



# The timing of carbohydrates intake

the National Diet and Nutrition Survey Rolling  
Programme (2008-2014)

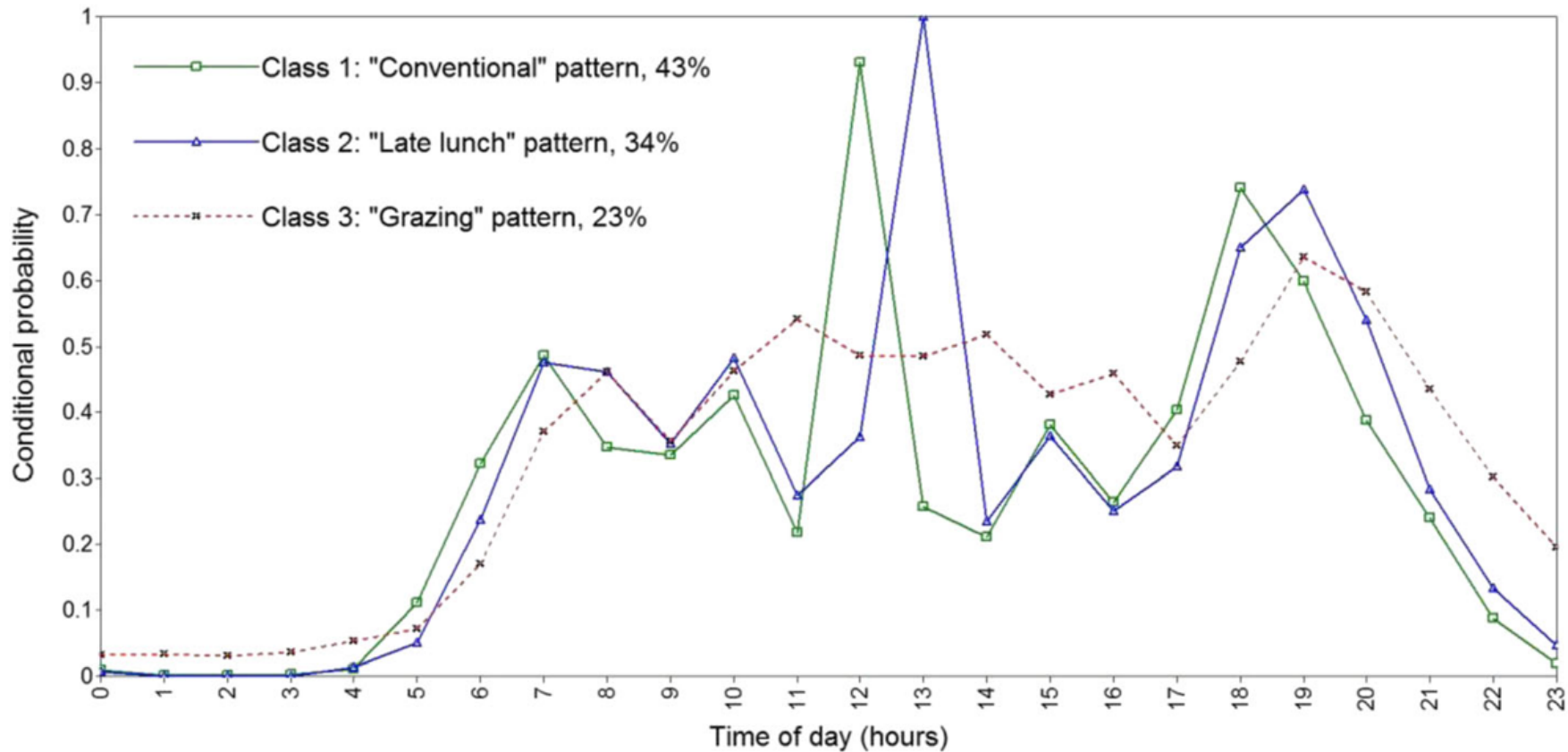
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2018/4/23-Project Talk (LG6)

# Background

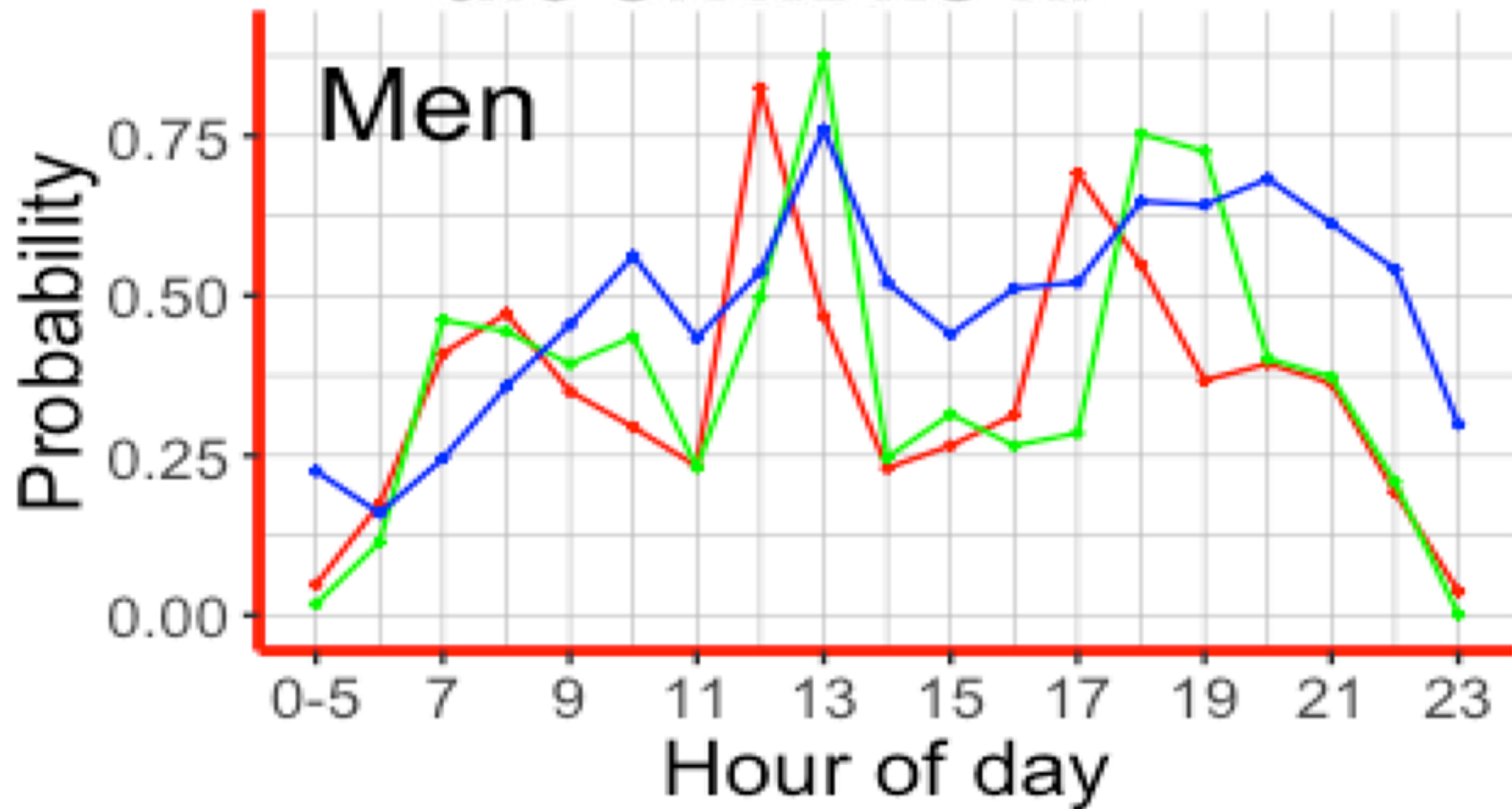
"Temporal eating patterns"--the timing, frequency, and regularity of food intake or eating occasions across the day may play a role in health outcomes:

- Interplay between timing of food intake and circadian rhythms, physiology, and metabolism. <sup>[1]</sup>
- Skipping breakfast is associated with higher risk of type 2 diabetes. <sup>[2]</sup>
- Shift workers have a higher risk of metabolic syndrome <sup>[4]</sup> and type 2 diabetes <sup>[3]</sup>.
- Evening energy intake is positively associated with overweight/obesity. <sup>[5]</sup>
- Three distinct temporal eating patterns were identified (next 2 slides) in both Australian population <sup>[6]</sup> and general population in the UK.

# Australian (NNPAS)



# the UK NDNS RP



# Objectives

- Investigate the timing of eating within the day and specific nutrients -- carbohydrates.
- Potentially it can be broken down further into some of their components: starch, glucose, sucrose, maltose, fructose, lactose, etc.
- Additionally, depending on the findings of preceding analysis, the association between carbohydrate eating patterns and diabetes and/or obesity will be explored.

# Methods (1) -- data

- the NDNS RP is an ongoing programme funded by the UK government on the purpose of surveillance of the food consumption, nutrient intake, and nutritional status of the general UK population.
- Data can be downloaded from the UK data service
- Target population for this project: adults, age range 19-64 years (sample size: around 5250).
- Collection of dietary data: the four-day food diary.

Day <i>Thurs</i>		Date <i>31st March</i>		
Time	Where? With Whom? TV on? At table?	Food/Drink description & preparation	Brand Name	Portion size or quantity <u>eaten</u>
<b>6am to 9am</b>				
6.30 am	Kitchen Alone No TV Standing	Filter coffee, decaffeinated milk (fresh, semi-skimmed) Sugar white	Douwe Egberts  Silverspoon	Mug A little 1 level tsp
7.30 am	Kitchen Partner TV on At table	Filter coffee with milk and sugar Cornflakes Milk (fresh, semi-skimmed) Toast, granary medium sliced Light spread Marmalade	As above Tesco's own  Hovis Flora Hartleys	As above 1b drowned 1 slice med spread 1 heaped tsp
<b>9am to 12 noon</b>				
10.15 am	Office desk Alone	Instant coffee, not decaffeinated Milk (fresh, whole) Sugar brown	Kenco	Mug A little 1 level tsp
11 am	Office desk Alone	Digestive biscuit – chocolate coated on one side	McVities	2

Time	Where? With Whom? TV on? At table?	Food/Drink description & preparation	Brand Name	Portion size or quantity <u>eaten</u>
<b>5pm to 8pm</b>				
6.30 pm	Pub Partner	Gin Tonic water diet Lager Salted peanuts	Gordon's Schweppes Draught KP	Single measure 1/2 small glass 1 pint 1 handful
8 pm	Dining room Family No TV At table	Spaghetti, wholemeal Bolognese sauce (see recipe) Courgettes (fried in butter) Tinned peaches in juice (juice drained) Single cream UHT  Orange squash No Added Sugar	Tesco's own  Prince's  Sainsbury's own	3b 6 tablespoons 4 tablespoons 3 halves 1 tablespoon  200ml glass, 1 part squash, 3 parts tap water
<b>8pm to 10pm</b>				
9 pm	Sitting room Alone TV on Not at table	Grapes, green, seedless Chocolates, chocolate creams Potato crisps, Prawn Cocktail	Bendicks Walkers	15 2 25g bag (from multipack)
<b>10pm to 6am</b>				
10.30 pm	Bed room Partner No TV Not at table	Camomile tea (no milk or sugar)	Twinings	1 mug



Was the amount of **food** that you had today about what you usually have, less than usual, or more than usual?

Yes,  
usual

☒

No, **less**  
than usual

☐

No, **more**  
than usual

☐

*Please tell us why you had less than usual*

*Please tell us why you had more than usual*

Was the amount you had to **drink** today, including water, tea, coffee and soft drinks [and alcohol], about what you usually have, less than usual, or more than usual?

Yes,  
usual

☐

No, **less**  
than usual

☐

No, **more**  
than usual

☒

*Please tell us why you had less than usual*

*Please tell us why you had more than usual*

Went to pub after work

# Methods (2) -- analysis

- Latent Class Analysis (CLA): to separate people into several eating pattern groups and also to calculate the probability of an Eating Occasion (EO) occurring for each class for every hour of the day.
- For every hour of the day whether an EO had occurred need to be calculated.
- The definition of an eating occasion specifically for carbohydrates need to be defined (total energy intake may also need to be adjusted).
- Multiple days (3-4 days) of dietary intake records need to be combined (average).
- Association between the defined eating pattern groups defined by CLA and obesity/diabetes will be explored through by logistic regression models.

# References

- [1] G. Asher, et al. *“Time for food: the intimate interplay between nutrition, metabolism, and the circadian clock”*. In: *Cell* 161.1 (2015), pp. 84–92.
- [2] M. Uemura, et al. *“Breakfast Skipping is Positively Associated With Incidence of Type 2 Diabetes Mellitus: Evidence From the Aichi Workers' Cohort Study”*. In: *J Epidemiol* 25.5 (2015), pp. 351–358.
- [3] A. Pan, et al. *“Rotating night shift work and risk of type 2 diabetes: two prospective cohort studies in women”*. In: *PLoS medicine* 8.12 (2011), p. e1001141.
- [4] D. De Bacquer, et al. *“Rotating shift work and the metabolic syndrome: a prospective study”*. In: *Int J Epidemiol* 38.3 (2009), pp. 848–854.
- [5] S. Almoosawi, et al. *“Chrono-nutrition: a review of current evidence from observational studies on global trends in time-of-day of energy intake and its association with obesity”*. In: *Proc Nutr Soc* 75.4 (2016), pp. 487–500.
- [6] R. M. Leech, et al. *“Temporal eating patterns: a latent class analysis approach”*. In: *Int J Behav Nutr Phys Act* 14.1 (2017), p. 3.

# Thanks!

Slides address: [wangcc.me/NDNS5slides](http://wangcc.me/NDNS5slides)