

Pediatric Infectious Disease Society of the Philippines
23rd Annual Convention
“Pediatric Infectious Disease Scenarios...Providing Practical Solutions”



WINNING THE WAR AGAINST WORMS

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Neglected Tropical Diseases (NTDs): Infectious Diseases of Poverty

- Group of 17 diseases which prevail in tropical areas
- Mostly ancient diseases
- Affect more than one billion people, primarily poor populations
- Cost developing economies billions of dollars every year (WHO, 2015)
- NTDs included in the Sustainable Development Goals (SDGs)





NTDs and Poverty



- NTDs closely linked to poverty and contribute to further poverty (Gazinelli *et al.*, 2012)
- Costs entailed by NTDs may permanently worsen family's economic status (Aangaard-Hansen & Chaignant, 2010)

HIGH COSTS OF DENGUE FEVER, LEISHMANIASIS

Clusters of households in underprivileged areas having high rates of dengue fever and leishmaniasis; High health costs affecting families in Thailand and Bangladesh (Alvar *et al.*, 2006; Anderson *et al.*, 2007)

NTDs & HIGH INCIDENCE OF INCOME POVERTY

Presence of more NTDs in Philippine provinces over the last 5 years associated with higher incidence of income poverty (Philippine Human Development Network, 2014)

POVERTY & POOR LIVING CONDITIONS

Poor families living in degraded and high-risk environments lacking housing, water and sanitation, result in close contact with pathogens (United Nations, 2010; Gazinelli *et al.*, 2012)



ASEAN Countries and NTD Endemicity



Brunei



Cambodia



Indonesia



Lao PDR



Malaysia



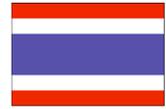
Myanmar



Philippines



Singapore



Thailand



Vietnam

13 NTDs endemic in ASEAN Region

HELMINTHS

- Cysticercosis/taeniasis
- Echinococcosis
- Foodborne trematodiasis
- Lymphatic filariasis
- Schistosomiasis
- Soil-transmitted helminthiasis

PROTOZOA

- Leishmaniasis

BACTERIA

- Buruli ulcer
- Leprosy
- Trachoma
- Yaws

VIRUS

- Dengue
- Rabies



ASEAN Countries and NTD Burden



Number of NTD cases in the Southeast Asian Region (in millions)

| | | |
|---|--------------|-------------------------------|
| Soil-transmitted helminthiases (STH), 2010 | 126.7 | (Pullan <i>et al.</i> , 2014) |
| Dengue fever, 2010 | 68.2 | (Bhatt <i>et al.</i> , 2013) |
| Liver fluke infection, 2005 | 9.3 | (Furst <i>et al.</i> , 2012) |
| Intestinal fluke infection, 2005 | 3.4 | (Furst <i>et al.</i> , 2012) |
| Schistosomiasis, 2012 | 1.0 | (WHO, 2014) |
| Leprosy, 2012 | 0.02 | (WHO, 2012) |

Soil-transmitted Helminthiasis (STH)

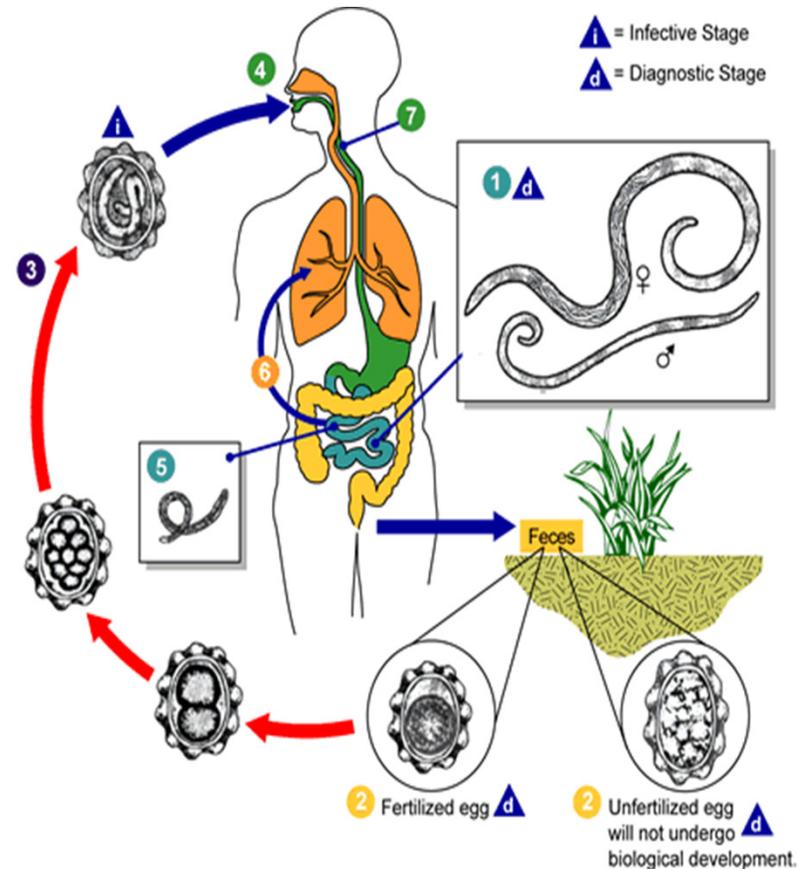
Ascaris, *Trichuris*, and hookworm infections

Transmission

- Ingestion of eggs from contaminated soil
- Skin penetration by larvae from the soil
- Poor environmental sanitation and poor personal hygiene—major factors for exposure (Continuing open defecation)

Populations at-risk

- Preschool-age children (PSAC)
- School-age children (SAC)
- Women of childbearing age (WCBA)
- Other high risk occupations



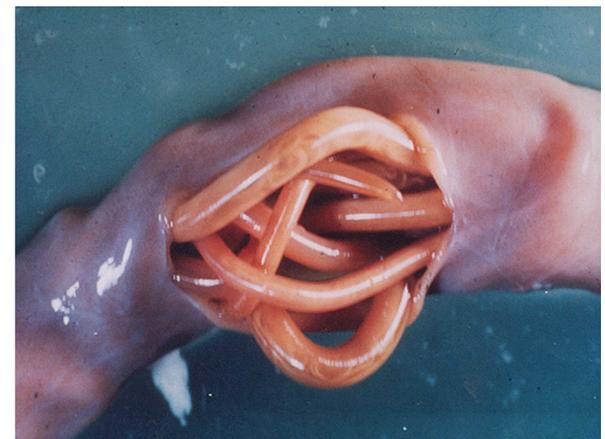
(WHO, 2012; CDC, 2013)

Morbidity caused by STH

- Malnutrition
 - Stunting - 30% prevalence among Filipinos 0 to 10 years old
 - Anemia - 39.4% among Filipinos 6 months to 1 year old (FNRI, 2013)
- Poor cognitive development and school performance
- Heavy intensity STH infections (~10M *Ascaris* eggs/day) result in greater morbidity and complications including intestinal obstruction, and dysentery syndromes (Bethony, 2006)



(WHO, 2006)



Intestinal obstruction and perforation



Burden of STH in the Philippines

We are not meeting global targets!

Sentinel Surveillance Data

(Cumulative prevalence of STH)

Preschool-age children (PSAC) **43.7%**

Heavy intensity **22.4%**

School-age children (SAC) **44.7%**

Heavy intensity **19.7%**

Adolescent females (AF) **30.4%**

Heavy intensity **7.9%**

Pregnant women (PW) **31.5%**

Heavy intensity **10.2%**

WHO Targets

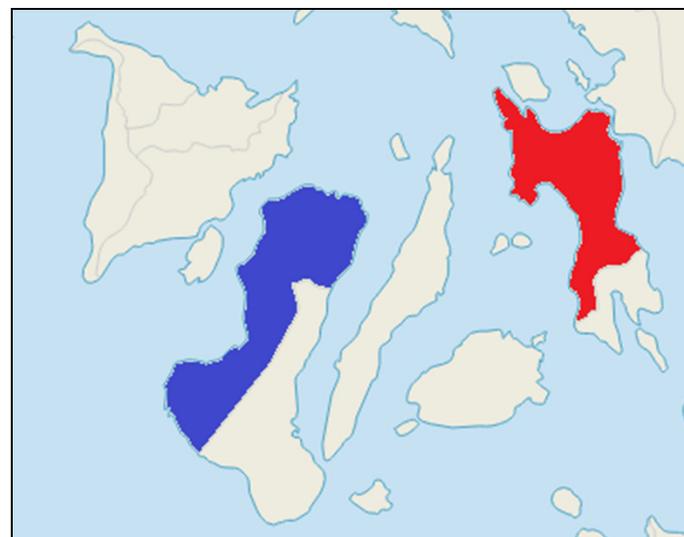
CP <20%

Heavy <1%

STH in Neg Occ

PSAC - **67.1%**, H **45.2%**

SAC - **60.9%**, H **35.0%**



STH in Leyte

AF - **61.8%**, H **22.6%**

PW - **75.8%**, H **39.6%**



Burden of STH in the Philippines

We are not meeting global targets!

PSAC in Masbate, 2015

- In 4 municipalities where Community-Led Total Sanitation (CLTS) is implemented

STH in 72.3%

H 100% in 3 barangays

- In 6 out of 7 barangays declared as Open Defecation Free (ODF)

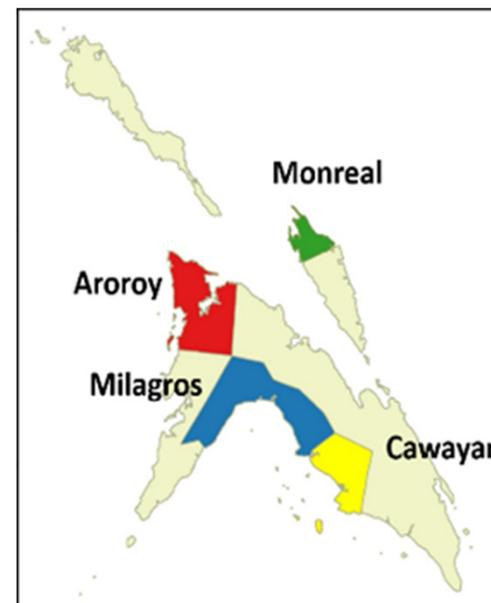
STH in >50%

H 40.8%

WHO Targets

CP <20%

Heavy <1%



Map of Masbate province showing the selected municipalities: Aroroy (red), Cawayan (yellow), Milagros (blue) and Monreal (green).





Strategies for Control of STH

WASH+D

WA



Water

Improving access to safe water for handwashing and hygiene

(WHO, 2012)

S



Sanitation

Improving quality of and access to sanitation facilities, and achieving Zero Open Defecation (ZOD) through Community-led Total Sanitation (CLTS)

(DOH NSSP, 2010)

H



Hygiene

Reduces transmission and reinfection by encouraging healthy behavior

(WHO, 2015)

D



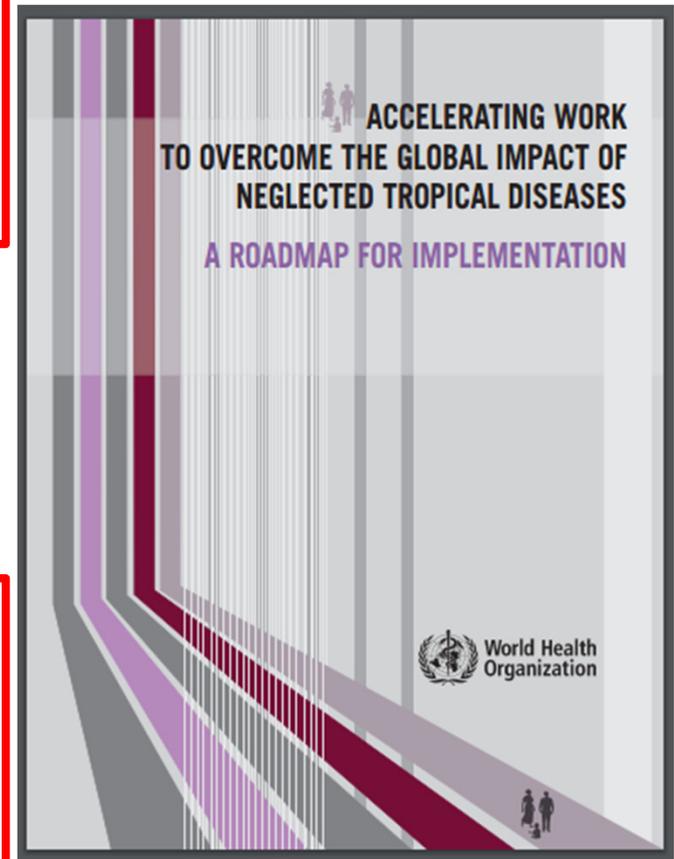
Deworming

Periodic treatment with anthelmintics (mass drug administration/MDA) without previous individual diagnosis to all at-risk people living in endemic areas for morbidity control

(WHO, 2012)

Interventions to overcome NTDs

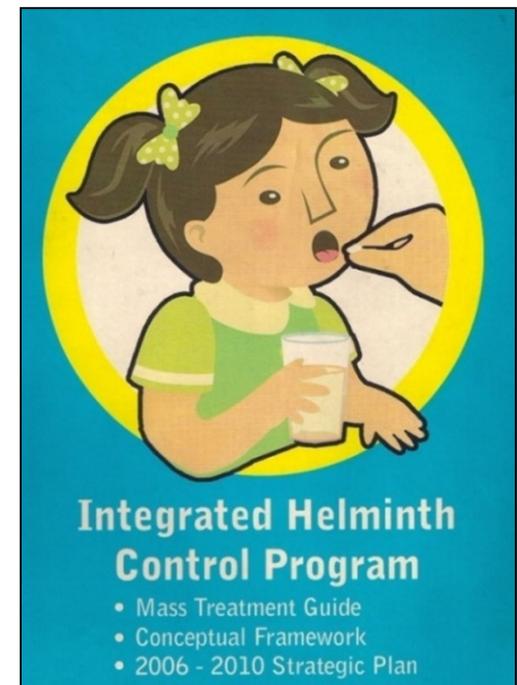
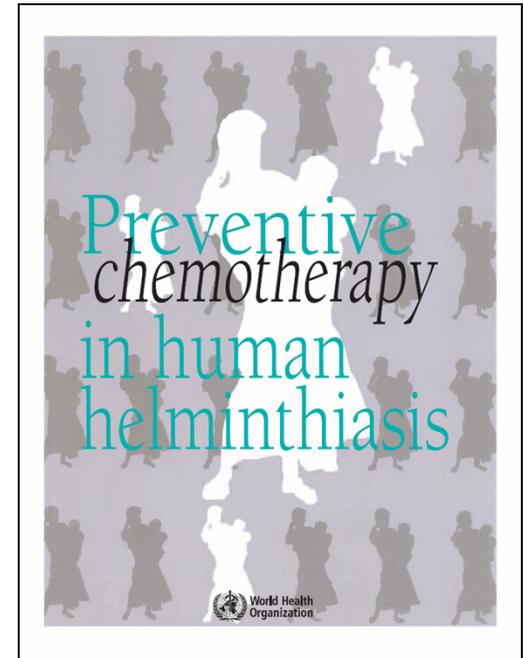
1. Preventive chemotherapy
2. Intensified case detection and case management
3. Vector and intermediate host control
4. Veterinary public health at the human-animal interface
5. Provision of safe water, sanitation, and hygiene (WASH)
6. Strengthening capacity to control NTDs



(WHO, 2012)

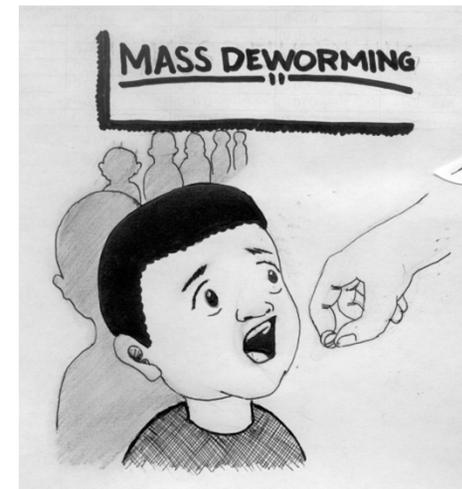
Preventive Chemotherapy (PC)

- Use of anthelmintics, either alone or in combination for morbidity control
- Mass drug administration (MDA)
 - Deworming in an eligible population even without the benefit of diagnostic examination (WHO, 2006)
- Target coverage:
 - WHO - 75% of PSAC and SAC (WHO, 2012)
 - Integrated Helminth Control Program (IHCP) of Department of Health (DOH): 85% of SAC (DOH, 2006)
- Harmonized schedule of biannual deworming in PSAC and SAC in the Philippines - January and July (DOH, 2015)



Anthelmintics are safe for Children

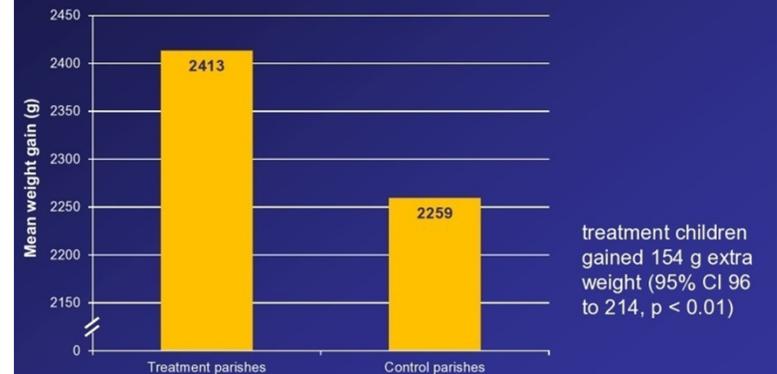
- Albendazole (400 mg) and Mebendazole (500 mg) highly recommended (WHO, 2015)
- Listed in Philippine National Drug Formulary
- Helminths immobilized through inhibitory effect on tubulin polymerization which results in the loss of cytoplasmic microtubules (DrugBank, 2015)
- Drugs have excellent safety record
- Adverse events minimal and transient (*e.g.* allergy, mild abdominal pain, diarrhea) (WHO, 2015)



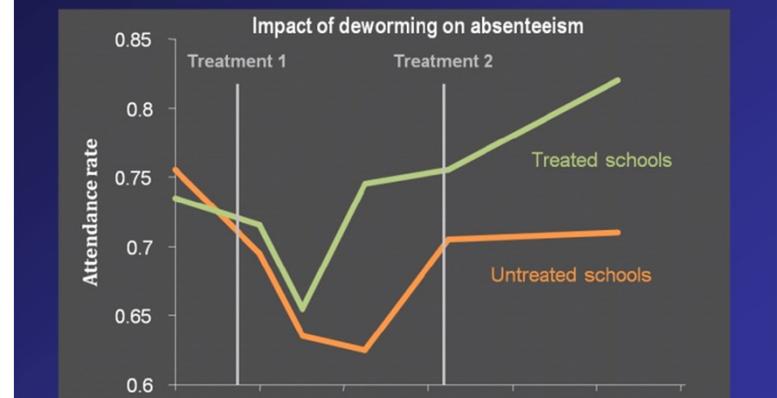
Benefits of PC/MDA (Benefits > Risks)

- **Physical growth**
 - Significant weight gain
 - Increase in height (Alderman *et al.*, 2006)
- **Learning and education**
 - Increase in school participation/attendance (Miguel and Kremer, 2004)
 - Improvements in cognitive scores (Bundy, 1992; Grigorenko *et al.*, 2007)
- **Long term benefits**
 - Reduction in work days lost to illness
 - Increase in hours worked
 - Improvement in wage earnings (Human Development Network, 2013)
- **Other ancillary benefits** - reduced burden of TB and malaria (WHO, 2006)

Twice-yearly deworming of preschoolers was associated with a 10% extra gain in weight



Deworming increased school participation by 7% and decreased absenteeism by 25%



Generally Low Deworming Coverage in SAC the Philippines

| Country | MDA coverage (%) | | | |
|-------------|------------------|--------|-------|--------------|
| | PSAC | | SAC | |
| | 2006 | 2014 | 2006 | 2014 |
| Cambodia | 100.00 | 104.95 | 79.16 | 90.16 |
| Lao PDR | 55.74 | 57.19 | 61.61 | 33.09 |
| Philippines | 82.76 | 90.15 | 31.54 | 16.48 |

(WHO PCT Databank, 2015)

WHO Target - 75%
DOH Target - 85%



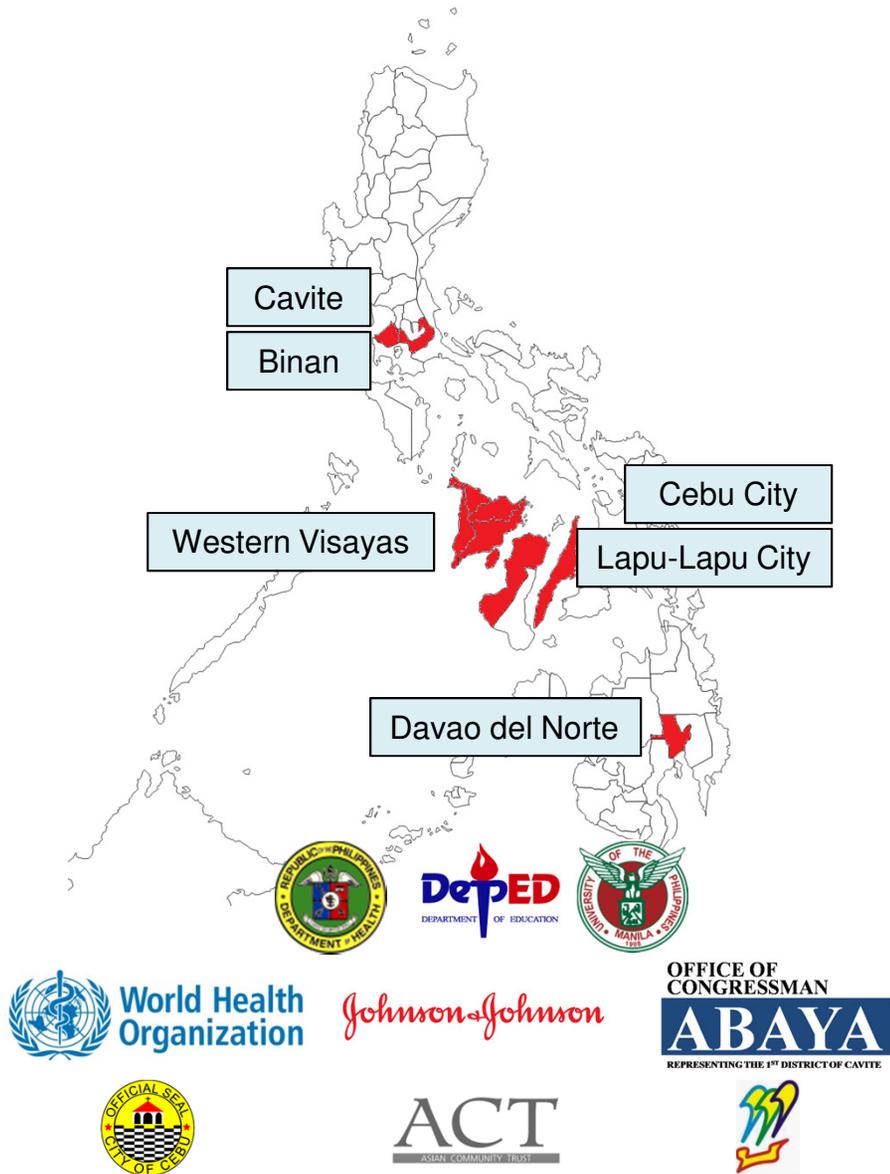
Reasons for Refusal to be Dewormed

- Lack of parent' s permit
- Child has been dewormed
- *“Wala namang lumabas”* (after last deworming)
- *“Side effects”* (worm passing out through the mouth, abdominal pain, etc.)
- *“Bawal sa relihiyon”*
- *“Kulto...”*
- *“May Pedia kami...”*
- *“Sabi ng Pedia...”*
- *“Umuulan”(???)*
- *“Bilog ang buwan”(???)*





War on Worms (WOW): Operations Research Towards Policy Formulation



- Aims to increase MDA coverage to reduce prevalence and intensity of helminth infections through advocacy, capacity building, social mobilization, multisectoral collaboration, monitoring and evaluation
- Promotes school-based, teacher-assisted approach for MDA
- Provided basis for National School Deworming Day (NSDD) and other policies aimed at improving STH control



WOW Highlights

- Demonstrated the feasibility of school-based teacher-assisted MDA for STH in Binan, Laguna (2000)
- Provided evidence for DOH to cover cost of anthelmintics for all PSAC and SAC in the Philippines
- No further significant reduction in STH prevalence after two years of biannual MDA in Western Visayas due to continuing challenges in WASH (2009) — *Reinfection, reinfection!*
- Six months after treatment, *Ascaris*, *Trichuris*, and hookworm infections could reach 68%, 67%, and 55% of its pretreatment levels, respectively, due to reinfection (Jia *et al.*, 2012)

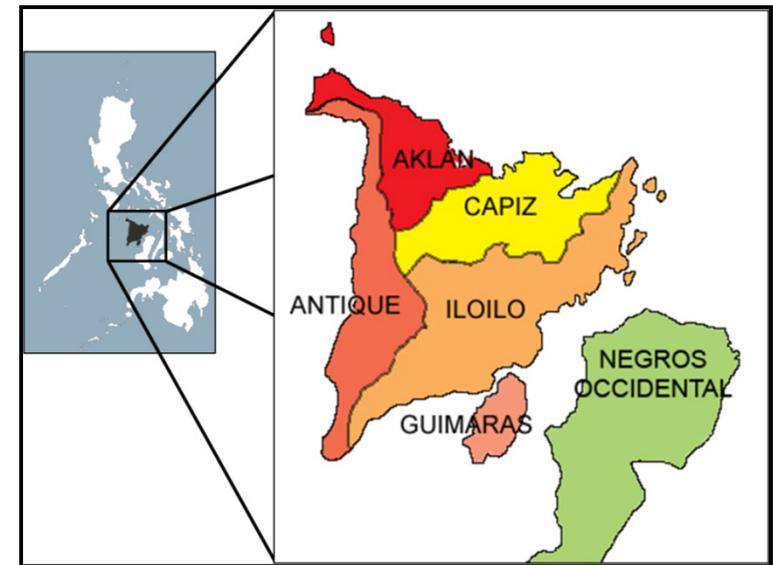


“War on Worms goes to Western Visayas” (*The Philippine Star*, 27 Nov 2007)



WOW Highlights

- Expansion of MDA to include secondary students in Guimaras (2013)
- Models for helminth control
 - Municipality – Binan, Laguna
 - City - Cebu City
 - Province – Aklan, Antique, Capiz, Davao del Norte
 - Regional - Western Visayas
- Partnership and collaboration with DOH, DepEd, LGUs, CSOs, communities, sponsors (CSR)

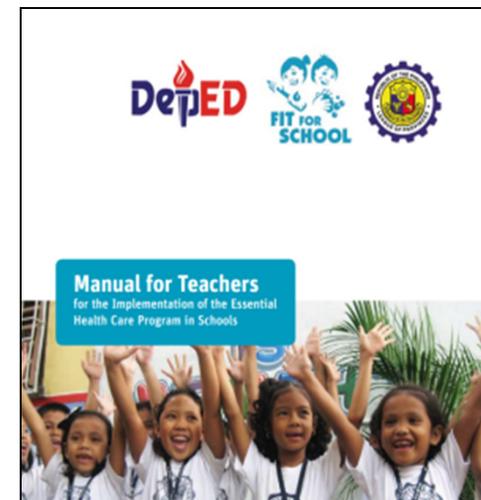
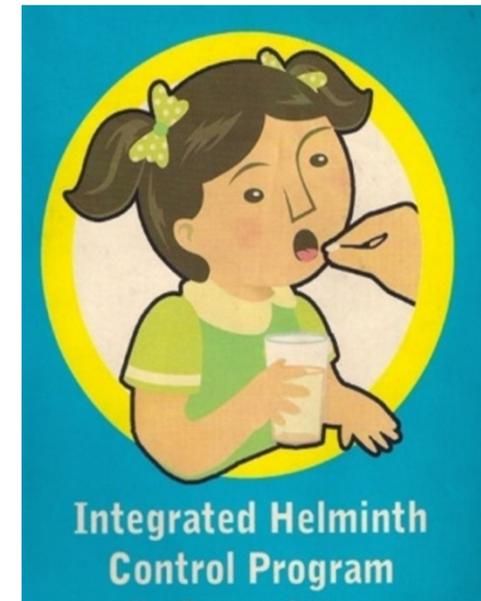


Western Visayas



WOW Outcomes

- DOH Integrated Helminth Control Program (DOH, 2006)
- Revised treatment and preventive chemotherapy guidelines of the DOH (DOH, 2006)
- Inclusion of deworming in children 6-14 years old as a requirement for a family's inclusion in the *Pantawid Pamilyang Pilipino* Program/Conditional Cash Transfer (DSWD, 2008)
- DepEd Essential Health Care Program (DepEd, 2009)



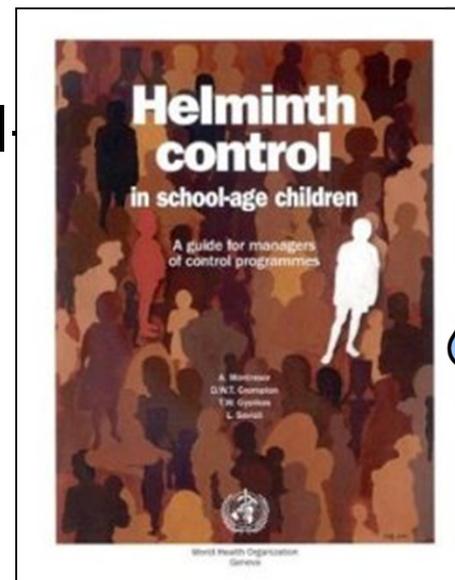
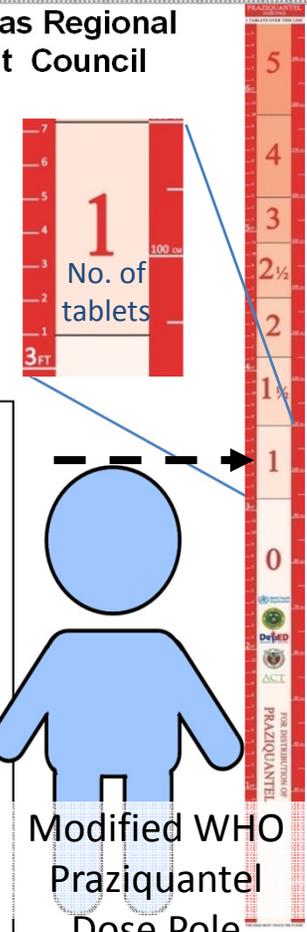


WOW Outcomes

- Methods of collecting epidemiological data in sentinel sites in the “Helminth Control in School-Age Children: A Guide for Managers of Control Programmes” (WHO, 2011)
- Western Visayas Regional Implementation Coordination Team and Regional Development Council resolutions endorsing War on Worms - RDC-VI Resolution No. VI-3 Series of 2012
- Validation of the Modified WHO Praziquantel Dose Pole for mass treatment of Filipino SAC for schistosomiasis (Erfe *et al.*, 2013)



Western Visayas Regional Development Council

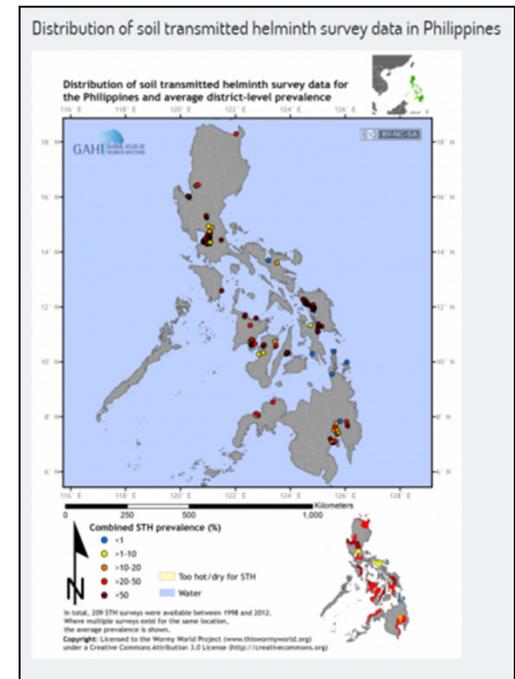
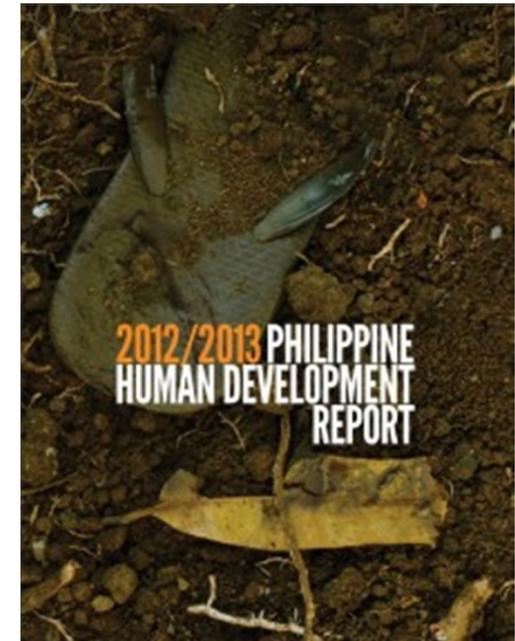


Modified WHO Praziquantel Dose Pole



WOW Outcomes

- NTD data in the 2012/2013 Philippine Human Development Report (PHDN, 2013)
 - Gross underreporting and misdiagnosis of NTDs
 - Lack of comprehensive strategy for specific NTDs such as schistosomiasis
 - School-based mass deworming as “the most cost-effective way to increase school participation” and “one of the most cost-effective ways to improve health”
- Contributed data on STH and schistosomiasis in the Global Atlas of Helminth Infections (GAHI, 2015)





National School Deworming Day (NSDD)

- Simultaneous MDA in all public elementary schools nationwide
- Experiences from War on Worms provided basis for the NSDD Guidelines - **DOH Administrative Order no. 2015-0030** and **DepEd Memorandum No. 80 series 2015**
- Harmonization of schedule of MDA for STH, schistosomiasis, and lymphatic filariasis - **DOH Memorandum No. 2015-0399**
- Achieved 83% MDA coverage with almost 12 million children dewormed nationwide on 27 January 2016





NSDD in Zamboanga (July 2015)

- Adverse events (AEs) concentrated in Zamboanga Region; eighty six children admitted to hospitals (Rappler, 2015)
- Students experienced “stomach ache and vomiting” (CNN, 2015)
- False rumors circulated through text resulted to mass hysteria (PIA, 2016)
- Challenges with health education and promotion
- Impact of AEs minimized through proper communication with community leaders and parents (WHO, 2011)
 - Presence of strict and rigorous protocol on AEs, as done in Kenya, may minimize impact of AEs (Heishman, 2015)

PHILIPPINES

DOH deworming: 1k students in Zambo hospitals

(2nd UPDATE) Grade school students in the 3 provinces of Zamboanga Peninsula suffer from vomiting, stomach ache, and dizziness, but Health Secretary Janette Garin denies the medicines administered to them were expired

Gualberto Laput

Published 5:52 PM, July 29, 2015

Updated 12:18 PM, July 30, 2015

[INQUIRER.net](#)

EMERGENCY. A student gasps for breath as she is moved to the emergency room at the Zamboanga del Norte Medical Center July 29, 2015. Photo by Gualberto Laput / Rappler

ZAMBOANGA DEL NORTE, Philippines (2nd UPDATE) – More than 1,000 grade school

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DOH denies reports of kids dying after deworming in Zamboanga Sur

Deworming tablet downs 228 schoolchildren in Zamboanga Peninsula

By: [Philippine News Agency](#)
July 29, 2015 11:27 PM

DOH deworming: 1k students in Zambo hospitals

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67
45K
Twitter
Reddit





Continuing Challenges

- Helminth control in other populations at-risk (*i.e.* PSAC and WCBA)
- More sensitive laboratory techniques
- Interface with Water, Sanitation and Hygiene (WASH) sector
- Health promotion and education, risk communication (*e.g.* Zamboanga Region during NSDD in July 2015)
- *What does it take to eliminate STH? – the main research question*





Diagnostics - Major Challenges

- Kato-Katz technique - recommended by WHO but not routinely performed (WHO, 1991; 1994)
 - Direct fecal smear commonly performed in rural health units and most hospitals
- Poor sensitivity of Kato-Katz
 - STH - 74-95%, but drops to 53-80% in low intensity settings (Nikolay *et al.*, 2014)
 - Limitation in demonstrating hookworm ova
 - *Schistosoma* - 51.1% to 59.6% (Zhou *et al.*, 2013; Lin *et al.*, 2008); 10.9% to 22.3% (Belizario *et al.*, 2013)
- Lack of quality assurance for laboratory diagnosis of parasitic infections (Misdiagnosis is common) (Belizario *et al.*, 2014)
- Molecular and serological techniques not readily available



Opportunities

- Inclusion of NTDs and WASH in SDGs
- NTD control contributing to Universal Health Care (UHC)
- Economic growth and more resources for the DOH and health sector
- Intersectoral and interagency collaboration
- ***This is the moment!***

SUSTAINABLE DEVELOPMENT GOALS





Summary

- Are we *Winning the War on Worms*?
- STH remains an important public health problem among Filipino children – NTDs, PC, WASH – *for sharing*
- Outputs of WOW disseminated and utilized as basis for policies aimed at improving STH control and public health; continuing challenges to be addressed using multidisciplinary/intersectoral approach
- SDGs, UHC/KP, and economic development provide opportunities in strengthening the national STH control program and other NTD programs
- Research on what it takes for STH elimination
- Onward to *Finishing the War on Worms*



Acknowledgements



Partnerships and collaboration needed more than ever



Thank you

