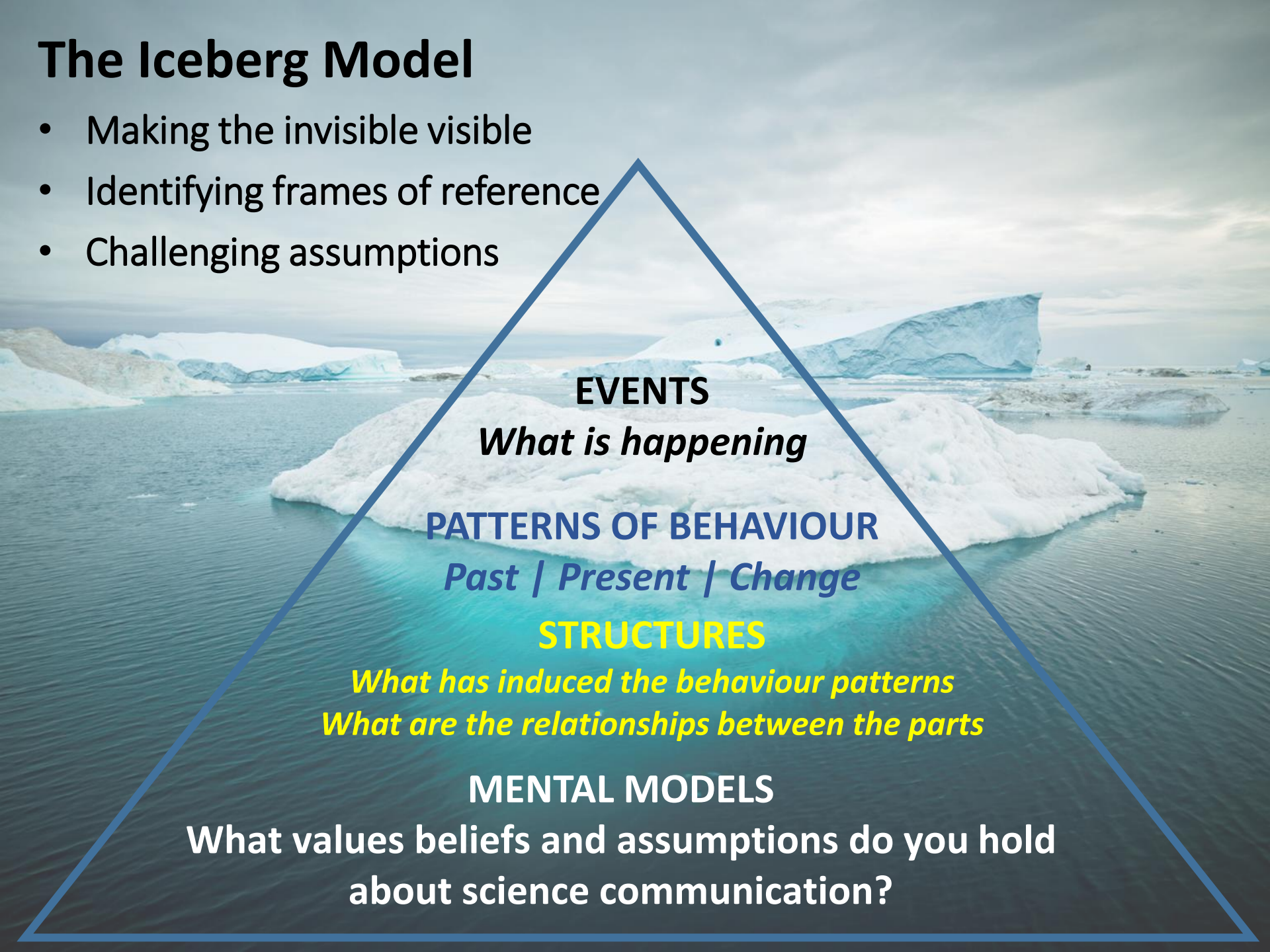


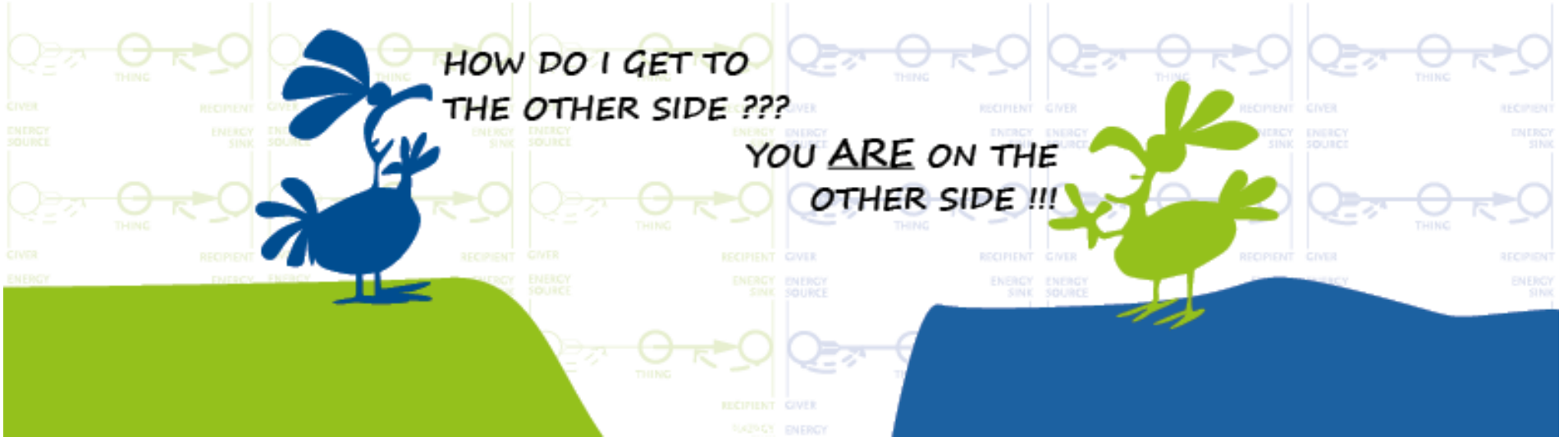
Frames of Reference

- In physics a frame of reference is the point of view from which we observe an object

Image from : https://share.ehs.uen.org/taxonomy/term/238?page=54

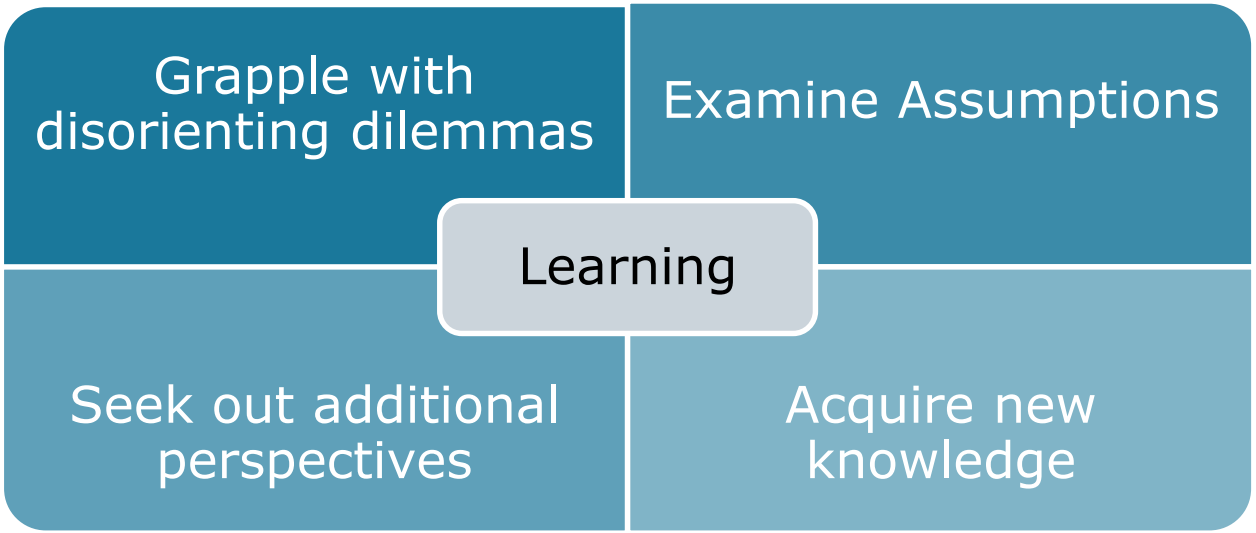
Frames of Reference: Making the invisible visible

- When we interpret another persons point of view from our angle, we allow our preconceived notions and prejudices to influence our interpretations.
- A persons frame of reference is based on their socio-ecological context including experience, education, cultural, social and physical exposures, resources, community, family, personality and personal situation (physical, mental and emotional).
- Understanding **our own frame of reference**, and experiencing **exposure to others frames of reference**, can be transformational



Transformative Learning (Mezirow, 1994)

"Transformative learning is the process of using prior interpretation to construe a new or revised interpretation of one's experience in order to guide future action." Mezirow 1996

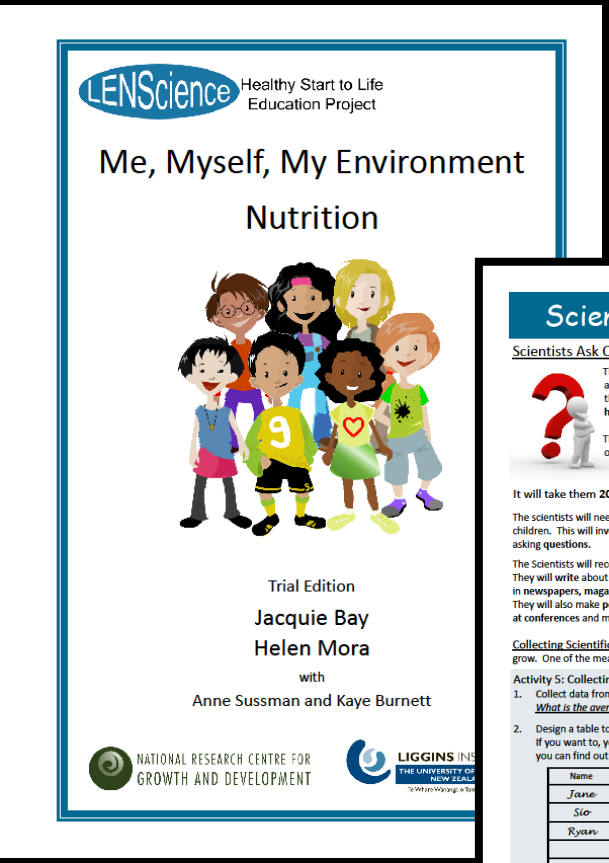


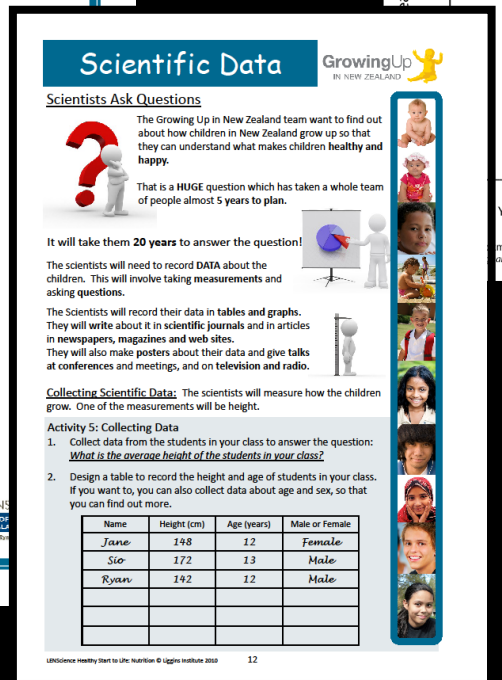
This can lead to:

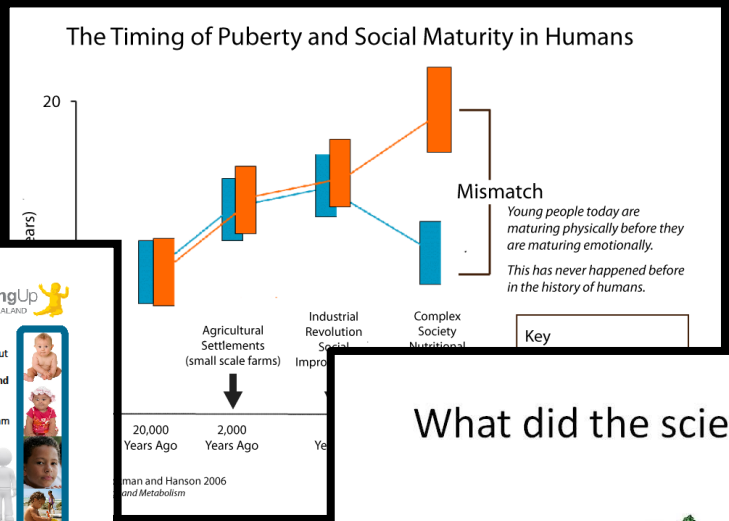
- *Planning a course of action*
- *Acquisition of knowledge and skills to implement the plan*
- *Testing out of new roles or perspectives*
- *Building competence and confidence in new roles and perspectives*
- *Reintegration of the new perspectives into ones life – i.e. a change in frame of reference.*

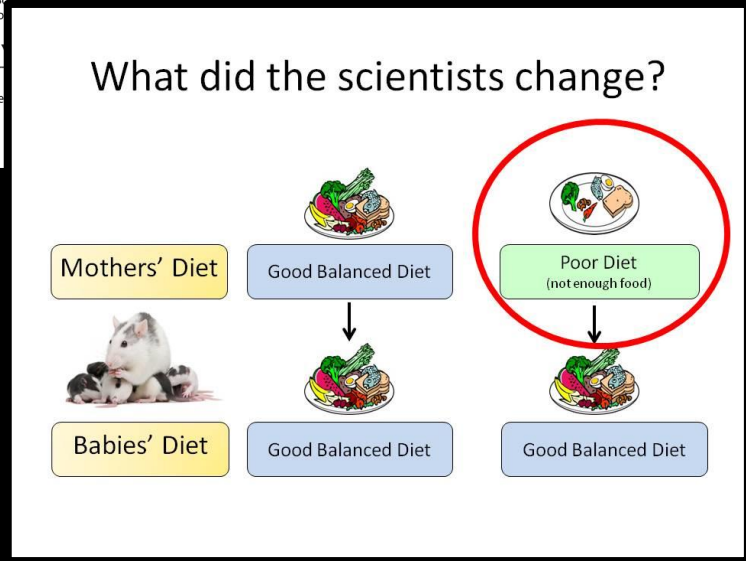
The Healthy Start to Life Modules

- Year 7-13 | Grade 6 – 12
- Curriculum linked differentiated resources
- Engaging students in **learning** about and **doing** science through **exploration of the nature of science and socio-scientific issues**



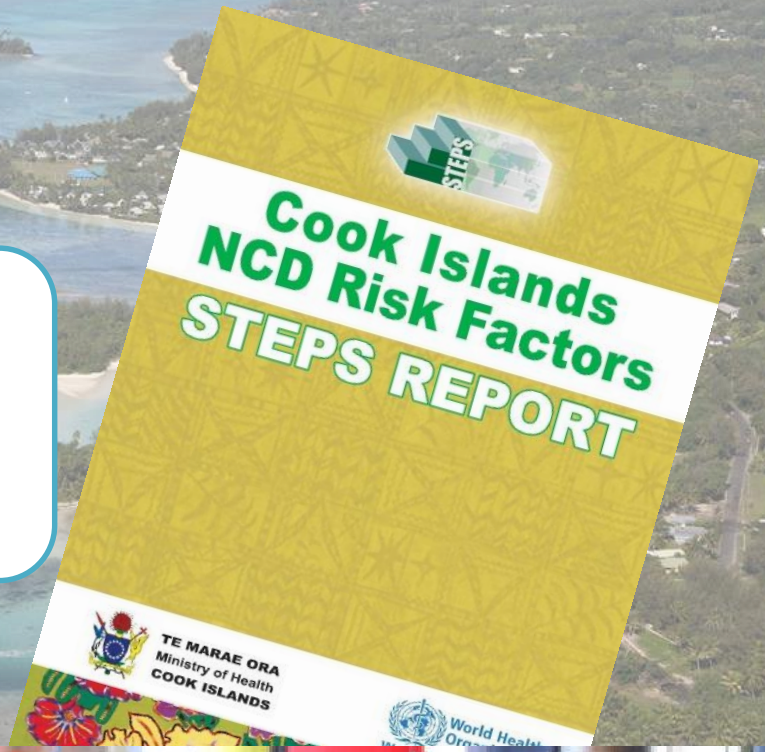




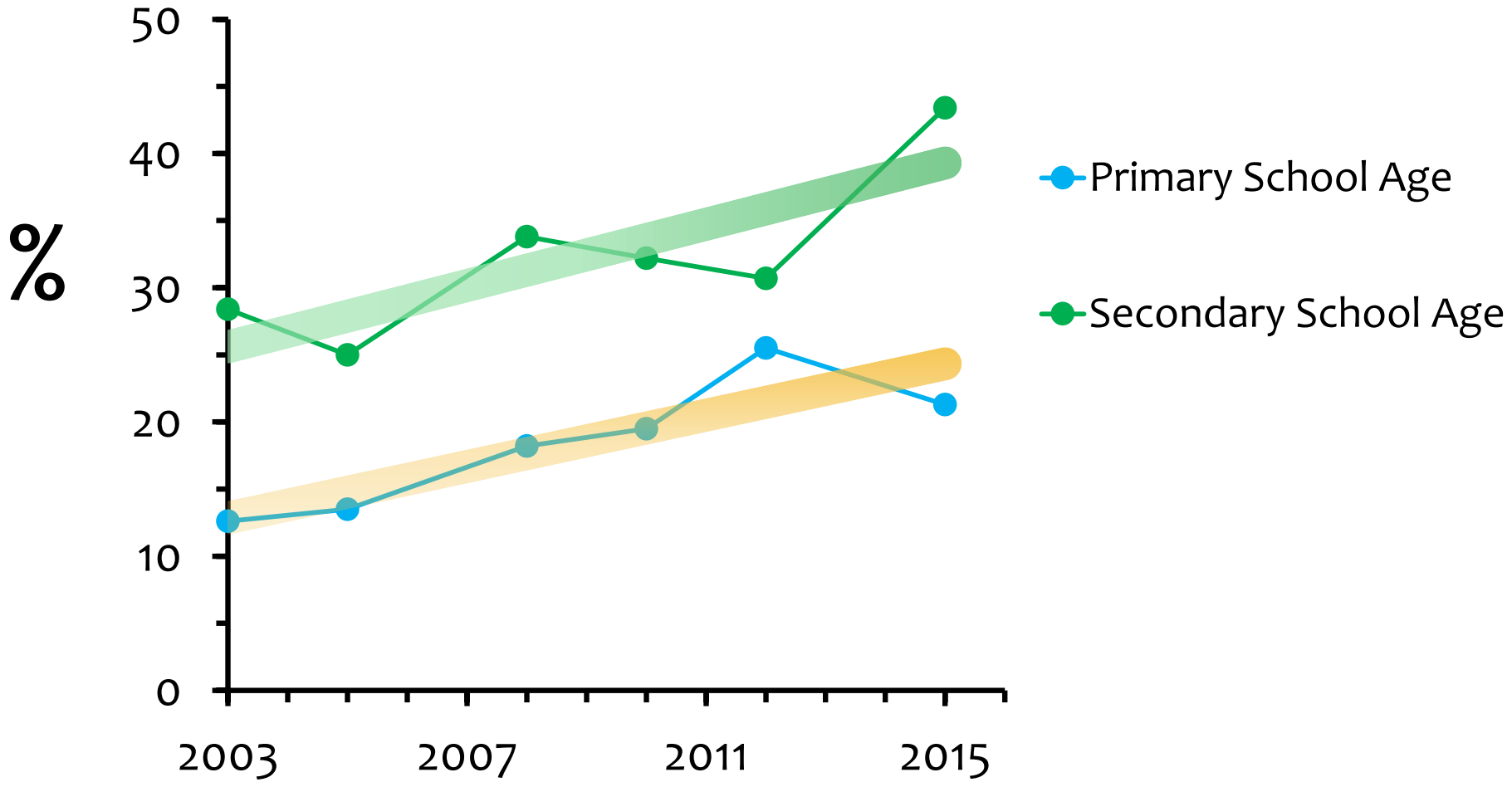


Assessing Risk in a Population

1. Questionnaire
2. Physical Measurements
3. Biochemical Measurements



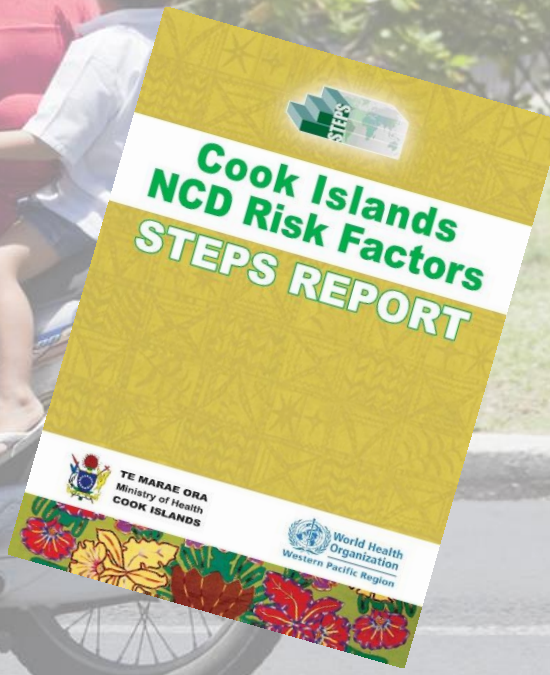
Overweight Children and Young People in the Cook Islands from 2003 to 2015



CI MoH School Physical Health Examination Data 2003 - 2015

Physical Inactivity?

75%

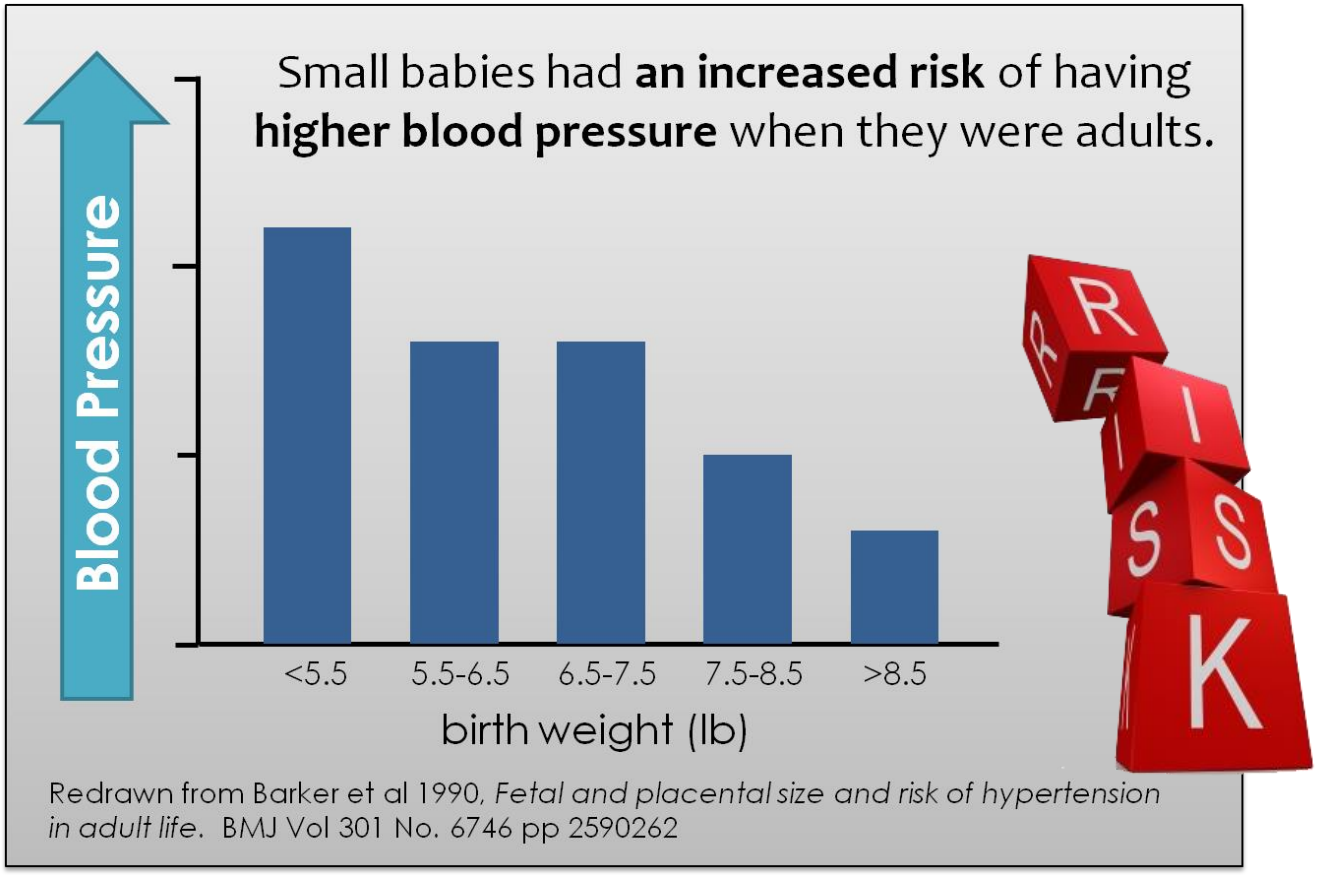


Learning through stories:
Exploring the work of scientists.

Growing Up in New Zealand

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

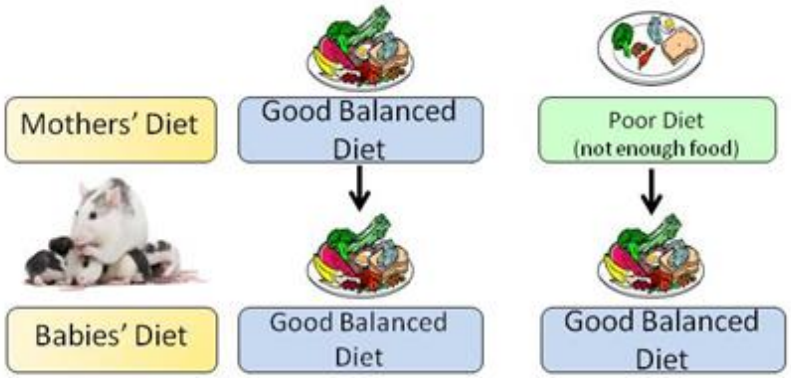
Learning through stories: Exploring the work of scientists.

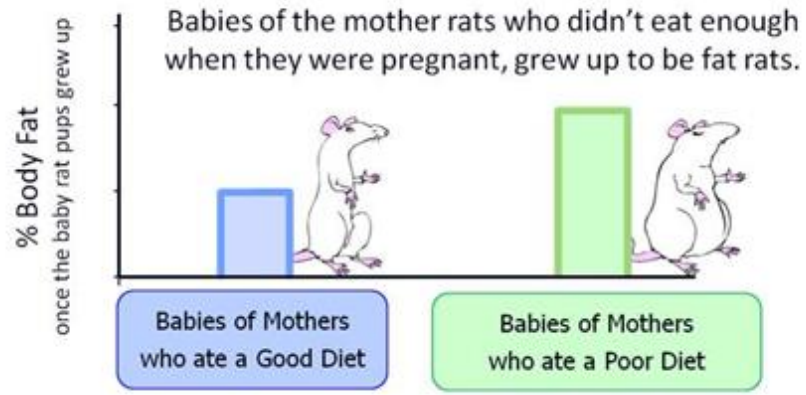


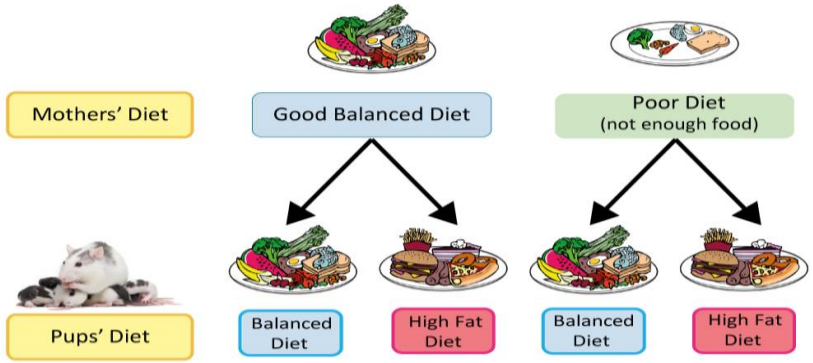
UNIVERSITY OF Southampton

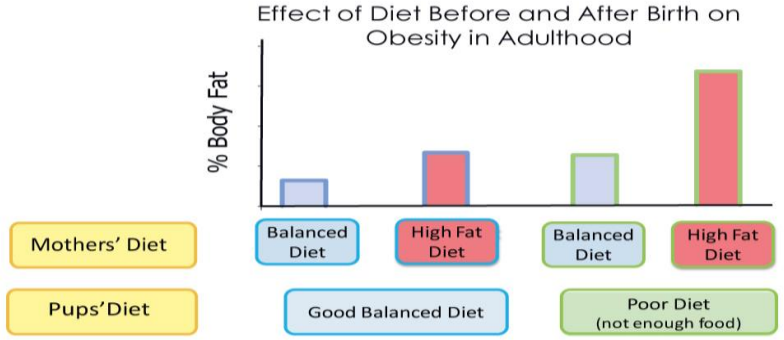
MRC | Lifecourse Epidemiology Unit

Learning through stories:
Exploring the work of scientists.









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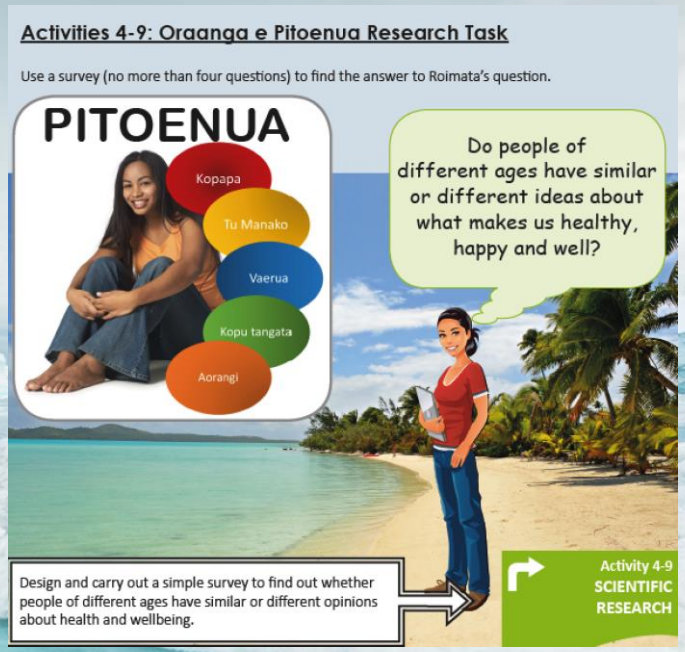
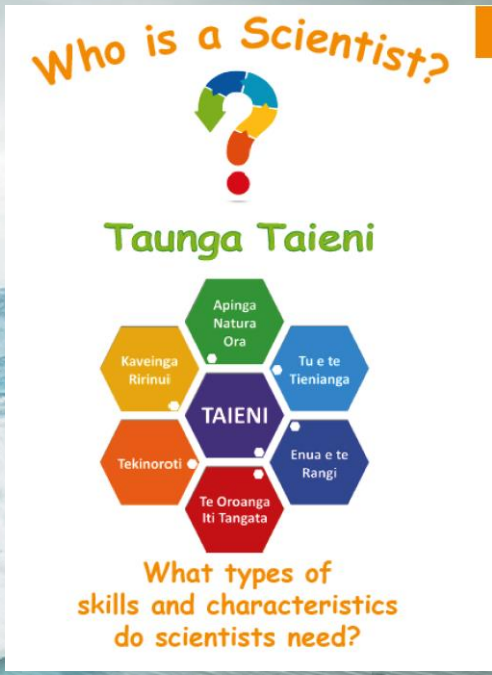
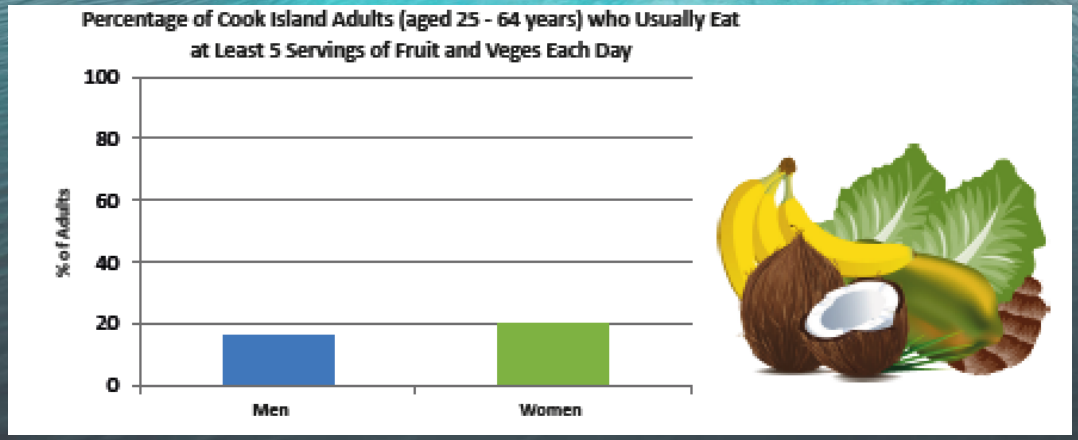
NATIONAL CENTRE FOR GROWTH AND DEVELOPMENT

Examples of Frames of Reference Identification Activities







Examples of Frames of Reference Identification Activities


Scientists Around the World

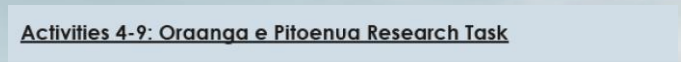
Scientists around the world are studying populations to find out about health and wellbeing. Each study has its own name, and is about ONE population at a particular time.

Cohort is a

group.

e.g.

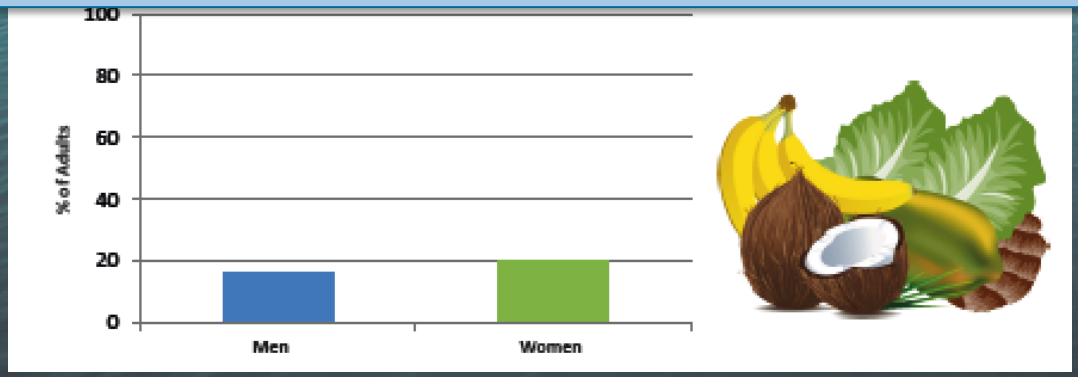
are


Activities 4-9: Oraanga e Pitoenua Research Task

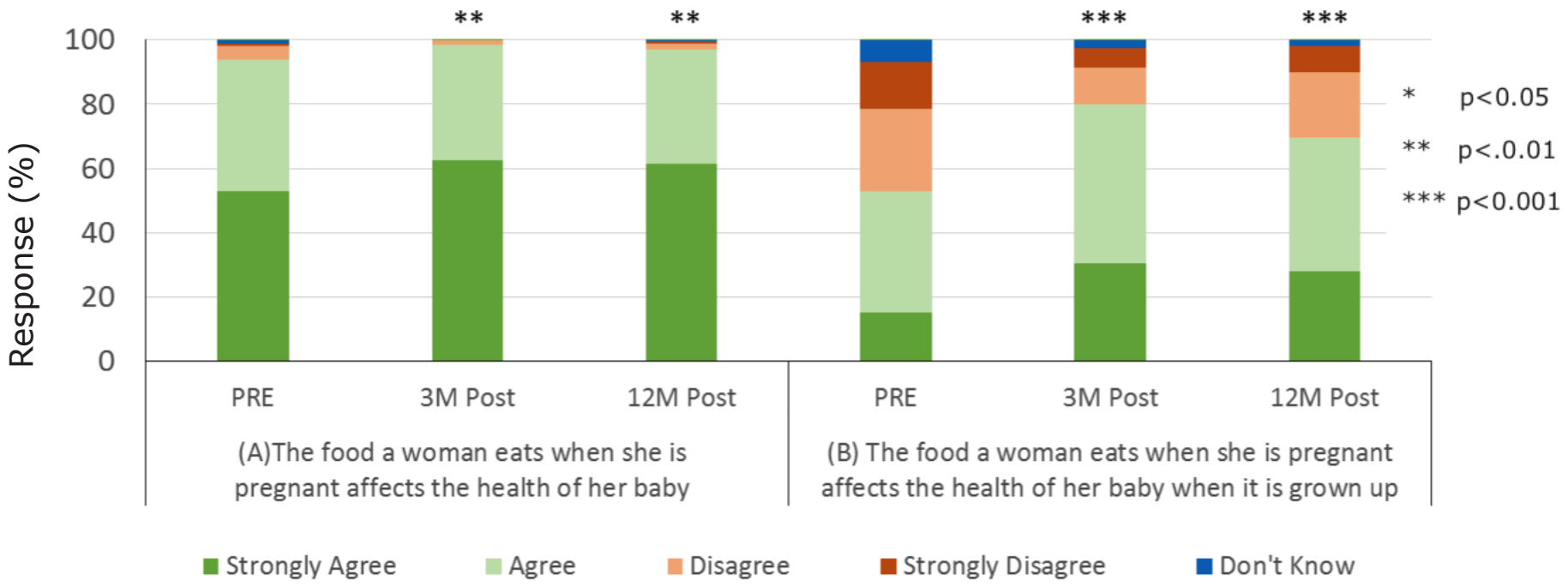

Who is a Scientist?

Examining frames of reference:

What does that look like in a classroom?



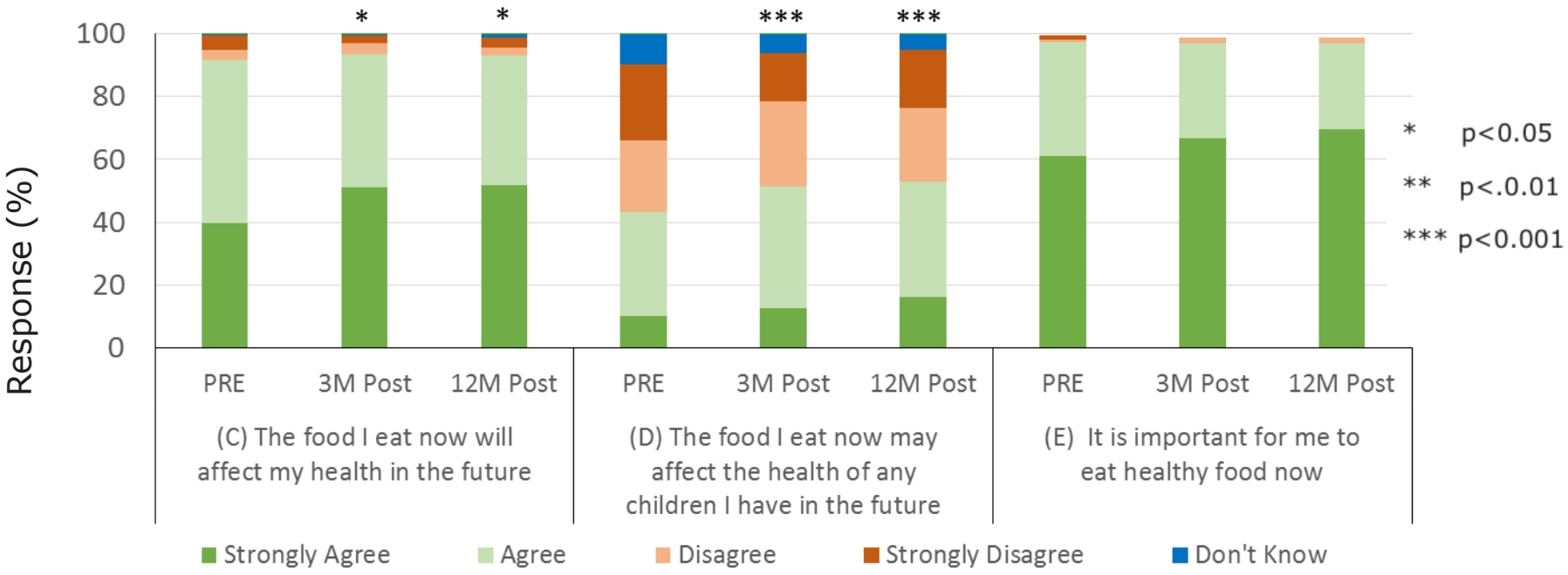
Knowledge of the association between maternal nutrition & health (n=201)



(A) A significant response change was seen between Pre and 3-month post-intervention, sustained to 12-month post-intervention.
Pre to 3MPost ($z=-3.13$, $p<.01$) | Pre to 12MPost ($z=-2.40$, $p<.01$) | 3MPost to 12MPost ($z=-0.54$, $p=.589$).
No significant difference was seen between knowledge of this concept for females vs. males.

(B) A significant response change was seen between Pre and 3-month post-intervention, sustained to 12-month post-intervention.
Pre to 3MPost ($z=-6.21$, $p<.001$) | Pre to 12MPost ($z=-4.71$, $p<.001$) | 3MPost to 12MPost ($z=-1.93$ $p=.053$).
Females significantly increased their knowledge of the association between maternal nutrition and health compared to males from Pre (OR 0.54 (95% CI, 0.3 to 0.9), $p<.05$) to 3MPost (no significant difference) intervention.

inking DOHaD knowledge to personal and future health (n=201)

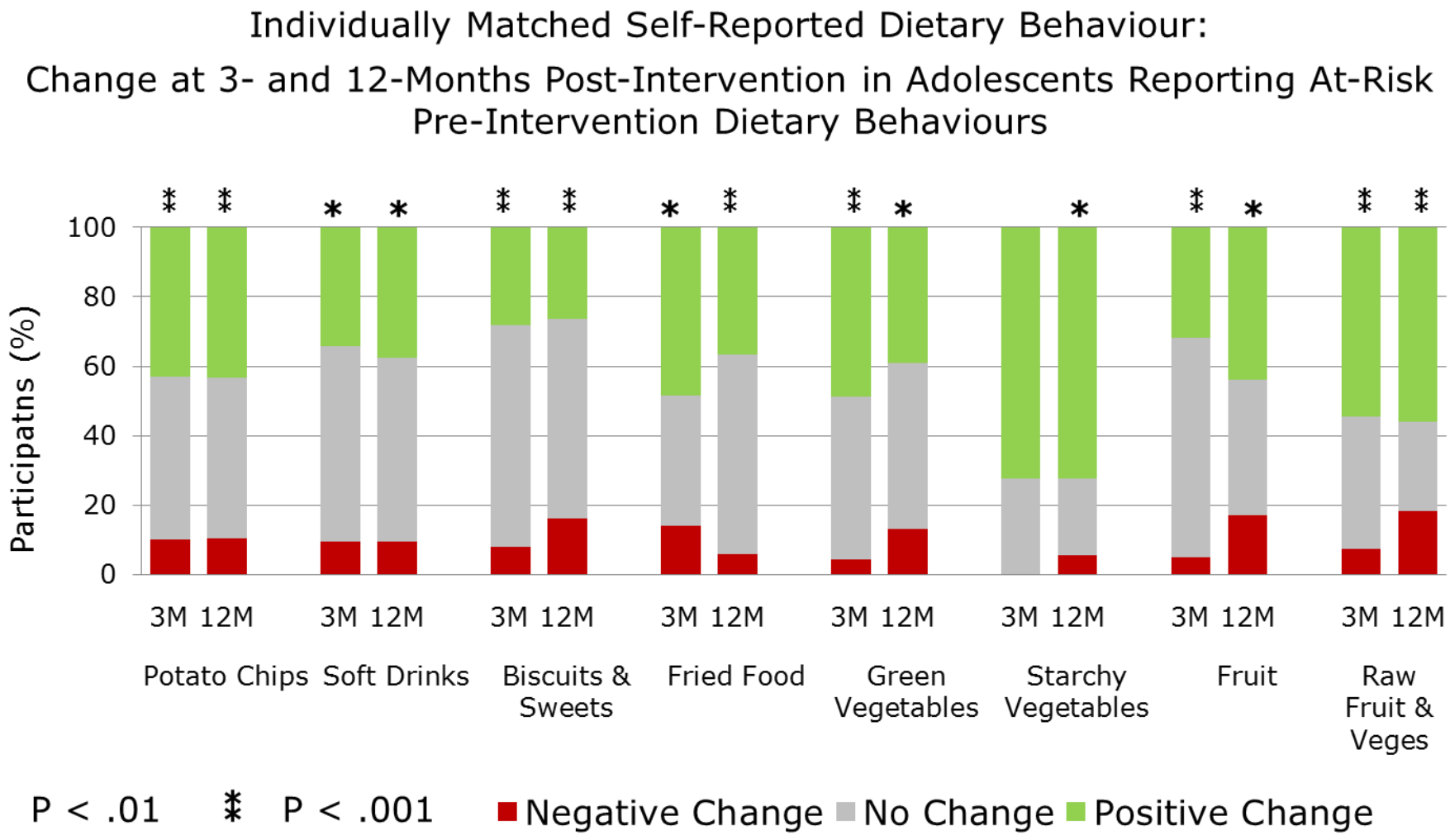


C) A significant response change was seen between Pre and 3-month post-intervention, sustained to 12-month post-intervention.
Pre to 3MPost ($z=-2.26$, $p<.05$) | Pre to 12MPost ($z=-2.19$, $p<.05$) | 3MPost to 12MPost ($z=-0.157$, $p=.876$).
No significant difference was seen between knowledge of this concept for females vs. males.

(D) A significant response change was seen between Pre and 3-month post-intervention, sustained to 12-month post-intervention.
Pre to 3MPost ($z=-3.31$, $p<.001$) | Pre to 12MPost ($z=-3.52$, $p<.001$) | 3MPost to 12MPost ($z=-0.44$ $p=.659$).
No significant difference was seen between knowledge of this concept for females vs. males.

(E) A positive trend but no significant change was seen between Pre and 3-month or 12-month post-intervention.
Males significantly increased their knowledge of the association between maternal nutrition and health compared to females from Pre (OR 0.48 (95%CI, 0.3 to 0.9), $p<.05$) to 3MPost (no significant difference) intervention.

Taking Action: Sustained changes in nutritional behaviors



REACH

Each secondary school teacher…….

…teaches between 5 and 6 classes of 20 – 35 students per class each year

Each young person has a family. Our evidence shows us that they talk to their family about DOHaD (often around the family dinner table) and many make decisions and take actions about health behaviours

We also know that for many, their educational achievements are enhanced by participation in the programmes

Impact

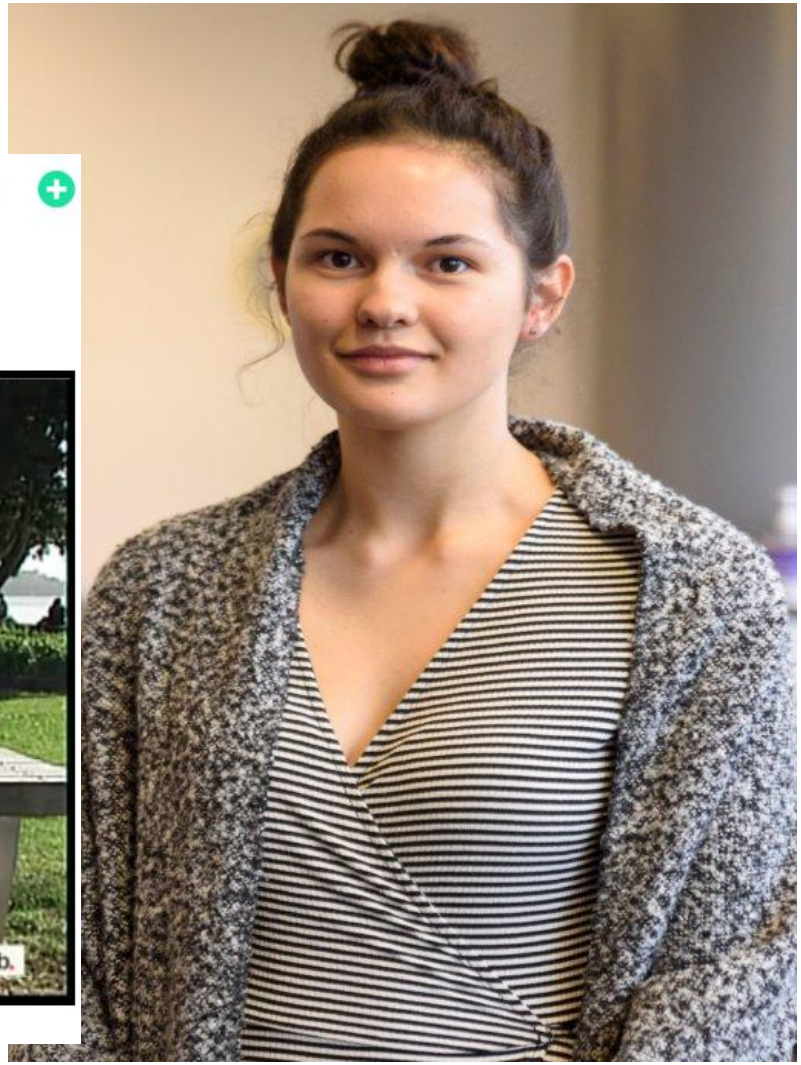
http://www.newshub.co.nz/nznews/kiwi-teenage-mum-speaks-at-geneva-health-summit-2016051417#axzz48xinBdVE

Kiwi teenage mum speaks at Geneva health summit

By Caitlin McGee

Saturday 14 May 2016 6:30 p.m.

Video help



Recommended Reading

- Gluckman, P. (2013). Interpreting Science—Implications for Public Understanding, Advocacy and Policy Formation. *Auckland, New Zealand: Office of the Prime Minister's Science Advisory Committee*.

- Gluckman, P., Rowarth, J., Ferguson, F., Denny, W., Eldridge, E., Hunter, P., & Wiltshire, R. (2013). Report of national science challenges panel.

- Bay, J.L.; Morton, S.M.; Vickers, M.H. (2016) Realizing the Potential of Adolescence to Prevent Transgenerational Conditioning of Noncommunicable Disease Risk: Multi-Sectoral Design Frameworks. *Healthcare* 4, 3: 39. doi:10.3390/healthcare4030039

- Bay, J.L. and Vickers, M.H. (2016) Adolescent education: an opportunity to create a Developmental Origins of Health and Disease (DOHaD) circuit breaker, *Journal of Developmental Origins of Health and Disease*, 7(5), pp. 501–504. https://www.ncbi.nlm.nih.gov/pubmed/27383865

- Bay JL. (2013) Scientific Literacy: The opportunity for leadership sits with science teachers – we need to talk about it. New Zealand Science Teacher, 132 (1), 50

- Bay JL, Mora HA, Sloboda DM, Morton SM, Vickers MH, Gluckman PD. (2012) Adolescent Understanding of DOHaD concepts: a school-based intervention to support knowledge translation and behaviour change. Journal of Developmental Origins of Health and Disease, 3 (6), 469-482. link to this article

http://www.lenscience.auckland.ac.nz/en/about/our-research/publications.html

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- The LENScience team and other Liggins Institute key contributors
- Tamaki College; Linwood College; Pakuranga College; Tangaroa College; Southern Cross Campus and participating New Zealand schools (>200)
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- Manaurau o te Pae Api'i, Ministry of Education Cook Islands
- Te Marae Ora, Ministry of Health Cook Islands
- Tonga College 'Atele; Tonga High School; Tonga Side School
- Tonga Ministry of Health, Tonga
- Tonga Ministry of Education and Training, Tonga
- Gravida National Centre for Growth and Development
- New Zealand Ministry of Foreign Affairs and Trade Aid Programme
- University of Southampton