Methodology for Objective, Passive, Image- and Sensor-based Assessment of Dietary Intake, Meal-timing, and Food-related Activity in Ghana and Kenya (P13-028-19)

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Objectives: Herein we describe a new system we have developed for assessment of dietary intake, meal timing, and food-related activities, adapted for use in low- and middle-income countries.

Methods: System components include one or more wearable cameras (the Automatic Ingestion Monitor-2 (AIM), an eyeglasses-mounted wearable chewing sensor and micro-camera; ear-worn camera; the eButton, a camera attached to clothes; and eHat, a camera attached to a visor worn by the mother when feeding infants and toddlers), and custom software for evaluation of dietary intake from food-based images and sensor-detected food intake. General protocol: The primary caregiver of the family uses one or more wearable cameras during all waking hours. The cameras aim directly in front of the participant and capture images every few seconds, thereby providing multiple images of all food-related activities throughout the day. The camera may be temporarily removed for short periods to preserve privacy, such as during bathing and personal care. For analysis, images and sensor signals are processed by the study team in custom software. The images are time-stamped, arranged in chronological order, and linked with sensor-detected eating occasions. The software also incorporates food composition databases of choice such as the West African Foods Database, a Kenyan Foods Database, and the USDA Food Composition Database, allowing for image-based dietary assessment by trained nutritionists. Images can be linked with nutritional analysis and tagged with an activity label (e.g., food shopping, child feeding, cooking, eating). Assessment of food-related activities such as food-shopping, food gathering from gardens, cooking, and feeding of other family members by the primary caregiver can help provide context for dietary intake and additional information to increase accuracy of dietary assessment and analysis of eating behavior. Examples of the latter include assessment of specific ingredients in prepared dishes, the source of these ingredients, cooking method, and how, where, and when food is consumed.

Results: N/A.

Conclusions: Pilot- and feasibility-testing is underway. The system will be tested for accuracy of dietary intake assessment versus weighed food intake in urban and rural settings around Accra, Ghana and Nairobi, Kenya.

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