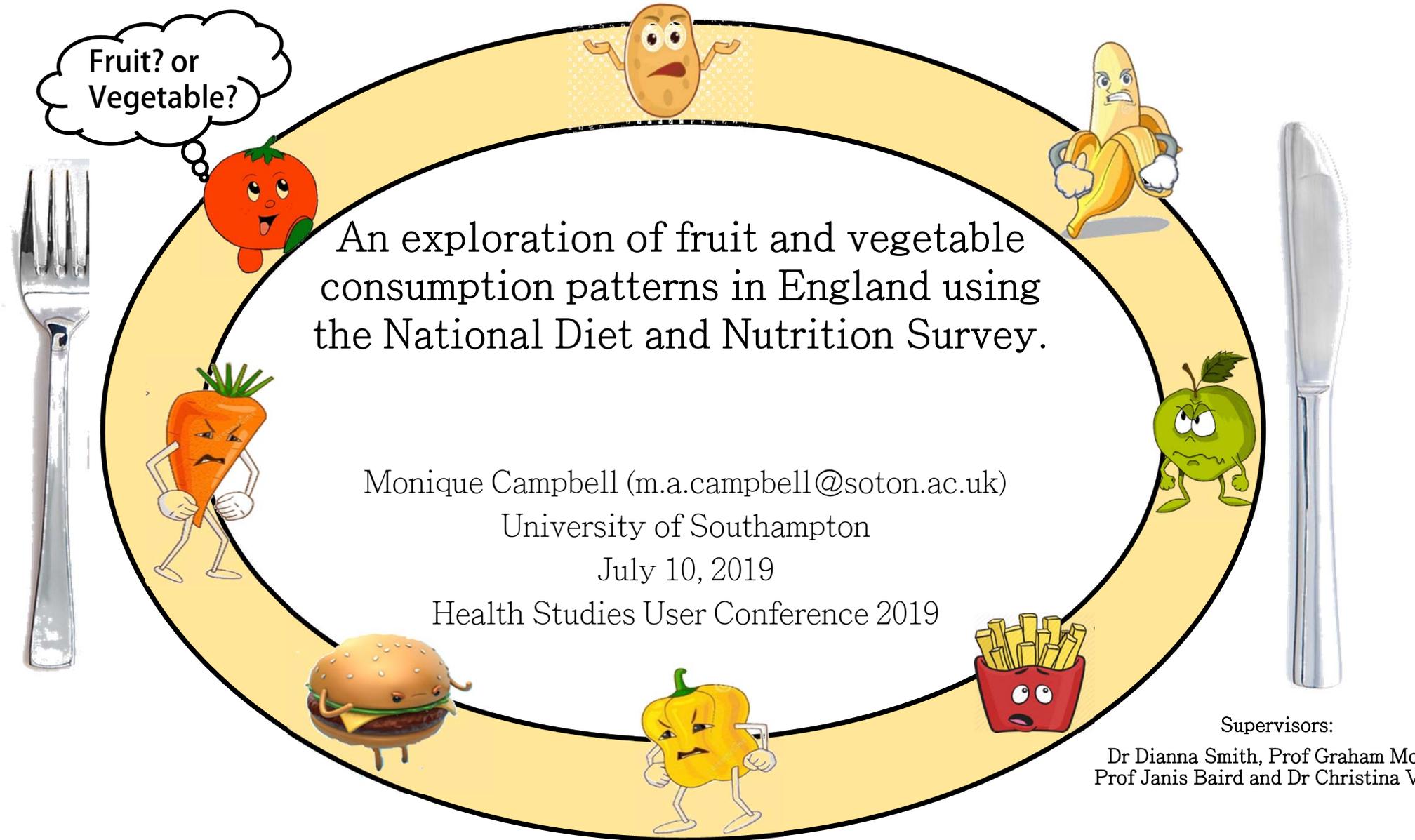


Fruit? or
Vegetable?



An exploration of fruit and vegetable
consumption patterns in England using
the National Diet and Nutrition Survey.

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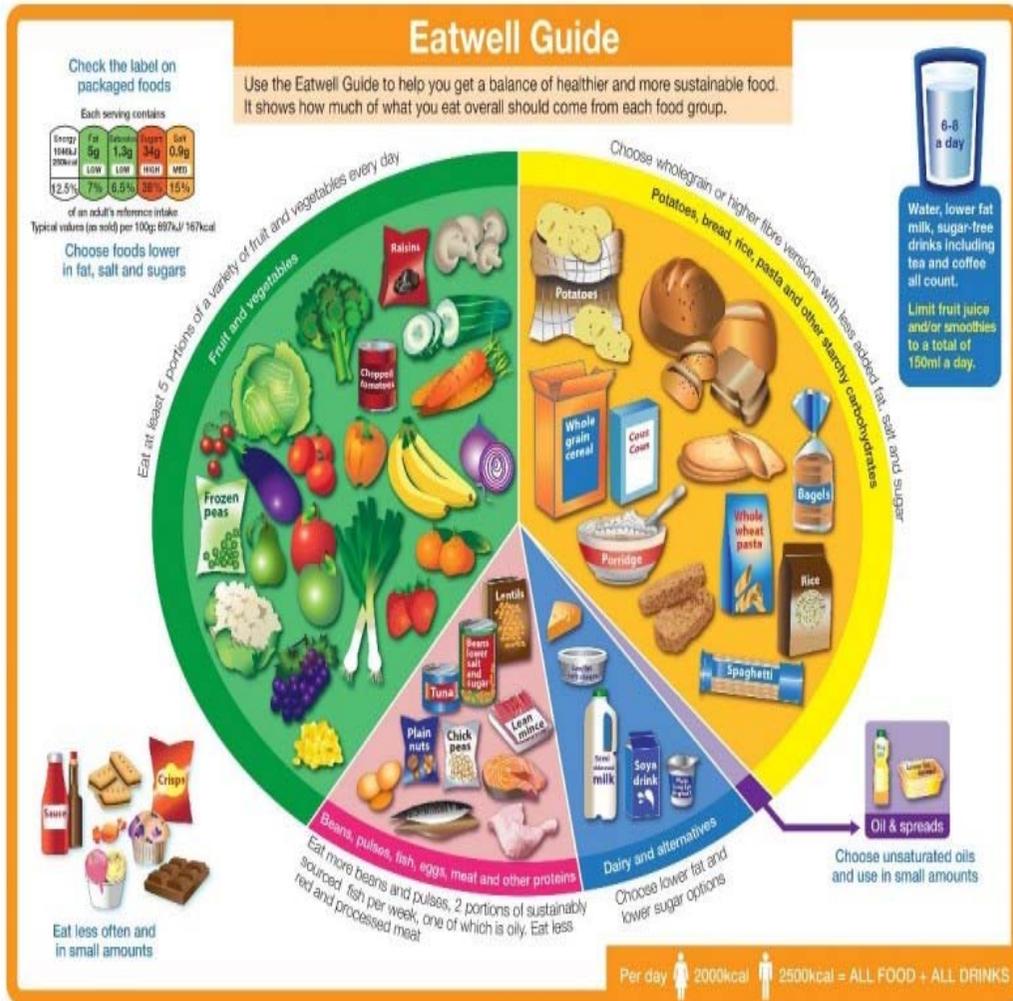
Supervisors:

Dr Dianna Smith, Prof Graham Moon,
Prof Janis Baird and Dr Christina Vogel

Outline of Presentation

- Background of Study and Study Rationale
- Overall Project Aims and Objectives/Areas of focus for presentation
- Data and Target Population
- Proposed Method for 1st analysis and rationale
- Exploratory/Preliminary findings for 1st Research Question
- Summary and Project Next steps

Background: Healthy vs Unhealthy Diet?



- ✓ **FRUITS**
- ✓ **VEGETABLES (F&Vs)**
(i.e. 5 portions daily; 80 grams = 1 portion)
- ✓ **LEGUMES** (e.g. lentils, beans)
- ✓ **NUTS, WHOLEGRAINS**
- ✗ **CALORIES**
- ✗ **FATS**
(Saturated fats and Trans fats/processed foods)
- ✗ **SALT**
- ✗ **FREE SUGARS**



BUT strong emphasis on “5-a-day” WHO and national target/diet indicator via Gov’t Change4Life Campaign





**WHY DIET?
AND
WHY ENGLAND?**

Why Study Diet and Why England?

Reason 1: Cost to Society

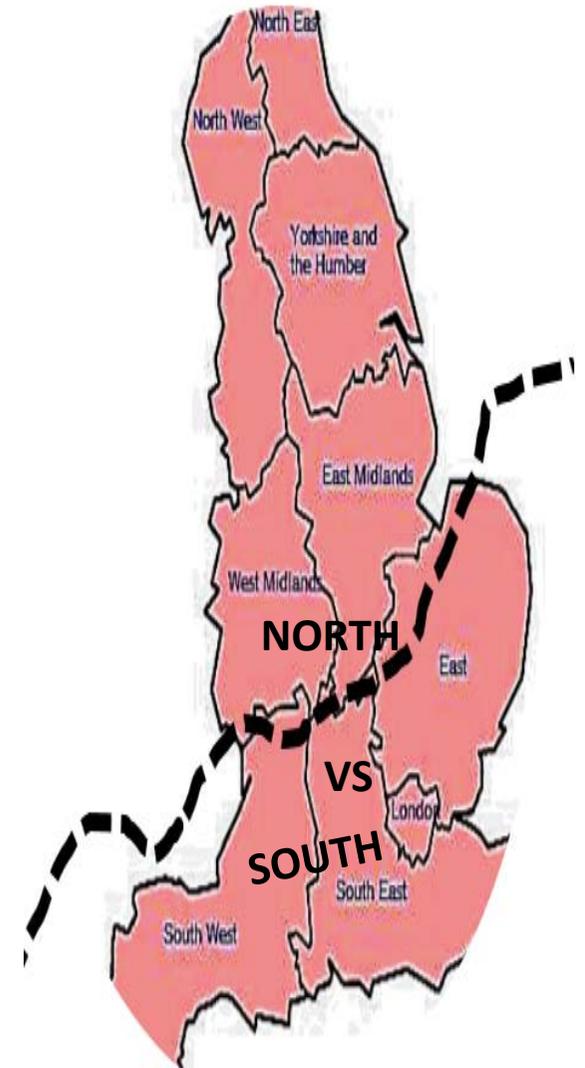


Diet-related ill-health costs NHS approx. £5.8b annually (Scarborough et al, 2011)

Why Study Diet and Why England?

Reason 2: Socio-economic and regional inequalities

- Sub-optimal diet and obesity generally more prevalent in North England and Midlands than South England (Morris et al, 2016; NHS Digital, 2018; Scarborough & Allender, 2008)
- **HOWEVER**, most related studies tend to focus on compositional factors (who) and less on contextual (where) **OR** North vs South divide **OR** specific regions or cities (e.g. North/Manchester) **OR** UK in general **OR** focus on outcomes (e.g. obesity, CVD) **OR** specific groups (e.g. women, children, vegetarians, middle class, middle-aged persons) **OR** single food groups e.g. F&Vs/5-a-day diet indicator only vs overall diet
- Very few studies on regional inequalities/differences in diet (not obesity) in England.



Overall Project Aim and Research Questions

Aim: To investigate the extent to which diet quality varies across the geographical regions of England

Question
1

To what extent does fruit and vegetable consumption vary by socio-demographics and/or region amongst adults (16-64 years) in England?

Question
2

To what extent does diet quality vary by socio-demographics and/or region amongst adults in England?

Question
3

*How does diet quality vary across smaller areas of England (sub-regional variation) and does this identify more localised barriers to higher diet quality for all residents?

* Work-in-progress- Question 3 is dependent on the results of Questions 1 and 2 and is therefore subject to change.

Data and Target Population

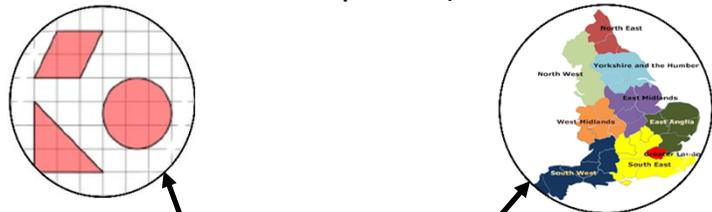
National Diet and Nutrition Survey (NDNS) RP selected based on the following criteria:

- ☑ Frequency: Conducted annually since 2008 (cross-sectional)
- ☑ Coverage: Survey captures males and females aged 1.5 years and over living across all regions of England and UK (nationally representative)
- ☑ Availability of diet data: Survey captures **all** foods and beverages consumed over 4-day period
NOT just F&Vs/5-a-day (detailed food diary methodology employed)
- ☑ Sample size: Approximately 1,000 persons surveyed annually **across UK**

Study Target Population: Adults (males and females) 16-64 years residing in England over the 2008-2016 period. Based on exclusion criteria study sample size = 3,286 (1,859/57% females and 1,427/43% males).

1st Analysis Method: 2 –WAY CROSS CLASSIFIED MULTILEVEL MODEL

Contextual/Environmental Level

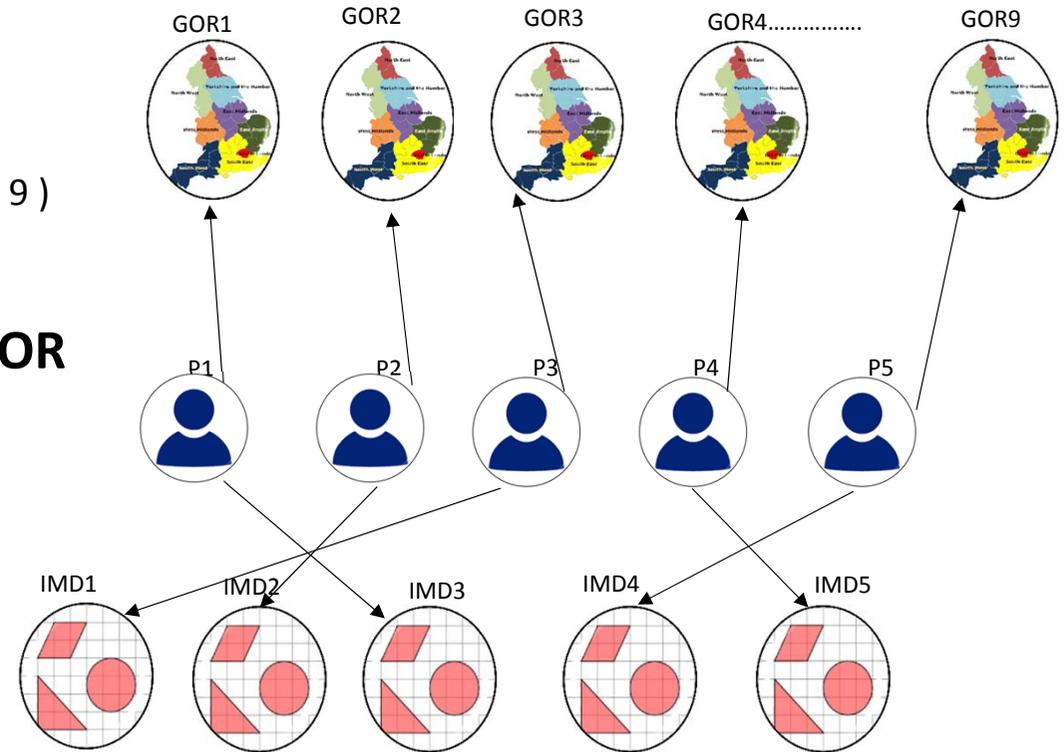


Compositional/Person Level

PERSON (P)

Classification Diagram

OR



Unit Diagram

Considers compositional (individual level) AND contextual factors (area/geographical level) at national level.

Preliminary Findings for Research Question 1

- Approximately 74% of sample (2,423 of 3,286 persons) did not consume 5 portions of F&Vs and thus did not achieve the national 5-a-day target (despite Gov't messages and campaigns like Change4Life)



Preliminary Findings for Research Question 1

Percentage of adults (16-64 years) in England who achieved 5-a-day F&V consumption target by GOR (2008-2016)



Bivariate correlations showed a significant association between GOR and F&V consumption. North and Midlands consume less F&Vs than South. In line with previous studies (Morris et al, 2016; NHS Digital, 2018; Scarborough & Allender, 2008)

PRELIMINARY

MLM results ...What does this mean?



Fixed effects (age, sex, eth, marital, SES, BMI)
 Random effects (GOR and IMD)

$$\text{Achievement of 5 portions of F\&V}_i = \beta_0 + \beta_1 \text{age}_i + \beta_2 \text{sex} \dots + u_{\text{gor}(i)} + u_{\text{imd}(i)} + e_i$$

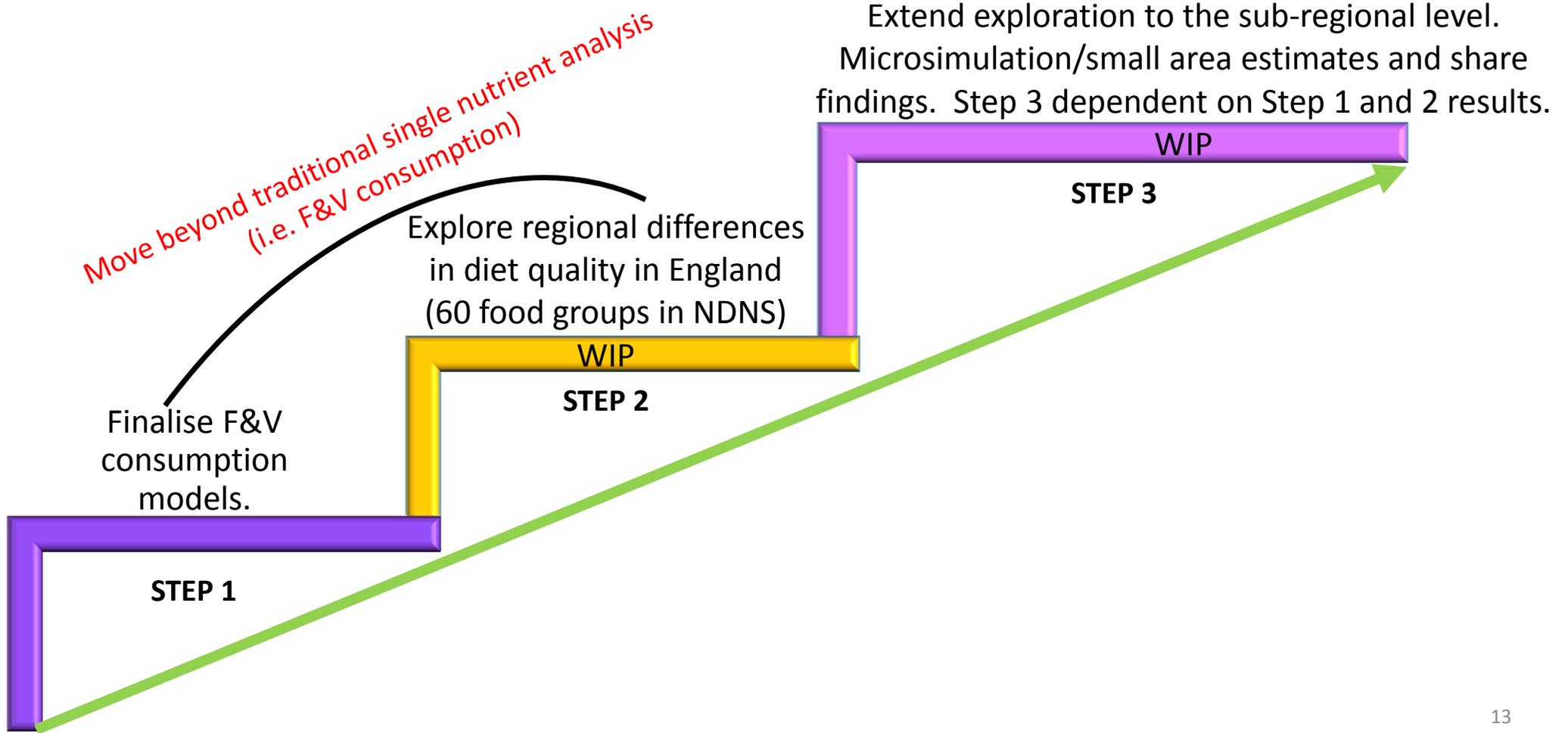
$$[u_{0,\text{gor}(i)}^{(3)}] \sim N(0, \Omega_u^{(3)}) : \Omega_u^{(3)} = [0.028(0.030)]$$

$$[u_{0,\text{QIMD1_srecodeFINAL}(i)}^{(2)}] \sim N(0, \Omega_u^{(2)}) : \Omega_u^{(2)} = [0.044(0.074)]$$

$$\text{var}(\text{Achieve5recoded}_i | \pi_i) = \pi_i(1 - \pi_i) / \text{cons}_i$$

- **WHO?**- Age gradient with people increasingly likely to hit 5-a-day as they get older (over 25 compared to 16-24 year olds)
- **WHERE?**-No significant variation between IMD Groups or between Gov't Office Regions in terms of the consumption of F&V once compositional factors are taken into account. SO, it's more about who you are than the place where you live.

Project Next Steps

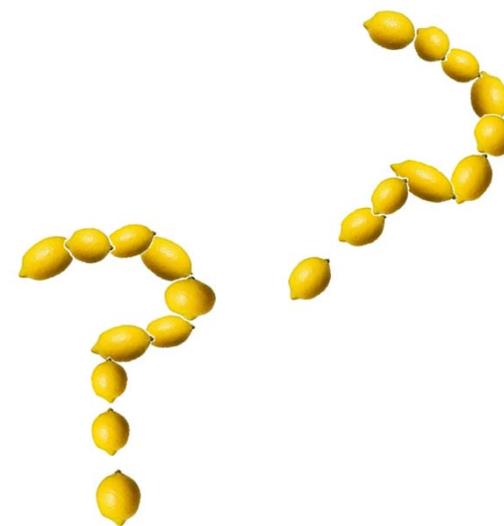


Summary

- Majority of adults in England sampled over the 2008-16 period did not meet the Government's recommended 5-a-day target. NOTHING NEW.
- A lot of research on diet BUT despite numerous studies on the subject, very few studies on regional inequalities/differences in diet quality in England.
- On the surface, persons in the North and Midlands appeared to consume less F&Vs than South. When explored using MLM, no observed difference in the consumption of F&V across the regions of England.
- Highlights the importance of disaggregating data at the regional level and looking at the overall diet vs single food groups/diet targets i.e. F&Vs.



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Questions/Comments

References

Acheson, D. (1998). *Independent Inquiry into Inequalities in Health Report*. Retrieved from

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/265503/ih.pdf.

British Medical Association (BMA). (2016). Obesity and diet-related illness in the UK [Press release]

Forouzanfar, M., Alexander, L., Anderson, HR., Bachman, VF., Biryukov, S., Brauer, M....GBD 2013 Risk Factors Collaborators. (2015). Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*, 386, 2287–2323. doi:10.1016/S0140-6736(15)00128-2

Gakidou, E., Afshin, A., Abajobir, A. A., Abate, K. H., Abbafati, C., Abbas, K. M., ... GBD 2016 Risk Factors Collaborators. (2017). Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, 390(10100), 1345–1422. doi:10.1016/S0140-6736(17)32366-8

Malhotra, A., Noakes, T., & Phinney, S. (2015). It is time to bust the myth of physical inactivity and obesity: you cannot outrun a bad diet. *Br J Sports Med*, 49(15), 967–968. doi:10.1136/bjsports-2015-094911

Moon, G., Quarendon, G., Barnard, S., Twigg, L., & Blyth, B. (2007). Fat nation: deciphering the distinctive geographies of obesity in England. *Soc Sci Med*, 65(1), 20–31. doi:10.1016/j.socscimed.2007.02.046

Morris, M. A., Clarke, G. P., Edwards, K. L., Hulme, C., & Cade, J. E. (2016). Geography of Diet in the UK Women's Cohort Study: A Cross-Sectional Analysis. *Epidemiology - Open Journal*, 1(1), 20–32. doi:10.17140/epoj-1-104

References

NHS Digital. (2017). Statistics on Obesity, Physical Activity and Diet, England: 2017. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/613532/obes-phys-acti-diet-eng-2017-rep.pdf

Public Health England (PHE). (2017). *Health matters: obesity and the food environment*. Retrieved from <https://www.gov.uk/government/publications/health-matters-obesity-and-the-food-environment/health-matters-obesity-and-the-food-environment--2>.

Roberts, K., Cavill, N., Hancock, C., & Rutter, H. (2013). *Social and economic inequalities in diet and physical activity*. Retrieved from http://www.oneeastmidlands.org.uk/sites/default/files/library/vid_19253_Social_and_economic_inequalities_in_diet_and_physical_activity_04.11.13.pdf.

Scarborough, P., & Allender, S. (2008). The North-South gap in overweight and obesity in England. *Br J Nutr*, 100(3), 677-684. doi:10.1017/S0007114508911582

Scarborough, P., Bhatnagar, P., Wickramasinghe, K., Allender, S., Foster, C., Rayner, M. (2011). The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006-07 NHS costs. *J Public Health*, 33(4), 527-535. doi: 10.1093/pubmed/fdr033.

Tiffin, R., & Salois, M. (2012). Inequalities in diet and nutrition. *Proc Nutr Soc*, 71(1), 105-111. doi:10.1017/S0029665111003284