A Smartphone App to Record Food Purchases and Acquisitions

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Background

› FoodAPS-2 data collection – USDA / ERS
  • Challenge is to lessen burden to reduce underreporting
  • Other consumer purchasing surveys face similar challenges

› Initial Hybrid App - ADCM
  • Data collection test used a web-based app
  • Collected food acquisitions for all members of a household over a seven-day period
  • Smartphone host app created to better integrate for bar code scanning – require steady internet to function
What the App Collects

› Food Events
  • Where do they happen and what are they?
    – Food at home (FAH) – food you bring home
    – Food away from home (FAFH) – food you acquire and consume out of home
  • How much did you pay?
  • How did you pay?

› Food Items
  • Type of item, quantity/amount, price
Current Implementation Status

› Single adult/primary respondent
  • Captures FAH & FAFH acquisitions
  • Excludes meals at school
  • Excludes shared meals

› Future versions
  • Include all household members
    – Allow for data sharing among household members
    – Capture school meals
    – Reduce burden by entering shared meals only once
  • Integrate with web instrument for non smartphone participants
App Implementation Strategy

❯ Leveraged work done for DailyTravel HTS app
  • Cross-platform
  • Battery efficient location capture
  • Fully disconnected mobile survey engine
  • Used by thousands of participants across US and Canada

❯ Created new pages to bridge transitions between survey levels
  • Stop, Food Events, Food Items

❯ Survey pages using programmable instruments
  • Added new question types (bar code scanning, PLU, picture taking, etc.)

❯ Integrated with additional cloud services
App Technical Details

❯ Implemented in C# using Xamarin Forms
  • Approximately 90% of source code shared between iOS and Android (.NET Standard)
  • Encrypted SQLite database on phones

❯ Server components implemented in C#
  • Website and services API in .NET Core
  • Phone activation
  • Secure data uploads and downloads

❯ Server database hosted by PostgreSQL
  • Survey responses stored in binary JSON
New FoodAPS-2 Apps

› Native apps for iOS and Android (started in October of 2018)
  • Ability to run in disconnected mode
  • Faster, more responsive user interface

› Apps to be installed on participants’ phones (BYOD)
  • Web versions to be made available as fallback

› Reduce respondent burden through technology
  • Location tracking, picture taking, receipt reading
  • Integrate with online services (Nutritionix, Calorie Mama)

› Improve accuracy of food events and items
  • Link items to locations
General App Flow

Is this a place you stopped? (valid stop)

Did you obtain food here? (Food Stop?)

Is it one of these places?

If not, Search for it

Get Food Events at Stop

For each Food Event, get event info

Get all Food Items

For each Food Item, get all responses
Cloud Support Services

› List of food locations near stop
  • Google Places and Nutritionix APIs

› Auto-complete suggestions based on location’s items
  • Restaurant menu items or grocery store

› Matches scanned barcodes codes to product descriptions and other data

› Uses Calorie Mamma machine vision for FAFH when a “picture” is taken
  • Identifies potential matches and asks respondent for confirmation
Internal Testing and Review

Conducted internal feasibility test with no training earlier in 2019

Main feedback items were

- Stop detection sensitivity needs to be adjusted (too many short stops detected)
- Maps should be made bigger
- Not all participants noticed that they could add items using...
  - Barcode scanner
  - PLU code
- Keyboard was hard to dismiss on some survey pages
Work in Progress - Processing of Receipts

➢ Receipt pictures uploaded to Westat
➢ Python code hosted inside R package running on OpenCPU
➢ Server runs through a series of steps
  • Filter out background using OpenCV
  • Stitch images back together
  • Perform OCR
  • Search for totals and items
➢ App checks for completion and downloads data
  • User is presented details
Next Steps

› Working with ERS to revise and simplify instruments at all levels (stop, food event and food items)

› Will create web alternative for participants that would rather not use a smartphone
  • Participants will be able to start on smartphone and finish on web
  • Single integrated server database

› Field test to take place in 2020/2021
Thank You

For more information on Westat branding, contact MarceloSimas@westat.com