

## Supplemental Data

### Description of included studies

#### ESTHER

The “*Epidemiologische Studie zu Chancen der Verhütung, Früherkennung und optimierten Therapie chronischer Erkrankungen in der älteren Bevölkerung* [German]” (ESTHER) study is a population-based cohort of 9949 adults, aged 50-74 years at baseline, recruited by their general practitioners during a routine health check-up between 2000 and 2002 in the German federal state Saarland. At baseline, participants completed a comprehensive self-administered questionnaire, medical data and biological samples (blood, stool, urine) were collected and stored at -80°C for further analyses. The distribution of socio-demographic baseline characteristics and common prevalent chronic diseases were similar to the distribution in the respective age categories in the German National Health Survey, which is a representative sample of the German population [23,24], a fact supporting the population-based character of the study.

After 2, 5, 8 and 11 years of follow-up, study participants completed standardized questionnaires. The occurrence of selected incident diseases was validated by inquiry at the caring physicians. Additionally, blood samples were collected at 5 and 8 year follow-ups. Deaths during follow-up until Dec 31, 2012 were identified by inquiry at the residents’ registration offices and death certificates were provided by public health departments.

#### HAPIEE

The **Health, Alcohol and Psychological factors in Eastern Europe** (HAPIEE) study comprises four cohorts in four countries: six towns in the Czech Republic (Havírov/Karvina, Hradec Králové, Jihlava, Kromeriz, Liberec and Ústí nad Labem), Krakow (Poland), Kaunas (Lithuania) and Novosibirsk (Russia); each consists of a random sample of men and women, aged 45–69 years old at baseline, stratified by gender and 5 year age groups, and selected from population registers (electoral list in Russia). The baseline sample sizes were 8,857, 10,728, 7,134 and 9,360 for Czech Republic, Poland, Lithuania and Russia, respectively. Baseline information from the Czech Republic, Russia and Poland was collected in 2002–2005 and in Lithuania 2006-2008 and includes data on health, lifestyle, diet (food frequency), socioeconomic circumstances and psychosocial factors. A short examination included measurement of anthropometric parameters, blood pressure, lung function and cognitive function, and a fasting venous blood sample. For these analyses, we used followed up for total mortality by official country-wide (Czech Republic), local (Lithuania) or regional mortality registers (Poland) until end of 2011 (Czech Republic, Lithuania). Data from Russia was not included because 25(OH)D levels were not available.

## **MONICA/KORA**

The **M**onitoring of Trends and Determinants in **C**ardiovascular Disease (MONICA) - **C**ooperative Health **R**esearch in the Region of **A**ugsburg (KORA) consists of three independent population-based surveys (S), with a total number of 13,427 men and women aged 25–64 (S1) or 25–74 years (S2-S3). The surveys were conducted in 1984–1985 (S1), 1989–1990 (S2) and 1994–1995 (S3) and all subjects were prospectively followed until the end of 2002 within the framework of KORA. Deaths during follow-up until end of 2009 were identified by inquiry at the residents' registration offices and death certificates were provided by public health departments.

## **NHANES**

The **N**ational **H**ealth and **N**utrition **E**xamination **S**urvey (NHANES) is a program of studies designed to assess the health and nutritional status of adults and children in the United States. The latter is a cross-sectional study conducted by the National Center for Health Statistics (NCHS) between 1988 and 1994 and was designed as a multistage stratified, clustered probability sample of the US civilian non-institutionalized population at least two months old. The included subjects participated in an interview conducted at home and an extensive physical examination. In total, 30,818 people were interviewed in NHANES III (1997) and had a physical examination and a blood sample taken. A mortality linkage of NHANES III to death certificate data obtained in the National Death Index (NDI) until Dec 31, 2006 was established.

## **SENECA**

The **S**urvey in **E**urope on **N**utrition and the **E**lderly; a **C**oncerted **A**ction (SENECA) is a multi-centre European prospective mixed cross-sectional and longitudinal study that recruited in 1988/89 around 2000 individuals from 12 countries (Belgium, Denmark, France, Italy, the Netherlands, Portugal, Spain, Switzerland, Poland, Hungary, Norway and Greece) born between 1913 and 1918 (70-75 years old at baseline). Information on the dietary intake, nutritional status, physical activity, lifestyle and health status were collected through standardised interviews, examinations of blood and anthropometric measurements. Two follow-ups with 5-year intervals were performed after the baseline. Vital status of participants until end of 1998 was assessed via municipal registries.

## **Tromsø Study**

The Tromsø Study is a prospective study of inhabitants in the municipality of Tromsø, Norway. It is a repeated population-based health survey with examinations in 1974 (Tromsø 1), 1979-80 (Tromsø 2), 1986-87 (Tromsø 3), 1994-95 (Tromsø 4), 2001 (Tromsø 5), 2007-08 (Tromsø 6). Surveys between 1979-80 and 2001 (Tromsø 2 to 5) were available for CHANCES consortium, which includes more than 37,000 participants.

The examinations included standardized measurements of height, weight, blood pressure, non-fasting serum lipids, and blood cell counts. A self-administered questionnaire handed in at the screening examination covered information about current and previous cigarette smoking, physical activity in leisure time, currently or previously treated hypertension, and a medical history of angina pectoris, diabetes mellitus, asthma, myocardial infarction, and stroke. Mortality was assessed until end of 2010 for this study via record linkage to Statistics Norway.

**Suppl. Table 1.** Assessment of baseline covariates across the cohorts

Cohort	Weight and height		History of diabetes		History of hypertension		History of cardiovascular disease		History of cancer	
	Self-reported	Measured	Self-reported	Documented	Self-reported	Documented /measured	Self-reported	Documented	Self-reported	Documented
ESTHER	X	X	X	X	X	X	X		X	X
Tromsø		X	X	X	X		X	X		X
NHANES	X	X	X		X		X		X	
SENECA		X	X		X		X		X	
MONICA/KORA		X	X			X	X		X	
HAPIEE Czech Republic		X	X		X		X		X	
HAPIEE Poland		X	X		X		X		X	
HAPIEE Lithuania		X	X		X		X		X	

X: Assessed

**Suppl. Table 2.** Cut-offs for 25(OH)D quintiles in analyses on all-cause mortality

Stratum	Cohort	25(OH)D [nmol/L] quintile				
		1	2	3	4	5
Total	ESTHER	<32.1	<41.0	<50.7	<66.4	≥66.4
	Tromsø	<40.9	<49.7	<58.0	<68.0	≥68.0
	MONICA/KORA	<27.7	<35.7	<45.8	<59.1	≥59.1
	SENECA	<21.0	<29.0	<37.0	<50.0	≥50.0
	HAPIEE CZ	<16.4	<24.3	<32.4	<43.8	≥43.8
	HAPIEE POL	<27.0	<34.3	<41.9	<52.0	≥52.0
	HAPIEE LIT	<33.0	<40.8	<49.3	<61.0	≥61.0
	NHANES	<42.2	<54.9	<69.1	<85.6	≥85.6
Age 50-59 y	ESTHER	<32.3	<42.3	<52.5	<67.8	≥67.8
	Tromsø	<43.1	<51.8	<60.2	<69.6	≥69.6
	MONICA/KORA	<27.3	<35.1	<45.8	<59.0	≥59.0
	HAPIEE CZ	<14.7	<21.1	<28.8	<41.1	≥41.1
	HAPIEE POL	<26.5	<33.5	<40.1	<50.3	≥50.3
	HAPIEE LIT	<32.8	<39.9	<48.8	<60.6	≥60.6
	NHANES	<41.1	<53.7	<67.9	<84.4	≥84.4
	Age 60-69 y	ESTHER	<32.5	<41.0	<50.6	<66.8
Tromsø		<40.5	<48.9	<57.1	<67.3	≥67.3
MONICA/KORA		<29.0	<36.6	<47.0	<59.9	≥59.9
HAPIEE CZ		<17.1	<25.6	<33.8	<44.4	≥44.4
HAPIEE POL		<27.3	<34.6	<42.7	<52.5	≥52.5
HAPIEE LIT		<32.7	<40.6	<49.3	<60.3	≥60.3
NHANES		<41.4	<54.2	<68.6	<85.6	≥85.6
Age 70-79 y		ESTHER	<30.8	<38.0	<47.5	<61.4
	Tromsø	<39.2	<47.1	<55.3	<65.1	≥65.1
	MONICA/KORA	<26.3	<34.7	<41.2	<58.8	≥58.8
	SENECA	<21.0	<29.0	<37.0	<50.0	≥50.0
	HAPIEE CZ	<19.1	<25.3	<37.9	<49.7	≥49.7
	HAPIEE POL	<28.2	<38.0	<45.9	<56.2	≥56.2
	HAPIEE LIT	<34.3	<41.8	<49.4	<62.6	≥62.6
	NHANES	<44.4	<58.4	<71.1	<86.6	≥86.6
Women	ESTHER	<31.5	<38.5	<46.5	<57.5	≥57.5
	Tromsø	<39.5	<48.3	<56.3	<67.3	≥67.3
	MONICA/KORA	<27.3	<34.0	<42.1	<53.1	≥53.1
	SENECA	<19.0	<27.0	<35.0	<48.0	≥48.0
	HAPIEE CZ	<14.6	<20.9	<28.2	<40.4	≥40.4
	HAPIEE POL	<25.0	<32.3	<38.6	<48.8	≥48.8
	HAPIEE LIT	<31.0	<39.6	<46.5	<57.8	≥57.8
	NHANES	<38.9	<50.7	<63.6	<80.9	≥80.9
Men	ESTHER	<33.7	<46.0	<59.4	<76.5	≥76.5
	Tromsø	<43.2	<51.8	<59.8	<68.9	≥68.9
	MONICA/KORA	<28.4	<39.0	<49.2	<64.5	≥64.5
	SENECA	<24.0	<32.0	<42.0	<53.0	≥53.0
	HAPIEE CZ	<17.7	<26.0	<34.1	<45.5	≥45.5
	HAPIEE POL	<27.9	<35.2	<43.1	<53.2	≥53.2
	HAPIEE LIT	<33.6	<42.1	<50.3	<62.3	≥62.3
	NHANES	<46.4	<60.2	<73.9	<90.1	≥90.1

**Suppl. Table 2 continues**

Stratum	Cohort	25(OH)D [nmol/L] quintile				
		1	2	3	4	5
Winter	ESTHER	<29.5	<36.3	<44.9	<59.1	≥59.1
	Tromsø	<38.0	<47.3	<55.7	<65.6	≥65.6
	MONICA/KORA	<25.4	<31.9	<40.7	<56.2	≥56.2
	SENECA	<20.0	<28.0	<35.0	<48.0	≥48.0
	HAPIEE CZ	<16.1	<23.5	<31.6	<42.3	≥42.3
	HAPIEE POL	<26.7	<33.9	<41.0	<51.3	≥51.3
	HAPIEE LIT	<31.1	<38.3	<45.6	<56.3	≥56.3
	NHANES	<40.4	<51.3	<65.9	<81.9	≥81.9
Spring	ESTHER	<30.1	<36.3	<43.9	<56.3	≥56.3
	Tromsø	<43.4	<52.7	<60.5	<70.0	≥70.0
	MONICA/KORA	<25.2	<32.3	<42.2	<53.3	≥53.3
	SENECA	<24.0	<34.0	<43.0	<57.0	≥57.0
	HAPIEE CZ	<15.3	<22.7	<30.0	<42.1	≥42.1
	HAPIEE POL	<27.5	<34.3	<41.6	<52.5	≥52.5
	HAPIEE LIT	<30.8	<38.8	<47.4	<58.9	≥58.9
	NHANES	<39.1	<51.7	<63.6	<79.9	≥79.9
Summer	ESTHER	<38.4	<47.9	<58.4	<75.3	≥75.3
	Tromsø	<51.1	<59.1	<68.5	<78.5	≥78.5
	MONICA/KORA	<34.3	<45.8	<55.1	<64.1	≥64.1
	HAPIEE LIT	<35.1	<42.8	<49.2	<59.5	≥59.5
	NHANES	<44.9	<59.7	<72.4	<89.6	≥89.6
Autumn	ESTHER	<34.9	<45.5	<55.1	<72.2	≥72.2
	Tromsø	<40.2	<47.7	<55.4	<65.9	≥65.9
	MONICA/KORA	<35.8	<42.6	<53.2	<69.0	≥69.0
	HAPIEE CZ	<20.1	<28.2	<38.2	<48.3	≥48.3
	HAPIEE POL	<28.2	<37.3	<45.1	<56.3	≥56.3
	HAPIEE LIT	<36.8	<45.7	<54.9	<65.5	≥65.5
	NHANES	<44.7	<58.2	<73.1	<90.4	≥90.4
Without history of CVD	ESTHER	<32.3	<41.1	<50.7	<66.3	≥66.3
	Tromsø	<40.9	<49.6	<58.0	<67.8	≥67.8
	MONICA/KORA	<27.4	<35.4	<45.8	<59.3	≥59.3
	SENECA	<21.0	<29.0	<36.0	<49.0	≥49.0
	HAPIEE CZ	<16.6	<24.5	<32.7	<44.0	≥44.0
	HAPIEE POL	<27.4	<34.8	<42.5	<52.4	≥52.4
	HAPIEE LIT	<33.0	<40.5	<49.4	<61.1	≥61.1
	NHANES	<42.4	<55.2	<69.4	<85.9	≥85.9
With history of CVD	ESTHER	<31.5	<41.1	<52.5	<68.2	≥68.2
	Tromsø	<40.6	<50.3	<58.2	<68.9	≥68.9
	MONICA/KORA	<30.8	<37.2	<47.9	<56.3	≥56.3
	SENECA	<20.0	<30.0	<40.0	<49.0	≥49.0
	HAPIEE CZ	<14.3	<23.2	<29.3	<40.3	≥40.3
	HAPIEE POL	<24.7	<32.2	<38.9	<49.8	≥49.8
	HAPIEE LIT	<33.1	<42.3	<49.1	<58.9	≥58.9
	NHANES	<40.9	<53.9	<68.1	<85.1	≥85.1

**Suppl. Table 2 continues**

Stratum	Cohort	25(OH)D [nmol/L] quintile				
		1	2	3	4	5
Without history of cancer						
	ESTHER	<32.1	<41.1	<50.9	<66.7	≥66.7
	Tromsø	<41.0	<49.8	<58.2	<68.2	≥68.2
	MONICA/KORA	<29.4	<37.5	<47.8	<62.3	≥62.3
	SENECA	<21.0	<29.0	<36.0	<49.0	≥49.0
	HAPIEE CZ	<16.6	<24.5	<32.6	<43.9	≥43.9
	HAPIEE POL	<27.0	<34.4	<41.9	<52.0	≥52.0
	HAPIEE LIT	<33.1	<40.8	<49.3	<61.3	≥61.3
	NHANES	<42.2	<54.9	<68.9	<85.6	≥85.6
With history of cancer						
	ESTHER	<31.5	<39.9	<48.9	<64.4	≥64.4
	Tromsø	<40.6	<48.4	<55.8	<65.7	≥65.7
	MONICA/KORA	<22.4	<30.2	<40.9	<63.8	≥63.8
	SENECA	<11.0	<26.0	<35.0	<51.0	≥51.0
	HAPIEE CZ	<14.2	<22.7	<30.8	<43.5	≥43.5
	HAPIEE POL	<27.2	<33.5	<40.3	<49.8	≥49.8
	HAPIEE LIT	<30.3	<39.8	<49.2	<58.8	≥58.8
	NHANES	<43.7	<58.2	<72.1	<87.6	≥87.6

CZ, Czech Republic; LIT, Lithuania; POL, Poland

**Suppl. Table 3** – Baseline characteristics of included study participants from studies with 25-hydroxyvitamin D (25(OH)D) measurements for the total cohort or a random subsample <sup>a</sup>

Characteristic	ESTHER, Germany (n=9,083)	Tromsø study, Norway (n=4,406)	MONICA/KORA, Germany (n=939)	SENECA, Europe (n=661)	NHANES III, USA (n=5,626)
Age (years)	62 (57; 67)	62 (56; 68)	60 (55; 66)	74 (73; 75)	64 (57; 71)
50-59	3,140 (34.6)	1,798 (40.8)	477 (50.8)	0	1,773 (31.5)
60-69	4,564 (50.3)	1,770 (40.2)	371 (39.5)	0	2,206 (39.2)
70-79	1,379 (15.2)	838 (19.0)	91 (9.7)	661 (100.0)	1,647 (29.3)
Male sex	4,028 (44.4)	1,754 (39.8)	492 (52.4)	333 (50.4)	2,719 (48.3)
25(OH)D (nmol/L)	46 (34; 62)	54 (43; 65)	41 (30; 55)	33 (23; 47)	62 (45; 81)
Season of blood draw					
Winter (Dec/Jan/Feb)	2,501 (27.5)	1,429 (32.4)	291 (31.0)	447 (67.6)	1,254 (22.9)
Spring (Mar/Apr/Mai)	1,891 (20.8)	1,570 (35.6)	355 (37.8)	214 (32.4)	1,439 (25.6)
Summer (June/July/Aug)	2,193 (24.1)	172 (3.9)	38 (4.1)	0 (0)	1,388 (24.7)
Autumn (Sept/Oct/Nov)	2,498 (27.5)	1,235 (28.0)	255 (27.2)	0 (0)	1,545 (27.5)
Education <sup>b</sup>					
Low	6,782 (74.7)	2,356 (53.5)	237 (25.2)	501 (75.8)	2,157 (38.3)
Medium	1,860 (20.5)	1,255 (28.5)	529 (56.3)	96 (14.5)	2,195 (39.0)
High	441 (4.9)	795 (18.0)	173 (18.4)	64 (9.7)	1,274 (22.6)
Weight <sup>c</sup>					
Normal or underweight	2,521 (27.8)	1,595 (36.2)	252 (26.8)	196 (29.7)	1,772 (31.5)
Overweight	4,264 (46.9)	2,028 (46.0)	453 (48.2)	312 (47.2)	2,203 (39.2)
Obesity	2,298 (25.3)	783 (17.8)	234 (24.9)	153 (23.2)	1,651 (29.4)
Smoking					
Never	4,588 (50.5)	2,084 (47.3)	557 (59.3)	368 (55.7)	2,345 (41.7)
Former	2,952 (32.5)	2,322 (52.7)	202 (21.5)	192 (29.1)	1,969 (35.0)
Current	1,543 (17.0)	Excluded	180 (19.2)	101 (15.3)	1,312 (23.3)
Vigorous physical activity	3,896 (42.9)	1,578 (35.8)	298 (31.7)	68 (10.3)	2,213 (39.3)
History of diabetes <sup>d</sup>	1,275 (14.0)	120 (2.7)	81 (8.6)	50 (8.0)	1,153 (20.5)
History of hypertension <sup>d</sup>	4,788 (52.7)	3,468 (79.1)	435 (46.3)	136 (21.6)	3,221 (57.3)
History of cardiovascular disease <sup>d</sup>	724 (8.1)	335 (7.6)	62 (6.6)	114 (18.2)	699 (12.4)
History of cancer <sup>d, e</sup>	618 (6.8)	269 (6.1)	16 (2.5)	10 (1.6)	328 (5.8)

<sup>a</sup> Data shown are the absolute number and percentage (%) for categorical variables or the median with interquartile range for continuous variables.

<sup>b</sup> Definition of categories of education by years of full-time education: low ( $\leq 9$  years), medium (10-12 years), high ( $\geq 13$  years).

<sup>c</sup> Definition of categories of weight by World Health Organisation BMI categories: normal or underweight ( $< 25$  kg/m<sup>2</sup>); overweight (25-  $<30$  kg/m<sup>2</sup>); obesity ( $\geq 30$  kg/m<sup>2</sup>).

<sup>d</sup> These variables can have missing values and therefore do not always add up to the total. Data shown are calculated for subjects with complete data.

<sup>e</sup> A question on history of cancer was not included in the first survey round (S1) of the MONICA/KORA study and information is therefore missing for all participants of the S1 contact round.



**Suppl. Table 4** – Baseline characteristics of included study participants from studies with 25-hydroxyvitamin D (25(OH)D) measurements in nested case-control design <sup>a</sup>

Characteristic	HAPIEE Czech Rep.		HAPIEE Poland		HAPIEE Lithuania	
	Controls (n=1,576)	Cases (n=453)	Controls (n=1,289)	Cases (n=411)	Controls (n=1,206)	Cases (n=368)
Age (years)	63 (59; 67)	64 (59; 67)	63 (57; 67)	63 (58; 67)	66 (61; 70)	67 (62; 71)
50-59	444 (28.2)	124 (27.4)	444 (34.5)	129 (31.4)	234 (19.4)	67 (18.2)
60-69	1,070 (67.9)	310 (68.4)	811 (62.9)	272 (66.2)	652 (54.1)	199 (54.1)
70-79	62 (3.9)	19 (4.2)	34 (2.6)	10 (2.4)	320 (26.5)	102 (27.7)
Male sex	1,039 (65.9)	300 (66.2)	879 (68.2)	275 (66.9)	778 (64.5)	245 (66.6)
25(OH)D (nmol/L)	<b>29 (19; 42)</b>	<b>24 (16; 35)</b>	<b>39 (30; 50)</b>	<b>35 (25; 47)</b>	<b>46 (37; 59)</b>	<b>42 (31; 53)</b>
Season of blood draw						
Winter (Dec/Jan/Feb)	558 (35.4)	156 (34.4)	550 (42.7)	179 (43.6)	281 (23.3)	82 (22.3)
Spring (Mar/Apr/Mai)	650 (41.2)	183 (40.4)	641 (49.7)	193 (47.0)	446 (37.0)	143 (38.9)
Summer (June/July/Aug)	0 (0)	0 (0)	0 (0)	0 (0)	122 (10.1)	40 (10.9)
Autumn (Sept/Oct/Nov)	368 (23.4)	114 (25.2)	98 (7.6)	39 (9.5)	357 (29.6)	103 (28.0)
Education <sup>b</sup>						
Low	<b>161 (10.2)</b>	<b>78 (17.2)</b>	<b>151 (11.7)</b>	<b>75 (18.3)</b>	<b>132 (11.0)</b>	<b>66 (17.9)</b>
Medium	<b>1,160 (73.6)</b>	<b>333 (73.5)</b>	<b>729 (56.6)</b>	<b>254 (61.8)</b>	<b>433 (35.9)</b>	<b>173 (47.0)</b>
High	<b>255 (16.2)</b>	<b>42 (9.3)</b>	<b>409 (31.7)</b>	<b>82 (20.0)</b>	<b>641 (53.2)</b>	<b>129 (35.1)</b>
Weight <sup>c</sup>						
Normal or underweight	<b>310 (19.7)</b>	<b>89 (19.7)</b>	292 (22.7)	108 (26.3)	230 (19.1)	79 (21.5)
Overweight	<b>737 (46.8)</b>	<b>180 (39.7)</b>	596 (46.2)	177 (43.1)	485 (40.2)	145 (39.4)
Obesity	<b>529 (33.6)</b>	<b>184 (40.6)</b>	401 (31.1)	126 (30.7)	491 (40.7)	144 (39.1)
Smoking						
Never	<b>680 (43.2)</b>	<b>116 (25.6)</b>	<b>533 (41.4)</b>	<b>99 (24.1)</b>	<b>721 (59.8)</b>	<b>174 (47.3)</b>
Former	<b>560 (35.5)</b>	<b>176 (38.9)</b>	<b>447 (34.7)</b>	<b>142 (34.6)</b>	<b>280 (23.2)</b>	<b>98 (26.6)</b>
Current	<b>336 (21.3)</b>	<b>161 (35.5)</b>	<b>309 (24.0)</b>	<b>170 (41.4)</b>	<b>205 (17.0)</b>	<b>96 (26.1)</b>
Vigorous physical activity	<b>1,181 (74.9)</b>	<b>276 (60.9)</b>	<b>966 (74.9)</b>	<b>281 (68.4)</b>	<b>708 (58.7)</b>	<b>166 (45.1)</b>
History of diabetes <sup>d</sup>	<b>217 (13.8)</b>	<b>111 (24.6)</b>	<b>176 (13.7)</b>	<b>92 (22.4)</b>	<b>90 (7.5)</b>	<b>54 (14.7)</b>
History of hypertension <sup>d</sup>	<b>819 (52.1)</b>	<b>264 (58.7)</b>	<b>754 (58.5)</b>	<b>264 (64.7)</b>	761 (63.2)	238 (64.9)
History of cardiovascular disease <sup>d</sup>	<b>141 (9.2)</b>	<b>90 (20.4)</b>	<b>154 (12.1)</b>	<b>105 (25.8)</b>	<b>172 (14.3)</b>	<b>90 (24.5)</b>
History of cancer (%) <sup>d</sup>	<b>84 (5.5)</b>	<b>50 (11.5)</b>	<b>57 (4.5)</b>	<b>39 (9.6)</b>	<b>172 (8.5)</b>	<b>57 (15.5)</b>

**Bold** printed: statistical significant difference among cases and controls in HAPIEE cohorts (two-sided P<0.05, Wilcoxon Rank-Sum test).

<sup>a</sup> Data shown are the absolute number and percentage (%) for categorical variables or the median with interquartile range for continuous variables.

<sup>b</sup> Definition of categories of education by highest level of full-time education: low (primary school or less), medium (More than primary school but less than college or university), high (college or university).

<sup>c</sup> Definition of categories of weight by World Health Organisation BMI categories: normal or underweight (< 25 kg/m<sup>2</sup>); overweight (25- <30 kg/m<sup>2</sup>); obesity (≥ 30 kg/m<sup>2</sup>).

<sup>d</sup> These variables can have missing values and therefore do not always add up to the total. Data shown are calculated for subjects with complete data.

**Suppl. Table 5.** Association of 25-hydroxyvitamin D with all-cause mortality

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	Model <sup>1</sup>	RR (95% CI) for 25(OH)D quintile				
		1	2	3	4	5
ESTHER (9,083/ 1,338)	1	1.79 (1.50; 2.13)	1.41 (1.17; 1.69)	1.19 (0.99; 1.43)	1.05 (0.88; 1.26)	1.0
	2	1.51 (1.27; 1.81)	1.23 (1.02; 1.47)	1.13 (0.94; 1.35)	0.98 (0.82; 1.18)	1.0
	3	1.53 (1.28; 1.84)	1.24 (1.03; 1.50)	1.12 (0.93; 1.35)	0.99 (0.82; 1.19)	1.0
Tromsø (4,406/ 1,141)	1	1.29 (1.07; 1.56)	1.13 (0.93; 1.37)	1.08 (0.89; 1.31)	0.91 (0.75; 1.11)	1.0
	2	1.21 (1.01; 1.47)	1.07 (0.89; 1.30)	1.05 (0.86; 1.27)	0.92 (0.75; 1.12)	1.0
	3	1.25 (1.03; 1.51)	1.09 (0.90; 1.32)	1.05 (0.86; 1.27)	0.94 (0.77; 1.15)	1.0
MONICA/KORA (939/ 366)	1	1.65 (1.18; 2.32)	1.28 (0.91; 1.80)	1.23 (0.88; 1.72)	1.09 (0.77; 1.54)	1.0
	2	1.35 (0.96; 1.91)	1.17 (0.83; 1.66)	1.12 (0.80; 1.58)	1.00 (0.70; 1.42)	1.0
	3	1.39 (0.89; 2.18)	1.06 (0.67; 1.66)	1.16 (0.74; 1.79)	1.11 (0.72; 1.71)	1.0
SENECA (661/ 270)	1	2.28 (1.50; 3.48)	1.68 (1.13; 2.53)	1.28 (0.85; 1.93)	1.45 (0.98; 2.16)	1.0
	2	2.13 (1.40; 3.27)	1.60 (1.07; 2.42)	1.28 (0.85; 1.93)	1.51 (1.02; 2.27)	1.0
	3	2.18 (1.41; 3.41)	1.61 (1.06; 2.48)	1.27 (0.83; 1.95)	1.28 (0.84; 1.97)	1.0
HAPIEE Czech Rep. (2,029/ 453)	1	2.51 (1.78; 3.54)	1.90 (1.34; 2.69)	1.52 (1.07; 2.16)	0.95 (0.65; 1.38)	1.0
	2	2.08 (1.46; 2.96)	1.63 (1.14; 2.34)	1.38 (0.96; 1.98)	0.95 (0.65; 1.40)	1.0
	3	1.92 (1.33; 2.78)	1.63 (1.12; 2.36)	1.26 (0.86; 1.85)	0.94 (0.63; 1.40)	1.0
HAPIEE Poland (1,700/ 411)	1	1.99 (1.41; 2.81)	1.09 (0.76; 1.57)	1.11 (0.77; 1.60)	0.86 (0.59; 1.26)	1.0
	2	1.56 (1.09; 2.24)	0.91 (0.63; 1.33)	0.88 (0.61; 1.29)	0.76 (0.51; 1.11)	1.0
	3	1.48 (1.02; 2.15)	0.90 (0.61; 1.32)	0.87 (0.59; 1.29)	0.79 (0.53; 1.17)	1.0
HAPIEE Lithuania (1,574/ 368)	1	2.67 (1.83; 3.89)	1.23 (0.76; 1.92)	1.25 (0.84; 1.86)	1.26 (0.85; 1.88)	1.0
	2	2.32 (1.57; 3.43)	1.13 (0.75; 1.70)	1.14 (0.76; 1.72)	1.18 (0.79; 1.77)	1.0
	3	2.16 (1.45; 3.22)	1.07 (0.70; 1.62)	1.09 (0.72; 1.65)	1.13 (0.75; 1.71)	1.0
NHANES (5,626/ 2,348)	1	1.56 (1.36; 1.79)	1.10 (0.96; 1.26)	1.17 (1.03; 1.33)	0.98 (0.86; 1.12)	1.0
	2	1.42 (1.24; 1.63)	1.07 (0.93; 1.22)	1.15 (1.01; 1.32)	1.00 (0.88; 1.15)	1.0
	3	1.35 (1.17; 1.55)	1.00 (0.87; 1.15)	1.09 (0.96; 1.25)	0.96 (0.84; 1.09)	1.0
<b>Pooled<sup>2</sup></b> <b>(26,018/ 6,695)</b>	<b>1</b>	<b>1.83 (1.55; 2.16)</b>	<b>1.29 (1.13; 1.47)</b>	<b>1.18 (1.09; 1.28)</b>	<b>1.02 (0.94; 1.11)</b>	<b>1.0</b>
	<b>2</b>	<b>1.57 (1.36; 1.81)</b>	<b>1.16 (1.04; 1.29)</b>	<b>1.13 (1.04; 1.22)</b>	<b>0.99 (0.91; 1.08)</b>	<b>1.0</b>
	<b>3</b>	<b>1.53 (1.34; 1.74)</b>	<b>1.14 (1.01; 1.30)</b>	<b>1.09 (1.01; 1.18)</b>	<b>0.98 (0.90; 1.06)</b>	<b>1.0</b>
Heterogeneity <sup>3</sup> (I <sup>2</sup> ; Q; p)		59%; 17.0; 0.02 <sup>4</sup>	29%; 9.8; 0.20	0%; 3.8; 0.80	5%; 7.4; 0.39	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Model 1: Adjusted for age, sex and season of blood draw. Model 2: Model 1 additionally adjusted for education, BMI, smoking and physical activity. Model 3: Model 2 additionally adjusted for history of CVD, diabetes, hypertension and cancer. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

<sup>2</sup> Random effects model.

<sup>3</sup> Measures for results of model 2.

<sup>4</sup> Heterogeneity becomes non-significant if the study with the strongest effect estimate (HAPIEE Lithuania) is excluded: RR after exclusion: 1.49 (1.31; 1.70). I<sup>2</sup>=47.15%; Q=11.3, p=0.08.

**Suppl. Table 6.** Association of 25-hydroxyvitamin D with cardiovascular mortality (subjects without history of CVD)

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	Model <sup>1</sup>	RR (95% CI) for 25(OH)D quintile				
		1	2	3	4	5
ESTHER (8,216/ 306)	1	1.67 (1.16; 2.41)	1.35 (0.92; 1.99)	1.18 (0.80; 1.73)	1.29 (0.89; 1.86)	1.0
	2	1.38 (0.95; 2.01)	1.14 (0.77; 1.68)	1.10 (0.74; 1.62)	1.19 (0.82; 1.72)	1.0
	3	1.34 (0.91; 1.97)	1.14 (0.77; 1.69)	1.07 (0.72; 1.58)	1.18 (0.82; 1.71)	1.0
Tromsø (4,071/370)	1	1.30 (0.93; 1.82)	0.92 (0.65; 1.31)	1.02 (0.71; 1.45)	1.05 (0.74; 1.48)	1.0
	2	1.16 (0.83; 1.62)	0.86 (0.60; 1.23)	0.98 (0.68; 1.40)	1.02 (0.72; 1.45)	1.0
	3	1.15 (0.74; 1.79)	0.86 (0.60; 1.23)	1.01 (0.70; 1.45)	1.05 (0.74; 1.49)	1.0
MONICA/KORA (877/136)	1	2.56 (1.42; 4.63)	2.42 (1.35; 4.33)	1.57 (0.86; 2.84)	1.40 (0.75; 2.61)	1.0
	2	2.32 (1.24; 4.34)	2.38 (1.32; 4.27)	1.52 (0.82; 2.80)	1.31 (0.70; 2.46)	1.0
	3	2.21 (0.99; 4.93)	1.96 (0.90; 4.25)	1.31 (0.59; 2.90)	1.31 (0.62; 2.76)	1.0
SENECA (514/58)	1	1.02 (0.44; 2.37)	0.91 (0.40; 2.04)	0.88 (0.38; 2.03)	0.75 (0.30; 1.86)	1.0
	2	0.98 (0.40; 2.36)	0.89 (0.38; 2.08)	0.92 (0.39; 2.19)	0.81 (0.32; 2.02)	1.0
	3	1.02 (0.42; 2.52)	0.92 (0.40; 2.13)	0.95 (0.40; 2.27)	0.80 (0.32; 2.02)	1.0
HAPIEE Czech Rep. (1,739/117)	1	2.91 (1.59; 5.32)	1.93 (1.02; 3.62)	1.17 (0.59; 2.31)	0.91 (0.45; 1.86)	1.0
	2	2.32 (1.25; 4.30)	1.56 (0.82; 2.97)	1.04 (0.52; 2.07)	0.91 (0.44; 1.86)	1.0
	3	2.29 (1.21; 4.31)	1.58 (0.81; 3.06)	1.06 (0.52; 2.15)	0.93 (0.45; 1.94)	1.0
HAPIEE Poland (1,425/79)	1	2.23 (1.06; 4.69)	1.68 (0.78; 3.63)	1.30 (0.58; 2.92)	1.20 (0.53; 2.72)	1.0
	2	1.75 (0.82; 3.74)	1.40 (0.64; 3.06)	1.04 (0.46; 2.37)	1.07 (0.47; 2.45)	1.0
	3	1.56 (0.72; 3.40)	1.43 (0.65; 3.16)	1.01 (0.44; 2.34)	1.08 (0.46; 2.49)	1.0
HAPIEE Lithuania (1,312/99)	1	2.05 (0.99; 4.26)	1.65 (0.77; 3.50)	2.40 (1.18; 4.88)	1.61 (0.76; 3.42)	1.0
	2	1.68 (0.79; 3.56)	1.38 (0.64; 2.98)	2.23 (1.08; 4.58)	1.48 (0.69; 3.18)	1.0
	3	1.72 (0.79; 3.73)	1.36 (0.61; 3.02)	2.35 (1.12; 4.95)	1.56 (0.71; 3.44)	1.0
NHANES (4,927/721)	1	1.38 (1.07; 1.78)	1.18 (0.92; 1.49)	1.13 (0.88; 1.43)	1.00 (0.78; 1.28)	1.0
	2	1.26 (0.97; 1.63)	1.12 (0.87; 1.43)	1.08 (0.84; 1.38)	0.99 (0.77; 1.28)	1.0
	3	1.21 (0.93; 1.56)	1.08 (0.84; 1.39)	1.04 (0.81; 1.33)	0.99 (0.77; 1.27)	1.0
<b>Pooled</b> <sup>2</sup> <b>(23,081/ 1,886)</b>	<b>1</b>	<b>1.68 (1.35; 2.09)</b>	<b>1.34 (1.07; 1.68)</b>	<b>1.18 (1.01; 1.38)</b>	<b>1.10 (0.94; 1.28)</b>	<b>1.0</b>
	<b>2</b>	<b>1.41 (1.18; 1.68)</b>	<b>1.20 (0.97; 1.48)</b>	<b>1.10 (0.95; 1.27)</b>	<b>1.06 (0.90; 1.24)</b>	<b>1.0</b>
	<b>3</b>	<b>1.35 (1.14; 1.59)</b>	<b>1.11 (0.94; 1.30)</b>	<b>1.09 (0.93; 1.28)</b>	<b>1.06 (0.91; 1.25)</b>	<b>1.0</b>
Heterogeneity <sup>3</sup> (I <sup>2</sup> ; Q; p)		13%; 8.1; 0.32	31%; 10.1; 0.18	0%; 5.5; 0.60	0%; 1.9; 0.96	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Model 1: Adjusted for age, sex, season of blood draw. Model 2: Model 1 additionally adjusted for education, BMI, smoking and physical activity. Model 3: Model 2 additionally adjusted for history of diabetes, hypertension and cancer. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

<sup>2</sup> Random effects model.

<sup>3</sup> Measures for results of model 2.

**Suppl. Table 7.** Association of 25-hydroxyvitamin D with cancer mortality (subjects without history of cancer)

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	Model <sup>1</sup>	RR (95% CI) for 25(OH)D quintile				
		1	2	3	4	5
ESTHER (8,465/414)	1	1.27 (0.94; 1.72)	1.00 (0.73; 1.38)	0.95 (0.69; 1.31)	0.94 (0.69; 1.27)	1.0
	2	1.09 (0.80; 1.48)	0.88 (0.64; 1.22)	0.91 (0.66; 1.26)	0.89 (0.66; 1.21)	1.0
	3	1.11 (0.81; 1.52)	0.89 (0.64; 1.23)	0.93 (0.67; 1.28)	0.88 (0.65; 1.20)	1.0
Tromsø (4,137/337)	1	0.76 (0.53; 1.08)	1.00 (0.73; 1.39)	0.99 (0.71; 1.38)	0.76 (0.54; 1.07)	1.0
	2	0.74 (0.52; 1.05)	1.00 (0.72; 1.39)	0.99 (0.71; 1.39)	0.78 (0.55; 1.10)	1.0
	3	0.74 (0.52; 1.05)	0.98 (0.70; 1.36)	0.99 (0.71; 1.38)	0.78 (0.55; 1.10)	1.0
MONICA/KORA (638/61) <sup>2</sup>	1	0.87 (0.34; 2.21)	0.99 (0.45; 2.16)	0.81 (0.34; 1.91)	1.67 (0.81; 3.43)	1.0
	2	0.77 (0.31; 1.93)	0.88 (0.40; 1.94)	0.75 (0.31; 1.79)	1.55 (0.74; 3.25)	1.0
	3	0.74 (0.30; 1.81)	0.89 (0.40; 1.95)	0.76 (0.32; 1.83)	1.57 (0.76; 3.26)	1.0
SENECA (613/48)	1	1.75 (0.70; 4.43)	1.28 (0.46; 3.51)	0.63 (0.21; 1.91)	1.93 (0.80; 4.68)	1.0
	2	1.61 (0.64; 4.10)	1.19 (0.43; 3.32)	0.63 (0.20; 1.94)	2.09 (0.86; 5.08)	1.0
	3	1.63 (0.62; 4.28)	1.07 (0.37; 3.11)	0.60 (0.19; 1.87)	2.03 (0.82; 5.03)	1.0
HAPIEE Czech Rep. (1,823/171)	1	1.75 (1.05; 2.90)	1.29 (0.76; 2.19)	1.31 (0.78; 2.21)	1.09 (0.64; 1.87)	1.0
	2	1.44 (0.86; 2.43)	1.09 (0.63; 1.87)	1.23 (0.72; 2.10)	1.11 (0.64; 1.92)	1.0
	3	1.43 (0.85; 2.41)	1.08 (0.63; 1.85)	1.23 (0.72; 2.10)	1.11 (0.64; 1.92)	1.0
HAPIEE Poland (1,584/167)	1	1.56 (0.96; 2.55)	0.73 (0.41; 1.28)	1.12 (0.67; 1.88)	1.07 (0.64; 1.80)	1.0
	2	1.18 (0.71; 1.95)	0.60 (0.33; 1.06)	0.88 (0.52; 1.50)	0.94 (0.55; 1.60)	1.0
	3	1.22 (0.73; 2.04)	0.62 (0.34; 1.11)	0.91 (0.53; 1.57)	0.99 (0.58; 1.69)	1.0
HAPIEE Lithuania (1,414/110)	1	1.55 (0.88; 2.75)	0.82 (0.43; 1.55)	0.66 (0.34; 1.29)	0.76 (0.40; 1.44)	1.0
	2	1.38 (0.77; 2.48)	0.73 (0.38; 1.39)	0.62 (0.32; 1.21)	0.71 (0.37; 1.35)	1.0
	3	1.36 (0.75; 2.45)	0.72 (0.38; 1.37)	0.62 (0.32; 1.21)	0.71 (0.37; 1.35)	1.0
NHANES (5,296/531)	1	1.07 (0.80; 1.44)	1.09 (0.82; 1.43)	1.11 (0.85; 1.46)	0.99 (0.75; 1.30)	1.0
	2	0.95 (0.71; 1.28)	1.04 (0.79; 1.38)	1.11 (0.85; 1.47)	1.01 (0.77; 1.33)	1.0
	3	0.97 (0.72; 1.31)	1.05 (0.80; 1.40)	1.12 (0.85; 1.48)	1.02 (0.78; 1.34)	1.0
<b>Pooled<sup>3</sup></b> <b>(23,970/ 1,839)</b>	<b>1</b>	<b>1.22 (0.98; 1.51)</b>	<b>1.02 (0.88; 1.18)</b>	<b>1.02 (0.87; 1.18)</b>	<b>0.97 (0.83; 1.14)</b>	<b>1.0</b>
	<b>2</b>	<b>1.03 (0.89; 1.20)</b>	<b>0.94 (0.81; 1.09)</b>	<b>0.97 (0.84; 1.13)</b>	<b>0.96 (0.82; 1.12)</b>	<b>1.0</b>
	<b>3</b>	<b>1.04 (0.88; 1.23)</b>	<b>0.94 (0.81; 1.10)</b>	<b>0.98 (0.84; 1.15)</b>	<b>0.96 (0.82; 1.12)</b>	<b>1.0</b>
Heterogeneity <sup>4</sup> (I <sup>2</sup> ; Q; p)		11%; 7.9; 0.34	0%; 4.2; 0.76	0%; 4.6; 0.71	6%; 7.4; 0.39	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Model 1: Adjusted for age, sex, season of blood draw. Model 2: Model 1 additionally adjusted for education, BMI, smoking and physical activity. Model 3: Model 2 additionally adjusted for history of CVD, diabetes and hypertension. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

<sup>2</sup> A question on history of cancer was not included in the first survey round (S1) of the MONICA/KORA study and participants of the S1 contact round could therefore not be used for this analysis.

<sup>3</sup> Random effects model.

<sup>4</sup> Measures for results of model 2.

**Suppl. Table 8.** Association of 25-hydroxyvitamin D with CVD mortality in subjects with a history of CVD

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
ESTHER (724/114)	1.51 (0.82; 2.77)	0.90 (0.48; 1.69)	1.17 (0.66; 2.08)	0.89 (0.48; 1.64)	1.0
Tromsø (355/128)	1.86 (1.01; 3.44)	1.16 (0.62; 2.16)	0.78 (0.42; 1.48)	0.99 (0.54; 1.79)	1.0
MONICA/KORA (62/29)	0.80 (0.26; 2.47)	1.48 (0.37; 5.83)	0.33 (0.09; 1.16)	0.35 (0.07; 1.82)	1.0
SENECA (114/36)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (231/48)	1.96 (0.53; 7.28)	3.21 (0.89; 11.59)	4.23 (1.18; 15.10)	2.69 (0.70; 10.32)	1.0
Poland (259/54)	1.59 (0.56; 4.57)	1.56 (0.55; 4.39)	2.48 (0.93; 6.65)	1.10 (0.37; 3.29)	1.0
Lithuania (262/47)	6.30 (1.86; 21.3)	2.71 (0.80; 9.12)	1.13 (0.30; 4.20)	1.42 (0.40; 4.97)	1.0
NHANES (699/282)	1.46 (0.97; 2.20)	1.20 (0.82; 1.76)	1.10 (0.76; 1.59)	0.81 (0.56; 1.17)	1.0
<b>Pooled (2,706/738)</b>	<b>1.65 (1.22; 2.22)</b>	<b>1.26 (0.97; 1.63)</b>	<b>1.16 (0.77; 1.75)</b>	<b>0.91 (0.70; 1.18)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	13%; 6.9; 0.33	0%; 5.0; 0.55	48%; 11.5; 0.07	0%; 4.9; 0.56	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers.

<sup>1</sup> Adjusted for age, sex, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region as well as race/ethnicity for the NHANES.

**Suppl. Table 9.** Association of 25-hydroxyvitamin D with cancer mortality in subjects with history of cancer

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
ESTHER (618/117)	1.62 (0.87; 3.00)	1.49 (0.77; 2.86)	1.02 (0.53; 1.97)	1.42 (0.77; 2.61)	1.0
Tromsø (269/76)	3.59 (1.46; 8.81)	2.83 (1.22; 6.57)	1.83 (0.75; 4.43)	1.68 (0.70; 3.99)	1.0
MONICA/KORA (16/5) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
SENECA (10/3)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (134/37)	1.64 (0.47; 5.72)	0.87 (0.25; 3.00)	1.18 (0.35; 4.06)	0.05 (0.005; 0.54)	1.0
Poland (96/27)	n. a.	n. a.	n. a.	n. a.	1.0
Lithuania (160/42)	2.39 (0.64; 9.00)	2.26 (0.54; 9.41)	0.88 (0.20; 3.94)	3.34 (0.93; 11.97)	1.0
NHANES (328/81)	0.74 (0.31; 1.78)	0.48 (0.22; 1.07)	0.67 (0.32; 1.38)	0.68 (0.32; 1.45)	1.0
<b>Pooled (1,631/388)</b>	<b>1.70 (1.00; 2.88)</b>	<b>1.29 (0.66; 2.52)</b>	<b>1.02 (0.69; 1.50)</b>	<b>1.09 (0.50; 2.35)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	37%; 6.4; 0.17	62%; 10.5; 0.03 <sup>3</sup>	0%; 3.0; 0.55	68%; 12.6; 0.01 <sup>4</sup>	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers.

<sup>1</sup> Adjusted for age, sex, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region as well as race/ethnicity for the NHANES.

<sup>2</sup> A question on history of cancer was not included in the first survey round (S1) of the MONICA/KORA study and participants of the S1 contact round could therefore not be used for this analysis.

<sup>3</sup> Heterogeneity becomes non-significant if the study with the strongest effect estimate (Tromsø) is excluded: RR after exclusion: 1.02 (0.52; 2.01). I<sup>2</sup>=50%; Q=6.4, p=0.11.

<sup>4</sup> Heterogeneity becomes non-significant if the study with the weakest effect estimate (HAPIEE Czech Republic) is excluded: RR after exclusion: 1.36 (0.78; 2.36). I<sup>2</sup>=43%; Q=5.3, p=0.15.

**Suppl. Table 10.** Association of 25-hydroxyvitamin D with all-cause mortality by history of cardiovascular disease

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Without CVD</b>					
ESTHER (8,216/1,059)	1.51 (1.24; 1.85)	1.21 (0.99; 1.49)	1.10 (0.89; 1.36)	1.01 (0.82; 1.24)	1.0
Tromsø (4,071/961)	1.16 (0.94; 1.43)	1.06 (0.86; 1.31)	1.05 (0.85; 1.30)	0.89 (0.71; 1.10)	1.0
MONICA/KORA (877/321)	1.39 (0.97; 2.01)	1.16 (0.80; 1.68)	1.12 (0.78; 1.61)	0.98 (0.66; 1.43)	1.0
SENECA (514/190)	2.08 (1.23; 3.51)	1.79 (1.11; 2.91)	1.26 (0.76; 2.08)	1.43 (0.88; 2.34)	1.0
HAPIEE					
Czech Rep. (1,739/352)	1.98 (1.34; 2.94)	1.51 (1.02; 2.26)	1.25 (0.83; 1.88)	0.94 (0.61; 1.44)	1.0
Poland (1,425/302)	1.56 (1.04; 2.34)	0.77 (0.50; 1.19)	0.74 (0.48; 1.15)	0.77 (0.50; 1.19)	1.0
Lithuania (1,312/278)	1.73 (1.12; 2.66)	0.94 (0.60; 1.48)	0.89 (0.57; 1.41)	0.97 (0.62; 1.53)	1.0
NHANES (4,927/1,859)	1.35 (1.15; 1.58)	1.07 (0.92; 1.25)	1.18 (1.02; 1.37)	1.06 (0.91; 1.23)	1.0
<b>Pooled (23,081/5,322)</b>	<b>1.46 (1.29; 1.64)</b>	<b>1.13 (1.00; 1.28)</b>	<b>1.11 (1.01; 1.21)</b>	<b>1.00 (0.91; 1.10)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	31%; 10.1; 0.18	33%; 10.4; 0.17	0%; 5.7; 0.57	0%; 5.2; 0.63	
<b>With CVD</b>					
ESTHER (724/243)	1.65 (1.06; 2.57)	1.12 (0.73; 1.71)	1.28 (0.85; 1.92)	0.74 (0.47; 1.14)	1.0
Tromsø (335/180)	1.95 (1.19; 3.23)	1.23 (0.74; 2.04)	1.12 (0.68; 1.87)	1.18 (0.72; 1.96)	1.0
MONICA/KORA (62/45)	1.10 (0.36; 3.33)	0.64 (0.18; 2.08)	0.57 (0.20; 1.58)	0.53 (0.15; 1.77)	1.0
SENECA (114/68)	2.77 (1.19; 6.90)	1.29 (0.54; 3.19)	1.28 (0.54; 3.10)	1.28 (0.57; 2.93)	1.0
HAPIEE					
Czech Rep. (231/90)	2.61 (1.01; 6.71)	2.73 (1.07; 7.00)	3.17 (1.22; 8.21)	1.34 (0.50; 3.55)	1.0
Poland (259/105)	2.14 (0.90; 5.10)	1.66 (0.71; 3.90)	2.00 (0.85; 4.67)	1.51 (0.64; 3.58)	1.0
Lithuania (262/90)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (699/489)	1.62 (1.20; 2.19)	1.02 (0.75; 1.37)	1.05 (0.79; 1.38)	0.68 (0.50; 0.91)	1.0
<b>Pooled (2,706/1,310)</b>	<b>1.77 (1.44; 2.16)</b>	<b>1.15 (0.94; 1.41)</b>	<b>1.23 (0.95; 1.59)</b>	<b>0.89 (0.69; 1.16)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 3.1; 0.80	0%; 5.6; 0.47	29%; 8.4; 0.21	27%; 8.2; 0.22	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers.

<sup>1</sup> Adjusted for age, sex, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region as well as race/ethnicity for the NHANES.

**Suppl. Table 11.** Association of 25-hydroxyvitamin D with all-cause mortality by history of cancer

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Without cancer</b>					
ESTHER (8,465/1,155)	1.49 (1.24; 1.81)	1.17 (0.96; 1.42)	1.13 (0.93; 1.37)	0.98 (0.80; 1.18)	1.0
Tromsø (4,137/1,013)	1.12 (0.92; 1.38)	0.98 (0.80; 1.20)	0.99 (0.81; 1.22)	0.84 (0.69; 1.04)	1.0
MONICA/KORA (638/213) <sup>2</sup>	1.30 (0.82; 2.07)	1.29 (0.83; 2.03)	1.12 (0.70; 1.78)	1.15 (0.73; 1.82)	1.0
SENECA (613/254)	2.18 (1.41; 3.38)	1.61 (1.07; 2.45)	1.22 (0.79; 1.88)	1.40 (0.93; 2.12)	1.0
HAPIEE					
Czech Rep. (1,823/384)	2.11 (1.43; 3.10)	1.66 (1.12; 2.46)	1.40 (0.94; 2.09)	1.13 (0.75; 1.71)	1.0
Poland (1,584/367)	1.58 (1.08; 2.31)	0.94 (0.63; 1.40)	0.95 (0.64; 1.42)	0.81 (0.54; 1.21)	1.0
Lithuania (1,414/311)	2.08 (1.37; 3.17)	1.10 (0.71; 1.72)	1.08 (0.70; 1.68)	1.04 (0.67; 1.61)	1.0
NHANES (5,296/2,155)	1.45 (1.25; 1.68)	1.08 (0.94; 1.25)	1.18 (1.03; 1.35)	1.02 (0.89; 1.17)	1.0
<b>Pooled (23,970/5,852)</b>	<b>1.54 (1.32; 1.80)</b>	<b>1.15 (1.02; 1.29)</b>	<b>1.13 (1.03; 1.23)</b>	<b>0.99 (0.91; 1.08)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	58%; 16.5; 0.02 <sup>3</sup>	31%; 10.1; 0.19	0%; 4.0; 0.78	3%; 7.2; 0.41	
<b>With Cancer</b>					
ESTHER (618/183)	1.65 (1.00; 2.75)	1.48 (0.89; 2.49)	1.09 (0.65; 1.83)	1.16 (0.70; 1.91)	1.0
Tromsø (269/128)	2.93 (1.62; 5.46)	1.60 (0.88; 2.97)	1.13 (0.60; 2.14)	1.48 (0.81; 2.74)	1.0
MONICA/KORA (16/10) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
SENECA (10/3)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (134/50)	2.64 (0.75; 9.30)	1.26 (0.38; 4.22)	1.47 (0.43; 5.00)	0.12 (0.02; 0.66)	1.0
Poland (96/39)	1.99 (0.48; 8.29)	0.54 (0.13; 2.28)	0.72 (0.17; 3.02)	0.32 (0.07; 1.47)	1.0
Lithuania (160/57)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (328/192)	1.13 (0.67; 1.89)	0.81 (0.50; 1.31)	0.80 (0.49; 1.29)	0.85 (0.53; 1.37)	1.0
<b>Pooled (1,631/662)</b>	<b>1.79 (1.21; 2.64)</b>	<b>1.16 (0.82; 1.64)</b>	<b>0.98 (0.73; 1.31)</b>	<b>0.84 (0.50; 1.44)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	33%; 6.0; 0.20	23%; 5.2; 0.27	0%; 1.6; 0.80	61%; 10.2; 0.04 <sup>4</sup>	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers.

<sup>1</sup> Adjusted for age, sex, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region as well as race/ethnicity for the NHANES.

<sup>2</sup> A question on history of cancer was not included in the first survey round (S1) of the MONICA/KORA study and participants of the S1 contact round could therefore not be used for this analysis.

<sup>3</sup> Heterogeneity becomes non-significant if the study with the weakest effect estimate (Tromsø) is excluded: RR after exclusion: 1.61 (1.41; 1.83). I<sup>2</sup>=26%; Q=8.2, p=0.23.

<sup>4</sup> Heterogeneity becomes non-significant if the study with the weakest effect estimate (HAPIEE Czech Republic) is excluded: RR after exclusion: 1.03 (0.70; 1.51). I<sup>2</sup>=33%; Q=4.5, p=0.22.



**Suppl. Table 12.** Association of 25-hydroxyvitamin D with all-cause mortality by sex

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Women</b>					
ESTHER (5,055/552)	1.54 (1.16; 2.05)	1.23 (0.93; 1.66)	1.04 (0.77; 1.41)	1.18 (0.88; 1.58)	1.0
Tromsø (2,652/539)	1.21 (0.92; 1.60)	1.00 (0.75; 1.33)	0.90 (0.67; 1.21)	0.98 (0.73; 1.32)	1.0
MONICA/KORA (447/136)	1.09 (0.63; 1.92)	0.67 (0.37; 1.21)	1.03 (0.60; 1.79)	0.74 (0.39; 1.38)	1.0
SENECA (328/96)	1.80 (0.90; 3.74)	1.35 (0.66; 2.84)	1.38 (0.69; 2.83)	0.94 (0.43; 2.07)	1.0
HAPIEE					
Czech Rep. (690/153)	1.83 (1.01; 3.33)	1.44 (0.78; 2.65)	1.39 (0.76; 2.56)	0.51 (0.25; 1.06)	1.0
Poland (546/136)	2.41 (1.27; 4.58)	1.38 (0.70; 2.71)	1.50 (0.77; 2.92)	0.76 (0.37; 1.58)	1.0
Lithuania (551/123)	3.68 (1.81; 7.47)	2.09 (1.01; 4.36)	1.33 (0.62; 2.88)	1.81 (0.86; 3.79)	1.0
NHANES (2,907/1,048)	1.53 (1.25; 1.88)	1.00 (0.82; 1.24)	1.11 (0.91; 1.36)	0.99 (0.81; 1.22)	1.0
<b>Pooled (13,176/2,783)</b>	<b>1.53 (1.26; 1.85)</b>	<b>1.11 (0.94; 1.31)</b>	<b>1.09 (0.95; 1.24)</b>	<b>0.99 (0.84; 1.16)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	50%; 13.9; 0.053	21%; 8.9; 0.26	0%; 4.0; 0.78	18%; 8.5; 0.29	
<b>Men</b>					
ESTHER (4,028/786)	1.52 (1.20; 1.93)	1.30 (1.03; 1.65)	0.93 (0.73; 1.18)	1.04 (0.82; 1.32)	1.0
Tromsø (1,754/602)	1.31 (1.01; 1.70)	1.18 (0.91; 1.53)	1.13 (0.87; 1.47)	1.00 (0.77; 1.31)	1.0
MONICA/KORA (492/230)	1.26 (0.81; 1.98)	1.24 (0.81; 1.91)	0.78 (0.49; 1.23)	1.12 (0.73; 1.73)	1.0
SENECA (333/174)	2.09 (1.24; 3.59)	1.70 (1.00; 2.93)	1.74 (1.04; 2.97)	1.68 (1.01; 2.85)	1.0
HAPIEE					
Czech Rep. (1,339/300)	2.07 (1.34; 3.22)	1.69 (1.08; 2.63)	1.22 (0.77; 1.93)	1.07 (0.67; 1.70)	1.0
Poland (1,154/275)	1.23 (0.79; 1.90)	0.79 (0.50; 1.25)	0.67 (0.42; 1.07)	0.77 (0.49; 1.21)	1.0
Lithuania (1,023/245)	1.79 (1.11; 2.89)	0.96 (0.58; 1.59)	0.95 (0.58; 1.57)	1.12 (0.69; 1.83)	1.0
NHANES (2,719/1,300)	1.32 (1.09; 1.58)	1.12 (0.93; 1.34)	1.06 (0.88; 1.26)	0.98 (0.82; 1.17)	1.0
<b>Pooled (12,842/3,912)</b>	<b>1.44 (1.28; 1.62)</b>	<b>1.20 (1.05; 1.36)</b>	<b>1.02 (0.88; 1.18)</b>	<b>1.03 (0.92; 1.14)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	9%; 7.7; 0.36	21%; 8.9; 0.26	33%; 10.4; 0.17	0%; 5.7; 0.58	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Adjusted for age, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

**Suppl. Table 13.** Association of 25-hydroxyvitamin D with all-cause mortality by age groups

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Age-range 50-59 years</b>					
ESTHER (3,140/223)	1.47 (0.96; 2.28)	1.14 (0.73; 1.80)	1.12 (0.71; 1.78)	1.13 (0.73; 1.76)	1.0
Tromsø (1,798/179)	1.30 (0.83; 2.04)	0.98 (0.61; 1.57)	0.82 (0.50; 1.33)	0.68 (0.40; 1.12)	1.0
MONICA/KORA (477/125)	1.52 (0.86; 2.76)	1.01 (0.55; 1.86)	0.89 (0.50; 1.61)	0.77 (0.41; 1.44)	1.0
HAPIEE					
Czech Rep. (568/124)	1.68 (0.86; 3.25)	1.22 (0.61; 2.46)	1.75 (0.90; 3.42)	0.69 (0.32; 1.47)	1.0
Poland (573/129)	2.60 (1.35; 5.00)	1.00 (0.50; 2.02)	1.20 (0.60; 2.40)	0.90 (0.44; 1.84)	1.0
Lithuania (301/67) <sup>2</sup>	2.71 (1.10; 6.63)	1.63 (0.65; 4.12)	0.84 (0.30; 2.34)	1.50 (0.59; 3.82)	1.0
NHANES (1,773/339)	1.37 (0.95; 2.01)	1.01 (0.69; 1.48)	1.36 (0.94; 1.96)	0.95 (0.65; 1.39)	1.0
<b>Pooled (8,630/1,186)</b>	<b>1.55 (1.27; 1.88)</b>	<b>1.07 (0.87; 1.31)</b>	<b>1.14 (0.93; 1.39)</b>	<b>0.91 (0.74; 1.12)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 8.0; 0.54	0%; 1.3; 0.97	0%; 5.3; 0.51	0%; 4.1; 0.67	
<b>Age-range 60-69 years</b>					
ESTHER (4,564/709)	1.52 (1.19; 1.93)	1.26 (0.98; 1.62)	1.11 (0.86; 1.43)	1.01 (0.79; 1.29)	1.0
Tromsø (1,770/490)	1.29 (0.96; 1.73)	0.98 (0.73; 1.32)	1.28 (0.97; 1.69)	0.91 (0.68; 1.23)	1.0
MONICA/KORA (371/178)	1.08 (0.64; 1.84)	1.29 (0.79; 2.12)	1.09 (0.66; 1.81)	1.01 (0.61; 1.69)	1.0
HAPIEE					
Czech Rep. (1,380/310)	2.56 (1.65; 3.98)	2.10 (1.35; 3.26)	1.43 (0.91; 2.26)	1.13 (0.70; 1.81)	1.0
Poland (1,083/272)	1.43 (0.91; 2.24)	0.96 (0.60; 1.52)	0.77 (0.48; 1.24)	0.91 (0.57; 1.45)	1.0
Lithuania (851/199)	2.49 (1.44; 4.31)	1.25 (0.71; 2.22)	1.27 (0.73; 2.24)	1.14 (0.65; 2.02)	1.0
NHANES (2,206/901)	1.36 (1.09; 1.70)	1.04 (0.83; 1.30)	1.02 (0.82; 1.27)	0.99 (0.80; 1.24)	1.0
<b>Pooled (12,225/3,059)</b>	<b>1.54 (1.27; 1.86)</b>	<b>1.19 (1.00; 1.42)</b>	<b>1.11 (0.98; 1.26)</b>	<b>0.99 (0.88; 1.12)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	51%; 12.2; 0.06	42%; 10.4; 0.11	0%; 5.3; 0.51	0%; 1.0; 0.99	
<b>Age-range 70-79 years</b>					
ESTHER (1,379/406)	1.41 (1.02; 1.95)	1.33 (0.97; 1.83)	1.13 (0.82; 1.55)	0.78 (0.56; 1.08)	1.0
Tromsø (838/472)	1.21 (0.90; 1.64)	1.05 (0.78; 1.41)	1.10 (0.82; 1.48)	0.92 (0.69; 1.24)	1.0
MONICA/KORA (91/63)	3.05 (1.15; 8.33)	0.78 (0.28; 2.16)	2.10 (0.80; 5.64)	2.37 (0.96; 6.04)	1.0
SENECA (661/270)	2.13 (1.40; 3.27)	1.60 (1.07; 2.42)	1.28 (0.85; 1.93)	1.51 (1.02; 2.27)	1.0
HAPIEE					
Czech Rep. (81/19)	n. a.	n. a.	n. a.	n. a.	1.0
Poland (44/10)	n. a.	n. a.	n. a.	n. a.	1.0
Lithuania (320/102)	2.67 (1.28; 5.55)	0.57 (0.25; 1.33)	1.16 (0.55; 2.47)	1.06 (0.50; 2.27)	1.0
NHANES (1,647/1,108)	1.40 (1.14; 1.71)	1.06 (0.88; 1.29)	1.18 (0.98; 1.43)	0.88 (0.73; 1.07)	1.0
<b>Pooled (5,163/2,450)</b>	<b>1.57 (1.26; 1.95)</b>	<b>1.14 (0.94; 1.37)</b>	<b>1.18 (1.03; 1.34)</b>	<b>1.02 (0.79; 1.32)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	47%; 9.5; 0.09	34%; 7.5; 0.18	0%; 1.8; 0.88	64%; 11.0; 0.03 <sup>3</sup>	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Adjusted for age, sex, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

<sup>2</sup> Not adjusted for education because of complete separation of events according to education categories.

<sup>3</sup> Heterogeneity becomes non-significant if the study with the strongest effect estimate (MONICA/KORA) is excluded: RR after exclusion: 0.96 (0.76; 1.20). I<sup>2</sup>=57%; Q=7.1, p=0.07.

**Suppl. Table 14.** Association of 25-hydroxyvitamin D with all-cause mortality by season

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Winter</b>					
ESTHER (2,501/364)	1.67 (1.17; 2.39)	1.16 (0.83; 1.64)	1.08 (0.76; 1.54)	0.99 (0.69; 1.41)	1.0
Tromsø (1,429/383)	1.06 (0.76; 1.49)	1.07 (0.77; 1.50)	1.07 (0.77; 1.50)	1.08 (0.77; 1.52)	1.0
MONICA/KORA (291/115)	0.89 (0.47; 1.70)	0.84 (0.45; 1.57)	1.19 (0.67; 2.14)	0.81 (0.42; 1.57)	1.0
SENECA (447/187)	1.64 (1.00; 2.71)	1.34 (0.82; 2.17)	1.17 (0.72; 1.89)	1.34 (0.84; 2.15)	1.0
HAPIEE					
Czech Rep. (714/156)	1.68 (0.91; 3.21)	1.69 (0.92; 3.12)	1.53 (0.83; 2.83)	1.04 (0.55; 1.99)	1.0
Poland (729/179)	1.34 (0.78; 2.30)	0.80 (0.45; 1.40)	0.65 (0.36; 1.16)	0.65 (0.36; 1.16)	1.0
Lithuania (363/82)	1.48 (0.69; 3.19)	0.43 (0.18; 1.03)	0.54 (0.23; 1.26)	0.64 (0.28; 1.46)	1.0
NHANES (1,254/535)	1.59 (1.19; 2.13)	1.15 (0.87; 1.53)	1.18 (0.90; 1.56)	0.91 (0.69; 1.22)	1.0
<b>Pooled (7,728/2,001)</b>	<b>1.41 (1.21; 1.65)</b>	<b>1.08 (0.90; 1.30)</b>	<b>1.08 (0.93; 1.26)</b>	<b>0.96 (0.83; 1.12)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 6.9; 0.44	23%; 9.1; 0.24	4%; 7.3; 0.40	0%; 5.5; 0.60	
<b>Spring</b>					
ESTHER (1,891/245)	1.60 (1.08; 2.42)	1.29 (0.85; 1.98)	1.04 (0.66; 1.63)	1.06 (0.68; 1.67)	1.0
Tromsø (1,570/388)	1.31 (0.96; 1.81)	1.20 (0.87; 1.65)	0.91 (0.65; 1.27)	0.89 (0.64; 1.25)	1.0
MONICA/KORA (355/133)	1.97 (1.15; 3.42)	1.46 (0.84; 2.55)	1.45 (0.83; 2.54)	0.66 (0.34; 1.26)	1.0
SENECA (214/83)	3.87 (1.79; 8.91)	2.28 (1.06; 5.24)	1.86 (0.82; 4.37)	1.81 (0.84; 4.15)	1.0
HAPIEE					
Czech Rep. (833/183)	2.62 (1.49; 4.65)	2.04 (1.14; 3.66)	2.06 (1.14; 3.69)	0.91 (0.48; 1.74)	1.0
Poland (834/193)	1.72 (1.01; 2.91)	0.99 (0.57; 1.72)	1.14 (0.66; 1.97)	0.88 (0.50; 1.55)	1.0
Lithuania (589/143)	2.03 (1.07; 3.84)	1.69 (0.89; 3.23)	1.05 (0.54; 2.06)	1.00 (0.51; 1.97)	1.0
NHANES (1,439/619)	1.13 (0.87; 1.46)	0.81 (0.63; 1.05)	0.90 (0.70; 1.16)	0.81 (0.63; 1.04)	1.0
<b>Pooled (7,725/1,987)</b>	<b>1.71 (1.33; 2.20)</b>	<b>1.29 (1.00; 1.66)</b>	<b>1.12 (0.92; 1.37)</b>	<b>0.89 (0.76; 1.04)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	58%; 16.5; 0.02 <sup>2</sup>	57%; 16.5; 0.02 <sup>3</sup>	32%; 10.3; 0.17	0%; 5.1; 0.65	
<b>Summer</b>					
ESTHER (2,193/349)	1.79 (1.26; 2.55)	1.40 (0.97; 2.02)	1.25 (0.88; 1.78)	1.00 (0.69; 1.44)	1.0
Tromsø (172/38)	0.52 (0.13; 1.71)	1.41 (0.56; 3.73)	0.46 (0.13; 1.45)	2.22 (0.82; 6.28)	1.0
MONICA/KORA (38/13)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Lithuania (162/40)	2.95 (0.83; 10.5)	1.40 (0.38; 5.18)	0.81 (0.20; 3.24)	2.19 (0.61; 7.86)	1.0
NHANES (1,388/543)	1.51 (1.12; 2.02)	1.33 (1.01; 1.76)	1.15 (0.87; 1.53)	1.00 (0.75; 1.34)	1.0
<b>Pooled (3,953/983)</b>	<b>1.38 (1.18; 1.61)</b>	<b>1.36 (1.10; 1.68)</b>	<b>1.18 (0.95; 1.46)</b>	<b>1.09 (0.84; 1.41)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 2.7; 0.44	0%; 0.1; 1.00	0%; 0.4; 0.81	15%; 3.5; 0.32	
<b>Autumn</b>					
ESTHER (2,498/380)	1.22 (0.89; 1.66)	0.96 (0.69; 1.34)	0.84 (0.59; 1.17)	0.83 (0.60; 1.15)	1.0
Tromsø (1,235/332)	1.34 (0.95; 1.89)	0.98 (0.69; 1.40)	1.09 (0.77; 1.55)	0.83 (0.57; 1.20)	1.0
MONICA/KORA (255/105)	0.90 (0.47; 1.75)	1.05 (0.56; 1.98)	0.90 (0.46; 1.75)	0.96 (0.52; 1.79)	1.0
HAPIEE					
Czech Rep. (482/114)	1.62 (0.82; 3.23)	1.13 (0.56; 2.31)	0.82 (0.39; 1.70)	0.67 (0.31; 1.40)	1.0
Poland (137/39)	3.02 (0.75; 12.1)	0.87 (0.20; 3.80)	0.58 (0.12; 2.86)	1.68 (0.40; 7.10)	1.0
Lithuania (460/103)	2.38 (1.13; 5.02)	1.35 (0.62; 2.90)	1.25 (0.58; 2.71)	0.99 (0.44; 2.23)	1.0
NHANES (1,545/651)	1.45 (1.12; 1.89)	1.19 (0.92; 1.54)	1.11 (0.87; 1.43)	0.94 (0.72; 1.21)	1.0
<b>Pooled (6,612/1,724)</b>	<b>1.39 (1.17; 1.64)</b>	<b>1.08 (0.92; 1.27)</b>	<b>1.01 (0.86; 1.19)</b>	<b>0.89 (0.75; 1.04)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 5.9; 0.44	0%; 1.7; 0.94	0%; 3.0; 0.80	0%; 1.9; 0.93	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers.

<sup>1</sup> Adjusted for age, sex, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region as well as race/ethnicity for the NHANES.

<sup>2</sup> Heterogeneity becomes non-significant if the study with the strongest effect estimate (SENECA) is excluded: RR after exclusion: 1.58 (1.26; 1.96). I<sup>2</sup>=46%; Q=11.0, p=0.09.

<sup>3</sup> Heterogeneity becomes non-significant if the study with the weakest effect estimate (NHANES) is excluded: RR after exclusion: 1.37 (1.14; 1.65). I<sup>2</sup>=0%; Q=5.9, p=0.44.

**Suppl. Table 15.** Association of 25-hydroxyvitamin D with CVD mortality by sex (subjects without history of CVD)

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Women</b>					
ESTHER (4,711/133)	1.60 (0.88; 2.90)	1.31 (0.72; 2.41)	1.13 (0.59; 2.16)	1.40 (0.74; 2.64)	1.0
Tromsø (2,556/191)	1.08 (0.69; 1.71)	0.67 (0.41; 1.10)	0.73 (0.44; 1.21)	1.01 (0.61; 1.64)	1.0
MONICA/KORA (433/55)	2.10 (0.76; 5.82)	1.88 (0.72; 4.91)	1.89 (0.71; 5.03)	1.47 (0.51; 4.22)	1.0
SENECA (263/27)	2.32 (0.65; 8.32)	0.61 (0.11; 3.25)	1.39 (0.39; 5.03)	1.38 (0.30; 6.38)	1.0
HAPIEE					
Czech Rep. (619/36)	1.43 (0.48; 4.29)	1.04 (0.33; 3.29)	1.03 (0.33; 3.26)	0.45 (0.11; 1.96)	1.0
Poland (488/30)	2.22 (0.63; 7.85)	1.41 (0.35; 5.64)	1.72 (0.46; 6.42)	1.44 (0.36; 5.73)	1.0
Lithuania (491/40)	1.90 (0.52; 6.91)	1.93 (0.54; 6.94)	2.28 (0.64; 8.08)	3.01 (0.88; 10.2)	1.0
NHANES (2,626/353)	1.36 (0.95; 1.94)	1.15 (0.80; 1.65)	0.87 (0.60; 1.27)	1.23 (0.87; 1.73)	1.0
<b>Pooled (12,187/865)</b>	<b>1.41 (1.12; 1.77)</b>	<b>1.08 (0.85; 1.36)</b>	<b>0.99 (0.78; 1.26)</b>	<b>1.22 (0.97; 1.55)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 3.4; 0.84	7%; 6.8; 0.45	6%; 6.3; 0.51	0%; 4.9; 0.68	
<b>Men</b>					
ESTHER (3,505/173)	1.09 (0.66; 1.82)	1.07 (0.65; 1.74)	0.99 (0.61; 1.60)	0.96 (0.59; 1.57)	1.0
Tromsø (1,515/179)	1.13 (0.70; 1.84)	1.34 (0.83; 2.15)	1.22 (0.74; 1.99)	1.00 (0.59; 1.67)	1.0
MONICA/KORA (444/81)	1.92 (0.86; 4.29)	2.00 (0.94; 4.27)	1.16 (0.52; 2.59)	1.05 (0.47; 2.31)	1.0
SENECA (251/31)	0.71 (0.21; 2.36)	0.79 (0.24; 2.58)	0.64 (0.17; 2.38)	0.74 (0.25; 2.17)	1.0
HAPIEE					
Czech Rep. (1,120/81)	3.01 (1.42; 6.40)	1.21 (0.53; 2.81)	1.05 (0.45; 2.47)	1.03 (0.44; 2.41)	1.0
Poland (937/49)	1.47 (0.58; 3.69)	1.09 (0.41; 2.87)	0.89 (0.33; 2.43)	0.86 (0.31; 2.39)	1.0
Lithuania (821/59)	1.49 (0.58; 3.83)	0.98 (0.36; 2.67)	2.20 (0.90; 5.34)	0.88 (0.32; 2.48)	1.0
NHANES (2,301/368)	1.16 (0.81; 1.65)	1.14 (0.81; 1.60)	1.06 (0.76; 1.49)	0.94 (0.66; 1.35)	1.0
<b>Pooled (10,894/1,021)</b>	<b>1.31 (1.03; 1.66)</b>	<b>1.19 (0.97; 1.47)</b>	<b>1.10 (0.89; 1.36)</b>	<b>0.95 (0.77; 1.18)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	12%; 8.0; 0.34	0%; 2.9; 0.89	0%; 3.6; 0.83	0%; 0.4; 1.00	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Adjusted for age, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

**Suppl. Table 16.** Association of 25-hydroxyvitamin D with CVD mortality by age groups (subjects without history of CVD)

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Age-range 50-59 years</b>					
ESTHER (2,968/42)	0.69 (0.22; 2.19)	0.99 (0.36; 2.74)	1.09 (0.39; 3.04)	1.26 (0.49; 3.23)	1.0
Tromsø (1,738/40)	1.85 (0.72; 4.78)	0.66 (0.21; 2.12)	1.02 (0.34; 3.04)	1.10 (0.39; 3.16)	1.0
MONICA/KORA (461/38)	2.39 (0.71; 8.00)	2.44 (0.76; 7.83)	1.87 (0.60; 5.76)	0.23 (0.02; 2.17)	1.0
HAPIEE					
Czech Rep. (518/32)	3.51 (0.91; 13.52)	2.71 (0.67; 10.9)	1.29 (0.27; 6.09)	1.32 (0.28; 6.21)	1.0
Poland (511/26)	1.81 (0.51; 6.50)	0.74 (0.16; 3.46)	1.35 (0.33; 5.54)	1.59 (0.42; 6.05)	1.0
Lithuania (270/15)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,652/89)	0.86 (0.42; 1.75)	0.78 (0.38; 1.57)	0.86 (0.44; 1.71)	0.57 (0.26; 1.23)	1.0
<b>Pooled (8,118/282)</b>	<b>1.42 (0.88; 2.30)</b>	<b>1.05 (0.67; 1.65)</b>	<b>1.10 (0.72; 1.67)</b>	<b>0.91 (0.58; 1.43)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	20%; 6.3; 0.28	5%; 5.3; 0.38	0%; 1.5; 0.91	0%; 4.2; 0.52	
<b>Age-range 60-69 years</b>					
ESTHER (4,074/160)	1.69 (0.99; 2.86)	1.66 (0.97; 2.84)	1.01 (0.56; 1.82)	1.36 (0.80; 2.30)	1.0
Tromsø (1,605/155)	1.04 (0.61; 1.76)	0.60 (0.34; 1.06)	0.96 (0.58; 1.59)	1.02 (0.62; 1.68)	1.0
MONICA/KORA (334/68)	2.02 (0.77; 5.28)	3.38 (1.52; 7.52)	1.48 (0.59; 3.74)	2.42 (1.02; 5.74)	1.0
HAPIEE					
Czech Rep. (1,157/82)	2.55 (1.19; 5.45)	1.96 (0.90; 4.25)	1.04 (0.45; 2.45)	1.07 (0.45; 2.55)	1.0
Poland (874/51)	1.65 (0.66; 4.12)	1.43 (0.57; 3.60)	0.76 (0.27; 2.13)	0.55 (0.18; 1.75)	1.0
Lithuania (702/50)	0.97 (0.33; 2.83)	0.95 (0.33; 2.74)	1.57 (0.59; 4.19)	1.19 (0.42; 3.36)	1.0
NHANES (1,948/277)	1.40 (0.94; 2.10)	0.94 (0.62; 1.42)	0.95 (0.63; 1.43)	1.10 (0.75; 1.63)	1.0
<b>Pooled (13,694/843)</b>	<b>1.47 (1.17; 1.86)</b>	<b>1.31 (0.86; 2.01)</b>	<b>1.02 (0.80; 1.29)</b>	<b>1.16 (0.92; 1.46)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 5.0; 0.54	64%; 16.8; 0.01 <sup>2</sup>	0%; 1.9; 0.93	0%; 5.2; 0.52	
<b>Age-range 70-79 years</b>					
ESTHER (1,174/104)	1.50 (0.80; 2.82)	1.04 (0.54; 2.03)	1.02 (0.53; 1.96)	1.23 (0.68; 2.22)	1.0
Tromsø (728/175)	1.22 (0.74; 1.98)	1.18 (0.73; 1.91)	1.00 (0.60; 1.65)	0.88 (0.53; 1.46)	1.0
MONICA/KORA (82/30)	2.34 (0.53; 10.26)	1.40 (0.37; 5.34)	1.62 (0.39; 6.69)	0.82 (0.16; 4.16)	1.0
SENECA (514/58)	0.98 (0.40; 2.36)	0.89 (0.38; 2.08)	0.92 (0.39; 2.19)	0.81 (0.32; 2.02)	1.0
HAPIEE					
Czech Rep. (64/3)	n. a.	n. a.	n. a.	n. a.	1.0
Poland (40/2)	n. a.	n. a.	n. a.	n. a.	1.0
Lithuania (340/34)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,327/355)	1.36 (0.93; 1.98)	1.31 (0.92; 1.89)	1.39 (0.98; 1.99)	1.07 (0.73; 1.55)	1.0
<b>Pooled (4,269/761)</b>	<b>1.33 (1.03; 1.71)</b>	<b>1.20 (0.93; 1.53)</b>	<b>1.19 (0.93; 1.53)</b>	<b>1.02 (0.79; 1.31)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 1.3; 0.86	0%; 0.9; 0.92	0%; 1.9; 0.75	0%; 1.1; 0.90	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Adjusted for age, sex, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

<sup>2</sup> Heterogeneity becomes non-significant if the study with the strongest effect estimate (MONICA/KORA) is excluded: RR after exclusion: 1.13 (0.78; 1.63). I<sup>2</sup>=48%; Q=9.7, p=0.09.

**Suppl. Table 17.** Association of 25-hydroxyvitamin D with cardiovascular mortality by season (subjects without history of CVD)

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Winter</b>					
ESTHER (2,264/67)	1.46 (0.60; 3.55)	1.21 (0.58; 2.53)	0.87 (0.38; 1.98)	0.84 (0.36; 1.92)	1.0
Tromsø (1,332/133)	0.83 (0.48; 1.45)	0.95 (0.56; 1.62)	0.79 (0.43; 1.44)	1.10 (0.63; 1.92)	1.0
MONICA/KORA (272/37)	1.02 (0.26; 3.96)	1.72 (0.47; 6.21)	1.69 (0.50; 6.21)	0.87 (0.22; 3.39)	1.0
SENECA (344/52)	1.09 (0.44; 2.69)	0.81 (0.32; 2.08)	0.69 (0.29; 1.63)	1.08 (0.44; 2.66)	1.0
HAPIEE					
Czech Rep. (630/41)	n. a.	n. a.	n. a.	n. a.	1.0
Poland (605/33)	2.29 (0.67; 7.85)	1.40 (0.39; 5.09)	0.77 (0.19; 3.17)	0.69 (0.16; 2.99)	1.0
Lithuania (308/27)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,112/173)	2.02 (1.16; 3.55)	1.62 (0.94; 2.78)	1.41 (0.83; 2.39)	1.03 (0.59; 1.78)	1.0
<b>Pooled (6,867/563)</b>	<b>1.32 (0.92; 1.90)</b>	<b>1.21 (0.90; 1.63)</b>	<b>1.01 (0.74; 1.38)</b>	<b>1.00 (0.73; 1.37)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	17%; 6.1; 0.30	0%; 3.0; 0.71	0%; 3.8; 0.58	0%; 0.6; 0.99	
<b>Spring</b>					
ESTHER (1,729/68)	1.65 (0.80; 3.39)	1.01 (0.46; 2.25)	0.81 (0.34; 1.93)	0.98 (0.43; 2.23)	1.0
Tromsø (1,456/114)	1.23 (0.67; 2.25)	1.03 (0.56; 1.89)	0.87 (0.46; 1.63)	0.77 (0.40; 1.47)	1.0
MONICA/KORA (333/54)	n. a.	n. a.	n. a.	n. a.	1.0
SENECA (170/6)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (694/44)	4.83 (1.56; 15.0)	3.34 (1.03; 10.8)	1.16 (0.30; 4.50)	0.70 (0.15; 3.22)	1.0
Poland (700/40)	1.56 (0.54; 4.50)	1.29 (0.43; 3.87)	1.19 (0.39; 3.61)	1.23 (0.41; 3.69)	1.0
Lithuania (493/34)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,261/195)	0.78 (0.49; 1.24)	0.76 (0.49; 1.19)	0.63 (0.39; 1.01)	0.76 (0.48; 1.19)	1.0
<b>Pooled (6,836/555)</b>	<b>1.43 (0.85; 2.42)</b>	<b>1.05 (0.71; 1.56)</b>	<b>0.87 (0.72; 1.07)</b>	<b>0.82 (0.60; 1.13)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	60%; 10.1; 0.04 <sup>2</sup>	30%; 5.7; 0.22	0%; 2.6; 0.76	0%; 0.9; 0.93	
<b>Summer</b>					
ESTHER (1,963/84)	1.48 (0.68; 3.24)	1.51 (0.69; 3.27)	1.76 (0.87; 3.56)	1.02 (0.46; 2.28)	1.0
Tromsø (158/12)	n. a.	n. a.	n. a.	n. a.	1.0
MONICA/KORA (36/5)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Lithuania (127/9)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,224/162)	1.35 (0.79; 2.29)	1.40 (0.84; 2.34)	1.28 (0.77; 2.12)	0.95 (0.54; 1.68)	1.0
<b>Pooled (3,508/272)</b>	<b>1.39 (0.90; 2.16)</b>	<b>1.43 (0.93; 2.20)</b>	<b>1.43 (0.95; 2.15)</b>	<b>0.97 (0.61; 1.54)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 0.04; 0.85	0%; 0.0; 0.87	0%; 0.5; 0.47	0%; 0.0; 0.89	
<b>Autumn</b>					
ESTHER (2,260/87)	0.66 (0.32; 1.35)	1.17 (0.65; 2.13)	0.78 (0.38; 1.58)	1.03 (0.54; 1.95)	1.0
Tromsø (1,125/111)	1.05 (0.59; 1.87)	0.65 (0.35; 1.22)	0.75 (0.40; 1.39)	0.80 (0.43; 1.46)	1.0
MONICA/KORA (236/40)	2.13 (0.67; 6.72)	1.21 (0.34; 4.23)	1.58 (0.48; 5.18)	1.23 (0.40; 3.73)	1.0
HAPIEE					
Czech Rep. (415/32)	2.22 (0.69; 7.15)	1.20 (0.33; 4.32)	1.12 (0.32; 3.96)	0.66 (0.17; 2.65)	1.0
Poland (120/6)	n. a.	n. a.	n. a.	n. a.	1.0
Lithuania (384/29)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,330/191)	1.23 (0.73; 2.06)	1.08 (0.66; 1.79)	1.22 (0.76; 1.97)	0.94 (0.64; 1.38)	1.0
<b>Pooled (5,870/496)</b>	<b>1.14 (0.80; 1.63)</b>	<b>0.99 (0.73; 1.34)</b>	<b>1.00 (0.74; 1.37)</b>	<b>0.97 (0.71; 1.31)</b>	
Heterogeneity (I <sup>2</sup> ; Q; p)	16%; 4.8; 0.31	0%; 2.3; 0.67	0%; 2.6; 0.64	0%; 1.0; 0.91	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers.

<sup>1</sup> Adjusted for age, sex, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region as well as race/ethnicity for the NHANES.

<sup>2</sup> Heterogeneity becomes non-significant if the study with the strongest effect estimate (HAPIEE Czech Republic) is excluded: RR after exclusion: 1.12 (0.77; 1.62). I<sup>2</sup>=22%; Q=3.9, p=0.28.

**Suppl. Table 18.** Association of 25-hydroxyvitamin D with cancer mortality by sex (subjects without history of cancer)

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Women</b>					
ESTHER (4,689/152)	0.76 (0.45; 1.27)	0.81 (0.48; 1.36)	0.74 (0.44; 1.23)	0.82 (0.50; 1.32)	1.0
Tromsø (2,483/158)	0.81 (0.49; 1.35)	1.10 (0.67; 1.79)	0.79 (0.47; 1.33)	0.81 (0.49; 1.35)	1.0
MONICA/KORA (303/23) <sup>2</sup>	0.24 (0.05; 1.19)	0.47 (0.13; 1.66)	0.79 (0.26; 2.37)	0.79 (0.23; 2.74)	1.0
SENECA (302/10)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (604/62)	1.21 (0.51; 2.90)	1.35 (0.58; 3.14)	0.92 (0.37; 2.29)	0.78 (0.30; 1.99)	1.0
Poland (496/61)	1.67 (0.68; 4.06)	1.10 (0.42; 2.82)	1.47 (0.59; 3.65)	0.73 (0.26; 2.03)	1.0
Lithuania (474/32)	2.06 (0.71; 5.97)	1.15 (0.36; 3.68)	0.41 (0.10; 1.76)	0.40 (0.10; 1.72)	1.0
NHANES (2,700/209)	1.15 (0.70; 1.90)	1.10 (0.68; 1.79)	1.65 (1.05; 2.60)	1.32 (0.83; 2.10)	1.0
<b>Pooled (12,051/707)</b>	<b>1.00 (0.73; 1.37)</b>	<b>1.01 (0.79; 1.30)</b>	<b>0.98 (0.70; 1.36)</b>	<b>0.91 (0.71; 1.17)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	28.2%; 8.4; 0.21	0%; 2.8; 0.83	35%; 9.2; 0.16	0%; 4.5; 0.62	
<b>Men</b>					
ESTHER (3,776/262)	1.22 (0.82; 1.81)	0.96 (0.64; 1.44)	0.69 (0.45; 1.05)	1.00 (0.67; 1.48)	1.0
Tromsø (1,654/179)	0.65 (0.40; 1.07)	1.06 (0.68; 1.65)	0.89 (0.56; 1.42)	0.85 (0.54; 1.34)	1.0
MONICA/KORA (335/38) <sup>2</sup>	0.85 (0.25; 2.96)	1.09 (0.35; 3.34)	0.63 (0.17; 2.33)	1.96 (0.77; 4.99)	1.0
SENECA (311/38)	0.74 (0.23; 2.38)	0.91 (0.28; 2.98)	0.49 (0.12; 1.97)	2.65 (0.98; 7.19)	1.0
HAPIEE					
Czech Rep. (1,219/109)	1.12 (0.57; 2.19)	1.29 (0.67; 2.50)	1.17 (0.60; 2.26)	1.07 (0.54; 2.11)	1.0
Poland (1,088/106)	0.88 (0.47; 1.65)	0.33 (0.15; 0.72)	0.55 (0.28; 1.10)	0.98 (0.53; 1.82)	1.0
Lithuania (940/78)	1.10 (0.54; 2.26)	0.73 (0.34; 1.56)	0.46 (0.20; 1.07)	0.94 (0.46; 1.93)	1.0
NHANES (2,596/322)	0.97 (0.67; 1.40)	0.97 (0.67; 1.38)	0.81 (0.56; 1.17)	1.02 (0.72; 1.45)	1.0
<b>Pooled (11,919/1,132)</b>	<b>0.96 (0.79; 1.17)</b>	<b>0.92 (0.73; 1.15)</b>	<b>0.75 (0.62; 0.91)</b>	<b>1.04 (0.86; 1.26)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 4.5; 0.73	18%; 8.5; 0.29	0%; 5.0; 0.66	0%; 6.0; 0.53	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; IR, incidence rate; n<sub>cases</sub>, case numbers; n. a., not assessed due to limited case numbers; n<sub>total</sub>, total sample size.

<sup>1</sup> Adjusted for age, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

<sup>2</sup> A question on history of cancer was not included in the first survey round (S1) of the MONICA/KORA study and participants of the S1 contact round could therefore not be used for this analysis.

**Suppl. Table 19.** Association of 25-hydroxyvitamin D with cancer mortality by age groups (subjects without history of cancer)

Cohort (N <sub>total</sub> / N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Age-range 50-59 years</b>					
ESTHER (3,002/79)	1.77 (0.85; 3.72)	1.04 (0.47; 2.30)	0.87 (0.38; 1.97)	1.08 (0.51; 2.29)	1.0
Tromsø (1,731/79)	0.57 (0.26; 1.23)	0.96 (0.49; 1.88)	0.86 (0.44; 1.69)	0.60 (0.29; 1.24)	1.0
MONICA/KORA (291/19) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (518/44)	0.73 (0.29; 1.86)	0.41 (0.14; 1.21)	0.85 (0.33; 2.20)	0.43 (0.15; 1.24)	1.0
Poland (541/48)	2.49 (0.89; 6.95)	1.13 (0.36; 3.51)	1.40 (0.47; 4.20)	1.21 (0.39; 3.74)	1.0
Lithuania (283/17)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,710/119)	1.02 (0.53; 1.95)	1.18 (0.64; 2.18)	1.67 (0.91; 3.06)	1.17 (0.63; 2.18)	1.0
<b>Pooled (8,067/405)</b>	<b>1.10 (0.67; 1.81)</b>	<b>0.97 (0.68; 1.38)</b>	<b>1.12 (0.79; 1.58)</b>	<b>0.88 (0.61; 1.26)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	47%; 6.6; 0.11	0%; 2.9; 0.56	0%; 3.1; 0.54	5%; 4.2; 0.38	
<b>Age-range 60-69 years</b>					
ESTHER (4,228/243)	1.10 (0.74; 1.66)	0.75 (0.48; 1.17)	0.99 (0.66; 1.48)	0.88 (0.60; 1.29)	1.0
Tromsø (1,647/154)	0.81 (0.49; 1.34)	0.72 (0.44; 1.19)	1.07 (0.68; 1.69)	0.60 (0.35; 1.00)	1.0
MONICA/KORA (267/29) <sup>2</sup>	0.56 (0.18; 1.73)	0.52 (0.17; 1.61)	0.32 (0.07; 1.52)	0.93 (0.30; 2.93)	1.0
HAPIEE					
Czech Rep. (1,229/121)	1.48 (0.78; 2.82)	1.59 (0.85; 2.99)	1.28 (0.66; 2.48)	1.17 (0.60; 2.31)	1.0
Poland (1,001/114)	0.94 (0.51; 1.75)	0.45 (0.22; 0.92)	0.68 (0.36; 1.31)	1.08 (0.58; 1.98)	1.0
Lithuania (769/61)	2.12 (0.89; 5.07)	1.29 (0.52; 3.23)	0.94 (0.36; 2.47)	0.98 (0.38; 2.53)	1.0
NHANES (2,085/203)	0.75 (0.46; 1.22)	0.78 (0.49; 1.24)	0.92 (0.59; 1.42)	1.07 (0.69; 1.66)	1.0
<b>Pooled (11,226/925)</b>	<b>1.00 (0.78; 1.28)</b>	<b>0.80 (0.61; 1.07)</b>	<b>0.95 (0.77; 1.18)</b>	<b>0.92 (0.74; 1.13)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	21%; 7.6; 0.27	33%; 8.9; 0.18	0%; 4.1; 0.67	0%; 3.9; 0.69	
<b>Age-range 70-79 years</b>					
ESTHER (1,235/92)	0.57 (0.29; 1.12)	0.66 (0.35; 1.23)	0.82 (0.44; 1.52)	0.36 (0.17; 0.74)	1.0
Tromsø (759/104)	0.61 (0.31; 1.19)	1.20 (0.69; 2.09)	0.78 (0.42; 1.47)	0.68 (0.36; 1.26)	1.0
MONICA/KORA (80/13) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
SENECA (613/48)	1.61 (0.64; 4.10)	1.19 (0.43; 3.32)	0.63 (0.20; 1.94)	2.09 (0.86; 5.08)	1.0
HAPIEE					
Czech Rep. (76/6)	n. a.	n. a.	n. a.	n. a.	1.0
Poland (42/5)	n. a.	n. a.	n. a.	n. a.	1.0
Lithuania (362/32)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,501/209)	1.06 (0.66; 1.72)	1.04 (0.67; 1.61)	0.94 (0.60; 1.47)	0.73 (0.47; 1.13)	1.0
<b>Pooled (4,668/509)</b>	<b>0.85 (0.56; 1.30)</b>	<b>0.99 (0.74; 1.33)</b>	<b>0.85 (0.63; 1.15)</b>	<b>0.75 (0.43; 1.31)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	39%; 4.9; 0.18	0%; 2.2; 0.53	0%; 0.5; 0.91	67%; 9.0; 0.03 <sup>3</sup>	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers; IR, incidence rate.

<sup>1</sup> Adjusted for age, sex, season of blood draw, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region (West, Mid-West, North-East, South) as well as race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other) for the NHANES.

<sup>2</sup> A question on history of cancer was not included in the first survey round (S1) of the MONICA/KORA study and participants of the S1 contact round could therefore not be used for this analysis.

<sup>3</sup> Heterogeneity becomes non-significant if the study with the strongest effect estimate (SENECA) is excluded: RR after exclusion: 0.61 (0.41; 0.90). I<sup>2</sup>=26%; Q=2.7, p=0.26.



**Suppl. Table 20.** Association of 25-hydroxyvitamin D with cancer mortality by season (subjects without history of cancer)

Cohort (N <sub>total</sub> /N <sub>cases</sub> )	RR (95% CI) for 25(OH)D quintile <sup>1</sup>				
	1	2	3	4	5
<b>Winter</b>					
ESTHER (2,324/116)	1.54 (0.85; 2.79)	0.67 (0.36; 1.22)	0.89 (0.49; 1.61)	1.05 (0.58; 1.89)	1.0
Tromsø (1,329/104)	0.80 (0.41; 1.55)	1.27 (0.70; 2.29)	1.08 (0.59; 1.99)	0.76 (0.40; 1.47)	1.0
MONICA/KORA (193/21) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
SENECA (416/38)	0.87 (0.29; 2.56)	1.19 (0.43; 3.31)	0.62 (0.20; 1.87)	1.13 (0.44; 2.91)	1.0
HAPIEE					
Czech Rep. (657/62)	1.52 (0.62; 3.73)	1.28 (0.52; 3.18)	1.50 (0.62; 3.65)	0.83 (0.30; 2.27)	1.0
Poland (667/74)	0.96 (0.43; 2.15)	0.55 (0.22; 1.34)	1.17 (0.53; 2.57)	0.93 (0.41; 2.13)	1.0
Lithuania (333/19)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,193/112)	1.11 (0.59; 2.07)	0.98 (0.54; 1.77)	0.95 (0.52; 1.74)	0.78 (0.42; 1.46)	1.0
<b>Pooled (7,112/546)</b>	<b>1.13 (0.84; 1.52)</b>	<b>0.94 (0.70; 1.26)</b>	<b>1.01 (0.76; 1.35)</b>	<b>0.89 (0.66; 1.20)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 2.9; 0.72	0%; 4.2; 0.52	0%; 1.9; 0.86	0%; 1.0; 0.97	
<b>Spring</b>					
ESTHER (1,771/81)	1.09 (0.57; 2.07)	0.90 (0.44; 1.81)	0.78 (0.38; 1.60)	0.63 (0.29; 1.36)	1.0
Tromsø (1,476/127)	0.66 (0.37; 1.18)	0.95 (0.55; 1.65)	0.88 (0.52; 1.50)	0.80 (0.46; 1.37)	1.0
MONICA/KORA (241/18) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
SENECA (197/10)	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (738/67)	1.27 (0.55; 2.94)	1.21 (0.52; 2.81)	0.96 (0.39; 2.38)	1.49 (0.66; 3.38)	1.0
Poland (786/74)	1.33 (0.64; 2.77)	0.52 (0.22; 1.27)	0.76 (0.34; 1.70)	0.97 (0.44; 2.11)	1.0
Lithuania (520/51)	1.54 (0.66; 3.62)	0.90 (0.35; 2.29)	0.69 (0.26; 1.81)	0.43 (0.14; 1.29)	1.0
NHANES (1,359/144)	0.82 (0.47; 1.43)	1.02 (0.60; 1.75)	1.38 (0.84; 2.28)	0.92 (0.54; 1.55)	1.0
<b>Pooled (7,088/572)</b>	<b>0.99 (0.75; 1.30)</b>	<b>0.92 (0.70; 1.22)</b>	<b>0.96 (0.73; 1.27)</b>	<b>0.86 (0.65; 1.13)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 4.4; 0.49	0%; 2.2; 0.82	0%; 3.2; 0.67	0%; 4.1; 0.54	
<b>Summer</b>					
ESTHER (2,042/100)	0.91 (0.47; 1.78)	0.77 (0.40; 1.48)	0.75 (0.41; 1.37)	0.84 (0.47; 1.50)	1.0
Tromsø (165/10)	n. a.	n. a.	n. a.	n. a.	1.0
MONICA/KORA (36/1) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Lithuania (148/13)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,294/127)	1.18 (0.61; 2.27)	1.05 (0.56; 1.94)	1.32 (0.74; 2.34)	1.42 (0.80; 2.55)	1.0
<b>Pooled (3,685/251)</b>	<b>1.04 (0.65; 1.66)</b>	<b>0.91 (0.58; 1.42)</b>	<b>1.00 (0.58; 1.74)</b>	<b>1.09 (0.65; 1.83)</b>	<b>1.0</b>
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 0.3; 0.59	0%; 0.5; 0.50	43%; 1.8; 0.18	36%; 1.6; 0.21	
<b>Autumn</b>					
ESTHER (2,328/117)	1.04 (0.59; 1.84)	0.68 (0.36; 1.29)	0.82 (0.46; 1.47)	0.86 (0.49; 1.50)	1.0
Tromsø (1,167/96)	0.73 (0.38; 1.41)	1.30 (0.75; 2.28)	0.80 (0.42; 1.54)	0.80 (0.42; 1.53)	1.0
MONICA/KORA (168/21) <sup>2</sup>	n. a.	n. a.	n. a.	n. a.	1.0
HAPIEE					
Czech Rep. (428/42)	0.87 (0.33; 2.33)	0.64 (0.22; 1.86)	0.78 (0.29; 2.11)	0.47 (0.16; 1.41)	1.0
Poland (131/19)	n. a.	n. a.	n. a.	n. a.	1.0
Lithuania (413/27)	n. a.	n. a.	n. a.	n. a.	1.0
NHANES (1,450/148)	0.96 (0.55; 1.69)	1.52 (0.91; 2.54)	1.15 (0.67; 1.96)	1.21 (0.72; 2.03)	1.0
<b>Pooled (6,085/470)</b>	<b>0.91 (0.66; 1.26)</b>	<b>1.06 (0.70; 1.61)</b>	<b>0.91 (0.66; 1.26)</b>	<b>0.91 (0.67; 1.25)</b>	
Heterogeneity (I <sup>2</sup> ; Q; p)	0%; 0.7; 0.88	40%; 5.0; 0.17	0%; 1.1; 0.78	0%; 2.8; 0.43	

Abbreviations: 25(OH)D, 25-hydroxyvitamin D; CI, confidence interval; RR, risk ratio; n<sub>cases</sub>, case numbers; n<sub>total</sub>, total sample size; n. a., not assessed due to limited case numbers; IR, incidence rate.

<sup>1</sup> Adjusted for age, sex, education, BMI, smoking and physical activity. In addition, the following adjustment for cohort-specific characteristics were made in all three models: survey for MONICA/KORA, latitude of study center for SENECA, and region as well as race/ethnicity for the NHANES.

<sup>2</sup> A question on history of cancer was not included in the first survey round (S1) of the MONICA/KORA study and participants of the S1 contact round could therefore not be used for this analysis.