- Diet score:
  - What we tried
  - Issues
  - Final diet score

- Environment score

- Selecting persistently lean individuals with an obesogenic lifestyle

Data

- All datasets consist of subjects who:

    - have nationality data available and were Swedish

    - have the visit variable(besok) available

    - have sufficient diet data in the first place(looking at the variable *exclude*)

    - have a plausible energy intake, based on their basal metabolic rate(looking at the variable *FIL*)

    - have values of basic variables like height, weight, waist, etc. inside the recommended limit values

    - have all the basic data and the macro and micro nutrient, PA and alcohol data available.

- Three datasets were constructed, an independent dataset and a dataset containing subjects with two visits [9,11] years apart, for each visit.

- Out of 111505 subjects total, independent dataset has 44735 subjects, dataset with two visits has 30380 subjects.

Diet score

- We had tried:

    - constructing diet score based on the guidelines stated at Nordic Nutrition Recommendations or diet score used in publications,

    - constructing diet score using continuous macro and micro nutrient, multiplied with the appropriate effect size on bmi and summing them up

Diet score

- Issues:

  - When constructing the diet score based on guidelines or publications:

    - they did not completely fit our needs to construct an obesogenic diet score,

    - they did not cover all the macro or micro nutrients,

    - they were simple and general, not considering food synergy or antagonism and not considering nutrient effect by food source,

    - we had observed unexpected directions of association with bmi.

  - When constructing the diet score by multiplication with corresponding effect size:

    - how to take into account the complexity of diet and make an appropriate model to get appropriate effect sizes,

    - many model selection and effect size estimation methods,

    - even the best model did not have very good results(low R^2 and AUC)

Diet score

- Final diet score was constructed using the unshrunken effect sizes where all the macro and micro nutrients were fitted together to model the residuals from modeling BMI with basic covariates.
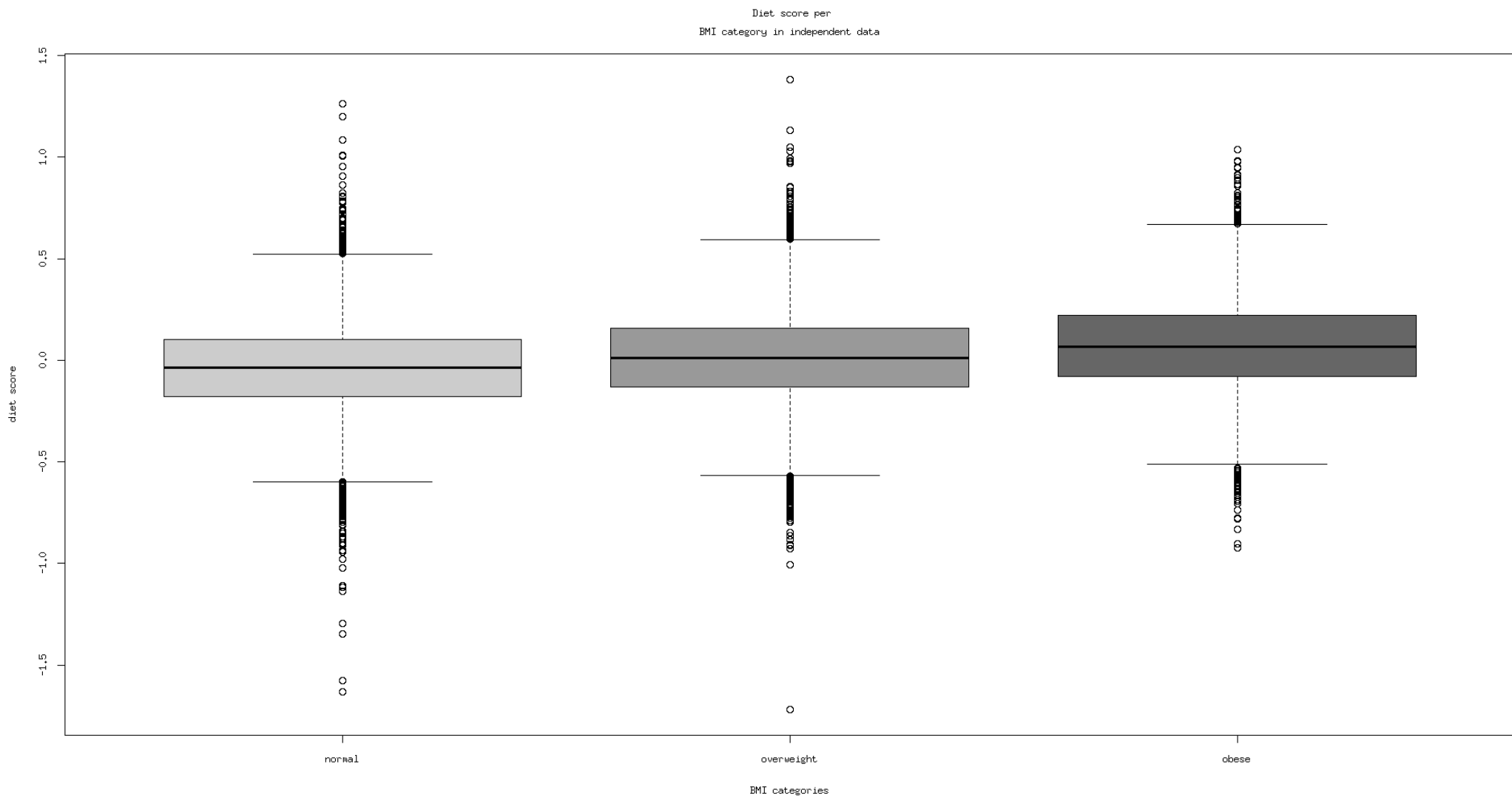
- Significant macro nutrients and TEI:

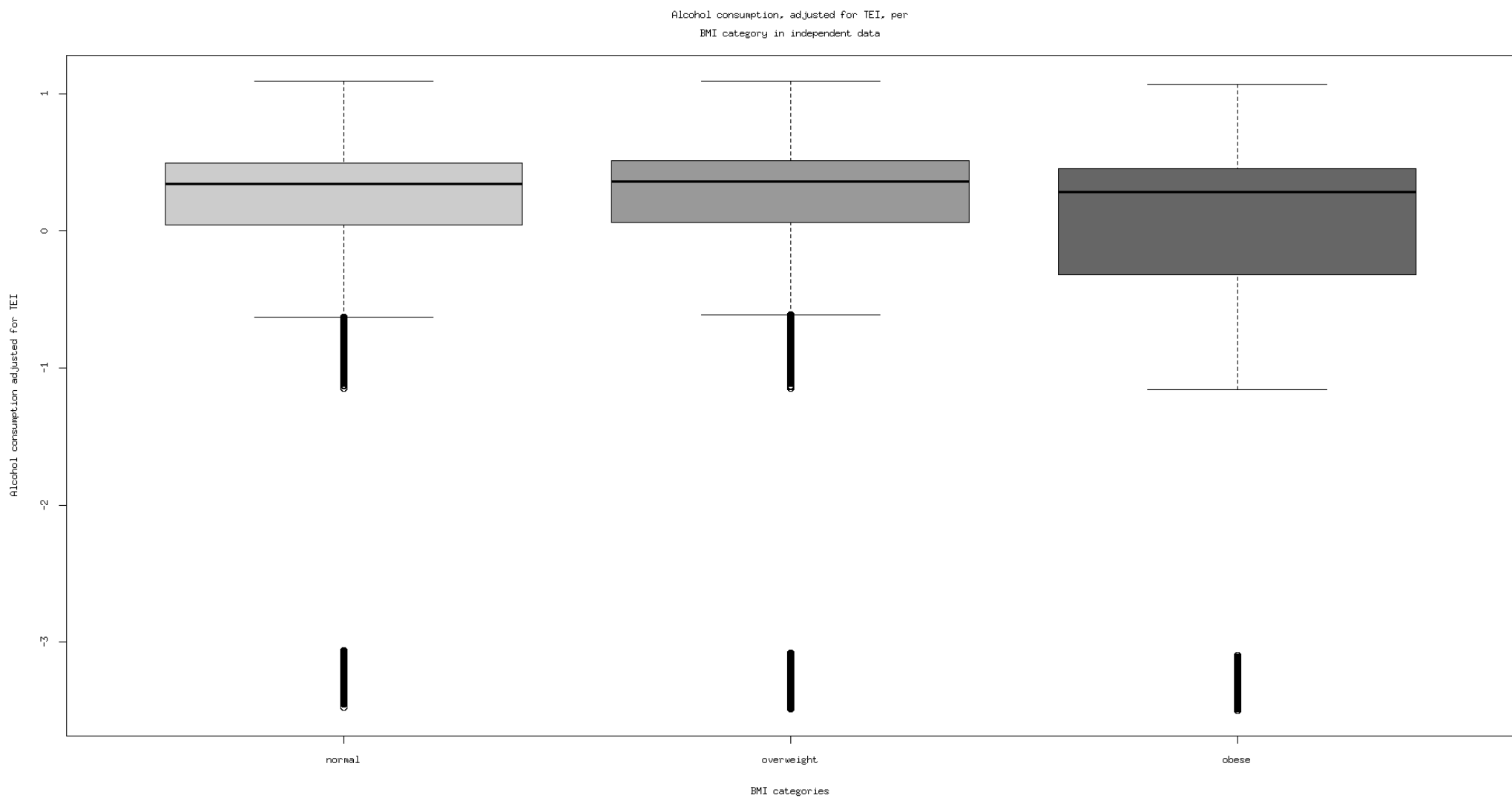|	effect size	p-value	vif
Polyunsaturated fat	0.172	2.868733e-06	33.072674
Saturated fat	-0.225	7.580582e-06	44.209620
Sucrose	-0.098	1.122240e-09	8.593770
Carbohydrates	-0.102	2.062294e-03	14.823591
Essential fatty acids	-0.195	5.187166e-10	25.861051
Animal proteins	0.213	8.985754e-16	15.442719
Fiber	0.080	2.030805e-05	10.879772
Disaccharides	0.170	1.569436e-15	12.106861
Trans fat	-0.032	1.116558e-04	2.307944
Salt (sodium)	0.203	5.061785e-35	3.603837
Total energy intake	0.013	4.211870e-03	1.000033

Environment score

- Similar was done for diet score, PA and alcohol consumption, obtaining effect sizes and using them to multiply corresponding variable and then summing all up:

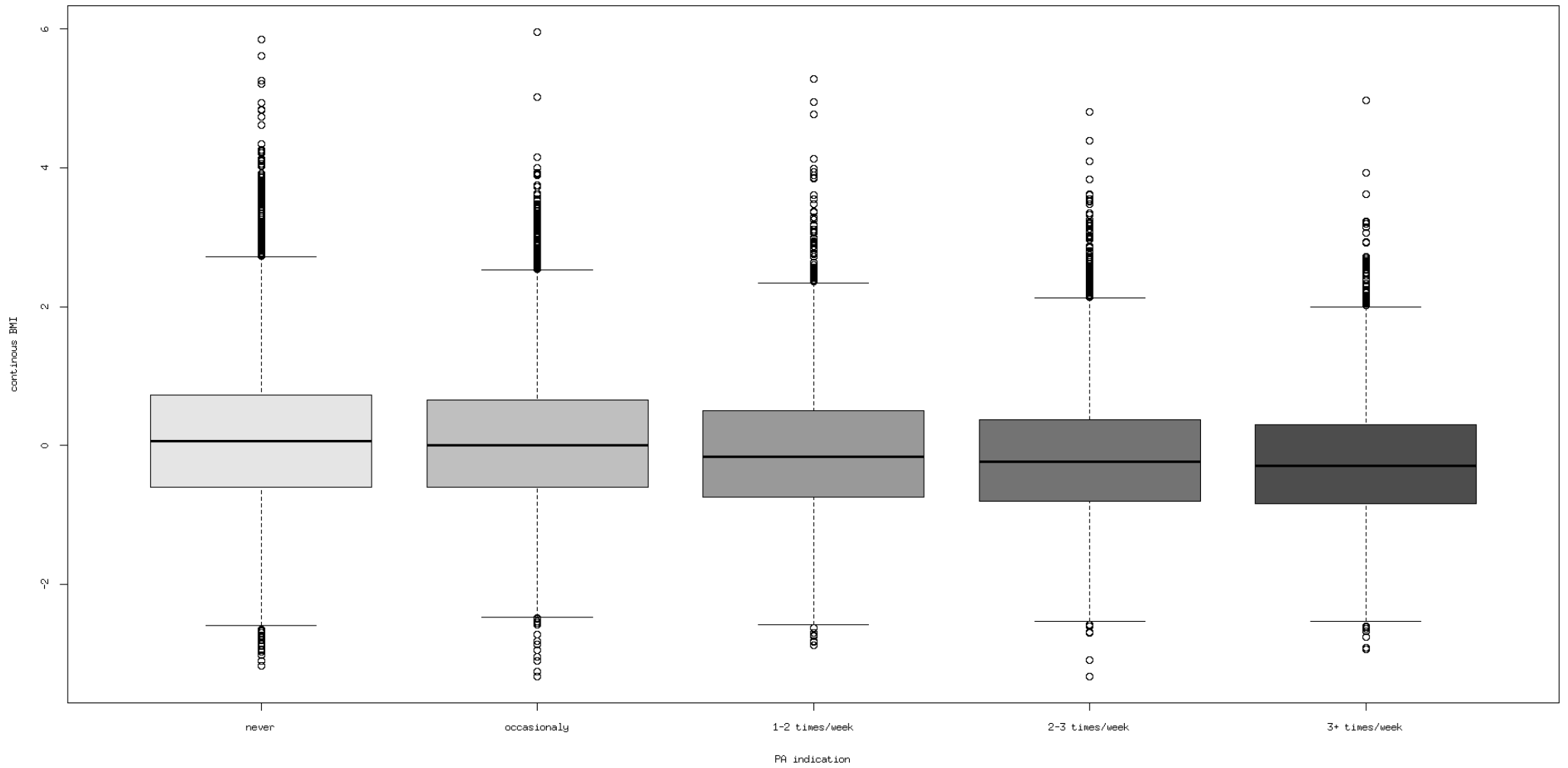|	effect size	p-value	Variable summary
Diet score	0.876992	<2e-16	[-1.719 , 1.383]
PA	-0.081397	<2e-16	[1, 2, 3, 4, 5]
alcohol	-0.041880*	<2e-16	[-3.496 , 1.093]

*we tried to investigate confounding factors influencing the effect of alcohol on bmi, focusing on the socio-economic status, represented by the variable for education, but were not able to confirm confounding.
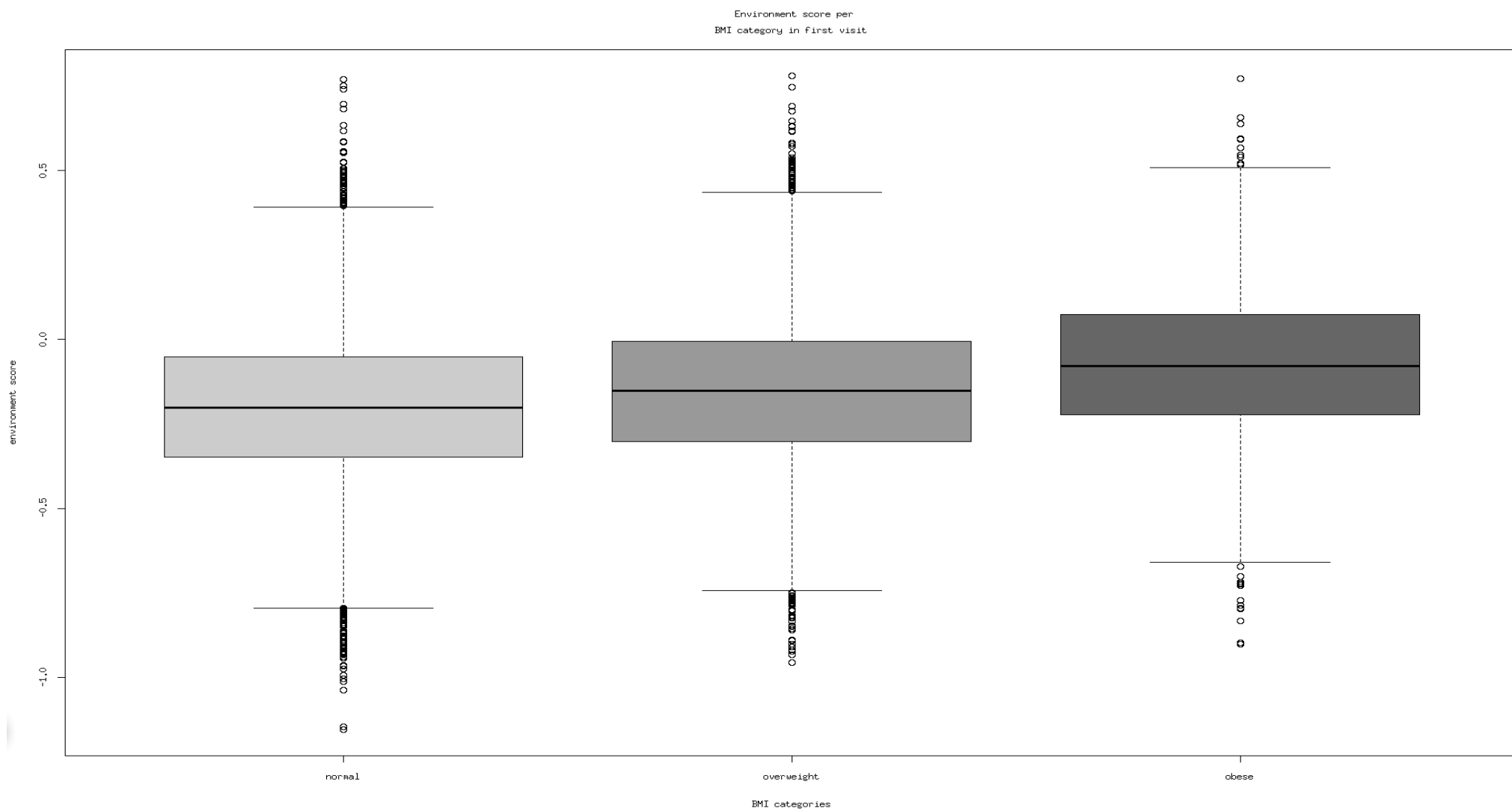
Diet score per
BMI category in independent data

Alcohol consumption, adjusted for TEI, per
BMI category in independent data

continous BMI per PA indication in independent data

Environment score

- Results for the model:

	continous		
	R²	Environment effect size	p-value
Visit 1	0.04057	0.866377	<2e-16
Visit 2	0.05668	1.002757	<2e-16

	discrete			
	R²	Environment effect size	p-value	AUC
Visit 1	0.0496214	1.369 (1) 2.893 (2)	<2e-16	0.655383
Visit 2	0.0450873	1.248 (1) 2.976 (2)	<2e-16	0.6491333

Environment score per
BMI category in first visit

environment score

normal   overweight   obese

BMI categories

Selecting subjects of interest

- Based on the environment score and bmi in both visits, we have to select subjects that are persistently lean/normal weight, despite having an obesogenic environment score.

- We had considered:

  - Setting a cut-off point in the environment score and defining all values above as obesogenic and select lean/normal weight subjects with the environment score above that value,

  - Obtain the ratio $\dfrac{bmi\ Z\ score}{environment\ Z\ score}$ and set a cut-off point somewhere below one, to select those subjects whose environment z-score is substantially larger than their bmi z-score,

  - Selecting those lean/normal weight subjects that are persistently misclassified as overweight or obese.

predicted \ true	0	1	2
0	14090	7122	1771
1	2688	3632	809
2	5	0	1