1664. Maternal Hookworm Infection and Its Effect on Maternal/Child Health: A Systematic Review and Meta-Analysis

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Background. Hookworm is an intestinal parasite that infects 500 million people, with 20% at risk at all levels, especially in poverty-stricken, tropical and subtropical regions. In 2005, an estimated 6.9 million pregnant women living in Sub-Saharan Africa were infected with hookworm, despite efforts for mass drug administration (MDA) being recommended. This study aimed to investigate the health impact of hookworm infection in pregnant women in order to guide public health interventions.

Methods. A systematic review and meta-analysis were conducted using Medline OVID for the creation of a MeSH terms, with subsequent translation to EMBASE and Cochrane Library. We performed a meta-analysis on the association between maternal hookworm and maternal anemia, as well as maternal hookworm co-infection with malaria. Other effects on maternal/child health were investigated and summarized without a meta-analysis due to the limited study numbers.

Results. Our search resulted in 471 studies for the meta-analysis, of which 23 met inclusion criteria. The prevalence of hookworm ranged from 1% to 67% in pregnant women; while malaria prevalence ranged from 11% to 81% in pregnant women. Women with anemia were more likely to have concurrent hookworm infection (combined odds ratio (COR) 2.21 [1.94, 2.51], P < 0.001). Additionally, pregnant women with malaria were more likely to have hookworm infection (COR 1.71 [1.43, 2.03], P < 0.001). Our investigation also showed an interaction between maternal hookworm and infant birth weight (significant in three of four studies). Infant vaccine response did not show an association (four studies).

Conclusion. Hookworm infection in pregnant women is an important global health issue associated with significant maternal anemia and concurrent parasitic infections, such as malaria. Despite current MDA strategies in pregnant women, heavy hookworm burden, co-infection with malaria, and subsequent anemia persists. Further investigation on maternal-child outcomes of hookworm infection on maternal anemia, maternal malaria co-infection, and other areas, such as infant cognitive outcomes, will provide potential public health intervention targets to reduce morbidity.

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1665. The Cascade of Care for the Strong Hearts Chagas Disease Screening and Treatment Program in Boston, Massachusetts

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Background. Over 300,000 people in the United States are infected with Trypanosoma cruzi, the parasite that causes Chagas disease. Less than 1% of those people have received antitrypanosomal therapy. We report findings of an ongoing project to address Chagas disease in East Boston, including the epidemiology and cascade of care for this disease.

Methods. Providers at the East Boston Neighborhood Health Center were offered continuing medical education sessions on Chagas disease by the Strong Hearts project. One-time screening for Chagas disease is recommended for all patients <50 years old who had lived in Mexico, South or Central America for 6 months at the provider’s discretion. Screening is performed by a commercial laboratory using the Hemigen ELISA; confirmatory testing is performed at CDC. Patients with confirmed positive serology are referred to the Center for Infectious Diseases (ID) at Boston Medical Center for evaluation and treatment. We compared the prevalence of Chagas disease by age, sex and national origin. We then used a conditional numerator and fixed denominator to construct the cascade of care, with the stages defined as referred to ID care, evaluation in ID, initiation of treatment and completion of antitrypanosomal therapy. We used chi-squared tests to compare proportions.

Results. From March 21, 2017 to April 17, 2019, 5,125 patients were screened. 50 (0.97%) were confirmed to have T. cruzi infection, among them 3 pregnant women. There were no differences in the prevalence of T. cruzi infection by sex (M = 22/1870 [1.18%], F = 28/3505 [0.85%], P = 0.245) but prevalence increased from 0/190 (0%) in those <20 years old to 11/11083 (0.1%) in 40–49 year olds (P = 0.001). The 3 infected of pregnant women were screened. The cascade of care for Strong Hearts is displayed in Figure 1.

Conclusion. Chagas disease prevalence in at-risk communities in Boston is substantial (97% of patients with T. cruzi infection identified in this program have completed treatment to date. Most infected patients were referred for evaluation, but substantial drop-off occurred at each of the next 3 steps of the cascade. Confronting barriers at each of these steps is a crucial component of efforts to address this neglected disease.

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1666. Community Beliefs about Ebola and Implications for Disease Control in Eastern Democratic Republic of the Congo

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Background. The current Ebola epidemic in Eastern Democratic Republic of the Congo (DRC) has surpassed 1,300 cases and 800 deaths. Social resistance is a major barrier to control efforts, and invites an exploration of community beliefs around Ebola and its origins.

Methods. Mixed-methods study, using focus group discussions (FGDs) with key community informants and 19-item survey questionnaire broadly sampling the outbreak zone.

Results. Between 4 to 17 August, 2018, we conducted 4 FGDs (20 participants) and 26 community FGDs across Eastern DRC. FGDs revealed a widespread rumor in Mangina early in the epidemic of two brothers bewitched by their aunt after eating her cat, who developed bleeding symptoms and triggered the epidemic. However, this myth appeared to dissipate as the epidemic progressed and biomedical transmission became generally accepted (medical science). In our survey, 6% of respondents endorsed supernatural origins of Ebola. This subgroup did not differ from other respondents in terms of knowledge of biomedical modes of transmission or resistant attitudes toward infection control measures, but was more likely to believe that traditional healers could cure Ebola. Wild animals of the forest were recognized as sources of the Ebola virus by 53% of survey respondents. Our findings suggest that skepticism and/or denial of the biomedical diagnosis, coupled with mistrust and fear of ETUs may fuel “underground” transmission of Ebola outside western-style medical facilities, as patients seek care from traditional healers, who are ill-equipped to address Ebola.

Conclusion. A deeper understanding of beliefs around Ebola origins may illuminate strategies to engage communities in control efforts.

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1667. Influenza A and B Co-Circulation and Burden: A 2018–2019 Influenza Season Analysis Using the National Active Surveillance Database in Mexico

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Background. Seasonal influenza is a prevalent respiratory infection for children and adults in Mexico. Influenza A and B viruses co-circulate and there is a need to better understand local epidemiology to inform vaccination recommendations (trivalent, quadrivalent vaccines). We describe the 2018–2019 influenza season to estimate influenza burden, virus co-circulation and understand the vaccine match in Mexico.

Methods. We reviewed preliminary sentinel surveillance data for the influenza season (October 2018–May 2019) from the Mexican Health Secretariat and World Health Organization’s (WHO) Flubnet databases. We performed a descriptive analysis of cases and deaths due to influenza-like illness (ILI), severe acute respiratory infections (SARI) and lab-confirmed influenza to estimate the prevalence of influenza A and B circulating strains, per state and age group, and then determine B strain vaccine match.

Results. During the 2018–2019 season in Mexico, there were 52,525 reported cases of ILI/SARI with 6,997 lab-confirmed influenza cases (28% positivity rate among ILI/SARI) and 787 (11%) deaths (Figures 1 and 2). The states with 36% of cases were Mexico City, State of Mexico, Hidalgo, Tlaxcala and Guanajuato. More than half of the Mexican states had a high (10–14.9%) to intense (25%) accumulated case positivity rate of confirmed influenza in relation to ILI/SARI cases (Figure 3). Most cases were reported among the 1–9 and > 60-year-old groups. 45% of deaths occurred in State of Mexico, Hidalgo, Mexico City, Puebla, and Guanajuato. The seasonal viral profile was dominated by A/H1N1 (68%), followed by B (16%) and A/H3N2 (12%), with 90%
of deaths attributed to A/H1N1. FluNet's influenza B data show Yamagata (55%) and Victoria (27%) co-circulation (Figure 1).

**Conclusion.** The 2018–2019 seasonal co-circulation of influenza A and B viruses in Mexico showed significant nation-wide morbidity-burden, with A/H1N1 and B/Yamagata dominance. Stronger B lineage determination is needed in Mexico to understand associated burden and prevent vaccine mismatch, considering the trivalent vaccine does not contain both B strains. Given the circulation of both influenza B lineages and the recommendation of the WHO, Mexico could enhance quadrivalent vaccine use in coming seasons to optimize protection.

**Methods.** We enrolled 466 households with children eligible for OPV before the February 2015 national health week from 3 semi-rural Indigenous communities near Orizaba, Mexico. In each community, a different proportion of eligible children received OPV (10%, 30%, 70%), with a total of 155 vaccinated children. OPV shedding was measured by RT-qPCR detection of OPV in samples collected serially over 10 weeks. Anthropometric measurements were collected and compared with the WHO Multicenter Growth Reference Study growth curves to assign stunting. Associations between stunting, OPV shedding, and shedding duration were tested by Fisher exact test and Wilcoxon-Man Whitney Test (α = 0.05).

**Results.** Samples of fecal OPV isolates were collected over time and analyzed from 148 vaccines. 25 (17%) of the vaccines were stunted. There was no relationship between pediatric stunting and likelihood of ever shedding any serotype of OPV (P = 0.82). The mean duration of OPV shedding by stunted and non-stunted children differed, but not significantly (10.9 days vs. 9.3 days, respectively, P = 0.32). We did not find any statistically significant differences between stunting status and shedding of any individual OPV serotype.

**Conclusion.** Further understanding of factors related to OPV shedding is necessary to approach efficient worldwide poliovirus control. We found no relationship between stunting status and both OPV shedding and shedding duration post-vaccination, suggesting that nutritional status does not play a role in OPV shedding. The ongoing analysis includes longitudinal analysis of OPV shedding patterns by nutritional status, and the impact of stunting on viral load and reversion of OPV to vaccine-associated paralytic polio mutants.

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1668. Trends in Authorship for Infectious Disease Research Conducted in Low-Income Countries
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**Background.** Research capacity in low-income countries (LICs) plays an important role in strengthening national healthcare systems and addressing local health priorities. Research in infectious diseases is especially important as they comprise five of the top 10 causes of death in LICs. While academic collaborations between high-income countries (HICs) and LICs offer many benefits, they also risk structural and professional imbalances. This study explores research capacity as a function of first or last authorship and funding for research conducted in LICs that is published in high-impact infectious disease journals.

**Methods.** A literature search using the abstract database Scopus was completed for original research conducted within LICs or using samples collected from LIC subjects published between 1998 – 2017 in Clinical Infections Diseases, Journal of Infectious Diseases, and Open Forum Infectious Diseases. Primary outcomes included the number of LIC and HIC authors compared with LIC authors over time. Secondary outcomes included the geographic distribution of research and the proportion of research financed by LICs.

**Results.** A total of 1380 articles were identified of which 20% had LIC first authors and 21% had first authors with dual LIC/HIC affiliations. For last authors, 13% were affiliated with a LIC and 15% had dual LIC/HIC affiliation. LIC researchers compiled the majority of first and last authors regardless of geography (Figure 1). The number of studies conducted in LICs increased over the 20-year timeframe (Figure 2) but is attributed to an increase in articles with HIC authors. The number of LIC authors remained unchanged resulting in a decreasing proportion of LIC authors. Only 4% of articles received funding from a LIC; however, 79% of these studies were authored by LIC researchers vs. 39% of studies funded by HIC sources.

**Conclusion.** There is a growing appreciation for international HIC/LIC research collaborations with the objective to reduce the burden of infectious diseases that disproportionately affect low-income settings. However, with this increased attention comes the responsibility to improve LIC research capacity. This includes promoting LIC researchers via authorship and supporting sustainability with funding that highlights LIC priorities.

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1669. No Impact of Nutritional Status on Oral Polio Vaccine shedding after Vaccination of Under 5 Children in Rural Mexico
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**Background.** As wild poliovirus is nearing global eradication and countries switch from Oral Polio Vaccine (OPV) to Inactivated Polio Vaccine (IPV), preventing circulating vaccine-derived poliovirus is a top priority. However, the circulation of OPV serotypes remains a concern in undervaccinated communities. We sought to examine the relationship between pediatric nutritional status and OPV shedding based on length-for-age categorizations. Mexico provides a natural environment to study these patterns as it provides routine IPV immunization and bi-annual OPV campaigns.

**Methods.** We enrolled 466 households with children eligible for OPV before the February 2015 national health week from 3 semi-rural Indigenous communities near Orizaba, Mexico. In each community, a different proportion of eligible children received OPV (10%, 30%, 70%), with a total of 155 vaccinated children. OPV shedding was measured by RT-qPCR detection of OPV in samples collected serially over 10 weeks. Anthropometric measurements were collected and compared with the WHO Multicenter Growth Reference Study growth curves to assign stunting. Associations between stunting, OPV shedding, and shedding duration were tested by Fisher exact test and Wilcoxon-Man Whitney Test (α = 0.05).

**Results.** Samples of fecal OPV isolates were collected over time and analyzed from 148 vaccines. 25 (17%) of the vaccines were stunted. There was no relationship between pediatric stunting and likelihood of ever shedding any serotype of OPV (P = 0.82). The mean duration of OPV shedding by stunted and non-stunted children differed, but not significantly (10.9 days vs. 9.3 days, respectively, P = 0.32). We did not find any statistically significant differences between stunting status and shedding of any individual OPV serotype.

**Conclusion.** Further understanding of factors related to OPV shedding is necessary to approach efficient worldwide poliovirus control. We found no relationship between stunting status and both OPV shedding and shedding duration post-vaccination, suggesting that nutritional status does not play a role in OPV shedding. The ongoing analysis includes longitudinal analysis of OPV shedding patterns by nutritional status, and the impact of stunting on viral load and reversion of OPV to vaccine-associated paralytic polio mutants.

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**Figure 1. 2018-2019 influenza season cases, deaths, and viral distribution of confirmed cases in Mexico**

**Figure 2. 2018-2019 influenza season cases epidemic curve and positivity rate of confirmed influenza among EI/SARI in Mexico (until epidemiological week 17)**

**Figure 3. 2018-2019 influenza season case positivity rate of lab-confirmed influenza among EI/SARI, per state in Mexico**