UNIVERSITY OF LEEDS

This is a repository copy of *Dietary patterns derived with multiple methods from food diaries and breast cancer risk in the UK Dietary Cohort Consortium*.

White Rose Research Online URL for this paper:
http://eprints.whiterose.ac.uk/80215/

Version: Accepted Version

Article:
Pot, GK, Stephen, AM, Dahm, CC et al. (12 more authors) (2014) Dietary patterns derived with multiple methods from food diaries and breast cancer risk in the UK Dietary Cohort Consortium. European Journal of Clinical Nutrition. ISSN 0954-3007

https://doi.org/10.1038/ejcn.2014.135

Reuse
Unless indicated otherwise, fulltext items are protected by copyright with all rights reserved. The copyright exception in section 29 of the Copyright, Designs and Patents Act 1988 allows the making of a single copy solely for the purpose of non-commercial research or private study within the limits of fair dealing. The publisher or other rights-holder may allow further reproduction and re-use of this version - refer to the White Rose Research Online record for this item. Where records identify the publisher as the copyright holder, users can verify any specific terms of use on the publisher's website.

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

White Rose university consortium
Universities of Leeds, Sheffield & York

eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk/

Table 1 number of controls and cases per cohort of the UK dietary consortium

Cohorts Breast cancer	N Controls	N Cases	N post-menopausal cases	Period of food diaries completion
EPIC-Norfolk	1297	360	291	1993-1998
EPIC-Oxford:	140	140	61	1993-1999
UKCWS (Leeds Dante)	184	41	28	1999-2002
Whitehall II	270	69	29	1991-1993
Subtotal	*1891*	*610*	*409*	

Table 2 Characteristics of controls (n=1891) and cases of breast cancer (n=610) of the UK Dietary consortium#

	Controls		Cases		
	Mean	**SD**	**Mean**	**SD**	**p value***
Age (y)	57.2	9.25	56.6	9.5	0.04
Age at first live birth (y)	25.4	4.8	26.0	4.6	0.02
Age at menopause (y)	49.4	4.2	49.7	3.9	0.12
Participant's height (cm)	161.47	6.43	162.7	6.6	<0.0001
Participant's weight (kg)	67.3	12.1	68.0	12.0	0.19
BMI (kg/m^2)	25.8	4.5	25.7	4.5	0.72
Parity (Number of children)	1.91	1.31	1.75	1.22	0.00
Physical activity (low, medium, medium-high, high) %	26/34/23/17		28/34/23/14		0.38
Menopausal status (pre-peri-post%)	19/9/72		18/15/67		<0.0001
HRT use ever(%yes)	32		30		0.55
Education level (0/1/2/3) %	34/21/29/16		31/21/27/21		0.07
Smoking status (never-former-current)	59/31/10		60/30/10		0.99
Social class (0-6) %	8/39/21/18/10/4		9/37/25/17/8/3		0.27
Family history (% yes)	7		11		0.00
Ever breastfed (% yes)	69		67		0.44
OC use ever (%yes)	52		54		0.41
Energy (kcal/day)	1740	403	1803	392	0.00
Energy (MJ/day)	7.34	1.69	7.60	1.65	0.00
Saturated fat (% FE)	12.7	3.1	12.6	3.2	0.39
PUFA (% FE)	6.4	1.8	6.5	1.8	0.37
Protein (% FE)	15.6	3.1	15.4	2.9	0.20
CHO (% FE)	47.2	6.4	47.0	6.8	0.40
Non-starch polysaccharides (NSP) (g/d)	14.7	5.3	15.4	5.5	0.005
Sucrose (% FE)	9.1	3.7	9.1	3.8	0.97
Cholesterol (mg/d)	186.2	85.1	186.2	82.8	0.99
Calcium (mg/d)	795	257	815	255	0.10
Ratio MUFA/SFA	0.94	0.22	0.96	0.24	0.05
Alcohol (g/d)	9.0	13.2	10.4	13.4	0.01
Fruit and veg (g/d)	310.6	178.6	321.1	183.6	0.21
Fish (g/d)	16.9	23.3	16.9	23.3	0.99
Meat and meat products (g/d)	92.8	64.0	93.3	66.1	0.87
Vegetables (g/d)	129.2	79.2	134.5	87.5	0.17
Legumes (g/d)	22.4	25.8	25.1	27.0	0.03
Whole grain cereals (g/d)	41.6	56.9	45.9	59.7	0.10
Dairy intake incl cheese (g/d)	271.9	154.8	275.1	155.7	0.65

* P value based on t-test for continuous variables and chi-square for categorical variables

Abbreviations: BMI (Body Mass Index); HRT (hormone replacement therapy); OC (oral contraceptive); MJ (Mega-joule); FE (food energy); PUFA (poly unsaturated fatty acids); CHO (carbohydrate); NSP (non-starch polysaccharide)

N was 1891 for controls and 610 for cases except for age at live first birth (n controls=1507, n cases=465), age at menopause (n controls=1539, n cases=450), participant's height (n controls=1883, n cases=603), participant's weight (n controls=1869, n cases=604), BMI (n controls=1866, n cases=602), education level (n controls=1816, n cases=562), smoking status (n controls=1874, n cases=598), social class (n controls=1714, n cases=460), family history of breast cancer (n controls=1481, n cases=401), ever breastfed (n controls=1580, n cases=530), OC use ever (n controls=1864, n cases=604)

TABLE 3 Odds ratios for breast cancer risk according to tertiles of Mediterranean Diet Score (MDS), with and without including alcohol in MDS score

	n cases/ controls	**Model**	Tertile 1	Tertile 2	Tertile 3	P trend$
MDS*						
	610/1891	0	1.00 (ref)	1.05 (0.84;1.32)	1.22 (0.94;1.58)	0.12
	610/1891	1	1.00 (ref)	1.03 (0.82;1.30)	1.20 (0.92; 1.56)	0.15
	387/1430	2	1.00 (ref)	0.91 (0.70;1.18)	1.05 (0.77;1.43)	0.68
	387/1430	1adj	1.00 (ref)	0.91 (0.70;1.19)	1.06 (0.78;1.45)	0.62
Post-menopausal	409/1360	1	1.00 (ref)	0.90 (0.68; 1.19)	1.10 (0.80; 1.51)	0.46
≥2 year after diagnosis	518/1887	1	1.00 (ref)	1.08 (0.85;1.38)	1.22 (0.92;1.62)	0.16
MDS no alcohol**						
	610/1891	0	1.00 (ref)	1.02 (0.79; 1.32)	1.18 (0.85; 1.63)	0.32
	610/1891	1#	1.00 (ref)	0.99 (0.76; 1.29)	1.15 (0.83; 1.60)	0.40
	387/1430	2#	1.00 (ref)	0.99 (0.73; 1.35)	1.02 (0.69; 1.52)	0.92
	387/1430	1adj	1.00 (ref)	1.00 (0.74; 1.36)	1.04 (0.70; 1.53)	0.86
Post-menopausal	409/1360	1#	1.00 (ref)	0.95 (0.68; 1.32)	1.14 (0.76; 1.71)	0.57
≥2 year after diagnosis	518/1887	1#	1.00 (ref)	0.93 (0.70;1.23)	1.12 (0.79;1.59)	0.52

*P interaction MDS score with study centre 0.16; ** p interaction MDS score without alcohol with study centre 0.22

$ P for trend was based on median tertile score

Model 0: unadjusted

Model 1: adjusted for exact age, parity, use of HRT, weight, height, physical activity, and menopausal status

Model 2: adjusted for exact age, parity, use of HRT, weight, height, physical activity, menopausal status, family history of breast cancer, breast feeding, and education level

Model 1adj: see model 1 but now including a reduced number of cases and controls as in model 2

 # This model was also adjusted for alcohol

TABLE 4 Odds ratios for breast cancer according to tertiles of the first factor score of dietary patterns derived with principal components analyses (PCA) using 42 predefined food groups.

	n cases/ controls	**model**	Tertile 1	Tertile 2	Tertile 3	P trend$
PCA factor 1	610/1891	0	1.00 (ref)	1.03 (0.81; 1.31)	1.18 (0.92; 1.52)	0.18
	610/1891	1	1.00 (ref)	1.03 (0.80; 1.31)	1.18 (0.91; 1.53)	0.19
	387/1430	2	1.00 (ref)	0.94 (0.71; 1.23)	1.02 (0.75; 1.39)	0.89
	387/1430	1adj	1.00 (ref)	0.95 (0.73; 1.25)	1.05 (0.78; 1.42)	0.74
Post-menopausal	409/1360	1	1.00 (ref)	1.04 (0.79; 1.38)	1.27 (0.93; 1.73)	0.13
≥2 year after diagnosis	518/1887	1	1.00 (ref)	1.05 (0.81;1.36)	1.16 (0.88;1.53)	0.29

Factor 1 was positively loaded by cheese, crisps and savoury snacks, fresh fruit, legumes, low-fat milk, nuts and seeds, other fruits, and negatively loaded by poultry, red meat and water (all scoring >0.25 factor loading)

$ P for trend was based on median tertile score

Model 0: unadjusted

Model 1: adjusted for exact age, parity, use of HRT, weight, height, physical activity, and menopausal status

Model 2: adjusted for exact age, parity, use of HRT, weight, height, physical activity, menopausal status, family history of breast cancer

Model 1adj: see model 1 but now including a reduced number of cases and controls as in model 2

TABLE 5 Odds ratios for breast cancer according to tertiles of RRR-derived dietary patterns using 42 predefined food groups using alcohol, total fat and fibre as response variables. Results are presented for tertiles of the factor loading score for the first dietary pattern.

RRR dietary pattern	**n cases/ controls**	**model**	Tertile 1	Tertile 2	Tertile 3	P trend$
First dietary pattern#: high alcohol	610/1891	0	1.00 (ref)	1.04 (0.81;1.33)	1.29 (1.01;1.64)	0.02
	610/1891	1	1.00 (ref)	1.06 (0.83;1.36)	1.27 (1.00;1.62)	0.04
	387/1430	2	1.00 (ref)	1.04 (0.77;1.39)	1.28 (0.95;1.71)	0.08
	387/1430	1adj	1.00 (ref)	1.05 (0.78; 1.40)	1.33 (0.99; 1.77)	0.04
Post-menopausal	409/1360	1	1.00 (ref)	1.14 (0.84;1.55)	1.46 (1.08;1.98)	0.01
≥2 year after diagnosis	518/1887	1	1.00 (ref)	1.08 (0.82;1.42)	1.32 (1.01;1.71)	0.03
Second dietary pattern: high fibre	610/1891	0	1.00 (ref)	1.04 (0.82;1.31)	1.09 (0.86;1.39)	0.46
	610/1891	1	1.00 (ref)	1.04 (0.82;1.31)	1.08 (0.84;1.38)	0.55
	387/1430	2	1.00 (ref)	1.14 (0.86;1.50)	1.08 (0.81;1.44)	0.65
	387/1430	1adj	1.00 (ref)	1.15 (0.87; 1.51)	1.10 (0.82; 1.46)	0.56
Post-menopausal	409/1360	1	1.00 (ref)	1.10 (0.83;1.48)	1.23 (0.91;1.66)	0.18
≥2 year after diagnosis	518/1887	1	1.00 (ref)	0.99 (0.77;1.28)	1.10 (0.84;1.43)	0.48

The first dietary pattern was positively loaded by total wines, spirits, and beers and ciders (scores >0.2).

The second dietary pattern was positively loaded by fresh fruit, vegetables raw and boiled, high fibre bread, high fibre breakfast cereals, legumes, yoghurts (scores >0.2)

$ P for trend was based on median tertile score

 # P interaction of first RRR derived dietary pattern score with study centre 0.83

Model 0: unadjusted

Model 1: adjusted for exact age, parity, use of HRT, weight, height, physical activity, and menopausal status

Model 2: adjusted for exact age, parity, use of HRT, weight, height, physical activity, menopausal status, family history of breast cancer, breast feeding, and education level

Model 1adj: see model 1 but now including a reduced number of cases and controls as in model 2

Supplementary TABLE 1 Factor loadings of PCA derived dietary patterns in full sample (n=2501) as well as random split sample (n=1242)

	Factor 1		Factor 2		Factor 3	
	Full	*Split*	Full	*Split*	Full	*Split*
spirits, liqueur, alcopops	-14	*-9*	-6	*-18*	**-33**	*-33*
beers and ciders	1	*-1*	-11	*-14*	**-27**	*-27*
wines	7	*10*	-1	*-43*	**-53**	*-30*
biscuits and cakes	6	*9*	**-29**	*42*	38	*-2*
butters and animal fat	-1	*-3*	**-31**	*20*	4	*-27*
cereal based mixed meals	13	*14*	**-**24	*10*	-4	*-12*
cheeses	**40**	*44*	-3	*-1*	-10	*-2*
chocolate and confectionery	9	*14*	**-30**	*45*	35	*-11*
condiments	-5	*5*	1	*24*	**26**	*10*
crisps and savoury snacks	**26**	*33*	5	*6*	1	*4*
eggs	4	*6*	**-31**	*17*	3	*-24*
fish	-16	*-14*	18	*-17*	-10	*8*
fresh fruit	**27**	*26*	**55**	*-11*	22	*56*
fruit and vegetable juices	16	*14*	11	*-20*	-14	*7*
game and offal	-14	*-19*	9	*-9*	1	*9*
high fat milk and cream	-14	*-8*	-7	*30*	33	*13*
high fibre bread	15	*3*	**46**	*-24*	8	*48*
high fibre breakfast cereals	6	*3*	**26**	*8*	31	*39*
hot and powdered drinks	-3	*0*	-18	*24*	23	*-3*
ice cream	4	*0*	-13	*20*	14	*2*
infant nutrition	3	*0*	1	*0*	3	*0*
legumes	**50**	*49*	-4	*11*	13	*5*
low fat milk	**42**	*38*	3	*7*	10	*9*
low fibre bread	-4	*7*	**-58**	*46*	11	*-45*
margarine and vegetable oils	8	*9*	2	*19*	22	*23*
miscellaneous	-1	*3*	-12	*-7*	-17	*-23*
nuts and seeds	**39**	*44*	15	*-1*	5	*17*
other bread	18	*17*	-11	*-10*	-22	*-22*
other breakfast cereals	0	*0*	-12	*9*	0	*-11*
other fruit	**32**	*33*	12	*-3*	7	*12*
potatoes	**-25**	*-21*	-22	*48*	**35**	*-9*
poultry	**-31**	*-19*	21	*-25*	-20	*-6*
puddings	-7	*-8*	-11	*31*	**35**	*16*
red meat	**-45**	*-47*	-13	*5*	-1	*-16*
rice, pasta and other grains	**41**	*43*	5	*-34*	-34	*-13*
sauces	**25**	*34*	0	*-4*	-11	*-7*
soft drinks and squashes	-9	*0*	-3	*-1*	-15	*-21*
soups	9	*2*	12	*-18*	-13	*4*
vegetable mixed dishes	**51**	*47*	-1	*-28*	-28	*-14*
vegetables, raw and boiled	13	*20*	43	*1*	24	*42*
water	22	*28*	32	*-16*	-1	*20*
yogurts	15	*20*	35	*-18*	2	*26*

Factors loadings |>25| and non-overlapping are indicated in **bold**

Supplementary TABLE 2 Factor loadings of the first RRR derived dietary pattern in the full sample (n=2501) as well as random split sample (n=1242)

	Full sample	*Split sample*
wines	**0.739**	***0.716***
spirits, liqueur, alcopops	**0.469**	***0.451***
beers and ciders	**0.311**	***0.280***
rice, pasta, other grains	0.124	*0.129*
poultry	0.090	*0.073*
fruit and vegetable juice	0.089	*0.052*
soft drinks and squashes	0.087	*0.078*
cheeses	0.078	*0.125*
fish	0.064	*0.093*
vegetable mixed dishes	0.063	*0.068*
sauces	0.063	*0.102*
red meat	0.051	*0.058*
soups	0.044	*0.026*
cereal based mixed meals	0.036	*0.026*
miscellaneous	0.035	*0.013*
high fibre bread	0.023	*-0.050*
water	0.023	*-0.043*
bread other	0.014	*0.026*
vegetables, raw or boiled	0.011	*-0.071*
game or offal	0.004	*0.000*
other breakfast cereals	-0.002	*0.006*
crisps and savoury snacks	-0.004	*0.007*
hot and powdered drinks	-0.005	*0.001*
eggs	-0.012	*0.059*
legumes	-0.013	*-0.086*
infant nutrition	-0.019	*-0.022*
yogurts	-0.020	*-0.074*
other fruit	-0.022	*-0.040*
butters and animal fat	-0.027	*0.047*
condiments	-0.032	*-0.017*
low fat milk	-0.036	*-0.055*
nuts and seeds	-0.044	*-0.048*
potatoes	-0.045	*-0.056*
fresh fruit	-0.048	*-0.172*
high fibre breakfast cereals	-0.055	*-0.120*
low fibre bread	-0.059	*-0.005*
ice-cream	-0.065	*-0.047*
margarine and vegetable oils	-0.072	*-0.088*
high fat milk and cream	-0.088	*-0.110*
chocolate and confectionery	-0.096	*-0.067*
puddings	-0.108	*-0.098*
biscuits and cakes	-0.127	*-0.107*

Factors loadings $|>25|$ are indicated in **bold**