**A diet-wide association study for liver cancer risk: findings from a prospective cohort study in Chinese men**

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**Supplementary Table S1** **Available items for foods/food groups in our study (*n*=88)**

1. Rice
2. Cooked wheaten food
3. Cake and biscuits
4. Bread
5. Cereals (rice, cooked wheaten foods, cake and biscuits, bread)
6. Pork chops
7. Pork ribs
8. Pork feet
9. Fatty pork
10. Lean pork
11. Fatty and lean pork
12. Animal liver
13. Animal organs
14. Beef and mutton
15. Eggs
16. Chicken
17. Duck and goose
18. Marine fish
19. Freshwater fish
20. Eel
21. Shrimp and crabs
22. Snails and other shellfish
23. Red meat (pork chops, pork ribs, pork feet, fatty pork, lean pork, fatty and lean pork, animal liver, animal organs, beef and mutton)
24. Poultry (chicken, duck and goose)
25. Fish (marine fish, freshwater fish)
26. Fresh milk
27. Milk powder
28. Soy milk
29. Tofu
30. Other soy products
31. Dried soybeans
32. Other dried beans
33. Soybean sprouts
34. Mung bean sprouts
35. Chinese greens
36. Spinach
37. Green cabbage
38. Chinese cabbage
39. Cauliflower
40. Celery
41. Eggplant
42. Zizania
43. Lettuce
44. Potatoes
45. Wax gourds
46. Cucumbers and loofah
47. Fresh mushrooms
48. Hot pepper
49. Tomatoes
50. Bamboo shoots
51. Lotus root
52. Garlic heads
53. Garlic and garlic shoots
54. Onions
55. Chinese chives
56. Green onions
57. Carrots
58. White radish
59. Sweet potatoes
60. Young soybeans, peas and broad beans
61. Cowpeas
62. Green beans
63. Snow peas
64. Dry beans (soy milk, tofu, other soy products like fried bean curd, dried soybeans, other dried beans like green bean and red bean)
65. Fresh beans (young soybeans, peas, broad beans, cowpeas, green beans, snow peas, soybean sprouts, mung bean sprouts)
66. Solanaceous vegetables (eggplant, hot pepper, tomatoes, wax gourds, cucumbers and loofah)
67. Leafy vegetables (spinach)
68. Stem vegetables (celery, zizania, bamboo shoots, lotus root)
69. Allium (garlic heads, garlic and garlic shoots, onions, Chinese chives, green onions)
70. Cruciferous vegetables (Chinese greens, Chinese cabbage, green cabbage, cauliflower, white radish)
71. Fruits (apple, pear, orange, banana, grape, watermelon, peach, other fruits including strawberries and cantaloupe like strawberries and Hami melon)
72. Apple
73. Pear
74. Orange
75. Banana
76. Grape
77. Watermelon
78. Peach
79. Other fruits including strawberries and cantaloupe
80. Candy preserves
81. Brown and white sugar
82. Green tea
83. Peanuts
84. Edible tree fungus
85. Dried mushrooms
86. Soybean oil
87. Peanut oil
88. Pig oil

**Supplementary Table S2** **Available nutrients measured in our study (*n*=38)**

1. Carbohydrate
2. Fiber
3. Protein
4. Protein from soy
5. Protein from vegetables
6. Protein from fruits
7. Protein from red meat
8. Fat
9. Saturated fat
10. Monounsaturated fat
11. Polyunsaturated fat
12. Fat from soy
13. Fat from vegetables
14. Fat from fruits
15. Fat from red meat
16. Cholesterol
17. Vitamin A
18. Carotene
19. Retinol
20. Vitamin B1
21. Vitamin B2
22. Niacin
23. Vitamin B6
24. Folate
25. Vitamin B12
26. Vitamin C
27. Vitamin D
28. Vitamin E
29. Potassium
30. Sodium
31. Calcium
32. Magnesium
33. Iron
34. Manganese
35. Zinc
36. Copper
37. Phosphorus
38. Selenium

**Supplementary Table S3** Baseline dietary items intake levels in the cohort (SWHS, 2002-2016)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Items** | **Mean**  | **SD** | **Q1 (median)** | **Q2 (median)** | **Q3 (median)** | **Q4 (median)** |
| Rice (g/d) | 254.73  | 80.36  | 0-200(200) | 200-250(250) | 250-300(300) | 300-750(400) |
| Cooked wheaten food (g/d) | 34.42  | 37.09  | 0-13.14(4.93) | 13.14-21.43(16.43) | 21.43-42.86(35.71) | 42.86-750(71.43) |
| Cake and biscuits (g/d) | 14.74  | 19.34  | 0-0.14(0) | 0.14-8.21(4.93) | 8.21-16.43(16.43) | 16.43-500(35.71) |
| Bread (g/d) | 11.44  | 17.71  | 0-0.14(0) | 0.14-4.93(3.29) | 4.93-14.29(8.21) | 14.29-500(28.57) |
| Cereals (g/d) | 315.33  | 83.03  | 13.14-264.29(228.57) | 264.29-307.38(285.71) | 307.38-357.64(328.57) | 357.64-882.85(409.86) |
| Pork chops (g/d) | 6.29  | 7.51  | 0-2.23(0.84) | 2.23-3.35(3.35) | 3.35-9.71(9.71) | 9.71-238(14.57) |
| Pork ribs (g/d) | 7.43  | 9.55  | 0-2.37(0.99) | 2.37-4.73(3.55) | 4.73-10.29(7.1) | 10.29-252(15.43) |
| Pork feet (g/d) | 1.19  | 3.13  | 0-0.08(0) | 0.08-0.82(0.41) | 0.82-2.05(1.64) | 2.05-128.57(4.93) |
| Fatty pork (g/d) | 0.58  | 3.54  | 0-0.14(0) | 0.14-3.29(1.64) | 3.29-6.57(4.93) | 6.57-150(14.29) |
| Lean pork (g/d) | 19.68  | 19.40  | 0-7.14(3.29) | 7.14-14.29(14.29) | 14.29-28.57(21.43) | 28.57-321.43(35.71) |
| Fatty and lean pork (g/d) | 10.74  | 13.39  | 0-3.29(0.68) | 3.29-6.57(4.93) | 6.57-14.29(8.21) | 14.29-250(21.43) |
| Animal liver (g/d) | 0.98  | 2.96  | 0-0.14(0) | 0.14-0.68(0.41) | 0.68-3.25(1.63) | 3.25-106.07(6.5) |
| Animal organs (g/d) | 0.76  | 2.53  | 0-0.13(0) | 0.13-0.53(0.26) | 0.53-1.32(0.66) | 1.32-124.39(3.18) |
| Beef and mutton (g/d) | 3.20  | 7.22  | 0-0.13(0) | 0.13-1.3(0.65) | 1.3-3.12(2.6) | 3.12-339.29(7.8) |
| Eggs (g/d) | 27.06  | 19.95  | 0-12.49(6.24) | 12.49-24.97(18.73) | 24.97-43.7(43.7) | 43.7-218.5(87.4) |
| Chicken (g/d) | 11.39  | 14.25  | 0-2.71(0.9) | 2.71-5.42(4.71) | 5.42-14.14(10.84) | 14.14-353.57(23.57) |
| Duck and goose (g/d) | 3.89  | 7.31  | 0-0.09(0) | 0.09-1.47(0.46) | 1.47-4.79(2.75) | 4.79-335(9.57) |
| Marine fish (g/d) | 20.60  | 26.80  | 0-3.62(1) | 3.62-12.06(8.44) | 12.06-26.21(24.11) | 26.21-477.1(52.43) |
| Freshwater fish (g/d) | 17.30  | 20.98  | 0-4.21(1.62) | 4.21-9.69(8.43) | 9.69-21.07(19.38) | 21.07-295(42.14) |
| Eel (g/d) | 2.69  | 5.71  | 0-0.1(0) | 0.1-1.16(0.48) | 1.16-3.47(2.31) | 3.47-226.29(5.78) |
| Shrimp and crabs (g/d) | 8.89  | 12.29  | 0-1.92(0.8) | 1.92-4.8(3.84) | 4.8-12.54(9.61) | 12.54-292.5(20.89) |
| Snails and other shellfish (g/d) | 1.12  | 3.79  | 0-0.06(0) | 0.06-0.56(0.28) | 0.56-1.41(1.13) | 1.41-165(3.39) |
| Red meat (g/d) | 50.85  | 36.09  | 0-26.5(17.2) | 26.5-43.36(34.76) | 43.36-65.67(52.95) | 65.67-397.43(87.28) |
| Poultry (g/d) | 15.28  | 17.71  | 0-4.37(2.17) | 4.37-10.16(6.55) | 10.16-20.75(14.14) | 20.75-355.41(29.07) |
| Fish (g/d) | 37.90  | 36.50  | 0-13.67(7.62) | 13.67-27.1(20.99) | 27.1-47.29(36.8) | 47.29-481.95(73.5) |
| Fresh milk (g/d) | 67.78  | 91.77  | 0-0.27(0) | 0.27-100(57.14) | 100-200(200) | 200-1000(300) |
| Milk powder (g/d) | 2.05  | 6.99  | 0-0.14(0) | 0.14-3.29(1.37) | 3.29-14.78(8.21) | 14.78-250(23) |
| Soy milk (g/d) | 69.68  | 105.06  | 0-0.27(0) | 0.27-57.14(24.64) | 57.14-178.57(107.14) | 178.57-3750(250) |
| Tofu (g/d) | 35.50  | 35.18  | 0-14.29(9.86) | 14.29-28.57(28.57) | 28.57-57.14(57.14) | 57.14-800(114.29) |
| Other soy products (g/d) | 18.18  | 21.09  | 0-4.93(3.29) | 4.93-14.29(8.21) | 14.29-21.43(21.43) | 21.43-700(35.71) |
| Dried soybeans (g/d) | 0.80  | 3.14  | 0-0.14(0) | 0.14-0.68(0.55) | 0.68-1.37(1.37) | 1.37-150(3.29) |
| Other dried beans (g/d) | 2.56  | 5.63  | 0-0.14(0) | 0.14-1.37(1.37) | 1.37-2.74(2.74) | 2.74-500(4.79) |
| Soybean sprouts (g/d) | 4.27  | 8.89  | 0-0.14(0) | 0.14-1.64(0.68) | 1.64-6.57(3.42) | 6.57-500(13.14) |
| Mung bean sprouts (g/d) | 5.12  | 9.42  | 0-0.14(0) | 0.14-2.05(0.82) | 2.05-6.57(4.11) | 6.57-428.57(14.29) |
| Chinese greens (g/d) | 72.85  | 54.01  | 0-34.41(16.44) | 34.41-58.79(50.69) | 58.79-104.36(78.79) | 104.36-993.23(132.6) |
| Spinach (g/d) | 4.75  | 7.07  | 0-0.75(0.08) | 0.75-2.77(1.5) | 2.77-6.45(4.01) | 6.45-171.55(8.88) |
| Green cabbage (g/d) | 6.25  | 10.21  | 0-0.02(0) | 0.02-1.97(0.78) | 1.97-6.32(4.07) | 6.32-337.38(10.33) |
| Chinese cabbage (g/d) | 6.81  | 10.20  | 0-1(0.22) | 1-3.9(2.5) | 3.9-7.15(5.84) | 7.15-282.32(15.08) |
| Cauliflower (g/d) | 3.98  | 6.38  | 0-0.53(0.04) | 0.53-1.71(1.15) | 1.71-4.98(3.03) | 4.98-261.96(8.29) |
| Celery (g/d) | 8.83  | 12.00  | 0-1.72(0.7) | 1.72-5.65(3.41) | 5.65-9.79(8.25) | 9.79-307.62(19) |
| Eggplant (g/d) | 7.34  | 10.86  | 0-1.01(0.07) | 1.01-4.4(2.88) | 4.4-8.08(6.42) | 8.08-281.69(17.07) |
| Zizania (g/d) | 3.89  | 4.82  | 0-0.92(0.23) | 0.92-2.42(1.34) | 2.42-5.6(3.56) | 5.6-135.65(6.94) |
| Lettuce (g/d) | 1.82  | 3.34  | 0-0.01(0) | 0.01-0.63(0.21) | 0.63-2.34(1.35) | 2.34-110.22(4.18) |
| Potatoes (g/d) | 11.84  | 16.58  | 0-1.82(0.36) | 1.82-6.41(3.26) | 6.41-15.23(9.77) | 15.23-559.31(30.32) |
| Wax gourds (g/d) | 27.22  | 24.71  | 0-8.63(5.65) | 8.63-20.22(15.39) | 20.22-36.7(28.71) | 36.7-702.12(54.93) |
| Cucumbers and loofah (g/d) | 22.02  | 27.45  | 0-6.52(3.4) | 6.52-12.24(9.96) | 12.24-25.28(20.26) | 25.28-566.67(48.25) |
| Fresh mushrooms (g/d) | 6.78  | 10.34  | 0-0.02(0) | 0.02-2.38(1.03) | 2.38-7.73(4.89) | 7.73-339.15(13.57) |
| Hot pepper (g/d) | 4.33  | 8.46  | 0-0.02(0) | 0.02-1.49(0.81) | 1.49-4.71(2.56) | 4.71-247.32(10.24) |
| Tomatoes (g/d) | 40.15  | 47.56  | 0-11.22(5.41) | 11.22-26.37(15.43) | 26.37-56.87(32.15) | 56.87-1015.6(88.06) |
| Bamboo shoots (g/d) | 8.31  | 11.73  | 0-1.17(0.21) | 1.17-4.77(2.95) | 4.77-10.62(6.24) | 10.62-355.94(18.61) |
| Lotus root (g/d) | 1.52  | 4.88  | 0-0.01(0) | 0.01-0.22(0.08) | 0.22-1.42(0.59) | 1.42-343.29(3.99) |
| Garlic and garlic shoots (g/d) | 1.61  | 4.10  | 0-0.02(0) | 0.02-0.47(0.1) | 0.47-1.77(1.12) | 1.77-130.57(5.26) |
| Garlic heads (g/d) | 0.78  | 2.66  | 0-0.05(0) | 0.05-0.22(0.15) | 0.22-0.94(0.41) | 0.94-166.91(1.87) |
| Onions (g/d) | 0.69  | 2.87  | 0-0.02(0) | 0.02-0.16(0.08) | 0.16-0.89(0.34) | 0.89-343(1.95) |
| Chinese chives (g/d) | 1.95  | 5.20  | 0-0.02(0) | 0.02-0.63(0.14) | 0.63-2.01(1.21) | 2.01-177.07(4.14) |
| Green onions (g/d) | 3.36  | 3.17  | 0-2.13(1.09) | 2.13-2.19(2.19) | 2.19-4.72(3.28) | 4.72-101.24(5.46) |
| Carrots (g/d) | 3.65  | 10.45  | 0-0.02(0) | 0.02-0.47(0.14) | 0.47-3.13(1.58) | 3.13-349.78(9.8) |
| White radish (g/d) | 4.42  | 9.04  | 0-0.02(0) | 0.02-1.16(0.29) | 1.16-4.36(2.11) | 4.36-319.97(9.44) |
| Sweet potatoes (g/d) | 2.40  | 8.12  | 0-0.01(0) | 0.01-0.37(0.18) | 0.37-1.51(0.67) | 1.51-549.12(5.68) |
| Young soybeans, peas and broad beans (g/d) | 12.11  | 15.87  | 0-3.32(1.57) | 3.32-7.65(4.03) | 7.65-16.16(10.43) | 16.16-308.39(25.3) |
| Cowpeas (g/d) | 6.29  | 7.20  | 0-2.09(0.55) | 2.09-4.11(3.2) | 4.11-6.85(6.19) | 6.85-207.56(13.63) |
| Green beans (g/d) | 8.82  | 9.71  | 0-2.77(0.97) | 2.77-6.09(4.2) | 6.09-10.4(8.82) | 10.4-170.38(19.27) |
| Snow peas (g/d) | 1.92  | 3.51  | 0-0.01(0) | 0.01-0.57(0.16) | 0.57-2.41(1.28) | 2.41-83.28(5.25) |
| Dry beans (g/d) | 126.73  | 120.21  | 0-39.36(23.27) | 39.36-81.4(59.2) | 81.4-178.8(118.39) | 178.8-3794.91(289.14) |
| Fresh beans (g/d) | 38.54  | 31.37  | 0-18.03(11.57) | 18.03-30.73(24.09) | 30.73-49.91(38.81) | 49.91-731.05(69.23) |
| Solanaceous vegetables (g/d) | 101.06  | 80.27  | 0-46.62(30.58) | 46.62-80.34(62.71) | 80.34-132.5(102.41) | 132.5-1132.58(181.12) |
| Leafy vegetables (g/d) | 13.59  | 15.07  | 0-4.68(2.46) | 4.68-9.45(6.96) | 9.45-17.11(12.23) | 17.11-334.67(25.74) |
| Stem vegetables (g/d) | 22.56  | 21.48  | 0-9.06(5.38) | 9.06-16.66(12.65) | 16.66-29.13(21.8) | 29.13-515.6(42.51) |
| Allium (g/d) | 8.38  | 10.48  | 0-2.91(2.06) | 2.91-5.46(4.11) | 5.46-10.19(7.19) | 10.19-376.69(15.65) |
| Cruciferous vegetables (g/d) | 94.31  | 63.26  | 0-51.25(31.83) | 51.25-82.76(64.75) | 82.76-129.43(98.25) | 129.43-994.93(157.83) |
| Fruits (g/d) | 264.98  | 179.09  | 0-134.86(76.42) | 134.86-239.25(187.2) | 239.25-357.86(293.96) | 357.86-2266.08(458.78) |
| Apple (g/d) | 44.34  | 39.74  | 0-11.23(1.67) | 11.23-37.7(22.26) | 37.7-65.28(59.35) | 65.28-525.68(84.9) |
| Pear (g/d) | 27.66  | 27.72  | 0-5.5(0.46) | 5.5-18.26(11.46) | 18.26-48.46(29.88) | 48.46-347.56(60.42) |
| Orange (g/d) | 22.68  | 23.35  | 0-6.15(1.28) | 6.15-17.87(10.72) | 17.87-32.2(21.98) | 32.2-512.94(45.72) |
| Banana (g/d) | 16.06  | 23.29  | 0-1.29(0.18) | 1.29-6.69(3.23) | 6.69-22.12(10.81) | 22.12-461.46(39.6) |
| Grape (g/d) | 8.47  | 16.29  | 0-0.01(0) | 0.01-1.65(0.4) | 1.65-8.89(4.48) | 8.89-471.84(18.67) |
| Watermelon (g/d) | 114.27  | 87.47  | 0-52.29(24.19) | 52.29-105.3(65.26) | 105.3-164.42(126.31) | 164.42-693.03(203.49) |
| Peach (g/d) | 7.69  | 14.48  | 0-0.01(0) | 0.01-0.87(0.27) | 0.87-8.12(3.55) | 8.12-596.38(18.68) |
| Other fruits (g/d) | 23.82  | 43.34  | 0-1.21(0.14) | 1.21-8.92(4.22) | 8.92-26.1(12.89) | 26.1-1275.69(55.27) |
| Candy preserves (g/d) | 2.67  | 7.17  | 0-0.14(0) | 0.14-0.68(0.55) | 0.68-3.29(1.64) | 3.29-250(8.21) |
| Brown and white sugar (g/d) | 10.97  | 8.86  | 0-5.56(4.17) | 5.56-8.33(8.33) | 8.33-14.58(11.11) | 14.58-555(18.33) |
| Green tea (g/d) | 11.70  | 25.35  | 0-0.83(0) | 0.83-33.33(33.33) | 33.33-50(50) | 50-333.33(83.33) |
| Peanuts (g/d) | 1.60  | 3.46  | 0-0.07(0) | 0.07-0.73(0.36) | 0.73-1.45(1.45) | 1.45-79.5(2.9) |
| Edible tree fungus (g/d) | 0.79  | 1.19  | 0-0.27(0.13) | 0.27-0.67(0.67) | 0.67-0.8(0.8) | 0.8-98(1.34) |
| Dried mushrooms (g/d) | 0.79  | 1.21  | 0-0.26(0.13) | 0.26-0.65(0.65) | 0.65-0.91(0.91) | 0.91-81.43(1.3) |
| Soybean oil (g/d) | 36.29  | 15.07  | 0-27.78(25) | 27.78-33.33(33.33) | 33.33-41.67(41.67) | 41.67-554.44(55.56) |
| Peanut oil (g/d) | 0.65  | 2.41  | 0-0.17(0) | 0.17-1(0.56) | 1-1.67(1.39) | 1.67-415.83(2.78) |
| Pig oil (g/d) | 0.10  | 2.17  | 0-0.14(0) | 0.14-0.67(0.56) | 0.67-1.67(1.11) | 1.67-554.44(2.78) |
| Carbohydrate (g/d) | 285.17  | 66.91  | 39.06-241.24(254.02) | 241.24-278.3(278.23) | 278.3-322.09(294.39) | 322.09-712.59(315.6) |
| Fiber (g/d) | 10.96  | 4.20  | 1.39-8.04(7.59) | 8.04-10.38(9.7) | 10.38-13.13(11.56) | 13.13-55.93(14.5) |
| Protein (g/d) | 67.04  | 20.65  | 13.16-52.75(55.63) | 52.75-64.35(63.1) | 64.35-78.15(69.22) | 78.15-216.39(79.01) |
| Protein from soy (g/d) | 8.86  | 6.44  | 0-4.58(3.5) | 4.58-7.51(6.44) | 7.51-11.44(9.36) | 11.44-143.47(14.59) |
| Protein from vegetables (g/d) | 5.30  | 3.28  | 0.06-3.07(2.53) | 3.07-4.58(4.04) | 4.58-6.68(5.52) | 6.68-63.78(8.33) |
| Protein from fruits (g/d) | 1.56  | 1.11  | 0-0.77(0.52) | 0.77-1.36(1.11) | 1.36-2.1(1.7) | 2.1-14.39(2.69) |
| Protein from red meat (g/d) | 9.01  | 6.41  | 0-4.69(3.71) | 4.69-7.69(6.92) | 7.69-11.64(9.66) | 11.64-74.66(14.5) |
| Fat (g/d) | 29.35  | 13.04  | 1.96-20.42(20.03) | 20.42-27.37(26.42) | 27.37-35.91(31.33) | 35.91-155.49(38.84) |
| Saturated fat (g/d) | 8.57  | 4.21  | 0.44-5.61(5.26) | 5.61-7.97(7.44) | 7.97-10.72(9.25) | 10.72-53.24(11.95) |
| Monounsaturated fat (g/d) | 12.88  | 6.49  | 0.63-8.46(7.98) | 8.46-11.77(11.19) | 11.77-15.92(13.73) | 15.92-75.58(17.89) |
| Polyunsaturated fat (g/d) | 7.68  | 3.56  | 0.56-5.24(5.12) | 5.24-7.06(6.75) | 7.06-9.38(8.12) | 9.38-62.68(10.38) |
| Fat from soy (g/d) | 4.51  | 3.51  | 0-2.26(1.7) | 2.26-3.71(3.22) | 3.71-5.82(4.72) | 5.82-92.61(7.43) |
| Fat from vegetables (g/d) | 1.09  | 0.78  | 0.01-0.59(0.47) | 0.59-0.91(0.79) | 0.91-1.38(1.11) | 1.38-17.75(1.75) |
| Fat from fruits (g/d) | 0.41  | 0.28  | 0-0.2(0.14) | 0.2-0.37(0.29) | 0.37-0.56(0.45) | 0.56-3.78(0.69) |
| Fat from red meat (g/d) | 9.31  | 7.91  | 0-4.28(3.21) | 4.28-7.4(6.82) | 7.4-11.94(9.86) | 11.94-142.26(15.6) |
| Cholesterol (g/d) | 300.42  | 159.33  | 0-180.74(153.45) | 180.74-285.74(246.06) | 285.74-394.81(336.04) | 394.81-1569.12(445.98) |
| Vitamin A (μg/d) | 663.74  | 330.09  | 12.01-444.25(386.2) | 444.25-608.5(551.37) | 608.5-814.96(700.44) | 814.96-6271.61(953.18) |
| Carotene (μg/d) | 2911.25  | 1550.13  | 58.52-1845(1507.54) | 1845-2639.94(2316.37) | 2639.94-3655.33(3096.7) | 3655.33-25123.11(4395.07) |
| Retinol (μg/d) | 178.46  | 172.54  | 0-86.13(67.78) | 86.13-144.01(124.82) | 144.01-213.45(176.62) | 213.45-5671.89(282.12) |
| Vitamin B1 (mg/d) | 0.91  | 0.27  | 0.2-0.73(0.77) | 0.73-0.88(0.86) | 0.88-1.06(0.94) | 1.06-3.33(1.07) |
| Vitamin B2 (mg/d) | 0.85  | 0.31  | 0.1-0.63(0.61) | 0.63-0.81(0.76) | 0.81-1.02(0.9) | 1.02-3.84(1.1) |
| Niacin (mg/d) | 14.24  | 4.26  | 3.24-11.3(12.06) | 11.3-13.64(13.44) | 13.64-16.49(14.59) | 16.49-46.75(16.54) |
| Vitamin B6 (mg/d) | 1.69  | 0.55  | 0.27-1.31(1.32) | 1.31-1.62(1.56) | 1.62-1.99(1.76) | 1.99-5.8(2.09) |
| Folate (μg/d) | 290.67  | 102.34  | 45.41-218.61(211.08) | 218.61-275.99(257.29) | 275.99-346.18(303.02) | 346.18-2048.38(379) |
| Vitamin B12 (μg/d) | 2.60  | 1.66  | 0-1.48(1.24) | 1.48-2.3(2.06) | 2.3-3.31(2.77) | 3.31-34.23(4) |
| Vitamin C (mg/d) | 90.82  | 48.89  | 0.58-56.98(48.26) | 56.98-81.46(73.12) | 81.46-113.76(96.21) | 113.76-682.81(136.59) |
| Vitamin D (mg/d) | 95.88  | 64.63  | 0-45.44(36.72) | 45.44-84.18(67.84) | 84.18-134.14(108.14) | 134.14-872.58(161.36) |
| Vitamin E (mg/d) | 13.47  | 6.01  | 1.09-9.48(9.01) | 9.48-12.48(11.75) | 12.48-16.17(14.1) | 16.17-135.71(18.02) |
| Potassium (mg/d) | 1777.08  | 636.28  | 212.58-1333.66(1307.52) | 1333.66-1691.02(1610.87) | 1691.02-2117.57(1868.46) | 2117.57-7297.14(2271.91) |
| Sodium (mg/d) | 339.79  | 151.30  | 14.43-232.87(216.5) | 232.87-317.81(297.23) | 317.81-419.69(364.14) | 419.69-1569.28(470.1) |
| Calcium (mg/d) | 464.67  | 200.33  | 34.04-318.75(292.02) | 318.75-439.09(398.58) | 439.09-576.41(500.3) | 576.41-2745.54(646.26) |
| Magnesium (mg/d) | 275.94  | 79.97  | 57.81-221(231.46) | 221-265.45(259.57) | 265.45-319.13(283.62) | 319.13-1065.38(322.93) |
| Iron (mg/d) | 18.83  | 5.42  | 3.96-15.12(15.99) | 15.12-18.1(17.77) | 18.1-21.71(19.28) | 21.71-70.61(21.83) |
| Manganese (mg/d) | 5.89  | 1.44  | 1.26-4.91(5.24) | 4.91-5.72(5.72) | 5.72-6.7(6.05) | 6.7-17.57(6.53) |
| Zinc (mg/d) | 10.78  | 2.80  | 2.77-8.86(9.71) | 8.86-10.45(10.4) | 10.45-12.32(10.97) | 12.32-30.88(11.91) |
| Copper (mg/d) | 2.17  | 0.62  | 0.49-1.74(1.82) | 1.74-2.09(2.04) | 2.09-2.51(2.23) | 2.51-7.2(2.54) |
| Phosphorus (mg/d) | 966.12  | 283.17  | 192.79-770.01(812.21) | 770.01-933.19(915.53) | 933.19-1122.3(998.78) | 1122.3-3054.71(1126.21) |
| Selenium (μg/d) | 45.44  | 21.40  | 4.67-30.87(29.69) | 30.87-41.39(38.82) | 41.39-54.99(46.98) | 54.99-251.05(62.5) |

SWHS, Shanghai Women's Health Study.

**Supplementary Table S4** HRs and 95% CIs for the association of 126 food and nutrient intakes in relation to liver cancer risk (SWHS, 1996-2016)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dietary Variable | HR (95% CI) | *P trend* | HR (95% CI) for1-SD increment | *P* value | FDR |
| Q1 | Q2 | Q3 | Q4 |
| **Cereals/cereal products** |  |  |  |  |  |  |  |  |
| Rice | 1[ref.] | 0.95 (0.68, 1.33) | 1.38 (0.96, 1.97) | 1.61 (1.03, 2.52) | 0.016  | 1.17 (1.00, 1.36) | 0.051  | 0.584  |
| Cooked wheaten foods | 1[ref.] | 0.92 (0.67, 1.25) | 0.84 (0.59, 1.20) | 0.60 (0.41, 0.88) | 0.008  | 0.77 (0.65, 0.91) | 0.002  | 0.252  |
| Cake and biscuits | 1[ref.] | 0.92 (0.65, 1.28) | 0.90 (0.60, 1.35) | 0.99 (0.67, 1.46) | 0.848  | 0.96 (0.83, 1.11) | 0.590  | 0.985  |
| Bread | 1[ref.] | 1.26 (0.92, 1.72) | 1.08 (0.76, 1.56) | 1.08 (0.73, 1.60) | 0.961  | 1.02 (0.89, 1.17) | 0.772  | 0.985  |
| Cereals | 1[ref.] | 0.91 (0.62, 1.34) | 1.30 (0.89, 1.91) | 1.21 (0.74, 1.99) | 0.294  | 1.02 (0.83, 1.26) | 0.835  | 0.985  |
| **Meat, egg, fish** |  |  |  |  |  |  |  |  |
| Pork chops | 1[ref.] | 0.96 (0.68, 1.38) | 1.08 (0.79, 1.47) | 1.18 (0.78, 1.78) | 0.381  | 1.08 (0.95, 1.22) | 0.239  | 0.985  |
| Pork ribs | 1[ref.] | 0.83 (0.58, 1.20) | 0.80 (0.58, 1.10) | 0.80 (0.56, 1.15) | 0.214  | 1.03 (0.91, 1.16) | 0.623  | 0.985  |
| Pork feet | 1[ref.] | 1.02 (0.75, 1.39) | 1.01 (0.67, 1.54) | 0.76 (0.49, 1.17) | 0.222  | 0.91 (0.76, 1.10) | 0.330  | 0.985  |
| Fatty pork | 1[ref.] | 0.79 (0.40, 1.54) | 0.30 (0.04, 2.13) | 1.42 (0.72, 2.78) | 0.528  | 1.02 (0.90, 1.15) | 0.792  | 0.985  |
| Lean pork | 1[ref.] | 1.09 (0.80, 1.48) | 0.73 (0.50, 1.05) | 0.97 (0.67, 1.42) | 0.508  | 0.94 (0.81, 1.09) | 0.392  | 0.985  |
| Fatty and lean pork | 1[ref.] | 1.38 (0.97, 1.96) | 1.06 (0.77, 1.47) | 1.17 (0.82, 1.67) | 0.524  | 1.03 (0.90, 1.17) | 0.706  | 0.985  |
| Animal liver | 1[ref.] | 1.10 (0.77, 1.57) | 1.08 (0.73, 1.59) | 1.03 (0.58, 1.84) | 0.858  | 1.00 (0.87, 1.15) | 1.000  | 1.000  |
| Animal organs | 1[ref.] | 1.21 (0.87, 1.69) | 0.86 (0.56, 1.32) | 0.88 (0.54, 1.45) | 0.546  | 1.00 (0.87, 1.15) | 0.991  | 1.000  |
| Beef and mutton | 1[ref.] | 0.76 (0.56, 1.03) | 0.87 (0.60, 1.28) | 0.79 (0.55, 1.14) | 0.497  | 0.98 (0.84, 1.14) | 0.800  | 0.985  |
| Eggs | 1[ref.] | 0.77 (0.55, 1.06) | 0.86 (0.63, 1.17) | 1.13 (0.62, 2.05) | 0.949  | 0.98 (0.86, 1.12) | 0.802  | 0.985  |
| Chicken | 1[ref.] | 1.05 (0.76, 1.44) | 0.80 (0.56, 1.14) | 0.89 (0.61, 1.29) | 0.347  | 1.00 (0.87, 1.15) | 0.997  | 1.000  |
| Duck and goose | 1[ref.] | 0.97 (0.69, 1.35) | 0.98 (0.70, 1.39) | 1.02 (0.71, 1.45) | 0.859  | 1.03 (0.92, 1.16) | 0.575  | 0.985  |
| Marine fish | 1[ref.] | 0.82 (0.60, 1.12) | 0.78 (0.56, 1.10) | 0.84 (0.56, 1.25) | 0.402  | 0.93 (0.80, 1.09) | 0.360  | 0.985  |
| Freshwater fish | 1[ref.] | 0.90 (0.64, 1.27) | 1.02 (0.74, 1.41) | 0.89 (0.60, 1.31) | 0.705  | 1.00 (0.88, 1.14) | 0.949  | 0.996  |
| Eel | 1[ref.] | 1.08 (0.79, 1.47) | 0.90 (0.62, 1.30) | 0.88 (0.59, 1.31) | 0.382  | 1.03 (0.90, 1.18) | 0.669  | 0.985  |
| Shrimp and crabs | 1[ref.] | 1.10 (0.80, 1.52) | 1.32 (0.95, 1.85) | 0.94 (0.61, 1.44) | 0.947  | 0.96 (0.82, 1.12) | 0.574  | 0.985  |
| Snails and other shellfish | 1[ref.] | 0.76 (0.55, 1.05) | 0.56 (0.33, 0.93) | 0.74 (0.49, 1.13) | 0.127  | 0.93 (0.76, 1.14) | 0.505  | 0.985  |
| Red meat | 1[ref.] | 0.84 (0.60, 1.16) | 0.83 (0.59, 1.18) | 0.78 (0.53, 1.17) | 0.253  | 0.99 (0.85, 1.16) | 0.942  | 0.996  |
| Poultry | 1[ref.] | 0.78 (0.56, 1.08) | 0.71 (0.50, 1.00) | 0.81 (0.57, 1.17) | 0.335  | 1.02 (0.89, 1.17) | 0.811  | 0.985  |
| Fish | 1[ref.] | 1.10 (0.79, 1.51) | 0.98 (0.69, 1.39) | 0.84 (0.57, 1.23) | 0.254  | 0.95 (0.82, 1.10) | 0.527  | 0.985  |
| **Dairy products** |  |  |  |  |  |  |  |  |
| Fresh milk | 1[ref.] | 1.31 (0.91, 1.87) | 1.03 (0.76, 1.40) | 1.08 (0.34, 3.42) | 0.896  | 1.04 (0.91, 1.18) | 0.575  | 0.985  |
| Milk powder | 1[ref.] | 0.79 (0.45, 1.38) | 1.16 (0.77, 1.74) | 1.24 (0.67, 2.30) | 0.353  | 1.06 (0.97, 1.15) | 0.217  | 0.985  |
| **Fruit and vegetables** |  |  |  |  |  |  |  |  |
| Soy milk | 1[ref.] | 1.34 (0.97, 1.86) | 1.10 (0.77, 1.57) | 1.12 (0.80, 1.57) | 0.761  | 1.02 (0.91, 1.15) | 0.730  | 0.985  |
| Tofu | 1[ref.] | 1.28 (0.94, 1.74) | 0.99 (0.71, 1.40) | 1.13 (0.72, 1.75) | 0.949  | 1.02 (0.91, 1.15) | 0.756  | 0.985  |
| Other soy products | 1[ref.] | 0.89 (0.66, 1.22) | 0.69 (0.44, 1.07) | 0.95 (0.67, 1.36) | 0.778  | 0.91 (0.79, 1.06) | 0.227  | 0.985  |
| Dried soybeans | 1[ref.] | 0.97 (0.71, 1.33) | 0.88 (0.57, 1.36) | 0.84 (0.55, 1.28) | 0.364  | 0.89 (0.73, 1.09) | 0.270  | 0.985  |
| Other dried beans | 1[ref.] | 0.88 (0.63, 1.23) | 0.95 (0.65, 1.38) | 1.00 (0.69, 1.45) | 0.831  | 1.00 (0.88, 1.14) | 0.978  | 1.000  |
| Soybean sprouts | 1[ref.] | 0.79 (0.56, 1.11) | 1.02 (0.75, 1.41) | 0.81 (0.56, 1.17) | 0.436  | 0.99 (0.87, 1.13) | 0.882  | 0.989  |
| Mung bean sprouts | 1[ref.] | 0.85 (0.61, 1.17) | 0.77 (0.55, 1.09) | 0.79 (0.56, 1.13) | 0.318  | 0.92 (0.79, 1.08) | 0.299  | 0.985  |
| Chinese greens | 1[ref.] | 1.08 (0.76, 1.54) | 1.19 (0.84, 1.68) | 1.05 (0.73, 1.49) | 0.793  | 0.99 (0.88, 1.12) | 0.860  | 0.985  |
| Spinach | 1[ref.] | 0.71 (0.51, 1.00) | 0.76 (0.53, 1.08) | 0.97 (0.70, 1.36) | 0.738  | 1.13 (1.03, 1.24) | 0.010  | 0.420  |
| Green cabbage | 1[ref.] | 0.96 (0.65, 1.40) | 1.06 (0.72, 1.56) | 0.89 (0.59, 1.33) | 0.575  | 0.96 (0.83, 1.11) | 0.551  | 0.985  |
| Chinese cabbage | 1[ref.] | 0.99 (0.71, 1.38) | 0.80 (0.56, 1.14) | 0.91 (0.65, 1.28) | 0.562  | 1.03 (0.92, 1.14) | 0.628  | 0.985  |
| Cauliflower | 1[ref.] | 0.77 (0.55, 1.09) | 0.98 (0.70, 1.37) | 1.00 (0.71, 1.42) | 0.582  | 1.05 (0.94, 1.18) | 0.365  | 0.985  |
| Celery | 1[ref.] | 1.22 (0.88, 1.69) | 0.87 (0.60, 1.25) | 1.01 (0.70, 1.45) | 0.635  | 1.07 (0.96, 1.19) | 0.253  | 0.985  |
| Eggplant | 1[ref.] | 0.87 (0.61, 1.23) | 0.89 (0.62, 1.26) | 1.16 (0.83, 1.63) | 0.197  | 1.10 (1.00, 1.21) | 0.043  | 0.584  |
| Zizania | 1[ref.] | 1.08 (0.78, 1.48) | 0.65 (0.45, 0.95) | 0.80 (0.56, 1.13) | 0.054  | 0.94 (0.82, 1.08) | 0.359  | 0.985  |
| Lettuce | 1[ref.] | 0.95 (0.68, 1.31) | 0.80 (0.56, 1.14) | 0.88 (0.63, 1.24) | 0.499  | 1.01 (0.90, 1.14) | 0.832  | 0.985  |
| Potatoes | 1[ref.] | 0.89 (0.62, 1.26) | 1.01 (0.72, 1.43) | 0.96 (0.66, 1.38) | 0.993  | 1.04 (0.92, 1.17) | 0.503  | 0.985  |
| Wax gourds | 1[ref.] | 0.57 (0.40, 0.81) | 0.68 (0.48, 0.95) | 0.79 (0.56, 1.10) | 0.468  | 1.04 (0.93, 1.17) | 0.505  | 0.985  |
| Cucumbers and loofah | 1[ref.] | 1.05 (0.75, 1.46) | 0.88 (0.62, 1.26) | 0.95 (0.67, 1.36) | 0.673  | 0.96 (0.84, 1.09) | 0.531  | 0.985  |
| Fresh mushrooms | 1[ref.] | 1.19 (0.83, 1.73) | 0.94 (0.63, 1.39) | 0.88 (0.58, 1.32) | 0.145  | 0.98 (0.85, 1.13) | 0.773  | 0.985  |
| Hot pepper | 1[ref.] | 0.95 (0.68, 1.33) | 1.01 (0.71, 1.41) | 0.91 (0.62, 1.31) | 0.631  | 1.05 (0.93, 1.18) | 0.412  | 0.985  |
| Tomatoes | 1[ref.] | 1.06 (0.74, 1.51) | 1.32 (0.93, 1.87) | 1.32 (0.92, 1.90) | 0.122  | 1.04 (0.92, 1.18) | 0.547  | 0.985  |
| Bamboo shoots | 1[ref.] | 0.86 (0.61, 1.21) | 0.77 (0.54, 1.10) | 0.90 (0.64, 1.26) | 0.748  | 0.96 (0.84, 1.09) | 0.512  | 0.985  |
| Lotus root | 1[ref.] | 0.82 (0.58, 1.15) | 0.88 (0.64, 1.23) | 0.67 (0.47, 0.98) | 0.068  | 0.80 (0.63, 1.02) | 0.071  | 0.639  |
| Garlic and garlic shoots | 1[ref.] | 1.03 (0.74, 1.43) | 1.12 (0.81, 1.56) | 0.89 (0.62, 1.28) | 0.483  | 0.89 (0.74, 1.06) | 0.181  | 0.985  |
| Garlic heads | 1[ref.] | 1.09 (0.77, 1.54) | 1.24 (0.89, 1.72) | 1.04 (0.74, 1.46) | 0.997  | 1.03 (0.94, 1.12) | 0.540  | 0.985  |
| Onions | 1[ref.] | 1.00 (0.71, 1.41) | 0.86 (0.60, 1.23) | 0.91 (0.63, 1.30) | 0.609  | 0.91 (0.74, 1.13) | 0.398  | 0.985  |
| Chinese chives | 1[ref.] | 1.09 (0.79, 1.51) | 0.86 (0.60, 1.22) | 0.99 (0.69, 1.41) | 0.752  | 1.03 (0.94, 1.13) | 0.527  | 0.985  |
| Green onions | 1[ref.] | 1.16 (0.82, 1.63) | 1.44 (1.02, 2.04) | 0.97 (0.66, 1.41) | 0.889  | 0.98 (0.86, 1.12) | 0.791  | 0.985  |
| Carrots | 1[ref.] | 0.94 (0.66, 1.34) | 1.01 (0.72, 1.42) | 1.07 (0.76, 1.49) | 0.590  | 1.10 (1.02, 1.18) | 0.016  | 0.504  |
| White radish | 1[ref.] | 0.83 (0.58, 1.19) | 0.88 (0.62, 1.25) | 0.88 (0.62, 1.26) | 0.854  | 0.97 (0.86, 1.11) | 0.695  | 0.985  |
| Sweet potatoes | 1[ref.] | 1.37 (0.97, 1.93) | 0.98 (0.68, 1.41) | 1.39 (1.00, 1.93) | 0.090  | 1.03 (0.94, 1.13) | 0.581  | 0.985  |
| Young soybeans, peas and broad beans | 1[ref.] | 0.94 (0.63, 1.39) | 1.38 (0.96, 1.98) | 1.48 (1.04, 2.11) | 0.008  | 1.05 (0.95, 1.17) | 0.326  | 0.985  |
| Cowpeas | 1[ref.] | 0.85 (0.60, 1.21) | 0.91 (0.65, 1.28) | 0.93 (0.66, 1.31) | 0.869  | 1.01 (0.90, 1.14) | 0.853  | 0.985  |
| Green beans | 1[ref.] | 0.86 (0.62, 1.19) | 0.70 (0.49, 0.99) | 0.84 (0.59, 1.20) | 0.334  | 0.93 (0.80, 1.08) | 0.343  | 0.985  |
| Snow peas | 1[ref.] | 0.92 (0.68, 1.24) | 0.64 (0.45, 0.92) | 0.56 (0.38, 0.82) | 0.003  | 0.88 (0.75, 1.04) | 0.133  | 0.907  |
| Dry beans | 1[ref.] | 1.10 (0.77, 1.58) | 1.09 (0.76, 1.58) | 1.15 (0.80, 1.64) | 0.529  | 1.01 (0.89, 1.14) | 0.870  | 0.988  |
| Fresh beans | 1[ref.] | 1.17 (0.83, 1.65) | 1.03 (0.72, 1.47) | 1.03 (0.71, 1.50) | 0.897  | 0.99 (0.86, 1.13) | 0.841  | 0.985  |
| Solanaceous vegetables | 1[ref.] | 0.74 (0.51, 1.07) | 1.19 (0.85, 1.67) | 1.17 (0.82, 1.66) | 0.122  | 1.05 (0.92, 1.19) | 0.477  | 0.985  |
| Leafy vegetables | 1[ref.] | 0.86 (0.61, 1.21) | 0.92 (0.65, 1.30) | 0.89 (0.63, 1.27) | 0.650  | 1.12 (1.01, 1.24) | 0.037  | 0.584  |
| Stem vegetables | 1[ref.] | 0.98 (0.69, 1.37) | 1.01 (0.72, 1.43) | 0.84 (0.58, 1.20) | 0.327  | 0.98 (0.86, 1.12) | 0.734  | 0.985  |
| Allium | 1[ref.] | 1.04 (0.74, 1.46) | 1.06 (0.75, 1.49) | 0.94 (0.65, 1.35) | 0.633  | 0.98 (0.85, 1.12) | 0.744  | 0.985  |
| Cruciferous vegetables | 1[ref.] | 1.28 (0.90, 1.81) | 1.19 (0.83, 1.71) | 1.09 (0.76, 1.58) | 0.900  | 0.99 (0.88, 1.12) | 0.888  | 0.989  |
| Fruits | 1[ref.] | 0.94 (0.67, 1.31) | 0.89 (0.63, 1.27) | 0.82 (0.55, 1.20) | 0.286  | 0.87 (0.75, 1.01) | 0.068  | 0.639  |
| Apple | 1[ref.] | 1.22 (0.87, 1.71) | 1.10 (0.77, 1.57) | 0.99 (0.68, 1.46) | 0.816  | 0.99 (0.87, 1.14) | 0.929  | 0.996  |
| Pear | 1[ref.] | 1.01 (0.74, 1.40) | 0.91 (0.66, 1.26) | 0.54 (0.35, 0.82) | 0.003  | 0.80 (0.68, 0.93) | 0.004  | 0.252  |
| Orange | 1[ref.] | 1.01 (0.72, 1.41) | 0.93 (0.66, 1.30) | 0.78 (0.53, 1.13) | 0.147  | 0.89 (0.77, 1.04) | 0.144  | 0.907  |
| Banana | 1[ref.] | 0.90 (0.64, 1.27) | 0.85 (0.60, 1.22) | 0.81 (0.56, 1.17) | 0.337  | 0.98 (0.85, 1.12) | 0.739  | 0.985  |
| Grape | 1[ref.] | 1.07 (0.76, 1.52) | 1.06 (0.73, 1.54) | 0.93 (0.62, 1.38) | 0.459  | 0.80 (0.65, 0.99) | 0.038  | 0.584  |
| Watermelon | 1[ref.] | 0.81 (0.57, 1.15) | 0.90 (0.63, 1.28) | 1.02 (0.72, 1.46) | 0.707  | 0.96 (0.84, 1.10) | 0.582  | 0.985  |
| Peach | 1[ref.] | 0.87 (0.62, 1.21) | 0.84 (0.59, 1.18) | 0.71 (0.49, 1.02) | 0.113  | 0.88 (0.74, 1.04) | 0.122  | 0.907  |
| Other fruits including strawberries and cantaloupe | 1[ref.] | 0.82 (0.60, 1.14) | 0.59 (0.41, 0.85) | 0.70 (0.49, 1.00) | 0.136  | 0.83 (0.69, 1.00) | 0.051  | 0.584  |
| **Sugar and confectionery** |  |  |  |  |  |  |  |  |
| Candy preserves | 1[ref.] | 1.01 (0.72, 1.40) | 0.85 (0.58, 1.23) | 0.76 (0.50, 1.17) | 0.193  | 1.07 (0.95, 1.20) | 0.255  | 0.985  |
| Brown and white sugar | 1[ref.] | 0.90 (0.63, 1.28) | 0.94 (0.66, 1.34) | 1.04 (0.75, 1.46) | 0.701  | 1.02 (0.92, 1.14) | 0.658  | 0.985  |
| **Non-alcoholic beverages** |  |  |  |  |  |  |  |  |
| Green tea | 1[ref.] | 1.01 (0.71, 1.44) | 0.61 (0.27, 1.39) | 0.66 (0.34, 1.30) | 0.193  | 0.93 (0.80, 1.08) | 0.339  | 0.985  |
| **Others** |  |  |  |  |  |  |  |  |
| Peanuts | 1[ref.] | 1.10 (0.78, 1.55) | 0.78 (0.50, 1.23) | 1.05 (0.72, 1.52) | 0.819  | 1.04 (0.95, 1.15) | 0.390  | 0.985  |
| Edible tree fungus | 1[ref.] | 0.90 (0.67, 1.20) | 1.04 (0.38, 2.84) | 0.91 (0.64, 1.28) | 0.578  | 0.95 (0.81, 1.12) | 0.545  | 0.985  |
| Dried mushrooms | 1[ref.] | 0.85 (0.64, 1.13) | 0.75 (0.33, 1.73) | 0.74 (0.52, 1.05) | 0.085  | 0.91 (0.76, 1.08) | 0.280  | 0.985  |
| Soybean oil | 1[ref.] | 0.82 (0.58, 1.17) | 0.96 (0.68, 1.34) | 0.86 (0.62, 1.21) | 0.505  | 0.93 (0.82, 1.06) | 0.300  | 0.985  |
| Peanut oil | 1[ref.] | 1.09 (0.73, 1.62) | 0.91 (0.59, 1.38) | 0.98 (0.63, 1.54) | 0.822  | 0.87 (0.67, 1.13) | 0.296  | 0.985  |
| Pig oil | 1[ref.] | 1.18 (0.53, 2.67) | 0.71 (0.29, 1.72) | 1.28 (0.47, 3.43) | 0.906  | 1.01 (0.94, 1.09) | 0.816  | 0.985  |
| **Nutrients** |  |  |  |  |  |  |  |  |
| Carbohydrate | 1[ref.] | 0.70 (0.48, 1.01) | 0.71 (0.50, 1.02) | 0.94 (0.67, 1.32) | 0.789  | 1.01 (0.88, 1.15) | 0.907  | 0.994  |
| Fiber | 1[ref.] | 1.12 (0.80, 1.57) | 0.92 (0.64, 1.31) | 0.88 (0.62, 1.26) | 0.318  | 0.91 (0.79, 1.03) | 0.140  | 0.907  |
| Protein | 1[ref.] | 0.94 (0.67, 1.31) | 0.89 (0.63, 1.26) | 0.79 (0.54, 1.14) | 0.205  | 0.94 (0.82, 1.08) | 0.374  | 0.985  |
| Protein from soy | 1[ref.] | 1.07 (0.74, 1.56) | 1.10 (0.77, 1.59) | 1.02 (0.71, 1.47) | 0.995  | 0.97 (0.86, 1.10) | 0.669  | 0.985  |
| Protein from vegetables | 1[ref.] | 0.99 (0.69, 1.44) | 1.16 (0.82, 1.66) | 1.23 (0.87, 1.74) | 0.171  | 1.06 (0.94, 1.19) | 0.337  | 0.985  |
| Protein from fruits | 1[ref.] | 1.13 (0.81, 1.58) | 1.04 (0.73, 1.47) | 0.85 (0.58, 1.25) | 0.325  | 0.87 (0.75, 1.01) | 0.068  | 0.639  |
| Protein from red meat | 1[ref.] | 0.78 (0.55, 1.09) | 0.68 (0.48, 0.97) | 0.85 (0.60, 1.20) | 0.319  | 0.98 (0.86, 1.13) | 0.810  | 0.985  |
| Fat | 1[ref.] | 0.81 (0.57, 1.15) | 0.80 (0.56, 1.15) | 1.10 (0.78, 1.54) | 0.632  | 1.02 (0.90, 1.16) | 0.760  | 0.985  |
| Saturated fat | 1[ref.] | 1.02 (0.72, 1.45) | 1.01 (0.70, 1.44) | 1.22 (0.86, 1.74) | 0.293  | 1.05 (0.92, 1.19) | 0.508  | 0.985  |
| Monounsaturated fat | 1[ref.] | 0.97 (0.69, 1.37) | 0.89 (0.62, 1.28) | 1.07 (0.75, 1.52) | 0.795  | 1.06 (0.93, 1.20) | 0.383  | 0.985  |
| Polyunsaturated fat | 1[ref.] | 0.86 (0.60, 1.23) | 0.88 (0.61, 1.25) | 1.03 (0.73, 1.46) | 0.735  | 1.00 (0.88, 1.13) | 0.965  | 1.000  |
| Fat from soy | 1[ref.] | 0.93 (0.64, 1.35) | 1.02 (0.71, 1.47) | 0.93 (0.65, 1.34) | 0.805  | 0.95 (0.84, 1.08) | 0.476  | 0.985  |
| Fat from vegetables | 1[ref.] | 0.99 (0.67, 1.47) | 1.41 (0.99, 2.02) | 1.32 (0.92, 1.88) | 0.065  | 1.06 (0.95, 1.19) | 0.265  | 0.985  |
| Fat from fruits | 1[ref.] | 1.09 (0.78, 1.52) | 0.95 (0.67, 1.36) | 0.83 (0.57, 1.21) | 0.249  | 0.86 (0.75, 1.00) | 0.051  | 0.584  |
| Fat from red meat | 1[ref.] | 0.71 (0.50, 1.02) | 0.92 (0.65, 1.30) | 0.84 (0.59, 1.19) | 0.582  | 1.03 (0.91, 1.18) | 0.600  | 0.985  |
| Cholesterol | 1[ref.] | 0.76 (0.54, 1.08) | 1.01 (0.72, 1.41) | 0.90 (0.63, 1.29) | 0.847  | 0.98 (0.86, 1.12) | 0.805  | 0.985  |
| Vitamin A | 1[ref.] | 0.78 (0.55, 1.11) | 1.08 (0.78, 1.51) | 0.98 (0.69, 1.39) | 0.725  | 1.03 (0.91, 1.17) | 0.654  | 0.985  |
| Carotene | 1[ref.] | 0.84 (0.58, 1.20) | 1.13 (0.80, 1.58) | 1.01 (0.71, 1.43) | 0.618  | 1.03 (0.92, 1.17) | 0.588  | 0.985  |
| Retinol | 1[ref.] | 0.93 (0.66, 1.31) | 1.02 (0.72, 1.46) | 1.05 (0.73, 1.52) | 0.668  | 1.00 (0.87, 1.15) | 0.978  | 1.000  |
| Vitamin B1 | 1[ref.] | 0.94 (0.68, 1.31) | 0.78 (0.55, 1.11) | 0.74 (0.51, 1.06) | 0.064  | 0.91 (0.79, 1.04) | 0.152  | 0.912  |
| Vitamin B2 | 1[ref.] | 0.84 (0.60, 1.18) | 0.93 (0.66, 1.31) | 0.95 (0.66, 1.36) | 0.855  | 1.01 (0.88, 1.15) | 0.941  | 0.996  |
| Niacin | 1[ref.] | 0.94 (0.68, 1.32) | 0.94 (0.67, 1.33) | 0.83 (0.57, 1.21) | 0.346  | 0.99 (0.86, 1.13) | 0.857  | 0.985  |
| Vitamin B6 | 1[ref.] | 0.99 (0.71, 1.38) | 0.96 (0.68, 1.36) | 0.91 (0.63, 1.31) | 0.587  | 0.97 (0.85, 1.11) | 0.672  | 0.985  |
| Folate | 1[ref.] | 0.70 (0.48, 1.00) | 0.94 (0.67, 1.32) | 0.92 (0.66, 1.29) | 0.944  | 0.99 (0.87, 1.12) | 0.836  | 0.985  |
| Vitamin B12 | 1[ref.] | 1.06 (0.76, 1.47) | 0.95 (0.66, 1.37) | 1.06 (0.73, 1.54) | 0.876  | 0.99 (0.85, 1.14) | 0.840  | 0.985  |
| Vitamin C | 1[ref.] | 1.06 (0.76, 1.48) | 0.92 (0.65, 1.31) | 0.94 (0.65, 1.34) | 0.579  | 0.97 (0.85, 1.11) | 0.625  | 0.985  |
| Vitamin D | 1[ref.] | 0.88 (0.63, 1.23) | 0.80 (0.55, 1.15) | 1.02 (0.71, 1.46) | 0.975  | 1.02 (0.89, 1.17) | 0.784  | 0.985  |
| Vitamin E | 1[ref.] | 0.77 (0.54, 1.09) | 0.85 (0.61, 1.20) | 0.75 (0.53, 1.06) | 0.165  | 0.90 (0.79, 1.03) | 0.135  | 0.907  |
| Potassium | 1[ref.] | 0.94 (0.67, 1.31) | 0.90 (0.63, 1.27) | 0.85 (0.59, 1.23) | 0.375  | 0.96 (0.84, 1.10) | 0.590  | 0.985  |
| Sodium | 1[ref.] | 0.93 (0.67, 1.30) | 0.83 (0.58, 1.19) | 0.93 (0.65, 1.34) | 0.597  | 0.99 (0.86, 1.14) | 0.895  | 0.989  |
| Calcium | 1[ref.] | 1.03 (0.73, 1.46) | 0.95 (0.66, 1.36) | 1.08 (0.76, 1.55) | 0.737  | 1.01 (0.89, 1.14) | 0.919  | 0.996  |
| Magnesium | 1[ref.] | 0.90 (0.64, 1.27) | 0.99 (0.71, 1.40) | 0.83 (0.58, 1.19) | 0.398  | 0.94 (0.83, 1.08) | 0.391  | 0.985  |
| Iron | 1[ref.] | 0.93 (0.66, 1.31) | 0.89 (0.63, 1.26) | 0.85 (0.60, 1.22) | 0.374  | 0.92 (0.81, 1.05) | 0.218  | 0.985  |
| Manganese | 1[ref.] | 0.97 (0.67, 1.41) | 0.96 (0.66, 1.39) | 0.92 (0.64, 1.33) | 0.653  | 0.90 (0.79, 1.03) | 0.116  | 0.907  |
| Zinc | 1[ref.] | 1.13 (0.81, 1.58) | 0.85 (0.59, 1.22) | 0.93 (0.65, 1.34) | 0.443  | 0.96 (0.84, 1.10) | 0.544  | 0.985  |
| Copper | 1[ref.] | 1.23 (0.89, 1.70) | 0.87 (0.61, 1.24) | 0.76 (0.53, 1.11) | 0.055  | 0.86 (0.75, 0.98) | 0.028  | 0.584  |
| Phosphorus | 1[ref.] | 0.79 (0.56, 1.11) | 0.85 (0.60, 1.20) | 0.88 (0.62, 1.26) | 0.564  | 0.95 (0.83, 1.08) | 0.419  | 0.985  |
| Selenium | 1[ref.] | 1.04 (0.75, 1.44) | 0.91 (0.63, 1.30) | 0.89 (0.61, 1.31) | 0.462  | 0.93 (0.80, 1.07) | 0.316  | 0.985  |

The models were adjusted for calorie intake (kcal/d, continuous), age (years, continuous), BMI (<18.5, 18.5-24, 24-28, ≥28 kg/m2), physical activity (MET-h/week, continuous), education (elementary school and below, middle school, high school, college and higher), menopause status (no, yes), smoking status (no, yes), alcohol drinking status (no, yes), family history of liver cancer (no, yes), medical history of hepatitis (no, yes) and T2DM (no, yes).

**Supplementary Table S5** HRs and 95% CIs for the association of 126 food and nutrient intakes in relation to liver cancer risk, stratified by menopause status (SWHS, 1996-2016)

|  |  |  |
| --- | --- | --- |
| Dietary Variable | Premenopause | Postmenopause |
| HR (95% CI) for1-SD increment | *P* value | FDR | HR (95% CI) for1-SD increment | *P* value | FDR |
| **Cereals/cereal products** |  |  |  |  |  |  |
| Rice | 0.98 (0.71, 1.35) | 0.911  | 0.986  | 1.23 (1.03, 1.47) | 0.025  | 0.630  |
| Cooked wheaten foods | 0.92 (0.68, 1.24) | 0.590  | 0.986  | 0.72 (0.59, 0.88) | 0.001  | 0.126  |
| Cake and biscuits | 0.97 (0.74, 1.28) | 0.850  | 0.986  | 0.96 (0.80, 1.14) | 0.610  | 0.982  |
| Bread | 1.08 (0.87, 1.35) | 0.493  | 0.986  | 0.99 (0.83, 1.18) | 0.896  | 0.982  |
| Cereals | 0.93 (0.61, 1.41) | 0.733  | 0.986  | 1.05 (0.82, 1.33) | 0.718  | 0.982  |
| **Meat, egg, fish** |  |  |  |  |  |  |
| Pork chops | 1.10 (0.90, 1.34) | 0.375  | 0.986  | 1.07 (0.91, 1.25) | 0.418  | 0.982  |
| Pork ribs | 1.03 (0.80, 1.32) | 0.827  | 0.986  | 1.03 (0.90, 1.18) | 0.653  | 0.982  |
| Pork feet | 0.74 (0.47, 1.16) | 0.189  | 0.986  | 0.97 (0.80, 1.17) | 0.747  | 0.982  |
| Fatty pork | 0.90 (0.59, 1.38) | 0.640  | 0.986  | 1.04 (0.92, 1.17) | 0.566  | 0.982  |
| Lean pork | 0.99 (0.77, 1.28) | 0.965  | 0.986  | 0.92 (0.77, 1.10) | 0.351  | 0.982  |
| Fatty and lean pork | 1.01 (0.78, 1.31) | 0.939  | 0.986  | 1.03 (0.88, 1.20) | 0.736  | 0.982  |
| Animal liver | 0.97 (0.74, 1.27) | 0.805  | 0.986  | 1.02 (0.86, 1.20) | 0.838  | 0.982  |
| Animal organs | 0.94 (0.69, 1.27) | 0.682  | 0.986  | 1.03 (0.89, 1.18) | 0.728  | 0.982  |
| Beef and mutton | 0.99 (0.77, 1.29) | 0.961  | 0.986  | 0.98 (0.81, 1.18) | 0.834  | 0.982  |
| Eggs | 1.18 (0.94, 1.48) | 0.165  | 0.986  | 0.92 (0.78, 1.08) | 0.282  | 0.954  |
| Chicken | 0.96 (0.73, 1.25) | 0.749  | 0.986  | 1.02 (0.86, 1.20) | 0.829  | 0.982  |
| Duck and goose | 0.87 (0.63, 1.20) | 0.385  | 0.986  | 1.06 (0.97, 1.17) | 0.209  | 0.934  |
| Marine fish | 0.93 (0.70, 1.23) | 0.614  | 0.986  | 0.94 (0.78, 1.13) | 0.489  | 0.982  |
| Freshwater fish | 1.16 (0.96, 1.41) | 0.129  | 0.986  | 0.94 (0.80, 1.10) | 0.442  | 0.982  |
| Eel | 0.99 (0.77, 1.26) | 0.926  | 0.986  | 1.05 (0.89, 1.25) | 0.532  | 0.982  |
| Shrimp and crabs | 0.81 (0.57, 1.15) | 0.242  | 0.986  | 1.01 (0.86, 1.20) | 0.861  | 0.982  |
| Snails and other shellfish | 1.07 (0.91, 1.26) | 0.389  | 0.986  | 0.67 (0.42, 1.07) | 0.095  | 0.882  |
| Red meat | 1.00 (0.76, 1.33) | 0.974  | 0.986  | 0.99 (0.83, 1.19) | 0.943  | 0.986  |
| Poultry | 0.91 (0.68, 1.21) | 0.526  | 0.986  | 1.06 (0.90, 1.24) | 0.480  | 0.982  |
| Fish | 1.06 (0.83, 1.36) | 0.618  | 0.986  | 0.91 (0.76, 1.09) | 0.317  | 0.954  |
| **Dairy products** |  |  |  |  |  |  |
| Fresh milk | 0.93 (0.71, 1.23) | 0.615  | 0.986  | 1.08 (0.93, 1.26) | 0.292  | 0.954  |
| Milk powder | 1.07 (0.89, 1.28) | 0.469  | 0.986  | 1.05 (0.95, 1.16) | 0.296  | 0.954  |
| **Fruit and vegetables** |  |  |  |  |  |  |
| Soy milk | 1.03 (0.80, 1.33) | 0.822  | 0.986  | 1.01 (0.89, 1.16) | 0.848  | 0.982  |
| Tofu | 1.04 (0.83, 1.32) | 0.719  | 0.986  | 1.01 (0.88, 1.15) | 0.930  | 0.986  |
| Other soy products | 0.95 (0.71, 1.27) | 0.710  | 0.986  | 0.90 (0.76, 1.07) | 0.238  | 0.934  |
| Dried soybeans | 0.91 (0.57, 1.47) | 0.709  | 0.986  | 0.89 (0.71, 1.12) | 0.311  | 0.954  |
| Other dried beans | 1.03 (0.80, 1.32) | 0.824  | 0.986  | 0.99 (0.86, 1.16) | 0.944  | 0.986  |
| Soybean sprouts | 0.98 (0.74, 1.28) | 0.867  | 0.986  | 0.99 (0.85, 1.15) | 0.906  | 0.984  |
| Mung bean sprouts | 0.81 (0.55, 1.18) | 0.268  | 0.986  | 0.95 (0.80, 1.13) | 0.552  | 0.982  |
| Chinese greens | 1.21 (0.97, 1.51) | 0.084  | 0.986  | 0.92 (0.80, 1.07) | 0.274  | 0.954  |
| Spinach | 1.00 (0.77, 1.28) | 0.976  | 0.986  | 1.17 (1.06, 1.28) | 0.002  | 0.126  |
| Green cabbage | 1.05 (0.85, 1.30) | 0.633  | 0.986  | 0.91 (0.76, 1.10) | 0.318  | 0.954  |
| Chinese cabbage | 1.17 (0.98, 1.41) | 0.087  | 0.986  | 0.98 (0.86, 1.13) | 0.815  | 0.982  |
| Cauliflower | 1.10 (0.97, 1.25) | 0.138  | 0.986  | 1.00 (0.85, 1.18) | 0.970  | 0.986  |
| Celery | 1.12 (0.91, 1.36) | 0.281  | 0.986  | 1.05 (0.92, 1.19) | 0.504  | 0.982  |
| Eggplant | 1.13 (0.97, 1.30) | 0.111  | 0.986  | 1.08 (0.96, 1.22) | 0.214  | 0.934  |
| Zizania | 1.07 (0.84, 1.36) | 0.603  | 0.986  | 0.90 (0.76, 1.06) | 0.222  | 0.934  |
| Lettuce | 1.12 (0.94, 1.32) | 0.195  | 0.986  | 0.97 (0.83, 1.13) | 0.669  | 0.982  |
| Potatoes | 1.16 (1.03, 1.32) | 0.015  | 0.986  | 0.96 (0.82, 1.13) | 0.641  | 0.982  |
| Wax gourds | 0.97 (0.74, 1.28) | 0.844  | 0.986  | 1.06 (0.93, 1.20) | 0.382  | 0.982  |
| Cucumbers and loofah | 1.01 (0.79, 1.31) | 0.914  | 0.986  | 0.94 (0.81, 1.10) | 0.450  | 0.982  |
| Fresh mushrooms | 1.02 (0.80, 1.29) | 0.899  | 0.986  | 0.96 (0.81, 1.14) | 0.659  | 0.982  |
| Hot pepper | 1.10 (0.93, 1.30) | 0.266  | 0.986  | 1.02 (0.87, 1.19) | 0.825  | 0.982  |
| Tomatoes | 1.05 (0.84, 1.31) | 0.683  | 0.986  | 1.03 (0.89, 1.21) | 0.664  | 0.982  |
| Bamboo shoots | 0.93 (0.69, 1.26) | 0.648  | 0.986  | 0.97 (0.83, 1.12) | 0.674  | 0.982  |
| Lotus root | 0.82 (0.52, 1.31) | 0.413  | 0.986  | 0.79 (0.60, 1.05) | 0.105  | 0.882  |
| Garlic and garlic shoots | 0.93 (0.68, 1.27) | 0.646  | 0.986  | 0.87 (0.71, 1.08) | 0.205  | 0.934  |
| Garlic heads | 1.07 (0.95, 1.22) | 0.271  | 0.986  | 1.01 (0.90, 1.13) | 0.860  | 0.982  |
| Onions | 1.06 (0.93, 1.21) | 0.374  | 0.986  | 0.77 (0.55, 1.08) | 0.134  | 0.889  |
| Chinese chives | 1.01 (0.76, 1.32) | 0.968  | 0.986  | 1.04 (0.94, 1.15) | 0.471  | 0.982  |
| Green onions | 0.93 (0.68, 1.27) | 0.650  | 0.986  | 1.00 (0.86, 1.15) | 0.977  | 0.986  |
| Carrots | 1.14 (1.01, 1.28) | 0.034  | 0.986  | 1.08 (0.99, 1.18) | 0.096  | 0.882  |
| White radish | 0.82 (0.55, 1.23) | 0.339  | 0.986  | 1.00 (0.88, 1.14) | 0.986  | 0.986  |
| Sweet potatoes | 1.09 (0.88, 1.35) | 0.429  | 0.986  | 1.02 (0.91, 1.13) | 0.765  | 0.982  |
| Young soybeans, peas and broad beans | 1.12 (0.89, 1.42) | 0.326  | 0.986  | 1.04 (0.93, 1.17) | 0.456  | 0.982  |
| Cowpeas | 1.05 (0.82, 1.35) | 0.695  | 0.986  | 1.00 (0.88, 1.15) | 0.952  | 0.986  |
| Green beans | 0.95 (0.72, 1.25) | 0.724  | 0.986  | 0.93 (0.78, 1.10) | 0.396  | 0.982  |
| Snow peas | 0.92 (0.69, 1.24) | 0.589  | 0.986  | 0.87 (0.71, 1.06) | 0.162  | 0.934  |
| Dry beans | 1.03 (0.80, 1.34) | 0.804  | 0.986  | 1.00 (0.87, 1.15) | 0.972  | 0.986  |
| Fresh beans | 0.99 (0.75, 1.31) | 0.966  | 0.986  | 0.99 (0.85, 1.15) | 0.881  | 0.982  |
| Solanaceous vegetables | 1.07 (0.85, 1.36) | 0.550  | 0.986  | 1.04 (0.89, 1.20) | 0.647  | 0.982  |
| Leafy vegetables | 1.10 (0.88, 1.36) | 0.400  | 0.986  | 1.12 (1.00, 1.27) | 0.059  | 0.882  |
| Stem vegetables | 1.04 (0.81, 1.35) | 0.752  | 0.986  | 0.96 (0.82, 1.12) | 0.616  | 0.982  |
| Allium | 1.02 (0.79, 1.33) | 0.860  | 0.986  | 0.97 (0.82, 1.14) | 0.673  | 0.982  |
| Cruciferous vegetables | 1.23 (0.99, 1.52) | 0.063  | 0.986  | 0.92 (0.79, 1.06) | 0.251  | 0.934  |
| Fruits | 0.81 (0.60, 1.09) | 0.156  | 0.986  | 0.90 (0.75, 1.07) | 0.226  | 0.934  |
| Apple | 1.01 (0.78, 1.31) | 0.924  | 0.986  | 0.99 (0.84, 1.16) | 0.869  | 0.982  |
| Pear | 0.78 (0.58, 1.05) | 0.103  | 0.986  | 0.80 (0.67, 0.96) | 0.017  | 0.630  |
| Orange | 0.98 (0.75, 1.28) | 0.885  | 0.986  | 0.86 (0.72, 1.04) | 0.117  | 0.889  |
| Banana | 0.78 (0.56, 1.10) | 0.160  | 0.986  | 1.04 (0.89, 1.20) | 0.649  | 0.982  |
| Grape | 0.71 (0.46, 1.08) | 0.109  | 0.986  | 0.86 (0.68, 1.08) | 0.196  | 0.934  |
| Watermelon | 0.81 (0.60, 1.08) | 0.146  | 0.986  | 1.02 (0.88, 1.20) | 0.763  | 0.982  |
| Peach | 0.94 (0.71, 1.25) | 0.668  | 0.986  | 0.85 (0.70, 1.04) | 0.122  | 0.889  |
| Other fruits including strawberries and cantaloupe | 0.98 (0.77, 1.26) | 0.882  | 0.986  | 0.74 (0.57, 0.96) | 0.025  | 0.630  |
| **Sugar and confectionery** |  |  |  |  |  |  |
| Candy preserves | 1.14 (0.98, 1.32) | 0.095  | 0.986  | 1.02 (0.83, 1.24) | 0.879  | 0.982  |
| Brown and white sugar | 0.99 (0.75, 1.30) | 0.942  | 0.986  | 1.04 (0.92, 1.18) | 0.537  | 0.982  |
| **Non-alcoholic beverages** |  |  |  |  |  |  |
| Green tea | 0.69 (0.48, 1.00) | 0.050  | 0.986  | 1.01 (0.86, 1.18) | 0.880  | 0.982  |
| **Others** |  |  |  |  |  |  |
| Peanuts | 1.12 (0.97, 1.28) | 0.113  | 0.986  | 1.01 (0.89, 1.15) | 0.889  | 0.982  |
| Edible tree fungus | 0.99 (0.74, 1.32) | 0.930  | 0.986  | 0.94 (0.77, 1.14) | 0.515  | 0.982  |
| Dried mushrooms | 0.77 (0.49, 1.21) | 0.252  | 0.986  | 0.95 (0.79, 1.14) | 0.559  | 0.982  |
| Soybean oil | 1.08 (0.90, 1.29) | 0.396  | 0.986  | 0.89 (0.77, 1.03) | 0.129  | 0.889  |
| Peanut oil | 0.71 (0.36, 1.40) | 0.321  | 0.986  | 0.91 (0.69, 1.19) | 0.483  | 0.982  |
| Pig oil | 1.01 (0.96, 1.07) | 0.659  | 0.986  | 0.85 (0.42, 1.71) | 0.655  | 0.982  |
| **Nutrients** |  |  |  |  |  |  |
| Carbohydrate | 0.95 (0.73, 1.23) | 0.713  | 0.986  | 1.02 (0.88, 1.19) | 0.767  | 0.982  |
| Fiber | 1.02 (0.79, 1.32) | 0.892  | 0.986  | 0.87 (0.75, 1.01) | 0.076  | 0.882  |
| Protein | 1.05 (0.81, 1.36) | 0.696  | 0.986  | 0.91 (0.78, 1.06) | 0.235  | 0.934  |
| Protein from soy | 1.02 (0.79, 1.32) | 0.887  | 0.986  | 0.96 (0.83, 1.10) | 0.559  | 0.982  |
| Protein from vegetables | 1.20 (0.98, 1.48) | 0.080  | 0.986  | 1.02 (0.89, 1.17) | 0.805  | 0.982  |
| Protein from fruits | 0.80 (0.60, 1.07) | 0.130  | 0.986  | 0.91 (0.76, 1.07) | 0.252  | 0.934  |
| Protein from red meat | 1.00 (0.79, 1.28) | 0.972  | 0.986  | 0.98 (0.83, 1.15) | 0.792  | 0.982  |
| Fat | 1.04 (0.80, 1.34) | 0.772  | 0.986  | 1.02 (0.88, 1.18) | 0.828  | 0.982  |
| Saturated fat | 1.01 (0.78, 1.32) | 0.928  | 0.986  | 1.06 (0.91, 1.23) | 0.439  | 0.982  |
| Monounsaturated fat | 1.06 (0.83, 1.35) | 0.656  | 0.986  | 1.06 (0.91, 1.23) | 0.443  | 0.982  |
| Polyunsaturated fat | 1.07 (0.83, 1.39) | 0.583  | 0.986  | 0.98 (0.85, 1.12) | 0.754  | 0.982  |
| Fat from soy | 1.00 (0.77, 1.30) | 0.986  | 0.986  | 0.94 (0.81, 1.09) | 0.413  | 0.982  |
| Fat from vegetables | 1.17 (0.96, 1.44) | 0.124  | 0.986  | 1.04 (0.91, 1.18) | 0.560  | 0.982  |
| Fat from fruits | 0.83 (0.63, 1.11) | 0.208  | 0.986  | 0.88 (0.74, 1.04) | 0.143  | 0.901  |
| Fat from red meat | 1.00 (0.78, 1.28) | 0.985  | 0.986  | 1.05 (0.90, 1.21) | 0.539  | 0.982  |
| Cholesterol | 1.14 (0.89, 1.45) | 0.293  | 0.986  | 0.94 (0.80, 1.09) | 0.403  | 0.982  |
| Vitamin A | 1.14 (0.92, 1.41) | 0.245  | 0.986  | 0.99 (0.85, 1.15) | 0.892  | 0.982  |
| Carotene | 1.17 (0.94, 1.46) | 0.163  | 0.986  | 0.99 (0.86, 1.14) | 0.885  | 0.982  |
| Retinol | 1.01 (0.80, 1.27) | 0.958  | 0.986  | 1.00 (0.84, 1.19) | 0.985  | 0.986  |
| Vitamin B1 | 1.05 (0.83, 1.35) | 0.669  | 0.986  | 0.86 (0.73, 1.01) | 0.063  | 0.882  |
| Vitamin B2 | 1.06 (0.82, 1.37) | 0.650  | 0.986  | 0.99 (0.84, 1.16) | 0.918  | 0.986  |
| Niacin | 1.09 (0.85, 1.38) | 0.498  | 0.986  | 0.95 (0.81, 1.12) | 0.556  | 0.982  |
| Vitamin B6 | 1.01 (0.78, 1.31) | 0.918  | 0.986  | 0.96 (0.83, 1.12) | 0.616  | 0.982  |
| Folate | 1.12 (0.89, 1.42) | 0.331  | 0.986  | 0.94 (0.81, 1.09) | 0.432  | 0.982  |
| Vitamin B12 | 1.01 (0.78, 1.30) | 0.961  | 0.986  | 0.99 (0.83, 1.17) | 0.872  | 0.982  |
| Vitamin C | 1.12 (0.89, 1.40) | 0.324  | 0.986  | 0.91 (0.77, 1.07) | 0.249  | 0.934  |
| Vitamin D | 1.02 (0.78, 1.33) | 0.871  | 0.986  | 1.03 (0.88, 1.21) | 0.714  | 0.982  |
| Vitamin E | 1.02 (0.78, 1.32) | 0.903  | 0.986  | 0.87 (0.74, 1.02) | 0.077  | 0.882  |
| Potassium | 1.08 (0.84, 1.39) | 0.544  | 0.986  | 0.93 (0.80, 1.09) | 0.363  | 0.982  |
| Sodium | 1.15 (0.89, 1.48) | 0.291  | 0.986  | 0.94 (0.80, 1.11) | 0.487  | 0.982  |
| Calcium | 1.08 (0.83, 1.40) | 0.561  | 0.986  | 0.99 (0.85, 1.15) | 0.890  | 0.982  |
| Magnesium | 1.05 (0.81, 1.36) | 0.713  | 0.986  | 0.91 (0.79, 1.06) | 0.249  | 0.934  |
| Iron | 1.11 (0.87, 1.42) | 0.417  | 0.986  | 0.86 (0.74, 1.01) | 0.065  | 0.882  |
| Manganese | 0.95 (0.73, 1.23) | 0.699  | 0.986  | 0.88 (0.75, 1.03) | 0.102  | 0.882  |
| Zinc | 1.07 (0.84, 1.36) | 0.604  | 0.986  | 0.93 (0.79, 1.08) | 0.337  | 0.982  |
| Copper | 0.88 (0.67, 1.15) | 0.349  | 0.986  | 0.85 (0.72, 1.00) | 0.047  | 0.882  |
| Phosphorus | 1.09 (0.84, 1.42) | 0.507  | 0.986  | 0.91 (0.78, 1.06) | 0.221  | 0.934  |
| Selenium | 0.98 (0.76, 1.28) | 0.906  | 0.986  | 0.91 (0.76, 1.09) | 0.307  | 0.954  |

The models were adjusted for calorie intake (kcal/d, continuous), age (years, continuous), BMI (<18.5, 18.5-24, 24-28, ≥28 kg/m2), physical activity (MET-h/week, continuous), education (elementary school and below, middle school, high school, college and higher), smoking status (no, yes), alcohol drinking status (no, yes), family history of liver cancer (no, yes), medical history of hepatitis (no, yes) and T2DM (no, yes).

**Supplementary Table S6** HRs and 95% CIs for the association of 126 foods and nutrients in relation to liver cancer risk among participants without smoking and alcohol drinking (SWHS, 1996-2016)

|  |  |  |  |
| --- | --- | --- | --- |
| Dietary Variable | HR (95% CI) | *P* value | FDR |
| **Cereals/cereal products** |  |  |  |
| Rice | 1.17 (0.99, 1.37) | 0.058  | 0.609  |
| Cooked wheaten foods | 0.77 (0.65, 0.92) | 0.003  | 0.252  |
| Cake and biscuits | 0.96 (0.82, 1.12) | 0.583  | 0.967  |
| Bread | 1.02 (0.89, 1.18) | 0.761  | 0.985  |
| Cereals | 1.03 (0.83, 1.28) | 0.802  | 0.985  |
| **Meat, egg, fish** |  |  |  |
| Pork chops | 1.08 (0.95, 1.22) | 0.223  | 0.843  |
| Pork ribs | 1.04 (0.92, 1.18) | 0.483  | 0.967  |
| Pork feet | 0.87 (0.71, 1.07) | 0.199  | 0.843  |
| Fatty pork | 1.04 (0.93, 1.16) | 0.527  | 0.967  |
| Lean pork | 0.95 (0.82, 1.10) | 0.510  | 0.967  |
| Fatty and lean pork | 1.03 (0.90, 1.18) | 0.687  | 0.977  |
| Animal liver | 0.99 (0.85, 1.16) | 0.902  | 0.985  |
| Animal organs | 1.01 (0.88, 1.15) | 0.940  | 0.985  |
| Beef and mutton | 0.97 (0.82, 1.15) | 0.717  | 0.977  |
| Eggs | 0.98 (0.85, 1.12) | 0.721  | 0.977  |
| Chicken | 1.02 (0.89, 1.18) | 0.777  | 0.985  |
| Duck and goose | 1.04 (0.93, 1.16) | 0.498  | 0.967  |
| Marine fish | 0.92 (0.78, 1.08) | 0.293  | 0.926  |
| Freshwater fish | 0.99 (0.86, 1.13) | 0.837  | 0.985  |
| Eel | 0.97 (0.81, 1.15) | 0.712  | 0.977  |
| Shrimp and crabs | 0.96 (0.82, 1.12) | 0.602  | 0.967  |
| Snails and other shellfish | 0.92 (0.74, 1.15) | 0.468  | 0.967  |
| Red meat | 1.01 (0.86, 1.18) | 0.910  | 0.985  |
| Poultry | 1.04 (0.90, 1.19) | 0.599  | 0.967  |
| Fish | 0.93 (0.80, 1.09) | 0.368  | 0.967  |
| **Dairy products** |  |  |  |
| Fresh milk | 1.01 (0.88, 1.16) | 0.875  | 0.985  |
| Milk powder | 1.06 (0.98, 1.16) | 0.134  | 0.840  |
| **Fruit and vegetables** |  |  |  |
| Soy milk | 1.03 (0.92, 1.17) | 0.581  | 0.967  |
| Tofu | 1.03 (0.91, 1.16) | 0.616  | 0.967  |
| Other soy products | 0.92 (0.79, 1.07) | 0.271  | 0.923  |
| Dried soybeans | 0.88 (0.70, 1.09) | 0.239  | 0.843  |
| Other dried beans | 1.01 (0.89, 1.15) | 0.831  | 0.985  |
| Soybean sprouts | 1.00 (0.87, 1.14) | 0.944  | 0.985  |
| Mung bean sprouts | 0.94 (0.80, 1.10) | 0.410  | 0.967  |
| Chinese greens | 1.00 (0.88, 1.13) | 0.970  | 0.993  |
| Spinach | 1.12 (1.02, 1.24) | 0.024  | 0.527  |
| Green cabbage | 0.96 (0.83, 1.12) | 0.622  | 0.967  |
| Chinese cabbage | 1.02 (0.91, 1.14) | 0.717  | 0.977  |
| Cauliflower | 1.05 (0.94, 1.19) | 0.373  | 0.967  |
| Celery | 1.08 (0.97, 1.20) | 0.178  | 0.843  |
| Eggplant | 1.11 (1.01, 1.22) | 0.026  | 0.527  |
| Zizania | 0.96 (0.83, 1.10) | 0.538  | 0.967  |
| Lettuce | 1.00 (0.89, 1.14) | 0.938  | 0.985  |
| Potatoes | 1.04 (0.91, 1.17) | 0.591  | 0.967  |
| Wax gourds | 1.03 (0.91, 1.16) | 0.626  | 0.967  |
| Cucumbers and loofah | 0.97 (0.84, 1.11) | 0.614  | 0.967  |
| Fresh mushrooms | 0.99 (0.86, 1.14) | 0.856  | 0.985  |
| Hot pepper | 1.06 (0.94, 1.19) | 0.367  | 0.967  |
| Tomatoes | 1.03 (0.90, 1.17) | 0.680  | 0.977  |
| Bamboo shoots | 0.95 (0.83, 1.10) | 0.506  | 0.967  |
| Lotus root | 0.80 (0.62, 1.03) | 0.079  | 0.711  |
| Garlic and garlic shoots | 0.88 (0.73, 1.06) | 0.185  | 0.843  |
| Garlic heads | 1.00 (0.88, 1.13) | 0.942  | 0.985  |
| Onions | 0.84 (0.65, 1.09) | 0.200  | 0.843  |
| Chinese chives | 1.03 (0.94, 1.14) | 0.520  | 0.967  |
| Green onions | 0.99 (0.87, 1.13) | 0.910  | 0.985  |
| Carrots | 1.09 (1.01, 1.18) | 0.028  | 0.527  |
| White radish | 0.97 (0.85, 1.11) | 0.640  | 0.972  |
| Sweet potatoes | 0.99 (0.88, 1.12) | 0.910  | 0.985  |
| Young soybeans, peas and broad beans | 1.07 (0.96, 1.18) | 0.219  | 0.843  |
| Cowpeas | 1.00 (0.88, 1.13) | 0.999  | 0.999  |
| Green beans | 0.89 (0.76, 1.04) | 0.140  | 0.840  |
| Snow peas | 0.88 (0.74, 1.04) | 0.128  | 0.840  |
| Dry beans | 1.03 (0.91, 1.16) | 0.670  | 0.977  |
| Fresh beans | 0.99 (0.86, 1.13) | 0.859  | 0.985  |
| Solanaceous vegetables | 1.04 (0.91, 1.19) | 0.530  | 0.967  |
| Leafy vegetables | 1.12 (1.01, 1.25) | 0.035  | 0.527  |
| Stem vegetables | 0.99 (0.87, 1.13) | 0.877  | 0.985  |
| Allium | 0.96 (0.82, 1.12) | 0.586  | 0.967  |
| Cruciferous vegetables | 1.00 (0.88, 1.13) | 0.972  | 0.993  |
| Fruits | 0.85 (0.73, 1.00) | 0.046  | 0.527  |
| Apple | 0.97 (0.84, 1.12) | 0.719  | 0.977  |
| Pear | 0.79 (0.67, 0.93) | 0.004  | 0.252  |
| Orange | 0.87 (0.75, 1.02) | 0.093  | 0.732  |
| Banana | 0.96 (0.83, 1.11) | 0.570  | 0.967  |
| Grape | 0.80 (0.64, 0.99) | 0.039  | 0.527  |
| Watermelon | 0.95 (0.83, 1.10) | 0.524  | 0.967  |
| Peach | 0.86 (0.72, 1.02) | 0.089  | 0.732  |
| Other fruits including strawberries and cantaloupe | 0.83 (0.69, 1.01) | 0.064  | 0.620  |
| **Sugar and confectionery** |  |  |  |
| Candy preserves | 1.08 (0.96, 1.21) | 0.219  | 0.843  |
| Brown and white sugar | 1.03 (0.93, 1.15) | 0.576  | 0.967  |
| **Non-alcoholic beverages** |  |  |  |
| Green tea | 0.93 (0.80, 1.09) | 0.390  | 0.967  |
| **Others** |  |  |  |
| Peanuts | 1.05 (0.95, 1.16) | 0.347  | 0.967  |
| Edible tree fungus | 0.94 (0.79, 1.11) | 0.459  | 0.967  |
| Dried mushrooms | 0.89 (0.73, 1.07) | 0.221  | 0.843  |
| Soybean oil | 0.90 (0.78, 1.03) | 0.117  | 0.840  |
| Peanut oil | 0.86 (0.66, 1.13) | 0.294  | 0.926  |
| Pig oil | 1.01 (0.94, 1.08) | 0.802  | 0.985  |
| **Nutrients** |  |  |  |
| Carbohydrate | 1.00 (0.87, 1.14) | 0.982  | 0.993  |
| Fiber | 0.90 (0.79, 1.04) | 0.148  | 0.843  |
| Protein | 0.94 (0.82, 1.08) | 0.392  | 0.967  |
| Protein from soy | 0.99 (0.87, 1.12) | 0.868  | 0.985  |
| Protein from vegetables | 1.06 (0.94, 1.20) | 0.317  | 0.967  |
| Protein from fruits | 0.85 (0.73, 1.00) | 0.044  | 0.527  |
| Protein from red meat | 0.99 (0.87, 1.14) | 0.927  | 0.985  |
| Fat | 1.03 (0.90, 1.18) | 0.629  | 0.967  |
| Saturated fat | 1.05 (0.92, 1.21) | 0.447  | 0.967  |
| Monounsaturated fat | 1.07 (0.94, 1.22) | 0.283  | 0.926  |
| Polyunsaturated fat | 1.02 (0.90, 1.15) | 0.787  | 0.985  |
| Fat from soy | 0.97 (0.85, 1.10) | 0.625  | 0.967  |
| Fat from vegetables | 1.07 (0.96, 1.20) | 0.204  | 0.843  |
| Fat from fruits | 0.85 (0.73, 0.99) | 0.031  | 0.527  |
| Fat from red meat | 1.05 (0.92, 1.20) | 0.437  | 0.967  |
| Cholesterol | 0.97 (0.85, 1.12) | 0.701  | 0.977  |
| Vitamin A | 1.02 (0.89, 1.16) | 0.779  | 0.985  |
| Carotene | 1.03 (0.91, 1.17) | 0.652  | 0.977  |
| Retinol | 0.98 (0.84, 1.15) | 0.838  | 0.985  |
| Vitamin B1 | 0.91 (0.80, 1.05) | 0.203  | 0.843  |
| Vitamin B2 | 0.98 (0.85, 1.13) | 0.812  | 0.985  |
| Niacin | 0.99 (0.86, 1.14) | 0.880  | 0.985  |
| Vitamin B6 | 0.96 (0.84, 1.10) | 0.557  | 0.967  |
| Folate | 0.99 (0.87, 1.13) | 0.890  | 0.985  |
| Vitamin B12 | 0.96 (0.83, 1.12) | 0.609  | 0.967  |
| Vitamin C | 0.96 (0.83, 1.10) | 0.548  | 0.967  |
| Vitamin D | 1.00 (0.87, 1.15) | 0.985  | 0.993  |
| Vitamin E | 0.91 (0.79, 1.04) | 0.159  | 0.843  |
| Potassium | 0.95 (0.83, 1.09) | 0.501  | 0.967  |
| Sodium | 0.98 (0.86, 1.13) | 0.831  | 0.985  |
| Calcium | 1.00 (0.88, 1.15) | 0.946  | 0.985  |
| Magnesium | 0.94 (0.82, 1.08) | 0.381  | 0.967  |
| Iron | 0.92 (0.80, 1.06) | 0.241  | 0.843  |
| Manganese | 0.90 (0.78, 1.03) | 0.128  | 0.840  |
| Zinc | 0.96 (0.84, 1.11) | 0.597  | 0.967  |
| Copper | 0.86 (0.74, 0.99) | 0.036  | 0.527  |
| Phosphorus | 0.94 (0.82, 1.08) | 0.402  | 0.967  |
| Selenium | 0.91 (0.78, 1.06) | 0.236  | 0.843  |

The models were adjusted for calorie intake (kcal/d, continuous), age (years, continuous), BMI (<18.5, 18.5-24, 24-28, ≥28 kg/m2), physical activity (MET-h/week, continuous), education (elementary school and below, middle school, high school, college and higher), menopause status (no, yes), family history of liver cancer (no, yes), medical history of hepatitis (no, yes) and T2DM (no, yes).

**Supplementary Table S7** Sensitivity analyses: HRs and 95% CIs for the association of 126 foods and nutrients in relation to liver cancer risk among participants with follow-up years≥2

|  |  |  |  |
| --- | --- | --- | --- |
| Dietary Variable | HR (95% CI) | *P* value | FDR |
| **Cereals/cereal products** |  |  |  |
| Rice | 1.22 (1.04, 1.44) | 0.017  | 0.357  |
| Cooked wheaten foods | 0.75 (0.63, 0.90) | 0.002  | 0.084  |
| Cake and biscuits | 0.98 (0.84, 1.14) | 0.823  | 0.976  |
| Bread | 0.92 (0.77, 1.10) | 0.351  | 0.974  |
| Cereals | 1.06 (0.85, 1.32) | 0.630  | 0.976  |
| **Meat, egg, fish** |  |  |  |
| Pork chops | 1.07 (0.93, 1.22) | 0.345  | 0.974  |
| Pork ribs | 1.04 (0.91, 1.17) | 0.585  | 0.976  |
| Pork feet | 0.93 (0.78, 1.12) | 0.468  | 0.974  |
| Fatty pork | 1.03 (0.91, 1.16) | 0.676  | 0.976  |
| Lean pork | 0.94 (0.80, 1.10) | 0.432  | 0.974  |
| Fatty and lean pork | 1.03 (0.90, 1.19) | 0.643  | 0.976  |
| Animal liver | 1.02 (0.89, 1.17) | 0.780  | 0.976  |
| Animal organs | 1.01 (0.89, 1.16) | 0.832  | 0.976  |
| Beef and mutton | 1.00 (0.86, 1.16) | 0.973  | 0.989  |
| Eggs | 0.97 (0.84, 1.12) | 0.715  | 0.976  |
| Chicken | 0.93 (0.79, 1.10) | 0.397  | 0.974  |
| Duck and goose | 1.05 (0.93, 1.17) | 0.432  | 0.974  |
| Marine fish | 0.97 (0.83, 1.13) | 0.673  | 0.976  |
| Freshwater fish | 0.99 (0.87, 1.14) | 0.923  | 0.980  |
| Eel | 1.03 (0.89, 1.19) | 0.678  | 0.976  |
| Shrimp and crabs | 0.93 (0.78, 1.10) | 0.391  | 0.974  |
| Snails and other shellfish | 0.86 (0.66, 1.12) | 0.266  | 0.974  |
| Red meat | 1.01 (0.86, 1.18) | 0.918  | 0.980  |
| Poultry | 0.97 (0.83, 1.14) | 0.721  | 0.976  |
| Fish | 0.97 (0.83, 1.13) | 0.710  | 0.976  |
| **Dairy products** |  |  |  |
| Fresh milk | 1.01 (0.88, 1.17) | 0.855  | 0.978  |
| Milk powder | 1.03 (0.92, 1.15) | 0.600  | 0.976  |
| **Fruit and vegetables** |  |  |  |
| Soy milk | 1.00 (0.88, 1.14) | 1.000  | 1.000  |
| Tofu | 0.99 (0.87, 1.13) | 0.924  | 0.980  |
| Other soy products | 0.91 (0.78, 1.07) | 0.254  | 0.974  |
| Dried soybeans | 0.89 (0.71, 1.11) | 0.295  | 0.974  |
| Other dried beans | 1.01 (0.91, 1.13) | 0.799  | 0.976  |
| Soybean sprouts | 1.00 (0.87, 1.14) | 0.946  | 0.980  |
| Mung bean sprouts | 0.95 (0.81, 1.11) | 0.491  | 0.974  |
| Chinese greens | 0.96 (0.84, 1.10) | 0.539  | 0.976  |
| Spinach | 1.16 (1.06, 1.26) | 0.001  | 0.084  |
| Green cabbage | 0.97 (0.84, 1.12) | 0.686  | 0.976  |
| Chinese cabbage | 1.02 (0.91, 1.15) | 0.738  | 0.976  |
| Cauliflower | 1.07 (0.95, 1.20) | 0.258  | 0.974  |
| Celery | 1.05 (0.93, 1.19) | 0.394  | 0.974  |
| Eggplant | 1.13 (1.03, 1.24) | 0.008  | 0.252  |
| Zizania | 0.95 (0.82, 1.10) | 0.473  | 0.974  |
| Lettuce | 1.03 (0.91, 1.16) | 0.634  | 0.976  |
| Potatoes | 1.05 (0.93, 1.18) | 0.469  | 0.974  |
| Wax gourds | 0.93 (0.81, 1.07) | 0.314  | 0.974  |
| Cucumbers and loofah | 0.92 (0.79, 1.07) | 0.262  | 0.974  |
| Fresh mushrooms | 0.97 (0.83, 1.13) | 0.689  | 0.976  |
| Hot pepper | 1.08 (0.96, 1.20) | 0.203  | 0.974  |
| Tomatoes | 1.04 (0.91, 1.19) | 0.527  | 0.976  |
| Bamboo shoots | 0.97 (0.84, 1.11) | 0.634  | 0.976  |
| Lotus root | 0.75 (0.56, 0.99) | 0.043  | 0.573  |
| Garlic and garlic shoots | 0.89 (0.74, 1.07) | 0.197  | 0.974  |
| Garlic heads | 0.99 (0.87, 1.13) | 0.909  | 0.980  |
| Onions | 0.92 (0.74, 1.15) | 0.468  | 0.974  |
| Chinese chives | 1.04 (0.95, 1.14) | 0.419  | 0.974  |
| Green onions | 0.98 (0.86, 1.13) | 0.807  | 0.976  |
| Carrots | 1.06 (0.96, 1.17) | 0.224  | 0.974  |
| White radish | 0.98 (0.86, 1.12) | 0.821  | 0.976  |
| Sweet potatoes | 1.01 (0.90, 1.13) | 0.843  | 0.976  |
| Young soybeans, peas and broad beans | 1.05 (0.94, 1.17) | 0.352  | 0.974  |
| Cowpeas | 1.01 (0.89, 1.15) | 0.844  | 0.976  |
| Green beans | 0.92 (0.79, 1.08) | 0.318  | 0.974  |
| Snow peas | 0.88 (0.74, 1.05) | 0.167  | 0.974  |
| Dry beans | 0.98 (0.86, 1.12) | 0.808  | 0.976  |
| Fresh beans | 0.99 (0.86, 1.14) | 0.918  | 0.980  |
| Solanaceous vegetables | 1.01 (0.88, 1.16) | 0.898  | 0.980  |
| Leafy vegetables | 1.13 (1.01, 1.25) | 0.033  | 0.520  |
| Stem vegetables | 0.97 (0.84, 1.12) | 0.698  | 0.976  |
| Allium | 0.97 (0.84, 1.13) | 0.699  | 0.976  |
| Cruciferous vegetables | 0.97 (0.85, 1.11) | 0.634  | 0.976  |
| Fruits | 0.86 (0.73, 1.01) | 0.071  | 0.737  |
| Apple | 0.98 (0.85, 1.14) | 0.808  | 0.976  |
| Pear | 0.77 (0.65, 0.91) | 0.002  | 0.084  |
| Orange | 0.91 (0.78, 1.06) | 0.227  | 0.974  |
| Banana | 0.97 (0.84, 1.12) | 0.674  | 0.976  |
| Grape | 0.77 (0.61, 0.97) | 0.025  | 0.450  |
| Watermelon | 0.97 (0.84, 1.12) | 0.687  | 0.976  |
| Peach | 0.88 (0.74, 1.04) | 0.138  | 0.966  |
| Other fruits including strawberries and cantaloupe | 0.82 (0.67, 1.00) | 0.050  | 0.573  |
| **Sugar and confectionery** |  |  |  |
| Candy preserves | 1.09 (0.98, 1.22) | 0.115  | 0.906  |
| Brown and white sugar | 1.04 (0.95, 1.14) | 0.364  | 0.974  |
| **Non-alcoholic beverages** |  |  |  |
| Green tea | 0.94 (0.80, 1.09) | 0.416  | 0.974  |
| **Others** |  |  |  |
| Peanuts | 1.04 (0.93, 1.15) | 0.507  | 0.974  |
| Edible tree fungus | 0.96 (0.81, 1.14) | 0.644  | 0.976  |
| Dried mushrooms | 0.92 (0.77, 1.11) | 0.375  | 0.974  |
| Soybean oil | 0.99 (0.87, 1.13) | 0.925  | 0.980  |
| Peanut oil | 0.84 (0.63, 1.13) | 0.252  | 0.974  |
| Pig oil | 1.01 (0.95, 1.08) | 0.775  | 0.976  |
| **Nutrients** |  |  |  |
| Carbohydrate | 1.03 (0.90, 1.19) | 0.662  | 0.976  |
| Fiber | 0.89 (0.77, 1.02) | 0.095  | 0.798  |
| Protein | 0.92 (0.80, 1.06) | 0.236  | 0.974  |
| Protein from soy | 0.96 (0.84, 1.09) | 0.514  | 0.974  |
| Protein from vegetables | 1.05 (0.93, 1.19) | 0.452  | 0.974  |
| Protein from fruits | 0.87 (0.74, 1.01) | 0.076  | 0.737  |
| Protein from red meat | 0.99 (0.86, 1.14) | 0.937  | 0.980  |
| Fat | 1.00 (0.87, 1.15) | 0.987  | 0.995  |
| Saturated fat | 1.02 (0.89, 1.17) | 0.759  | 0.976  |
| Monounsaturated fat | 1.05 (0.91, 1.20) | 0.508  | 0.974  |
| Polyunsaturated fat | 0.98 (0.86, 1.12) | 0.799  | 0.976  |
| Fat from soy | 0.94 (0.82, 1.08) | 0.388  | 0.974  |
| Fat from vegetables | 1.05 (0.94, 1.19) | 0.373  | 0.974  |
| Fat from fruits | 0.86 (0.73, 1.00) | 0.050  | 0.573  |
| Fat from red meat | 1.05 (0.92, 1.19) | 0.494  | 0.974  |
| Cholesterol | 0.97 (0.84, 1.11) | 0.647  | 0.976  |
| Vitamin A | 1.01 (0.88, 1.15) | 0.936  | 0.980  |
| Carotene | 1.00 (0.88, 1.15) | 0.957  | 0.980  |
| Retinol | 1.00 (0.87, 1.16) | 0.949  | 0.980  |
| Vitamin B1 | 0.90 (0.78, 1.03) | 0.128  | 0.949  |
| Vitamin B2 | 0.97 (0.84, 1.12) | 0.672  | 0.976  |
| Niacin | 0.98 (0.85, 1.12) | 0.736  | 0.976  |
| Vitamin B6 | 0.95 (0.83, 1.10) | 0.518  | 0.974  |
| Folate | 0.96 (0.84, 1.10) | 0.604  | 0.976  |
| Vitamin B12 | 0.99 (0.85, 1.15) | 0.862  | 0.978  |
| Vitamin C | 0.95 (0.82, 1.09) | 0.471  | 0.974  |
| Vitamin D | 0.98 (0.84, 1.13) | 0.747  | 0.976  |
| Vitamin E | 0.88 (0.77, 1.02) | 0.088  | 0.792  |
| Potassium | 0.94 (0.82, 1.08) | 0.399  | 0.974  |
| Sodium | 0.94 (0.81, 1.08) | 0.381  | 0.974  |
| Calcium | 0.95 (0.83, 1.10) | 0.506  | 0.974  |
| Magnesium | 0.92 (0.80, 1.06) | 0.236  | 0.974  |
| Iron | 0.91 (0.79, 1.04) | 0.177  | 0.974  |
| Manganese | 0.91 (0.79, 1.05) | 0.206  | 0.974  |
| Zinc | 0.94 (0.81, 1.08) | 0.369  | 0.974  |
| Copper | 0.83 (0.71, 0.96) | 0.013  | 0.328  |
| Phosphorus | 0.91 (0.79, 1.05) | 0.204  | 0.974  |
| Selenium | 0.92 (0.79, 1.08) | 0.298  | 0.974  |

The models were adjusted for calorie intake (kcal/d, continuous), age (years, continuous), BMI (<18.5, 18.5-24, 24-28, ≥28 kg/m2), physical activity (MET-h/week, continuous), education (elementary school and below, middle school, high school, college and higher), menopause status (no, yes), smoking status (no, yes), alcohol drinking status (no, yes), family history of liver cancer (no, yes), medical history of hepatitis (no, yes) and T2DM (no, yes).

**Supplementary Table S8** Sensitivity analyses: HRs and 95% CIs for the association of 126 food and nutrient intakes in relation to liver cancer risk adjusting with energy-density method

|  |  |  |  |
| --- | --- | --- | --- |
| Dietary Variable | HR (95% CI) | *P* value | FDR |
| **Cereals/cereal products** |  |  |  |
| Rice | 1.17 (1.00, 1.36) | 0.051  | 0.714  |
| Cooked wheaten foods | 0.77 (0.65, 0.91) | 0.002  | 0.252  |
| Cake and biscuits | 0.96 (0.83, 1.11) | 0.590  | 0.965  |
| Bread | 1.02 (0.89, 1.17) | 0.772  | 0.965  |
| Cereals | 1.02 (0.83, 1.26) | 0.835  | 0.965  |
| **Meat, egg, fish** |  |  |  |
| Pork chops | 1.08 (0.95, 1.22) | 0.239  | 0.965  |
| Pork ribs | 1.03 (0.91, 1.16) | 0.623  | 0.965  |
| Pork feet | 0.91 (0.76, 1.10) | 0.330  | 0.965  |
| Fatty pork | 1.02 (0.90, 1.15) | 0.792  | 0.965  |
| Lean pork | 0.94 (0.81, 1.09) | 0.392  | 0.965  |
| Fatty and lean pork | 1.03 (0.90, 1.17) | 0.706  | 0.965  |
| Animal liver | 1.00 (0.87, 1.15) | 1.000  | 1.000  |
| Animal organs | 1.00 (0.87, 1.15) | 0.991  | 1.000  |
| Beef and mutton | 0.98 (0.84, 1.14) | 0.800  | 0.965  |
| Eggs | 0.98 (0.86, 1.12) | 0.802  | 0.965  |
| Chicken | 1.00 (0.87, 1.15) | 0.997  | 1.000  |
| Duck and goose | 1.03 (0.92, 1.16) | 0.575  | 0.965  |
| Marine fish | 0.93 (0.80, 1.09) | 0.360  | 0.965  |
| Freshwater fish | 1.00 (0.88, 1.14) | 0.949  | 0.994  |
| Eel | 1.03 (0.90, 1.18) | 0.669  | 0.965  |
| Shrimp and crabs | 0.96 (0.82, 1.12) | 0.574  | 0.965  |
| Snails and other shellfish | 0.93 (0.76, 1.14) | 0.505  | 0.965  |
| Red meat | 0.99 (0.85, 1.16) | 0.942  | 0.994  |
| Poultry | 1.02 (0.89, 1.17) | 0.811  | 0.965  |
| Fish | 0.95 (0.82, 1.10) | 0.527  | 0.965  |
| **Dairy products** |  |  |  |
| Fresh milk | 1.04 (0.91, 1.18) | 0.575  | 0.965  |
| Milk powder | 1.06 (0.97, 1.15) | 0.217  | 0.965  |
| **Fruit and vegetables** |  |  |  |
| Soy milk | 1.02 (0.91, 1.15) | 0.730  | 0.965  |
| Tofu | 1.02 (0.91, 1.15) | 0.756  | 0.965  |
| Other soy products | 0.91 (0.79, 1.06) | 0.227  | 0.965  |
| Dried soybeans | 0.89 (0.73, 1.09) | 0.270  | 0.965  |
| Other dried beans | 1.00 (0.88, 1.14) | 0.978  | 1.000  |
| Soybean sprouts | 0.99 (0.87, 1.13) | 0.882  | 0.965  |
| Mung bean sprouts | 0.92 (0.79, 1.08) | 0.299  | 0.965  |
| Chinese greens | 0.99 (0.88, 1.12) | 0.860  | 0.965  |
| Spinach | 1.13 (1.03, 1.24) | 0.010  | 0.420  |
| Green cabbage | 0.96 (0.83, 1.11) | 0.551  | 0.965  |
| Chinese cabbage | 1.03 (0.92, 1.14) | 0.628  | 0.965  |
| Cauliflower | 1.05 (0.94, 1.18) | 0.365  | 0.965  |
| Celery | 1.07 (0.96, 1.19) | 0.253  | 0.965  |
| Eggplant | 1.10 (1.00, 1.21) | 0.043  | 0.714  |
| Zizania | 0.94 (0.82, 1.08) | 0.359  | 0.965  |
| Lettuce | 1.01 (0.90, 1.14) | 0.832  | 0.965  |
| Potatoes | 1.04 (0.92, 1.17) | 0.503  | 0.965  |
| Wax gourds | 1.04 (0.93, 1.17) | 0.505  | 0.965  |
| Cucumbers and loofah | 0.96 (0.84, 1.09) | 0.531  | 0.965  |
| Fresh mushrooms | 0.98 (0.85, 1.13) | 0.773  | 0.965  |
| Hot pepper | 1.05 (0.93, 1.18) | 0.412  | 0.965  |
| Tomatoes | 1.04 (0.92, 1.18) | 0.547  | 0.965  |
| Bamboo shoots | 0.96 (0.84, 1.09) | 0.512  | 0.965  |
| Lotus root | 0.80 (0.63, 1.02) | 0.071  | 0.745  |
| Garlic and garlic shoots | 0.89 (0.74, 1.06) | 0.181  | 0.965  |
| Garlic heads | 1.03 (0.94, 1.12) | 0.540  | 0.965  |
| Onions | 0.91 (0.74, 1.13) | 0.398  | 0.965  |
| Chinese chives | 1.03 (0.94, 1.13) | 0.527  | 0.965  |
| Green onions | 0.98 (0.86, 1.12) | 0.791  | 0.965  |
| Carrots | 1.10 (1.02, 1.18) | 0.016  | 0.504  |
| White radish | 0.97 (0.86, 1.11) | 0.695  | 0.965  |
| Sweet potatoes | 1.03 (0.94, 1.13) | 0.581  | 0.965  |
| Young soybeans, peas and broad beans | 1.05 (0.95, 1.17) | 0.326  | 0.965  |
| Cowpeas | 1.01 (0.90, 1.14) | 0.853  | 0.965  |
| Green beans | 0.93 (0.80, 1.08) | 0.343  | 0.965  |
| Snow peas | 0.88 (0.75, 1.04) | 0.133  | 0.965  |
| Dry beans | 1.01 (0.89, 1.14) | 0.870  | 0.965  |
| Fresh beans | 0.99 (0.86, 1.13) | 0.841  | 0.965  |
| Solanaceous vegetables | 1.05 (0.92, 1.19) | 0.477  | 0.965  |
| Leafy vegetables | 1.12 (1.01, 1.24) | 0.037  | 0.714  |
| Stem vegetables | 0.98 (0.86, 1.12) | 0.734  | 0.965  |
| Allium | 0.98 (0.85, 1.12) | 0.744  | 0.965  |
| Cruciferous vegetables | 0.99 (0.88, 1.12) | 0.888  | 0.965  |
| Fruits | 0.87 (0.75, 1.01) | 0.068  | 0.745  |
| Apple | 0.99 (0.87, 1.14) | 0.929  | 0.992  |
| Pear | 0.80 (0.68, 0.93) | 0.004  | 0.252  |
| Orange | 0.89 (0.77, 1.04) | 0.144  | 0.965  |
| Banana | 0.98 (0.85, 1.12) | 0.739  | 0.965  |
| Grape | 0.80 (0.65, 0.99) | 0.038  | 0.714  |
| Watermelon | 0.96 (0.84, 1.10) | 0.582  | 0.965  |
| Peach | 0.88 (0.74, 1.04) | 0.122  | 0.965  |
| Other fruits including strawberries and cantaloupe | 0.83 (0.69, 1.00) | 0.051  | 0.714  |
| **Sugar and confectionery** |  |  |  |
| Candy preserves | 1.07 (0.95, 1.20) | 0.255  | 0.965  |
| Brown and white sugar | 1.02 (0.92, 1.14) | 0.658  | 0.965  |
| **Non-alcoholic beverages** |  |  |  |
| Green tea | 0.93 (0.80, 1.08) | 0.339  | 0.965  |
| **Others** |  |  |  |
| Peanuts | 1.04 (0.95, 1.15) | 0.390  | 0.965  |
| Edible tree fungus | 0.95 (0.81, 1.12) | 0.545  | 0.965  |
| Dried mushrooms | 0.91 (0.76, 1.08) | 0.280  | 0.965  |
| Soybean oil | 0.93 (0.82, 1.06) | 0.300  | 0.965  |
| Peanut oil | 0.87 (0.67, 1.13) | 0.296  | 0.965  |
| Pig oil | 1.01 (0.94, 1.09) | 0.816  | 0.965  |
| **Nutrients** |  |  |  |
| Carbohydrate | 1.01 (0.89, 1.15) | 0.851  | 0.965  |
| Fiber | 0.93 (0.82, 1.06) | 0.277  | 0.965  |
| Protein | 0.94 (0.82, 1.07) | 0.356  | 0.965  |
| Protein from soy | 0.99 (0.88, 1.12) | 0.916  | 0.986  |
| Protein from vegetables | 1.06 (0.95, 1.19) | 0.291  | 0.965  |
| Protein from fruits | 0.89 (0.77, 1.03) | 0.112  | 0.965  |
| Protein from red meat | 0.97 (0.84, 1.11) | 0.626  | 0.965  |
| Fat | 1.02 (0.89, 1.16) | 0.816  | 0.965  |
| Saturated fat | 1.04 (0.91, 1.18) | 0.584  | 0.965  |
| Monounsaturated fat | 1.04 (0.91, 1.18) | 0.585  | 0.965  |
| Polyunsaturated fat | 1.01 (0.89, 1.14) | 0.878  | 0.965  |
| Fat from soy | 0.98 (0.87, 1.10) | 0.717  | 0.965  |
| Fat from vegetables | 1.07 (0.96, 1.19) | 0.214  | 0.965  |
| Fat from fruits | 0.89 (0.77, 1.02) | 0.093  | 0.901  |
| Fat from red meat | 1.01 (0.89, 1.15) | 0.844  | 0.965  |
| Cholesterol | 0.96 (0.84, 1.09) | 0.504  | 0.965  |
| Vitamin A | 1.04 (0.92, 1.18) | 0.492  | 0.965  |
| Carotene | 1.06 (0.94, 1.19) | 0.323  | 0.965  |
| Retinol | 0.97 (0.84, 1.13) | 0.702  | 0.965  |
| Vitamin B1 | 0.91 (0.79, 1.03) | 0.138  | 0.965  |
| Vitamin B2 | 1.01 (0.89, 1.16) | 0.847  | 0.965  |
| Niacin | 0.97 (0.85, 1.11) | 0.700  | 0.965  |
| Vitamin B6 | 0.98 (0.86, 1.11) | 0.713  | 0.965  |
| Folate | 1.00 (0.88, 1.13) | 0.956  | 0.994  |
| Vitamin B12 | 0.97 (0.84, 1.12) | 0.639  | 0.965  |
| Vitamin C | 0.99 (0.87, 1.12) | 0.840  | 0.965  |
| Vitamin D | 1.02 (0.89, 1.17) | 0.760  | 0.965  |
| Vitamin E | 0.93 (0.82, 1.05) | 0.257  | 0.965  |
| Potassium | 0.98 (0.86, 1.11) | 0.731  | 0.965  |
| Sodium | 1.00 (0.88, 1.15) | 0.962  | 0.994  |
| Calcium | 1.03 (0.91, 1.17) | 0.601  | 0.965  |
| Magnesium | 0.96 (0.85, 1.09) | 0.551  | 0.965  |
| Iron | 0.93 (0.82, 1.06) | 0.289  | 0.965  |
| Manganese | 0.92 (0.80, 1.05) | 0.193  | 0.965  |
| Zinc | 0.96 (0.85, 1.10) | 0.573  | 0.965  |
| Copper | 0.88 (0.77, 1.01) | 0.066  | 0.745  |
| Phosphorus | 0.96 (0.84, 1.09) | 0.533  | 0.965  |
| Selenium | 0.92 (0.79, 1.06) | 0.241  | 0.965  |

The models were adjusted for calorie intake (kcal/d, continuous), age (years, continuous), BMI (<18.5, 18.5-24, 24-28, ≥28 kg/m2), physical activity (MET-h/week, continuous), education (elementary school and below, middle school, high school, college and higher), menopause status (no, yes), smoking status (no, yes), alcohol drinking status (no, yes), family history of liver cancer (no, yes), medical history of hepatitis (no, yes) and T2DM (no, yes).

R code

#gc()

setwd("I:/use/DWAS/primary")

library(haven)

female1 <- read\_sas("qiuming\_female.sas7bdat", NULL)

fcancer2016 <- read\_sas("f\_lc2016.sas7bdat", NULL)

fcancerhistory <- read\_sas("ca\_history\_f.sas7bdat", NULL)

fothers <- read\_sas("tjy20220221.sas7bdat", NULL)

fadd <- read\_sas("tjy20221110\_f.sas7bdat", NULL)

library(openxlsx)

fpreg <- read.xlsx("tuojiayi20220221-use.xlsx",sheet=1)

female2 <- merge(female1,fcancer2016,by="SWQ")

female3 <- merge(female2,fcancerhistory,by="SWQ")

female4 <- merge(female3,fothers,by="SWQ")

female5 <- merge(female4,fadd,by="SWQ")

female5.1 <- merge(female5,fpreg,by="SWQ")

female5 <- female5.1

#include variable

dput(names(female5))

table(female5$hysterectomy)

table(female5$ovariectomy)

table(female5$HRT.x)

female5$HRT1 <- NA

female5$HRT1[female5$HRT.x==0] <- 2

female5$HRT1[female5$HRT.x==1 | female5$HRT.x==2] <- 1

table(female5$HRT1)

table(female5$oral.contraceptive)

table(female5$contraceptive.injection)

table(female5$contraceptive.ring)

female5$injective\_contraceptive <- NA

female5$injective\_contraceptive[female5$contraceptive.ring==1|

 female5$contraceptive.injection==1] <- 1

female5$injective\_contraceptive[female5$contraceptive.ring==2&

 female5$contraceptive.injection==2] <- 2

table(female5$injective\_contraceptive)

table(female5$No\_live.x)

female5$No\_live1 <- NA

female5$No\_live1[female5$No\_live.x<=1] <- 1

female5$No\_live1[female5$No\_live.x>=2] <- 2

femalev <- names(female5)%in%c("SWQ","cancer1.y","cancer\_type1.y","cancer\_date1.y",

 "cancer2.y","cancer\_type2.y", "cancer\_date2.y",

 "cancer16.x", "date16.x",

 "Birthday.y", "Date\_intv.x", "Age\_intv.y","last\_fol\_date.x",

 "BMI.x","WHR","education.x", "income.x","Occupation.x","Marriage", "menopaus.x",

 "C1", "C2", "C3", "C4", "C5", "C6", "C7", "C8", "C9",

 "C10", "C11", "C12", "C13", "C14", "C15", "C16", "C17", "C18",

 "C19","MET\_total\_wk.x","K7","HRT",

 "B1A10.x","B1A11.x","B1A6.x", "B1A9.x","B12A5", "B3.x", "B4.x", "B5.x",

 "H5.y", "H5\_1B.y", "H5\_2B.y", "H5\_3B.y", "H5\_4B.y",

 "vv1", "vv2", "vv3", "vv4", "vv5", "vv6", "vv7", "vv8",

 "vv9", "vv10", "vv11", "vv12", "vv13", "vv14", "vv15", "vv16",

 "vv17", "vv18", "vv19", "vv20", "vv21", "vv22", "vv23", "vv24",

 "vv25", "vv26", "vv27", "vv28", "vv29", "vv30", "vv31", "vv32",

 "vv33", "vv34", "vv35", "vv36", "vv37", "vv38", "vv39", "vv40",

 "vv41", "vv42", "vv43", "vv44", "vv45", "vv46", "vv47", "vv48",

 "vv49", "vv50", "vv51", "vv52", "vv53", "vv54", "vv55", "vv56",

 "vv57", "vv58", "vv59", "vv60", "vv61", "vv62", "vv63", "vv64",

 "vv65", "vv66", "vv67", "vv68", "vv69", "vv70", "vv71",

 "J10\_1", "J10\_2", "J10\_3","J10\_4", "J10\_5", "J11",

 "Redmeat","Poultry", "Rice","Soy", "Fish", "Egg", "AllVeg", "Fruit",

 "soy\_milk", "Allium", "Crucifers", "tofu","oil\_tofu", "dry\_bean", "fresh\_bean", "bean\_sprout",

 "Kcal.x","Protein", "protein\_soy", "protein\_veg", "protein\_fruit",

 "protein\_redmeat", "Fat", "fat\_SAT", "fat\_MOUNSAT", "fat\_POUNSAT","fat\_soy", "fat\_veg", "fat\_fruit", "fat\_redmeat",

 "cholesterol","Carbohydrate", "Fiber","VitA", "Carotene", "Retinol",

 "VitB1", "VitB2", "Niacin", "Vb6", "Vb12","folic\_acid",

 "VitC","Vit\_D","VitE","Calcium", "Phosphorus","Potassium", "Sodium", "Magnesium", "Iron",

 "Zinc", "Selenium", "Copper", "Manganese","hysterectomy","ovariectomy","HRT1",

 "oral.contraceptive","injective\_contraceptive","No\_live1")

female6 <- female5[femalev]

table(female6$C15)

#change variables name

dput(names(female6))

library(plyr)

female7 <- plyr::rename(female6,c(B1A6.x="hepatitis",B1A9.x="cholelithiasis",B1A10.x="diabetes",

 B1A11.x="hypertension",B3.x="disease1",B4.x="disease2",

 B5.x="disease3",B12A5="cholecystectomy",C1="EverSmk",

 C6="EverDrk",C13="EverTea",C4="nowSmk",C8="nowDrk",C15="nowTea",

 C9="nowDrk\_times",C10="nowDrk\_type",C11="nowDrk\_dose",

 C16="nowTea\_type",C18="nowTea\_amount",H5.y="family\_cancer\_history",

 H5\_1B.y="first\_person\_type",H5\_2B.y="second\_person\_type",H5\_3B.y="third\_person\_type",

 H5\_4B.y="forth\_person\_type",J10\_1="Vegetable\_oil\_0",

 J10\_2="Soybean\_oil\_0",J10\_3="Peanut\_oil\_0",J10\_4="pig\_oil\_0",

 J10\_5="red\_white\_sugar\_0",J11="family\_number",

 Vb6="USVb6",Vb12="USVb12",Vit\_D="USVd",

 last\_fol\_date.x="last\_fol\_date",education.x="Education1",Kcal.x="Calorie\_intake1",

 income.x="Family\_income1",menopaus.x="Menopausal\_status",Occupation.x="Occupation1",

 BMI.x="BMI1",MET\_total\_wk.x="Physical\_activity1",cancer1.y="cancer1",

 cancer\_type1.y="cancer\_type1",cancer\_date1.y="cancer\_date1",

 cancer2.y="cancer2",cancer\_type2.y="cancer\_type2",

 cancer\_date2.y="cancer\_date2",Birthday.y="Birthday",

 Age\_intv.y="Age\_at\_entry",date16.x="cancer\_date16",

 cancer16.x="cancer16",Date\_intv.x="Date\_intv",K7="OC"))

#calculate variable

female7$cholecystitis <- NA

female7$cholecystitis[female7$disease1==575 |

 female7$disease2==575|

 female7$disease3==575] <- 1

female7$cholecystitis[is.na(female7$cholecystitis)] <- 2

table(female7$cholecystitis)

female7$family\_livercancer <- NA

female7$family\_livercancer[female7$first\_person\_type==155 |

 female7$second\_person\_type==155|

 female7$third\_person\_type==155|

 female7$forth\_person\_type==155] <- 1

female7$family\_livercancer[female7$family\_cancer\_history==8] <- 8

female7$family\_livercancer[is.na(female7$family\_livercancer)] <- 2

table(female7$family\_livercancer)

dput(names(female7))

female7$Vegetable\_oil\_0 <- as.numeric(female7$Vegetable\_oil\_0)

female7$Soybean\_oil\_0 <- as.numeric(female7$Soybean\_oil\_0)

female7$Peanut\_oil\_0 <- as.numeric(female7$Peanut\_oil\_0)

female7$pig\_oil\_0 <- as.numeric(female7$pig\_oil\_0)

female7$red\_white\_sugar\_0 <- as.numeric(female7$red\_white\_sugar\_0)

female7$family\_number <- as.numeric(female7$family\_number)

female7$Vegetable\_oil <- NA

female7$Vegetable\_oil <- female7$Vegetable\_oil\_0\*50/(female7$family\_number\*30)

female7$Soybean\_oil <- NA

female7$Soybean\_oil <- female7$Soybean\_oil\_0\*50/(female7$family\_number\*30)

female7$Peanut\_oil <- NA

female7$Peanut\_oil <- female7$Peanut\_oil\_0\*50/(female7$family\_number\*30)

female7$pig\_oil <- NA

female7$pig\_oil <- female7$pig\_oil\_0\*50/(female7$family\_number\*30)

female7$red\_white\_sugar <- NA

female7$red\_white\_sugar <- female7$red\_white\_sugar\_0\*50/(female7$family\_number\*30)

dput(names(female7))

table(female7$nowDrk\_type)

table(female7$nowTea\_type)

female7$nowDrk\_type <- as.numeric(female7$nowDrk\_type)

female7$nowDrk\_dose <- as.numeric(female7$nowDrk\_dose)

female7$nowDrk\_times <- as.numeric(female7$nowDrk\_times)

female7$nowTea\_type <- as.numeric(female7$nowTea\_type)

female7$nowTea\_amount <- as.numeric(female7$nowTea\_amount)

female7$yellow\_rice\_wine1 <- NA

female7$yellow\_rice\_wine1 <- ifelse(female7$nowDrk\_type==1,female7$nowDrk\_dose\*50\*(female7$nowDrk\_times/7),0)

female7$yellow\_rice\_wine1[is.na(female7$yellow\_rice\_wine1)] <- 0

female7$beer1 <- NA

female7$beer1 <- ifelse(female7$nowDrk\_type==2,female7$nowDrk\_dose\*50\*(female7$nowDrk\_times/7),0)

female7$beer1[is.na(female7$beer1)] <- 0

female7$liquor1 <- NA

female7$liquor1 <- ifelse(female7$nowDrk\_type==3,female7$nowDrk\_dose\*50\*(female7$nowDrk\_times/7),0)

female7$liquor1[is.na(female7$liquor1)] <- 0

female7$grape\_wine1 <- NA

female7$grape\_wine1 <- ifelse(female7$nowDrk\_type==4,female7$nowDrk\_dose\*50\*(female7$nowDrk\_times/7),0)

female7$grape\_wine1[is.na(female7$grape\_wine1)] <- 0

female7$green\_tea1 <- NA

female7$green\_tea1 <- ifelse(female7$nowTea\_type==1,female7$nowTea\_amount\*50/30,

 ifelse(female7$nowTea\_type==5|female7$nowTea\_type==6,

 female7$nowTea\_amount\*50/(30\*2),0))

female7$green\_tea1[is.na(female7$green\_tea1)] <- 0

female7$black\_tea1 <- NA

female7$black\_tea1 <- ifelse(female7$nowTea\_type==2,female7$nowTea\_amount\*50/30,

 ifelse(female7$nowTea\_type==5|female7$nowTea\_type==7,

 female7$nowTea\_amount\*50/(30\*2),0))

female7$black\_tea1[is.na(female7$black\_tea1)] <- 0

female7$oolong\_tea1 <- NA

female7$oolong\_tea1 <- ifelse(female7$nowTea\_type==3,female7$nowTea\_amount\*50/30,0)

female7$oolong\_tea1[is.na(female7$oolong\_tea1)] <- 0

female7$flower\_tea1 <- NA

female7$flower\_tea1 <- ifelse(female7$nowTea\_type==4,female7$nowTea\_amount\*50/30,

 ifelse(female7$nowTea\_type==6|female7$nowTea\_type==7,

 female7$nowTea\_amount\*50/(30\*2),0))

female7$flower\_tea1[is.na(female7$flower\_tea1)] <- 0

table(female7$flower\_tea1)

#variables modify

female7$BMI[female7$BMI1<18.5] <- 1

female7$BMI[female7$BMI1>=18.5 & female7$BMI1<24] <- 2

female7$BMI[female7$BMI1>=24 & female7$BMI1<28] <- 3

female7$BMI[female7$BMI1>=28] <- 4

table(female7$BMI)

table(female7$Education1)

female7$Education <- NA

female7$Education[female7$Education1==1|female7$Education1==2] <- 1

female7$Education[female7$Education1==3] <- 2

female7$Education[female7$Education1==4] <- 3

female7$Education[female7$Education1==5|female7$Education1==6] <- 4

female7$Education[female7$Education1==8] <- 8

table(female7$Education)

table(female7$Family\_income1)

female7$Family\_income <- female7$Family\_income1

table(female7$Family\_income)

table(female7$Occupation1)

female7$Occupation[female7$Occupation1==0] <- 2

female7$Occupation[female7$Occupation1==1] <- 3

female7$Occupation[female7$Occupation1==2] <- 4

female7$Occupation[female7$Occupation1==3] <- 1

table(female7$Occupation)

table(female7$Menopausal\_status)

female7$Menopaus[female7$Menopausal\_status==1] <- 1

female7$Menopaus[female7$Menopausal\_status==0] <- 2

table(female7$Menopaus)

female7$hrt1[female7$HRT==1|female7$HRT==2] <- 1

female7$hrt1[female7$HRT==0] <- 2

female7$hrt[female7$HRT==1|female7$HRT==2] <- 1

female7$hrt[female7$HRT==0] <- 0

table(female7$hrt1)

table(female7$hrt)

table(female7$OC)

female7$Oral\_contraceptive[female7$OC==1] <- 1

female7$Oral\_contraceptive[female7$OC==2] <- 0

female7$Hormone1[female7$hrt==1|female7$Oral\_contraceptive==1] <- 1

female7$Hormone1[female7$hrt==0 & female7$Oral\_contraceptive==0] <- 2

female7$Hormone[female7$hrt==1|female7$Oral\_contraceptive==1] <- 1

female7$Hormone[female7$hrt==0 & female7$Oral\_contraceptive==0] <- 0

table(female7$Hormone1)

table(female7$Hormone)

table(female7$Marriage)

female7$Marital\_status <- NA

female7$Marital\_status[female7$Marriage==1] <- 1

female7$Marital\_status[female7$Marriage==0|female7$Marriage==2|

 female7$Marriage3|female7$Marriage==4] <- 0

table(female7$Marital\_status)

table(female7$EverSmk)

table(female7$nowSmk)

female7$Smoking[female7$EverSmk==1|female7$nowSmk==1] <- 1

female7$Smoking[is.na(female7$Smoking)] <- 0

table(female7$Smoking)

female7$Smoking1[female7$Smoking==1] <- 1

female7$Smoking1[female7$Smoking==0] <- 2

table(female7$Smoking1)

table(female7$EverDrk)

table(female7$nowDrk)

female7$Alcohol\_drinking[female7$EverDrk==1|female7$nowDrk==1] <- 1

female7$Alcohol\_drinking[is.na(female7$Alcohol\_drinking)] <- 0

table(female7$Alcohol\_drinking)

female7$Alcohol\_drinking1[female7$Alcohol\_drinking==1] <- 1

female7$Alcohol\_drinking1[female7$Alcohol\_drinking==0] <- 2

table(female7$Alcohol\_drinking1)

table(female7$EverTea)

table(female7$nowTea)

female7$Tea\_drinking[female7$EverTea==1|female7$nowTea==1] <- 1

female7$Tea\_drinking[is.na(female7$Tea\_drinking)] <- 0

table(female7$Tea\_drinking)

female7$Tea\_drinking1[female7$Tea\_drinking==1] <- 1

female7$Tea\_drinking1[female7$Tea\_drinking==0] <- 2

table(female7$Tea\_drinking1)

table(female7$diabetes)

female7$History\_of\_diabetes[female7$diabetes==1] <- 1

female7$History\_of\_diabetes[female7$diabetes==2] <- 0

table(female7$hypertension)

female7$History\_of\_high\_blood\_pressure[female7$hypertension==1] <- 1

female7$History\_of\_high\_blood\_pressure[female7$hypertension==2] <- 0

table(female7$History\_of\_high\_blood\_pressure)

table(female7$hepatitis)

female7$History\_of\_hepatitis[female7$hepatitis==1] <- 1

female7$History\_of\_hepatitis[female7$hepatitis==2] <- 0

table(female7$History\_of\_hepatitis)

table(female7$cholelithiasis)

female7$History\_of\_cholelithiasis[female7$cholelithiasis==1] <- 1

female7$History\_of\_cholelithiasis[female7$cholelithiasis==2] <- 0

table(female7$History\_of\_cholelithiasis)

table(female7$cholecystectomy)

female7$History\_of\_cholecystectomy[female7$cholecystectomy==1] <- 1

female7$History\_of\_cholecystectomy[female7$cholecystectomy==2] <- 0

table(female7$History\_of\_cholecystectomy)

table(female7$cholecystitis)

female7$History\_of\_cholecystitis[female7$cholecystitis==1] <- 1

female7$History\_of\_cholecystitis[female7$cholecystitis==2] <- 0

table(female7$History\_of\_cholecystitis)

table(female7$family\_livercancer)

female7$Family\_history\_of\_liver\_cancer[female7$family\_livercancer==1] <- 1

female7$Family\_history\_of\_liver\_cancer[female7$family\_livercancer==2] <- 0

female7$Family\_history\_of\_liver\_cancer[female7$family\_livercancer==8] <- 8

table(female7$Family\_history\_of\_liver\_cancer)

#change last year to 2016

library(lubridate)

female8 <- female7

female8$last\_fol\_date1 <- female8$last\_fol\_date

female8$last\_fol\_date<- as.Date(as.character(female8$last\_fol\_date),"%Y%m%d")

female8$last\_fol\_dateyear <- year(female8$last\_fol\_date)

female8$last\_fol\_date2 <- ifelse(female8$last\_fol\_dateyear>2016,"20161231",female8$last\_fol\_date1)

female8$last\_fol\_date3<- as.Date(as.character(female8$last\_fol\_date2),"%Y%m%d")

#delete cancer1=3/7/9/10

femalev1 <- which(female8$cancer1==3)

female8.1 <- female8[-femalev1,]

femalev2 <- which(female8.1$cancer1==7)

female8.2 <- female8.1[-femalev2,]

femalev3 <- which(female8.2$cancer1==8)

female8.3 <- female8.2[-femalev3,]

femalev4 <- which(female8.3$cancer1==9)

female8.4 <- female8.3[-femalev4,]

femalev5 <- which(female8.4$cancer1==10)

female8.5 <- female8.4[-femalev5,]

femalev <- which(female8$cancer1==3|female8$cancer1==7|female8$cancer1==8

 |female8$cancer1==9|female8$cancer1==10)

female9 <- female8[-femalev,]

#determine outcome and date

female9$outcome <- 0

female9$outcome[female9$cancer\_type1==155|female9$cancer\_type2==155|

 female9$cancer16==1] <- 1

table(female9$outcome)

female9.1 <- female9

names(female9.1)

i=1

i=2

i=3

female9.1$cancer\_type1[is.na(female9.1$cancer\_type1)] <- 0

summary(as.factor(female9.1$cancer\_type1))

female9.1$cancer\_type2[is.na(female9.1$cancer\_type2)] <- 0

summary(as.factor(female9.1$cancer\_type2))

female9.1$cancer16[is.na(female9.1$cancer16)] <- 0

summary(as.factor(female9.1$cancer16))

for (i in 1:nrow(female9.1)) {

 if(female9.1[i,"cancer\_type1"]==155){

 female9.1[i,"outcome\_date1"] <- female9.1[i,"cancer\_date1"]

 next

 }

 if(female9.1[i,"cancer\_type2"]==155){

 female9.1[i,"outcome\_date1"] <- female9.1[i,"cancer\_date2"]

 next

 }

 if(female9.1[i,"cancer16"]==1){

 female9.1[i,"outcome\_date1"] <- female9.1[i,"cancer\_date16"]

 next

 }

 female9.1[i,"outcome\_date1"] <- female9.1[i,"last\_fol\_date2"]

}

summary(female9.1$outcome\_date1)

table(female9.1[,c("cancer\_type1","outcome\_date1")])

is.na(female9.1$outcome\_date1)

summary(is.na(female9.1$outcome\_date1))

a <- female9.1[which(female9.1$cancer\_type1==155),c("outcome\_date1","cancer\_date1")]

a <- female9.1[which(female9.1$cancer\_type2==155),c("outcome\_date1","cancer\_date2")]

a <- female9.1[which(female9.1$cancer16==1),c("outcome\_date1","cancer\_date16")]

a <- female9.1[which(female9.1$cancer16!=1 & female9.1$cancer\_type1!=155 & female9.1$cancer\_type2!=155),c("outcome\_date1","last\_fol\_date2")]

fun=function(x){

 return(x[1]==x[2])

}

summary(apply(a,1,fun))

#determine follow up time

female9.1$outcome\_date <- female9.1$outcome\_date1

female9.1$outcome\_date <- as.Date(as.character(female9.1$outcome\_date),"%Y%m%d")

female9.1$startdate<- as.Date(as.character(female9.1$Date\_intv),"%Y%m%d")

library(lubridate)

female9.1$foluptime <- interval(female9.1$startdate,female9.1$outcome\_date)

female9.1$personyear <- time\_length(female9.1$foluptime,'year')

femalev6 <- which(female9.1$personyear<0)

female9.2 <- female9.1[-femalev6,]

dput(names(female9.2))

#energy delete

femalev7 <- which(female9.2$Calorie\_intake1<500|female9.2$Calorie\_intake1>3500)

female9.3 <- female9.2[-femalev7,]

#baseline unknown delete

femalev8 <- which(female9.3$Education1==8|female9.3$family\_livercancer==8)

female9.4 <- female9.3[-femalev8,]

#baseline blank delete

female9.5 <- female9.4

female9.5 <- female9.5[!(is.na(female9.5$BMI1))& !(is.na(female9.5$Family\_income1))

 & !(is.na(female9.5$Menopaus)),]

sapply(names(female9.5),function(x)sum(is.na(female9.5[x])))

#food blank delete

female9.6 <- female9.5

female9.6 <- female9.6[!(is.na(female9.6$vv2))

 & !(is.na(female9.6$vv4))& !(is.na(female9.6$vv13))

 & !(is.na(female9.6$vv14))& !(is.na(female9.6$vv15))

 & !(is.na(female9.6$vv26))& !(is.na(female9.6$vv27))

 & !(is.na(female9.6$vv30))& !(is.na(female9.6$vv32))

 & !(is.na(female9.6$vv33))& !(is.na(female9.6$vv34))

 & !(is.na(female9.6$vv39))& !(is.na(female9.6$vv47))

 & !(is.na(female9.6$vv53))& !(is.na(female9.6$vv65))

 & !(is.na(female9.6$vv66))& !(is.na(female9.6$vv67))

 & !(is.na(female9.6$vv68))& !(is.na(female9.6$vv69))

 & !(is.na(female9.6$vv70))& !(is.na(female9.6$vv71)),]

sapply(names(female9.6),function(x)sum(is.na(female9.6[x])))

#memory.limit()

#memory.limit(1000000)

female10 <- female9.6

sum(female10$personyear)

table(female10$outcome)

#Q4 Physical\_activity and Calorie\_intake

female10$Physical\_activity <- NA

female10$Physical\_activity[female10$Physical\_activity1>quantile(female10$Physical\_activity1,0.75)] <- 4

female10$Physical\_activity[female10$Physical\_activity1>quantile(female10$Physical\_activity1,0.5) & female10$Physical\_activity1<=quantile(female10$Physical\_activity1,0.75)] <- 3

female10$Physical\_activity[female10$Physical\_activity1>quantile(female10$Physical\_activity1,0.25) & female10$Physical\_activity1<=quantile(female10$Physical\_activity1,0.5)] <- 2

female10$Physical\_activity[female10$Physical\_activity1<=quantile(female10$Physical\_activity1,0.25)] <- 1

table(female10$Physical\_activity)

female10$Calorie\_intake <- female10$Calorie\_intake1

#energy residential

dput(names(female10))

e <- c("Protein","Fat", "Carbohydrate", "Fiber","cholesterol", "VitA",

 "Carotene","Retinol", "VitB1", "VitB2", "Niacin", "VitC", "VitE",

 "Potassium","Sodium", "Calcium", "Magnesium", "Iron", "Manganese",

 "Zinc","Copper", "Phosphorus", "Selenium", "folic\_acid", "USVd",

 "USVb6","USVb12", "protein\_soy", "protein\_veg", "protein\_fruit",

 "protein\_redmeat","fat\_soy", "fat\_veg", "fat\_fruit",

 "fat\_redmeat", "fat\_SAT","fat\_MOUNSAT", "fat\_POUNSAT")

i <- which(names(female10) %in% e);i

for (x in i) {

 fit1 <- lm(female10[,x]~Calorie\_intake1,data=female10)

 female10$residual <- residuals(fit1)

 coeff <- summary(fit1)$coefficients

 alpha <- coeff[1,1];alpha

 beta <- coeff[2,1];beta

 energy <- mean(female10$Calorie\_intake1);energy

 g <- paste(names(female10)[x],"adj",sep="\_");g

 female10[,g] <- NA

 female10[,g] <- female10$residual+energy\*beta+alpha

}

e <- c("vv1", "vv2", "vv3", "vv4", "vv5", "vv6",

 "vv7", "vv8", "vv9", "vv10", "vv11", "vv12", "vv13", "vv14",

 "vv15", "vv16", "vv17", "vv18", "vv19", "vv20", "vv21", "vv22",

 "vv23", "vv24", "vv25", "vv26", "vv27", "vv28", "vv29", "vv30",

 "vv31", "vv32", "vv33", "vv34", "vv35", "vv36", "vv37", "vv38",

 "vv39", "vv40", "vv41", "vv42", "vv43", "vv44", "vv45", "vv46",

 "vv47", "vv48", "vv49", "vv50", "vv51", "vv52", "vv53", "vv54",

 "vv55", "vv56", "vv57", "vv58", "vv59", "vv60", "vv61", "vv62",

 "vv63", "vv64", "vv65", "vv66", "vv67", "vv68", "vv69", "vv70",

 "vv71", "Redmeat", "Poultry", "Fish",

 "Cereal","Dry\_bean","Fresh\_bean", "Fruiting\_veg", "Leafy\_veg",

 "Stalk\_veg" , "Fruit", "Allium", "Crucifers","Vegetable\_oil","Soybean\_oil",

 "Peanut\_oil", "pig\_oil", "red\_white\_sugar", "yellow\_rice\_wine1",

 "beer1", "liquor1", "grape\_wine1", "green\_tea1", "black\_tea1",

 "oolong\_tea1", "flower\_tea1", "Protein\_adj", "Fat\_adj", "Carbohydrate\_adj",

 "Fiber\_adj", "cholesterol\_adj", "VitA\_adj", "Carotene\_adj", "Retinol\_adj",

 "VitB1\_adj", "VitB2\_adj", "Niacin\_adj", "VitC\_adj", "VitE\_adj",

 "Potassium\_adj", "Sodium\_adj", "Calcium\_adj", "Magnesium\_adj",

 "Iron\_adj", "Manganese\_adj", "Zinc\_adj", "Copper\_adj", "Phosphorus\_adj",

 "Selenium\_adj", "folic\_acid\_adj", "USVd\_adj", "USVb6\_adj", "USVb12\_adj",

 "protein\_soy\_adj", "protein\_veg\_adj", "protein\_fruit\_adj", "protein\_redmeat\_adj",

 "fat\_soy\_adj", "fat\_veg\_adj", "fat\_fruit\_adj", "fat\_redmeat\_adj",

 "fat\_SAT\_adj", "fat\_MOUNSAT\_adj", "fat\_POUNSAT\_adj")

i <- which(names(female10) %in% e);i

for (x in i) {

 u <- paste(names(female10)[x],"normal",sep="\_");u

 female10[,u] <- NA

 female10[,u] <- scale(female10[,x])

}

e <- c("vv1\_normal",

 "vv2\_normal", "vv3\_normal", "vv4\_normal", "vv5\_normal", "vv6\_normal",

 "vv7\_normal", "vv8\_normal", "vv9\_normal", "vv10\_normal", "vv11\_normal",

 "vv12\_normal", "vv13\_normal", "vv14\_normal", "vv15\_normal", "vv16\_normal",

 "vv17\_normal", "vv18\_normal", "vv19\_normal", "vv20\_normal", "vv21\_normal",

 "vv22\_normal", "vv23\_normal", "vv24\_normal", "vv25\_normal", "vv26\_normal",

 "vv27\_normal", "vv28\_normal", "vv29\_normal", "vv30\_normal", "vv31\_normal",

 "vv32\_normal", "vv33\_normal", "vv34\_normal", "vv35\_normal", "vv36\_normal",

 "vv37\_normal", "vv38\_normal", "vv39\_normal", "vv40\_normal", "vv41\_normal",

 "vv42\_normal", "vv43\_normal", "vv44\_normal", "vv45\_normal", "vv46\_normal",

 "vv47\_normal", "vv48\_normal", "vv49\_normal", "vv50\_normal", "vv51\_normal",

 "vv52\_normal", "vv53\_normal", "vv54\_normal", "vv55\_normal", "vv56\_normal",

 "vv57\_normal", "vv58\_normal", "vv59\_normal", "vv60\_normal", "vv61\_normal",

 "vv62\_normal", "vv63\_normal", "vv64\_normal", "vv65\_normal", "vv66\_normal",

 "vv67\_normal", "vv68\_normal", "vv69\_normal", "vv70\_normal", "vv71\_normal",

 "Redmeat\_normal",

 "Poultry\_normal", "Fish\_normal", "Cereal\_normal",

 "Dry\_bean\_normal","Fresh\_bean\_normal", "Fruiting\_veg\_normal","Leafy\_veg\_normal",

 "Stalk\_veg\_normal" ,

 "Fruit\_normal", "Allium\_normal",

 "Crucifers\_normal",

 "Soybean\_oil\_normal", "Peanut\_oil\_normal",

 "pig\_oil\_normal", "red\_white\_sugar\_normal", "green\_tea1\_normal",

 "Protein\_adj\_normal", "Fat\_adj\_normal", "Carbohydrate\_adj\_normal",

 "Fiber\_adj\_normal", "cholesterol\_adj\_normal", "VitA\_adj\_normal",

 "Carotene\_adj\_normal", "Retinol\_adj\_normal", "VitB1\_adj\_normal",

 "VitB2\_adj\_normal", "Niacin\_adj\_normal", "VitC\_adj\_normal", "VitE\_adj\_normal",

 "Potassium\_adj\_normal", "Sodium\_adj\_normal", "Calcium\_adj\_normal",

 "Magnesium\_adj\_normal", "Iron\_adj\_normal", "Manganese\_adj\_normal",

 "Zinc\_adj\_normal", "Copper\_adj\_normal", "Phosphorus\_adj\_normal",

 "Selenium\_adj\_normal", "folic\_acid\_adj\_normal", "USVd\_adj\_normal",

 "USVb6\_adj\_normal", "USVb12\_adj\_normal", "protein\_soy\_adj\_normal",

 "protein\_veg\_adj\_normal", "protein\_fruit\_adj\_normal", "protein\_redmeat\_adj\_normal",

 "fat\_soy\_adj\_normal", "fat\_veg\_adj\_normal", "fat\_fruit\_adj\_normal",

 "fat\_redmeat\_adj\_normal", "fat\_SAT\_adj\_normal", "fat\_MOUNSAT\_adj\_normal",

 "fat\_POUNSAT\_adj\_normal")

i <- which(names(female10) %in% e);i

#########model cox

ee <- data.frame('exp.coef...confint.'= "-",p="\_",stringsAsFactors=FALSE)

library(survival)

library(tableone)

female10$BMI <- as.factor(female10$BMI)

female10$Physical\_activity <- as.factor(female10$Physical\_activity)

female10$Education <- as.factor(female10$Education)

female10$Family\_income <- as.factor(female10$Family\_income)

female10$Occupation <- as.factor(female10$Occupation)

female10$Menopausal\_status <- as.factor(female10$Menopausal\_status)

female10$Hormone <- as.factor(female10$Hormone)

female10$Smoking <- as.factor(female10$Smoking)

female10$Alcohol\_drinking <- as.factor(female10$Alcohol\_drinking)

female10$Tea\_drinking <- as.factor(female10$Tea\_drinking)

female10$Family\_history\_of\_liver\_cancer <- as.factor(female10$Family\_history\_of\_liver\_cancer)

female10$History\_of\_hepatitis <- as.factor(female10$History\_of\_hepatitis)

female10$History\_of\_cholelithiasis <- as.factor(female10$History\_of\_cholelithiasis)

female10$History\_of\_diabetes <- as.factor(female10$History\_of\_diabetes)

female10$History\_of\_high\_blood\_pressure <- as.factor(female10$History\_of\_high\_blood\_pressure)

for (x in i) {

 cox\_modelww1 <- coxph(Surv(personyear,outcome)~female10[,x]+Calorie\_intake+Age\_at\_entry+

 BMI+Physical\_activity+Education+Menopausal\_status+Smoking+

 Alcohol\_drinking+History\_of\_hepatitis+

 History\_of\_diabetes+Family\_history\_of\_liver\_cancer,

 x=T,y=T,data=female10,method=("breslow"))

 coxww1<-ShowRegTable(cox\_modelww1,

 exp=TRUE,

 digits=2,

 pDigits =3,

 printToggle = TRUE,

 quote=FALSE,

 ciFun=confint)

 print(paste("?????б?????????",names(female10)[x]))

 print(coxww1[1,])

 print("############################################")

 a <- t(data.frame(coxww1[1,]));a

 rownames(a) <- names(female10)[x];rownames(a)

 b1 <- data.frame(a);b1

 ee <- rbind(ee,b1)

}

ee <- data.frame(ee);ee

ee1 <- ee[-1,];ee1

cca <- ee1;cca

names(cca) <- c("HR5","p5")

cca$p5[cca$p5=="<0.001"] <- 0.001;cca

cca$p5 <- as.numeric(cca$p5)

cca$p\_adj5 <- round(p.adjust(cca$p5,method = "fdr"),3);cca

cca5 <- cca[order(cca$p\_adj5,cca$p5),];cca5

write.csv(cca5,"all1\_f\_Cox\_model5.csv")

#all model5

dfm1u$label=ifelse(dfm1u$p\_adj5 < 0.1, as.character(dfm1u$English), '')

p <- ggplot(dfm1u,aes(dfm1u$HR5,-1\*log10(dfm1u$p\_adj5))) +

 geom\_point(aes(color = dfm1u$category)) +

 labs(x="Hazard Ratio",

 y="-log10(q)") +

 scale\_color\_manual(values = c("Alcoholic beverages"="purple",

 "Cereals/cereal products"="yellow",

 "Fruit and vegetables"="green",

 "Dairy products"="blue",

 "Meat, egg, fish"="red",

 "Non-alcoholic beverages"="darkgreen",

 "Sugar and confectionery"="pink",

 "Others"="grey",

 "Nutrients"="orange")) +

 geom\_hline(yintercept=-log10(0.1),linetype=2)+

 geom\_vline(xintercept=1,linetype=2)+

 ylim(0,1.5)+xlim(0.75,1.25)+

 geom\_text\_repel(aes(x = dfm1u$HR5,

 y = -1\*log10(dfm1u$p\_adj5),

 label=dfm1u$label),

 max.overlaps = 1000000000000000,

 size=4,

 box.padding=unit(1.0,'lines'),

 label.padding=unit(1.0,'lines'),

 point.padding=unit(0.1, 'lines'),

 segment.color='black',

 show.legend=FALSE,

 direction = "both")

p <- p + theme(axis.line = element\_line(linetype = "solid"),

 panel.grid.major = element\_line(colour = NA),

 panel.grid.minor = element\_line(colour = NA),

 plot.title = element\_text(hjust = 0.5),

 panel.background = element\_rect(fill = NA),

 legend.key = element\_rect(fill = NA),

 legend.background = element\_rect(fill = NA)) +labs(title = "", colour = NULL)

p

#ggThemeAssistGadget(p)

p <- p + theme(legend.text = element\_text(size = 9),

 legend.position = "bottom", legend.direction = "horizontal") +labs(title = NULL)

p

p <- p + theme(axis.ticks = element\_line(colour = "black"),

 axis.text.x = element\_text(colour = "black"),

 axis.text.y = element\_text(colour = "black"),

 legend.position = "right", legend.direction = "vertical")

p

ggsave(p,filename = "m\_model5.jpeg",width=200,height=150,units = "mm")