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Parasitological and nutritional status of school-age and preschool-age children in four villages in Southern Leyte, Philippines: Lessons for monitoring the outcome of Community-Led Total Sanitation

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ABSTRACT

While preventive chemotherapy remains to be a major strategy for the prevention and control of soil-transmitted helminthiases (STH), improvements in water, sanitation, and hygiene (WASH) comprise the long-term strategy to achieve sustained control of STH. This study examined the parasitological and nutritional status of school-age and preschool-age children in four villages in Southern Leyte, Philippines where two of the villages attained Open-Defecation-Free (ODF) status after introduction of Community-Led Total Sanitation (CLTS).

A total of 341 children (89.0% of the total eligible population) submitted stool samples which were examined using the Kato-Katz technique. Results showed that 27.9% of the total stool samples examined had at least one type of STH (cumulative prevalence), while 7.9% had moderate-heavy intensity infections. Between the two villages where CLTS was introduced, Buenavista had a significantly higher cumulative prevalence of STH at 67.4% ($p < 0.001$) and prevalence of moderate-heavy intensity STH at 23.5% ($p = 0.000$), while Caubang had a significantly lower cumulative prevalence at 4.9% and prevalence of moderate-heavy intensity at 1.8%. On the other hand, the non-CLTS villages of Bitoon and Saub had similar rates for cumulative prevalence (16.7% and 16.8%, respectively; $p = 0.984$) and prevalence of moderate-heavy intensity STH (2.0% and 3.1%, respectively; $p = 1.000$). The findings may be explained by factors that include possible reversion to open defecation, non-utilization of sanitary facilities, and mass drug administration (MDA) coverage, although further studies that can accurately assess the impact of CLTS are recommended. While this study was descriptive, the data indicate no clear pattern among the parasitological and nutritional parameters, as well as the presence of CLTS in the village, suggesting the need to monitor the ODF status of villages on a regular basis even after the end of CLTS activities to ensure the sustainability of the CLTS approach. In order to achieve effective control of STH, deeper collaboration between the WASH and STH sectors are recommended where partners can work together in the area of monitoring and evaluation that may include improved parasitological and nutritional status in high-risk groups, as well as sustainable behavior change as outcome indicators.

1. Introduction

Soil-transmitted helminthiases (STH) caused by *Ascaris lumbricoides*, *Trichuris trichiuria*, and hookworms are neglected tropical diseases (NTDs) that continue to cause burden to more than two billion people worldwide (WHO, 2012). The highest prevalence rates of STH are observed in low- and middle-income countries where the disease is strongly associated with poverty, poor hygiene, lack of access to safe and clean water, and inadequate sanitation (Brooker, 2010). Among school-age children (SAC) in the Philippines, sentinel surveillance in selected public elementary schools in 2006 revealed that cumulative prevalence, or positivity for at least one type of STH, was 54.0% (Belizario et al., 2009), which decreased to 44.7% three

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years later (Belizario et al., 2013). Among preschool-age children (PSAC), sentinel surveillance in 2004 revealed a cumulative prevalence of 66.0% (De Leon and Lumampao, 2005), which decreased to 43.7% during follow-up assessment five years later (Belizario et al., 2013). While reductions in prevalence rates were noted in these studies, the estimated prevalence of STH in the Philippines in the SAC and PSAC populations still have not satisfied the targets of <20% cumulative prevalence and zero heavy intensity STH recommended by the World Health Organization (WHO) to achieve morbidity control (WHO, 2011). On the other hand, the National Nutrition Survey, which is undertaken every five years by the Philippine Food and Nutrition Research Institute (FNRI) to monitor the population's nutrition status, among other parameters, revealed a significant increase in the proportion of children 0–5 years old who were underweight (26.2% from 24.6%) and stunted (27.9% from 26.3%) between 2008 and 2005. A significant increase in the proportion of children 6–10 years old who were underweight (25.6% from 22.8%) and stunted (33.1% from 32.0%) was likewise observed in the same survey (FNRI, 2008).

Preventive chemotherapy through regular mass drug administration (MDA) of anthelminthics to populations at-risk remains to be a major strategy of STH control programs worldwide (WHO, 2012). However, deworming alone may not be effective in preventing re-infections which are associated with poor sanitation (Ziegelbauer et al., 2012; Singer and Castro, 2007; Bethony et al., 2006; Chan et al., 1992). On the one hand, the WHO and NTD control programs worldwide have long recognized the importance of water, sanitation, and hygiene (WASH) as critical components on-top of deworming to achieve sustained control of STH. On the other hand, the WASH sector has usually emphasized a rights-based approach which focuses more on universal coverage of WASH services as outcome goals than disease control. Hence, deeper inter-sectoral collaboration between NTD control programs and the WASH sector has been advocated to achieve a common long-term vision of disease-free communities (Freeman et al., 2013). In two recent meta-analyses, the Cochrane Collaboration reported no evidence for the benefit of routine deworming on nutrition, hemoglobin, and school performance (Taylor-Robinson et al., 2012), as well as a small evidence for the benefit of WASH interventions on the length growth of children <5 years old (Dangour et al., 2013), both suggesting the need for further studies.

In the Philippines, Plan International, an international non-government child rights organization, introduced Community-Led total Sanitation (CLTS) in 381 selected *barangays*/villages in 28 municipalities across the country beginning in 2009 (Dominguez, 2012). CLTS is described as an integrated approach to sanitation to achieve and sustain Open-Defection-Free (ODF) status through the facilitation of the community's analysis of their sanitation profile and their practice of defecation and its consequences, which are expected to lead to collective action to become ODF (Kar and Chambers, 2008). Plan International adopted the CLTS approach drawing from its experience of implementing its WASH Program in the Philippines during the past decade, such as: (a) provision of subsidy for toilet construction which did not necessarily translate to the use of toilet by recipient families; and (b) co-financing schemes which did not favor poorer beneficiaries who often had difficulty raising counterpart funding to complete construction of their toilets (Dominguez, 2012).

Following the steps outlined by Kar and Chambers (2008), Plan International introduced CLTS in collaboration with local government units (LGUs) through the following steps: (a) pre-triggering, which involved groundwork meetings with LGU representatives and stakeholders in the locality to select the villages where CLTS will be piloted; (b) triggering, which involved sanitation profiling and analysis by the residents through focus group discussions, as well as "transect walks" in the village surroundings to map sites of open defecation that would move villagers to be "disgusted, embarrassed, and ashamed" of open defecation; (c) post-triggering, which involved action planning by the village residents to attain zero open defecation; and (d) scaling-up, which involved the introduction of CLTS in more villages (Dominguez, 2012).

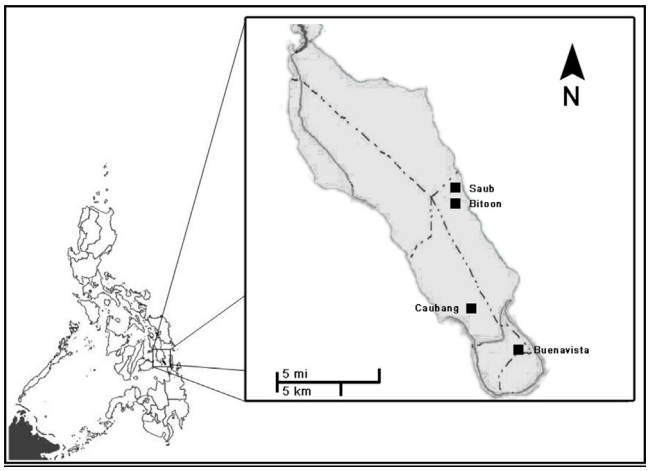

Fig. 1. Map of the Philippines showing the location of the four villages included in this study (modified map from https://maps.google.com/).

A key success indicator for CLTS is the number of communities that eventually attain ODF status, rather than the number of latrines built or the amount of investment. However, the experience in selected African countries has suggested that further research is needed to examine the link between ODF status and the incidence of disease, as well as sustained behavior change (Sah and Negussie, 2009). A recent report in 2013 commissioned by the United Nations Children's Fund (UNICEF) describing the experience of 14 Asia Pacific countries, including the Philippines, on CLTS has suggested that CLTS monitoring remains to be a significant weakness and that widespread reversion to open defecation may result post-CLTS. In the Philippines, where CLTS has mostly been championed by international non-government organizations (NGOs) like Plan International, challenges include the lack of a formal and sustainable system for monitoring CLTS progress data, as well as the lack of a common criteria for validating ODF status (UNICEF, 2013). Consequently, there remains to be a lack of compelling evidence on the contributions of CLTS not only to attaining ODF but also to sustainable behavior change and improvements in disease prevention and nutritional status, which may nonetheless be useful in convincing the Philippines and other governments to adopt a national policy on CLTS.

This study determined the prevalence and intensity of STH and described the nutritional status of SAC and PSAC in two villages in Southern Leyte that benefitted from CLTS and subsequently attained ODF status, and in two other villages that did not benefit from CLTS. To our knowledge, this is the first attempt to examine the cumulative prevalence of STH and nutritional status in children after introduction of CLTS using data from the Philippines.

2. Methodology

2.1. Study sites and population

This study was conducted in four villages in the province of Southern Leyte in the Eastern Philippines (Fig. 1). Plan International introduced CLTS in the villages of Caubang and Buenavista in November 2009 and August 2011, respectively. Initial mobilization activities included the orientation and training of an LGU-led provincial Technical Working Group (TWG), composed of