Development of a mobile phone application to monitor fruit and vegetable consumption and choice motivation in Nairobi

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Introduction

Integrated information on food intake and food choice behaviour of urban consumers in low and middle income counties (LMICs) can increase the potential of agriculture-for-nutrition-actions in (peri-)urban areas. However, food consumption research tends to focus on either dietary intake or psychological determinants. The ENRICH project aims to develop and validate a tool that integrates fruit and vegetable intake (FVI) and food choice motives (FCM) in urban Kenya. By combining both domains we aim to get better insights in consumption patterns, overcome drawbacks of traditional measurements and shorten the time to data availability. This abstract presents the tool development process.

Methods

Smartphone ownership is prevalent in LMICs (1) and offers ample opportunities for data collection (2). Therefore the tool was designed for use with smartphone technologies.

Currently, several app-based dietary assessment methods exist including electronic food records and image recognition, each having their own drawbacks (2). The 24h-recall method is a more practical and accurate way of assessing FVI (3). To apply this method in a tool, a comprehensive list of fruits and vegetables (F&V) and portion size estimations were listed. Secondly the order of questions were designed following that of traditional 24h recalls (3).

The FCM are measured by the Food Choice Questionnaire (FCQ) (4). The FCQ is widely applied and validated in developed countries (5). Based on literature search, expert discussions and data from other Sub-Saharan African countries the FCQ has been adapted to the local context.

Both methods were integrated into a chat-bot. An existing framework (Telegram Messenger) was chosen to comply to the following restrictions: ease of use, ability to send prompts, prompting schedules, security, flexibility regarding (multiple-choice) questions, iOS/Android compatible, low cost and minimum mobile data use. The bot is programmed in the back-end where data is securely stored.

Findings and interpretations

We found that current data on F&V consumption patterns are lacking. Furthermore there is a gap in knowledge on FCM in the local context. The literature review confirms that FCM are not widely applied in sub-Saharan countries nor in Kenya. It can thus be suggested that there is need to for validation and the insights of FCM.

It is a common misconception that food intake is easy to assess. Where an interviewer can commonly phrase questions that relate to the memory flow of the participant, in a standardized "chat" the survey flow becomes much more complex. Other complications were the many ways of writing F&V names and thus having to limit options to multiple choice. Finally, estimating portion size is already difficult in itself, and is even more challenging within the constraints of an automated chat-bot.

Since integration of the FVI and FCQ in one tool may pose a large cognitive burden on the participant, the tool is developed such that it recalls random time periods of 4 hours spread over multiple days. These aggregated data are then put together retrospectively to represent usual daily intake.

Conclusions

The ENRICH project creates and validates a tool that can gain insights into F&V consumption and the why and when of consumption. So far, this study has identified commonly consumed F&V in urban Kenya, portion size description for self-reporting and local FCM.

This study offers a framework for the exploration of F&V consumption in LMIC's by use of smartphone technologies. The framework includes: sampling scheme, survey flow, incentive program and integration of FCM and FVI. The study design implements an ecological momentary assessment technique (6) in a unique way by spreading the burden of response over time. Furthermore the framework is designed with flexibility in mind, so any future endeavours will have the option of adjusting questions, sampling schemes and so on.

Validation will be performed on reliability, construct validity and predictive validity in 2018. FVI validation will be performed by comparing the smartphone tool with 24 h recalls and skin-tone measurement as a marker of FVI. Motivations will be validated against a traditional paper questionnaire. A demonstration of the tool and preliminary results will be presented at the conference.

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