



# Toward the global control of scabies

**NZ Scabies Symposium, Auckland. September 2019**

**Daniel Engelman**

**Melbourne Children's Global Health**

Murdoch Children's Research Institute | University of Melbourne | Royal Children's Hospital

**International Alliance for the Control of Scabies**



**Daniel.Engelman@rch.org.au**

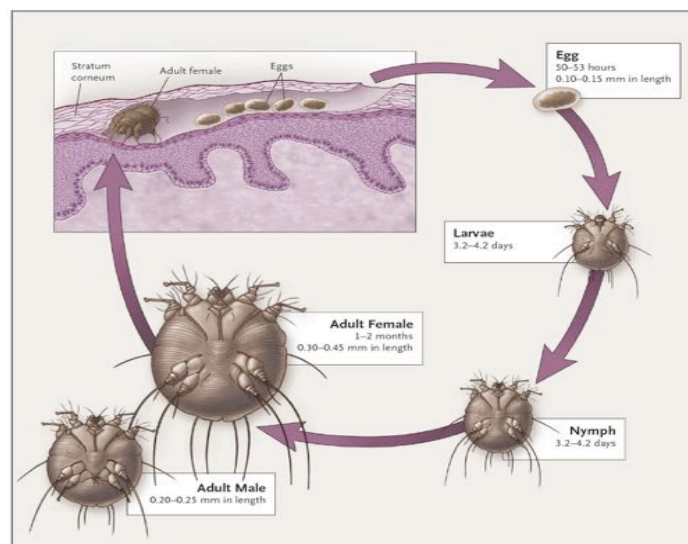


## Overview

- Introduction to scabies
- Clinical and Public Health significance
- A strategy toward global control
- Future directions

# Scabies

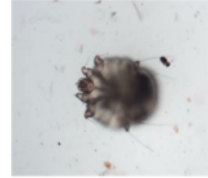
## *Sarcoptes scabiei* var *hominis*



Currie, NEJM 2010

## SCABIES

- Transmission: skin-skin (not zoonotic)
- All ages, infants + children most affected
- All countries. Highest in:
  - Resource-limited, tropical climates
  - Population crowding – camps, migration
  - Crowded households



## Clinical and Public Health Significance

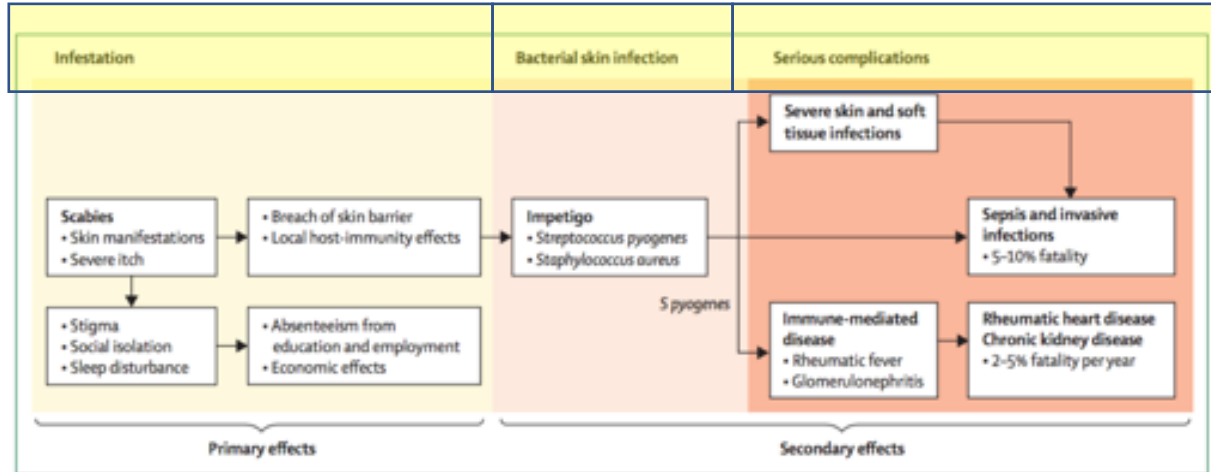


Figure 3: Primary and secondary effects of scabies infestation

Engelman et al, Lancet, 2019

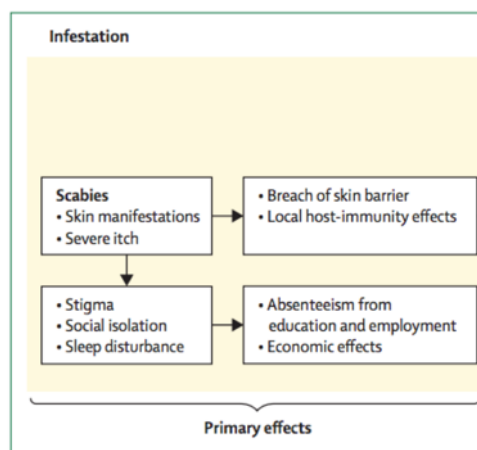



Figure 3: Primary and secondary effects of scabies infestation

Engelman et al, Lancet, 2019







**Bacterial skin infection**



**Impetigo**

- *Streptococcus pyogenes*
- *Staphylococcus aureus*









Engelman et al, Lancet, 2019

**GLOMERULONEPHRITIS**





**Serious complications**

**Severe skin and soft tissue infections**

**Immune-mediated disease**

- Rheumatic fever
- Glomerulonephritis

**Sepsis and invasive infections**

- 5-10% fatality

**Rheumatic heart disease**

**Chronic kidney disease**

- 2-5% fatality per year

**Secondary effects**

**GLOBAL RHD: 33 million cases**  
**319,000 deaths**

**OUR REGION: 3% of children**

Engelman et al, Lancet, 2019

# Toward Global Control

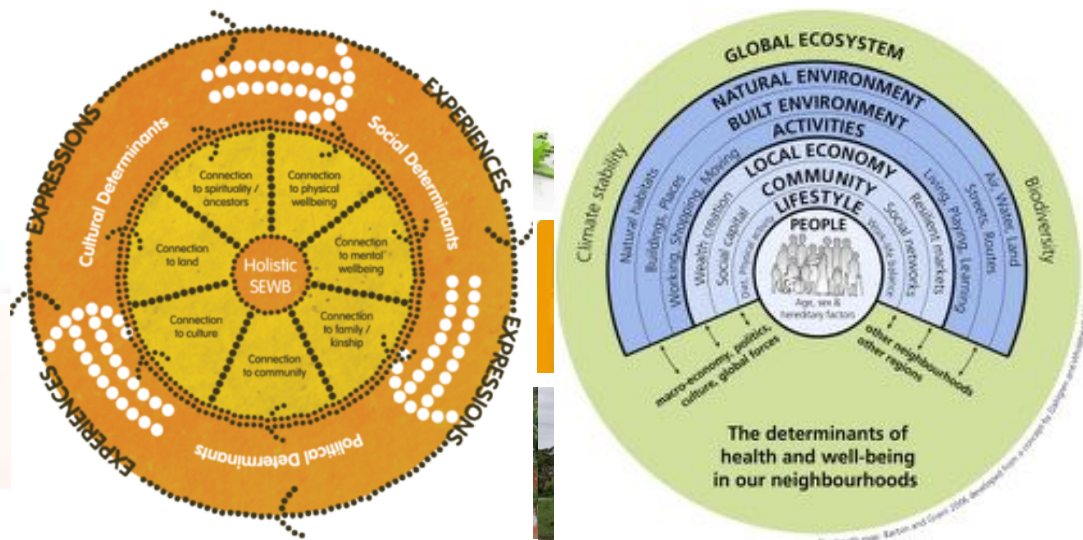


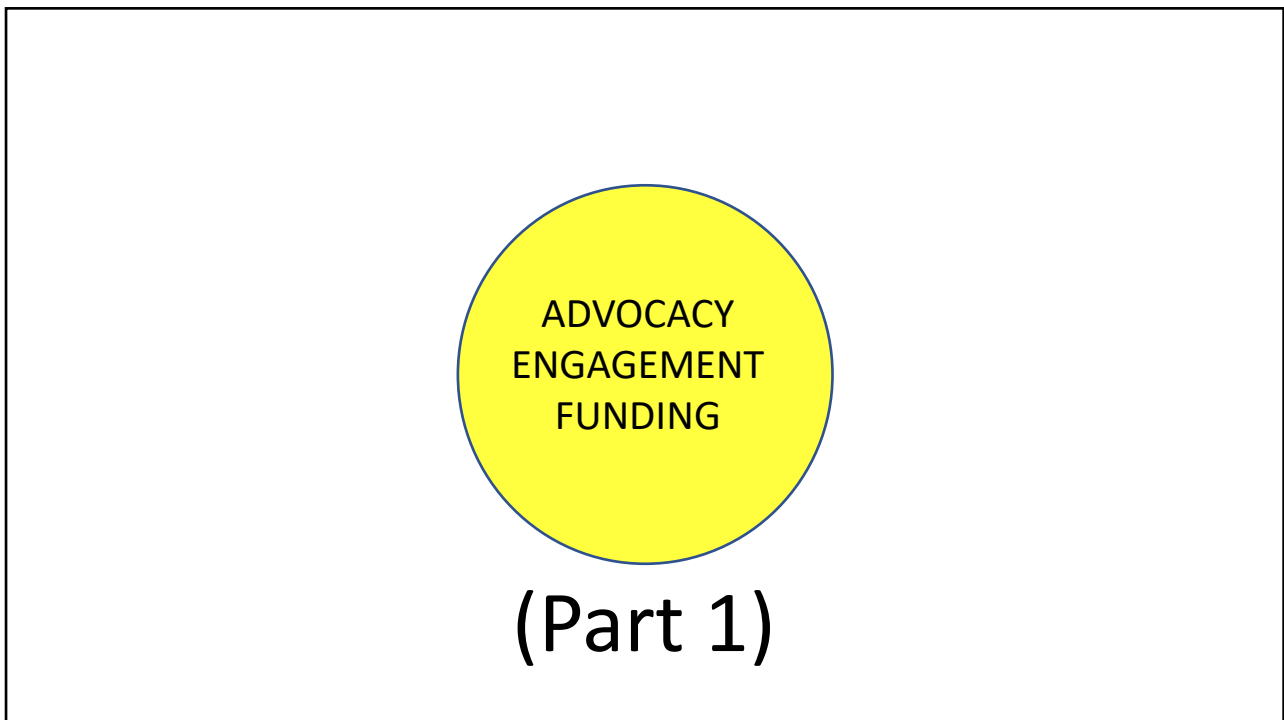
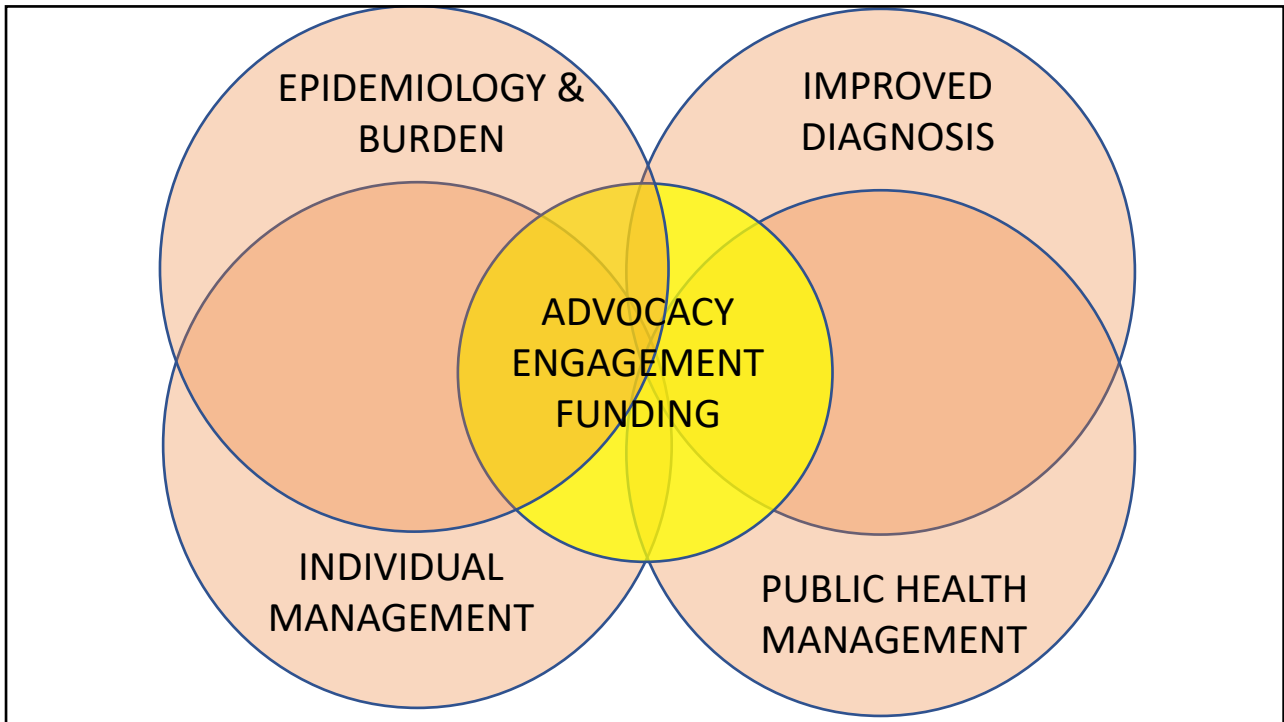
Can we eliminate scabies as a public health problem?  
In New Zealand?  
In the Pacific region?  
In the World?

Complex issues = Complex solutions



Complex issues = Complex solutions





2011-12	IACS formed; First meeting
	Development of aims and viewpoint "toward control"





**Viewpoints**

**Toward the Global Control of Human Scabies:  
Introducing the International Alliance for the Control of Scabies**

Daniel Engelman<sup>1</sup>, Karen Kiang<sup>1</sup>, Olivier Chosidow<sup>2</sup>, James McCarthy<sup>3</sup>, Claire Fuller<sup>4</sup>, Patrick Lammie<sup>5</sup>, Roderick Hay<sup>6</sup>, Andrew Steer<sup>1,2,\*</sup>, on behalf of the members of the International Alliance for the Control of Scabies (IACS)<sup>†</sup>

PLOS NTD 2013

2011-12	IACS formed; First meeting
	Development of aims and viewpoint "toward control"
2013-16	National/international meetings, Engagement with NTD community MOH engagement
	Growth and visibility, advocacy










Coalition for Operational Research on NTDs (COR-NTD)

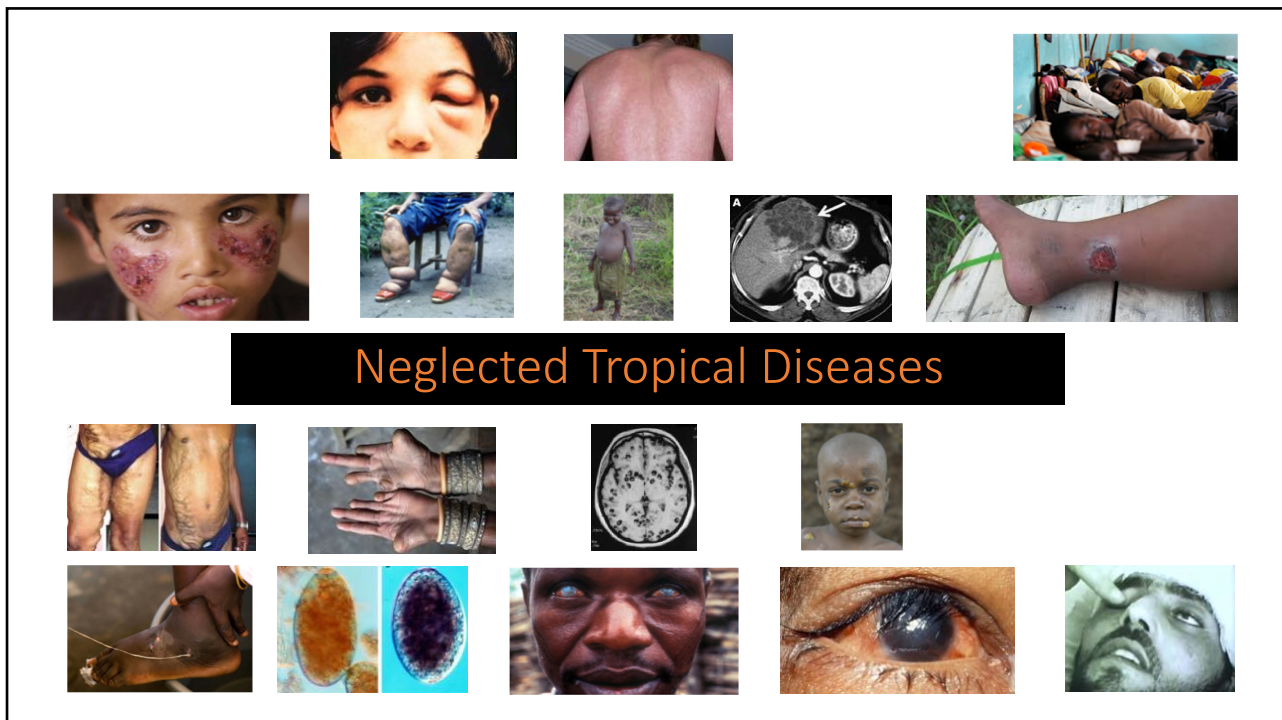


23<sup>RD</sup> WORLD CONGRESS OF DERMATOLOGY VANCOUVER 2015



International Congress for Tropical Medicine and Malaria 2016





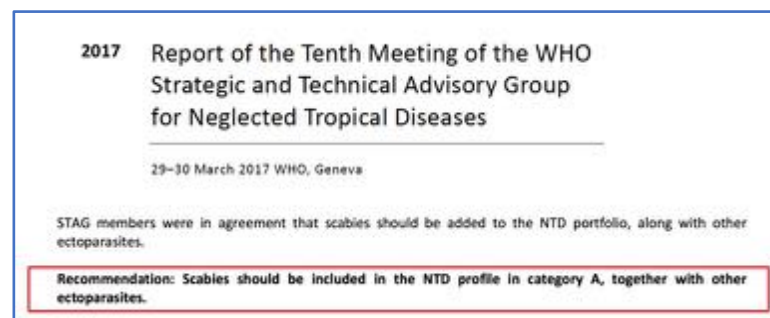
## Neglected Tropical Diseases (NTDs)

- 1. Common infections affecting poorest people esp. in tropical regions**
- 2. Disproportionately affect the “bottom billion”, with geographic overlap**
- 3. High morbidity but low-mortality**
  - Chronic illness
  - Promote & perpetuate poverty
  - Disfigurement & Stigma
- 4. Amenable to control (for example through Mass Drug Administration)**
- 5. Global, or regional programs in place**
  - WHO-supported / WHA resolutions; public-private partnerships
- 6. “Neglected” by public health investment and research**

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2013-16	National/international meetings, NTD & MOH engagement
	Growth and visibility, advocacy
2016-17	Development of dossier for WHO NTD STAG



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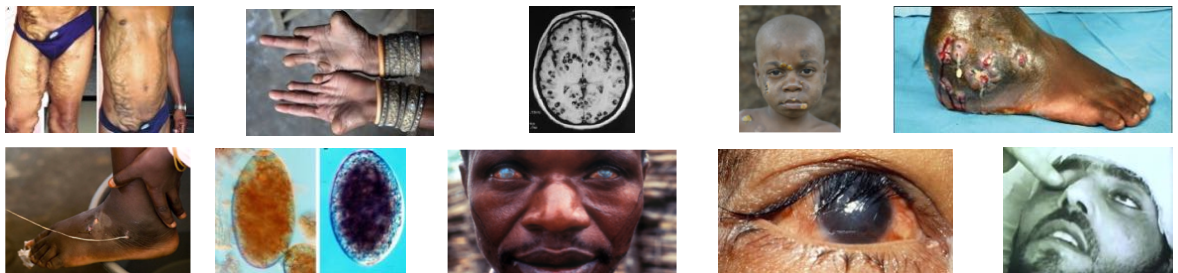
2017

STAG mem  
ectoparasit  
Recommen  
ectoparasit

This recommendation comes with the following note: Before large-scale activities associated with scabies prevention and control can begin, certain steps need to be carried out, such as mapping the disease's prevalence, adding scabies as an indication for the use of ivermectin and moxidectin in WHO's Essential Medicines List, ensuring affordable access to avermectins and developing guidelines for their public health use. Research on scabies is recommended in order to improve control efforts, including determining whether long-lasting insecticidal nets reduce scabies morbidity.



## Neglected Tropical Diseases





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2017-18	WHO meetings/guide on "skin-NTDs"

Opinion  
Opportunities for Integrated  
Control of Neglected Tropical  
Diseases That Affect the Skin  
Daniel Engelman,<sup>1,2</sup> L. Clare Fuley,<sup>3,4</sup> Anthony W. Solomon,<sup>5</sup>  
James S. McCarthy,<sup>6</sup> Frederick J. Hay,<sup>7</sup> Patrick J. Lammie,<sup>8</sup>  
and Andrew C. Shear<sup>1,2</sup>



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2017-18	WHO meetings/guide on "skin-NTDs" WHO WPRO NTD consultation and meetings



## Background and Rationale

2011-12	IACS formed; First meeting
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### 9<sup>th</sup> NTD-STAG Global Working Group Meeting on Monitoring and Evaluation of Neglected Tropical Diseases

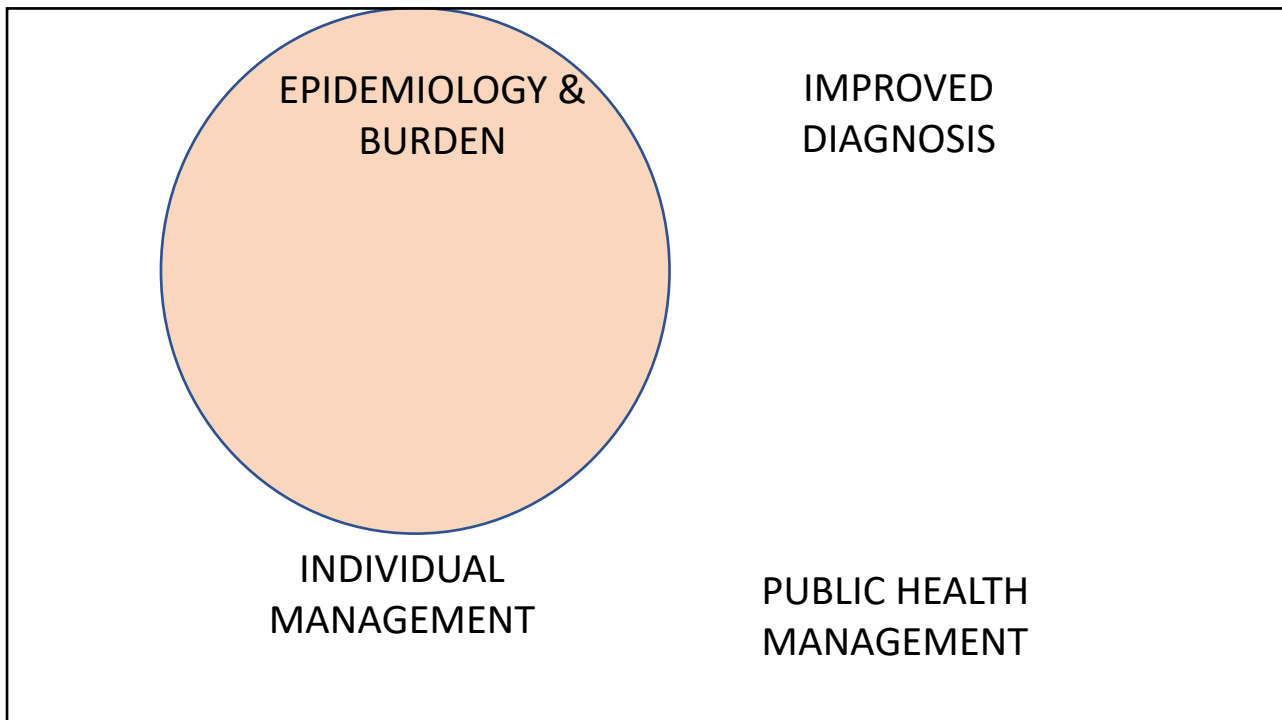
28 February – 2 March 2018

World Health Organization, Geneva - Switzerland

2. The Working Group noted that there is strong initial evidence for ivermectin-based mass drug administration for control of scabies in endemic populations and that simplified clinical case definitions for field surveys are available; however, there is currently **no global strategy for scabies control**. The Working Group was pleased to note several studies which are underway to better understand the situation and potential strategies for **scabies control and elimination**. In response to country requests for guidance, WHO should establish interim guidelines and standards for public health interventions for scabies control, including in outbreak situations.

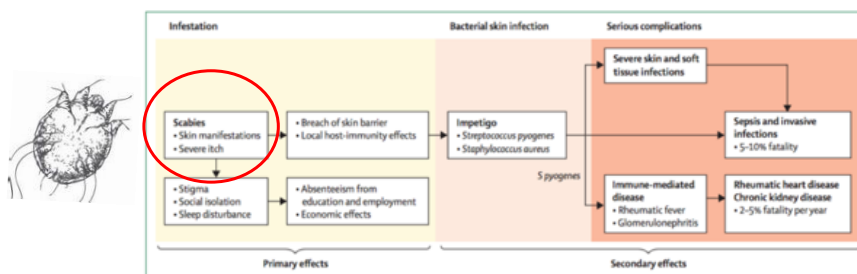
ADVOCACY  
ENGAGEMENT  
FUNDING

(To be continued)



## Defining 'Defining the burden...'

- Disease epidemiology - prevalence, incidence and distribution
- Amenable to developing a target, monitoring framework
- (Disease impact – morbidity, social, economic)
- (Impetigo, complications)



Engelman et al. Lancet, 2019

## Global Burden of Disease Study

### GBD 2015

Point prevalence – 204 million

### GBD 2016

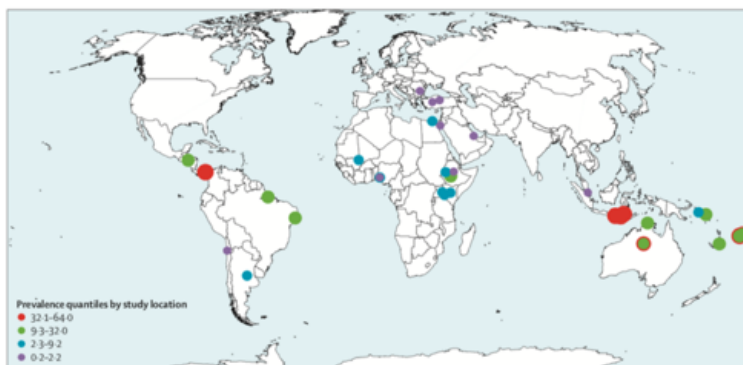
Point prevalence – 146.7 million

Annual incidence - 454 million

GBD 2016 Collaborators. Lancet. 2017

## Defining the burden of scabies

### • Systematic Review



**Figure 2: Map of scabies prevalence in children younger than 19 years**  
This map shows the study sites for the 32 studies reporting data in children younger than 19 years (three studies were done at two sites).

Many gaps  
Mainly ad-hoc  
Uncertain if  
representative

Sample size 56-18,000

Largest studies as part of  
yaws/leprosy surveys

Romani 2015 Lancet Inf Dis

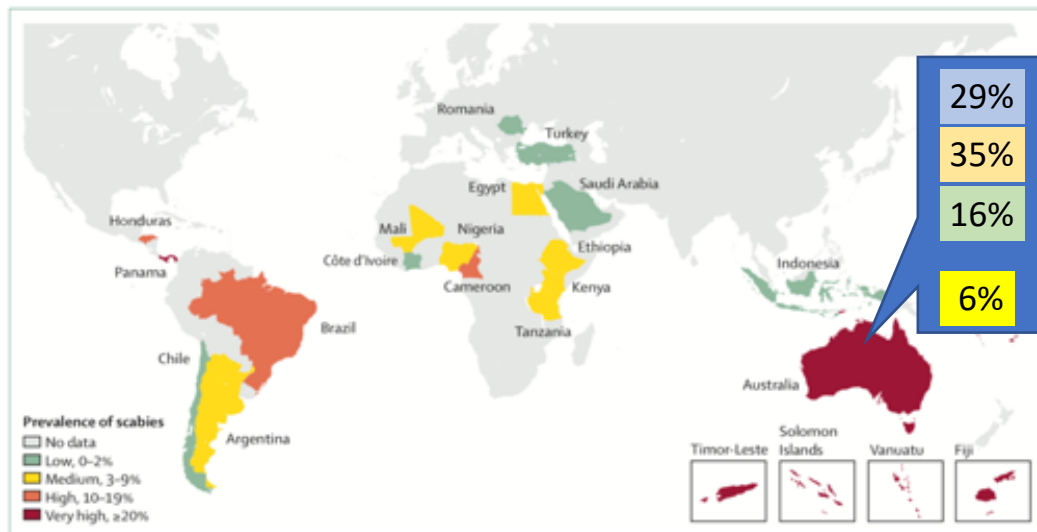


Figure 2: Prevalence of scabies in children and adolescents aged younger than 19 years

Prevalence is shown at the country level, using available data from Romani and colleagues<sup>7</sup> and updated with additional references.<sup>7-15</sup> Subnational variation exists but is not represented in the map.

Engelman et al. Lancet, 2019

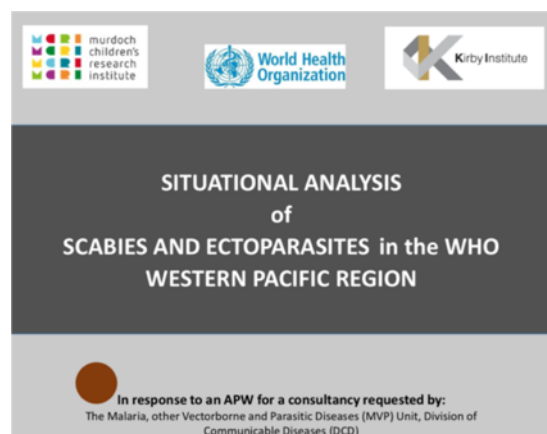
Carapetis et al. PIDJ, 1997

Andrews et al. PLOS NTDs 2009

Wong et al. Aust J Derm 2002

Kearns et al. PLOS NTDs 2015

*What about our region??*



Steer, Callum, Tong, Kaldor, Engelman. 2018

## Data availability + quality

High	Intermediate	Low	Only GBD modelled data		No data
Australia	American Samoa	Cook Islands	Japan	Macao SAR	Nauru
Cambodia	Malaysia	French Polynesia	Marshall Islands	Micronesia	New Caledonia
China	Samoa		Mongolia	Mongolia	Niue
Fiji	Tuvalu		Brunei	N Mariana Islands	Palau
PNG	Republic of Korea		Guam	Philippines	Pitcairn Islands
Solomon Islands	Singapore		Kiribati	Tonga	Wallis & Futuna
Vanuatu			Laos	Vietnam	
New Zealand					

Peer reviewed  
Prevalence

Peer reviewed

Routine

## New Zealand data

Andrews J. International Journal of Dermatology. 1979

- 1932: 2% in the general population.
- 1937: 23% in Maori populations

Lyttle PH. Sexually Transmitted Infections. 1994

- 2% of those presenting to STI clinic had scabies.

Wishart J. Australasian Journal of Dermatology. 1972

- Crusted scabies outbreaks in Christchurch

## National data:

- Fiji 2007
  - Only national survey with systematic sampling
  - Followed methods of LF survey
  - Stratified cluster method – based on LF survey
  - All community members invited to participate



## Results

10,787 participants at 75 sites

Prevalence 23.6%; impetigo 19.6%

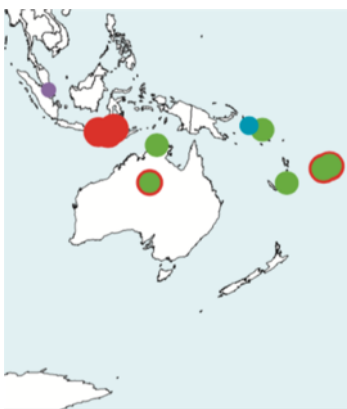
- Enabled Fiji to progress control strategy policy and prioritise further OR.

## Scabies and Impetigo Prevalence and Risk Factors in Fiji: A National Survey

Lucia Romani<sup>1\*</sup>, Josefa Koroivueta<sup>2</sup>, Andrew C. Steer<sup>3</sup>, Mike Kama<sup>4</sup>, John M. Kaldor<sup>1</sup>, Handan Wand<sup>1</sup>, Mohammed Hamid<sup>5</sup>, Margot J. Whitfield<sup>6</sup>

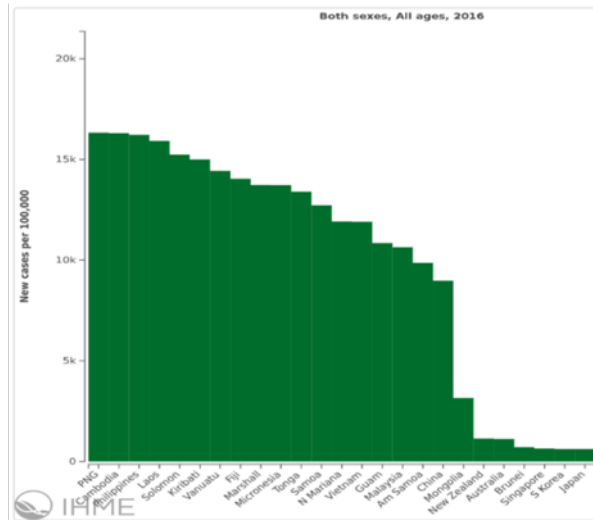
Romani 2015 PLOS NTDs

## Prevalence estimates



Romani et al. Lancet Inf Dis 2015  
Engelman et al. Lancet, 2019

## GBD estimates



- Heavy burden of disease affecting a vast number of people across WPR
- Low burden in Japan, South Korea, Singapore, Brunei, Australia and New Zealand.
- Modelled data

## Summary: the burden of scabies

- What do we know?
  - Prevalence of scabies varies from sporadic to extremely high
  - High to very high burden in several Asian & Pacific populations
- Where are the gaps?
  - Only 1 national survey. Most countries no data at all.
  - **No relevant published data from NZ**
  - Small surveys of variable quality/age – unlikely to be representative
  - Varying methods
  - Variation within countries (and over time)



## 2017 Report of the Tenth Meeting of the WHO Strategic and Technical Advisory Group for Neglected Tropical Diseases

29–30 March 2017 WHO, Geneva

STAG members were in agreement that scabies should be added to the NTD portfolio, along with other ectoparasites.

**Recommendation: Scabies should be included in the NTD profile in category A, together with other ectoparasites.**

This recommendation comes with the following note: Before large-scale activities associated with scabies prevention and control can begin, certain steps need to be carried out, such as mapping the disease's prevalence, adding scabies as an indication for the use of ivermectin and moxidectin in WHO's Essential Medicines List, ensuring affordable access to avermectins and developing guidelines for their public health use. Research on scabies is recommended in order to improve control efforts, including determining whether long-lasting insecticidal nets reduce scabies morbidity.

**What should we do to start to fill these gaps?**

## Can we use just routinely collected data?

### Fiji

- Routine Ministry data: 16 cases of scabies in July 2017.
- GBD data: Incidence 4.5% annual
- Several prevalence surveys
  - **Prevalence 15 – 38%**



### Tuvalu

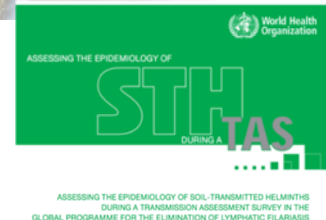
- Routine data: 48 cases scabies over 3 years
- Prevalence survey: **12.2%** of school-children



## What can we learn from other NTDs?

- **Easy to use diagnostic tools**
- Balance accuracy with feasibility at scale
- Validate and refine over time
- Different approaches for different needs
  - mapping vs monitoring vs post-intervention surveillance
- Integration possible with aligned protocols

Lymphatic filariasis  
Onchocerciasis  
Trachoma  
Schistosomiasis  
STH



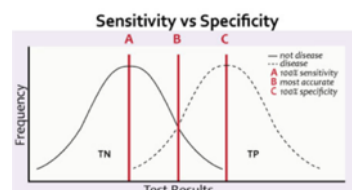
Baker, Lancet, 2010;; Cantey, Int Health, 2018; WHO documents

## What diagnostic methods should we use to further define the scabies burden?

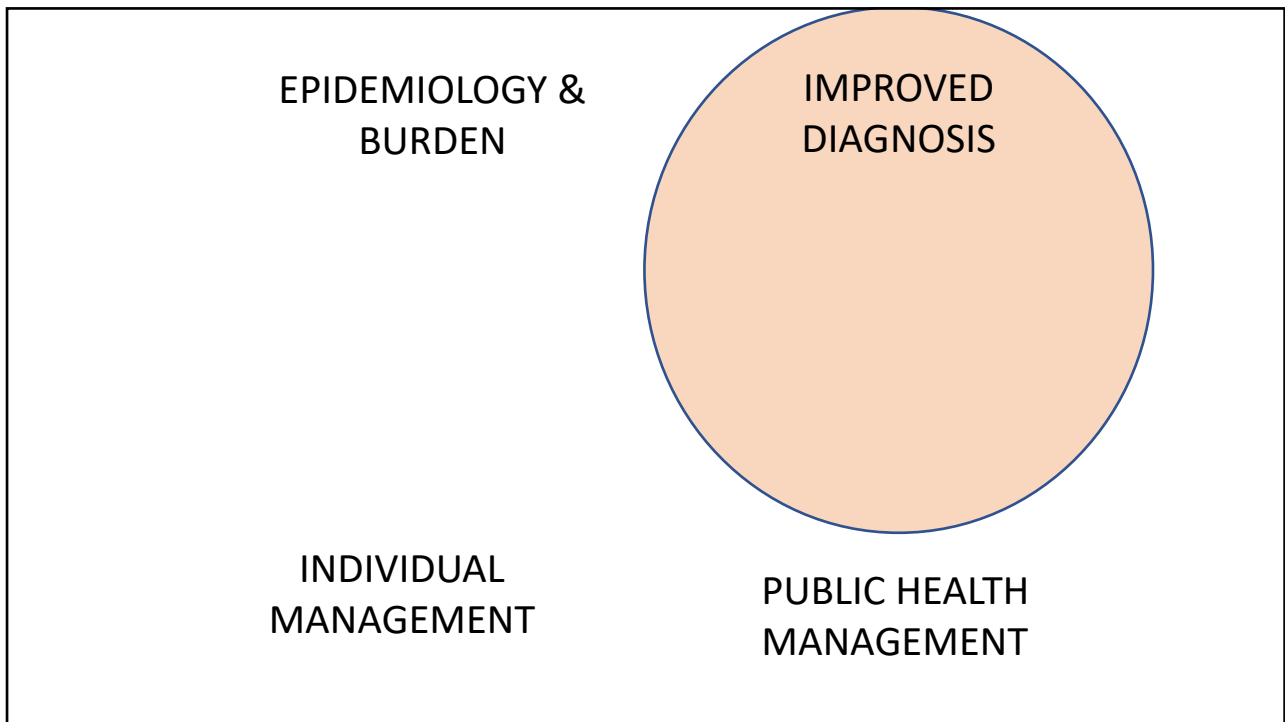
### FACTORS:

#### How can/should we diagnose scabies...

- In prevalence survey in Auckland? Kiribati?
- In rapid mapping to decide whether to implement MDA in Uganda?
- For a trial of new therapeutics?
- Clinical care at Starship?
- Clinical care in Maningrida?
- Suspected outbreak in Christchurch nursing home?



 socially acceptable?



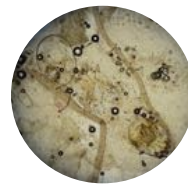
What methods can be used to diagnose scabies?

A. Microscopy

B. Magnification and visualisation (non-invasive)

C. Clinical

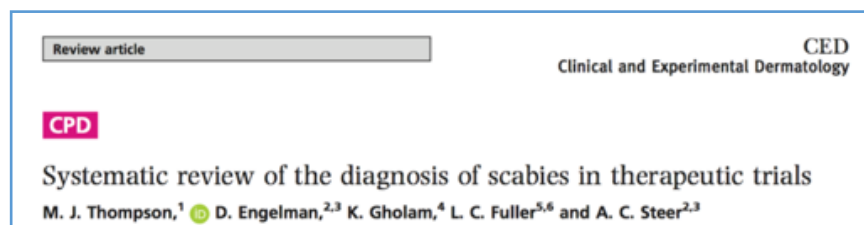
D. Other tests in development / proposed



## Detection of scabies: A systematic review of diagnostic methods

Victor Leung MD<sup>1</sup>, Mark Miller MD<sup>2</sup>  
Can J Infect Dis Med Microbiol Vol 22 No 4 Winter 2011

The present study confirms the lack of accurate and easily applicable methods for diagnosing scabies or for assessing the efficacy of treatment to eliminate mites.



- Diagnostic methods often **completely unstated** or **poorly defined**
- Of those that did describe diagnostic process:
  - **Highly variable – no predominant approach**

## National/regional guidelines



## 2018 IACS Criteria for Diagnosis of scabies

- Iterative, consensus (Delphi) study
- Panel participants (n=34)
- Highly experienced clinicians; range of clinical settings; all continents.
- Four rounds of anonymous surveys.
  - Rounds 1 and 2 - generation and ranking a long list of possible features.
  - Rounds 3 and 4 - development and refinement of draft criteria.



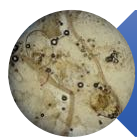
Engelman et al. PLOS NTDs. 2018.

## 2018 IACS Criteria for Diagnosis of scabies

Table 3. Round 4 survey responses.

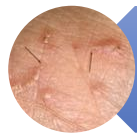
	Strongly Disagree	Disagree	Agree	Strongly Agree	Agreement %
n					
Level A: Confirmed scabies	0	1	9	18	96.4
Microscopy	0	1	7	20	96.3
High-powered visualization	0	1	9	17	96.3
Dermoscopy	0	0	9	19	100.0
Level B: Clinical scabies	0	2	11	15	92.9
Burrows	0	0	12	16	100.0
Male genital lesions	0	1	9	17	96.3
Typical lesions and distribution and two history features	0	1	10	17	96.4
Level C: Suspected scabies	0	0	11	17	100.0
Typical lesions and distribution and one history feature	0	0	9	19	100.0
Atypical lesions or distribution and two history features	0	3	8	17	89.3
Support criteria adoption	0	1	9	18	96.4

## Structure of Criteria



### A. Confirmed scabies

- Test
- Direct visualization



### B. Clinical scabies

- Highly specific clinical signs
- Specific skin signs + history features



### C. Suspected scabies

- Less specific skin signs + history features

## Specificity

Trials  
High income  
Hospitals and clinics  
Experts

?

Surveys  
Low income  
Field  
Non experts

## Sensitivity



## LEVEL A: CONFIRMED SCABIES



Courtesy Giuseppe Micali

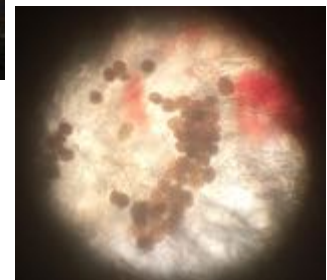
## A1. Microscopy

- Obtain skin sample
  - Scraping of suspected burrow / papule – scalpel blade
  - Direct needle/tweezer extraction
- Mount on KOH 10-20% for 2-5 minutes on glass slide
  - Alt: mineral oil
- Biopsy
  - Transparent adhesive tape –directly placed on slide
- Dermoscopy / “ink test” can help to delineate suspected burrow\*



## A1: Microscopy

- Examine under light microscope
  - mites (adult /immature)
  - eggs
  - faecal pellets (scybala)\*



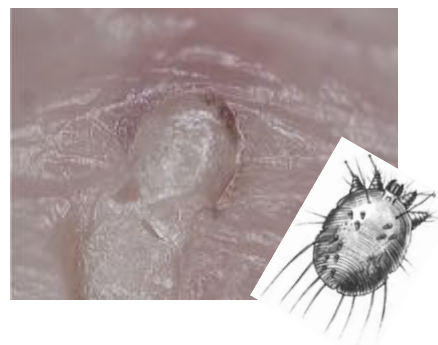


## A2/3. Visualisation for scabies diagnosis

- A2: High magnification
  - Video-dermatoscope (up to 1000x)
  - Video-microscope
  - Reflective confocal microscopy



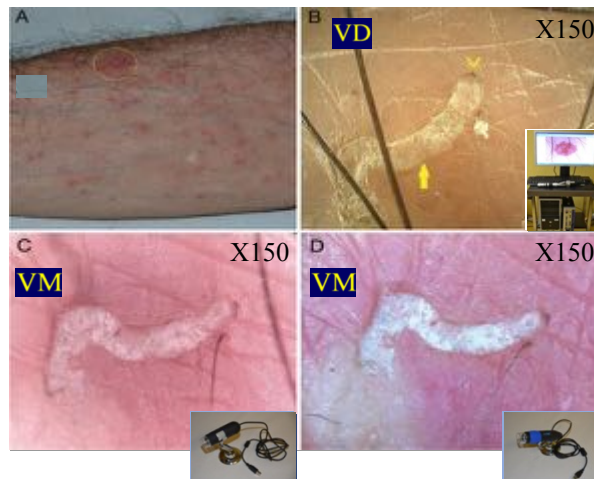
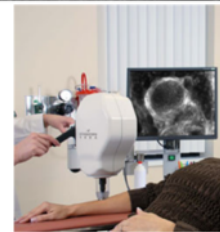
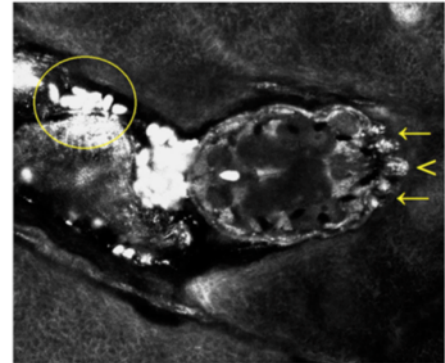
- A3: Low magnification – dermoscopy
  - Up to 10X



Courtesy Giuseppe Micali

## In-vivo reflectance confocal microscopy (RCM)

- Horizontal scans of the skin at various depths
- Visualization of epidermis and superficial dermis at cellular resolution.
- detailed identification of burrow, mites, eggs, and faecal material.
- *in vivo* visualization of the parasite's peristalsis (indicator of viability).
- Time consuming
- Very high cost
- Only available in few specialist centres



*Clin Infect Dis*. 2015 Jan 15;60(2):327-9. doi: 10.1093/cid/ciu826. Epub 2014 Oct 23.

**Low-cost equipment for diagnosis and management of endemic scabies outbreaks in underserved populations.**

Micali G<sup>1</sup>, Lacarubba F<sup>1</sup>, Verzi AE<sup>1</sup>, Nasca MR<sup>1</sup>.

Courtesy Guiseppe Micali



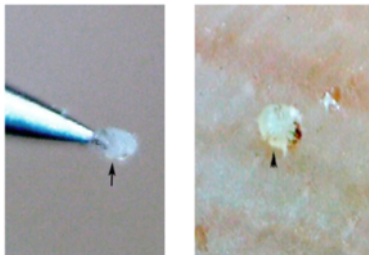
X10

Courtesy Giuseppe Micali

## Handheld microscope



10 - 30 - 90x magnification



**In Situ Diagnosis of Scabies Using a Handheld Digital Microscope in Resource-Poor Settings—A Proof-of-Principle Study in the Amazon Lowland of Colombia**

Hollman Miller<sup>1</sup>, Julian Trujillo-Trujillo<sup>2</sup> and Hermann Feldmeier<sup>3,\*</sup>

TMID 2018

## LEVEL B: CLINICAL SCABIES

## LEVEL C: SUSPECTED SCABIES

*Scabies presents with variety of lesion types, appearances and number – **challenge for clinical diagnosis***

### History features

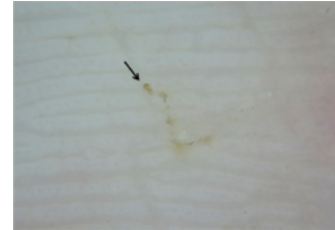
- Itch
- Positive Contact History

*Defining and reliably assessing these in field setting can be challenging*

## Examination features – highly specific

- B1: Burrows

- Rarely seen in tropical Australia / Pacific



- B2: Male genital lesions



Mittal 2013

## Examination features – common but not specific

- “Typical lesions”



- Different pattern for infants <2 years
- Different pattern for elderly/bedbound



## Examination features – common but not specific



## Examination features – common but not specific





## Atypical scabies

- Crusted scabies
- Bullous scabies
- Scabies
  - in elderly
  - those with dementia
  - immunosuppressed persons



**Difficult, specialised diagnoses**

## Ongoing work

- **Publication of detailed IACS criteria:** late 2019
- **Scabies Media Library** – images, videos\*  
([Daniel.Engelman@rch.org.au](mailto:Daniel.Engelman@rch.org.au))
- **Standardised training package**
- **Validation**
  - Range of settings - Geographic / prevalence
  - Examiner cadre + experience
- **Refinement**



## Refinements to training & implementation

- Simplified data form / training
- Improved definitions (typical lesions) from Delphi study
- Focus on mild cases
- Post-training assessments / hurdles
- Tablet-based data collection
- Improved visual reference sheets
- Collection of impetigo data



## Studies in progress / planned

2018 – Solomon Islands  
2018 – Western Australia  
2018 – Samoa

2019 – Timor Leste  
2019 – Solomon Islands  
2019 – Fiji

2020 – Indonesia  
2020 – Northern Territory  
2020 – India



RESEARCH ARTICLE

The diagnosis of scabies by non-expert examiners: A study of diagnostic accuracy

Millicent H. Osti<sup>1,2,3</sup>, Oliver Sokana<sup>4</sup>, Christina Gorae<sup>4</sup>, Margot J. Whitfield<sup>5,6</sup>, Andrew C. Steer<sup>1,2,3,7</sup>, Daniel Engelman<sup>1,2,3,7</sup>\*

Osti, PLOS NTDs 2019



## Mapping and surveillance

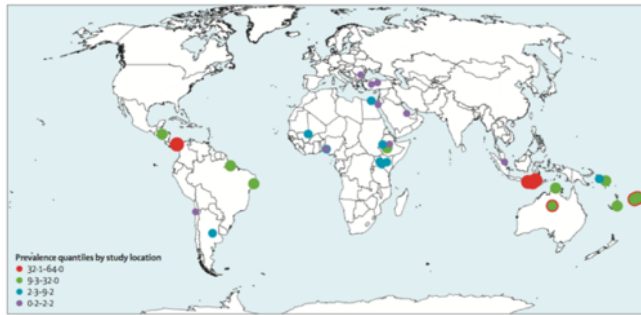
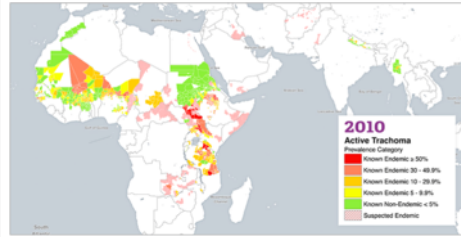


Figure 2: Map of scabies prevalence in children younger than 19 years



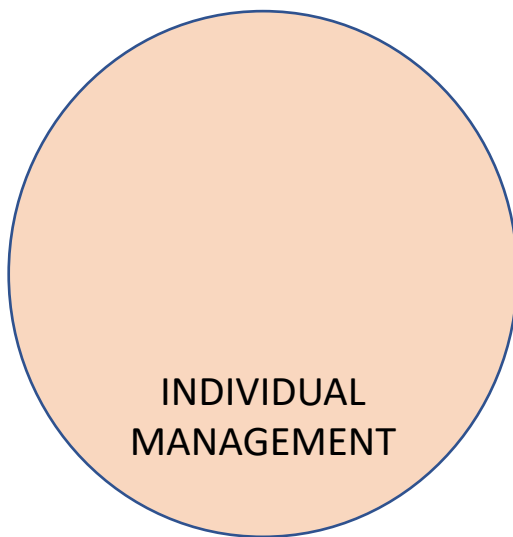
- Romani, Lancet ID, 2015; [www.trachomaatlas.org](http://www.trachomaatlas.org)



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EPIDEMIOLOGY &  
BURDEN

IMPROVED  
DIAGNOSIS



INDIVIDUAL  
MANAGEMENT

PUBLIC HEALTH  
MANAGEMENT

## Individual management

Community awareness

Health seeking

Clinician awareness, training, diagnosis

Availability of topical treatments – permethrin 5%

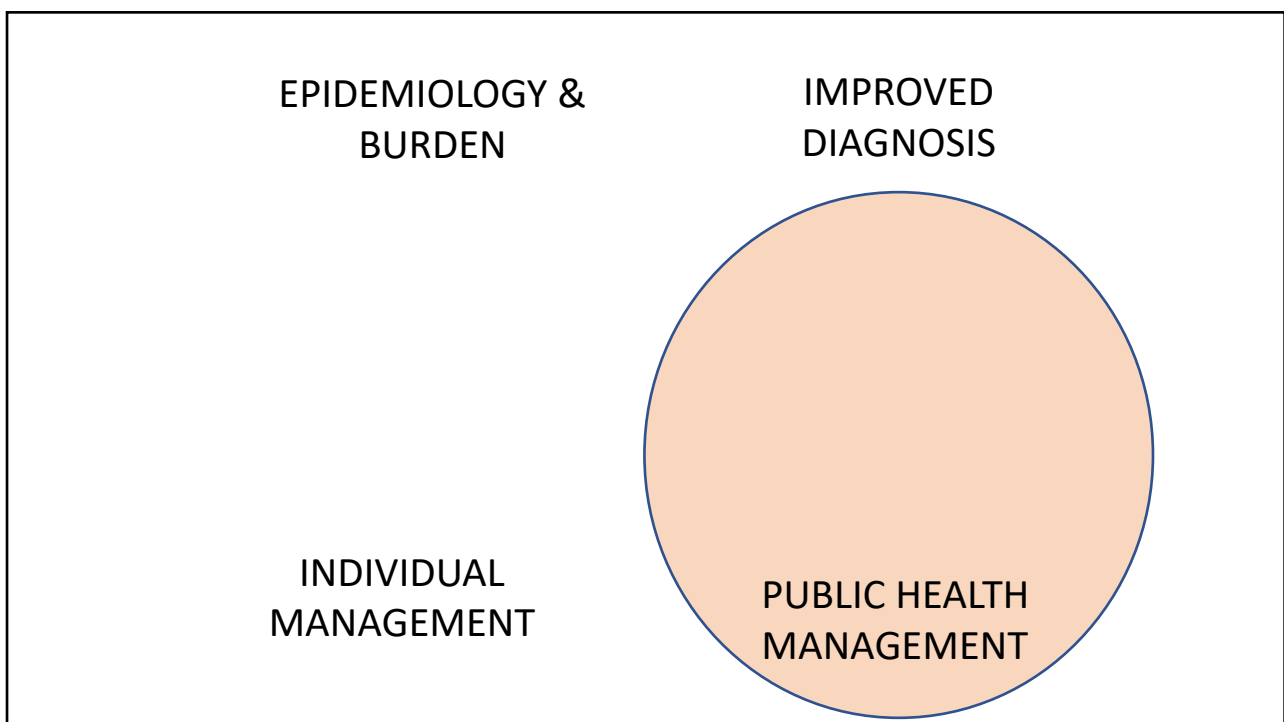
UHC (WHO package of care)

Treat ALL household contacts

Consider oral ivermectin

Identify + manage crusted scabies

**Failure to reduce burden in highly-endemic areas**



## Intensified case management vs MDA

Increase awareness to increase presentations for care

Improve clinical care of cases when people present

Better supply and access to medicines

Then... consider **mass drug administration**

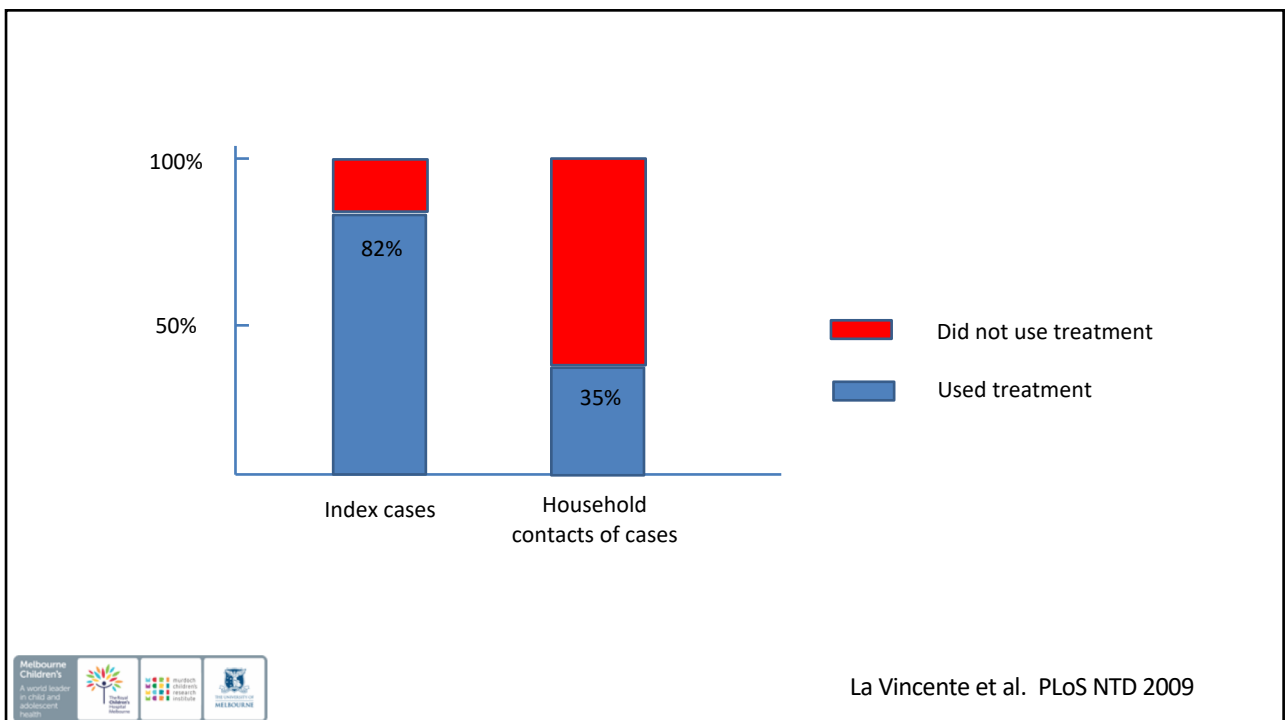
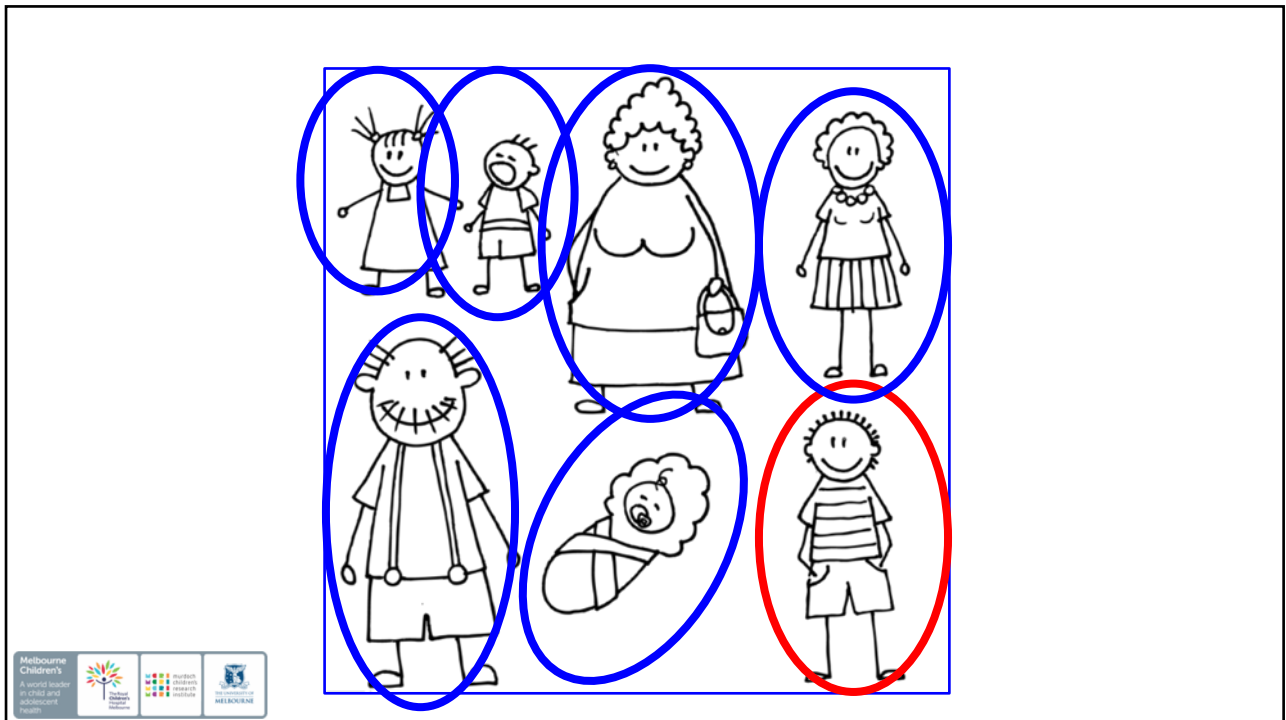


## Challenges with topical treatment









Courtesy Therese Kearns & Sophie La Vincente





La Vincente et al. PLoS NTD 2009



		
	Onchocerciasis	Ivermectin
	Lymphatic filariasis	Ivermectin / Albendazole / DEC
	Soil transmitted helminths (3)	Albendazole / Mebendazole
	Schistosomiasis	Praziquantel
	Trachoma	Azithromycin

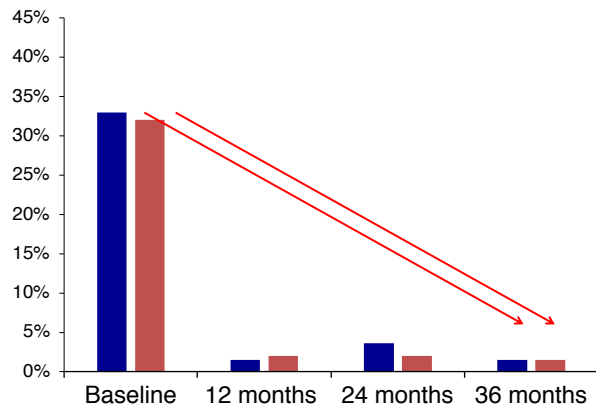
### Community control of scabies: a model based on use of permethrin cream

DAVID TAPLIN   SHERRI L. PORCELAIN   TERRI L. MEINKING  
RENEE L. ATHEY   JOAQUIN A. CHEN   PEDRO M. CASTILLERO  
REGULO SANCHEZ

For 18 years treatment with lindane or crotamiton products has failed to stem the epidemic of scabies among the Kuna Indians in the San Blas islands of the Republic of Panama. Permethrin 5% cream was introduced as the only treatment in a programme to control scabies on an island of 756 inhabitants and involving workers recruited locally. Prevalence fell from 33% to less than 1% after every person was treated. As long as continued surveillance and treatment of newly introduced cases was maintained, prevalence of scabies remained below 1.5% for over 3 years. When supply of medication was interrupted for 3 weeks, prevalence rose to 3.6%. When control was lost after the US invasion of Panama, prevalence rose to 12% within 3 months. Bacterial skin infections decreased dramatically when scabies was controlled. Permethrin is safe and effective even in areas where this disease has become resistant to lindane.

*Lancet* 1991; 337: 1016-18.

### MDA is effective for scabies



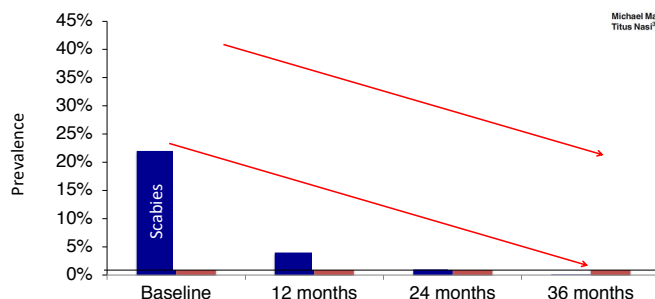
### Control of scabies, skin sores and haematuria in children in the Solomon Islands: another role for ivermectin

Gregor Lawrence,<sup>1</sup> Judson Leafasia,<sup>2</sup> John Sheridan,<sup>3</sup> Susan Hills,<sup>4</sup> Janet Wate,<sup>5</sup> Christine Wate,<sup>5</sup> Janet Montgomerv,<sup>6</sup> Nirmala Pandeva,<sup>1</sup> & David Purdie<sup>1</sup>

Long Term Control of Scabies Fifteen Years after an Intensive Treatment Programme

Michael Marks<sup>1,2,\*</sup>, Betty Tactao-Wini<sup>3</sup>, Lorraine Satorara<sup>4</sup>, Daniel Engelman<sup>5,6,7</sup>, Titus Nas<sup>1</sup>, David C. Mabey<sup>2</sup>, Andrew C. Steer<sup>8,9</sup>

PLOS NTDs 2015



338 residents examined (69% of population)

**1 case of scabies**

Impetigo 8.8%



Lawrence Bull WHO 2005




**The NEW ENGLAND JOURNAL of MEDICINE**

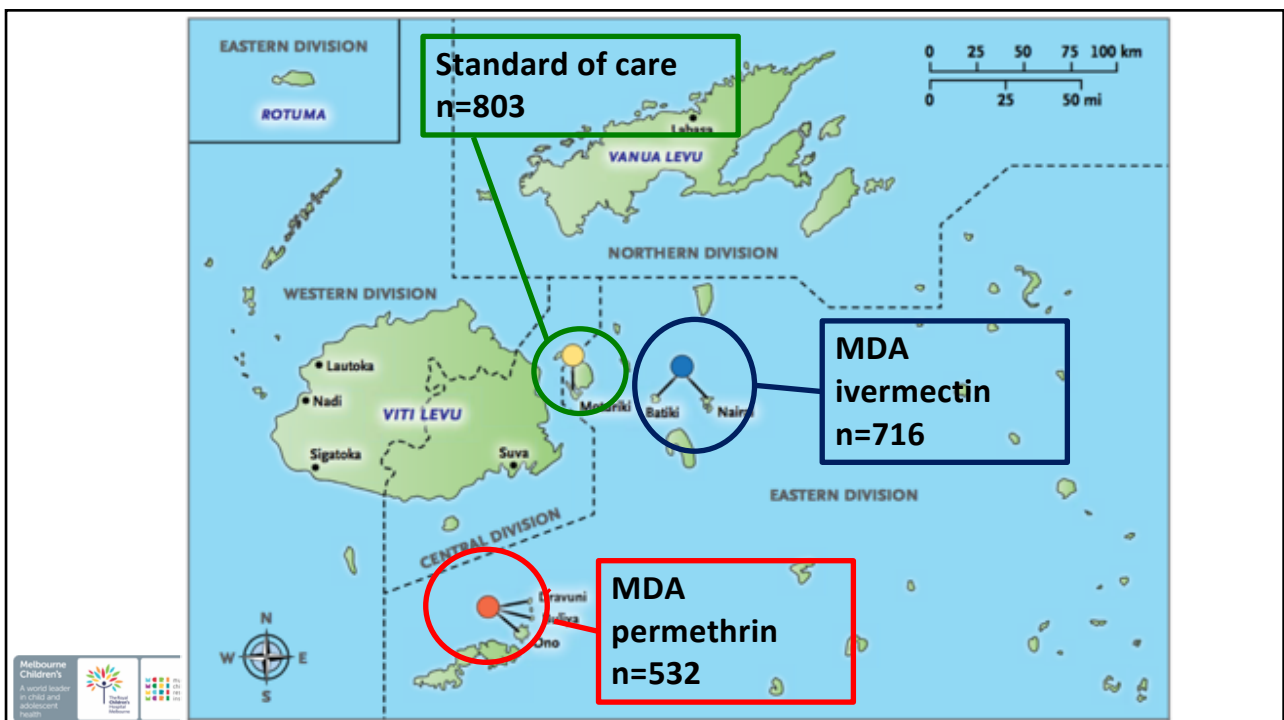
ESTABLISHED IN 1812      DECEMBER 10, 2015      VOL. 373    NO. 24

**Mass Drug Administration for Scabies Control in a Population with Endemic Disease**

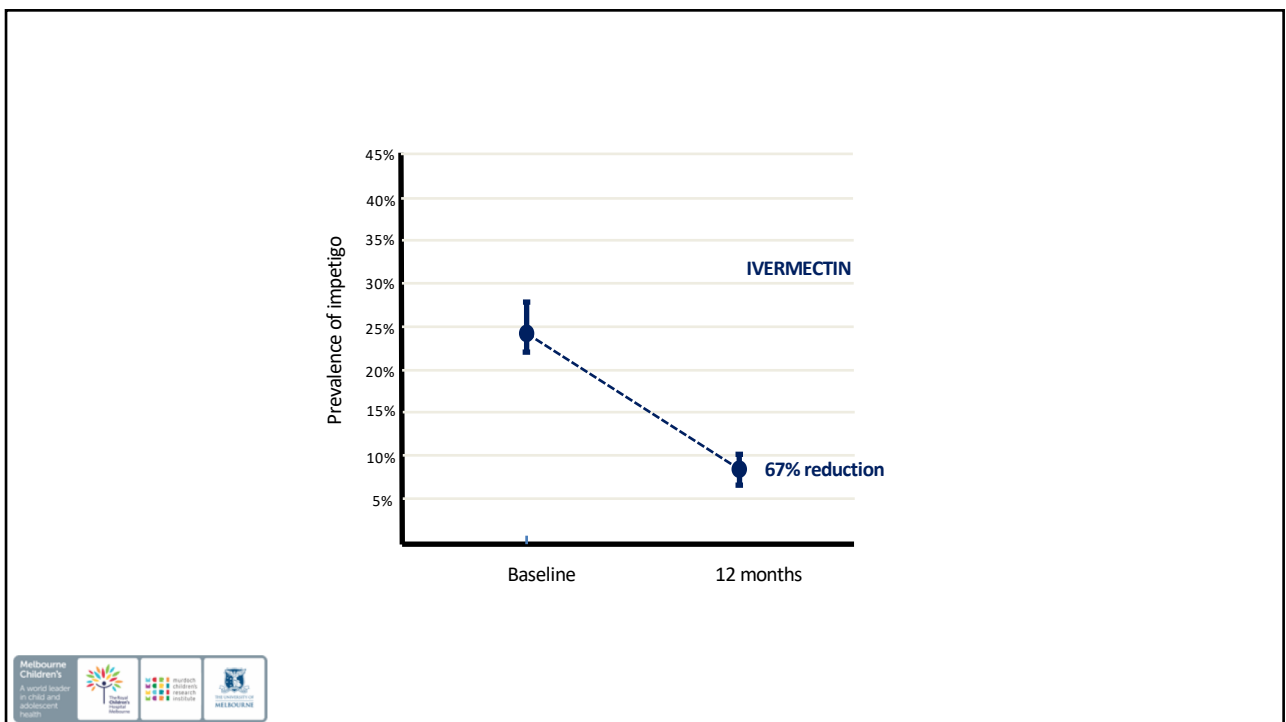
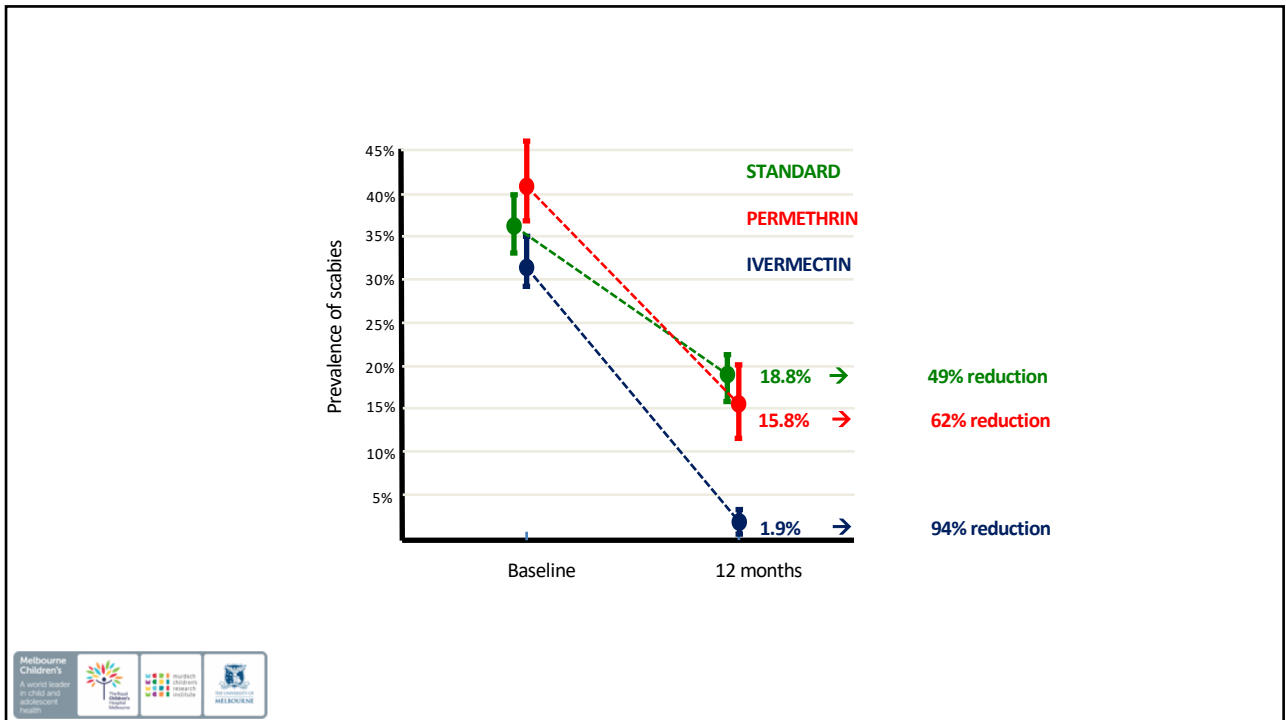
Lucia Romani, M.Soc.Dev., Margot J. Whitfield, M.B., B.S., Josefa Koroivuetu, M.B., B.S., Mike Kama, M.B., B.S., Handan Wand, Ph.D., Lisi Tikoduadua, M.B., B.S., Meciusela Tulcaku, M.B., B.S., Aminiasi Koroi, B.A., Ross Andrews, Ph.D., John M. Kaldor, Ph.D., and Andrew C. Steer, Ph.D.



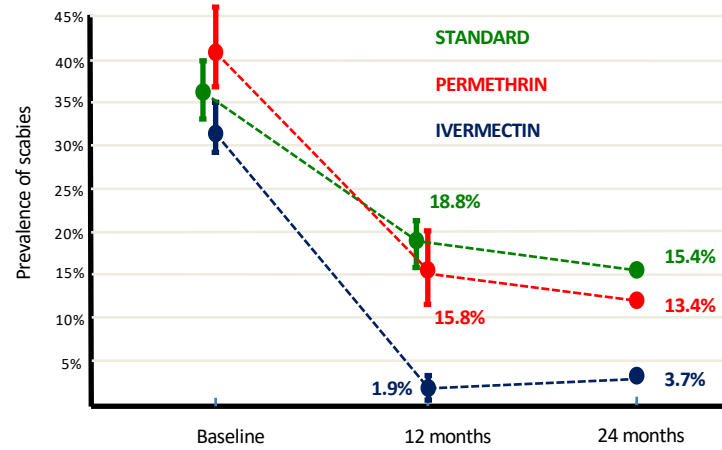






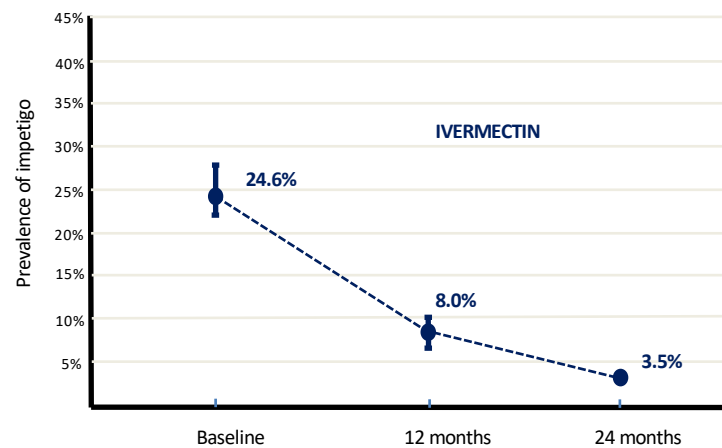


## Scabies: 24 months after intervention



Romani et al, NEJM, 2019

## Impetigo: 24 months after intervention



Romani et al, NEJM, 2019

## Scaling up + Integration



Choiseul population 26,372 (census 2009)

- 26,188 enrolled (99.3%)

98.2% received treatment for trachoma

98.6% received treatment for scabies

Adverse events: 2.6 – 4.3%

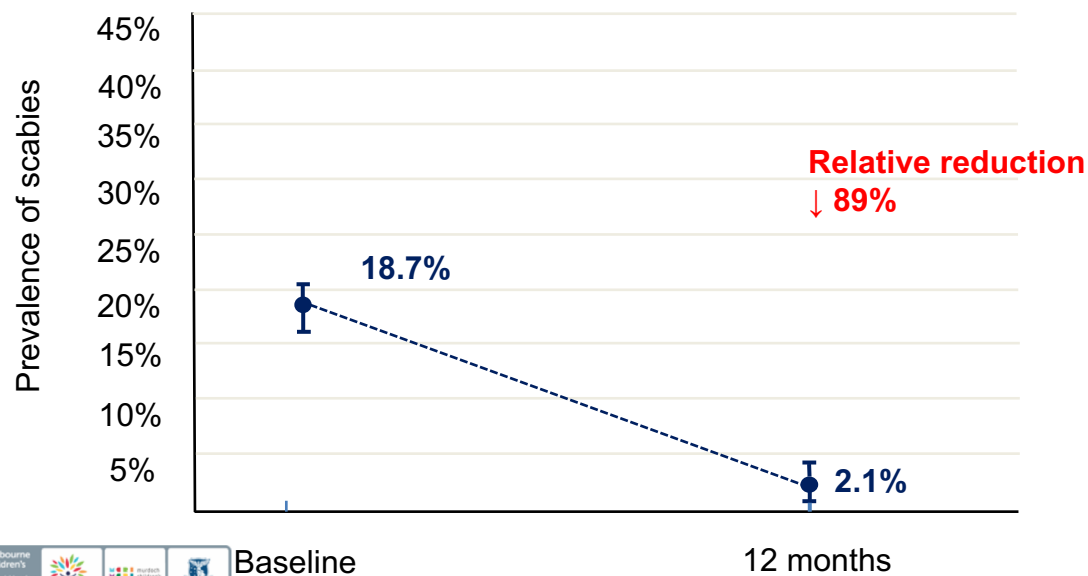
No serious adverse events

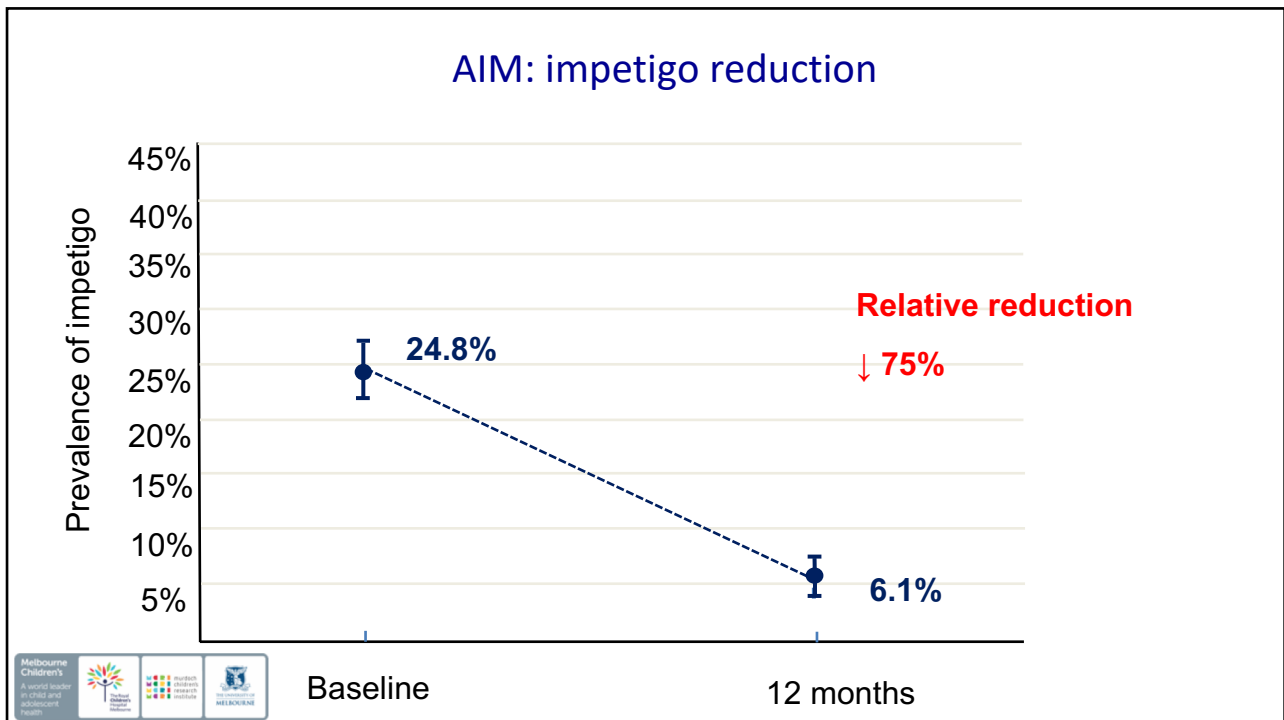
Ministry of Health, Solomon Islands  
The Kirby Institute, UNSW, Sydney, Australia  
The Murdoch Childrens Research Institute, Melbourne, Australia  
London School of Hygiene and Tropical Medicine

Romani et al, Lancet GH 2018  
Romani et al, Lancet ID 2019



## AIM: scabies reduction





**Strong evidence that IVM based  
MDA a highly effective control  
strategy in island settings for:**

- Scabies
- Impetigo



- Severe complications?
- Bigger / mobile populations?
- Integration / co-administration?
- Safety in younger children?

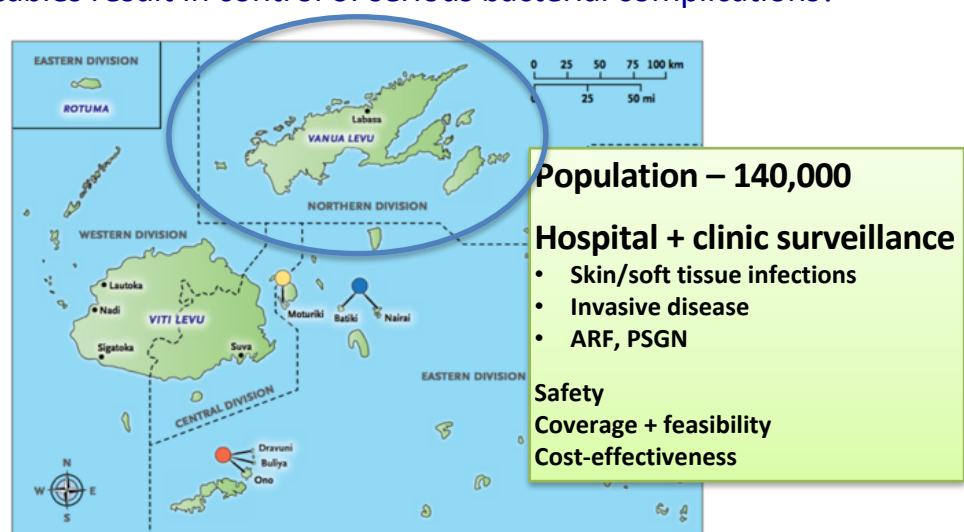


## CURRENT STUDIES



### STUDY 1 – “BIG SHIFT” - Fiji

Does MDA for scabies result in control of serious bacterial complications?



## STUDY 2 – “RISE” – Solomon Islands

Is one dose of ivermectin sufficiently effective as MDA Strategy?



**1 dose IVM vs 2 doses IVM MDA**  
**Non-inferiority**  
**Cluster-randomized**  
**20 villages**  
**~5000 participants**

**Prevalence scabies 12months**

- Impetigo
- 24months
- Clinic presentations
- Safety



## STUDY 3 – “FIT” (integration) - Fiji

2-drug (DEC and Albendazole) vs

3-drug (Ivermectin, DEC and Albendazole) for Lymphatic Filariasis  
 AND impact on scabies



## STUDY 4: "ITCH" Ivermectin Therapy in young Children



ADVOCACY  
ENGAGEMENT  
FUNDING

(Part 2)



## Background and Rationale

2011-12	IACS formed; First meeting
	Development of aims and viewpoint "toward control"
2013-16	National/international meetings, MOH engagement
	Growth and visibility, advocacy
2016-17	Development of dossier for WHO NTD STAG
2017	Scabies and other ectoparasites added to WHO NTD list Regular engagement with medical officer for scabies
2017-18	WHO meetings/guide on "skin-NTDs" WHO WPRO NTD consultation and meetings Scabies discussed NTD M+E meeting
	Multiple requests from national MOH for control recommendations
2019	



WHO Informal Consultation on a Framework for Scabies Control

World Health Organization, Western Pacific Region Headquarters, Manila, Philippines.  
19th - 21st February 2019




# Macquarie Award



## Meet the winners

We're proud to announce the five winners of the Macquarie 50th Anniversary Award. From close to 1,000 applications received globally, these five winners will each receive \$410 million in funding to deliver their projects that seek to initiate or build on a bold idea that addresses an area of social need.

**Murdoch Children's Research Institute**  
**World Scabies Elimination Program**  
 Taking action to eliminate scabies across the world

 <b>200 million+</b> People worldwide are affected by scabies	 <b>1.5 million</b> People expected to receive treatment from this funding	 <b>90% reduction</b> Expected in the prevalence of scabies with a single round of medicine
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## PROGRAM SKIN HEALTH SYMPOSIUM\*



14 AUGUST 2019 • DARWIN, NT



**HOT  
NORTH**  
 Improving Health Outcomes in the Tropical North

**ONE  
DISEASE**

# WHO 2030 Roadmap

## Neglected tropical diseases

### WHO extends deadline of second-phase web consultation for new Roadmap on neglected tropical diseases

#### CONSULTATION NOW CLOSED

30 July 2019 | Geneva — Following requests by several stakeholders, WHO has extended the deadline for online submission of feedback on the new NTD Roadmap from 31 July to 7 August 2019.

#### Working together to develop the global Roadmap for neglected tropical diseases

WHO coordinates and supports policies and strategies to enhance global access to interventions for the prevention, control, elimination and eradication of neglected tropical diseases (NTDs).

Consistent with World Health Assembly resolutions and in line with WHO's 13th General Programme of Work 2019–2023 (GPW13), WHO supports Member States to expand access to prevention, diagnosis, treatment and care interventions for NTDs as a contribution towards the achievement of universal health coverage by 2030.

#### Scabies

##### Overview

- Caused by a microscopic mite *Sarcoptes scabiei* var. *hominis* that is transmitted person-to-person through close skin contact.
- The female mite burrows in the skin and lays eggs, triggering an immune response that causes intense itching and rash.
- Bacterial infections can complicate the disease leading to serious consequences such as severe soft tissue infections, septicæmia, kidney disease and rheumatic fever.

##### Disease and epidemiology

455 million  
People affected by scabies at any time  
~5.6m  
(DALYs, 2018)<sup>1</sup>

Accurate data on incidence and prevalence are not available

##### Burden of disease

Age-standardized disability-adjusted life-years per 100 000 people

Cases per region in 2016

Scabies

##### Strategic interventions

##### Preventive chemotherapy

WHO 2030 target

WHO 2030 target

WHO 2030 target

WHO 2030 target

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## Future Directions

## New treatments - Moxidectin

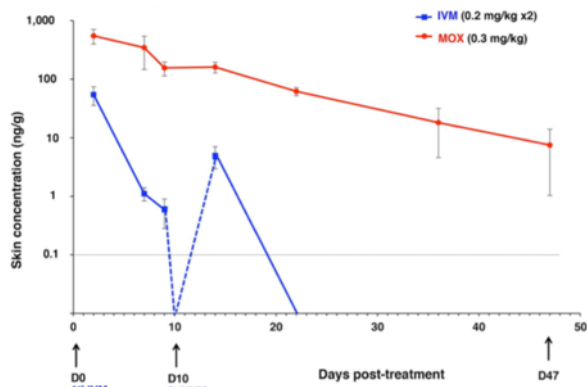
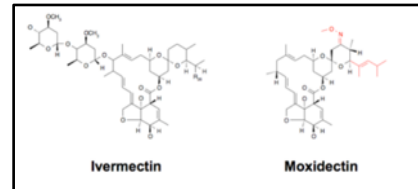


Fig 6. Skin MOX and IVM concentrations (mean  $\pm$  SD, ng/g) after oral intake in scabies-infected pigs. Concentrations measured on D2, 7, 9, 14, 22, 36, and 47 post-treatment are depicted. Predicted parts of the curves are indicated as a dashed line. W, week; D, day.



Medicines Development  
for Global Health

• Bernigaud, PLOS NTDs, 2016.



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## Integration

### Opinion

#### Opportunities for Integrated Control of Neglected Tropical Diseases That Affect the Skin

Daniel Engelman,<sup>1,2,\*</sup> L. Claire Fuller,<sup>3,4</sup> Anthony W. Solomon,<sup>5</sup> James S. McCarthy,<sup>6</sup> Roderick J. Hay,<sup>4,7</sup> Patrick J. Lammie,<sup>8</sup> and Andrew C. Steer<sup>1,2</sup>



Trends in Parasitology

### GUIDELINE

ALTERNATIVE MASS DRUG ADMINISTRATION REGIMENS TO ELIMINATE LYMPHATIC FILARIASIS

PLOS | NEGLECTED TROPICAL DISEASES

#### POLICY PLATFORM

##### Integrated Control and Management of Neglected Tropical Skin Diseases

Ornel Moya<sup>1,2,\*</sup>, Michael Marks<sup>3,4</sup>, Lela Bertoni<sup>5</sup>, Kasper Kuller<sup>6</sup>, Daniel Argon<sup>7</sup>, Ahmed H. Fahal<sup>8</sup>, Christopher Fitzgerald<sup>9</sup>, L. Claire Fuller<sup>10</sup>, Bernardo Garcia Izquierdo<sup>11</sup>, Roderick Hay<sup>12</sup>, Norihisa Imai<sup>13</sup>, Christian Jahnke<sup>14</sup>, Jeffrey V. Lasegne<sup>15</sup>, Anthony Dela<sup>16</sup>, Michele Munduch<sup>17</sup>, Sally Ann O'Connell<sup>18</sup>, Pam Small<sup>19</sup>, Andrew Steer<sup>20</sup>, Ernest N. Tsuba<sup>21</sup>, Alexandre Tondrebeago<sup>22</sup>, Lance Walker<sup>23</sup>, Ole Yntou<sup>24</sup>, Stephen L. Walker<sup>25</sup>, Kingsley Anisul<sup>26</sup>



World Health Organization



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## Acknowledgements

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- Junko Yoshizumi
- Scott Norton
- Lucia Romani
- Michael Marks
- John Kaldor
- IACS Steering Committee
- Delphi study panel
- + many others



### Funding:



*Vinaka vaka levu  
Tanggio tumas  
Thank-you*

[www.controlscaabies.org](http://www.controlscaabies.org)

