Food & Nutrition Board, National Academies Methods Workshop
May 19, 2021, 10am – 12pm EDT

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DEPARTMENT OF PEDIATRICS

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Objective passive ways to improve assessment of dietary intake

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Many problems in existing methods of child dietary intake assessment (24hdr)

- Forgotten foods
- Intrusions
- Portion size
- More error with increased time
- Minimum age: 9-10 yo

How minimize?

Many innovative methods

- Sensors of chewing, swallowing, hand/arm sensors
- Active smartphone use (before & after meals)
- Camera attached to eyeglass, earpiece (hearing aid)
- Tooth sensor
- Continuous glucose monitoring
- Metabolomics
- What do you want/need to measure?
- Other biometrics

Passive objective assessment

- Wearable chest worn eButton
  - Mingui Sun, Wenyan Jia, U Pitt
- Multiple sensors:
  - Camera: 120° , moveable angle
  - Nine axis motion sensor
  - Barometer
  - Temperature
  - Light

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Images at 4 sec intervals throughout day

- 10,800 images/12 hours
- Ideal image processing
  - Encryption
  - Transmission
  - De-identification
  - Step 1: Identifying images with food
  - Step 2: Identifying foods
  - Step 3: Assess portion size/amounts consumed
  - Step 4: Assess food preparation
  - Step 5: Estimate intake: centrally vs. locally

Status in ideal process

- Can identify images with foods
- Identify limited numbers of foods
- Portion size estimation/but not amount consumed
  - 3D wire mesh imposed on 2D image
  - Dot procedure (from e.cars)
  - Match images of all sides of odd shaped foods
- Food prep: next step
- Errors are additive across steps

Feasibility with children

- Some children willing to wear for 2 days (not sure of representativeness)
- Missing images (12.4%)
  - Camera malfunction/turned off
  - Dark, blurred
- Dietitians identified foods
  - 60.5% agreement on foods
- After verification interview
  - 77% agreement on foods
- Took 9 hours to code 1 day

A Beltran et al. JAND. 2018; 118:2144-2153

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Identifying child foods in preparation practices

- Few prep tasks at home
- Cutting and measuring were rare
- Need to conduct research on
  - Identifying foods
  - Identifying herbs and condiments
  - Identifying amounts
  - How best to add to 24hdr

M Raber et al. Nutr J. 2018; 17(1):32

Problems in use in Africa

- No tight fitting clothing
- Low lighting
- No/intermittent electricity
- Food eaten from a common bowl
- Food eaten by hand
- Food served to child right from hand

ML Jobarteh et al. Curr Dev Nutr . 2020; 4(2):nzaa020

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Conclusion: Much promise from Objective Passive Method, but

- Not sure how representative are the samples willing to use
- Some incomplete data
- Involvement of dietitians & parents/children limits "objectivity"
- Further technical development needed
- Food identification is bottleneck
- Send funding ☺

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Thank You!

Dêkuji! (Czeck)

DANKE! (German)

MUITO OBRIGADO! (Portuguese)

M ÒI! (Chinese, Cantonese)

ARIGATŌ! (Japanese)

MERCI BEAUCOUP!(French)

MUCHAS GRACIAS! (SPANISH)

SERDECZNIE DZIĘKUJĘ! (Polish)

SHUKRAN! (Arabic, Middle East)

TACK SÅMYCKET! (Swedish)

TAKK! (Norwegian)

EFCHARISTO! (GREEK)

Xie Xie! (Chinese, Mandarin)

Dank u wel (Dutch)

Khawp Khun maxh! (Thai)

Grazie! (Italian)

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