Selection of an automated dietary assessment tool for use in the UK National Diet and Nutrition Survey (NDNS) Rolling Programme (RP)

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https://www.mrc-epid.cam.ac.uk/research/nihr-cbrc-measurement-platform/

Adapted from an oral presentation given at the International Conference on Diet and Activity Methods (eICDAM): 8th-12th February 2021, Wageningen: https://www.icdamportal.org/icdam2020.html

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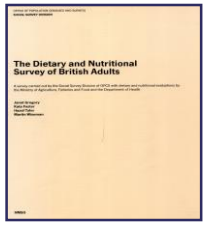
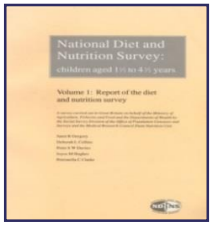
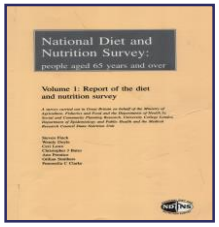
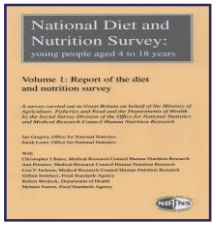
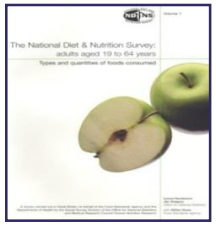
The UK National Diet and Nutrition Survey (NDNS)

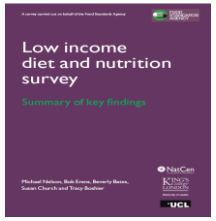












2008 onwards: The NDNS rolling programme is a continuous, cross-sectional survey. It is designed to collect detailed, quantitative information on the food consumption, nutrient intake and nutritional status of the general population aged 1.5 years and over living in private households in the UK. The survey covers a representative sample of around 1000 people per year.

GOV.UK

www.gov.uk/government/collections/national-diet-and-nutrition-survey

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Review of Dietary Assessment tools for NDNS (2016/17)

1. Challenges of NDNS:

- Cost and funding pressures
- Logistics
- Participant burden
- Falling response rates
- Dietary data quality and timeliness
- Scalability
- Future of the survey

2. Emergence and rapid development of digital dietary assessment methods

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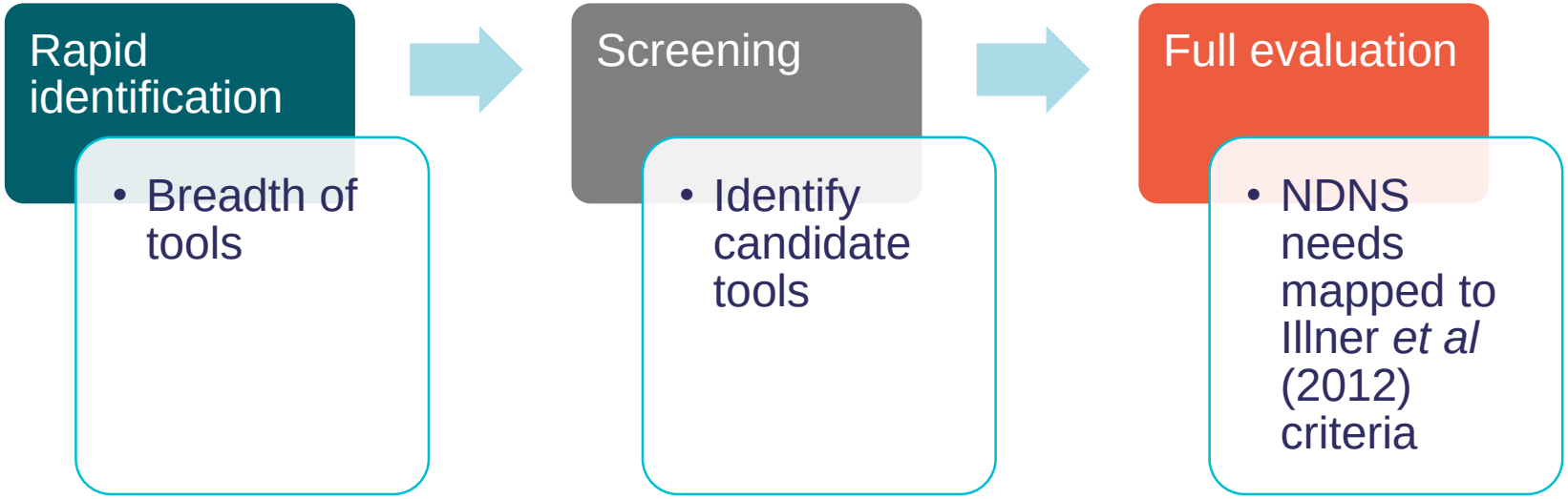
Dietary assessment tool review: Approach

Overall aim: *To identify, screen and evaluate potential automated tools to select a new dietary assessment tool for implementation in the NDNS RP*



Illner A-K, Freisling H, Boeing H, Huybrechts I, Crispim S P, Slimani N (2012). Review and evaluation of innovative technologies for measuring diet in nutritional epidemiology. *International Journal of Epidemiology*; **41**: 1187-1203.

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Rapid identification

- Breadth of tools

1. Use of existing literature reviews and dietary assessment collections
2. Expert knowledge and networks
3. National Cancer Institute (NCI) Dietary Assessment Calibration/Validation Register
4. Relevant conference abstracts
5. Hand searching for tools in national nutrition surveys and large cross sectional and longitudinal studies.
6. App store: Google Play
7. Database search: PubMed
   - Limited number of key search terms, informed by previous research papers
   - Publications 2007 onwards

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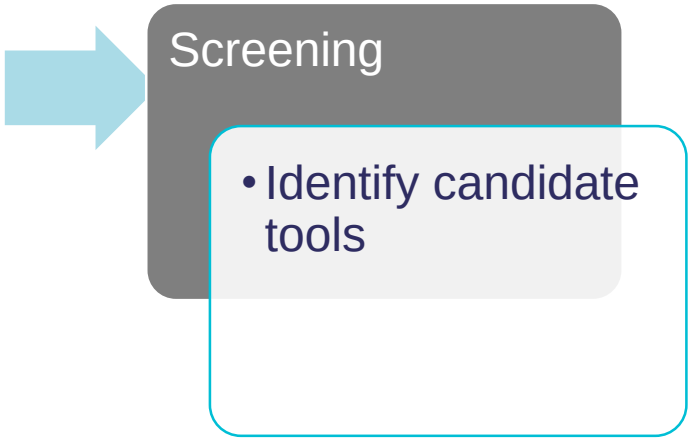
Project Advisory Group (PAG)

"Eligible tools are those that can fully automate the collection of food consumption data and the coding of foods and portion sizes and are capable of capturing the whole diet with sufficient detail of foods and drinks to allow full nutrient intake and analysis as currently provided by the NDNS."



- Has the tool been objectively validated?
- Has the tool been previously used in a large study/survey?
- Can the tool quantify portion sizes?
- Can the tool capture secondary detail required/brands?
- Is the tool available and can it be feasibly updated?

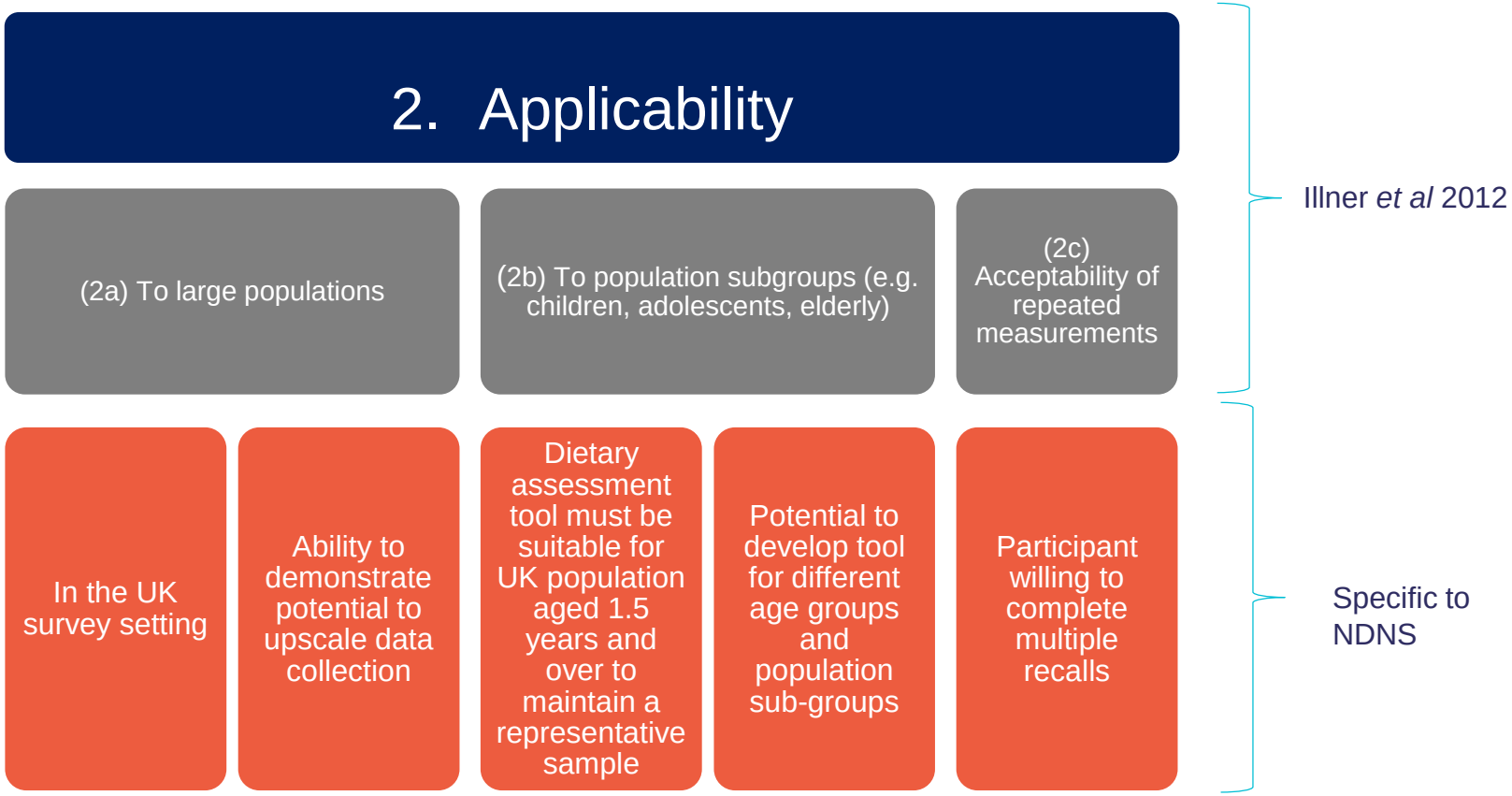
1. Organisational, Logistical, Financial: What are the practical and financial aspects of setting up, maintaining and running the tool?
2. Applicability: is the tool suitable for the population group of interest?
3. Respondent/interviewer/research usability: How suitable is the tool for use by researchers, interviewers, survey participants?
4. Potential for standardization: Does the tool capture the level of detail required for the survey?
5. Accuracy: How well does the tool measure dietary intake?
6. Reporting bias: Does the tool minimise or increase any kind of reporting bias, compared with a reference tool, e.g. social desirability bias?

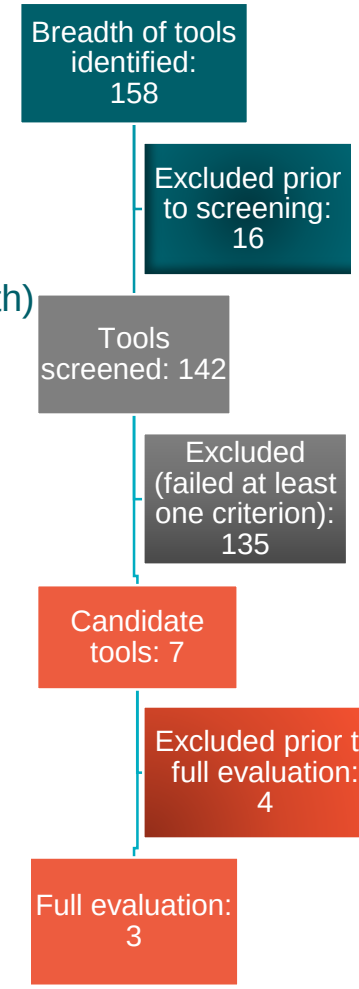
Full evaluation

- Illner *et al* (2012) mapped to NDNS criteria

Illner A-K, Freisling H, Boeing H, Huybrechts I, Crispim S P, Slimani N (2012). Review and evaluation of innovative technologies for measuring diet in nutritional epidemiology. *International Journal of Epidemiology*; **41**: 1187-1203.

Mapping: example





e.g. no `front end` capture

- 54 web based (22: recall, 23: record, 9: both)
- 12 computer based
- 76 smartphone applications

e.g. language, availability, technology

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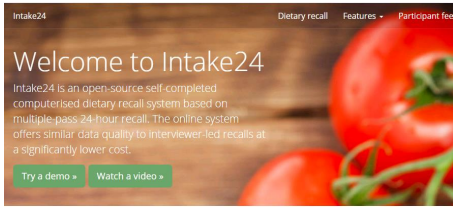
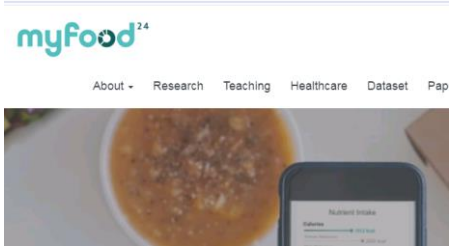
Tools fully evaluated: Jan-July 2018

- ASA24: https://epi.grants.cancer.gov/asa24/

- Intake24: https://intake24.org/



- myfood24: https://www.myfood24.org/



Final tool selection for NDNS

- **All 3 tools could deliver for the NDNS**, but all needed further development work.

- Final decision, based on detailed consideration of emerging critical themes:

  - Potential for use in the NDNS RP
  - technical functionality
  - Feasibility to develop/adapt for the NDNS
  - Organisational capacity and stability, contracting/partnering, cost
  - Data sharing and storage
  - Ongoing/longer term opportunities

- Evidence considered again and each tool ranked in preference for each theme
- Final decision taken by NDNS Project Board to select Intake24

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Tool review and selection for NDNS: learning points

- Rapid review approach, pragmatic, time and cost efficient
- Our approach/framework was developed to consider all aspects of implementing a change of DA tool in a national survey e.g. logistics, costs as well as validity
- Complete information not always easily available (importance of dialogue with key informants)
- Use of multi-disciplinary teams to enable the review

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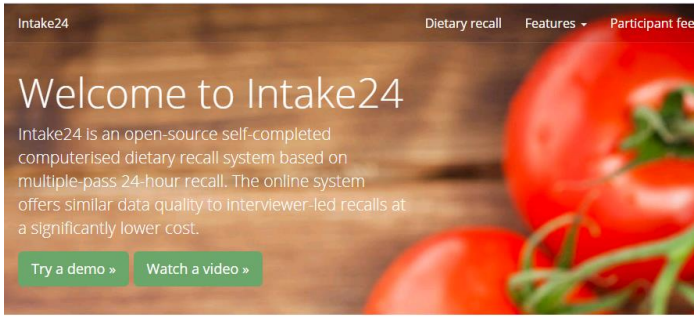
Intake24 implementation in NDNS

- Developed: 2018-2019
  - Rationalised food lists
  - Updated Nutrient Databank
  - Additional questions e.g. where purchased
  - Portion estimation e.g. images



- Deployed: 2019
  - Dress rehearsal (March 2019)
  - Full NDNS (October 2019)

- Evaluation: 2020-2023
  - Fieldwork model and response
  - Dietary data quality and data continuity
  - NDNS RP DLW sub study

Acknowledgements and thanks

- All our key informants, especially:
  - Amy Subar and team: National Institute for Health US, Beth Mittl and team: Westat, US for ASA24
  - Emma Foster, Ivan Poliakov and team: Newcastle University, UK for Intake24
  - Janet Cade and team: University of Leeds, UK for myfood24
  - Alanna Moshfegh and team: US Department of Agriculture, for AMPM
  - All the other key informants who helpfully spoke with us and provided information/experience of their automated dietary assessment tools

- Cambridge NIHR BRC Dietary Assessment Team:
  - Birdem Amoutzopoulos, Darren Cole, Anila Farooq, Polly Page, Caireen Roberts, Toni Steer

- The NDNS tool selection Project Advisory Group

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