

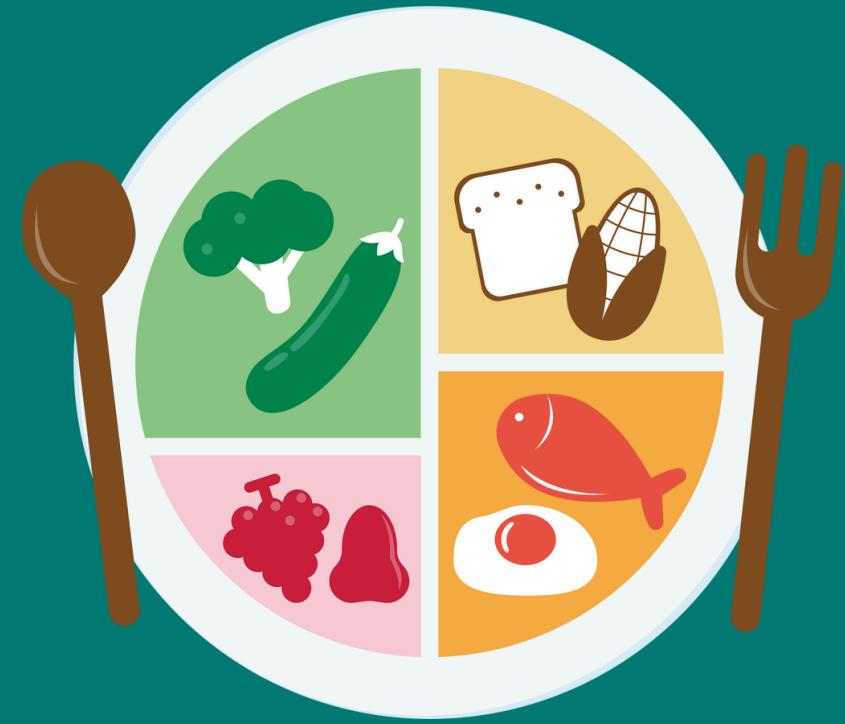


BC2402

GROUP

PROJECT

INTRODUCTION



Diet and Well Being



Fast Food Impact



Happiness Link



Q16. WINTER PROTEIN & FAT INTAKE VS HAPPINESS

- Relationship between protein fat intake and happiness
- Find out if nutrition plays a part in shaping well-being.





METHODOLOGY – STEPS



Analysed 5 countries
US, India, Germany,
Japan & Brazil



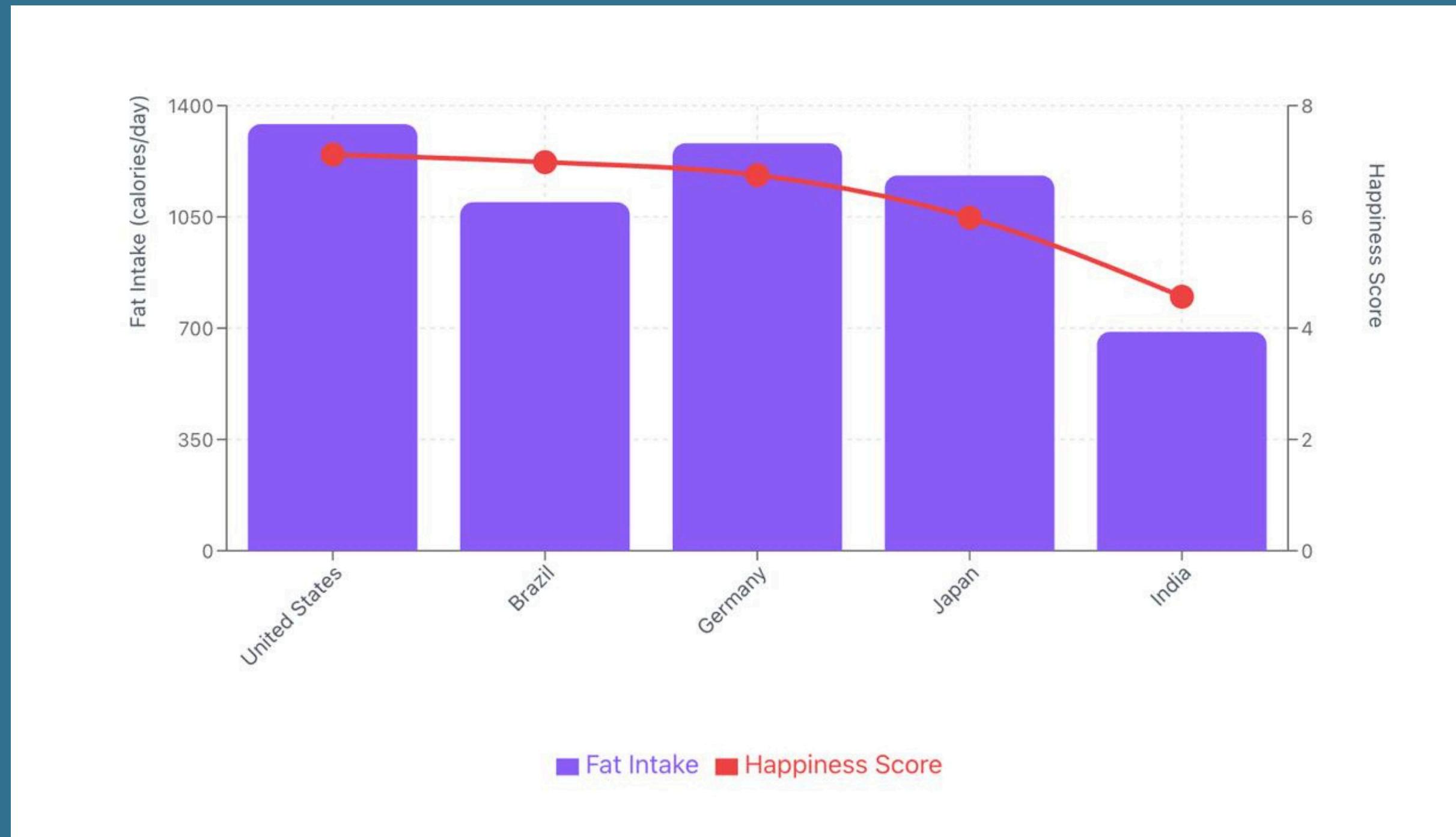
Defined winter months



Compare nutrition to
happiness

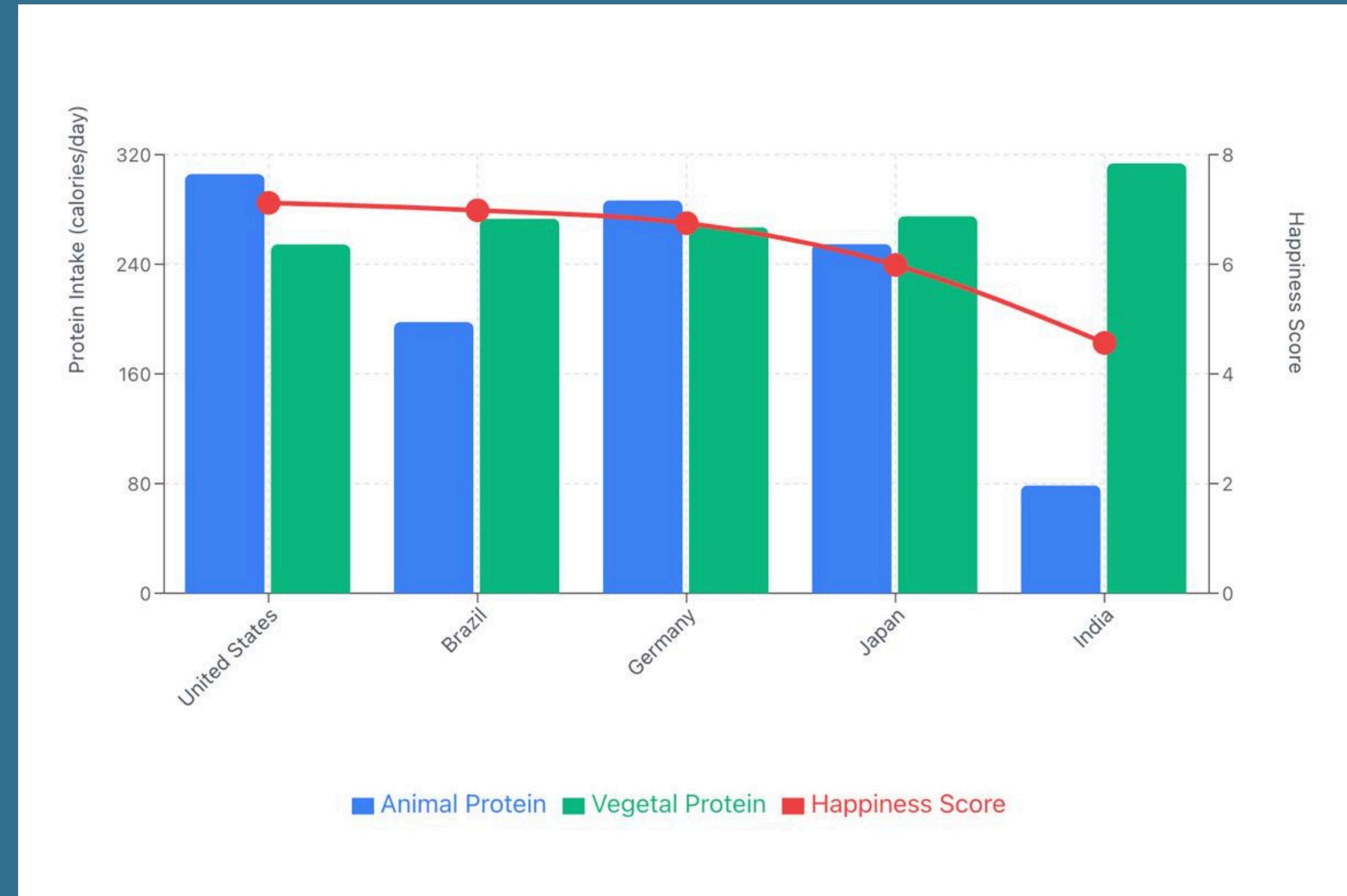


FAT INTAKE VS HAPPINESS





PROTEIN INTAKE VS HAPPINESS





CONCLUSION



Winter eating patterns do not reliably predict national happiness



Well-being shaped by many other factors that needs to be tested



Q17. DO LONG-TERM FAT INTAKE TRENDS (FROM 1961-2020) CORRELATE WITH HAPPINESS?



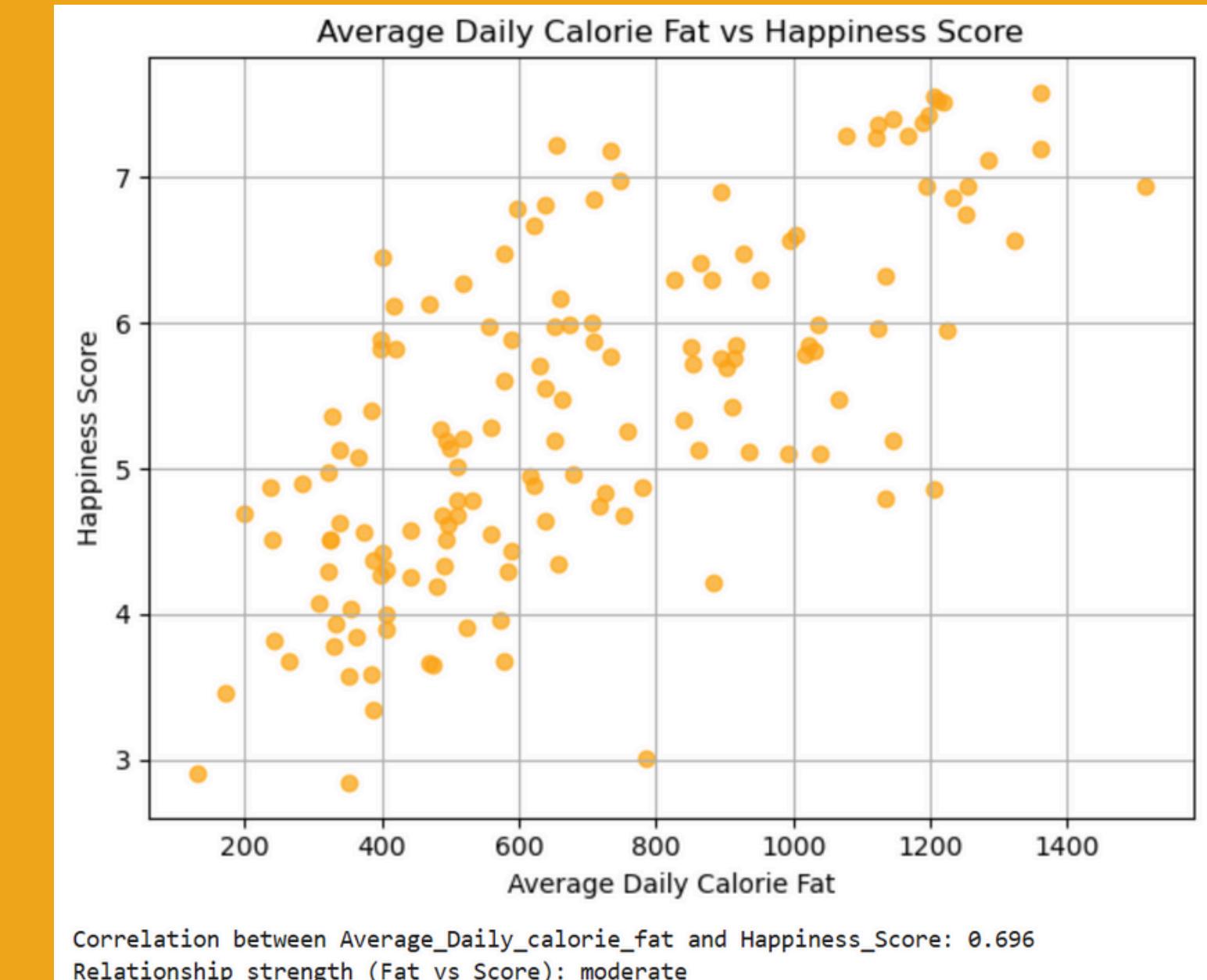
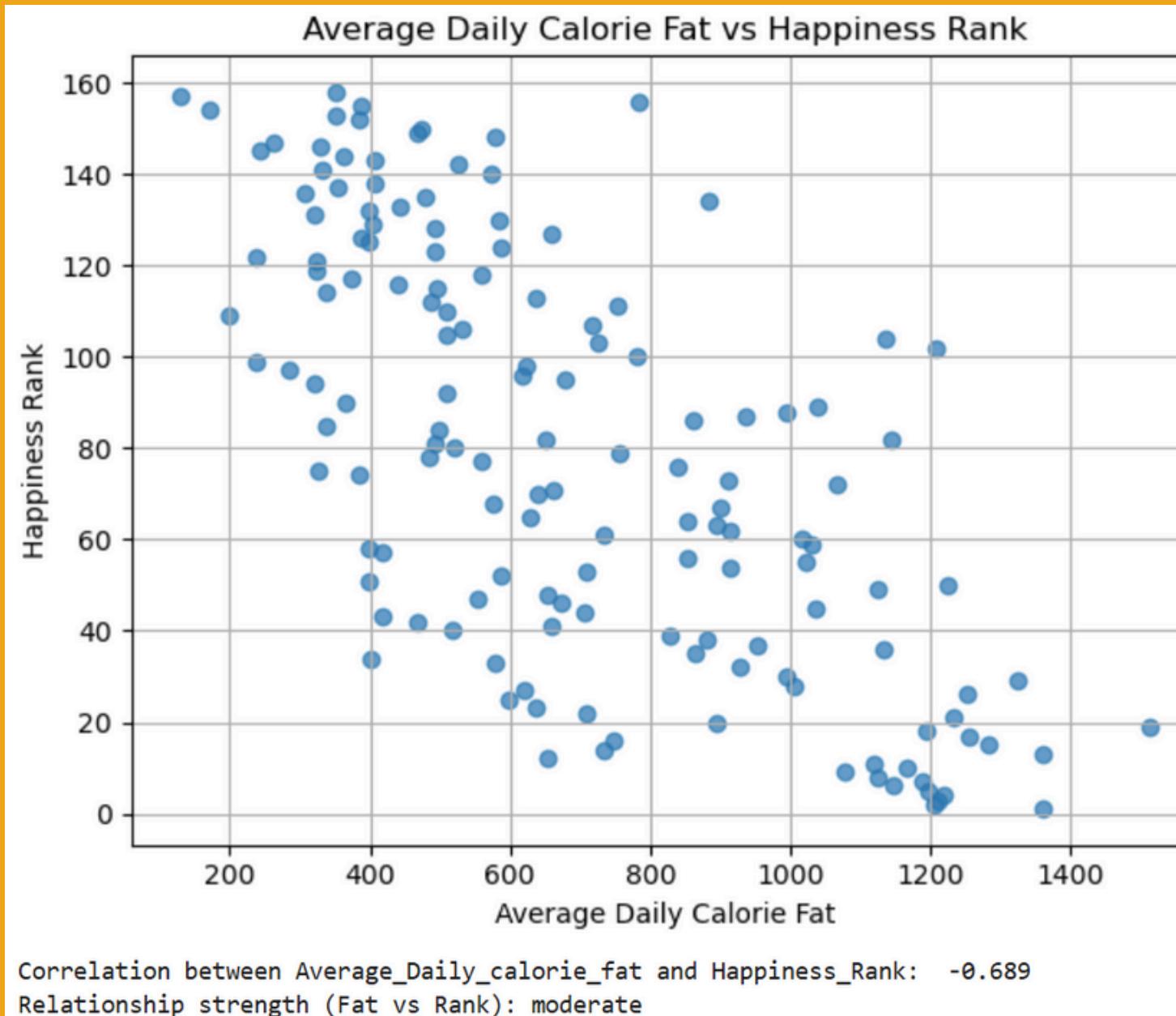


Ranked by happiness_rank

country	happiness_rank	happiness_score	avg_fat_intake
Switzerland	1	7.587	1360.23
Iceland	2	7.561	1206.07
Denmark	3	7.527	1210.15
Norway	4	7.522	1218.41
Canada	5	7.427	1197.45
Finland	6	7.406	1146.37
Netherlands	7	7.378	1189.63
Sweden	8	7.364	1124.64
New Zealand	9	7.286	1077.02
Australia	10	7.284	1166.43

Ranked by happiness_score

country	happiness_rank	happiness_score	avg_fat_intake
Denmark	3	7.527	1210.15
Iceland	2	7.561	1206.07
Norway	4	7.522	1218.41
Switzerland	1	7.587	1360.23
Argentina	30	6.574	994.19
Australia	10	7.284	1166.43
Austria	13	7.2	1360.96
Belgium	19	6.937	1514.03
Brazil	16	6.983	746.49
Canada	5	7.427	1197.45



● ● ● CORRELATION ≠ CAUSATION

- Correlation between fat intake & happiness ≠ causation
 - Strong correlation found ($|r| = 0.7$)
 - BUT correlation does not imply causation
 - Fat intake & happiness move together, but one does not cause the other
 - Relationship becomes unclear when plotted against happiness rank



REAL DRIVER: NATIONAL WEALTH

- The confounding variable: national wealth & development
 - Wealth explains both higher fat intake & higher happiness
 - Wealth → Happiness
 - Better healthcare, strong institutions, higher education, stable economy & governance
 - Wealth → Diet
 - Industrialised food systems, greater access to food groups & richer diets are higher in fat
 - Poorer nations rely more on carb heavy, lower-cost diets

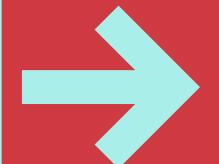
**Q18 ARE COUNTRIES WITH LOWER NUTRIENT
VARIATION HAPPIER?**

METHOD

DAILY INTAKE

1) Annualize nutrients

Sum nutrients per country ×
year (1961–2020)



2) Compute variation

StdDev across years →
“avg yearly variation”

```
STDDEV_SAMP(animal) AS std_animal,  
STDDEV_SAMP(vegetal) AS std_vegetal,  
STDDEV_SAMP(fat) AS std_fat,  
STDDEV_SAMP(carb) AS std_carb
```

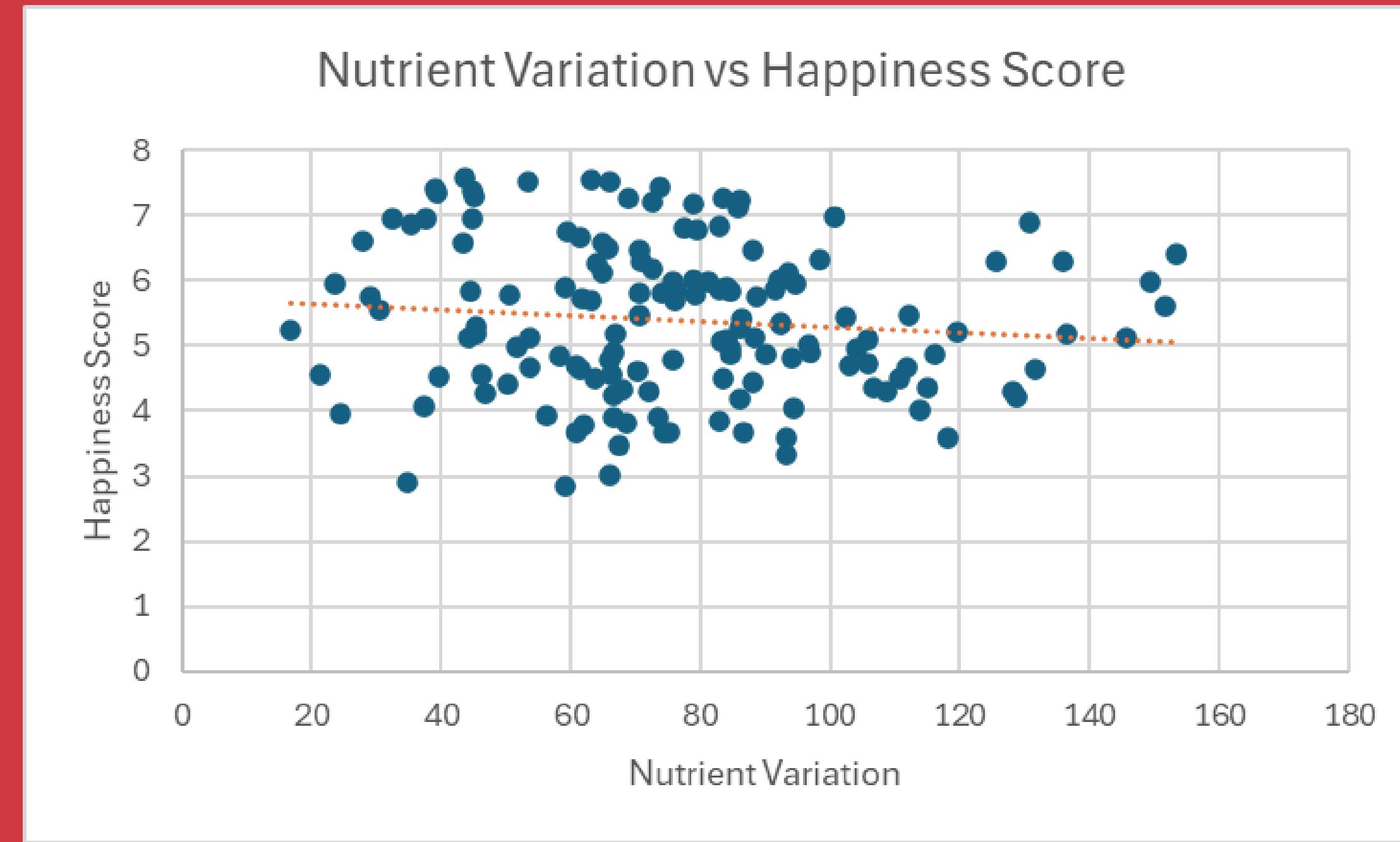


3) Join with Happiness Score

Country-level merge →
one row/country

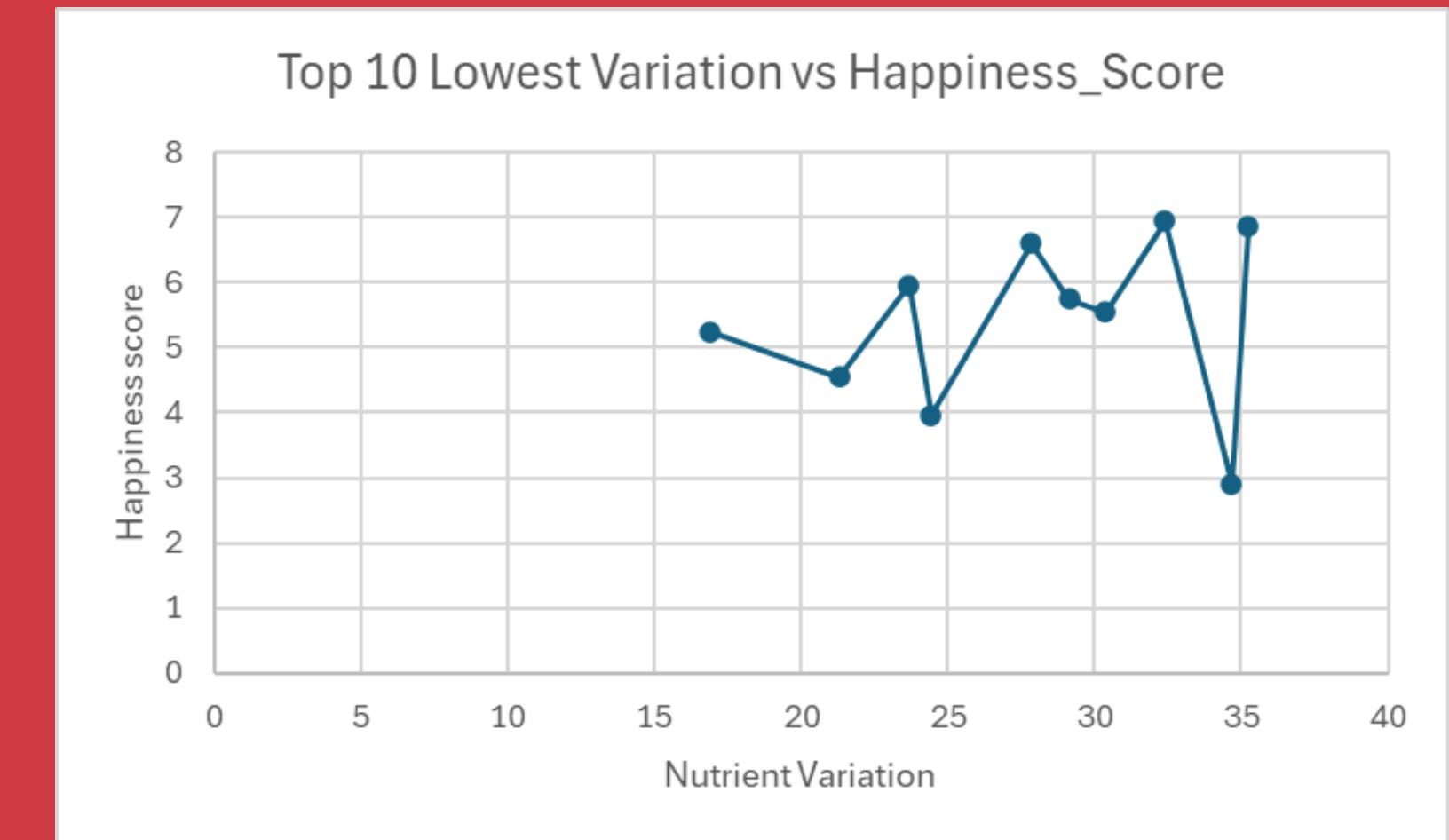
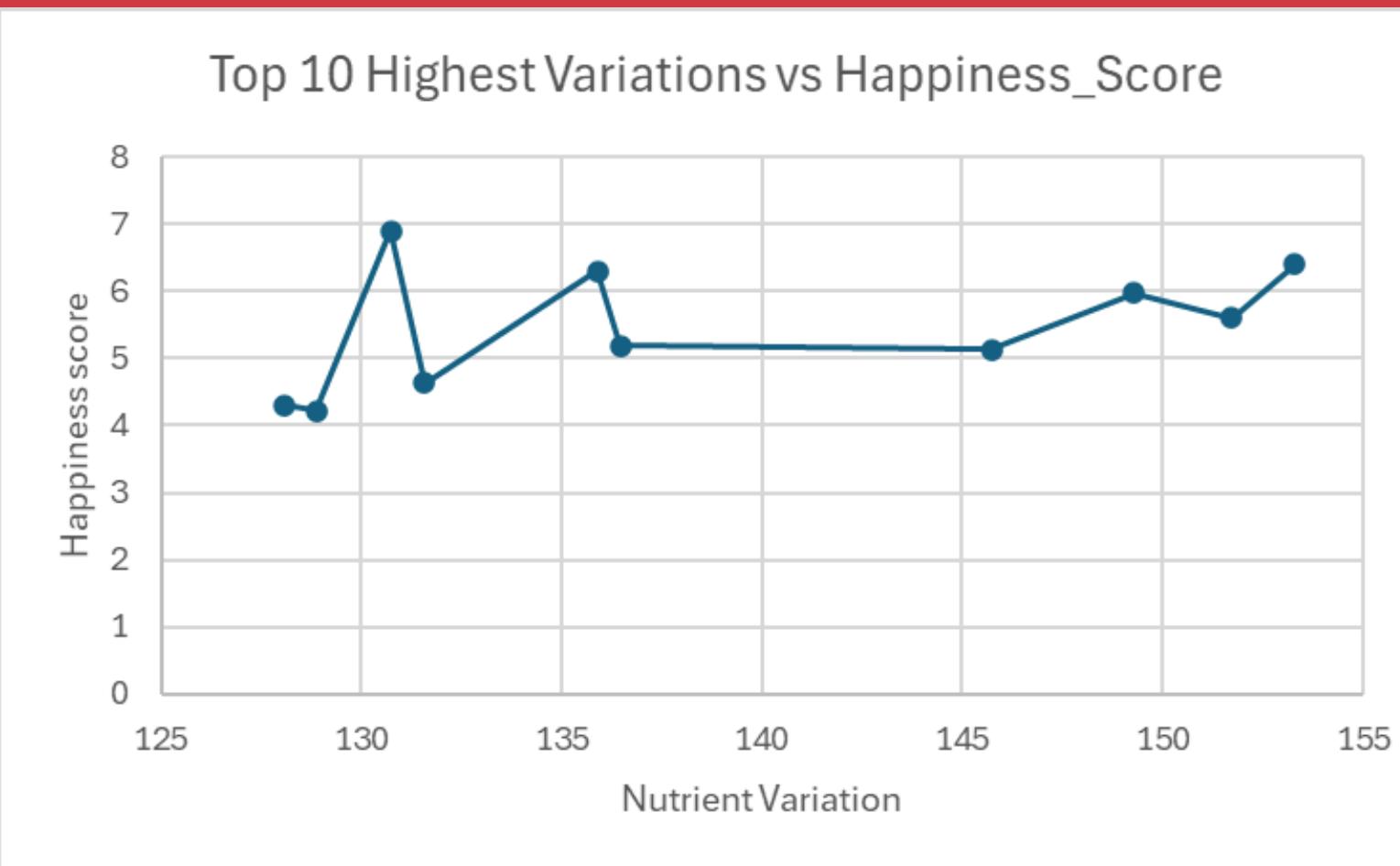
```
JOIN happiness h
```

FINDINGS



WEAK CORRELATION

EXTREME TABLES



TAKEAWAYS

- **Weak link:** Lower nutrient variation does not strongly predict happiness.
- **Context matters:** Income, health care, social support likely mediate outcomes.
- **Policy angle:** Aim for quality & access (adequate, stable nutrient supply) rather than chasing ultra-low variation.



Q19. COUNTRY TRENDS: PROCESSSED FOOD VS FAST FOOD MENUS HEALTH

- Are there any relationships between processed food intake and fast-food menus
- What can be the impact of processed food and fast-food consumption on happiness?
- What about health outcomes?



**Q19.1 ARE THERE ANY R/S BETWEEN PROCESSED
FOOD INTAKE AND FAST-FOOD MENUS?**



Q19.1 R/S: PROCESSED FOOD INTAKE & FAST-FOOD MENUS

- Approach:
 - Compute the average macronutrient breakdown of fast-food meals

- Average fast-food meal:

avg_calories	avg_fat	avg_carb	avg_protein
409.36	21.49	38.98	17.67

- Identify countries with high processed-food intake using external data
 - United States (58%), United Kingdom (57%) (BMJ, 2023)
 - Compute the average macronutrient intake of the US & UK

entity	avg_calorie_carbohydrate	avg_calorie_fat	avg_calorie_animal_protein
United Kingdom	1653.23	1231.71	226.56
United States	1738.45	1283.48	287.54



Q19.1 R/S: PROCESSED FOOD INTAKE & FAST-FOOD MENUS

- Why they align:
 - Fast-food culture shapes national eating habits
 - Economic/lifestyle factors: cost, time, accessibility & marketing
- Conclusion:
 - High intake countries show dietary macronutrient patterns that closely resemble fast-food meals
 - Strong evidence of a positive relationship between processed-food intake and fast-food nutritional patterns

Q19.2 WHAT CAN BE THE IMPACT OF PROCESSED-FOOD & FAST-FOOD CONSUMPTION ON HAPPINESS



Q19.2 IMPACT OF PROCESSED/FAST-FOOD CONSUMPTION

- Approach:
 - Identify high-intake countries
 - US, UK, Canada, Sweden, Australia (BMJ, 2023)
 - Identify low-intake countries
 - Romania, Colombia, Hungary, Italy, Estonia (BMJ, 2023)
 - Compute the average happiness metrics for each group:

High-intake group:

Low-intake group:

avg_rank	avg_score
11.6	7.2122
69.2	5.5556

Q19.2 IMPACT OF PROCESSED/FAST-FOOD CONSUMPTION

- Happiness may be driven by wealth, not diet
 - High intake countries:
 - High income
 - Better healthcare
 - Greater political stability
 - Strong social safety nets
 - Higher education
- Processed food intake does not cause happiness, it coincides with wealth and is a side product of economic development

Q19.3 WHAT ABOUT HEALTH OUTCOMES



Q19.3 HEALTH OUTCOMES

- Approach:
 - Identify high-intake countries
 - US, UK, Canada, Sweden, Australia (BMJ, 2023)
 - Identify low-intake countries
 - Romania, Colombia, Hungary, Italy, Estonia (BMJ, 2023)
 - Compute the average health metrics for each group:

High-intake countries:
Low-intake countries:

	avg_life_expectan...	avg_gdp_per_cap...	avg_family	avg_freedom
High-intake countries:	0.903856	1.330492	1.2906999999999997	0.61726
Low-intake countries:	0.789358	1.097176	1.150778	0.38354

Q19.3 HEALTH OUTCOMES

- Analysis:
 - Better outcomes ≠ processed food is healthy
 - Why high-intake countries score better:
 - Higher GDP per capita
 - Stronger social support systems
 - Greater freedom & autonomy
- Conclusion:
 - High processed/fast-food consumption ≠ healthier
 - Instead: wealthier countries can absorb the health damage
 - Differences reflect economic strength, not diet quality



Q20. DOES FAST-FOOD CONSUMPTION INCREASE HEALTH RISK? COULD THE RISK BE MITIGATED?



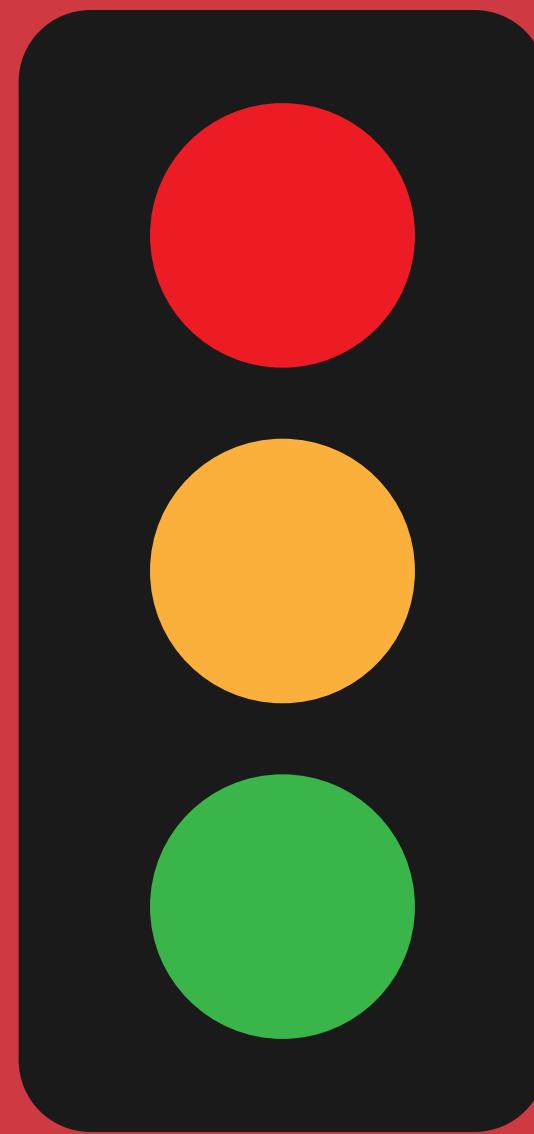
ANSWER:

**USING BURGER KING (BK) MENU DATA, REFORMULATION
REDUCED HIGH-RISK ITEMS BY 3.9 PERCENTAGE POINTS
RAISED LOW-RISK BY 6.5 POINTS WITH THE SAME SKU COUNT**

RISK IS REAL AND CAN BE MITIGATED.

HOW WE MEASURED “RISK”

RISK SCORE PER ITEM (PER 100 KCAL)



2

- 2 = HIGH RISK (SODIUM FLAG AND SATURATED-FAT FLAG)
- 1 = MEDIUM RISK (EITHER FLAG)
- 0 = LOW RISK (NEITHER)
- Cut-offs: learned from baseline ‘high’ labels (minimum values still flagged “high”), then re-applied unchanged to mitigated SKUs (apples-to-apples).

1

0

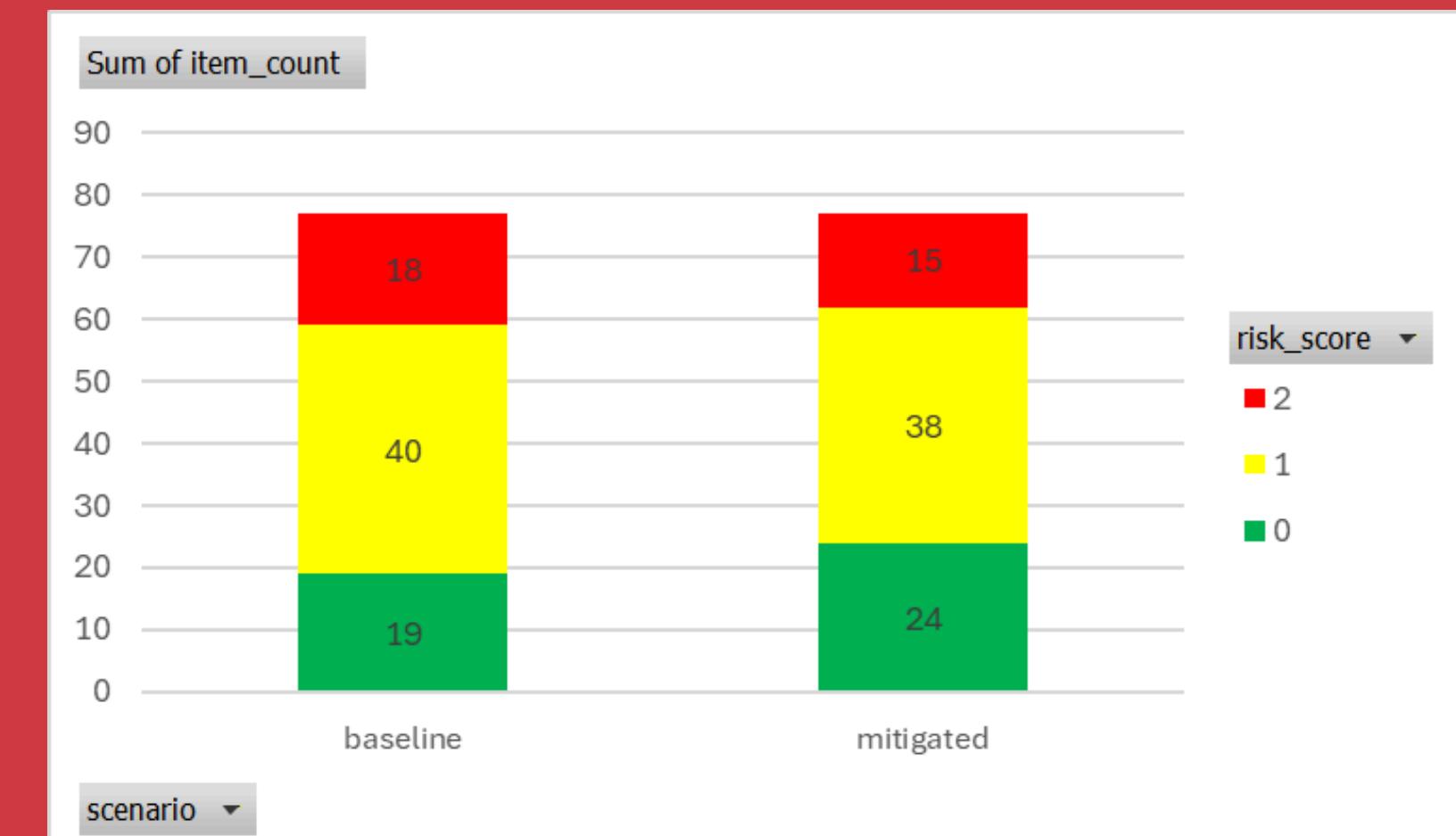
METHOD

Metric	Baseline	Mitigated	Δ (pp)
High-risk share	23.38	19.48	-3.90
Medium-risk share	51.95	49.35	-2.60
Low-risk share	24.68	31.17	6.49

IMPACT AT A GLANCE

COMPOSITION SHIFTED HEALTHIER

scenario	risk_score	item_count	pct_items
baseline	2	18	23.38
baseline	1	40	51.95
baseline	0	19	24.68
mitigated	2	15	19.48
mitigated	1	38	49.35
mitigated	0	24	31.17



77 - 77 SKUs split by risk (High = 2, Med = 1, Low = 0)

RECOMMENDATIONS

WHAT' NEXT?

Item	Category	Na_per_100kcal	Fat_per_100kcal	MarginOverCutoff
Spicy Crispy Chicken Sandwich	Chicken	162.8571429	6	0
Double Quarter Pound King Sandwich	Burgers	193.3333333	6	0
Single Stacker King	Burgers	194.2857143	6	0
Bacon Cheeseburger	Burgers	221.875	5	0
Whopper® Sandwich	Burgers	148.4848485	6.060606061	0.06



Q21. LONG-TERM DIETARY TRANSITION FOR EPIDEMIOLOGICAL ANALYSIS

SHIFTS IN US DIETARY CONSUMPTION

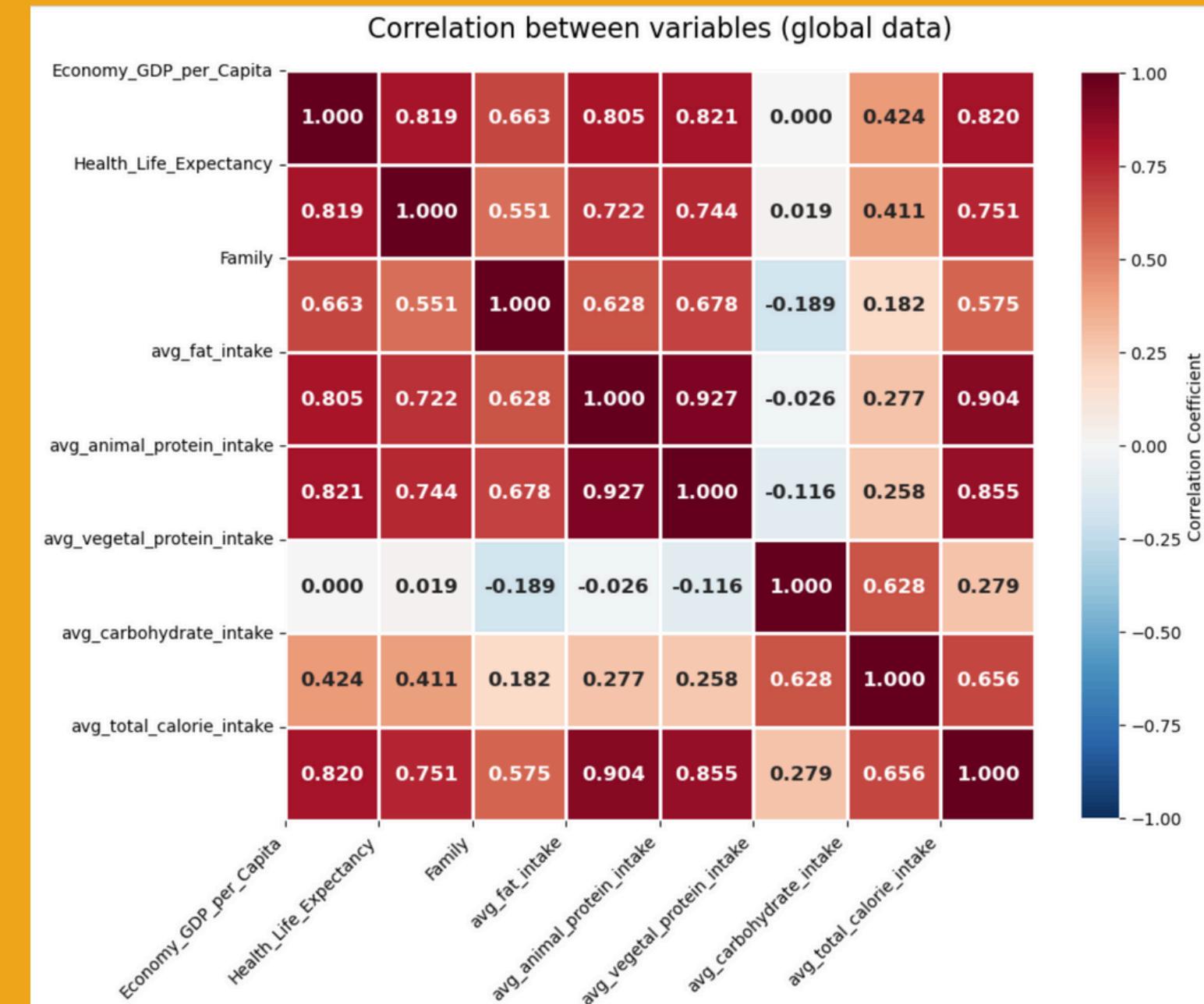




Analysis of global diet trends & variables

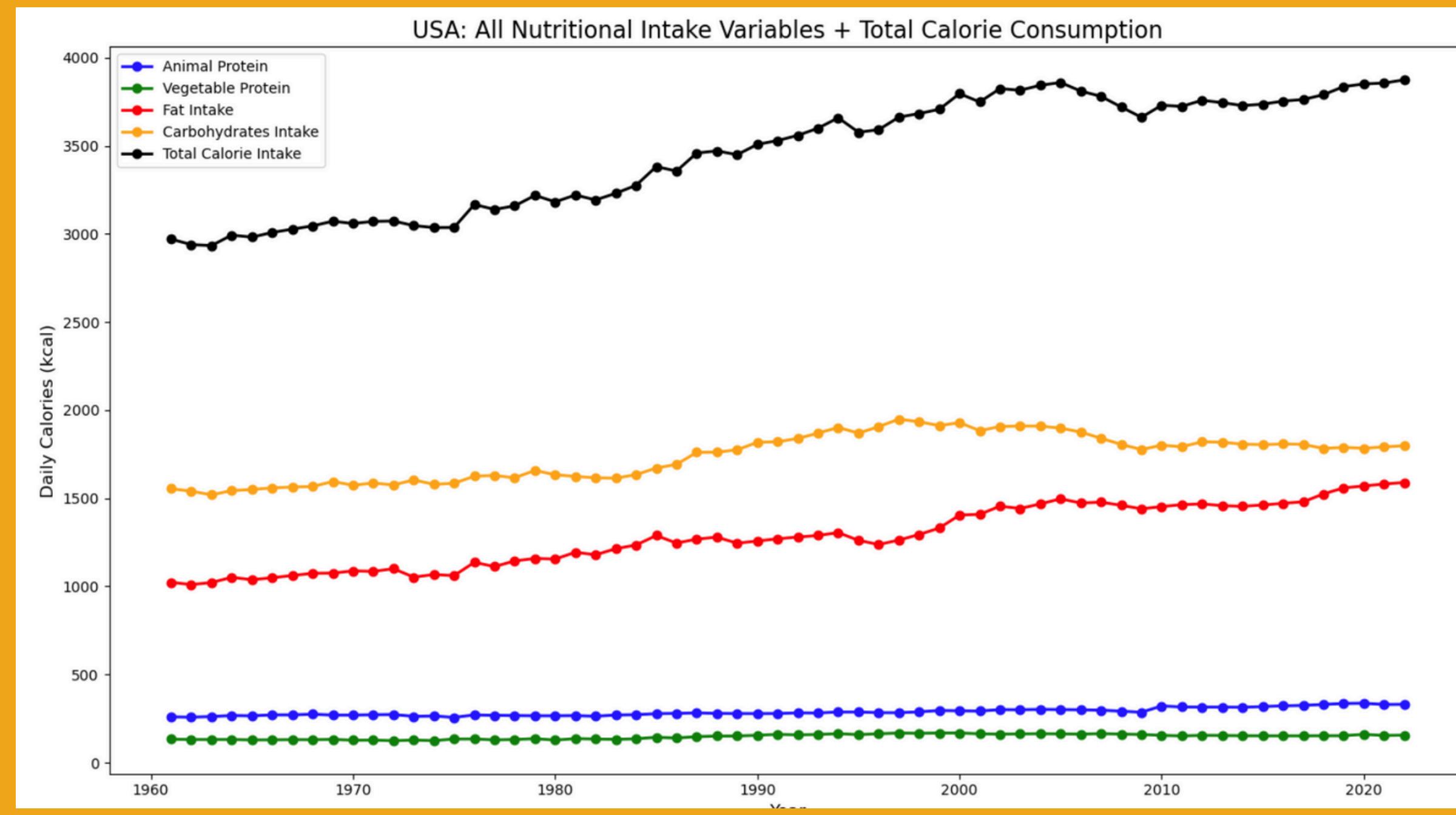
country	Economy_GDP_	Health_Life_Exp	Family	Avg Fat Intake	Avg Animal	Avg Veg Intake	Avg Carbs	Avg Total
Belgium	1.30782	0.89667	1.28566	1514.03	248.44	159.88	1845.08	3767.43
Saudi Arabia	1.39541	0.72025	1.08393	863.22	146.74	254.46	2385.99	3650.41
Ireland	1.33596	0.89533	1.36948	1193.55	278.78	170.23	1934.57	3577.13
Serbia	0.92053	0.74836	1.00964	936.23	219.38	251.29	2156.09	3562.99
Austria	1.33723	0.89042	1.29704	1360.96	245.01	153.59	1736.61	3496.17

Analysis of global diet trends

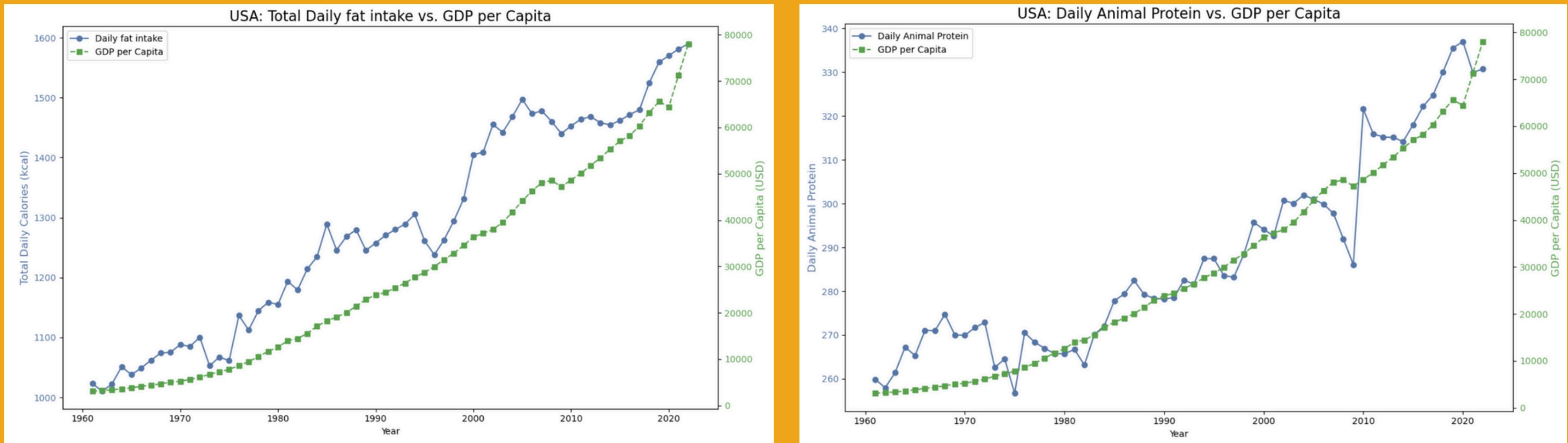




Analysis of US diet trends



Analysis of US diet against GDP per Capita





Final Analysis & Conclusion

Global Pattern: A strong global "nutrition transition" trend is confirmed: Rising GDP per capita directly correlates with higher average fat, animal protein, and total calorie intake.

U.S. Follows Global Trend: The United States is not an outlier. It perfectly mirrors this global economic-dietary pattern.

The U.S. Correlation: The relationship is exceptionally strong. We found near-perfect positive correlations between rising U.S. GDP and:

- Fat Intake ($r = 0.97$)
- Animal Protein Intake ($r = 0.96$)
- Total Calorie Intake ($r = 0.92$)



Q22. MONTHS OF UNHEALTHY FOOD SPIKES + HEALTHY FAST-FOOD PROMOTION

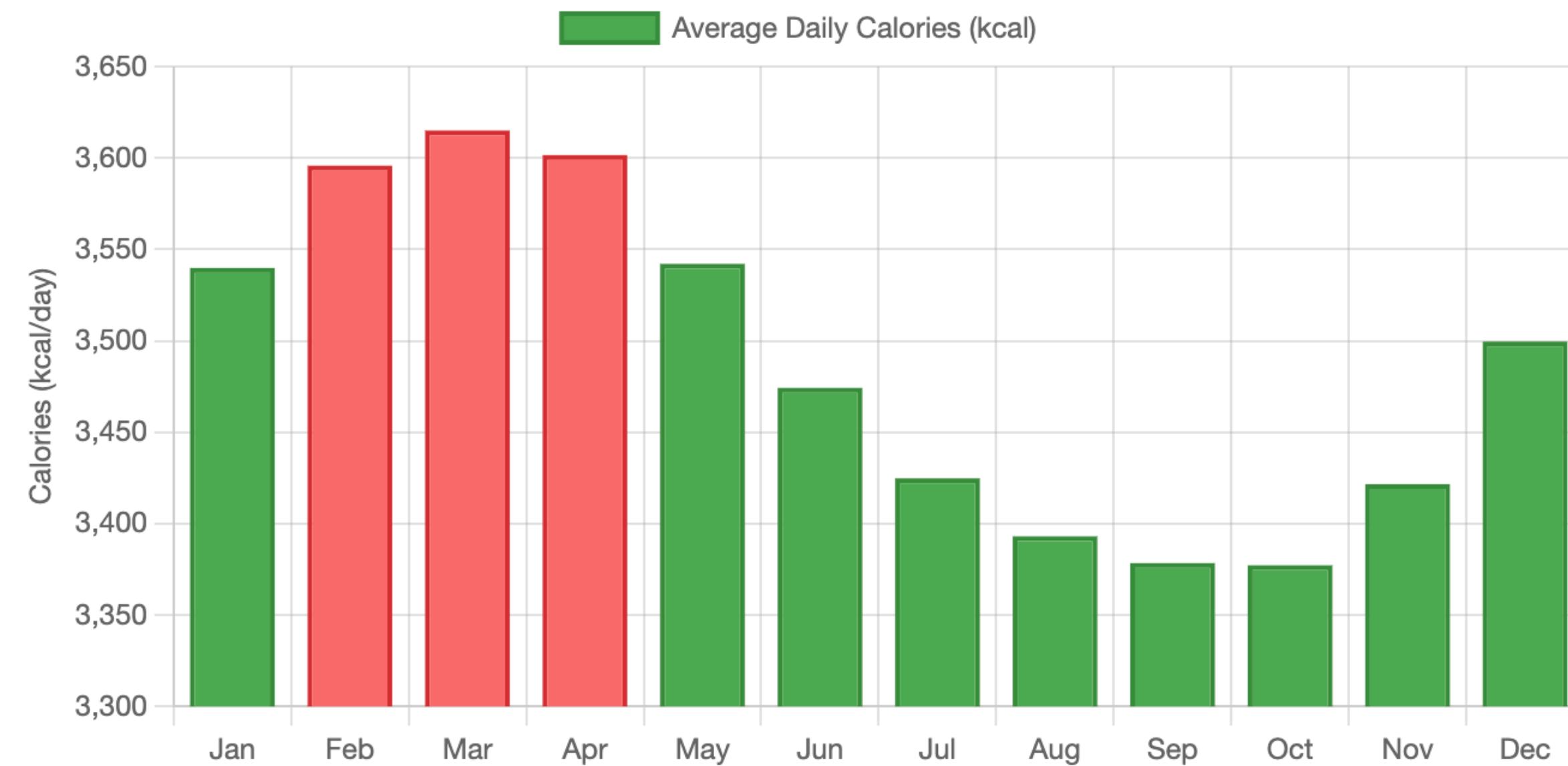
- What months should governments increase public awareness of unhealthy food spikes?
- For example, are there healthy fast-food options that can be promoted via public campaigns?
- What healthy fast-food options can be introduced? What makes these options suitable?





MONTHLY CALORY INTAKE DISTRIBUTION

Average total daily calories per person by month



Month	Daily Calorie Intake
March	3614.97
April	3601.53
February	3595.73
May	3542.05
January	3539.81



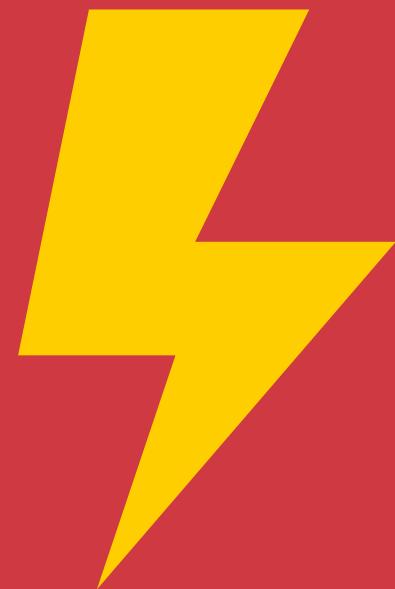
HEALTHIER FAST FOOD OPTIONS

Metric	Criteria
Calories (kcal)	<= 400
Protein (g)	> 15
Total Fat (g)	< 20
Sodium (mg)	< 1000
Sugar (g)	= 0

Main Meal Options					
Item	Category	Calories (kcal)	Protein (g)	Total Fat (g)	Sodium (mg)
Sausage Mc Muffin	Breakfast	281	16.25	10.81	742.60
Sausage Mc Muffin with Egg	Breakfast	290	22.46	15.94	804.04
Filet-O-Fish Burger	Regular	348	15.44	14.16	530.54
Mc Chicken Burger	Regular	400	15.66	15.70	766.33
Beverage Options					
Item	Category	Calories (kcal)	Sugar (g)		
Coke Zero Can	Beverage	~1	0		
Vedica Natural Mineral Water	Beverage	0	0		



WHY THEY ARE SUITABLE



Low energy
density



Higher
protein



Moderate
sodium



No sugar
drinks

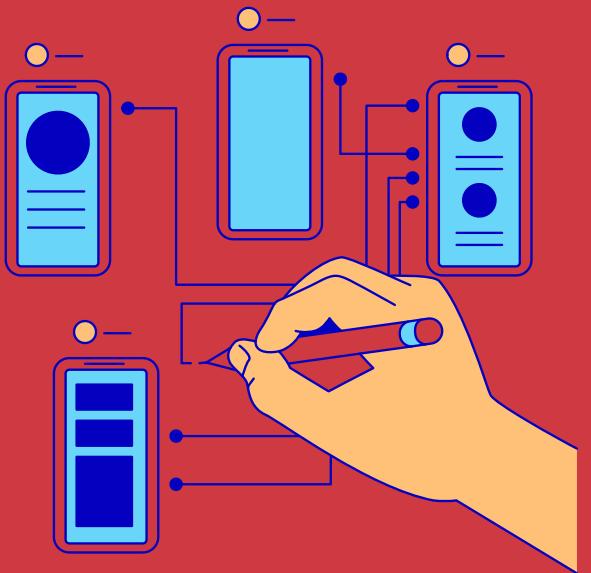
IMPLEMENTATION SUGGESTIONS



Targeted
timing
campaigns



Promotion
of “better”
options

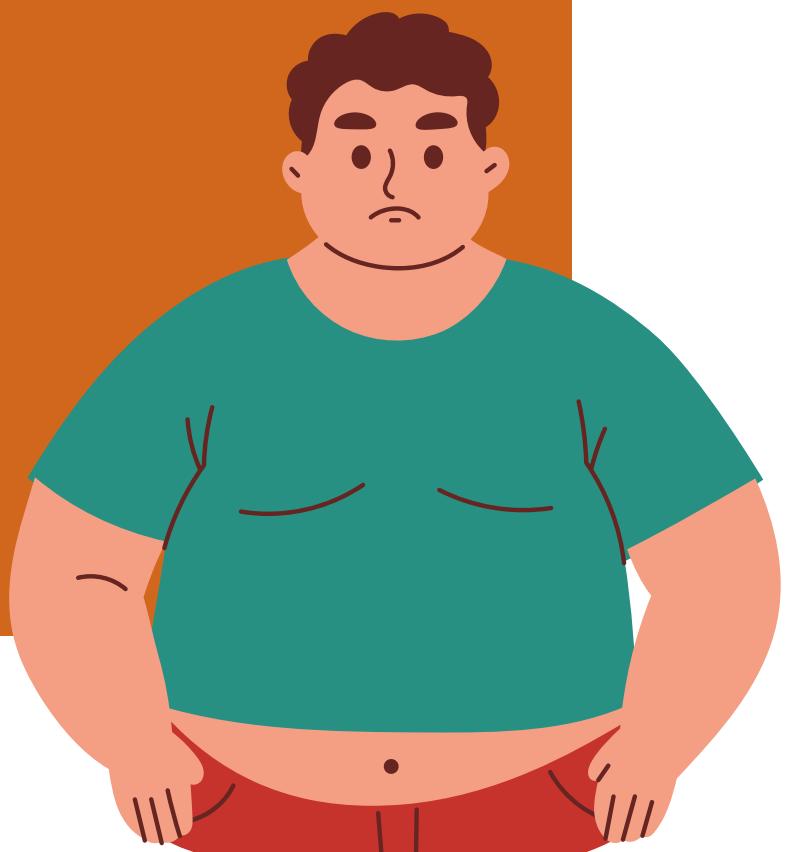


Labelling &
app
design

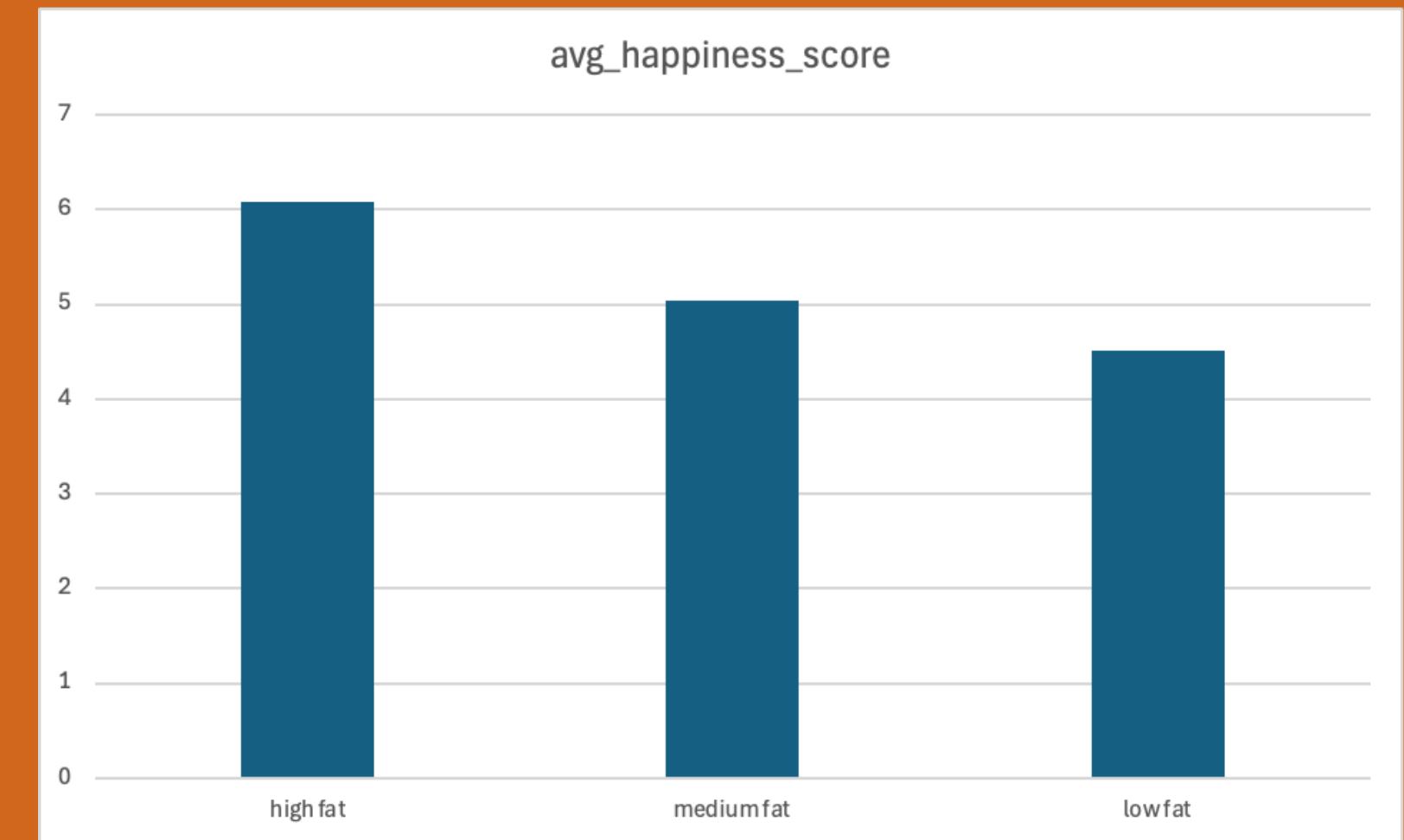


Q23. SHOULD COUNTRIES REGULATE SUGAR OR FAT CONSUMPTION?

- The relationship between dietary fat intake and national happiness levels
- How economic prosperity (GDP) influences this relationship
- The current health risk profile of fast-food environments
- Which countries would benefit most from intervention

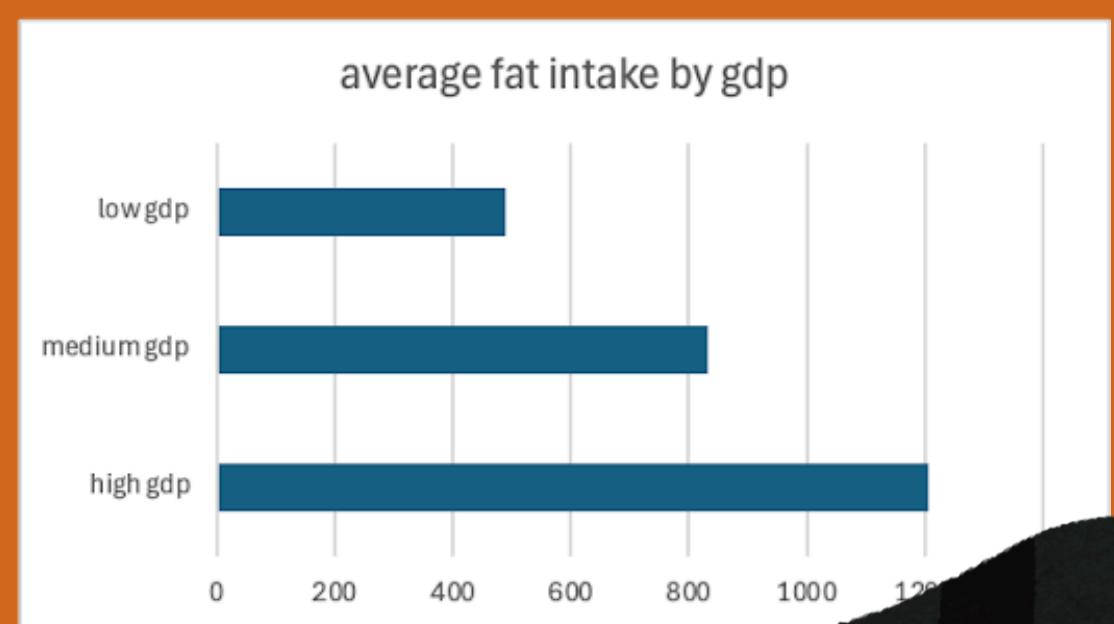
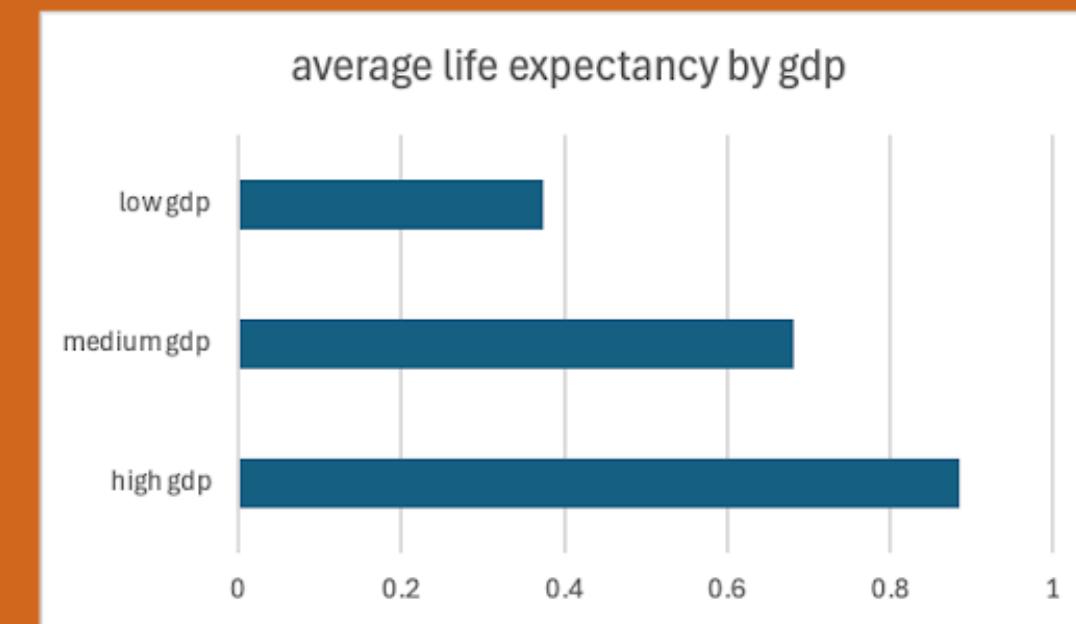
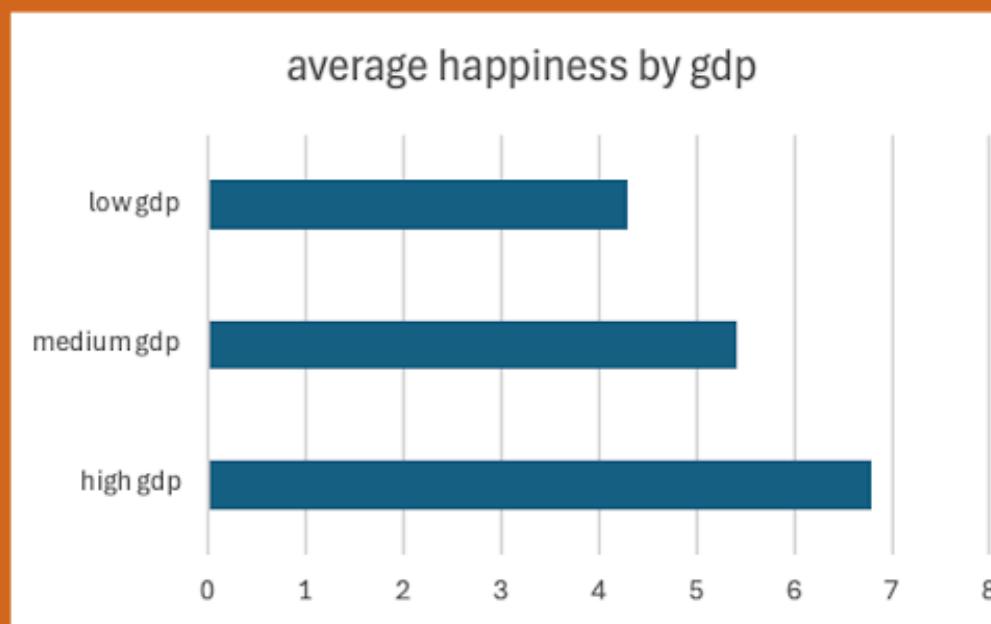


THE FAT-HAPPINESS PARADOX





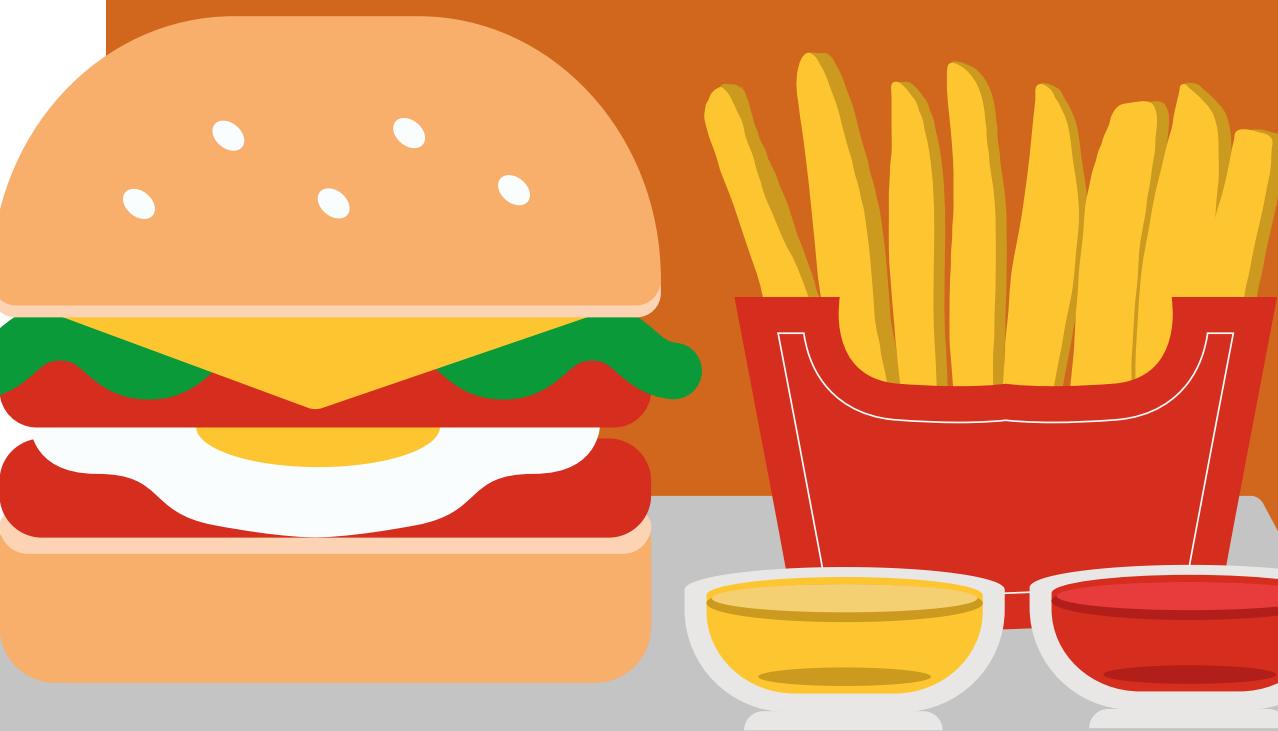
DOES GDP DRIVE THE RELATIONSHIP?





THE FAST FOOD ENVIRONMENT

Restaurant	Total items	Avg Sugar	High Sugar Items	Proportion of High Sugar Items
Mcdonalds	138	15.74	5	3.62%
Burger King	64	7.98	0	0%



WHICH COUNTRIES NEED THE MOST INTERVENTION



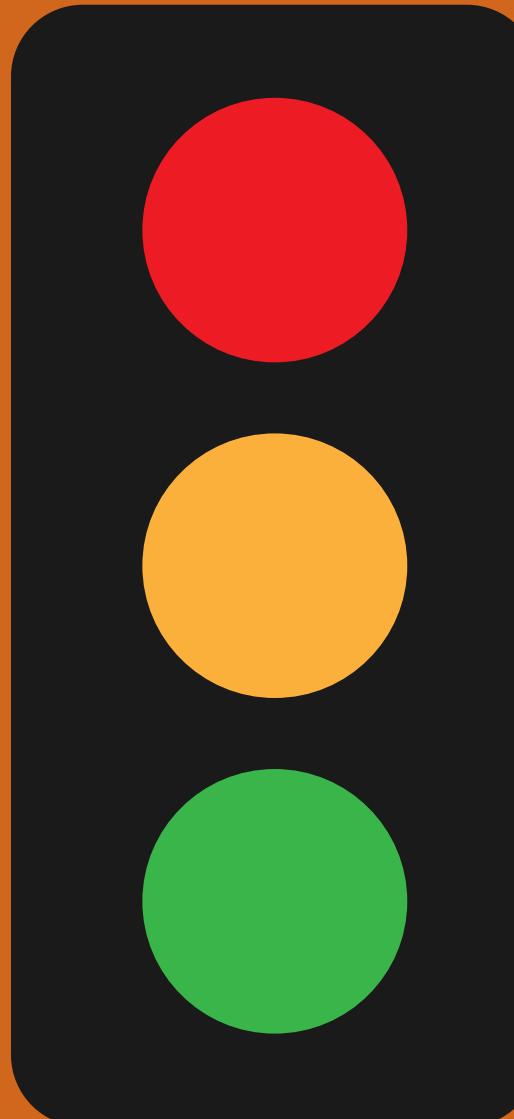
Priority for Intervention (11 countries): High fat intake + Low happiness

Consider Intervention (37 countries): Medium-to-high fat intake with moderate happiness

Monitor (99 countries): Either high happiness or low fat intake

FINAL RECOMMENDATION

TIERED POLICY APPROACH



IMPROVE ECONOMIC CONDITIONS

**USE EDUCATION AND VOLUNTARY
REFORMULATION**

USE SOFT POLICIES





THANK YOU!

