

Supplemental Table 1. Part of the food frequency questionnaire of the Golestan Cohort Study that ask about consumption of meat

Question. Over the last 12 months, how often did you eat the following foods?

| Type of food | | Typical portion size | How often | | | | How much | notes |
|-----------------------------------|---------------|--------------------------------|-----------|--------|---------|--------|----------|-------|
| | | | daily | weekly | monthly | yearly | | |
| Chopped red meat (beef or lamb) | | 1 stew piece (30 grams) | | | | | | |
| Ground red meat (beef or lamb) | | | | | | | | |
| Hamburger | | | | | | | | |
| Heart, liver, kidney | | 1 skewer contains 3 pieces | | | | | | |
| Chicken liver, gizzard, and heart | | 43, 17, and 7 grams | | | | | | |
| sausage | | 1 slice | | | | | | |
| Deli meat | | 1 slice | | | | | | |
| Chicken with skin | thigh | 1 piece (small, medium, large) | | | | | | |
| | breast | 1 piece (small, medium, large) | | | | | | |
| | wing | 1 piece (small, medium, large) | | | | | | |
| | neck | 1 piece (small, medium, large) | | | | | | |
| | Whole chicken | 1 piece (small, medium, large) | | | | | | |
| Chicken without skin | thigh | 1 piece (small, medium, large) | | | | | | |
| | breast | 1 piece (small, medium, large) | | | | | | |
| | wing | 1 piece (small, medium, large) | | | | | | |
| | neck | 1 piece (small, medium, large) | | | | | | |
| | Whole chicken | 1 piece (small, medium, large) | | | | | | |
| Tuna fish | | 1 can=200 grams | | | | | | |
| Stellate fish | | 1 piece 12*10*5 cm= 150 grams | | | | | | |
| Sturgeon fish | | 1 piece 12*10*5 cm= 150 grams | | | | | | |
| Carp fish | | 1 piece 12*10*5 cm= 150 grams | | | | | | |
| Smoked fish | | 1 piece 1*18*3 cm= 31 grams | | | | | | |
| Salty fish | | 1 piece 1*18*3 cm= 31 grams | | | | | | |
| Others | | | | | | | | |

Supplemental Table 2. Categorizations of food items in the food frequency questionnaire of the Golestan Cohort Study

| | | | |
|------------------|------------------|--------------|-----------------------------------|
| Total red meat | Unprocessed meat | | Chopped red meat (beef or lamb) |
| | | | Ground red meat (beef or lamb) |
| | | | Hamburger |
| | Organ meat | | Heart, liver, kidney |
| | | | Chicken liver, gizzard, and heart |
| | Processed meat | | sausage |
| Deli meat | | | |
| Total white meat | Chicken | With skin | thigh |
| | | | breast |
| | | | wing |
| | | | neck |
| | | | Whole chicken |
| | | Without skin | thigh |
| | | | breast |
| | | | wing |
| | | | neck |
| | Whole chicken | | |
| | Fish | | Tuna fish |
| | | | Stellate |
| | | | sturgeon |
| | | | Carp |

Supplemental Table 3. Odds ratios (95% CIs) for Non Alcoholic Fatty Liver Disease (NAFLD) plus elevated ALT (defined as ALT>30 in men and ALT>20) in women by quartiles of meat consumption in the Golestan Cohort Study

| | Quartiles of meat consumption | | | | |
|--|-------------------------------|------------------|-------------------------|-------------------------|--------------|
| | Q1 | Q2 | Q3 | Q4 | P trend |
| Total Red meat | | | | | |
| Case/participant, n | 37/178 | 51/244 | 83/315 | 110/374 | |
| Age and sex adjusted OR (95%CI) | 1 | 1.09 (0.67-1.77) | 1.44 (0.92-2.27) | 1.90 (1.22-2.95) | 0.001 |
| Fully adjusted OR (95%CI) ¹ | 1 | 1.11 (0.66-1.88) | 1.64 (1.00-2.70) | 1.93 (1.17-3.17) | 0.003 |
| Unprocessed red meat | | | | | |
| Age and sex adjusted OR (95%CI) | 1 | 1.41 (0.85-2.33) | 1.31 (0.80-2.14) | 1.72 (1.09-2.73) | 0.02 |
| Fully adjusted OR (95%CI) ¹ | 1 | 1.56 (0.90-2.68) | 1.51 (0.88-2.60) | 1.86 (1.10-3.15) | 0.04 |
| Processed meat | | | | | |
| Age and sex adjusted OR (95%CI) | 1 | 1 | 0.91 (0.65-1.28) | 1.18 (0.84-1.64) | 0.24 |
| Fully adjusted OR (95%CI) ¹ | 1 | 1 | 0.94 (0.65-1.35) | 1.09 (0.76-1.57) | 0.48 |
| Organ meat | | | | | |
| Age and sex adjusted OR (95%CI) | 1 | 1.07 (0.74-1.55) | 1.05 (0.71-1.57) | 1.83 (1.22-2.72) | 0.002 |
| Fully adjusted OR (95%CI) ¹ | 1 | 1.06 (0.71-1.57) | 1.05 (0.68-1.60) | 1.73 (1.11-2.71) | 0.007 |
| Total white meat | | | | | |
| Case/participant, n | 64/278 | 68/281 | 68/260 | 81/292 | |
| Age and sex adjusted OR (95%CI) | 1 | 1.09 (0.73-1.62) | 1.23 (0.82-1.83) | 1.28 (0.87-1.88) | 0.20 |
| Fully adjusted OR (95%CI) ¹ | 1 | 1.01 (0.66-1.59) | 1.07 (0.69-1.66) | 1.05 (0.68-1.63) | 0.29 |
| Chicken | | | | | |
| Age and sex adjusted OR (95%CI) | 1 | 1.11 (0.77-1.62) | 1.44 (0.97-2.14) | 1.09 (0.73-1.62) | 0.57 |
| Fully adjusted OR (95%CI) ¹ | 1 | 1.01 (0.68-1.51) | 1.24 (0.80-1.92) | 0.85 (0.54-1.32) | 0.76 |
| Fish | | | | | |
| Age and sex adjusted OR (95%CI) | 1 | 0.79 (0.47-1.32) | 0.55 (0.33-0.91) | 0.82 (0.51-1.31) | 0.60 |
| Fully adjusted OR (95%CI) ¹ | 1 | 0.83 (0.48-1.45) | 0.54 (0.31-0.95) | 0.78 (0.45-1.34) | 0.73 |

¹ Adjusted for age (years), sex (male, female), waist (<88, ≥88 for females and <102, ≥102 for males), formal education (yes, no), smoking status (never, former, current), opium use (never, ever), physical activity (tertile, MET), ethnicity (Turkman, non-Turkman), wealth score (tertile), alcohol drinker (ever, never), total energy intake (kcal/d); In red meat models we also adjusted for white meat consumption (and vice versa), and in each meat subtype model (e.g. organ meat) we adjusted for other subtypes (e.g. processed and unprocessed meat).

Supplemental Table 4. Consumption of food groups (grams/1000 kcal/day) based on quartiles of total red meat intake

| | Red meat | | | |
|---|-----------------|-----------|-----------|-----------|
| | Q1 | Q2 | Q3 | Q4 |
| Consumption of food groups (grams/1000 kcal/day) | | | | |
| Fruits | 68±52 | 95±70 | 97±59 | 110±63 |
| Vegeatbles | 77±50 | 82±51 | 80±42 | 91±47 |
| Legumes and nuts | 9±7 | 9±6 | 9±6 | 10±10 |
| Refine Grains | 204±56 | 193±48 | 182±46 | 178±43 |
| Fiber | 11±2 | 11±2 | 11±2 | 11±2 |
| Fish | 4±8 | 6±12 | 6±8 | 6±8 |