

Quisper



ONLINE PERSONALISED NUTRITION ADVICE AND THE NOVEL 'eNUTRI' APP

JULIE A. LOVEGROVE

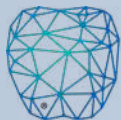
HUGH SINCLAIR PROFESSOR OF HUMAN NUTRITION

UNIVERSITY OF READING

QUISPER: *QUALITY INFORMATION SERVICES AND DIETARY ADVICE FOR PERSONALIZED NUTRITION IN EUROPE HAS RECEIVED FUNDING FROM EIT FOOD (ID 18064)*



EIT Food is supported by the EIT
a body of the European Union



CARDIOVASCULAR DEATH

TODAY

435
people will lose
their lives to CVD

...more than
110 people
younger than **75**
will be

7
MILLION
people fight their daily
battles with CVD


530
people will go to hospital
due to a heart attack

190
people will die from
a heart attack

12 babies
will be diagnosed
with a heart defect

British Heart Foundation Heart Statistics

CURRENT STRATEGIES

sugar swaps
change 4 life

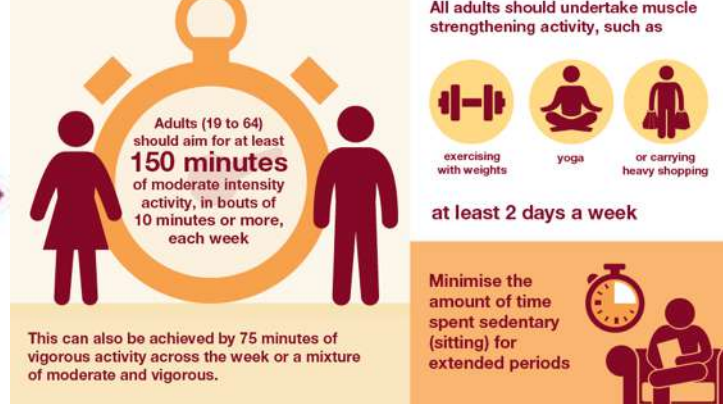
time for **sugar swaps**

SWAP!

How much physical activity should you do?



5 A DAY YOUR WAY



All adults should undertake muscle strengthening activity, such as

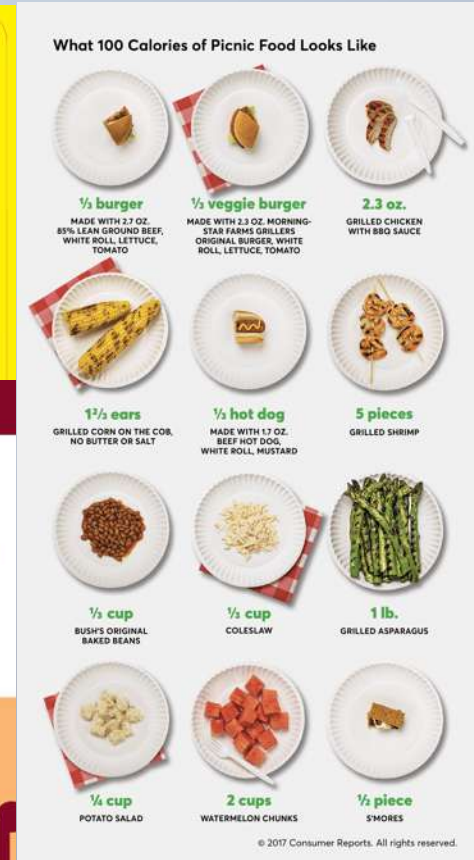
- exercising with weights
- yoga
- or carrying heavy shopping

at least 2 days a week

Minimise the amount of time spent sedentary (sitting) for extended periods

Adults (19 to 64) should aim for at least **150 minutes** of moderate intensity activity, in bouts of 10 minutes or more, each week

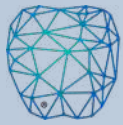
This can also be achieved by 75 minutes of vigorous activity across the week or a mixture of moderate and vigorous.



What 100 Calories of Picnic Food Looks Like

- 1/2 burger
- 1/2 veggie burger
- 2.3 oz. GRILLED CHICKEN WITH BBQ SAUCE
- 1 1/2 ears GRILLED CORN ON THE COB, NO BUTTER OR SALT
- 1/2 hot dog MADE WITH 1.7 OZ. BEEF HOT DOG, WHITE ROLL, MUSTARD
- 5 pieces GRILLED SHRIMP
- 1/2 cup BUSH'S ORIGINAL BAKED BEANS
- 1/2 cup COLESLAW
- 1 lb. GRILLED ASPARAGUS
- 1/2 cup POTATO SALAD
- 2 cups WATERMELON CHUNKS
- 1/2 piece SMORES

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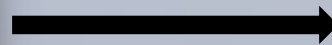
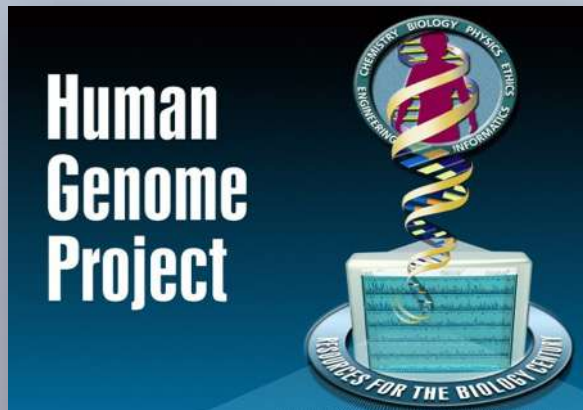


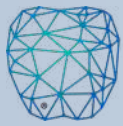
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PERSONALISED NUTRITION

“Tailoring dietary advice to suit an individual based on their diet, phenotype or genetic make-up.”

2000





Food4me STUDY

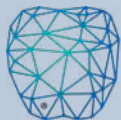


Does PERSONALISATION OF DIETARY ADVICE motivate a healthier diet compared with population dietary guidance?



Is PERSONALISATION BASED ON PHENOTYPIC OR GENOTYPIC INFORMATION more effective in motivating healthy choices, than personalisation based on diet alone?





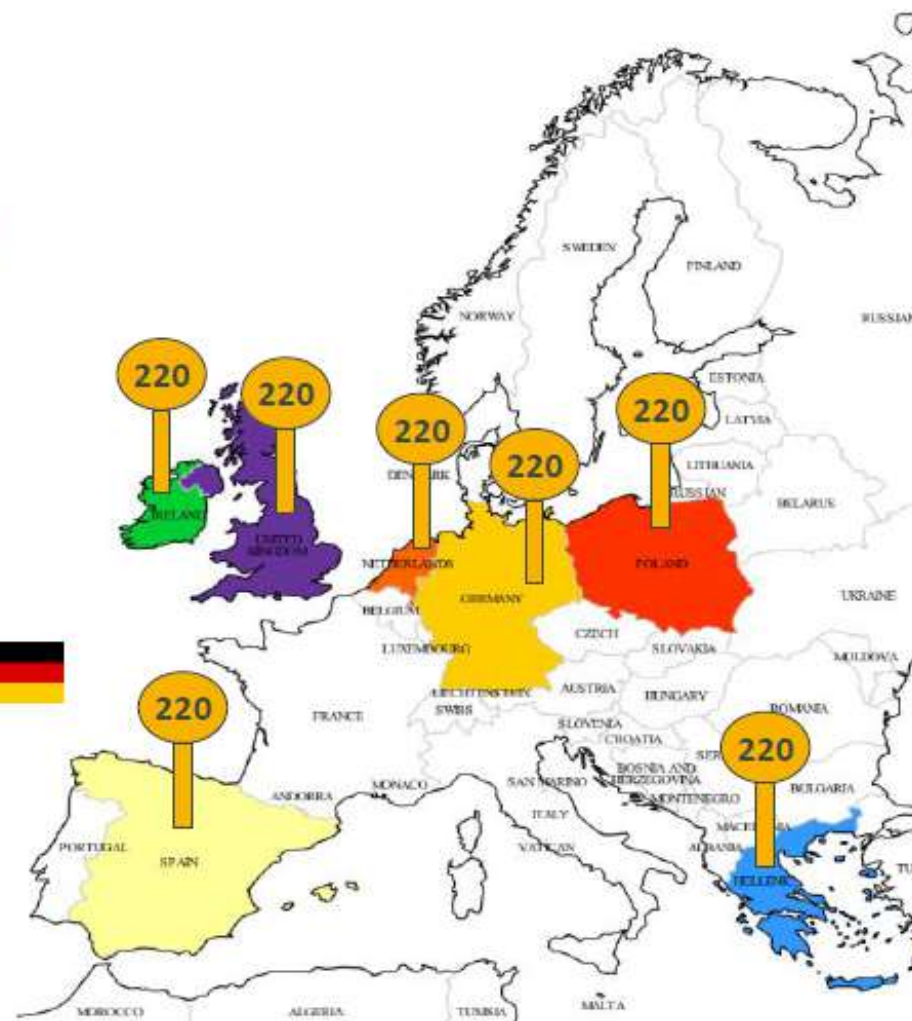
EU FP7 Food4me PROJECT

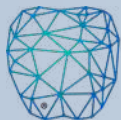


➤ 7 recruitment sites

1. University College Dublin (Ireland) 
2. Maastricht University (The Netherlands) 
3. University of Navarra (Spain) 
4. University of Reading (UK) 
5. National Food and Nutrition Institute Warsaw (Poland) 
6. Harokopio University Athens (Greece) 
7. Technische Universitaet Muenchen (Germany) 

➤ **Target n=1540**





Food4Me STUDY DESIGN



Volunteer Login

Email:

Password:

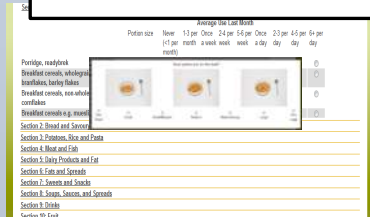
Logged Out.

Remember me

[Can't access your account?](#)

Participants who registered online for Food4Me (n=5,542)

Excluded from study (n= 3,845)



Level 0
General dietary guidelines (n=387)

Level 1
PN based on diet (n=414)

Level 2
PN based on diet + bloods (n=404)

Level 3
PN based on diet + bloods + genes (n=492)



Section 1: Cereal

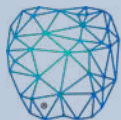
Portion size	Average Use Last Month									
	Never (<1 per month)	1-3 per month	Once a week	2-4 per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day	
Porridge, readybrek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Breakfast cereals, wholegrain e.g. branflakes, barley flakes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Breakfast cereals, non-wholegrain e.g.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Usual portion size for this food?

Very Small Small Small/Medium Medium Medium/Large Large Very Large



Fallaize et al., JMIR 2014;16(8):e190; Forster et al., JMIR . 2014;16(6):e150.



Food4Me STUDY DESIGN



Volunteer Login

Email:

Password:

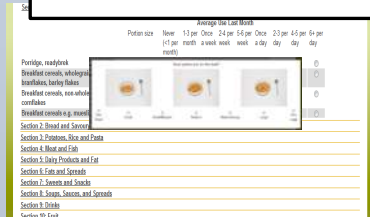
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Level 0
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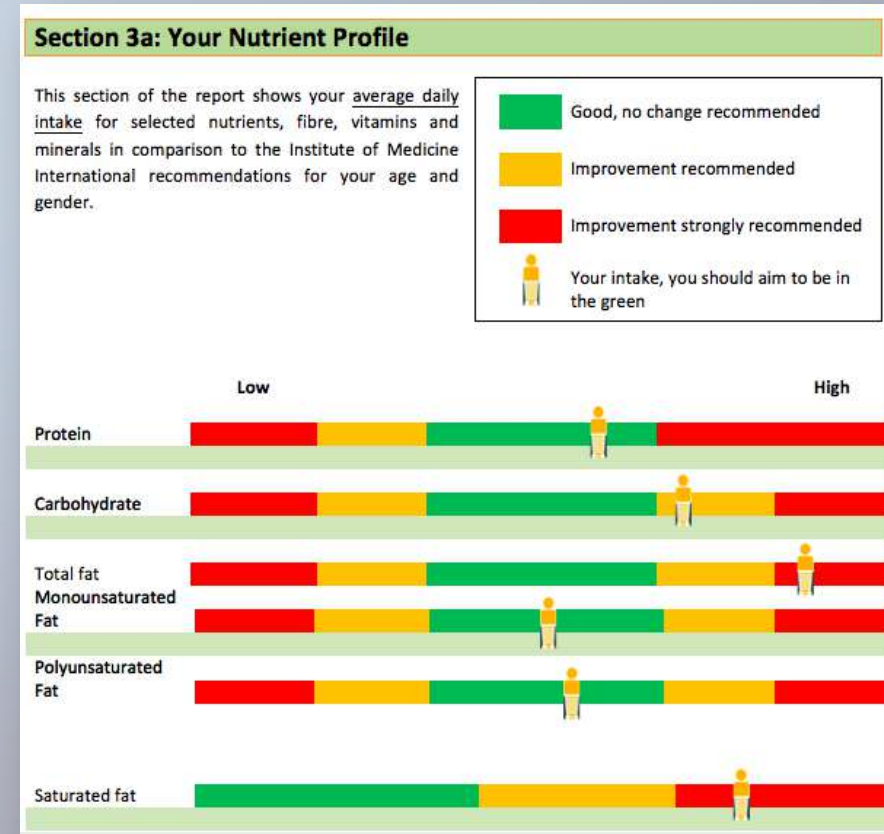
Level 1
PN based on diet (n=414)

Level 2
PN based on diet + bloods (n=404)

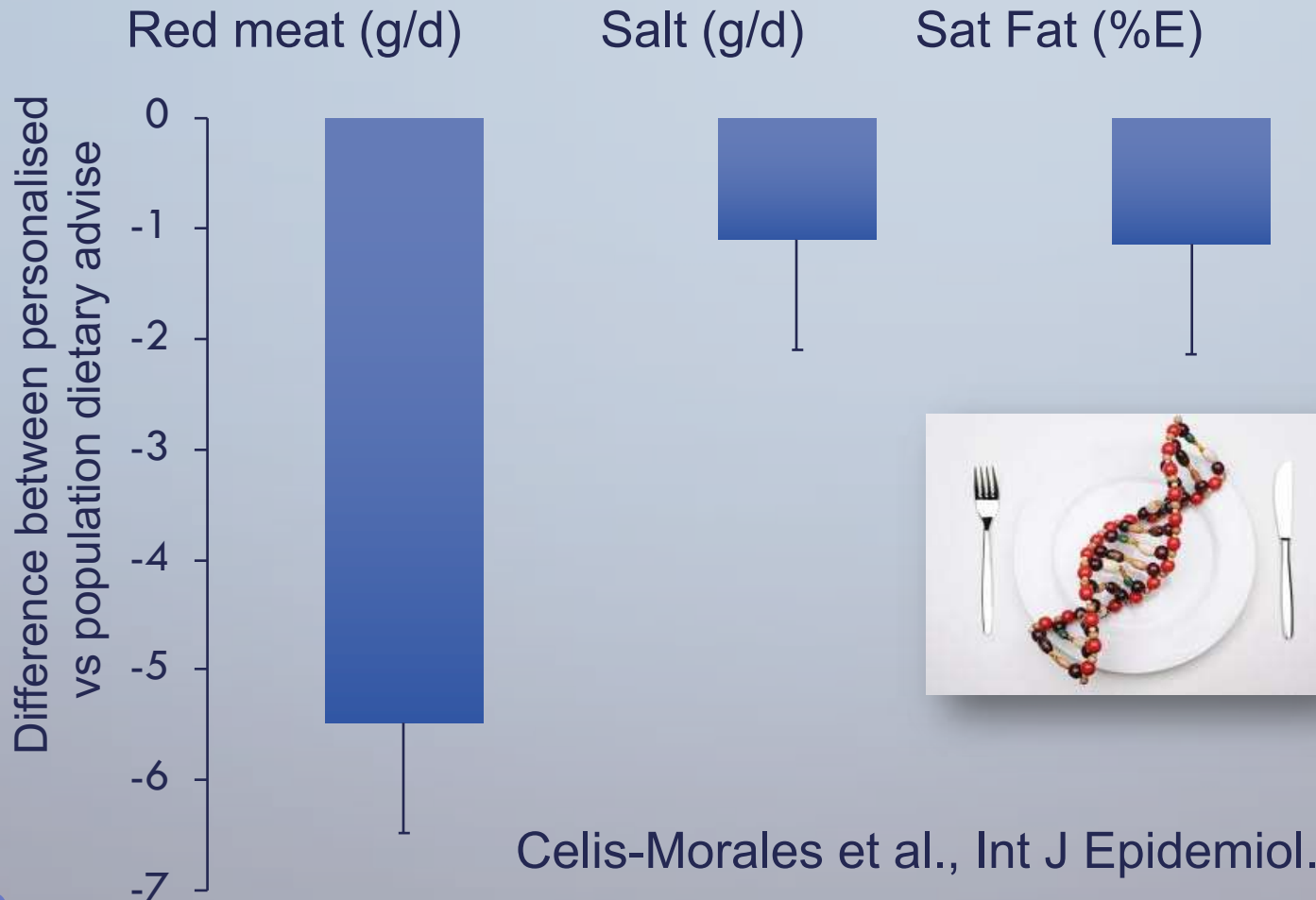
Level 3
PN based on diet + bloods + genes (n=492)

DELIVERY OF PN ADVICE

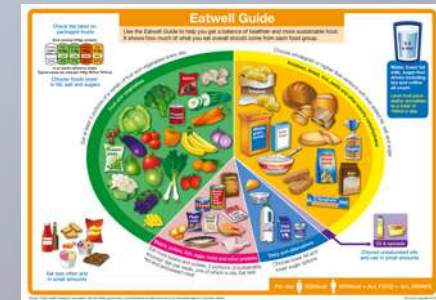
- Personalised advice delivered over the internet [feedback report] –0, 3 & 6 months
- All reports contained 5 pieces of advice:
 - *WEIGHT*
 - *PHYSICAL ACTIVITY*
 - *THREE DIETARY GOALS*



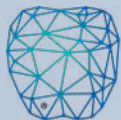
PERSONALISED NUTRITION IS MORE EFFECTIVE



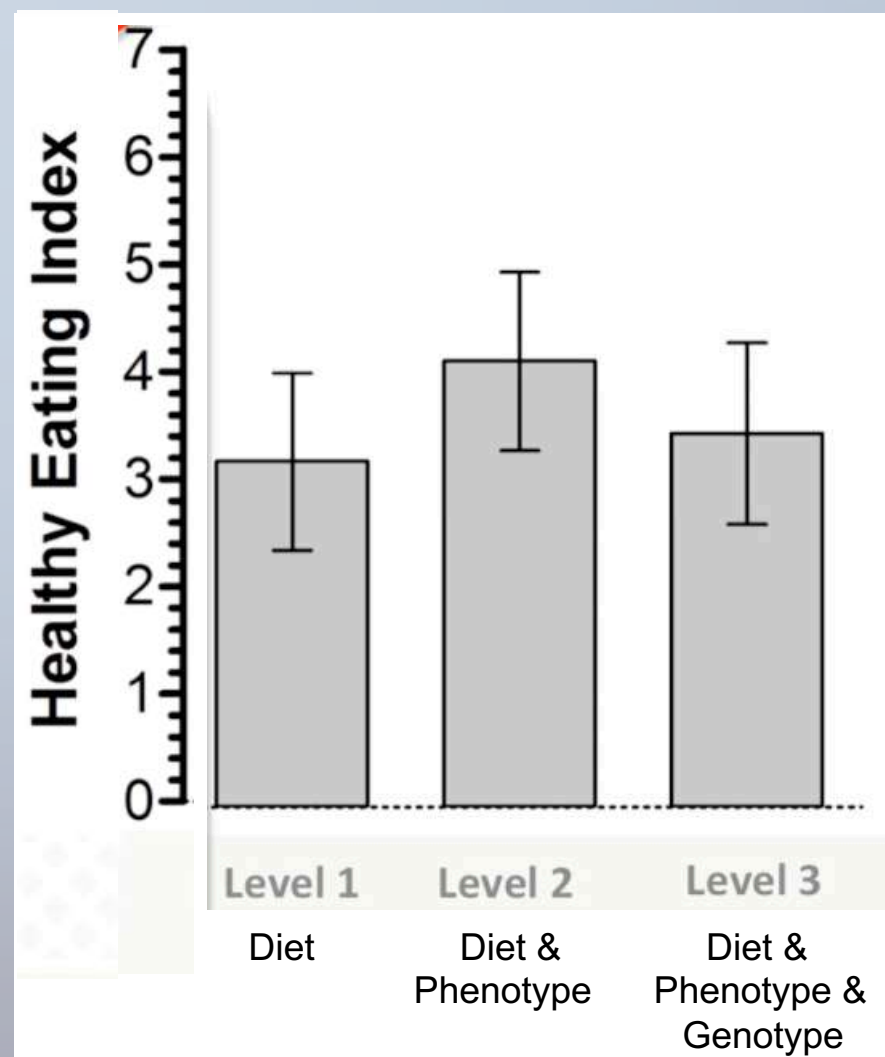
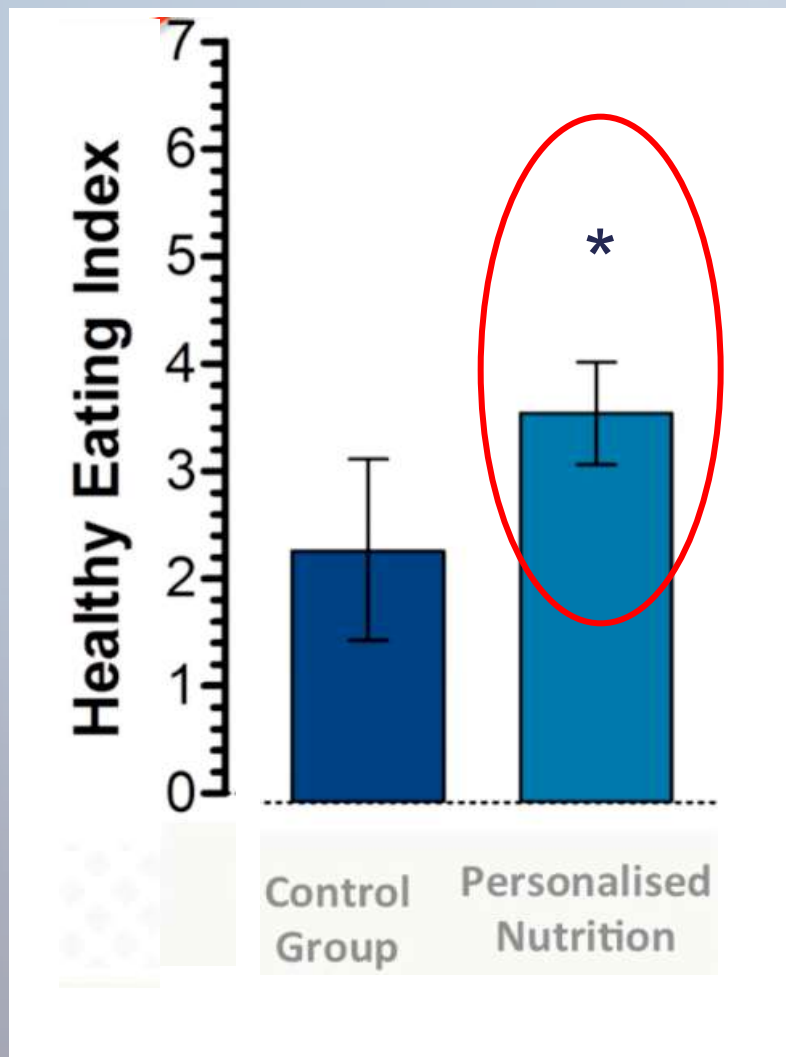
VS



Celis-Morales et al., Int J Epidemiol. 2017;46;578-88



STUDY FINDINGS (n=1480)



PERSONALISING DIET ADVICE



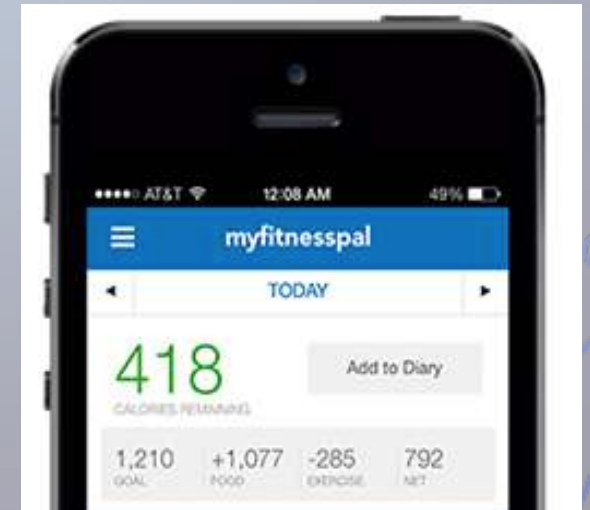
Web-based PN **based on BCT framework and diet** is more effective at improving dietary intake vs. standard advice

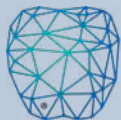
(Celis-Morales et al. 2016 *IJE*; Macready *JMIR Res Protocol*. 2018;7:e87)

Commercial diet apps are very popular

- 21 apps with +500k installs
- Focus on weight loss and calorie counting

(Franco et al., *JMIR Mhealth Uhealth*. 2016;4:e85)





MOBILE PHONE USE



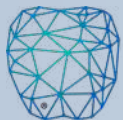
WorldMeters U.N. Data, GSMA intelligence

COMMERCIAL DIET APPS

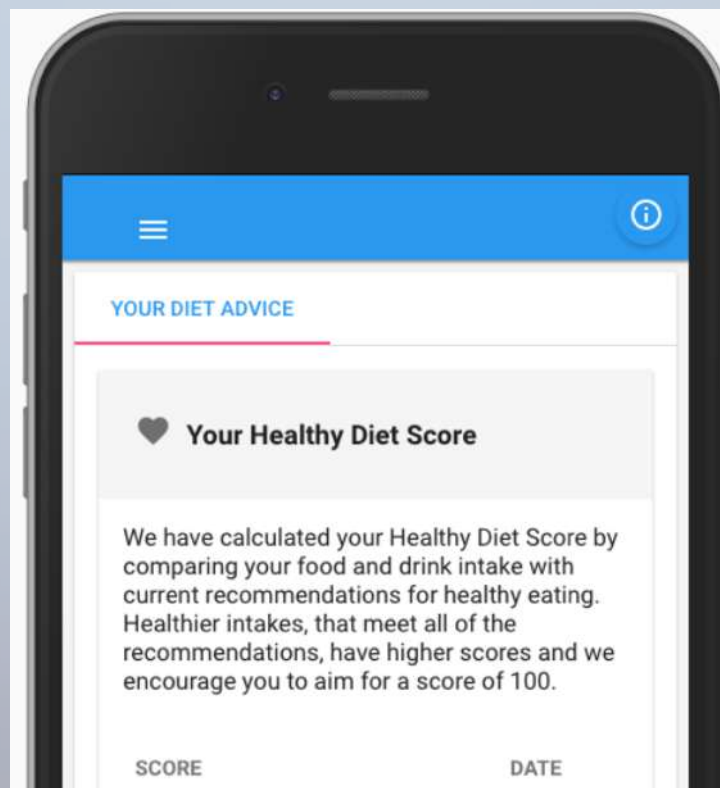


- Nutrition assessment
- Lack of personalisation/advice ✗

Fallaize et al., JMIR Mhealth Uhealth. 2019;7(2);e9838; Franco et al., JMIR Mhealth Uhealth. 2016;4:e85;

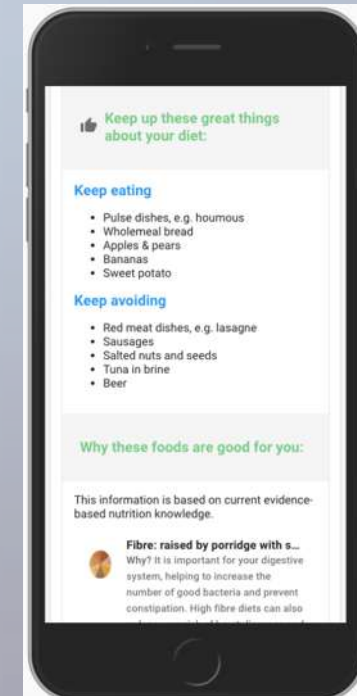
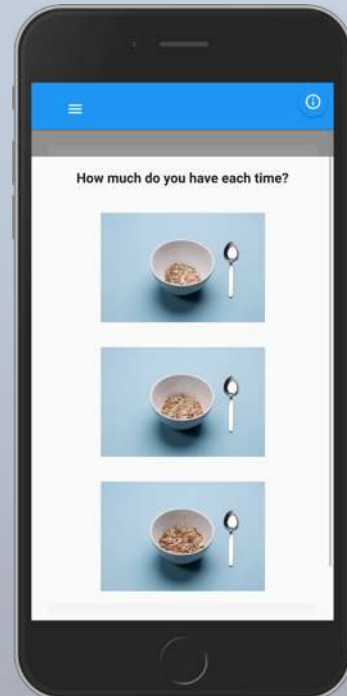
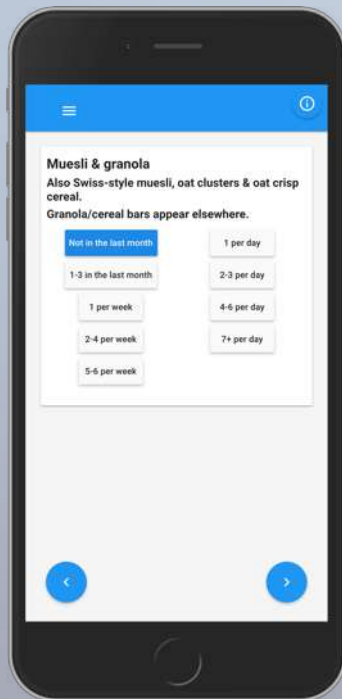


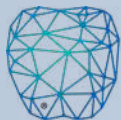
eNUTRI 1.0 DEVELOPMENT



eNUTRI 1.0

eNutri is a web app developed at the University of Reading that can deliver personalised food-based dietary advice automatically





ALTERNATIVE HEALTHY EATING INDEX

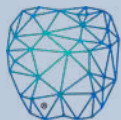
Positive components

Vegetables
Fruits
Whole Grains
Nuts and Legumes
Oily Fish
Polyunsaturated fat

Sugar
Processed Meat
Trans Fat
Sodium
Alcohol

Negative components





ALTERNATIVE HEALTHY EATING INDEX




Strongly predicts risk of chronic disease

Chiuve (2012) J. Nutr, 142: 1009–1018

ENUTRI 1.0 NUTRITION PROFESSIONALS STUDY

- 16 Registered Nutritionists + 16 Registered Dietitians
- Learning by comparing their advice with eNutri 1.0 advice

5-stars score	Appropriateness	Relevance	Suitability
eNutri score	3.5 ± 1.0	3.3 ± 1.2	3.3 ± 1.2



Fallaize et al PLoS ONE 2019;14 (4): e0214931.

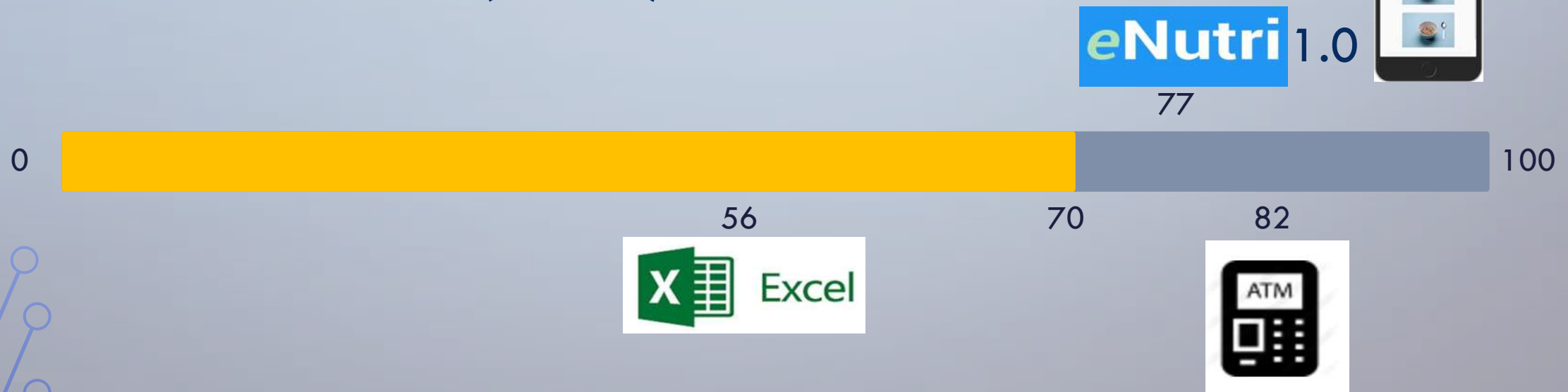
USABILITY OF eNUTRI 1.0

SYSTEM USABILITY SCALE (SUS)

321 participants (UK - 2017)

Completion time (157 food items) 13.3 min (CI 12.6, 13.7)

e-Nutri score: 77.0 (IQR 15)



Franco et al., PLoS One. 2018 Aug 10;13(8):e0202006.

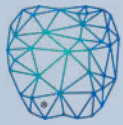
eNUTR 1.0 STUDY: IMPACT ON DIETARY CHANGE



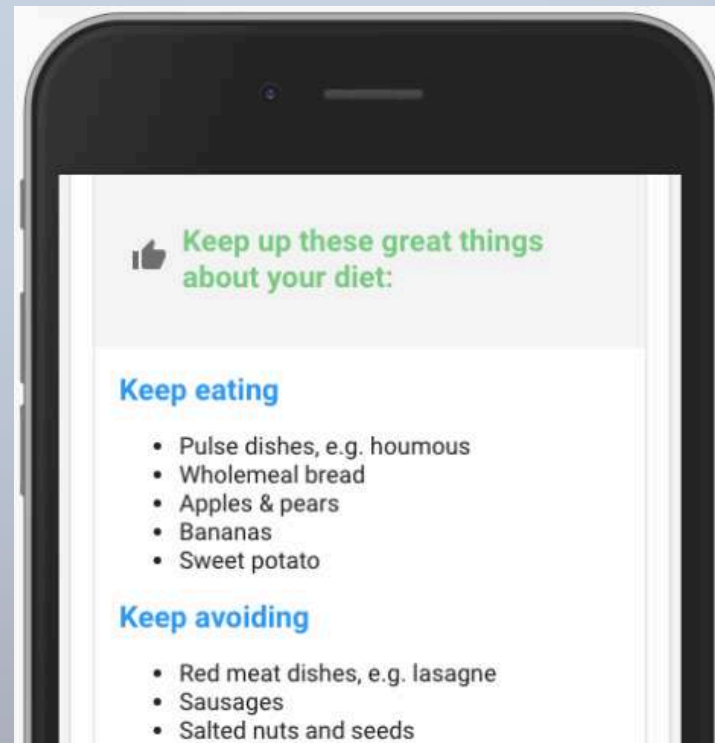
- 210 Self-reported “healthy” UK men & women. 18+ years
- Advice given 0, 6, 12 weeks
- Mean **3.06** point (**5.4%**) higher vs control (CI: 0.91, 5.21, P=0.005)

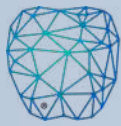


Franco et al., JMIR (in preparation)



eNUTRI 2.0 DEVELOPMENT





IMPROVEMENTS TO eNUTRI 2.0 APP

- Created new food portion library (UK & DE versions)
- Improvement of FFQ assessment.



- Addition of popular foods (eg humus, falafels, plant milks)
- Compulsory tutorial

White Rice **Food category**

e.g. basmati, pillaau, microwave and use in **HOMEMADE DISHES** (risotto, egg-fried rice, etc.) **EXAMPLES of foods in this category.**

NOT brown rice, rice pudding or in **DISHES PREPARED ELSEWHERE** (e.g. ready meals) **These foods should NOT be included here as you will add them later on.**

Each type of food you eat should only be included ONCE in the questionnaire. Please read each question carefully so you do not account for the same food in two places.



AIMS OF eNUTRI 2.0 FFQ VALIDATION STUDY (ENVAL)

- 1) Compare eNutri FFQ dietary intakes with 3-day weighed diet diary
- 2) To assess repeatability of the FFQ after 14 days

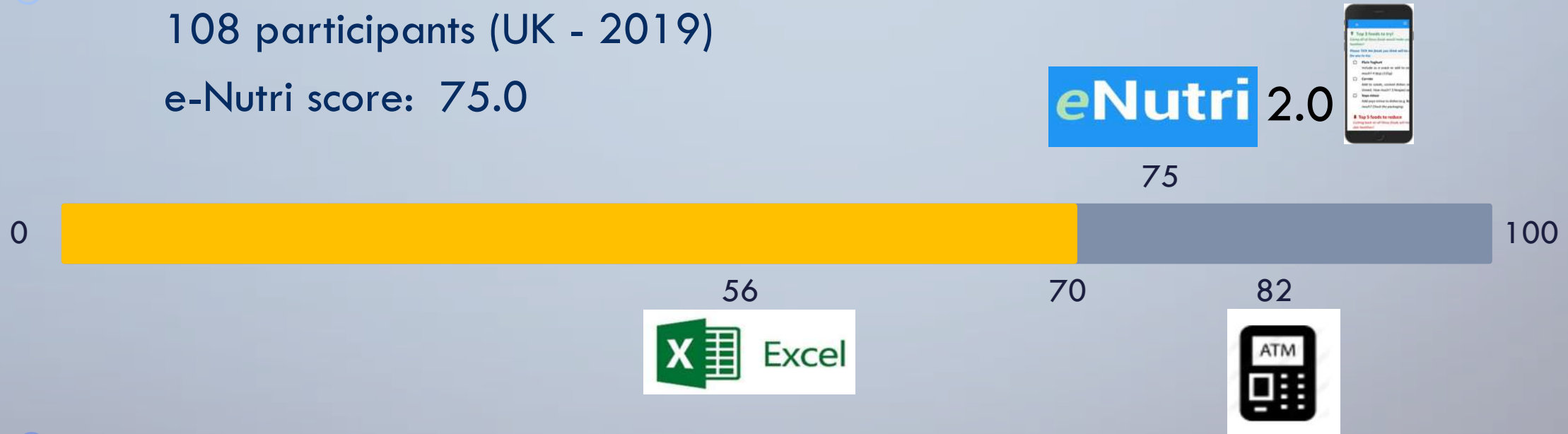


USABILITY of eNUTRI 2.0

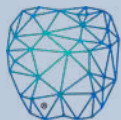
SYSTEM USABILITY SCALE (SUS)

108 participants (UK - 2019)

e-Nutri score: 75.0



“I felt very confident using the system” - 86% ‘strongly agree’ or ‘agree’



eNUTRI 2.0 DQS FOR NORTHERN EUROPE

Positive components

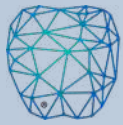
- 1) Vegetables
- 2) Fruits
- 3) Wholegrains
- 4) Nuts, seeds & legumes
- 5) Long chain n-3 fats
- 6) Dairy products
- 7) Unsaturated fats*

- 7) Saturated fats*
- 8) Free sugars
- 9) Red & processed meats
- 10) Sodium
- 11) Alcohol

Negative components

* Combined score for ratio of unsaturated to saturated fats & % of energy from saturated fats





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eNUTRI 2.0 DQS FOR NORTHERN EUROPE VALIDATION

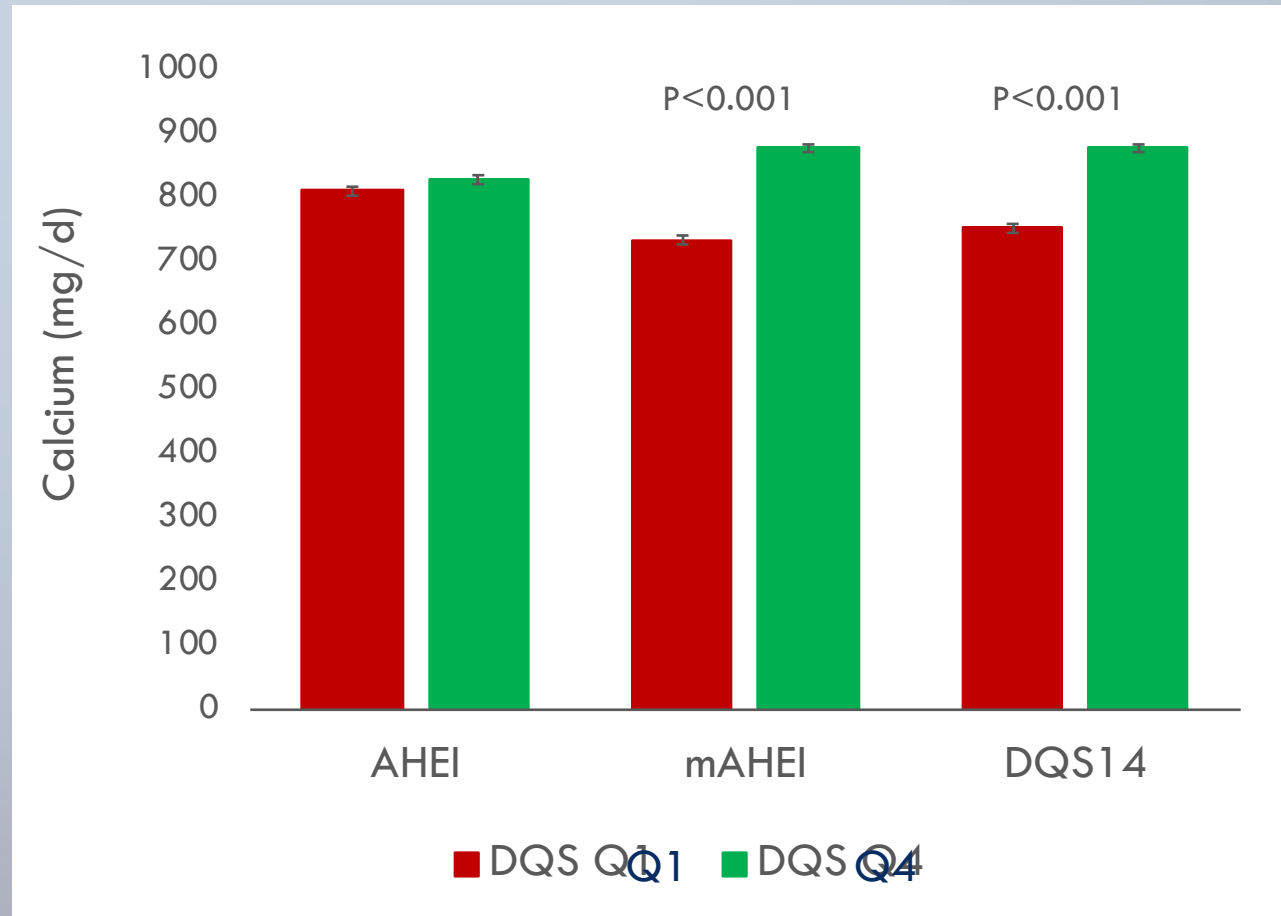


National Diet and Nutrition Survey

Results from Years 7 and 8 (combined) of the Rolling Programme (2014/2015 to 2015/2016)

A survey carried out on behalf of Public Health England and the Food Standards Agency

n=4704 men and women



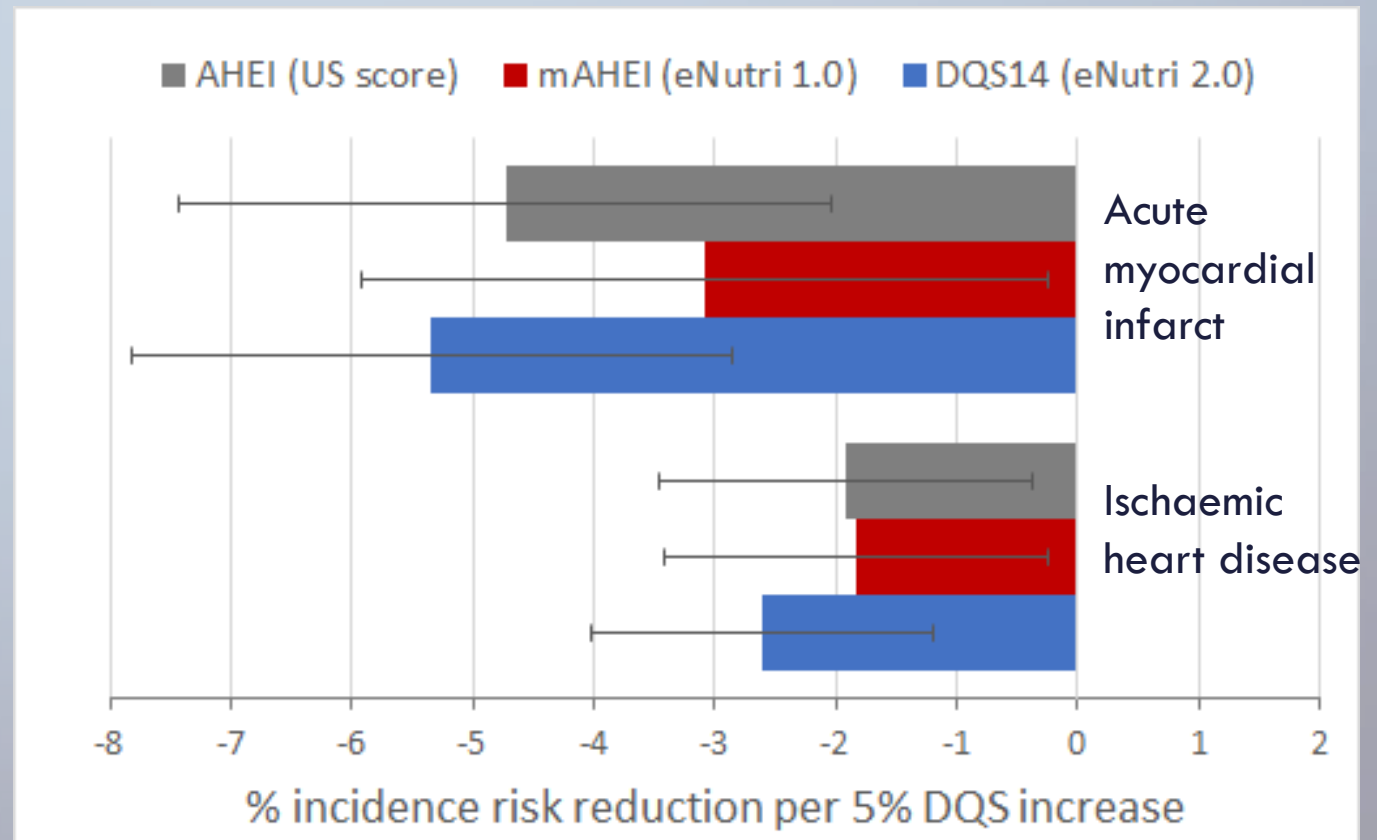
Mean (SEM) adjusted for age, sex, BMI & energy intake

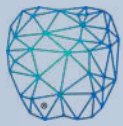


eNUTRI 2.0 DQS FOR NORTHERN EUROPE VALIDATION



n=25,637 men and women
20-23 years follow-up





PROOF OF CONCEPT STUDY USING ENUTRI 2.0

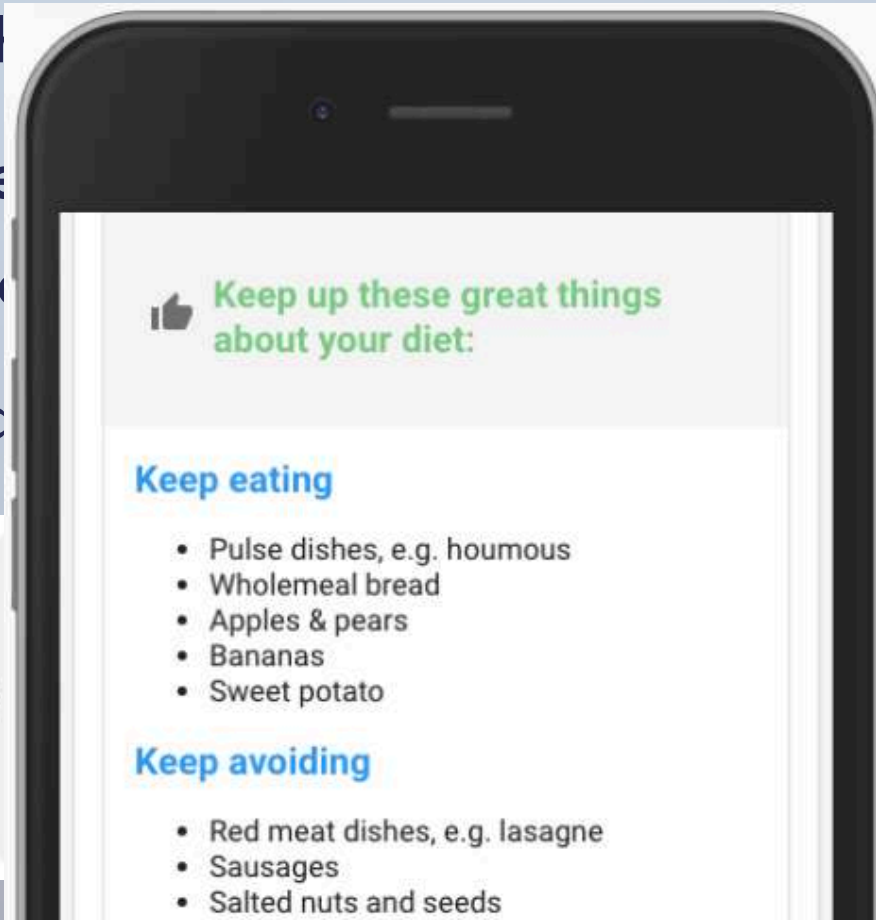
- **How many:** 196 “100% vegetarians”
- **Food based advice:** Foods to reduce; Keep eating
- **Ordered by individual BMI**

including vegetarians

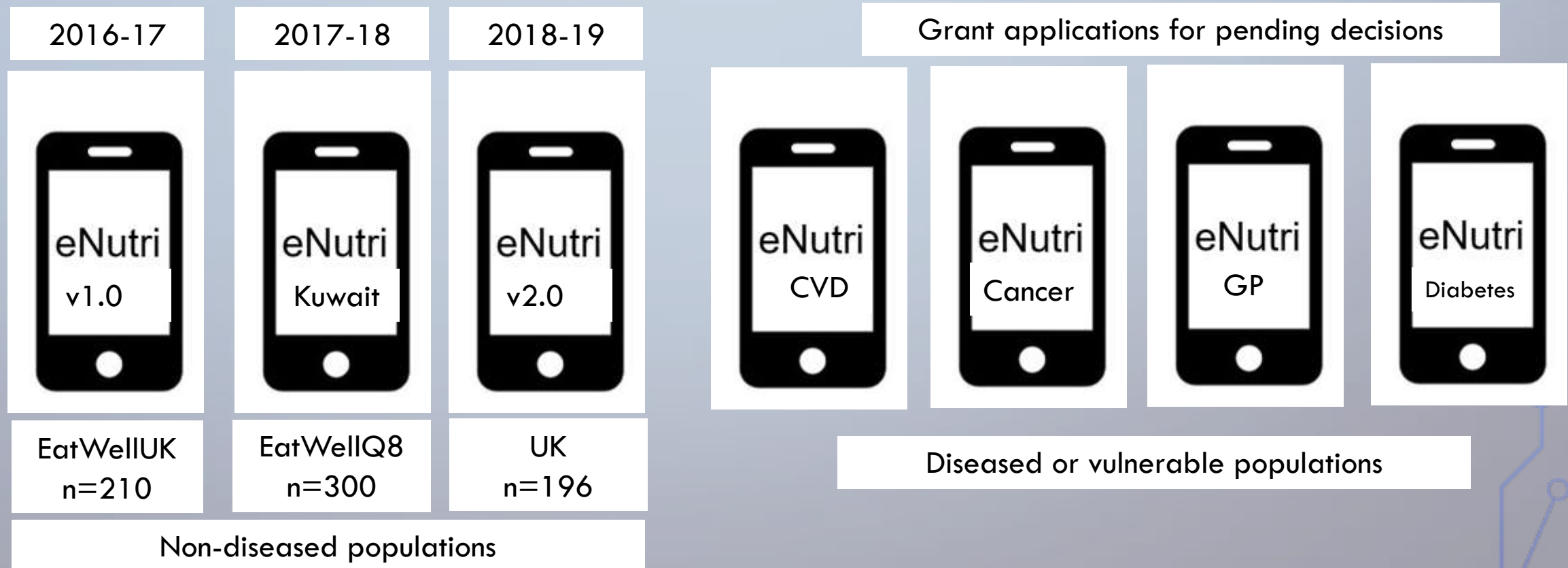
Foods to try; Top 5

g. Rationale.

used for individual **BMI**



APPLICATION AREAS



CONCLUSIONS

- Personalised dietary advice improves dietary change compared with population guidance
- Online delivery offers convenience, scalability, personalisation, sustainability and cost effectiveness
- eNUTRI app is effective at motivating healthy dietary choices
- Potential for use in many diverse and remote groups.



THANKS

Michelle Weech, Roz Fallaize, Rachel Sutton

Faustina Hwang, Rodrigo Zenun Franco, Guy Butcher

Ariane Kehlbacher, Jorge Campos González, Changqiong

Wang