



Table 4-C-II-1 Summary of Findings. Dietary Patterns Identified Using Factor or Cluster* Analysis and Association with Incidence of Type 2 Diabetes (T2D) in Adults

Author, Year, Quality Rating, Study Design, Cohort	Sample Size, Location, Duration, Dietary Assessment, Methodology, Number Patterns	Age, Percent Female, Race / Ethnicity, Outcome / Comparison, Number Cases	Dietary Patterns Associated With Decreased T2D Risk	Dietary Patterns With No Significant Association With T2D Risk	Dietary Patterns Associated With Increased T2D Risk
<p>Bauer et al, 2012</p> <p>Positive</p> <p>Prospective Cohort</p> <p>EPIC-NL study</p>	<p>N=20,385</p> <p>The Netherlands</p> <p>Eight years</p> <p>178-item FFQ</p> <p>FA derived two dietary patterns</p>	<p>21 to 70 years; Mean approximately 52 years</p> <p>73%</p> <p>Not reported</p> <p>T2D HR, Q4 vs. Q1</p> <p><i>Incidence:</i> 831 cases</p>		<p>Pattern 1: Shellfish, high-fat fish, low-fat fish, wine, raw vegetables, chicken and fruit juice; HR=1.00 (95% CI: 0.81, 1.23); P_{trend}=0.73</p>	<p>Pattern 2: Soft drinks, other non-alcoholic beverages, French fries, snacks and low-fiber cereal bread; HR=1.56 (95% CI: 1.20, 2.02); P_{trend}=0.0001</p>
<p>Brunner et al, 2008*</p> <p>Neutral</p> <p>Prospective Cohort</p> <p>Whitehall II study (1985–1988)</p> <p><i>*Study Used Cluster Analysis</i></p>	<p>N=6,471</p> <p>U.K.</p> <p>15 years</p> <p>127- item FFQ</p> <p>CA derived four dietary patterns</p>	<p>Mean 50 years</p> <p>30%</p> <p>Not reported</p> <p>T2D HR, healthy pattern vs. unhealthy pattern</p> <p>106,633 person years at risk; 410 cases</p>	<p>Healthy: Fruit, vegetables, whole-meal bread, low-fat dairy, and little alcohol; HR=0.74 (95% CI: 0.58, 0.94); P=0.016</p>	<p>Sweet: White bread, biscuits, cakes, processed meat, puddings and high-fat dairy products; NS</p> <p>Mediterranean-like: Fruit, vegetables, rice, pasta and wine; NS</p> <p>Comparator:</p> <p>Unhealthy: White bread, processed meat, fries, and full-cream milk, red meat and low intake of low-fat dairy products</p>	



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<p>Erber et al, 2009</p> <p>Positive</p> <p>Prospective Cohort</p> <p>Multiethnic Cohort MEC study (Hawaii Component)</p>	<p>N=75,512</p> <p>U.S.</p> <p>14 years</p> <p>FFQ ethnicity-specific</p> <p>FA derived three dietary patterns</p>	<p>45 years to 75 years</p> <p>52%</p> <p><i>Caucasian</i>: 39%</p> <p><i>Japanese American</i>: 47%</p> <p><i>Native Hawaiian</i>: 14%</p> <p>T2D HR, Q5 vs. Q1</p> <p>95% CI, by gender and ethnicity</p> <p><i>Incidence</i>: All men 4,555 cases</p>	<p>Vegetable: Dark-green, deep-yellow, and other vegetables; and with a relatively lower loading other fruits and citrus fruits, melons and berries).</p> <p>Men: Cases by quintile Q1 to Q5: 783; 907; 982; 976; 907</p> <ul style="list-style-type: none"> • <i>All men</i>: HR=0.86 (0.77, 0.95); P_{trend}=0.004 • <i>Caucasian</i>: HR=0.67 (0.53, 0.84); P_{trend}=0.01 • <i>Japanese American</i>: HR=0.86 (0.74 to 0.99); P_{trend}=0.007 <p>Fruit and milk: Milk, yogurt, cheese, and other fruits and citrus fruits, melons and berries</p> <p>Men: Cases by quintile Q1 to- Q5: 1,144, 1,011, 925, 770, 705</p> <ul style="list-style-type: none"> • <i>All men</i>: HR=0.92 (0.83, 1.02); P_{trend}=0.04 • <i>Caucasian</i>: HR=0.71 (0.56, 0.89); P_{trend}=0.02 <p>Women: Cases by quintile Q1 to Q5: 984, 862, 816, 725, 645</p> <ul style="list-style-type: none"> • <i>All women</i>: HR=0.85 (0.76, 0.96); P_{trend}=0.05 	<p>Vegetable:</p> <ul style="list-style-type: none"> • Dark-green, deep-yellow, and other vegetables; and with a relatively lower loading other fruits and citrus fruits, melons and berries • NS for Native Hawaiian men <p>Women:</p> <ul style="list-style-type: none"> • Cases by quintile Q1 to Q5: 665, 808, 816, 858, 885 • NS all women and women of all ethnicities <p>Fruit and milk:</p> <ul style="list-style-type: none"> • Milk, yogurt, cheese, and other fruits and citrus fruits, melons and berries • NS in analysis of women by ethnic group and in Japanese American and Native Hawaiian men <p>Fat meat:</p> <ul style="list-style-type: none"> • Discretionary fat, meat, eggs, cheese, white potatoes and non-whole grains) • NS for Native Hawaiian Men • NS for Caucasian and Native Hawaiian women 	<p>Fat meat: Discretionary fat, meat, eggs, cheese, white potatoes, and non-whole grains</p> <p>Men: Cases by quintile Q1 to Q5: 773, 812, 912, 958, 1,100</p> <ul style="list-style-type: none"> • <i>All men</i>: HR=1.4 (1.23-1.60); P_{trend}<0.0001 • <i>Caucasian</i>: HR=1.38 (1.05, 1.81); P_{trend}=0.007 • <i>Japanese American</i>: HR=1.38 (1.16, 1.64); P_{trend}<0.0002 <p>Women: Cases by quintile Q1 to Q5: 657; 691; 784; 823; 1,077</p> <ul style="list-style-type: none"> • <i>All women</i>: HR=1.22 (1.06, 1.40); P_{trend}=0.004 • <i>Japanese American</i>: HR=1.20 (1.00, 1.44); P_{trend}=0.045



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<p>Fung et al, 2004</p> <p>Positive</p> <p>Prospective Cohort</p> <p>Nurses' Health Study (NHS) (1984–1998)</p>	<p>N=69,554</p> <p>U.S.</p> <p>14 years</p> <p>116-item FFQ</p> <p>FA derived two dietary patterns</p>	<p>38 years to 63 years</p> <p>100%</p> <p>Not reported</p> <p>T2D RR, Q5 vs. Q1 (95% CI)</p> <p><i>Incidence: 2,699 cases</i></p>		<p>Prudent: Higher intakes of fruit, vegetables, whole grains, fish, poultry and low-fat dairy products; cases by quintile Q1 to Q5: 533, 543, 496, 565, 561; RR=0.89 (0.78, 1.02); P_{trend}=0.33; NS</p>	<p>Western: Higher intakes of red and processed meats, refined grains, sweets and desserts and high-fat dairy products; cases by quintile Q1 to Q5: 391, 455, 562, 559, 731; RR=1.49 (1.26-1.76); P_{trend}<0.001</p>
<p>Hodge et al, 2007</p> <p>Positive</p> <p>Prospective Cohort</p> <p>Melbourne Collaborative Cohort Study (1991-1994)</p>	<p>N=31,641</p> <p>Australia</p> <p>Four years</p> <p>121-item FFQ</p> <p>FA derived four dietary patterns</p>	<p>Mean 54.3 years</p> <p>61%</p> <p>Migrants from Italy (15%), Greece (12%) and U.K. (7%)</p> <p>T2D OR; Q5 vs. Q1 (95% CI)</p> <p><i>Incidence: 365 cases</i></p>		<p>Factor 1: Olive oil, salad vegetables, legumes and avoidance of sweet bakery items, margarine and tea; OR=1.12 (0.71, 1.77); P_{trend}=0.63; NS</p> <p>Factor 2: Salad and cooked vegetables; OR=0.83 (0.56, 1.23); P_{trend}=0.19; NS</p> <p>Factor 3: Meats, savory pastries, fried eggs, fried fish and fried potatoes; OR=1.65 (1.03, 2.63); P_{trend}=0.24; NS</p> <p>Factor 4: Fruits; OR=1.18 (0.81, 1.71); P_{trend}=0.85; NS</p>	



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<p>Malik et al, 2012</p> <p>Positive</p> <p>Prospective Cohort</p> <p>Nurses' Health Study II</p>	<p>N=37,038</p> <p>U.S.</p> <p>Seven years</p> <p>124-item FFQ</p> <p>FA derived two dietary patterns</p>	<p>24 years to 44 years</p> <p>100%</p> <p>Not reported</p> <p>T2D HR, Q5 vs. Q1 (95% CI)</p> <p>290,703 person-years of follow-up; 550 cases</p>		<p>Prudent: Higher intakes of vegetables, fruit, legumes, fish and better-quality grains and low consumption of snacks and soda; RR=1.27 (0.96 to 1.67); P_{trend}=0.14; NS</p> <p>Western: Higher intakes of desserts, snacks, processed meats, red meat, French fries and refined grains and low consumption of vegetables, fruits and fish; RR=1.19 (0.92 to 1.54); P_{trend}=0.14; NS</p>	
<p>Montonen et al, 2005</p> <p>Neutral</p> <p>Prospective Cohort</p> <p>Finnish Mobile Clinic Health Examination Survey</p>	<p>N = 4,304</p> <p>Finland</p> <p>23 years</p> <p>Dietary history</p> <p>FA derived 2 dietary patterns</p>	<p>40 years to 69 years</p> <p>Not reported</p> <p>T2D RR, Q4 vs. Q1 (95% CI)</p> <p><i>Incidence:</i> 383 cases</p>	<p>Prudent: Vegetables and fruits; RR=0.72 (0.53, 0.97); P_{trend}=0.03</p>		<p>Conservative: Butter, potatoes, whole milk and red meat; RR=1.49 (1.11, 2.00); P_{trend}=0.01</p>



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<p>Morimoto et al, 2012</p> <p>Neutral</p> <p>Prospective Cohort</p> <p>Dietary and Cardiovascular Risk Factor Prevalence Survey (1995–1996)</p>	<p>N=5,665</p> <p>Japan</p> <p>10.3 years</p> <p>16-item FFQ</p> <p>FA derived three dietary patterns</p>	<p>40 years to 69 years</p> <p>65%</p> <p>Not reported</p> <p>T2D HR, Q4 vs. Q1 (95% CI)</p> <p>58,151 person-years;</p> <p><i>Incidence: 446 cases</i></p>	<p>One healthy factor was identified, and characterized by more frequent consumption of vegetables, potatoes, seaweeds, fruits and soybean products, HR=0.78 (0.0.61, 0.95); P_{trend}=0.008</p> <p>Results were similar when stratified by sex.</p>		
<p>Nanri et al, 2013</p> <p>Neutral</p> <p>Prospective Cohort</p> <p>Second Survey of the Japan Public Health Center-based Prospective</p>	<p>N=64,705</p> <p>Japan</p> <p>Five years</p> <p>134-item FFQ</p> <p>FA derived three dietary patterns</p>	<p>45 years to 74 years, mean approximately 57 years</p> <p>57%</p> <p>Not reported</p> <p>T2D OR, Q4 vs. Q1 (95% CI)</p> <p><i>Incidence: 1,194 new cases</i></p>		<p>Prudent: High intakes of vegetables, fruit, potatoes, soy products, seaweed, mushrooms, fish and green tea:</p> <ul style="list-style-type: none"> • Men: OR=0.93 (0.74, 1.16), P_{trend}=0.25; NS • Women: OR=0.90 (0.69, 1.16); P_{trend}=0.45; NS <p>Westernized: High intake of meats, processed meat, bread, dressing, dairy products, fish, coffee, black tea, and sauces):</p> <ul style="list-style-type: none"> • Men: OR=1.15 (0.90, 1.46); P_{trend}=0.12; NS • Women: OR=0.81 (0.61, 1.08); P_{trend}=0.26; NS <p>Traditional Japanese: High intakes of fish, pickles, seafood other than fish, miso soup and rice):</p> <ul style="list-style-type: none"> • Men: OR=0.97 (0.74, 1.27); P_{trend}=0.88; NS • Women: OR=0.81 (0.61, 1.08); P_{trend}=0.26; NS 	



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<p>Nettleton et al, 2008</p> <p>Neutral</p> <p>Prospective Cohort</p> <p>Multi-Ethnic Study of Atherosclerosis</p>	<p>N=5,011</p> <p>U.S.</p> <p>Five years</p> <p>120-item FFQ</p> <p>FA derived four dietary patterns</p>	<p>45 years to 84 years, mean 61 years</p> <p>47%</p> <ul style="list-style-type: none"> • White: 43.5% • Black: 24% • Hispanic: 20.3% • Chinese: 12.2% <p>T2D HR, Q5 vs. Q1 (95% CI)</p> <p>Incidence: 413 cases</p>	<p>Whole grains and fruit: Whole grains, fruit, nuts and seeds, green leafy vegetables and low-fat dairy foods; HR=0.73 (0.52, 1.04); P_{trend}=0.05</p>	<p>Fats and processed meat: Added fats, processed meat, fried potatoes and desserts; NS</p> <p>Vegetables and fish: Several vegetable groups, fish, soup, Chinese foods, red meat, poultry; and soy; NS</p> <p>There were no significant associations between T2D race/ethnic-specific dietary patterns.</p>	<p>Beans, tomatoes and refined grains: B beans, tomatoes, refined grains, high-fat dairy foods, avocado and red meat; HR=1.28 (0.88, 1.84); P_{trend}=0.003</p>
<p>Van Dam et al, 2002</p> <p>Positive</p> <p>Prospective Cohort</p> <p>Health Professionals Follow-up Study</p>	<p>N=42,504</p> <p>U.S.</p> <p>12 years</p> <p>131-item FFQ</p> <p>FA derived two dietary patterns</p>	<p>40 years to 75 years; Mean approximately 53 years</p> <p>0%</p> <p>Not reported</p> <p>T2D RR, Q5 vs. Q1 (95% CI)</p> <p>466,508 person-years of follow-up; 1,321 cases</p>		<p>Prudent: Vegetables, fruit, legumes, fish, poultry and whole grains; RR=0.84 (0.70, 1.00); P_{trend}=0.2; NS</p>	<p>Western: Red and processed meats, refined grains, French fries, high-fat dairy products, sweets and desserts, high-sugar drinks and eggs); RR=1.59 (1.32, 1.93); P_{trend}<0.001</p>



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Yu et al, 2011 Neutral Prospective Cohort Hong Kong, China	N=690 Hong Kong, China Nine years to 14 years 266-item FFQ FA derived four dietary patterns	25 years to 74 years 52% Not reported T2D risk OR per one SD increase in score (95% CI) <i>Incidence: 74 new cases</i>	More vegetables, fruit and fish: Fish, seafood, fruit, other vegetables, dark green and leafy vegetables; OR=0.76 (0.58, 0.99)	More snacks and drinks: Chinese dim sum, tea, and soup; NS More refined grains: Sweets and desserts; NS	More meat and milk products: Red meat and milk; OR=1.39 (1.04, 1.84)

*Study Using Cluster Analysis