HIGH BURDEN OF SOIL-TRANSMITTED HELMINTHIASES IN PRESCHOOL-AGE CHILDREN IN MASBATE: A DECADE OF IMPLEMENTATION OF THE INTEGRATED HELMINTH CONTROL PROGRAM IN THE PHILIPPINES

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Abstract. This study aimed to describe the status of soil-transmitted helminthiases (STH) control in preschool-age children (PSAC) in four municipalities in Masbate Province, Philippines, a decade after the implementation of the Integrated Helminth Control Program. This cross sectional study, which included 1,224 PSAC, utilized Kato-Katz technique to determine parasitological status. Secondary data were reviewed to obtain deworming coverage in the selected municipalities. Results showed a prevalence of STH and a prevalence of moderate-heavy intensity STH of 72% and 41%, respectively, while the deworming coverage in the province in 2013 was 71%. None of the municipalities met the global target on prevalence of moderate-heavy intensity STH of below 1, while only Cawayan met the national target for STH prevalence of below 50%. The deworming coverage in the province was below the global and national targets of 75% and 85%, respectively. The failure to meet these targets may be related to challenges with coverage of mass drug administration, water, sanitation, and hygiene (WASH), health promotion, and other factors, such as poverty. Recommended strategies to meet global and national targets include increasing access to deworming, improving WASH and health promotion and education, and addressing factors contributing to STH, such as poverty. The War on Worms Campaign, which improved helminth control outcomes in various sites in the country, may be adopted.

Keywords: community-led total sanitation, Integrated Helminth Control Program, preschool-age children, preventive chemotherapy, soil-transmitted helminthiases, war on worms, WASH, Philippines

INTRODUCTION

The Integrated Helminth Control Program (IHCP) implemented by the Philippine Department of Health (DOH) in 2006 aimed to reduce the prevalence of soil-transmitted helminthiases (STH) to less than 50% by 2010 and to achieve

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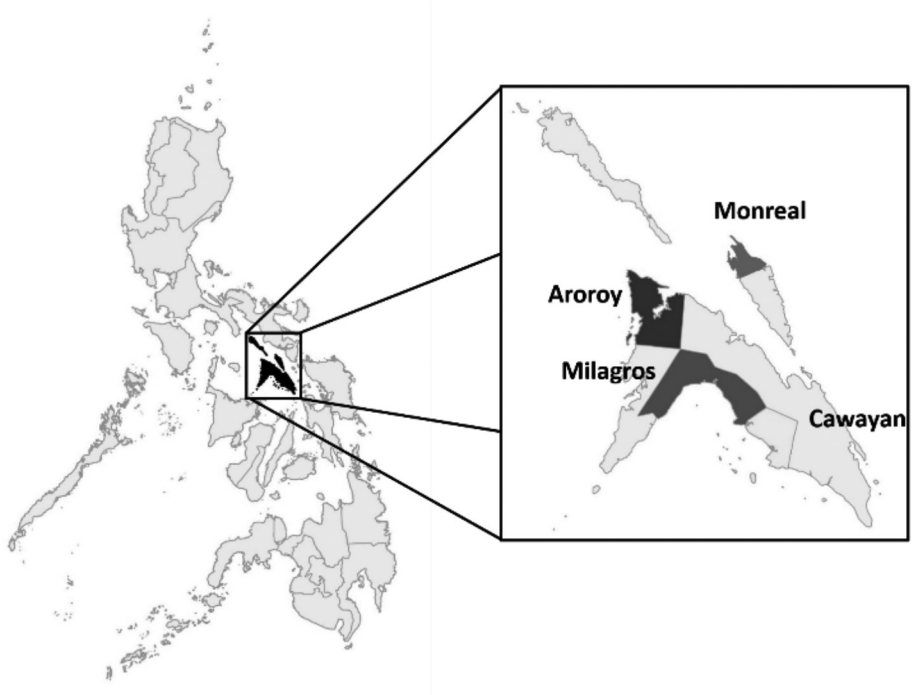

Fig 1–Map of Philippines (left) and Masbate Province (right) showing the municipalities of Aroroy, Cawayan, Milagros, and Monreal. Map generated using QGIS v2.8.

an 85% deworming coverage in children ages 1 to 12 years (DOH, 2006). Prior to its implementation, a study showed STH prevalence of 66% among preschool-age children (PSAC) in sentinel sites (de Leon and Lumampao, 2005, final report submitted to UNICEF). The global targets set by World Health Organization (WHO), on the other hand, are to reduce prevalence of moderate-heavy intensity STH to below 1% and to achieve a 75% deworming coverage by 2020 (WHO, 2012). The IHCP and WHO adopted various helminth control strategies, such as preventive chemotherapy, improvements in water, sanitation and hygiene (WASH), through approaches including Community-Led Total Sanitation (CLTS), and health promotion and education.

Almost a decade after its implementation, however, the status of IHCP in attaining the national and global targets on STH control, especially in poor provinces, such as Masbate, is yet to be described. Describing such will provide information on the effectiveness of the program. Likewise, it will provide opportunities to improve program implementation thereby alleviating those infected, especially PSAC, from the burden of STH.

This study aimed to describe the status of STH control in PSAC in selected municipalities in Masbate Province in attaining global and national targets.

MATERIALS AND METHODS

Study site and population

The study was conducted in four municipalities in Masbate, namely, Aroroy, Cawayan, Milagros, and Monreal (Fig 1). The municipalities were selected in this study based on reported high rates of chronic undernutrition, low socioeco-

nomic indicators, and implementation of CLTS by Action Contre la Faim (ACF), a non-government organization working on WASH in Masbate. The study included barangays implementing CLTS, as well as other barangays selected based on accessibility, relative distance from the poblacion (town center), topography, peace and order situation, and willingness of the local government units (LGUs) and community to participate.

PSAC residing in the selected barangays and enrolled in day care centers (DCCs) were recruited in the study. Prerequisites to their participation included Inform Consent Forms (ICFs) signed by parents and no history of treatment with albendazole or mebendazole within the last four months prior to the study. Basic information of the participants, such as their name, birthdate, age, and sex were obtained, verified, and recorded in the Master List by assigned research staff.

Study design and sampling

The study utilized a cross-sectional design, which involved the assessment of parasitological status of PSAC. A total of 39 barangays from the four selected municipalities were included. Nineteen of these barangays implement CLTS, seven of which were already declared as Open Defecation Free (ODF) prior to the study. The minimum sample size was computed at 280 per municipality or 1,120 PSAC from the four municipalities using the PASS software (PASS®, NCSS LLC: East Kaysville, UT). From each barangay, 30 participants were targeted for the study. Overall, the total targeted number of PSAC was 1,170.

Parasitological assessment

The parasitological assessment was conducted in the selected municipalities in March 2015. Stool cups with instructions for proper stool collection, along with the ICFs, were distributed by the research staff to the parents of the participants prior to fieldwork. Each targeted participant was asked to submit one stool sample on the scheduled date and time of specimen collection. Submitted stools were processed using the Kato-Katz technique following the WHO Bench Aids for Diagnosis of Intestinal Parasites (WHO, 1994) and were examined in the field laboratory within the day. Processing and examination of stool samples were performed by trained research staff and medical technologists from the University of the Philippines (UP) Manila. Results of the examination were recorded on Parasitological Results Forms.

Intensities of STH were classified as light, moderate, or heavy based on the number of helminth eggs per gram (epg) following WHO guidelines (WHO, 2012). For the purpose of this study, moderate and heavy intensity infections were classified together as moderate-heavy intensity STH.

The accuracy of parasitological assessment was maintained through quality assurance measures, which included proper collection of stool specimens, utilization of fresh reagents, adherence to standard laboratory techniques, meticulous examination of processed specimens, and accurate reporting of findings. In cases where medical technologists were not certain of their diagnosis, electronic images of the slides were taken and referred to the Medical Teleparasitology (MTP) System based in UP Manila, where diagnostic parasitologists provided confirmatory diagnoses. To ensure accuracy of microscopy readings, at least 10% of all samples processed using Kato-Katz technique were re-examined by a reference microscopist from UP Manila who was blinded to the results of the initial examination.

Deworming coverage

Deworming coverage rates in PSAC for each selected municipality and for the province for 2013 were obtained from the Provincial Nutrition Action Office (PNAO) of Masbate.

Data processing and analysis

Data in the forms were validated and double encoded using Microsoft Excel 2007 to ensure accuracy. The initial and second encoding were compared and finalized before data analysis was performed.

Descriptive statistics, which include cumulative prevalence of STH, prevalence of moderate-heavy intensity STH, prevalence *of Ascaris, Trichuris*, and hookworm infections, and prevalence of coinfections, were calculated. A 95% confidence interval was computed for prevalence estimates. The mean of these values were compared using *t*-test. Statistical analyses were performed using STATA 12 (STATA 12®; StataCorp, College Station, TX). Deworming coverage rates, STH prevalence, and prevalence of moderate-heavy intensity STH were compared with global and national targets.

Ethical considerations

The study protocol was reviewed and approved by the UP Manila Research Ethics Board (UPMREB 2015-128-01) to ensure adherence to ethical standards for human subject protection. Groundwork meetings with representatives from DOH and LGUs were carried out before project implementation. The project was coordinated with health and social welfare development offices at provincial and municipal levels. A designated research staff obtained informed consent from parents or guardians using the ICFs during fieldwork. For confidentiality of health information, a coding scheme for participant's identity was used. Only authorized members of the research team were allowed access to the results. PSAC positive for STH were referred to respective rural health units (RHUs) for appropriate management and treatment with anthelminthics.

RESULTS

Parasitological assessment

A total of 1,224 PSAC were included in the study, of which 480 were from Aroroy, 375 from Cawayan, 231 from Milagros, and 138 from Monreal. Among them, 885 were positive for at least one STH, giving an overall cumulative STH prevalence of 72%. The highest prevalence obtained were in Aroroy (86%) and Milagros (85%), followed by Monreal (73%), and lastly, Cawayan (46%). Cumulative prevalence across municipalities varied significantly ($p<0.001$). Out of the 39 barangays, 30 had cumulative prevalence higher than 50%, while three barangays, namely, Poblacion East and West in Milagros and Poblacion in Monreal, had cumulative prevalence of 100%. The lowest prevalence was observed in Tuburan, Cawayan at 18% (Table 1).

Moderate-heavy intensity STH was found in 500 PSAC, giving 41% prevalence. All four municipalities had prevalence of moderate-heavy intensity STH higher than 1%, the highest of which was 58% in Milagros, while the lowest was 16% in Cawayan. The prevalence of moderate-heavy intensity STH varied significantly ($p<0.001$) across municipalities. There were 36 barangays with prevalence of moderate-heavy intensity STH higher than 1%, while three barangays from Cawayan, namely, San Jose, San Vicente, and Maihao, had no case of moderate-heavy intensity STH (Table 1).

Ascariasis, the most prevalent STH,

Table 1
Cumulative prevalence and moderate-heavy intensity STH in PSAC in selected municipalities and barangays in Masbate, March 2015.

Municipality/Barangays	PSAC examined	Cumulative prevalence	Prevalence of moderate-heavy intensity STH
	n	*n* (%)	*n* (%)
Aroroy			
Poblacion	39	33 (85)	19 (49)
Ambolong	45	36 (80)	26 (58)
Baga Uma	46	44 (96)	32 (7)
Syndicate	37	31 (84)	13 (35)
Bangon	26	25 (96)	17 (65)
Talabaan	21	18 (86)	11 (52)
Don Pablo[a]	46	44 (96)	27 (59)
Matalang talang[a]	31	22 (71)	10 (32)
Tinago	21	18 (86)	10 (48)
Cabangcalan[a]	40	32 (80)	19 (48)
Malubi	41	36 (88)	23 (56)
Taliba	53	47 (89)	27 (51)
Jaboyoan	34	28 (82)	14 (41)
Subtotal	480	414 (86)	248 (52)
Cawayan			
Naro	30	27 (90)	20 (67)
Mahayahay	34	28 (82)	9 (27)
Taberna[a]	32	13 (41)	4 (13)
Palo Bandera	25	9 (36)	1 (4)
San Jose	34	7 (21)	0 -
Tuburan	34	6 (18)	2 (6)
Madbad	18	4 (22)	2 (11)
San Vicente	23	5 (22)	0 -
Poblacion	42	23 (55)	10 (24)
Divisoria	44	20 (46)	6 (14)
Behia	25	19 (76)	5 (20)
Maihao	34	12 (35)	0 -
Subtotal	375	173 (46)	59 (16)
Milagros			
Calasuche	26	23 (89)	15 (58)
Poblacion East[a]	24	24 (100)	23 (96)
Poblacion West	25	25 (100)	21 (84)
Bacolod	25	12 (48)	5 (20)
Tawad	21	18 (86)	10 (48)
Capaculan	26	25 (96)	18 (69)
Paraiso	26	18 (69)	12 (46)
Bangad	29	24 (83)	9 (31)
Subtotal	231	197 (85)	133 (58)
Monreal			
Poblacion	29	29 (100)	23 (79)
Famosa	22	20 (91)	11 (50)
Rizal	37	19 (51)	10 (27)
Real	29	16 (55)	8 (27)
Cantorna[a]	21	17 (81)	8 (38)
Subtotal	138	101 (73)	60 (43)
Total	1,224	885 (72.3)	500 (40.8)
		95% CI (69.8-74.8)	95% CI (38.1-43)

Cumulative prevalence across municipalities; Pearson chi^2=194.3565; p=<0.001.
Moderate-heavy intensity STH across municipalities; Pearson chi^2=148.2878; p=<0.001.
[a]ODF barangays.

Table 2
Ascariasis, trichuriasis, and hookworm infection prevalence and intensity in PSAC in selected municipalities in Masbate, March 2015.

Municipality	PSAC examined (*n*)	Positive for ascariasis		Positive for trichuriasis		Positive for hookworm infection[a]
		n (%)	Moderate-heavy intensity *n* (%)	*n* (%)	Moderate-heavy intensity *n* (%)	
Aroroy	480	343 (72.0)	227 (47.0)	332 (69.0)	96 (20.0)	10 (2.0)
Cawayan	375	117 (31.0)	54 (14.0)	117 (31.0)	23 (6.0)	5 (1.0)
Milagros	231	174 (75.0)	127 (55.0)	157 (68.0)	55 (24.0)	3 (1.0)
Monreal	138	88 (64.0)	53 (38.0)	55 (40.0)	14 (16.0)	0 -
Total	1,224	722 (59.0)	461 (37.8)	661 (54.0)	188 (15.4)	18 (2.0)
		95% CI (56.2-61.7)	95% CI (34.9-40.4)	95% CI (51.2-56.8)	95% CI (13.3-17.4)	95% CI (0.9-2.3)

[a]There was no case of moderate-heavy hookworm infection.

Table 3
Rates of coinfection of STH in PSAC in selected municipalities in Masbate, March 2015.

Municipality	PSAC examined *n*	*Ascaris-Trichuris* coinfections *n* (%)	*Ascaris*-hookworm coinfections *n* (%)	*Trichuris*-hookworm coinfections *n* (%)	*Ascaris-Trichuris*-hookworm coinfections *n* (%)
Aroroy	480	254 (53)	3 (0.6)	0 -	7 (1.5)
Cawayan	375	61 (16)	0 -	1 (0.3)	2 (0.5)
Milagros	231	132 (57)	1 (0.4)	0 -	2 (0.5)
Monreal	138	42 (30)	0 -	0 -	0 -
Total	1,224	489 (40)	4 (0.3)	1 (0.1)	11 (0.9)

was observed in 722 (59%) of PSAC, while moderate-heavy ascariasis was found in 461 (38%) of PSAC. Trichuriasis was observed in 661 (54%) of the PSAC, while moderate-heavy trichuriasis was found in 188 (15%) of the PSAC. Hookworm infection was observed only in 18 (2%) of the PSAC. None of the municipalities had a case of moderate-heavy hookworm infection (Table 2).

Coinfections were prevalent with *Ascaris*-*Trichuris* coinfection being most common with 489 cases (40%), followed by *Ascaris*-hookworm with four cases (0.3%), and *Trichuris*-hookworm with one case (0.1%). Triple STH coinfection was found in 11 PSAC (0.9%). Most cases of coinfections were observed in Aroroy (Table 3).

Among the four municipalities, only Cawayan (46%) met the national target of reducing STH prevalence to less than 50%. The municipalities of Aroroy (86%), Milagros (85%), and Monreal (73%) had higher STH prevalence than the national baseline data. None of the municipalities attained the global target of reducing prevalence of moderate-heavy STH to <1%.

Quality control

Validation of the slides examined by field microscopists showed an overall sensitivity and specificity of 93.8% and 86.8%, respectively. The sensitivity and specificity are 98.4% and 89.3% for *Ascaris* and 88.1% and 83.1% for *Trichuris*, respectively.

Deworming coverage

The deworming coverage for PSAC in the selected municipalities in 2013 was 66% for Aroroy, 106% for Cawayan, 67% for Milagros, and 87% for Monreal. The deworming coverage in the province (71%) was below the global and national targets for deworming coverage.

DISCUSSION

The study described the status of STH control in PSAC in selected municipalities in Masbate in attaining global and national targets. The overall cumulative STH prevalence, as well as the prevalence of moderate-heavy intensity STH, in the four municipalities did not meet both the global and national targets for STH morbidity. The results also revealed that only Cawayan met the IHCP target for STH prevalence, while none of the selected municipalities met the global target for prevalence of moderate-heavy intensity STH. When the data is disaggregated into barangays, most of the barangays likewise failed to meet the national and global targets. Three barangays had 100% STH prevalence. It must be noted that the IHCP targets were intended to have been attained in 2010, five years prior to the conduct of the study. Aside from failing to meet the global and national targets, the cumulative STH prevalence in PSAC observed was also higher than that of a survey conducted before the implementation of the IHCP, which was only 66% (de Leon and Lumampao, 2005; final report submitted to UNICEF) and a sentinel survey conducted in 2009 wherein prevalence was at 44% (Belizario *et al*, 2013a). The failure to meet both the national and global targets may suggest a need to enhance the STH prevention and control strategies, which include increasing access to preventive chemotherapy, improving WASH, and intensifying health promotion and education.

Ascariasis was the most prevalent STH, followed by trichuriasis. Low hookworm infection prevalence may indicate lack of exposure or limitation of Kato-Katz

technique in demonstrating hookworm eggs. Information on prevalent STH may help determine morbidity and thus the interventions needed, such as micronutrient supplementation. While STH, in general, contributes to malnutrition and poor cognitive performance, each type of STH causes specific morbidities, such as low serum vitamin A (retinol) levels, intestinal obstruction, and erratic migration for ascariasis (de Silva *et al,* 2010), anemia, rectal prolapse, and Trichuris Dysentery Syndrome for trichuriasis (Robertson *et al,* 1992; Noorizan and Mahendra Raj, 2001) and anemia for hookworm infection (Stoltzfus *et al,* 1997; Albonico *et al,* 2008).

Cases of coinfections were observed with *Ascaris-Trichuris* coinfection being most common due to their similar orofecal route of transmission (Ezeamama *et al*, 2005). Available evidence suggests that parasitic coinfections or polyparasitism may result to increased morbidity due to the possible synergistic effects of individual parasites. Coinfections may, likewise, increase susceptibility of individuals to other infections (Pullan and Brooker, 2008). Moreover, PSAC with STH coinfection are likely to suffer from physical, social, and cognitive developmental constraints (Tchuem Tchuente *et al,* 2003), considering that they are in a period of rapid growth and development.

Determinants of STH include challenges in the conduct of preventive chemotherapy, poor WASH and health promotion and education, and poverty (Ulukanligil and Seyrek, 2003; DOH, 2006; Ostan *et al*, 2007). Focusing on these determinants is crucial in improving helminth control and reducing the burden of STH.

Preventive chemotherapy, the use of anthelminthics regardless of infection status in high-risk groups, remains to be the major strategy for morbidity control of STH (WHO, 2012). In the Philippines, deworming in PSAC (1-5 years old) is done biannually through the *Garantisadong Pambata* (GP) program (DOH, 2006). Deworming tablets are also made available in health centers to children aged 1-14 years old through the Expanded GP Program (DOH, 2010a).

The reported mass drug administration (MDA) coverage rate in the province in 2013 was below both the global and national targets. The two municipalities with the highest STH prevalence rates and prevalence of moderate-heavy STH (Aroroy and Milagros) had the lowest deworming coverage rates. Challenges contributing to low MDA coverage include misconceptions of parents on deworming and poor delivery channels for MDA (Krentel *et al,* 2013). Increasing the knowledge on benefits of deworming makes MDA more acceptable which may likewise help increase the coverage rates (Amarillo *et al,* 2008). MDA delivery in Day Care Centers (DCC) may be explored to help increase treatment coverage for PSAC (Belizario *et al,* 2014). The use of existing infrastructure and manpower allows for a more cost effective service delivery (Crompton and Nesheim, 2002). MDA, however, will still be a challenge for PSAC who are not enrolled in DCCs.

While the MDA coverage rate in the province did not meet the global and national targets, it is higher than the national MDA coverage in the same year (19%) (WHO, 2015). The relatively high coverage rates, compared with the national average, were inconsistent with the high prevalence of moderate-heavy intensity STH observed. Reinfection, which occurs rapidly especially for *Ascaris* and *Trichuris* infection (Jia *et al,* 2012), may contribute to

the high prevalence of moderate-heavy intensity STH observed. Reinfection alone, however, may not suffice to explain the inconsistency since it only often results to light intensity infections especially if the children are regularly dewormed. The high prevalence of moderate-heavy intensity STH may indicate that the children are not being dewormed regularly. Thus, another explanation for the inconsistency is the possible lapses in the reporting of deworming coverage. A previous study conducted in the Philippines revealed that the estimated deworming coverage obtained through individual interviews was 32% lower than the reported coverage. This may be explained by assuming that the number of people given the drugs is equal to the number of people who actually took the drugs (Amarillo *et al*, 2008). Thus, direct observation of intake of anthelmintics is recommended to improve reporting of actual deworming coverage.

Strategies aimed at enhancement, promotion, and monitoring of WASH are crucial for STH prevention and control (WHO, 2012). Providing access to latrines, alone, will not suffice to improve WASH since this does not guarantee utilization (Institute of Development Studies, 2011; Belizario *et al*, 2014). Active participation of the community is crucial in improving WASH. A study in East Java found out that externally provided subsidies (*eg*, provision of free latrines) were associated with lack of ODF outcomes. Conversely, internally provided subsidies were instrumental in attaining ODF (World Bank Water and Sanitation Program, 2011). Thus, facilitating behavior change through strategies aimed at encouraging people to utilize their toilets and providing access to cheap sanitary toilets may be more feasible and effective in improving WASH and attaining ODF.

The DOH, through Administrative Order 2010-0021 which declared sustainable sanitation as a national policy and program priority, envisions that by 2016, 60% of all barangays are ODF and incidence of STH caused by poor sanitary conditions are reduced by 60%. These will be achieved through strategies highlighted in the National Sustainable Sanitation Plan (NSSP), which include strengthening of sanitation governance and regulatory mechanism, improving service delivery through capacity development, forming strategic alliances of multisectoral stakeholders, financing and adequate infrastructure investments, and promoting sanitation during emergency response (DOH, 2010b). CLTS, a strategy where communities are facilitated to conduct their own appraisal and analysis of open defecation and to take action to become ODF, may be important in attaining sustainable sanitation (Institute of Development Studies, 2011).

The high STH prevalence rates in some barangays where CLTS is implemented may be related with the parasitological assessment conducted less than a year after the implementation of CLTS in June 2014. Helminth eggs, particularly *Ascaris* ova, can survive for two years (Belizario *et al*, 2015) up to 10 years (Khuroo, 1996). Improvements in WASH must be sustained for several years before reductions in burden of STH may be observed. Follow-up parasitological assessments may be needed to measure the CLTS outcomes in these communities. Conversely, the high STH burden in ODF barangays were comparable to a previous study where high STH prevalence (67.4%) was observed in an ODF declared village (Belizario *et al*, 2014). Both were inconsistent with a meta-analysis (Zielgelbauer *et al*, 2012), which concluded that avail-

ability and access to sanitation facilities are associated with reduction in STH prevalence due to reduced risk of STH transmission and re-infections (Anderson and May, 1991). As STH persist in areas where challenges in WASH exist (Strunz *et al*, 2014), there may be a need to review the process of certifying ODF status in the province.

Monitoring and evaluation of parasitological status in the community is important to assess the effectiveness of existing helminth control programs. A parasitological assessment may be conducted every two years as recommended by WHO (WHO, 2011). Aside from parasitological status, monitoring and evaluation of the different indicators for the success of WASH programs, such as attainment of ODF status, may also be included.

Aside from poor sanitation, the high STH prevalence may also be due to poor hygienic practices, such as poor practice of hand washing which may be common among children (Vivas *et al,* 2010). Health promotion and hygiene education reduce transmission and reinfection when combined with behavioral change. Awareness of the community on the preventive measures and the morbidity caused by STH may help improve their health status.

Poverty is among the social determinants of NTD identified by WHO (WHO, 2010). NTDs, such as STH, are more prevalent in impoverished areas. Thus, poverty may be a factor contributing to the high STH prevalence in the province considering that Masbate has one of the lowest HDI in the country (HDN, 2013). It must be noted, however, that socio-economic development must be inclusive in order to benefit those at-risk for STH. In this study, Aroroy, which is a first class municipality (Philippine Statistics Authority, n.d.) due in part to the mining activities, has the highest burden of STH. This may indicate that the wealth generated in the municipality does not necessarily benefit the poorest people, especially in terms of public health. Thus, strategies aimed at promoting inclusive socio-economic development must be improved to achieve better health outcomes, especially in addressing STH.

The results of this study reflect the continuing challenges in the selected municipalities especially in the delivery of health services. Various components, which include advocacy, capacity building, social mobilization, multisectoral collaboration, and monitoring and evaluation, are crucial in the success of public health intervention in a decentralized health system where health service delivery is entrusted to LGUs. The War on Worms Campaign, which utilized these components, has attained improved health outcomes, such as higher deworming coverage and reduced prevalence and intensity of STH in Western Visayas and Davao del Norte (Belizario *et al,* 2013b). The good practices on helminth control in sites where WOW was implemented may be adopted in the province in order to improve delivery of health services, particularly deworming. Aside from Western Visayas and Davao del Norte, good practices in Compostela Valley and Surigao del Norte, provinces that had significant reductions in both prevalence of STH and of moderate-heavy intensity STH three years after baseline (Belizario *et al,* 2013a), may also be adopted.

Lastly, various opportunities exist which could be leveraged to improve helminth control not only in Masbate but also to other provinces. The inclusion of WASH

and NTDs in the Sustainable Development Goals will provide much needed focus and resources aimed at addressing STH for the next 15 years. Likewise, the sustained economic growth in the country and the increase in the budget of DOH will provide resources to address STH.

In conclusion, the results of the parasitological assessment in selected municipalities of Masbate revealed high infection rates and intensity of STH which failed to meet the IHCP and WHO reduction targets, despite the implementation of IHCP for 10 years. Improving helminth control outcomes warrants increasing access to preventive chemotherapy, improving WASH, intensifying health promotion and education, as well as addressing other factors contributing to STH, such as lack of inclusive socio-economic development. Good practices in WOW sites, such as Western Visayas and Davao del Norte, as well as in provinces, such as Compostela Valley and Surigao del Norte where there had been significant reductions in both STH prevalence and intensity, may be adopted in the province.

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