World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:13, No:04, 2019

Global Evidence on the Seasonality of Enteric Infections, Malnutrition, and Livestock Ownership

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Abstract : Livestock ownership is simultaneously linked to improved nutritional status through increased availability of animal-source protein, and increased risk of enteric infections through higher exposure to contaminated water sources. Agrarian and agro-pastoral households, especially those with cattle, goats, and sheep, are highly dependent on seasonally various environmental conditions, which directly impact nutrition and health. This study explores global spatiotemporally explicit evidence regarding the relationship between livestock ownership, enteric infections, and malnutrition. Seasonal and cyclical fluctuations, as well as mediating effects, are further examined to elucidate health and nutrition outcomes of individual and communal livestock ownership. The US Agency for International Development's Demographic and Health Surveys (DHS) and the United Nations International Children's Emergency Fund's Multi-Indicator Cluster Surveys (MICS) provide valuable sources of household-level information on anthropometry, asset ownership, and disease outcomes. These data are especially important in data-sparse regions, where surveys may only be conducted in the aftermath of emergencies. Child-level disease history, anthropometry, and household-level asset ownership information have been collected since DHS-V (2003-present) and MICS-III (2005-present). This analysis combines over 15 years of survey data from DHS and MICS to study 2,466,257 children under age five from 82 countries. Subnational (administrative level 1) measures of diarrhea prevalence, mean livestock ownership by type, mean and median anthropometric measures (height for age, weight for age, and weight for height) were investigated. Effects of several environmental, market, community, and household-level determinants were studied. Such covariates included precipitation, temperature, vegetation, the market price of staple cereals and animal source proteins, conflict events, livelihood zones, wealth indices and access to water, sanitation, hygiene, and public health services. Children aged 0 – 6 months, 6 months – 2 years, and 2 – 5 years of age were compared separately. All observations were standardized to interview day of year, and administrative units were harmonized for consistent comparisons over time. Geographically weighted regressions were constructed for each outcome and subnational unit. Preliminary results demonstrate the importance of accounting for seasonality in concurrent assessments of malnutrition and enteric infections. Household assets, including livestock, often determine the intensity of these outcomes. In many regions, livestock ownership affects seasonal fluxes in malnutrition and enteric infections, which are also directly affected by environmental and local factors. Regression analysis demonstrates the spatiotemporal variability in nutrition outcomes due to a variety of causal factors. This analysis presents a synthesis of evidence from global survey data on the interrelationship between enteric infections, malnutrition, and livestock. These results provide a starting point for locally appropriate interventions designed to address this nexus in a timely manner and simultaneously improve health, nutrition, and livelihoods.

Keywords : diarrhea, enteric infections, households, livestock, malnutrition, seasonality
Conference Title : ICEID 2019 : International Conference on Epidemiology and Infectious Diseases
Conference Location : Boston, United States
Conference Dates : April 24-25, 2019