

A Practical Approach to Carbohydrate Intake in CYP with Type 2 Diabetes

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Our Team at Barts Health

Who We Are:

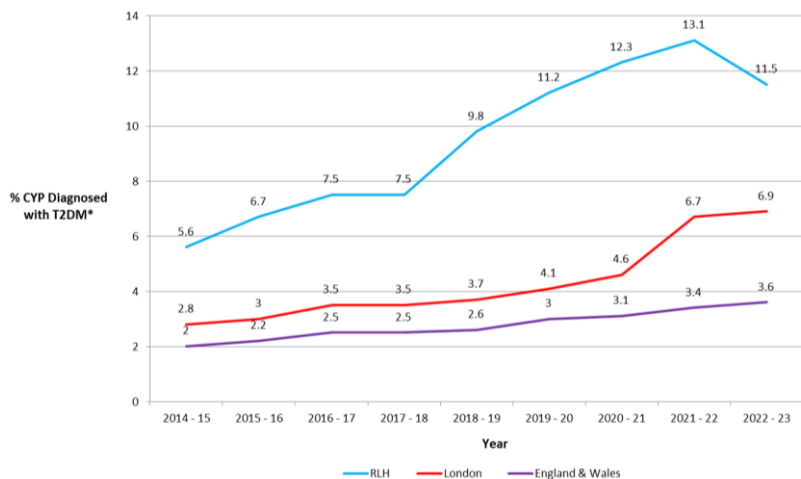


- Large Secondary & Tertiary Centre in East London
- The team: 10 Consultants, 8 nurses, 2 psychologists, 3.5 dietitians, family support worker, administrators and data managers
- 3 Sites: The Royal London Hospital, Whipps Cross Hospital and Newham University Hospital
- 781 patients across 3 Barts Health Trust sites - 400 (RLH), 216 (WXH), 165 (NUH)
- Above average number of CYP diagnosed with Type 2 Diabetes <19yrs – **11.5% RLH, 8.5% NUH and 6.9% WXH** (NPDA 2022 – 23)

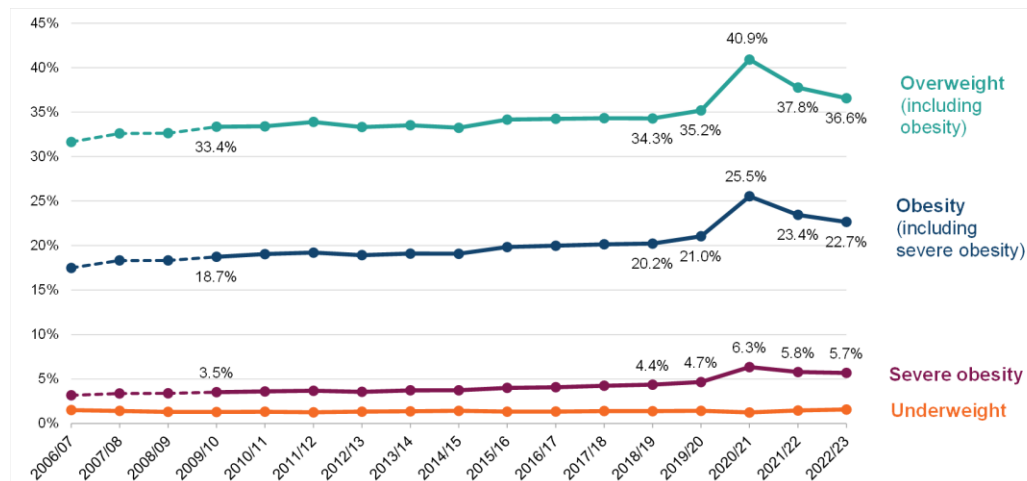


The Rising Trend

Prevalence of Type 2 Diabetes among CYP across RLH, London and England & Wales from 2014 - 2023 (NPDA 2022/23)



Year 6: Trends by BMI category National Child Measurement Programme 2006/2007 to 2022/2023



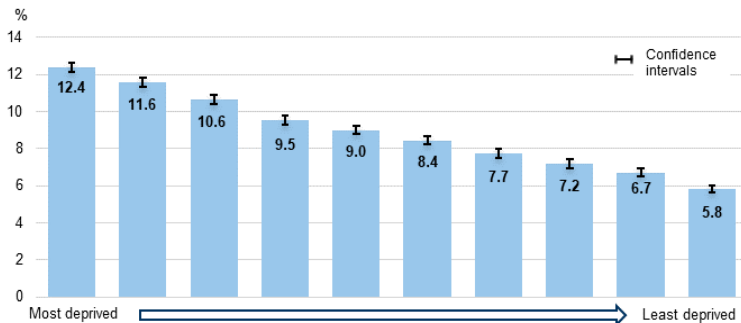
Key Contributing Factors to Obesity & T2DM Development in CYP

The Basics:



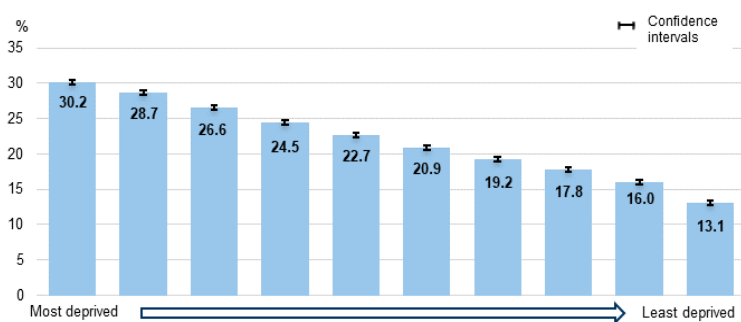
The Impact of Deprivation

Obesity prevalence in Reception by IMD decile (based on postcode of child), 2022/23



For more information: Table 6a National Child Measurement Programme, England, 2022/23 School Year

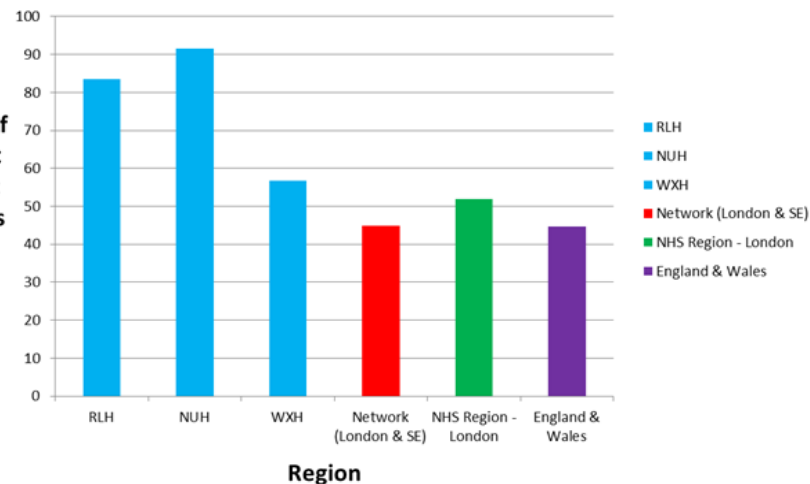
Obesity prevalence in Year 6 by IMD decile (based on postcode of child), 2022/23



For more information: Table 6a National Child Measurement Programme, England, 2022/23 School Year

% CYP in most and second most deprived quintiles for all Barts Health Sites (RLH, NUH, WXH), London & SE Network, NHS Region (London) and England & Wales (from NPDA data 2022/23)

% CYP (all types of diabetes) in most and second most deprived quintiles

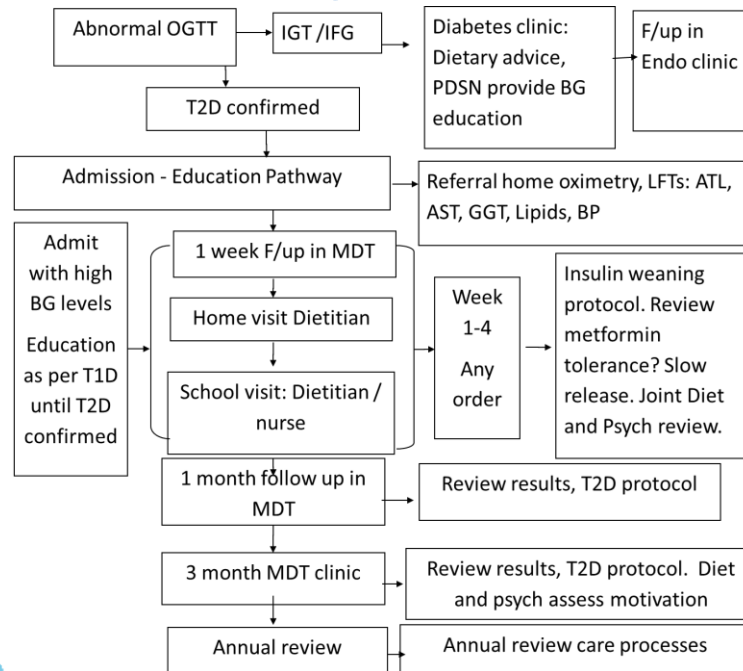


MDT & Dietetic Treatment Aims – Type 2 Diabetes Pathway

Target: HbA1c of <math><48\text{mmol/mol}</math> 12 months post diagnosis for all patients with T2DM



Key Dietetic Aim:
5% - 10% weight loss within 6 – 12 months of diagnosis



Our Dietetic Approach

Additional Dietetic Aims:

- A holistic, family-based approach
- Improved diet quality
- Positive relationships with food
- Physical & Emotional well-being

Step 1
Normalise Eating Behaviours
& Target 'Quick Wins'

Step 2
Progressive Normalisation of
Carb Intake

Step 3
Prescriptive Calorie &
Carbohydrate Plans

Increased Physical Activity & Psychology Support



Step 1. Normalisation of Eating & 'Quick Wins'



Meal Routine

- 26 –50% > 4 meals/d



Fruit & Vegetable Intake

- 1/3 CYP eat only 1 portion/d



Take- Away's & Fast Food

- A big challenge



Frequent Snacking

- Excessive & late-night snacking



Drinks

- >50% drinking fruit juice daily



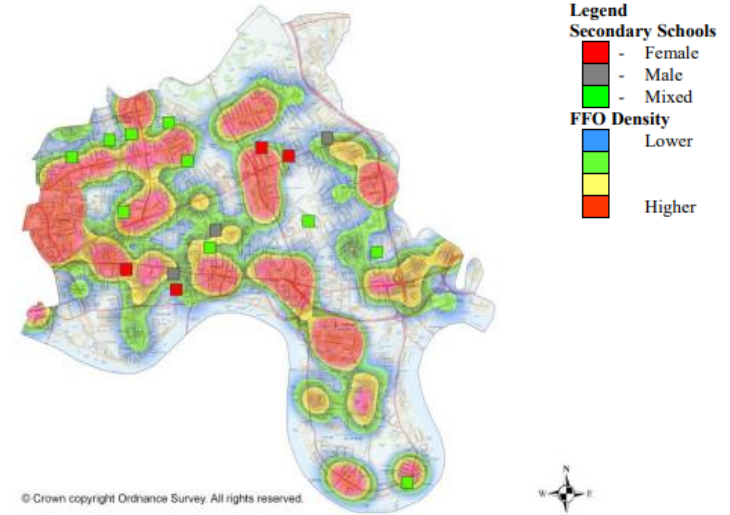
Density of Fast-food Outlets Mapped in location to Secondary Schools, Tower Hamlets (Caraher, 2014)



Take- Away's & Fast Food
- A big challenge



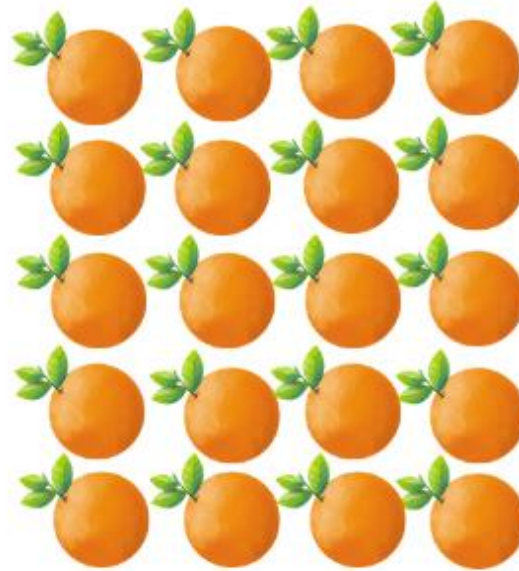
Frequent Snacking
- Excessive & late-night snacking





Drinks

- >50% drink fruit juice daily



Step 2. Normalisation of Carbohydrate Intake

- Explore Carb Awareness & Understanding
- Consider ACTUAL Current Intake vs Under-reporting

Estimated average energy and carbohydrate requirements in children

Age	BOYS			CARBS (g)		GIRLS			CARBS (g)	
	EAR kcal/d	av weight kg	EAR kcal/kg/d	40%	50%	EAR kcal/d	av weight kg	EAR kcal/kg/d	40%	50%
1-2 MO		5	96-120				4.7	96-120		
3-4 MO		6.7	96				6.1	96		
5-6MO		7.7	72-96				7	72-96		
7-12MO		9	72	65			8.3	72		
1 YEAR	770	9.6	80	77	96	720	9	80	72	90
2 YEARS	1000	12.2	82	100	125	930	11.5	81	93	116
3 YEARS	1170	14.4	82	117	146	1080	13.9	78	108	135
4 YEARS	1390	16.3	85	139	174	1290	16	81	129	161
5 YEARS	1480	18.6	80	148	185	1360	18.2	75	136	170
6 YEARS	1560	21	74	156	195	1480	21	70	148	185
7 YEARS	1650	23	71	165	206	1530	23	67	153	191
8 YEARS	1750	26	67	175	219	1630	26	63	163	204
9 YEARS	1840	29	63	184	230	1720	29	59	172	215
10 YEARS	2030	31.5	64	203	254	1940	32	61	194	243
11 YEARS	2130	34.5	62	213	266	2020	35.9	56	202	253
12 YEARS	2250	38	59	225	281	2100	40	53	210	263
13 YEARS	2410	43	56	241	301	2220	46	48	222	278
14 YEARS	2630	49	54	263	329	2340	51	46	234	293
15 YEARS	2820	55.5	51	282	353	2390	53	45	239	299
16 YEARS	2970	60.2	49	297	371	2410	55.3	44	241	301
17 YEARS	3080	64	48	308	385	2460	57	43	246	308
18 YEARS	3160	66.2	48	316	395	2460	57.2	43	246	308

Portion Distortion

20 YEARS AGO	TODAY	DIFFERENCE	20 YEARS AGO	TODAY	DIFFERENCE
333 Calories Lifting weights for 1 HOUR AND 30 MINUTES burns approximately 257 calories* *Based on 135pound person	590 Calories	257 MORE CALORIES	45 Calories Coffee, 8 oz (with whole milk and sugar)	350 Calories Mocha Coffee, 16 oz (with steamed whole milk and mocha syrup)	305 MORE CALORIES Walking 1 HOUR AND 20 MINUTES burns approximately 305 calories* *Based on 130pound person
500 Calories Playing golf (while walking and carrying your clubs) for 1 HOUR burns approximately 350 calories* *Based on 160pound person	850 Calories	350 MORE CALORIES	210 Calories 1.5 oz	500 Calories 4 oz	290 MORE CALORIES Vacuuming for 1 HOUR AND 30 MINUTES burns approximately 290 calories* *Based on 130pound person
500 Calories Housecleaning for 2 HOURS AND 35 MINUTES burns approximately 525 calories* *Based on 130pound person	1,025 Calories	525 MORE CALORIES	55 Calories 1.5 diameter	275 Calories 3.5 diameter	220 MORE CALORIES Washing a car for 1 HOUR AND 15 MINUTES burns approximately 220 calories* *Based on 130pound person

- Focus on Quality
- Portion Control



Step 3. Prescriptive Calorie & Lower Carbohydrate Plans

1. Mifflin-St Jeor Equation to calculate RMR:

Men: $(10 \times \text{weight in Kg}) + (6.25 \times \text{height in cm}) - (5 \times \text{age in years}) + 5$

Women: $(10 \times \text{weight in kg}) + (6.25 \times \text{height in cm}) - (5 \times \text{age in years}) - 161$

Mifflin St-Jeor -
Estimate Energy
Requirements

Adjust for 600 –
1000kcal/day
deficit = 5 – 10%
weight loss

Estimate Carbs
per day – 35 –
45% Total Energy
Intake

Daily Carb Target
– Carb Counting
& Prescriptive
Portions

2. Add a PAL Factor:

Usual Activity Level	PAL Factor
Sedentary	1.2
Light Activity	1.4
Moderate	1.5
Very Active	1.7

Example:

Weight (kg)	Height (m)	BMI (kg/m ²)	RMR (kcal/d)	PAL (1.5)	-600kcal (kcal/d)	-1000kcal (kcal/d)	Daily Carbs (approx. g/day)
96.6	168	34.2	1942	2893	2293	1893	166 - 220g/d



What About Low Carb Diets for CYP?

What is a 'Low Carb' Diet?

- No clear definition
- BDA: 50 – 130g per day
- ADA:
 - Very Low (Ketogenic): 20 – 50g/d
 - Low Carb: <130g/d (<26% total energy)
 - Moderate Carb: 130 – 230g/d (26 – 45% total energy)
 - High carb: >230g/d >45% total energy

Current evidence:

- Adults only so far...
- Evidence for short-term effectiveness
- Limited evidence to suggest low carb 50 – 130g/d is more effective than any other strategy
- Limited evidence and no guidelines for carb restriction in CYP
- Key differences between adults & children

Risks in CYP

- Growth implications
- Reduced fibre intake (gut and CVD risk)
- Nutritional deficiencies including magnesium, zinc, selenium
- Bone Health - Leaching of calcium into urine and effect on bone development
- Psychological impact of restrictive diet

General Consensus:

- Aim for lower carb intake (26-45% energy) recommended
- Minimum carb intake 130g/d for brain function
- Consideration of cultural beliefs and cooking practices
- Individual, step-wise approach

**ADA, SACN, ISPAD*



Thank you!

Questions?

email: childrensdiabetes.dietitians@nhs.net



References

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