EVALUATING THE ADAPTATION OF THE CANADIAN POPULATION TO LYME DISEASE USING A ONE HEALTH APPROACH, TO INFORM A PREVENTIVE INTERVENTION

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Overview

- What is One Health?
- Lyme disease in a One Health context
- Preventive behaviours & adaptation
- Objectives
- Methods

One Health

"One Health is a collaborative, multisectoral, and transdisciplinary approach — working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment."

Centers for Disease Control & Prevention

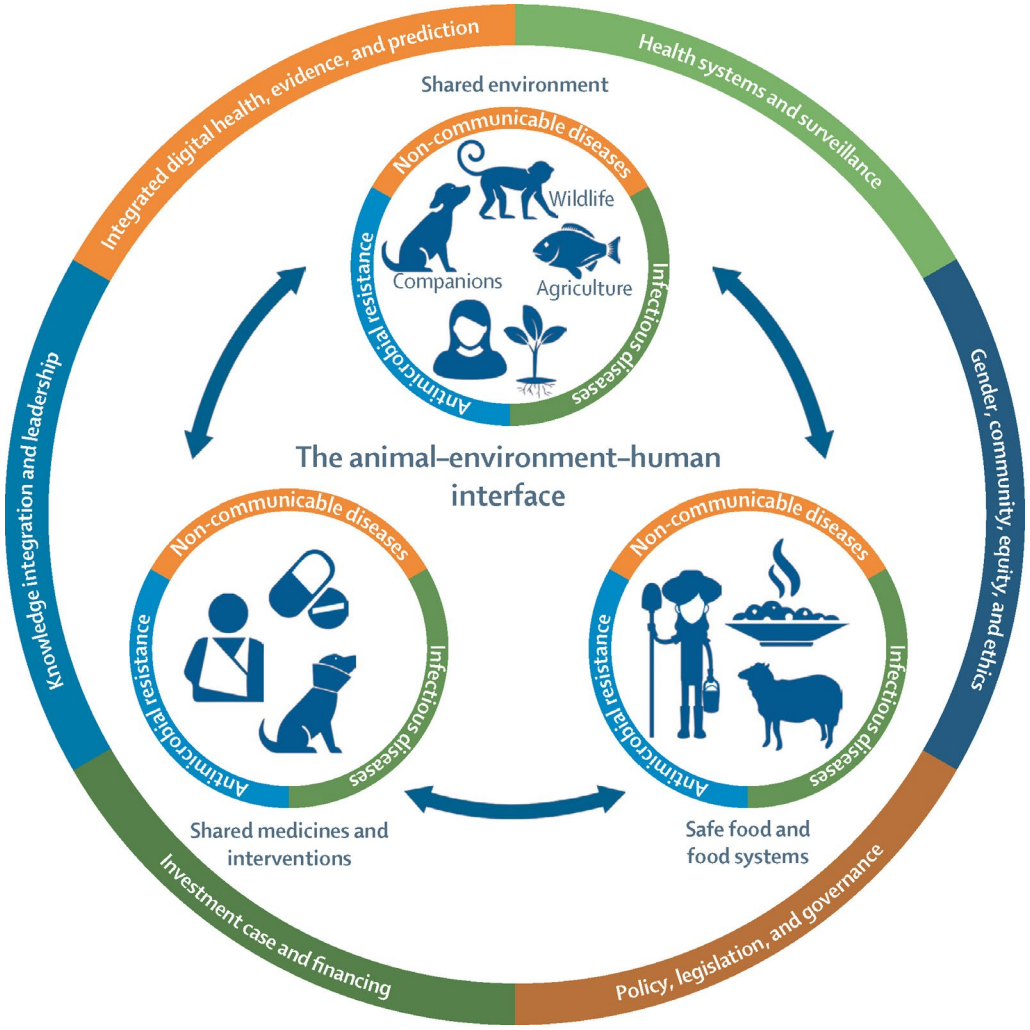


Fig 1. Approach of the Lancet One Health Commission

Amusi et al, 2020. Reconnecting for our future: The Lancet One Health Commission.

Lyme Disease in the Canadian canine population

- *Borrelia burgdorferi* sensu stricto & *Ixodes pacificus / scapularis*
- **Asymptomatic**, fever & lethargy, shifting limb lameness, Lyme nephritis, death
- Diagnostic testing – qualitative Bb antibody assay, quantitative C6 antibody test
- Treatment – doxycycline is first choice antibiotic, analgesia
- Prevention – tick control, vaccination (Littman et al, 2018)

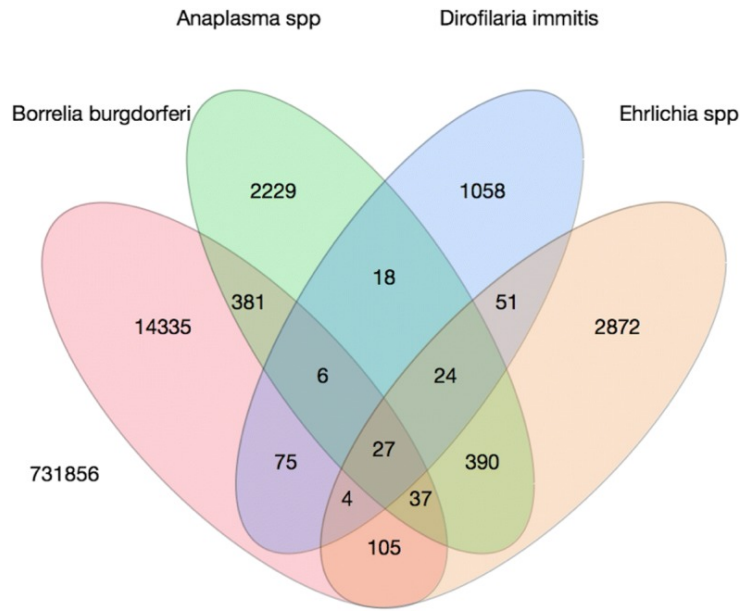


Fig 2. Venn diagram of canine co-infection in Canada (2008–2015). Evason et al, 2019.

Lyme Disease in the Canadian canine population

- Seroprevalence increased from 0.9% in 2008 to 2.2% in 2015 (Evason et al, 2019)
- Pet owners are at increased risk of encountering ticks, and possibly tick-borne disease (Jones et al, 2018)
- Dog owners have higher exposure to risk factors, yet also display high global preventive scores (Aenishaenslin et al, 2017)

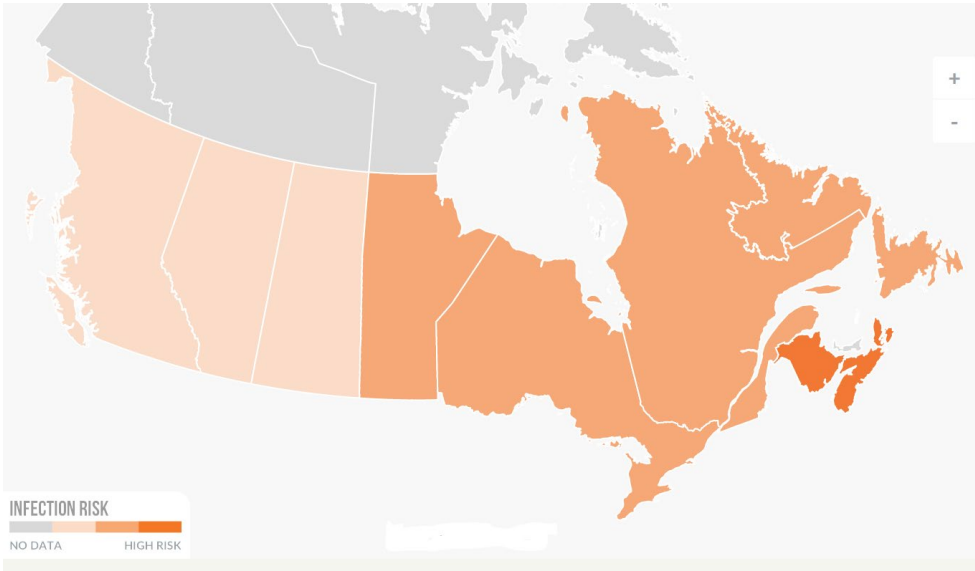
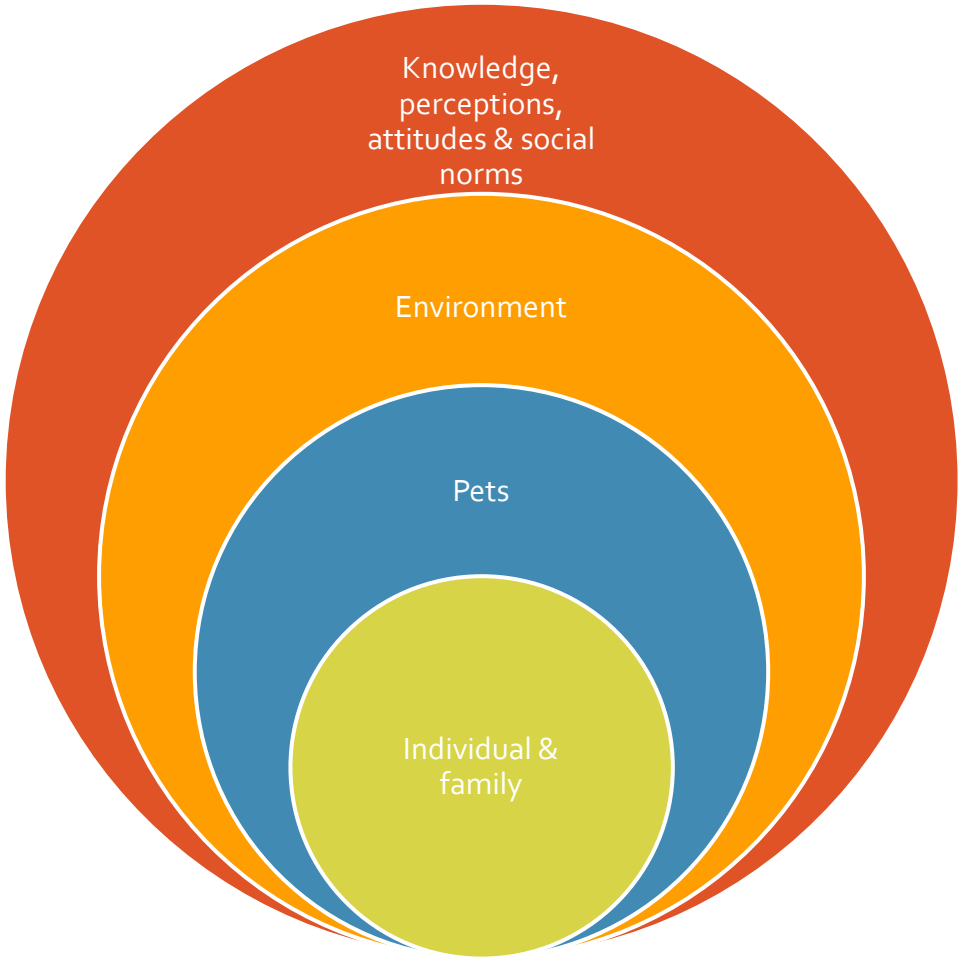


Fig 3. Representation of parasite activity, from Idexx/Antech 2019 data, Companion Animal Parasite Council

A One Health approach to Lyme disease prevention & adaptation



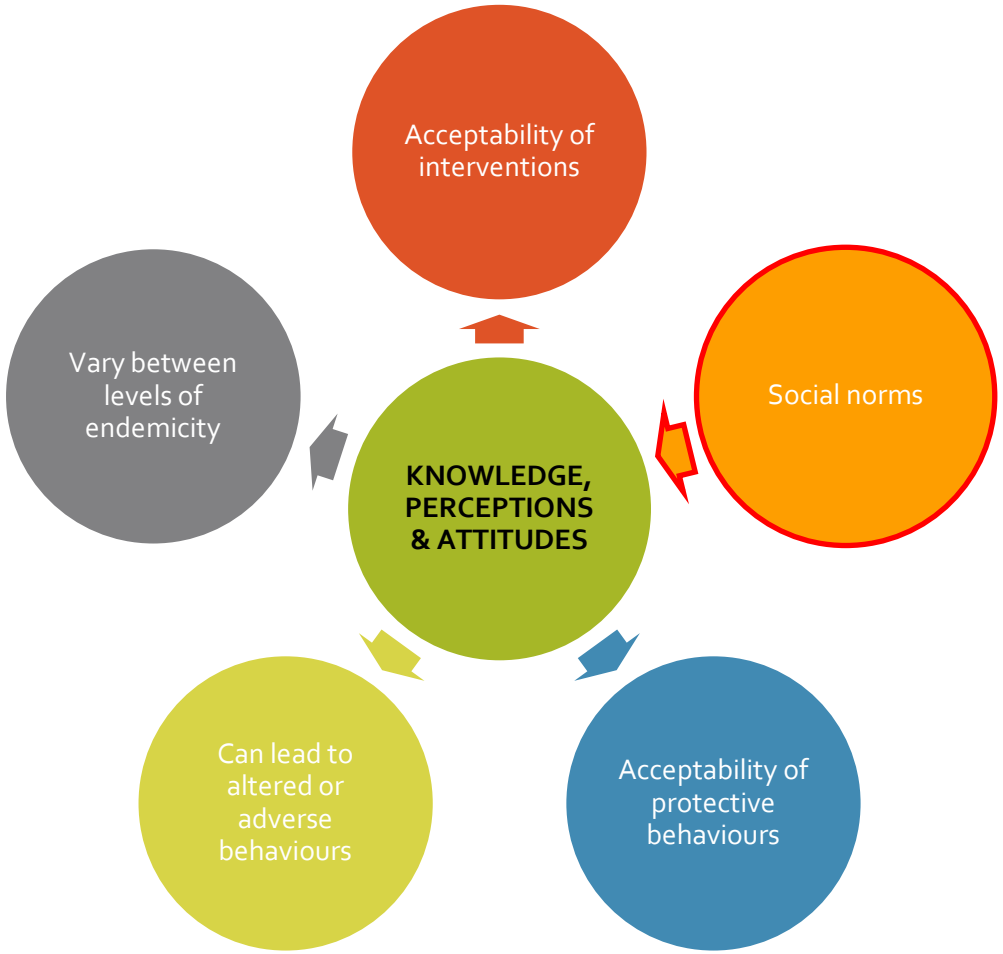
Landscape design and management
Pesticide application
Fencing to keep out deer

Pharmaceutical tick prevention
Vaccination (dogs)

Avoiding risk areas
Dressing appropriately and removing attached ticks
Using chemical repellants/barriers

Fig 4. Stafford (2005). The Connecticut Agricultural Experimentation Station handbook of integrated tick management

Previous research – preventive behaviours & adaptation



Less than half of the Canadians who were aware of Lyme disease adopted specific preventive behaviours (Aenishaenslin et al, 2017)

We can merge the socio-behavioural LD risk with ecological risk to produce risk maps and validate them with known human cases (Bouchard et al, 2018)

Targeted communication campaigns need to take these differences into account to be effective (Aenishaenslin et al, 2016)

Evaluating the adaptation of the Canadian population to Lyme disease with a 'One Health' perspective - Objectives

01

QUALITATIVE

Identify barriers & facilitators to LD prevention, explore related knowledge, attitudes & perceptions

02

QUANTITATIVE

Measure current levels of knowledge, attitudes & behaviours across Canada

03

QUANTITATIVE

Measure changes in these levels from 2014

04

Economics / cost of LD or LD prevention

04

Implement and evaluate a 'One Health' preventive intervention – web based platform & app

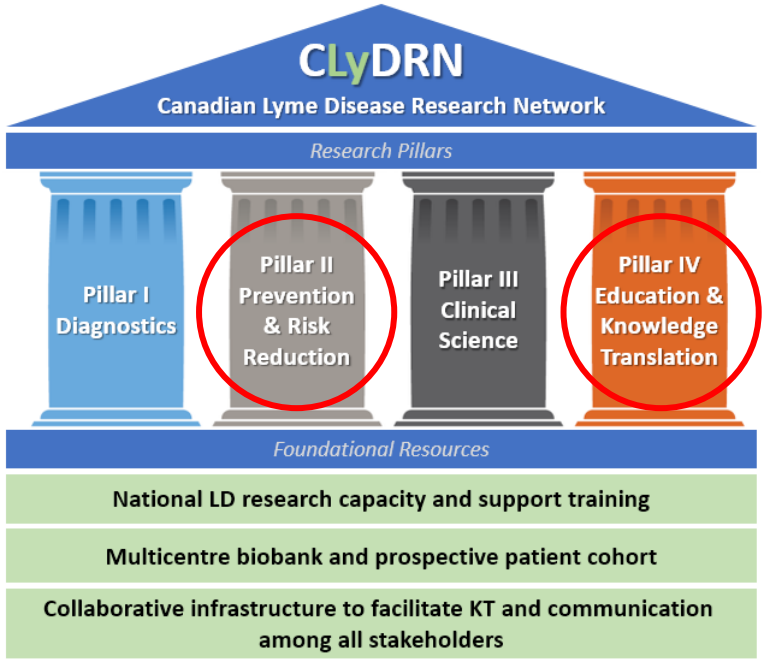


Fig 5 Research pillars & foundational resources of CLyDRN

Focus groups

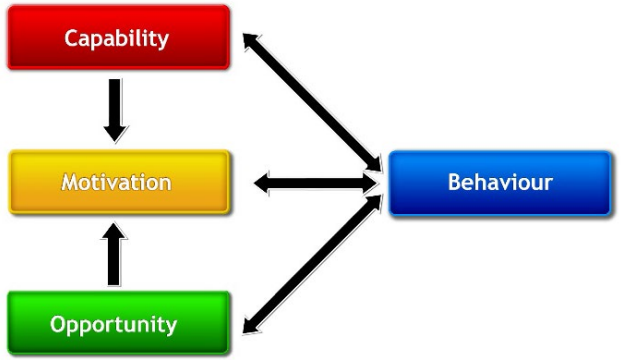
01	02	03	04
QUALITATIVE Identify barriers & facilitators to LD prevention, explore related knowledge, attitudes & perceptions	QUANTITATIVE Measure current levels of knowledge, attitudes & behaviours across Canada	QUANTITATIVE Measure changes in these levels from 2014	??? Economics / cost of LD or LD prevention

- **Across four endemic regions (Vancouver BC, Kingston ON, Estrie / Montérégie QC, Lunenburg NS)**
- **With general population and high risk groups**
- **In-person vs online**

- **Transcription, interpretation and analysis using computer assisted qualitative data analysis software (Nvivo).**
- **Behaviour Change Wheel framework, using capability, opportunity & motivation as the essential conditions of behaviour**

- **Results will be communicated, and used to inform the quantitative survey for objectives 2 & 3**

Behaviour Change Wheel - a result of a systematic literature review and merging/adaption from 19 frameworks.



The COM-B system

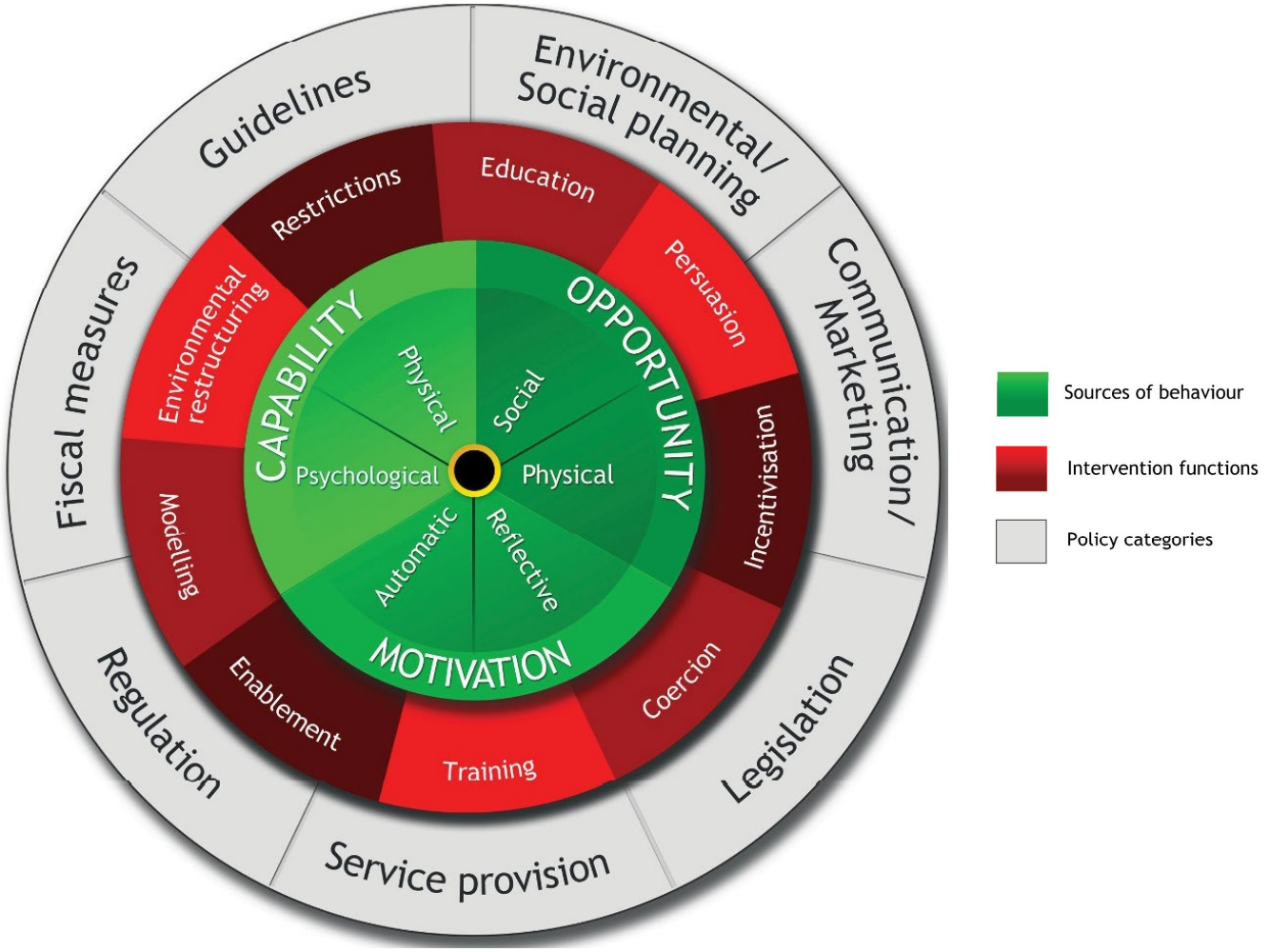
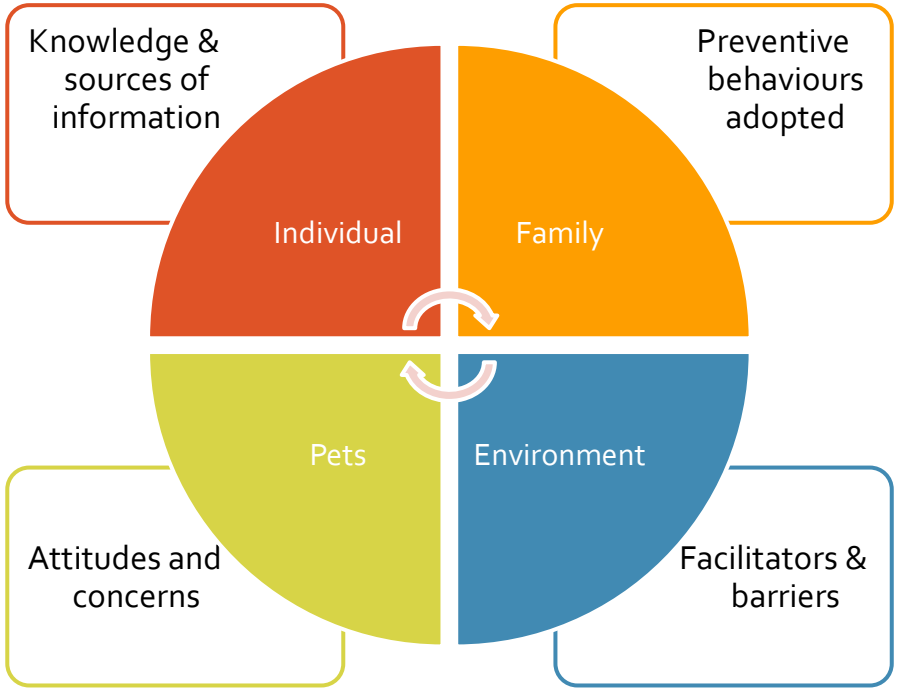


Fig 6. The Behaviour Change Wheel, Michie et al (2011)

Pan-Canadian survey

01	02	03	04
QUALITATIVE	QUANTITATIVE	QUANTITATIVE	???
Identify barriers & facilitators to LD prevention, explore related knowledge, attitudes & perceptions	Measure current levels of knowledge, attitudes & behaviours across Canada	Measure changes in these levels from 2014	Economics / cost of LD or LD prevention



- n=5,000
- Target population : Canadians
- Source population : using web based polling firm, therefore Canadians with internet access, > 18 y
- Stratified sampling across provinces
- Outcome variables e.g. preventive behaviours, perceived risk, tick bite exposure, people reporting LD, adverse behaviours, knowledge
- Descriptive statistics & multivariable logistic regression analysis to identify knowledge gaps and other differences

01	02	03	04
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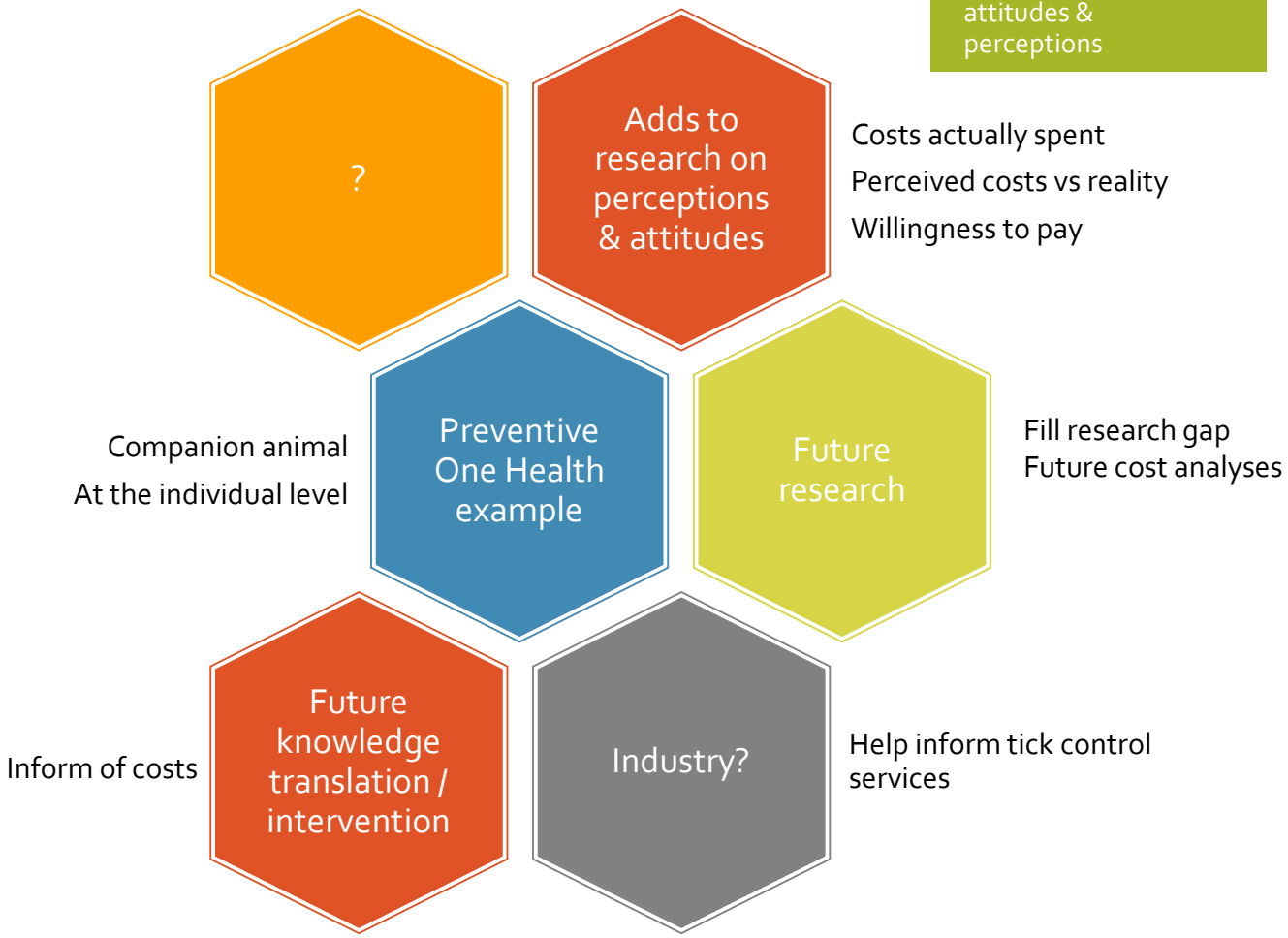

Costs actually spent
Perceived costs vs reality
Willingness to pay

Companion animal
At the individual level

Fill research gap
Future cost analyses

Inform of costs

Help inform tick control services

Clinical and economic outcomes evaluated in Lyme disease: a systematic review

T. Joseph Mattingly II[1*] and Kalpana Shere-Wolfe[2]

Abstract

Background: The financial implications of Lyme disease (LD) can vary widely for both the health system and the individual patients experiencing the disease. The aim of this review was to summarize published data on clinical and economic outcomes associated with LD.

Methods: A literature review was conducted to identify all studies of LD that incorporate both clinical outcomes and costs. Included studies were described and categorized based on costs consistent with best practices used in economic evaluation.

Results: The most frequent costs identified focused on formal health costs and productivity losses were the most common costs identified outside of the health system. Travel and informal care costs were less frequently reported. Clinical and economic outcomes of LD are primarily studied through economic models or observational analyses and focus on formal health care.

Conclusions: This review provides and overview of existing evidence and recommendations for future economic analyses in LD.

Keywords: Lyme disease, Value, Outcomes, Cost

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THANK YOU - QUESTIONS & COMMENTS