



**Second International workshop on
Onchocerciasis-Associated Epilepsy 2023**

19-21.09.2023 Antwerp Belgium



Chiara Trevisan
Postdoctoral Research Fellow
Institute of Tropical Medicine
Antwerp, Belgium
E-mail: ctrevisan@itg.be

BURDEN OF DISEASE

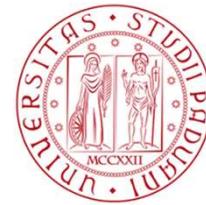
Lessons learned from *Taenia solium* cysticercosis



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BRIEF INTRODUCTION

- MSc in Animal Science (2012)
- PhD in Epidemiology and Public Health (2013 - 2017)
- Post doc, Veterinary Helminthology Unit (2017 – 2020)
- FWO senior post doc (2020 – 2023)



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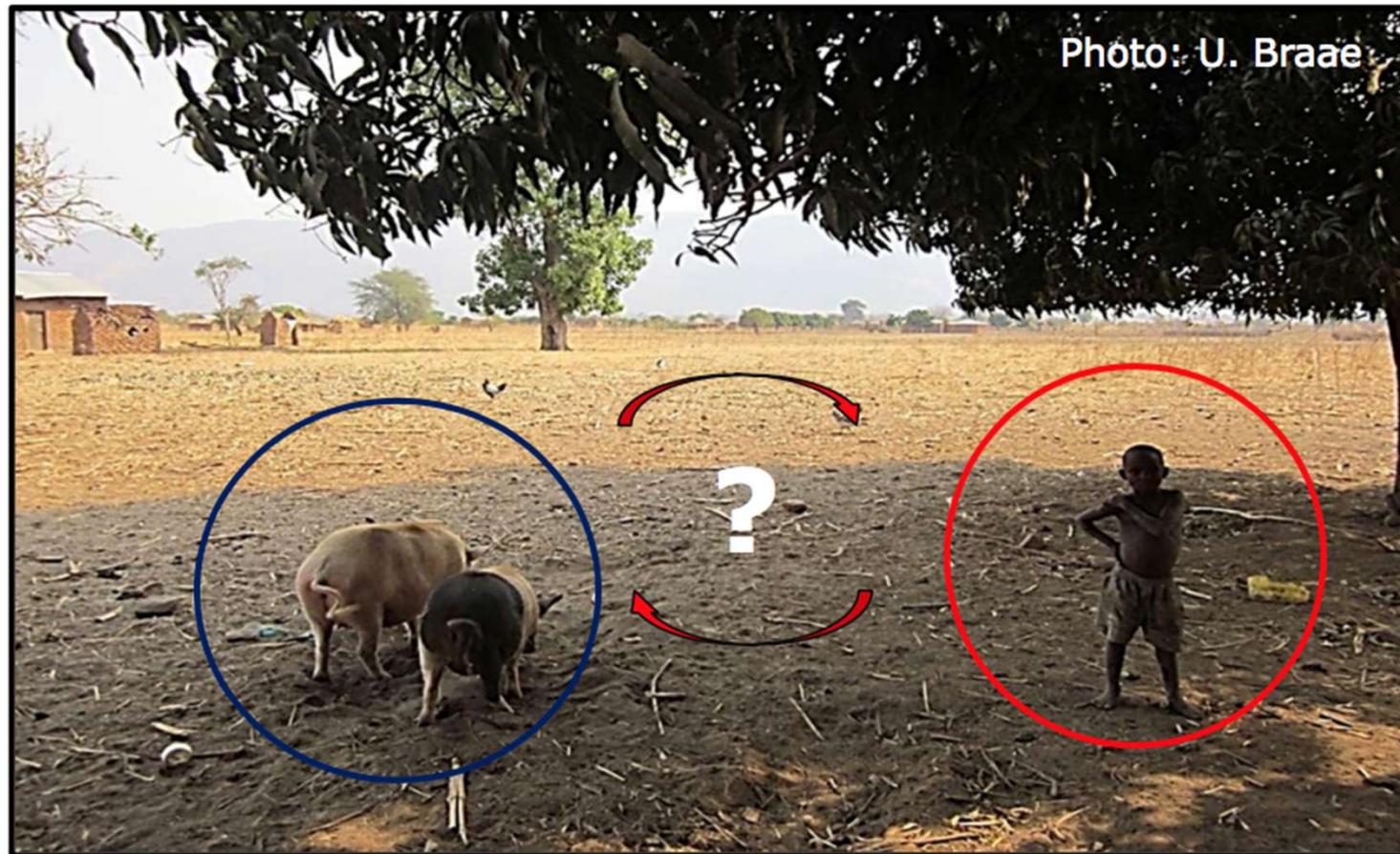


OUTLINE

- Background: What is *Taenia solium* cysticercosis
- Burden of Disease
- Disability Adjusted Life Years
- Global burden of cysticercosis
- Societal cost of *Taenia solium* cysticercosis
- Global burden of onchocerciasis



WHAT IS *TAENIA SOLIUM* CYSTICERCOSIS?



BURDEN OF DISEASE

How do you define disease impact or importance?

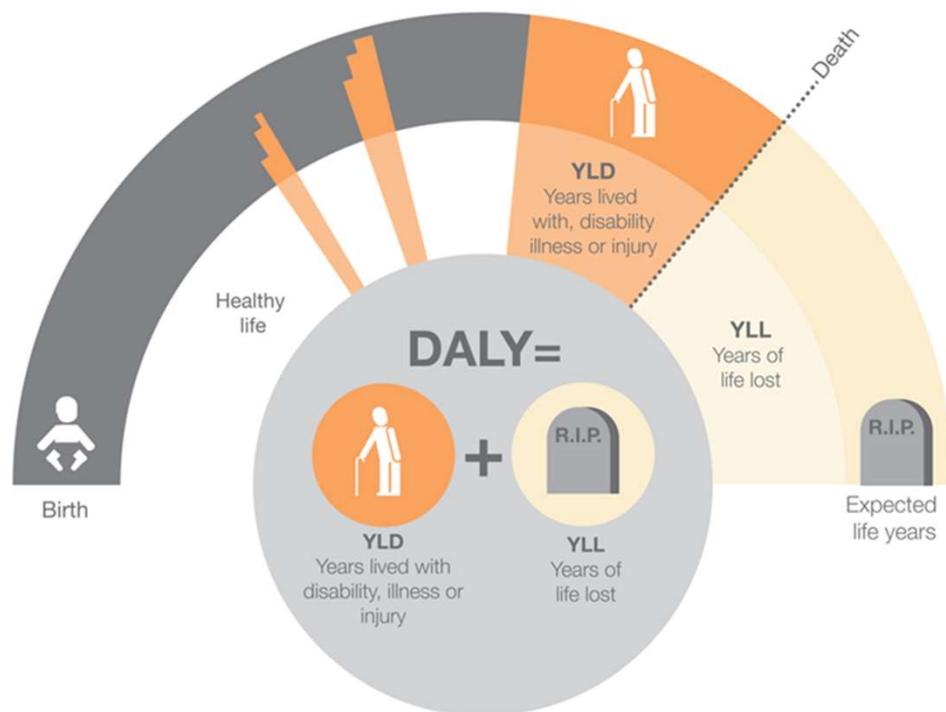


Diseases have an impact on multiple aspects

Burden of diseases – quantification of any of these aspects

- There are different metrics (incidence, prevalence, mortality, cost of illnesses)

DISABILITY ADJUSTED LIFE YEARS (DALYS)



International burden of disease studies utilizing DALYs:

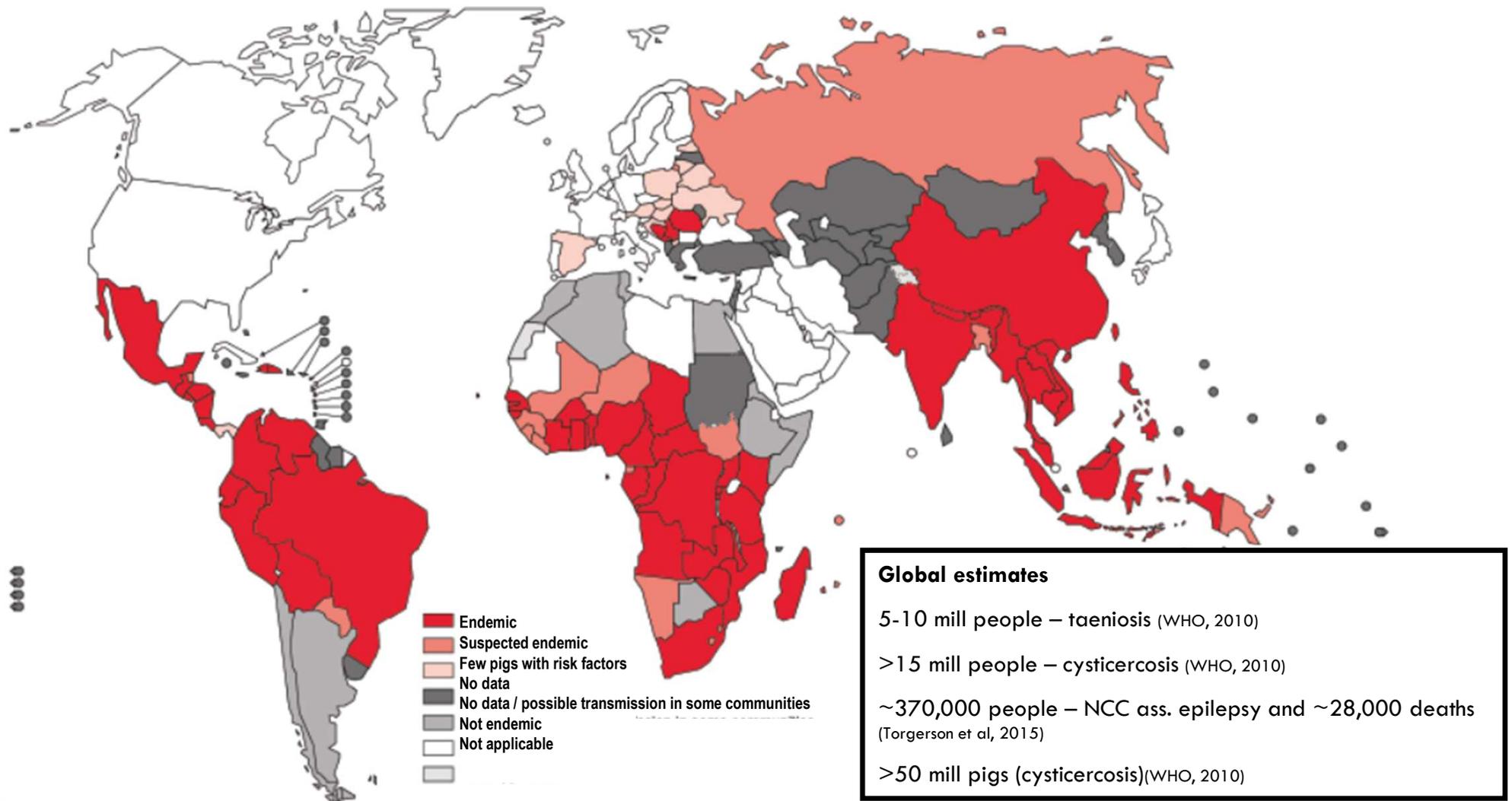
The Foodborne Disease Burden Epidemiology Reference Group - FERG

- Aims to quantify the health burden for foodborne disease
- Estimates: 2010

The Global Burden of Disease Study - GBD

- Aim to quantify the health effects of diseases, injuries and risk factors
- Estimates: 1990-2019

GLOBAL BURDEN OF CYSTICERCOSIS



GLOBAL BURDEN OF CYSTICERCOSIS



Measurements of the burden of human diseases

WHO uses DALYs:

$$\text{DALY} = \text{YLL} + \text{YLD}$$

YLL = Years of lost life

(number of death at each age x life expectancy at the age of death)

YLD = Years lived with disabilities

(incidences x mean duration of disease x severity of the disease)

(Global burden of diseases, 1990)

Literature review

- Epidemiological and clinical data

Development of disease model

- Literature based

Global burden calculation

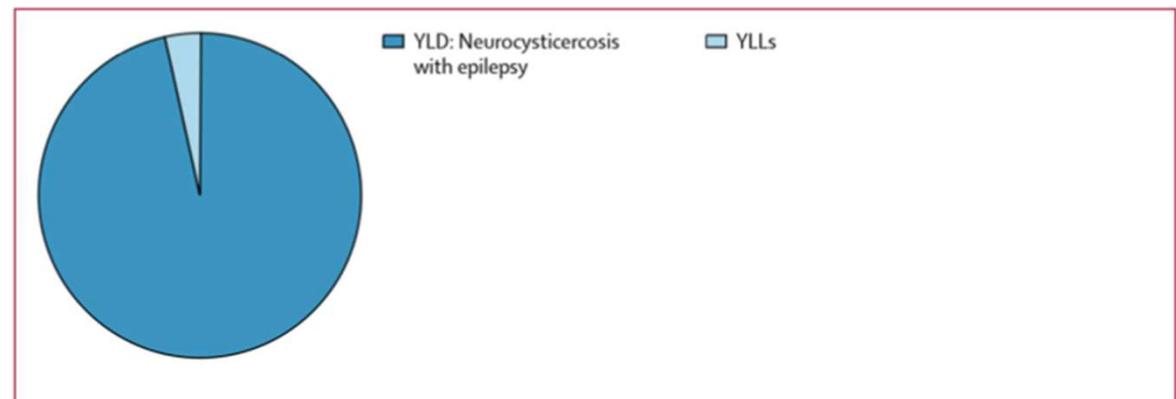
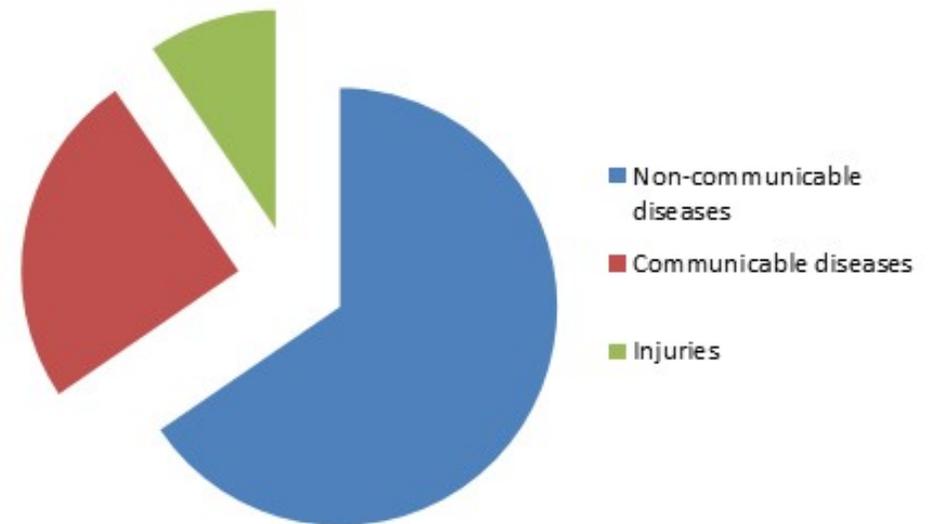


Figure 1: Composition of DALYs by YLLs and constituent sequelae YLDs for both sexes combined, 2019



GLOBAL BURDEN OF CYSTICERCOSIS



Aetiology: *Taenia solium*

Disease: Neurocysticercosis

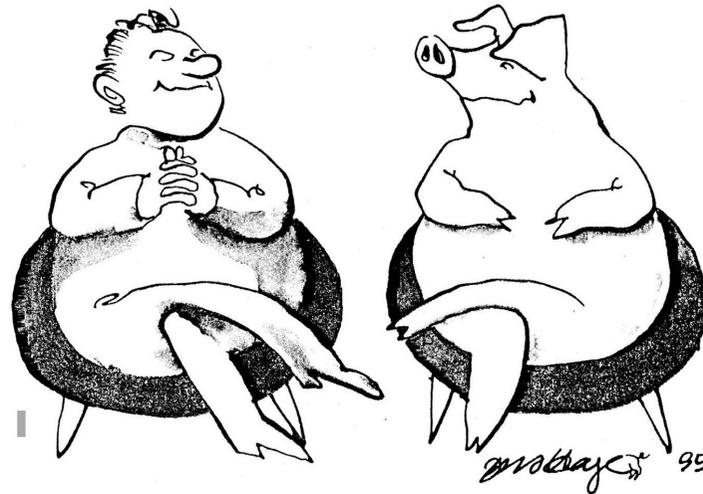
Symptoms: Epilepsy, headache, vision impairment

Sequelae: Stigmatization, decreased working capacity, unemployment

Outcome: **Traffic accidents, falls, burns, drowning**



SOCIETAL COST OF *TAENIA SOLIUM* CYSTICERCOSIS



Burden	(Human + Animal) = Total		
Non-monetary	DALY	?	?
Monetary	€	€	€
Societal cost	DALY	Z	Z-DALY

NEED FOR MORE DATA

PLOS NEGLECTED TROPICAL DISEASES

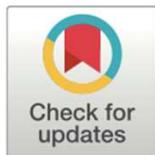
RESEARCH ARTICLE

A scoping review of burden of disease studies estimating disability-adjusted life years due to *Taenia solium*

Andrew Larkins ^{1,2,3*}, **Mieghan Bruce**^{1,2,3}, **Carlotta Di Bari**^{1,4}, **Brecht Devleesschaumer**^{1,4,5}, **David M. Pigott**^{1,6}, **Amanda Ash**²

1 Global Burden of Animal Diseases Programme <https://animalhealthmetrics.org>, **2** Centre for Biosecurity and One Health, Harry Butler Institute, Murdoch University, Perth, Australia, **3** School of Veterinary Medicine, Murdoch University, Perth, Australia, **4** Department of Epidemiology and Public Health, Sciensano, Brussels, Belgium, **5** Department of Translational Physiology, Infectiology and Public Health, Ghent University, Merelbeke, Belgium, **6** Institute for Health Metrics and Evaluation, Department of Health Metrics Sciences, School of Medicine, University of Washington, Seattle, Washington, United States of America

* andrew.larkins@murdoch.edu.au



GLOBAL BURDEN OF DISEASE – ONCHOCERCIASIS

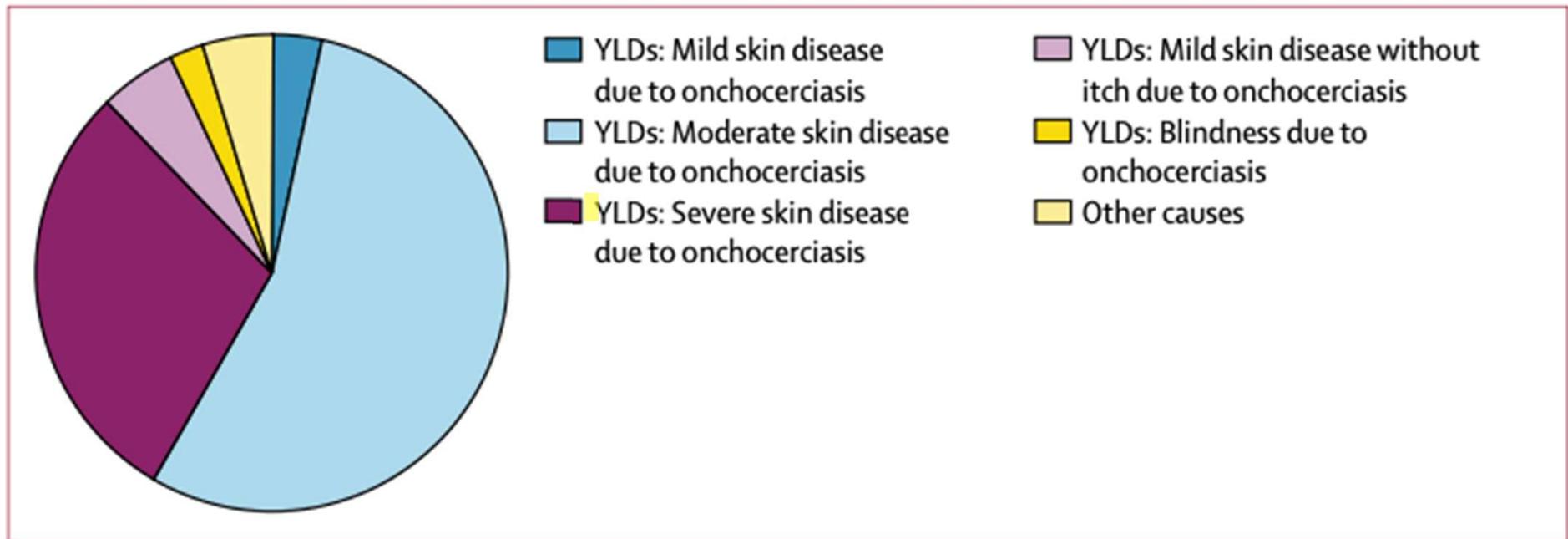


Figure 1: Composition of DALYs by constituent sequelae YLDs for both sexes combined, 2019

[GBD - the lancet](#)

www.thelancet.com Vol 396 October 17, 2020



GLOBAL BURDEN OF DISEASE — ONCHOCERCIASIS

Onchocerciasis—Level 3 cause

Summary The global burden of onchocerciasis in 2019 was 1·23 million (95% UI 0·765–1·82) DALYs.

Definition Onchocerciasis, also known as river blindness, is a parasitic disease caused by *Onchocerca volvulus*. Diagnosis can be made by skin snip biopsy to identify larvae, surgical removal of nodules and exam for adult worms, slit lamp exam of anterior part of the eye where larvae or lesions caused by them are visible, and antibody tests.

	Total sources
Incidence	0
Prevalence	345
Remission	0
Causes of death	0
Other	6

Table 1: Total sources used in GBD 2019 estimation

What is new in GBD 2019?

- There were no substantial changes to the modelling strategy for GBD 2019.

Cysticercosis B69–

Includes

- cysticerciasis infection due to larval form of Taenia solium

Clinical Information

- A parasitic infection caused by the larval form of taenia solium. It is a disseminated infection affecting the central nervous system, subcutaneous tissues, lungs, heart and liver. The most serious complications result from infection of the brain parenchyma. Patients may develop seizures, hydrocephalus, encephalopathy and meningoencephalitis.
- Infection with cysticercus, the larval form of the various tapeworms of the genus taenia (usually t. Solium in man). In humans they penetrate the intestinal wall and invade subcutaneous tissue, brain, eye, muscle, heart, liver, lung, and peritoneum. Brain involvement results in neurocysticercosis.

Codes

- ▶ B69 Cysticercosis
 - ▶ B69.0 Cysticercosis of central nervous system
 - ▶ B69.1 Cysticercosis of eye
 - ▶ B69.8 Cysticercosis of other sites
 - ▶ B69.81 Myositis in cysticercosis
 - ▶ B69.89 Cysticercosis of other sites
 - ▶ B69.9 Cysticercosis, unspecified



Onchocerciasis B73-

Includes

- onchocerca volvulus infection
- onchocercosis
- river blindness

Clinical Information

- Filarial infection of the eyes transmitted from person to person by bites of onchocerca volvulus-infected black flies. The microfilariae of onchocerca are thus deposited beneath the skin. They migrate through various tissues including the eye. Those persons infected have impaired vision and up to 20% are blind. The incidence of eye lesions has been reported to be as high as 30% in central america and parts of africa.
- Infection with nematodes of the genus onchocerca. Characteristics include the presence of firm subcutaneous nodules filled with adult worms, pruritus, and ocular lesions.
- Infection with nematodes of the genus onchocerca; characteristics include the presence of firm subcutaneous nodules filled with adult worms, pruritus, and ocular lesions.

Codes

- ▶ **B73** Onchocerciasis
 - ▶ **B73.0** Onchocerciasis with eye disease
 - ▶ **B73.00** Onchocerciasis with eye involvement, unspecified
 - ▶ **B73.01** Onchocerciasis with endophthalmitis
 - ▶ **B73.02** Onchocerciasis with glaucoma
 - ▶ **B73.09** Onchocerciasis with other eye involvement
 - ▶ **B73.1** Onchocerciasis without eye disease



THANK YOU

