



NEGLECTED TROPICAL DISEASES AND ANEMIA - WHAT DO WE KNOW

18 October, 2016- Accelerated Reduction Efforts on Anaemia COP Webinar

Yaobi Zhang

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1. What are the neglected tropical diseases (NTDs)?
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What are the neglected tropical diseases (NTDs)?

- Vir

NEGLECTED TROPICAL DISEASES
are a diverse group of diseases with distinct characteristics found mainly among the poorest populations of the world.

- Bac

The 17 diseases targeted by WHO share a common stranglehold on those populations left furthest behind by development: they perpetuate poverty. Most of those who suffer from more than one of these diseases at any given time are also mired in poverty, perpetuating a doubly intolerable and unacceptable situation destined to live in permanent disability.

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Preventive chemotherapy (PC)-NTDs

WHO, NTD Roadmap, 2012

5 Preventive chemotherapy (PC)-NTDs



- **Blinding trachoma**
 - **Onchocerciasis**
- } Blindness
- **Lymphatic filariasis (LF)**
- } Disfigurement
- **Schistosomiasis (SCH)**
 - **Soil transmitted helminthiases (STH)**

} Undernutrition / anemia

Soil-transmitted helminthes

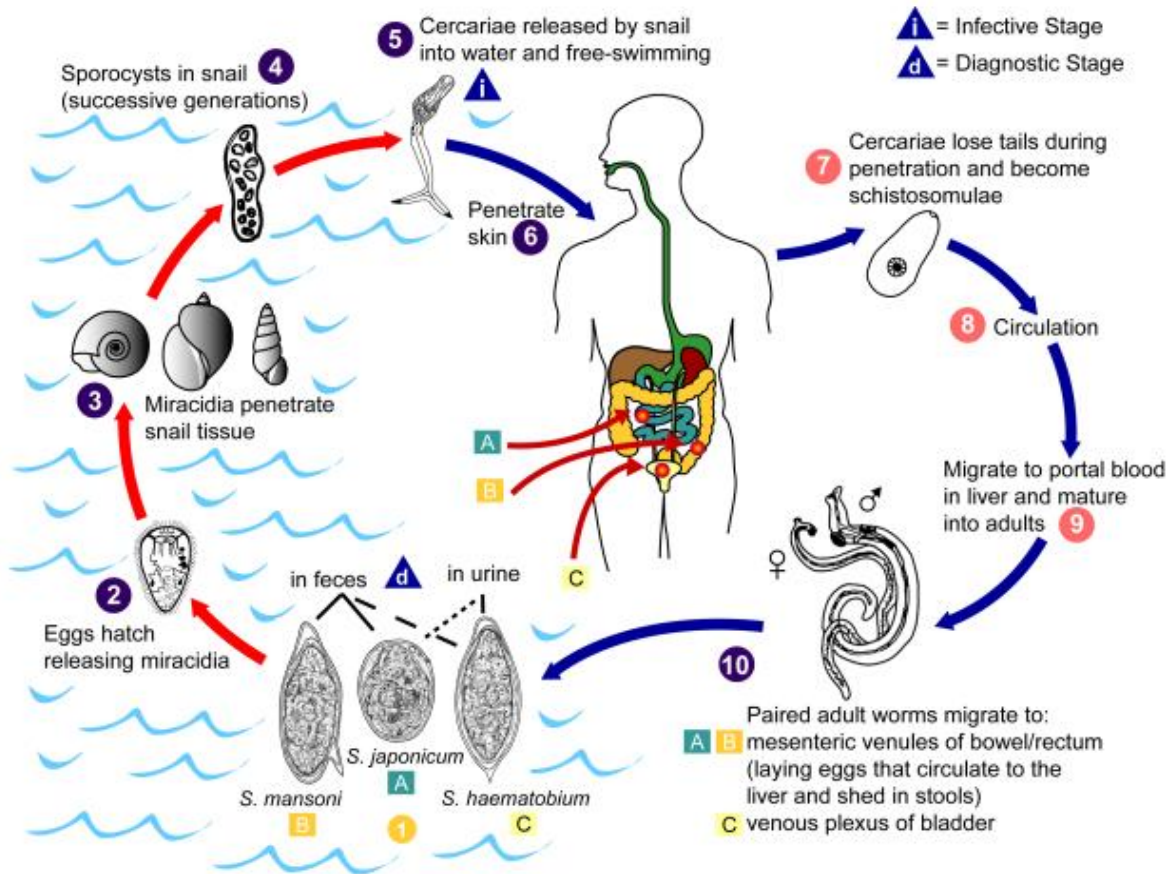
- Over 1 billion people infected or at the risk of being infected with soil-transmitted helminthes worldwide
- 266 million pre school age children require preventive chemotherapy
- 609 million school age children require preventive chemotherapy
- 37.7 million pregnant women in Africa

Schistosomiasis

- >770 million people estimated to be infected or at risk of infection globally
- 261 million people, including 121 million school age children, require preventive chemotherapy
- 20,000 to 200,000 deaths per year

Schistosomes (SCH)

Schistosomiasis



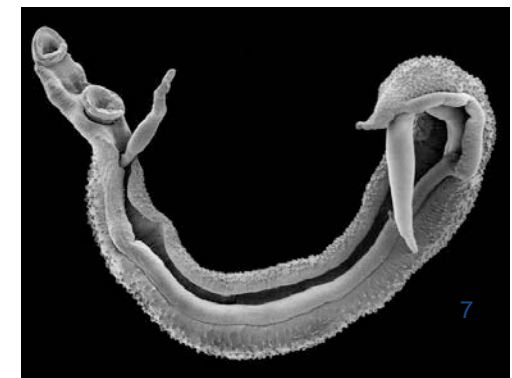
- Caused by infection with parasite ***Schistosoma***:

- Urogenital:

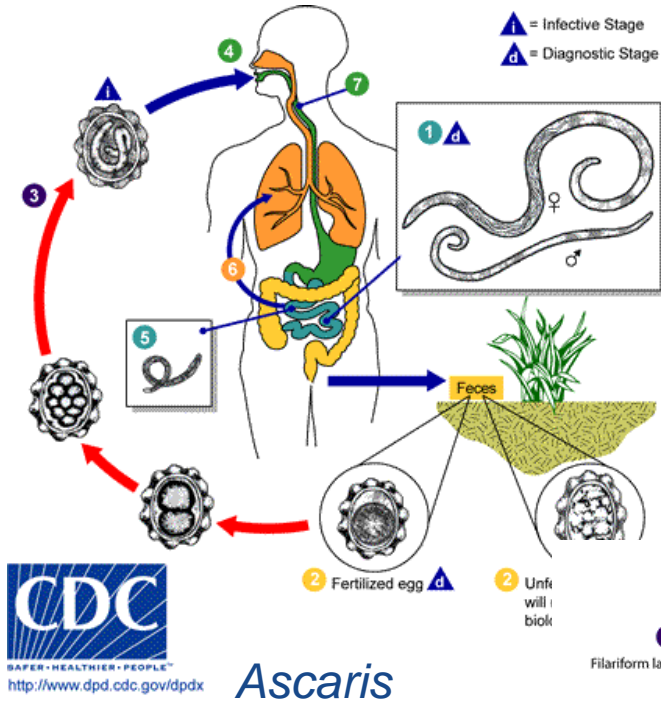
- *Schistosoma haematobium*

- Intestinal:

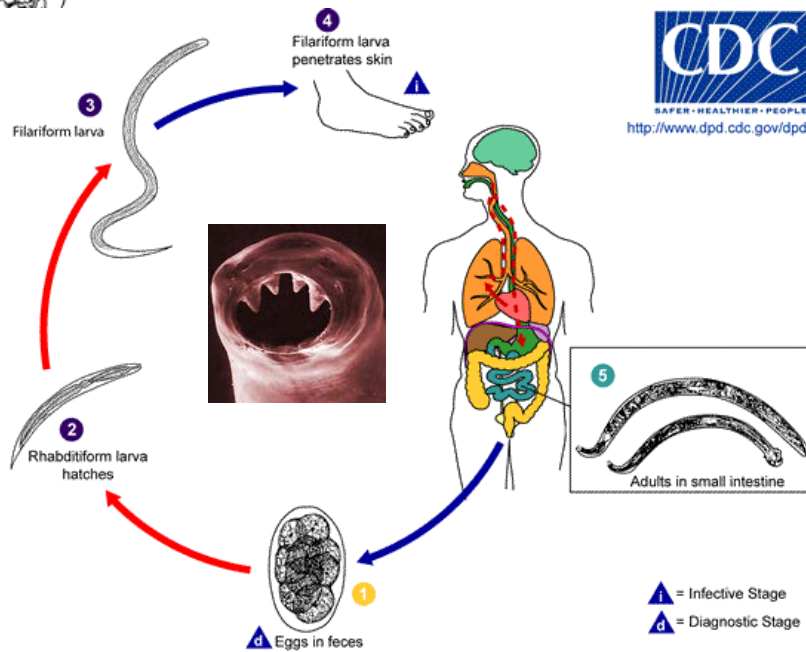
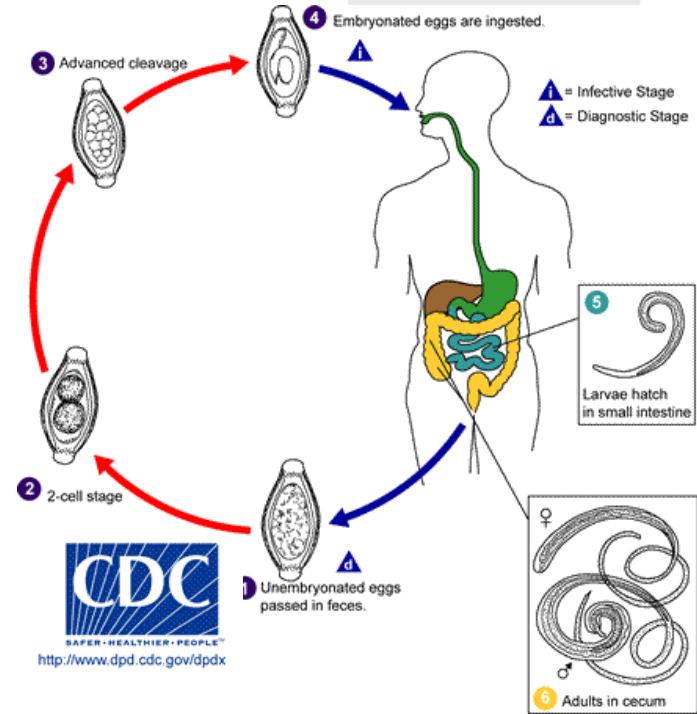
- *S. mansoni*
- *S. japonicum*



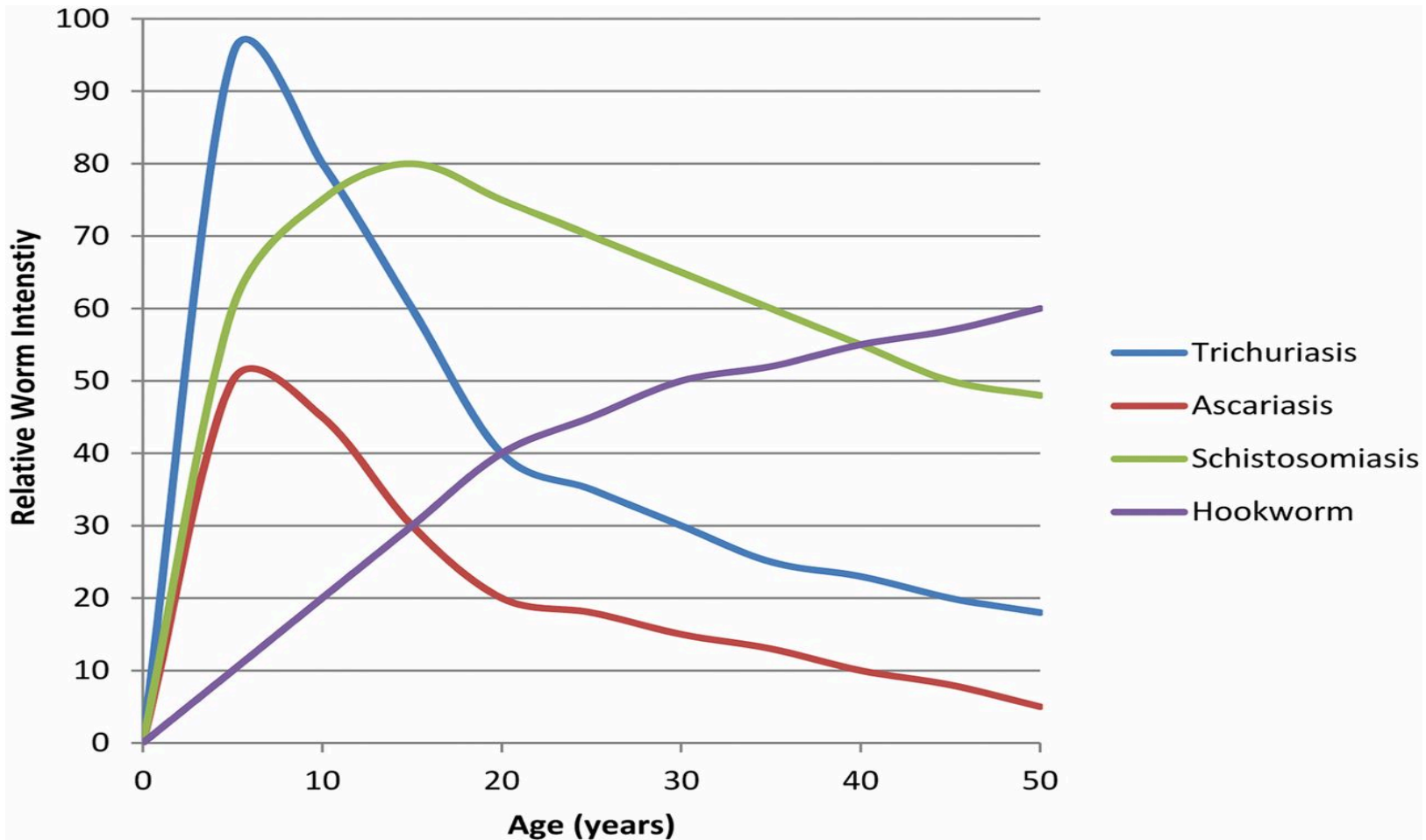
Soil-transmitted helminthes



Trichuris



Schistosomiasis and STH worm burden age profiles



Soil-transmitted helminthiasis

- **Under nutrition & anemia**
 - Impaired growth
 - Impaired cognition
 - Weakness, fatigue
 - Poor school performance
 - Reduced productivity and earning ability
- **Diarrhea and dysentery**

Schistosomiasis

- **Under nutrition & anemia**
 - Impaired growth
 - Impaired cognition
 - Heavy infection - poor short-term memory and slower reaction times in schoolchildren
 - Weakness, fatigue
- **Increased susceptibility to other infections (e.g. HIV)**
- **Chronic health problems: inflammation and fibrosis of the liver, spleen, lungs, bladder wall, colon**
- **Hematemesis (portal hypertension)**
- **Bladder cancer**

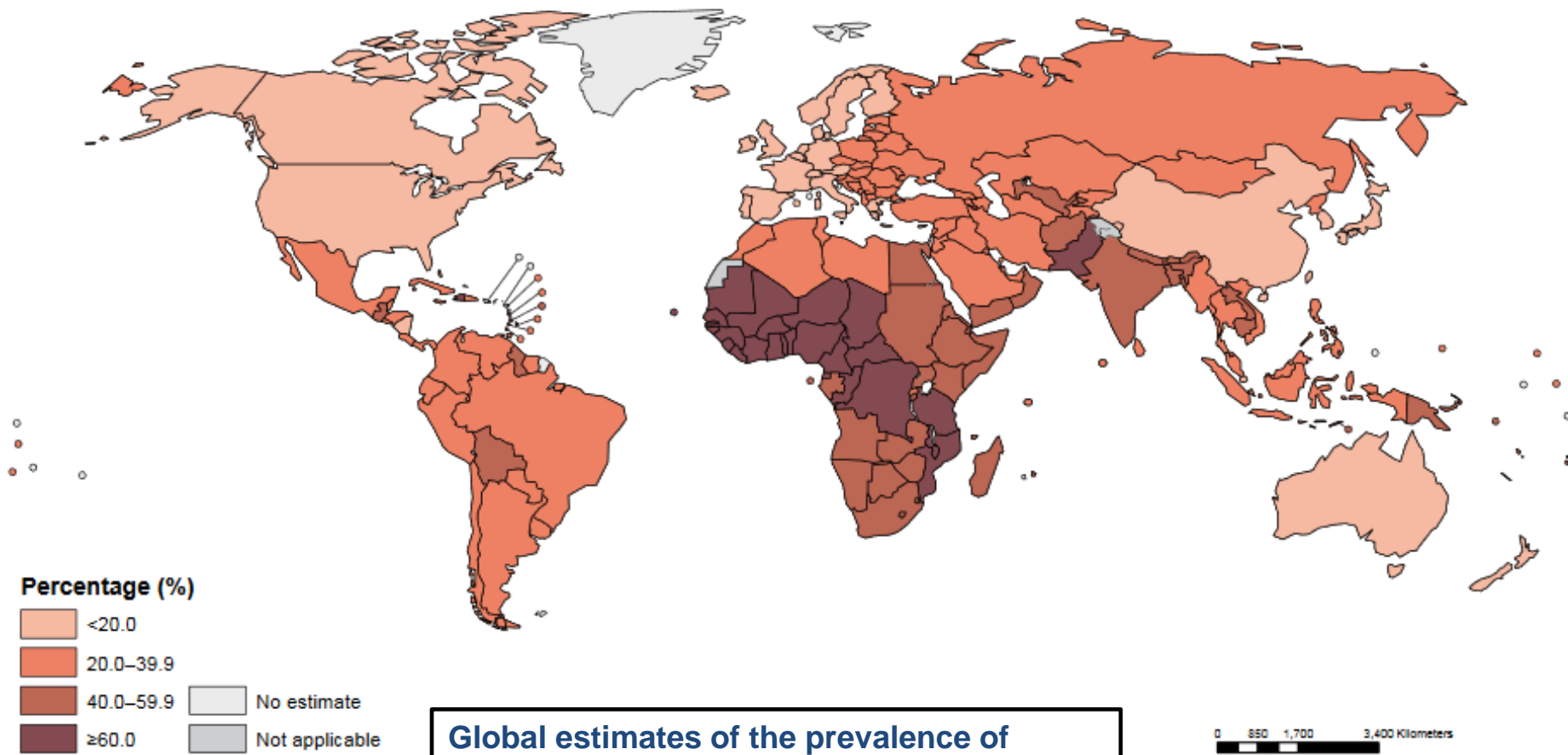


Links of STH and SCH with anemia

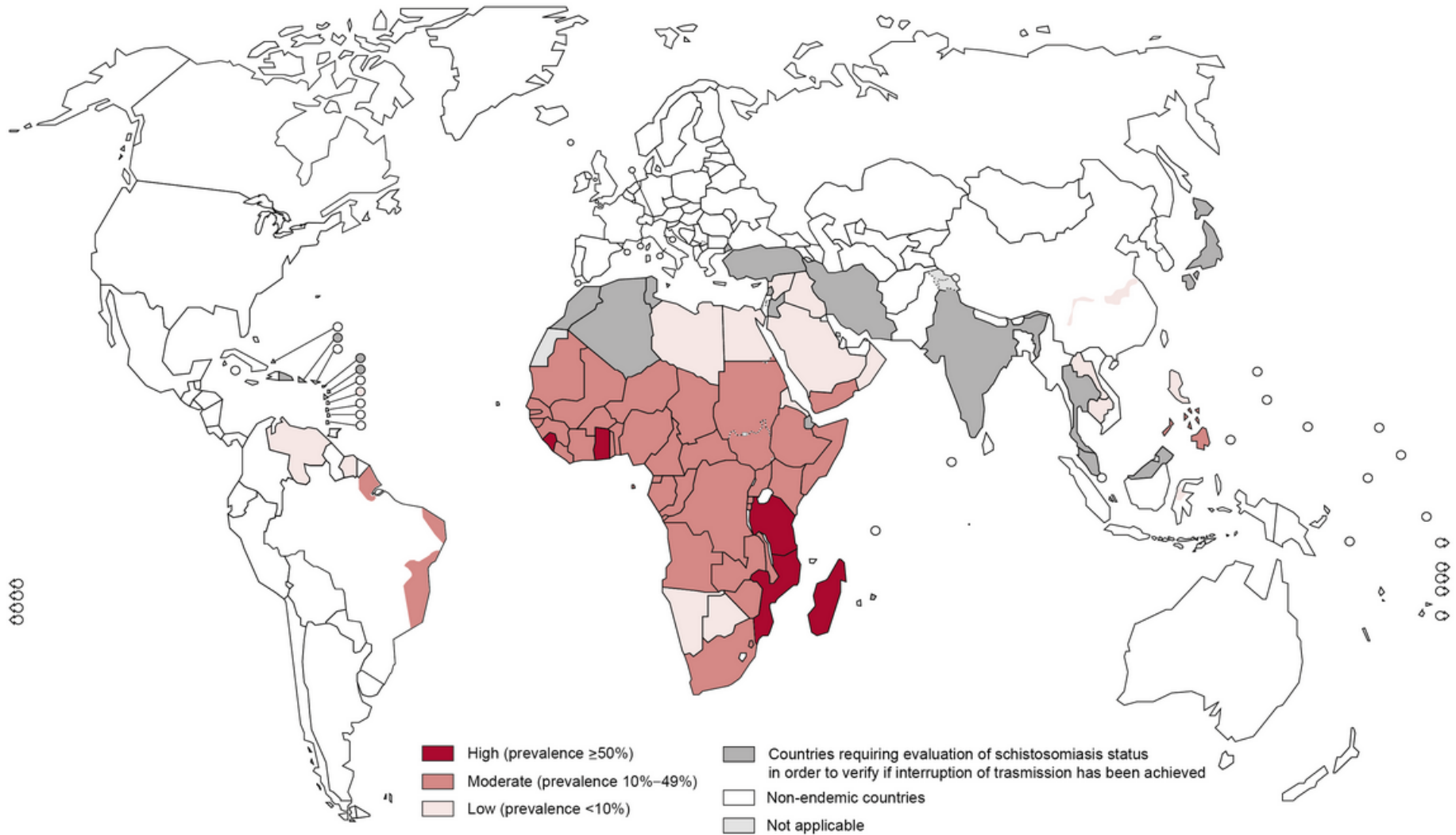
Overlapping geographical distribution



Helen Keller
INTERNATIONAL



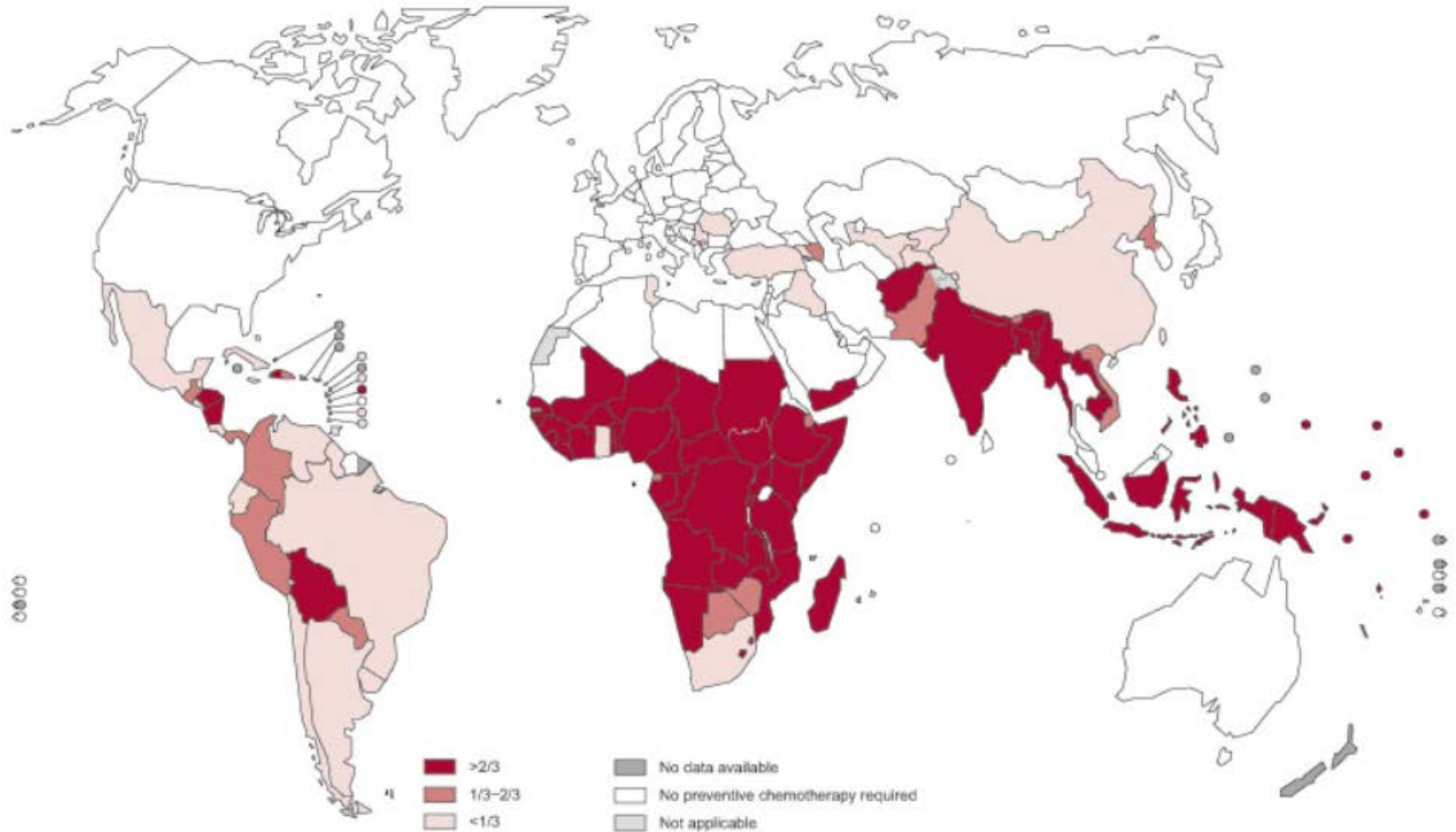
Overlapping geographical distribution



Distribution of schistosomiasis, 2011

Source: WHO

Overlapping geographical distribution

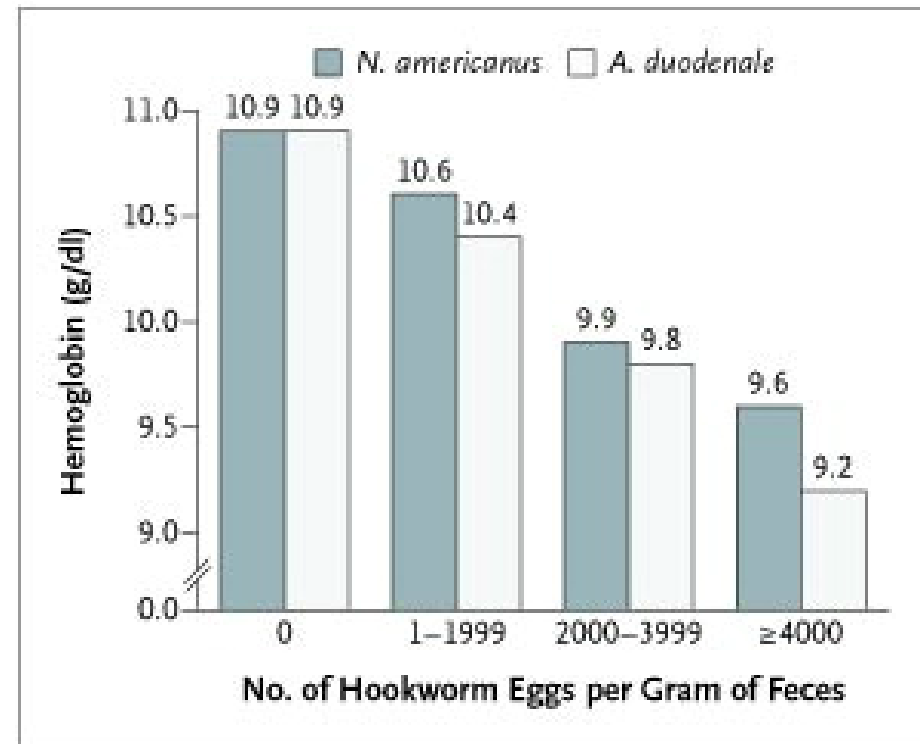


Distribution of STH and proportion of children (1-14 years) in each endemic country requiring PC, 2011

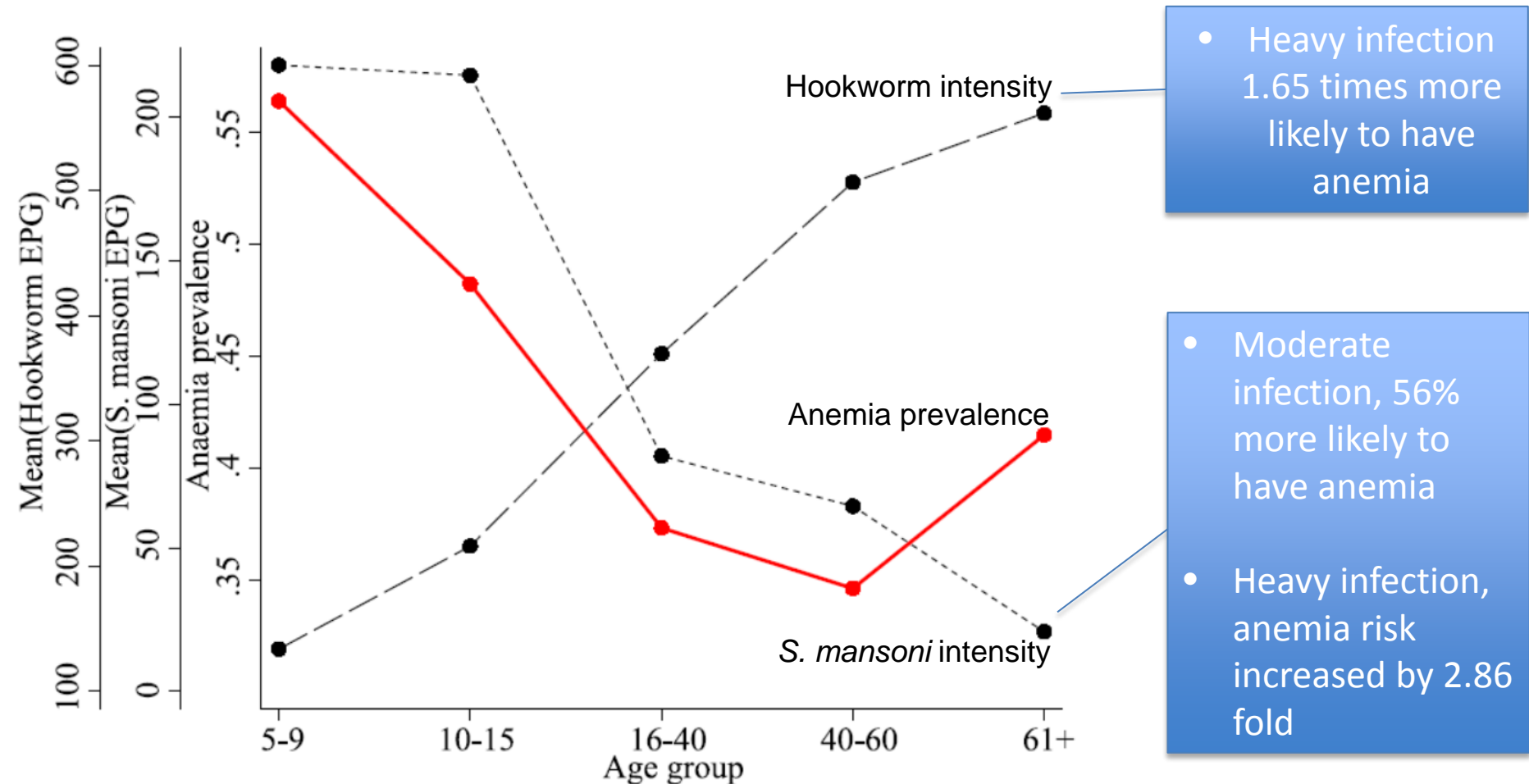
Significant association between STH/SCH & anemia

Severity of anemia is worm burden dependent

- **Anemia in moderate or heavy hookworm infection**
 - Even light infection can significantly decrease Hb level in pregnant women
- **Pregnant women with moderate or heavy *Trichuris* infection in their 2nd trimester had significantly lower Hb levels**
- **Anemia and schistosome infection is well established**



Schisto, hookworm and anemia in Ugandan communities



How do SCH/STH infections cause anemia?

• Iron deficiency anemia

– Blood loss:

- Blood in urine – 2.6 -126 ml/day – urogenital schistosomiasis
- Blood in stools – 7.5 - 25.9 ml/day – intestinal schistosomiasis
- 0.14 - 0.26 ml/worm/day for *A. duodenale*,
- 0.02 - 0.07 ml/worm/day for *N. americanus*
- ?? *Trichuris trichiura*

} Up to 100ml per day

+
Iron
-
infection



Iron

How much SCH/STH contribute to anemia?



- **Anemia attributable to schistosomiasis:**
 - 3.7% to *S. haematobium*
 - 3.6% to *S. mansoni* in whole population (4.5% in school-age children and pregnant women v.s 2.4% in adults)
 - 32% to *S. mansoni* in population with heavy infection
- **Anemia attributable to hookworm infection:**
 - 4.2-18% in preschool children
 - 5%-25% in school-aged individuals
 - 28% in pregnant women
 - 3% in whole population (4.6% in adults vs 1.8% in school age children and pregnant women)
 - 23.7% in population with heavy infection (more in adults)
- **Anemia attributable to trichuriasis:**
 - ?? *Trichuris trichiura*

Deworming benefits on improving Hb level



- **After deworming, treating anemic schoolchildren in Tanzania for 3 months**
 - with vitamin A increased Hb by 13.5 g/L
 - with iron + vitamin A increased Hb by 18.5 g/L
 - With placebo (deworming alone) increased Hb level by 3.5 g/L
- **Weekly iron-folic acid supplementation and regular de-worming increased and stabilized Hb level in women of childbearing age in Vietnam**
- **Single or repeated treatment of children with albendazole and praziquantel significantly improved Hb level from 123 g/L and 122 g/L to 136.8 g/L and 136 g/L in 24 months**



Systematic reviews of Cochrane & Campbell Collaboration on mass deworming!

Key negative findings:

- Little to no improvement in weight, height or school attendance
- Little to no difference in stunting, short-term cognition or mortality
- No evidence on spillover benefit

Some facts:

- Worm infection is not a good thing and deworming is beneficial
- **Absolute effects on reducing worm prevalence...**
- **Small effects on Hb level (of less than 3 g/L) unless mass deworming was combined with iron or praziquantel.**
 - Removing worms is not end of the game, but the beginning of recovery
 - It takes much longer for recovery after removing worms without addressing nutritional deficits
 - Drugs are donated and can be added to other intervention platforms, e.g. school health program, child health days, etc.

“Mass deworming alone is insufficient to improve growth, cognition, school performance or school attendance for children living in endemic areas. These findings suggest that in addition to a reconsideration of mass deworming programs in their current form, additional policy options need to be explored to improve child health and nutrition in worm-endemic areas. These include the needs for investing in interventions to address basic determinants of worm infestations such as poverty, living conditions, sanitation and inequities. Decisions on public health approaches in such settings need to be taken on the basis of human rights, ethics and evidence-based, sustainable cost-effective approaches. For schistosomiasis, policy implications are that mass deworming may be effective at improving weight.”

- Welch et al 2016, Campbell Collaboration



Progress and gaps

Control/elimination strategies

Schistosomiasis (elimination):

- Repeated mass drug administration with praziquantel
- Behavioral change communication
- Hygiene & sanitation
- Clean water supply
- Snail management

Effective but
does not
prevent
reinfection

Soil-transmitted helminthiases (control):

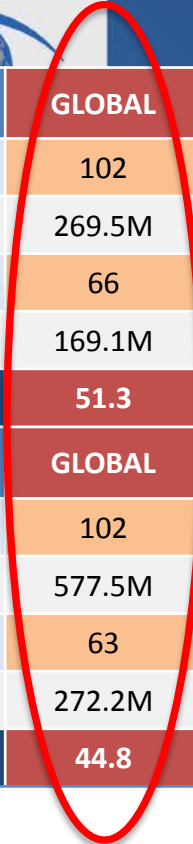
- Repeated mass drug administration with albendazole or mebendazole
- Behavioral change communication
- Hygiene & sanitation
- Clean water supply



Global status of preventive chemotherapy in 2014 – soil-transmitted helminthiases



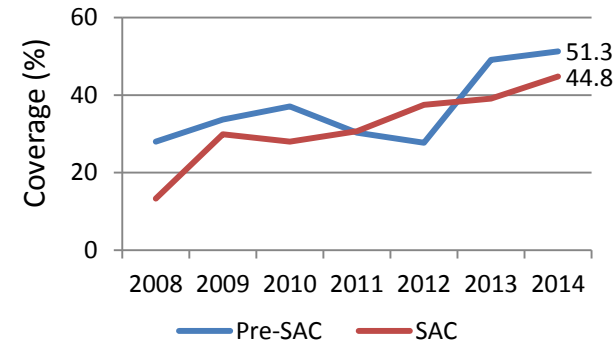
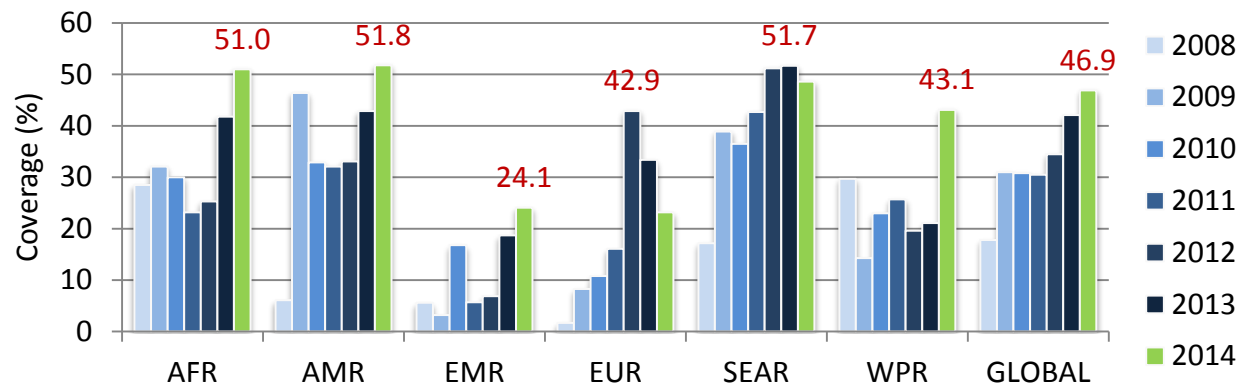
Preschool-aged children (1–4 years)	AFR	AMR	EMR	EUR	SEAR	WPR	GLOBAL
Number of countries requiring PC ¹	42	25	7	5	8	15	102
Number of people requiring PC	102M	13.3M	22.6M	844K	105.9M	24.9M	269.5M
Number of countries reporting ²	29	10	4	0	8	15	66
Number of people treated	90.7M	8.1M	14.2M	0	43M	13.1M	169.1M
Coverage (%)³	63.1	38.7	56.2	0	40.6	52.5	51.3
School-aged children (5–14 years)	AFR	AMR	EMR	EUR	SEAR	WPR	GLOBAL
Number of countries requiring PC ¹	42	25	7	5	8	15	102
Number of people requiring PC	191.5M	33.7M	51.8M	1.5M	248.5M	50.4M	577.5M
Number of countries reporting ²	23	12	2	3	6	17	63
Number of people treated	88.9M	27.1M	5.2M	2.3M	129.2M	19.4M	272.2M
Coverage (%)³	44.6	57.0	10.1	36.2	52.0	38.4	44.8



¹ Number of endemic countries moved to post-treatment surveillance stage is not included in total.

² Number of countries reporting data on PC implementation. Countries submitting blank reports are not included in total.

³ Coverage is calculated as number of people **in need of PC** and treated out of population requiring PC.

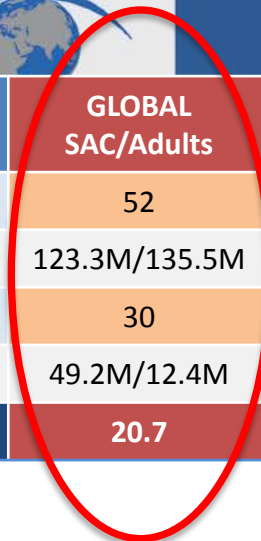


AFR – African Region; AMR – Region of the Americas; EMR – Eastern Mediterranean Region; EUR – European Region; SEAR – South-East Asia Region; WPR – Western Pacific Region

Global status of preventive chemotherapy in 2014 – schistosomiasis



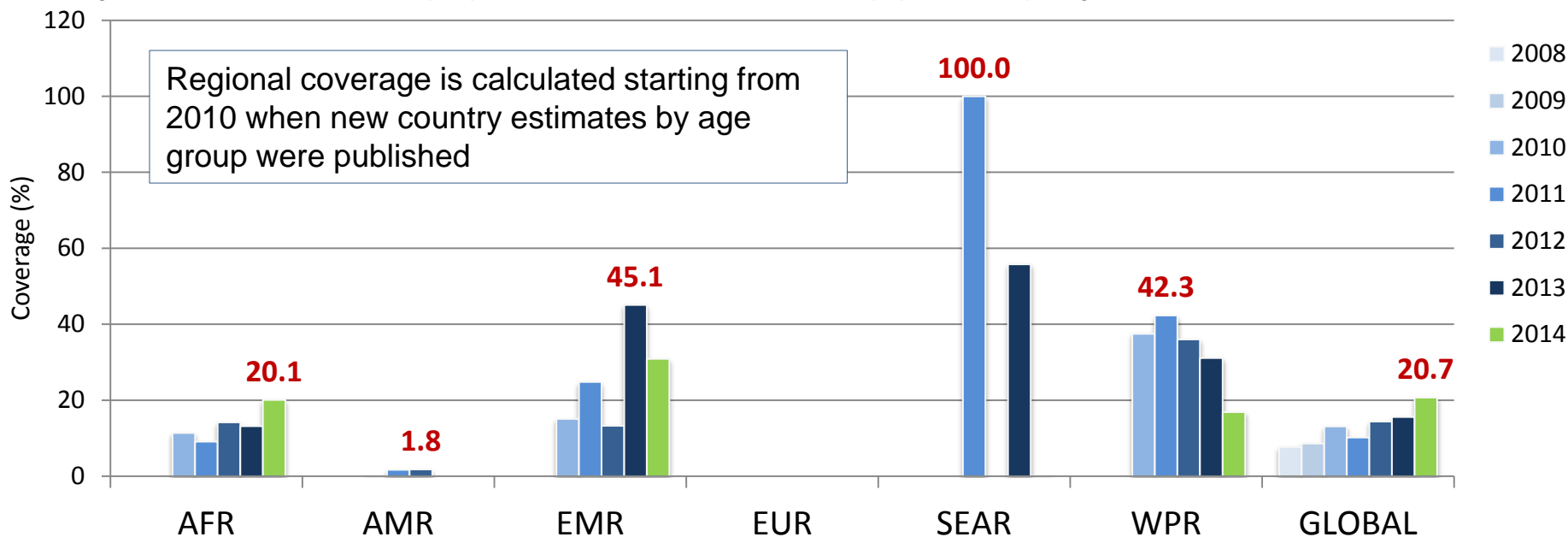
PC implementation	AFR SAC/Adults	AMR SAC	EMR SAC/Adults	EUR	SEAR SAC/Adults	WPR SAC/Adults	GLOBAL SAC/Adults
Number of countries requiring PC ¹	41	2	4	-	1	4	52
Number of people requiring PC	111.4M/125.2M	1.6M	8.1M/10.3M	-	28K/0	2.1M/67K	123.3M/135.5M
Number of countries reporting ²	23/10	0	3	-	1	3	30
Number of people treated	43.7M/8.7M	ND	5.2M/2.7M	-	31/161	327K/1.1M	49.2M/12.4M
Coverage (%)³	20.1	0	30.9	-	<1	16.9	20.7



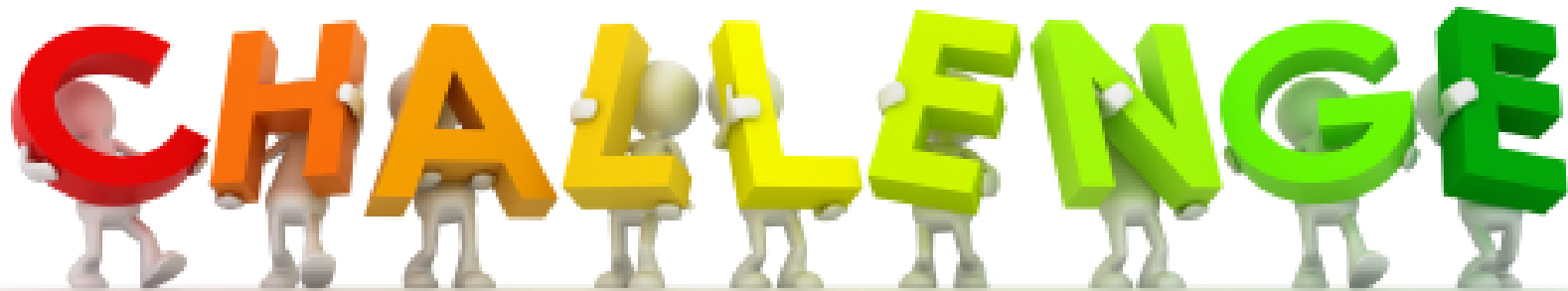
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AFR – African Region; AMR – Region of the Americas; EMR – Eastern Mediterranean Region; EUR – European Region; SEAR – South-East Asia Region; WPR – Western Pacific Region



Challenges and what we can do to help

- **Commitment of the endemic governments**
 - Political
 - Financial
- **Lack of guidelines for schisto elimination**
- **STH elimination – lack of clear program endpoint and guidelines**
- **Drug donations**
- **Lymphatic filariasis mass treatment scaling down**
- **Donor priority shift**
- **Country capacity**
 - Human resources (national, regional, local, CDDs etc)
 - Coordination of activities by partners and by sectors (e.g. education, rural development, WASH etc)
 - Weak health systems

What we (NGDOs) can do to help



- **Advocacy**
- **Technical support and training**
- **Financial support**
- **Coordination and partnership among selves**
- **Health system strengthening – institutionalizing deworming**
- **Integrate deworming with nutrition programs at all levels, e.g.**
 - Essential Nutrition Action (ENA) framework
 - School health/school feeding programs
 - Micronutrient supplementation programs
 - Child health days/weeks
 - Maternal health
 - ...

WHO documents and resources



- WHA resolutions: WHA54.19 (SCH/STH), WHA65.21 (SCH), WHA66.12 (NTDs)
- WHO NTD Roadmap: Accelerating work to overcome the global impact of neglected tropical diseases, 2012
- WHO Preventive chemotherapy guidelines 2006
- WHO Helminth Control in SAC 2012
- WHO Schistosomiasis: progress report 2001–2011 , strategic plan 2012–2020, 2012
- WHO Eliminating soil-transmitted helminthiases as a public health problem in children: progress report 2001–2010 and strategic plan 2011–2020, 2012
- WHO Water, sanitation and hygiene for accelerating and sustaining progress on neglected tropical diseases - a global strategy, 2015–2020, 2015

- WHO PCT databank
http://www.who.int/neglected_diseases/preventive_chemotherapy/databank/en/
- NTDmap.org www.ntdmap.org
- Thiswormyworld.org www.thiswormyworld.org
- InfoNTD.org www.infontd.org
- WHO/AFRO NTD Mapping Project (to be made available)

Acknowledgements



Questions/comments/contributions?



Helen Keller
INTERNATIONAL

THANK YOU/JE VOUS REMERCIE.

“Although the world is full of suffering, it is also full of overcoming it.”
-Helen Keller