Testing the modulatory effects of micronutrient status on the food insecurity-mental illness pathway in rural Haiti

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Introduction
Food insecurity and mental health
• Estimated 963 million are food insecure (FAO)
• Food insecure individuals are more likely to express symptoms of common mental disorders (Fomon, Hadley, 2008)

Mental illness in rural Haiti
• Chronic unmet mental health needs
• Poor understanding
• Prevalence rates
• Risk/protective factors
• Limited resources
• High burden of mental health in Central Plateau
• Depression: 50%, suicidal ideation: 6%

Role of micronutrient status
• Key micronutrients associated with mental functioning (Vitamin C, D, omega-3 FA, zinc, etc.)
• Limited knowledge exists on the role of folic acid on mental health status, but is suggested to influence relevant psychophysiological functions (Medina 2008)

Purpose
• This project aims to identify the modulatory effects of folate status on the effects of food insecurity on mental health (Figure 2), in order to test a potential pathway caused by dietary intake or behaviors
• Food insecurity will be reconceptualized to reflect and measure its experiential dimensions more broadly

Methodology
1) Survey development
• Community-based interviews: Haitian informants were interviewed to survey experience of food insecurity and perspectives on mental health, specifically depression, anxiety, and PTSD.
• Cultural consensus analysis: Informants completed pile sorts and free-lists as an additional elicitation technique understand local perspectives.
• Piloting surveys: Surveys were created and piloted using local, Kreyòl-speaking research assistants.

2) Biomarker/survey data collection
• Biomarker collection: Following a finger stick, blood was collected by absorbing five drops of blood onto filter paper and dried.
• Survey data collection: Local, Kreyòl-speaking research assistants conducted surveys in a community-based sample of rural Haitians

3) Laboratory analysis
• Folate quantification: Blood was eluted from dried blood spots and was used to culture folate-feeding Lactobacillus casei. Folate was quantified using spectrophotometric analysis based on turbidity.

4) Data analysis
• Linear regression: All scaled will be summed and used as continuous variables for analysis. Multiple linear regression models will be ran using Stata.

Results
1) Food insecurity scale
• Scale description: The 16-item scale was based on the USDA food insecurity model screener, which was adapted for use among Haitians in the Central Plateau. The scale assessed experience in terms of quality, quantity, and worry regarding accessing food in socially-appropriate ways.
• Lack of variation: Figure 7 displays a majority of respondents scoring ≥14/16 (15.5%), indicating that the scale did not successfully capture intragroup variation among the survey population.

2) Micronutrient status quantification
• Contamination: Figure 8 shows the standard curve of folate quantities in samples of known folic acid concentrations. Elevated concentrations suggest contamination of either unknown bacteria or folate during sample preparation and analysis.

3) Mental health scales
• Scale adaptation: The Traumatic Events Inventory, a psychological screener for PTSD in the United States, was adapted and piloted based on the cultural perspectives of trauma in the sample population.

Experimental Design

Future Directions
• Assessment of the modulatory effects of other micronutrients that play a role in mental health, such as zinc, calcium, and other B vitamins.
• Ethnographic investigation of the experience of food insecurity in rural Haiti and the social value of food
• Deeper understanding of cultural models of mental health, including ethnomedical explanatory models and coping mechanisms, as well as relevant biological mechanisms among rural Haitians, including genomic and epigenetic, and endocrinological dynamics.

Conclusions
• A more nuanced and culturally relevant food insecurity scale should be developed and piloted to capture more variability based on four criteria: comprehensibility, acceptability, relevance, and completeness (van Ommeren et al. 1999).
• Folate quantification methodology should be optimized to decrease risk of cross-contamination, using modified sterile technique
• A mediating effect of folate status will indicate that folate supplementation would be an effective nutrition intervention. If not effect is seen, then additional risk and protective factors should be considered to mitigate the burden of mental illness within this population.

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References