Table 38. Vitamin D and all-cause mortality: Characteristics of cohort studies (updated from original report)

| **Author Year****Study Name****Location****(Latitude)****[PMID]** | **Population** | **Vitamin D Concentration** | **Comparisons** | **Confounders/Effect Modifiers Adjusted** |
| --- | --- | --- | --- | --- |
| **Nutrients** | **Demograph** | **Anthrop** | **Medical** | **UV Exposure** | **Lifestyle** |
| **Radioreceptor Assay** |
| Pilz 2009[73](#_ENREF_73)Hoorn StudyNetherlands | * Health status
 | More than 20% Type 2 Diabetes or impaired glucose tolerance |  |  | All-cause mortality stratified by 25(OH)D quartiles |  | x | x | X | X | x |
| * Mean Age (range), y
 | 69.2 (6.5) |  |  |  |  |  |  |
| * Male (%)
 | 50% |  |  |  |  |  |  |  |  |
| Visser 2006[222](#_ENREF_222)Longitudinal Aging StudyNetherlands(52°N)[16960177] | * Health status
 | General populationB | * Assay method
 | Competitive protein binding | Comparison of various 25(OH)D concentration categories |  | x | x |  |  | x |
| * Age range, y
 | >65 |  |  |  |  |  |  |
| * Male (%)
 | 51 | * Season blood drawn
 | ND |  |  |  |  |  |  |
| **Radioimmunoassay** |
| Jia 2007[219](#_ENREF_219)UK(57°N)[17442130] | * Health status
 | Not terminally ill or demented | * Assay method
 | RIA | Comparison of various 25(OH)D concentration categories |  | x |  | x | x | x |
| * Age range, y
 | >75 |
| * Male (%)
 | 52 | * Season blood drawn
 | ND |
| Sambrook 2004 & 2006[220](#_ENREF_220),[221](#_ENREF_221)FREEAAustralia(33°S)[15531500 & 16598375] | * Health status
 | Not bedridden | * Assay method
 | RIA (Dia-sorin) | Association with log 25(OH)D |  | x |  | x |  |  |
| * Age range, y
 | >65 |  |  |  |  |  |  |
| * Male (%)
 | 22 | * Season blood drawn
 | ND |  |  |  |  |  |  |
| Melamed 2008[85](#_ENREF_85)NHANES IIIUS(various)[18695076] | * Health status
 | General population | * Assay method
 | RIA (Dia-sorin) | Comparison of various 25(OH)D concentration categories | x | x | x | x | x | x |
| * Age mean (range), y
 | 45 (≥20) |  |  |  |  |  |  |
| * Male (%)
 | 46 | * Season blood drawn
 | ND |  |  |  |  |  |  |
| Bolland 2010[58](#_ENREF_58)New Zealand | * Health status
 | HealthyPost-menopausal |  |  | Comparison of various 25(OH)D concentration categories |  | x | X | x |  | x |
| * Age range, y
 | 74 (SD 4.2) |
| * Male (%)
 | 0% |  |  |
| Johansson 2012[211](#_ENREF_211)MrOSSweden: Gothenburg, Malmö, Uppsala | * Health status
 | Some with diabetes, htn, cancer, stroke, MI, angina |  |  | Death and mortality stratified by varying 25(OH)D concentration levels |  | X |  | x |  | X |
| * Mean Age (SD), y
 | 75.7 (SD 3.4) |  |  |  |  |  |  |
| * Male (%)
 | 100% |  |  |  |  |  |  |  |  |
| Kritchevsky 2012[212](#_ENREF_212)Health, Aging, and Body Composition (ABC) StudyUSPittsburgh, Memphis | * Health status
 | Well-functioning |  |  | All-cause mortality stratified by 25(OH)D quartiles |  | X | X | X | X | X |
| * Mean Age (SD), y
 | 74.7 (SD 2.9) |  |  |  |  |  |  |
| * Male (%)
 | 49% |  |  |  |  |  |  |  |  |
| Semba 2010[93](#_ENREF_93)InCHIANTIItaly | * Health status
 | Nd |  |  | All-cause mortality and cardiovascular mortality stratified by 25(OH)D quartiles |  | x | x |  | x | x |
| * Mean Age (range), y
 | 78 (72-85) |  |  |  |  |  |  |
| * Male (%)
 | 67.3% |  |  |  |  |  |  |  |  |
| Smit 2012[213](#_ENREF_213)NHANES IIIUS(various) | * Health status
 | Malnourished/frailty, pre-frail, not frail |  |  | All-cause mortality stratified by 25(OH)D quartiles |  | X | X | X | X | X |
| * Mean Age (SD), y
 | 69.4 (SD 0.3) |  |  |  |  |  |  |
| * Male (%)
 | 46.5% |  |  |  |  |  |  |  |  |
| Szulc 2009[214](#_ENREF_214)MINOS StudyMontceau les Mines, France | * Health status
 | nd |  |  | Mortality stratified by 25(OH)D quartiles | X | x | X | x |  | x |
| * Mean Age (SD), y
 | 64 (SD 7) |
| * Male (%)
 | 55% |  |  |
| Szulc 2009[215](#_ENREF_215)MINOS StudyMontceau les Mines, France | * Health status
 | nd |  |  | Mortality stratified by 25(OH)D quartiles |  | x | X | x |  | x |
| * Mean Age (SD), y
 | 64 (SD 7) |
| * Male (%)
 | 100% |  |  |
| Tomson 2013[75](#_ENREF_75)Whitehall studyLondon, UK | * Health status
* Mean age (SD), y
* Male (%)
 | self-reported health good/excellent 77.4%76.9 (SD 4.9)100% |  |  | Death (all non-vascular) and Death (al causes) stratified by 25(OH)D doubling concentration  |  |  | X | X |  | X |
| Sempos 2013[218](#_ENREF_218)NHANES IIIUS | * Health status
* Mean age (SE), y
* Male (%)
 | NR45 (SE 0.47)49% |  |  | All-cause mortality stratified by 25(OH)D in 9 categories  |  | X |  |  | X |  |
| Formiga 2014[77](#_ENREF_77)OctabaixSpain | * Health status
* Mean age (SD), y
* Male (%)
 | Oldest old85 (SD 0)39.4% |  |  | Total mortality stratified by 25(OH)D quartiles |  | X |  | X |  |  |
| **Chemiluminescence Assay** |
| Eaton 2011[70](#_ENREF_70)WHI substudy US (multisite) | * Health status
 | nd |  |  | Post-menopausal women 50-79 years stratified by 25(OH)D quartiles |  |  | x | x | x | x |
| * Mean Age (SD), y
 | 65.1 (SD 7.6) |  |  |  |  |  |  |
| * Male (%)
 | 0% |  |  |  |  |  |  |  |  |
| Jacobs 2011[144](#_ENREF_144)Women’s Healthy Eating and Living Well (WHEL) Study | * Health status
 | Cancer in remission |  |  | Breast cancer survivors stratified by 25(OH)D concentration categories |  |  |  |  |  |  |
| * Mean Age (SD), y
 | 51.9 (SD 9) |
| * Male (%)
 | 0% |  |  |
| Skaaby 2013[86](#_ENREF_86)Monica10 and Inter99Denmark | * Health status
* Mean age (SD), y
* Male (%)
 | NRMonica 10: 55.4Inter 99: 46.1Monica 10: 50.2Inter 99: 49.2 |  |  | All-cause mortality stratified by 25(OH)D quartiles |  | X |  | X | X | X |
| Wong 2013[217](#_ENREF_217)Australia | * Health status
* Mean age (SD), y
* Male (%)
 | NR76 (70-88)100% |  |  | All-cause mortality stratified by 25(OH)D quartiles |  | X | X | X |  | X |
| Schottker 2013[76](#_ENREF_76)ESTHERGermany | * Health status
* Mean age (SD), y
* Male (%)
 | NR62 (SD 6.5)43.8% |  |  | All-cause mortality stratified by 25(OH)D tertiles | X | X |  | X | X | X |
| Signorello 2013[74](#_ENREF_74)Southern Community Cohort Study US | * Health status
 | nd |  |  | All-cause mortality stratified by 25(OH)D quartiles |  |  | X |  |  | X |
| * Mean Age (range), y
 | nd |  |  |  |  |  |  |
| * Male (%)
 | nd |  |  |  |  |  |  |  |  |
| * Male (%)
 | 100% |  |  |  |  |  |  |  |  |
| **Enzyme-linked Immunoabsorption Assay** |
| Hutchinson 2010[79](#_ENREF_79)Tromsø StudyTromso, Norway | * Health status
 | Nd |  |  | Smoking and non-smoking cause of death stratified by 25(OH)D quartiles |  | x | x | x |  | x |
| * Mean Age (range), y
 | nd |  |  |  |  |  |  |
| * Male (%)
 | nd |  |  |  |  |  |  |  |  |
| Fedirko 2012[101](#_ENREF_101)EPICUS (4 sites) | * Health status
 | nd |  |  | Diagnosis at age of 62 stratified by 25(OH)D quintiles |  | X | X | X | x | X |
| * Mean Age (SD), y
 | 62.1 (4.2) |
| * Male (%)
 | 40.5% |  |  |
| Lin 2012[83](#_ENREF_83)General Population Trial of Linxian, China | * Health status
 | Healthy, Hypertension |  |  | All-cause mortality stratified by continuous 25(OH)D  |  | x | X | x |  | x |
| * Mean Age (SD), y
 | 56.5 (7.9) |
| * Male (%)
 | 55% |  |  |
| **HPLC-Tandem Mass Spectrometry** |
| Cawthon 2010[98](#_ENREF_98)MrOS (multisite)US | * Health status
 | >80% Excellent/good health status |  |  | Association with log 25(OH)D | X | x | X | x | X | X |
| * Mean age (Age range), y
 | 74 (> or =65) |  |  |  |  |  |  |
| * Male (%)
 | nd |  |  |  |  |  |  |  |  |
| Michaelsson 2010[84](#_ENREF_84)Uppsala Longitudinal Study of Adult MenUppsala, Sweden | * Health status
 | More than 1/3 being treated for hypertension |  |  | Overall mortality stratified by 25(OH)D tertiles | X | x | X | x | X | X |
| * Mean Age (range), y
 | 71 (0.6) |  |  |  |  |  |  |
| * Male (%)
 | 100% |  |  |  |  |  |  |  |  |
| Kestenbaum 2011[81](#_ENREF_81)Cardiovascular Health StudyUS(various) | * Health status
 | nd |  |  | All-cause mortality stratified by 25(OH)D quartiles |  |  |  |  |  |  |
| * Mean Age (range), y
 | 73 (SD 4) |  |  |  |  |  |  |
| * Male (%)
 | 42% |  |  |  |  |  |  |  |  |
| Virtanen 2011[216](#_ENREF_216)Kuopio Ischaemic Heart Disease Risk Factor (KIHD) StudyFinland | * Health status
 | Post-menopausal,54-62% hypertension |  |  | Overall mortality stratified by 25(OH)D tertiles |  | x | X | x |  | X |
| * Mean Age (range), y
 | 61.8 (53.4-72.7/SD 6.2) |  |  |  |  |  |  |
| * Male (%)
 | 48.6% |  |  |  |  |  |  |  |  |
| Welsh 2012[60](#_ENREF_60)MIDSPAN Family StudyRenfrew and Paisley, UK | * Health status
 | vitamin D not deficient |  |  | All-cause mortality stratified by 25(OH)D tertiles | X | X | X | X | X | X |
| * Mean Age (range), y
 | 45.2 (6.2) |  |  |  |  |  |  |
| * Male (%)
 | 46% |  |  |  |  |  |  |  |  |
| de Boer 2012[87](#_ENREF_87)Cardiovascular Health StudyUS(various) | * Health status
 | nd |  |  | Comparison of various 25(OH)D concentration categories |  | x | x | X |  | x |
| * Mean Age (SD), y
 | 74 (SD 4.6) |  |  |  |  |  |  |
| * Male (%)
 | 30% |  |  |  |  |  |  |  |  |

AFracture Risk Epidemiology in the Elderly

B~40% with CVD and ~60% arthritis