

Title: Integrated interventions targeting enteric viruses' contamination of water to reduce childhood malnutrition in rural Cameroon

Subtitle: Reducing exposure to enteric viruses in the home environment to promote child nutrition

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Description of the initiative

•Background : Childhood malnutrition remains a persistent challenge in Cameroon, where stunting affects over 30% of children under five. Rural areas face particularly high burdens, as families confront poor access to safe water, sanitation and hygiene (WASH) services that enhance risk of enteric disease. Our recent works have demonstrated high contamination levels of enteric viruses in various water matrices, even in drinking water. Repeated bouts of diarrhea and environmental enteric dysfunction linked to fecal-oral contamination pathways undermine nutrient absorption and child growth.

•Rationale : Nutrition and WASH studies have largely been conducted in Cameroon, but no research to date has examined environmental enteric viruses. The most common enteric viruses in Cameroonian children are norovirus and rotavirus. Targeting their key contamination pathways with an integrated approach holds promise for breaking the cycle of viral enteric infection and malnutrition.

•Objectives and scope: The goal is to develop integrated WASH and nutrition interventions aimed at reducing environmental contamination by enteric pathogens and the burden of malnutrition in under 5 years. Specifically, to determine the enteric viruses' contamination of household drinking water and children, to evaluate the malnutrition status of the children and to explore associations between occurrence of enteric viruses and childhood malnutrition, to develop nutrition interventions that address the environmental sources of enteric viruses. Project design aims to durably improve enteric viruses' surveillance, and childhood nutrition through community ownership and integration into local services.

Planned activities & deliverables

•Outline the steps to be taken: A case-control study will be conducted in children under 5 years of rural community of the Cameroon.

The steps to be taken are: 1. Conducting a survey to identify the sources of household drinking water and the storage. 2. Collect and analyze samples of household drinking water, and children's stool samples for enteric virus (norovirus and rotavirus). 3. Conduct anthropometric measurements and nutritional assessments of children under 5 years of age. 4. Analyze relationships between enteric virus in water and children data, and child nutrition outcomes. 5. Establishing a task force to design nutrition interventions targeting environmental pathways of enteric virus transmission. 6. Conduct focus group discussions and in-depth interviews with caregivers and community members to understand their perceptions, knowledge, attitudes, and practices related to environmental enteric viruses and nutrition. 7. Develop integrated WASH and nutrition interventions based on the findings of the baseline assessment. 8. Provide training and support to community health workers, caregivers, and other relevant stakeholders to implement the interventions effectively.

•What are the concrete deliverables of the project? 1. Survey questionnaires and data records from the household surveys, drinking water sampling, and nutritional assessments of children. 2. Laboratory testing results and records showing presence/absence and levels of enteric viruses in water and stool samples. 3. Focus group and interview reports. 4. Documentation outlining evidence-based nutrition interventions designed to reduce enteric virus exposures. 5. Training materials and capacity building programs. 6. Project reports and scientific publications to disseminate the findings

•What achievements are possible in the next 12 months? Ethics approved, Communities mobilized and engaged, Survey completed, Analysis of the nutritional status of the children, Formation of a technical task force.

•What achievements are possible in the next 24 months? Enteric viruses analyses, Association analyses, Finalization of evidence-based integrated intervention, Development of implementation tools, training manuals, Finalization of the reports and publications.

Resources & enablers

•Describe personnel: Project Investigator, Project Coordinator, Field Workers, Task Force (Nutritionist, Virologist, Environmental Health Specialist, Community Health Worker), Community Health Officers and Mobilizers, Laboratory Technicians, Data Analyst

•Financial needs: €40,000

•Specify how the grant will be spent: 1. Personnel (€18,000; 45%): for the salary and per diem rates for each staff member and their respective. 2. Materials and Supplies (€12,000; 30%): for the equipments and consumables needed for achieve the different objectives. 3. Travel (€8,000): 20%. This covers the different travel costs. 4. Contingency (€2,000): 5% of the total budget.

•What factors will make it successful? Strong community engagement and participation: Involving communities in intervention design, implementation and monitoring will foster ownership and sustainability. Multisectoral collaboration: Bringing together experts from nutrition, WASH, virology, pediatric and social sectors in the task force will ensure a holistic, evidence-based approach. Government engagement and buy-in: Aligning the interventions and findings with national nutrition and WASH policies increases potential for wider scale-up. Adequate budget and human resources: Allocating finances commensurate to project scope and duration, as well as engaging qualified personnel are musts for success.

Results/outcomes & expected impact

•How will the findings be implemented? Guide the scale-up of integrated enteric viruses-nutrition interventions in rural Cameroon. Inform the revision and strengthening of national nutrition and enteric viruses policies/strategies. Improve community-level programming. Influence global guidance and Advance research. Leverage additional financing. Promote cross-sector coordination.

•How will this project advance patient care / contribute to optimal nutritional care? The project aims to reduce exposure to enteric viruses, which can weaken nutrient absorption and disrupt the gut microbiome, thereby improving children's nutritional status. The integrated approach of combining WASH promotion with nutrition actions addresses environmental, behavioral, and dietary determinants of malnutrition in a holistic manner, ensuring sustainable improvements. The results will enhance clinical management of malnourished children by better understanding the links between viral contamination, intestinal dysfunction, and nutritional status. The project also aims to strengthen community sensitization to promote better hygiene practices that favor children's health and growth. In the long-term, reducing malnutrition will decrease infant mortality and improve cognitive and physical development, laying the foundations for improved health across the lifespan.

•What makes the project innovative? It adopts an integrated, multi-sectoral approach targeting the linkages between WASH, enteric virus contamination and childhood nutrition. It expands surveillance of enteric viruses beyond clinical settings to systematically examine their environmental prevalence and transmission routes through water. It convenes a multidisciplinary technical working group blending nutrition, WASH, virology and social science expertise.

•Will the project be likely to influence national nutrition policy? This project directly tackles issues not covered by existing nutrition policies. The project is well-placed to advocate for a strengthened nutrition strategy that incorporates addressing environmental enteric disease through coordinated WASH-nutrition programming.

•Is the project transferable to other settings / countries? The multisectoral collaboration strategies and capacity building plans established under this project could serve as a template for other multi-country programs to jointly address malnutrition and enteric disease burdens. With modest adaptations, the integrated approach may translate well for rural poverty settings.



**Please tick to confirm the PEN letter of endorsement is attached.
Incomplete submissions will not be considered.**

